Derbyshire and Derby Minerals Plan

Strategic Transport Assessment (Stage 2)

FINAL

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Quality information

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1. Introduction

1.1 Overview

1.1.1 AECOM has been commissioned by Derbyshire County Council (DCC, on behalf of both DCC and Derby City Council) to conduct a Strategic Transport Assessment (STA) as part of the evidence base to support the development of their emerging Derbyshire and Derby Minerals Local Plan.

1.1.2 The purpose of the STA is to:

- provide evidence to support the development of policies and proposals in the Derbyshire and Derby Minerals Local Plan; and
- assess the impact of the plan's policies and proposals on the transport network.

1.1.3 The STA has been developed in two stages:

- Stage One – Baseline evaluation (to understand the existing highway context in Derbyshire and near existing and proposed sites); and
- Stage Two (i.e. this report) – Assessment of the proposed draft plan's policies upon the strategic transport network, including cumulative assessment.

1.1.4 This report comprises the analysis relating to **Stage Two**.

1.1.5 A Stage One report has already been produced (AECOM, September 2021) which details the policy context; states the assessment methodology adopted for both Stage One and Stage Two; and assesses the baseline conditions associated with each existing and proposed minerals site. The baseline assessment with Stage One considered site access, likely export modes and highway export routes in addition to collision clusters, areas of traffic delay, and the location of Noise Action Planning Areas and Air Quality Management Areas. Consideration was also given to any HGV restrictions, as well as the available rail and waterway network.

1.1.6 This Stage Two report should not be read without consideration of the Stage One findings.

1.2 Existing Sites

1.2.1 The existing minerals sites located within the Plan area are shown in Figure 1.1 and are as follows:

- AD – Ashwood Dale;
- BE – Ball Eye Quarry (non-operational);
- BM – Bolsover Moor (non-operational);
- BO – Bone Mill;
- BR – Brassington Moor;
- BL – Brierlow;
- DE – Dene;
- DH – Dove Holes;
- DO – Dowlow;

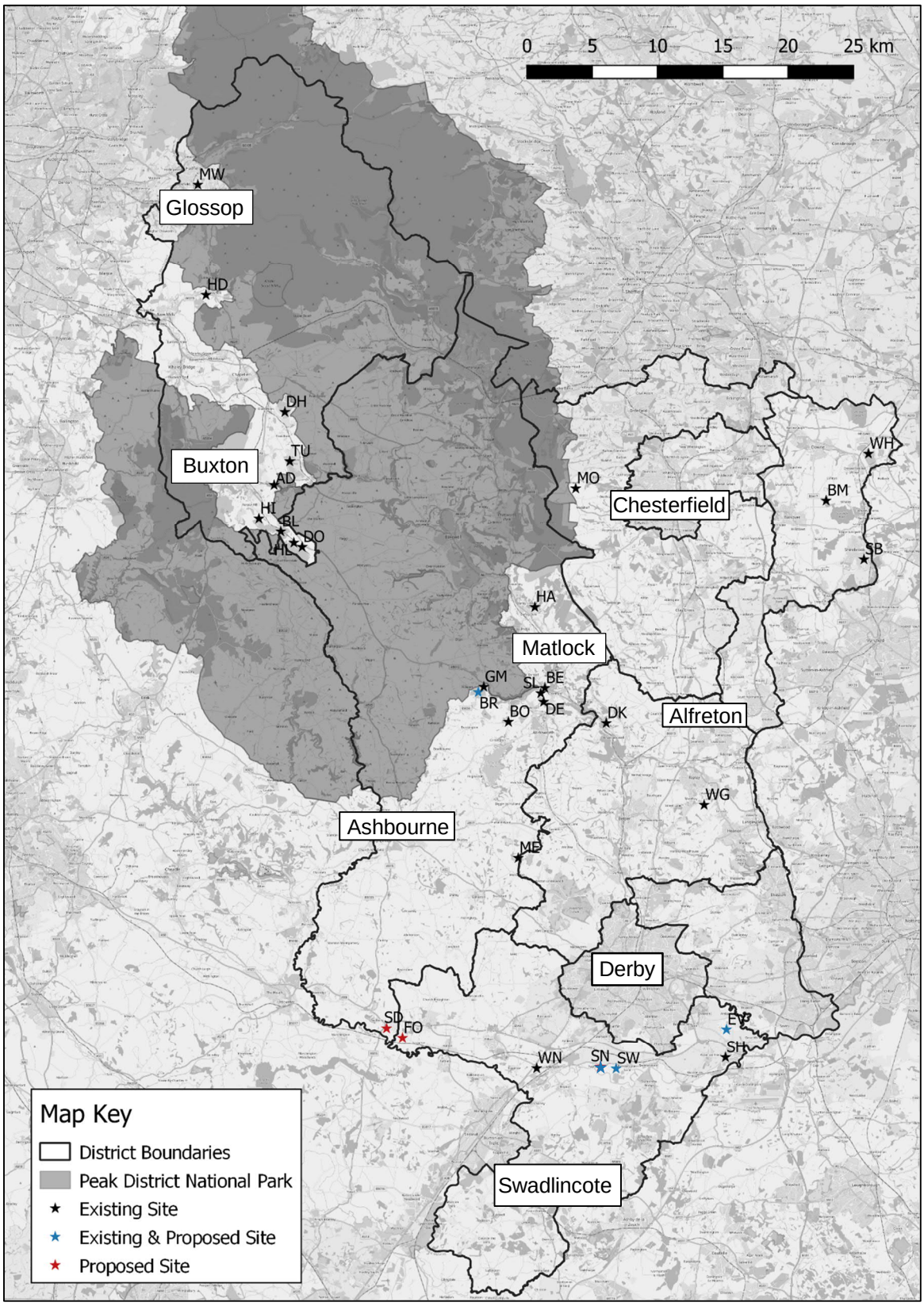
- DK – Dukes Quarry;
- EV – Elvaston (non-operational);
- GM – Grange Mill;
- HA – Hall Dale (non-operational);
- HD – Hayfield;
- HI – Hillhead;
- HL – Hindlow;
- ME – Mercaston;
- MO – Moorhay Farm;
- MW – Mouselow;
- SH – Shardlow;
- SB – Shirebrook;
- SL – Slinter Top;
- SW – Swarkestone;
- TU – Tunstead;
- WG – Waingroves;
- WH – Whitwell;
- WN – Willington;

1.2.2 Figure 1.1 also shows the proposed new minerals sites identified in the replacement Derbyshire and Derby Minerals Local Plan, which are:

- BR - Brassington Moor / Aldwark South (Extension to existing site);
- SW - Swarkestone South (Extension to existing Swarkestone Site);
- SN - Swarkestone North (extension to existing Swarkestone Site to follow on after Swarkestone South);
- EV - Elvaston (Extension to existing site);
- FO – Foston (New site, replaces Shardlow); and
- SD – Sudbury (New site, replaces Willington).

1.2.3 It should be noted that some of the proposed minerals sites are at existing minerals sites (i.e. extensions to the existing site). Existing sites also identified as proposed minerals site are therefore located in Figure 1.1.

Figure 1.1: Location of existing and proposed Derbyshire / Derby Minerals Sites



1.3 Key Findings of Stage One

1.3.1 The Stage One report examined the existing and proposed sites based upon their location, site accesses, likely export modes and likely export routes taking into account collision clusters, areas of traffic delay, and the location of Noise Action Planning Areas and Air Quality Management Areas. Consideration was also given to any HGV restrictions, as well as the available rail and waterway network.

1.3.2 The report went on to produce an evaluation matrix which assessed the type of site and location, access, export mode, export route (vehicular) and nearby sensitive receptors. These tables are reproduced in Table 1.1 and 1.2 respectively, and can be used to provide a tabulated assessment of all sites and to highlight any potential issues that may require mitigation.

Table 1.1: Matrix of assessment criteria impacts – Existing sites

	Assessment Criteria (See Table 3.1)						
	Type of Site	Access	Export Mode	Export Route (Vehicular)	Sensitive Receptors	Duration of Operations *(Multiplier)*	Existing Mitigation
Ashwood Dale (AD)							None
Ball Eye (BE)							None
Bolsover Moor (BM)							Weight limits
Bone Mill (BO)							Weight limits
Brassington Moor (BR)							S106 & weight limits
Brierlow (BL)							None
Dene (DE)							S106 & routing agreement
Dove Holes (DH)							Rail connected
Dowlow (DO)							Rail connected
Dukes Quarry (DK)							S106 routing agreement & avoiding school times
Elvaston (EV)							None
Grange Mill (GM)							Weight limits
Hall Dale (HA)							Routing agreement & tonnage limits
Hayfield (HD)							Tonnage limits
Hillhead (HI)							Potential rail connection
Hindlow (HL)							Potential rail connection
Mercaston (ME)							None
Moorhay (MO)							Routing agreement

Mouselow (MW)							Routing agreement
Shardlow (SH)							Alternative access arrangements in times of flood
Shirebrook (SB)							
Slinter Top (SL)							Vehicle limits
Swarkestone (SW)							None
Tunstead (TU)							Rail connected
Waingroves (WG)							None
Whitwell (WH)							S106 routing agreement
Willington (WN)							None

Table 1.2: Matrix of assessment criteria impacts – Proposed sites

	Assessment Criteria (See Table 3.1)						
	Type of Site	Access	Export Mode	Export Route (Vehicular)	Sensitive Receptors	Duration of Operations *(Multiplier)*	Potential Mitigation
Brassington Moor (BR)							S106 & weight limits
Elvaston (EV)							None
Foston (FO)							TBC
Sudbury (SD)							TBC
Swarkestone North (SN)							TBC
Swarkestone South (SW)							None

1.3.3 The Stage One report concluded that the majority of existing minerals sites are either situated within a good location in terms of transport connectivity, or have appropriate planning controls to govern HGV movements to / from the site. All proposed minerals sites are located within a good location in terms of transport access.

1.4 Structure of Report

1.4.1 This Stage Two report is arranged such that:

- **Section 2** provides an overview of the draft transport-related policies of the Derbyshire and Derby Minerals Local Plan.
- **Section 3** examines the cumulative transport impacts associated with the existing and proposed mineral sites.
- **Section 4** considers the transport impact of sites in terms of their carbon emissions.
- **Section 5** presents an overall summary and conclusions.

2. Draft Policy Review

2.1 Overview

2.1.1 The purpose of this section is to consider the draft policies of the Derbyshire and Derby Minerals Local Plan in so far as they relate to transport matters.

2.2 Draft Policies

2.2.1 The most pertinent draft policies are re-produced below. Where the policies are lengthy and relate to a variety of matters, only the specific points associated with transport are re-produced here.

SP1 SUSTAINABLE MINERALS DEVELOPMENT
Proposals for mineral development and mineral related development will be supported where they contribute towards achieving the economic, social and environmental objectives of sustainable development and where applicable, they:

8) minimise any adverse impacts from the road based transport of minerals, including emissions, and maximise the use of more sustainable transport modes including rail, water, conveyor and pipeline.

17) reduce impacts on the causes of climate change including reducing carbon emissions, and facilitate adaptation to increase resilience to climate change including the risk of flooding.

SP2 CLIMATE CHANGE
Proposals for mineral development and mineral related development will be supported where, taking into account the lifetime of the development (including restoration and aftercare), they incorporate measures to minimise and offset greenhouse gas emissions (mitigation) and effectively assist in the reduction of vulnerability from and increase resilience to, the future impacts of climate change (adaptation), through:

3) Using sustainable transport modes and low carbon emission vehicles to extract and transport the mineral to market;

POLICY DM1: PROTECTING LOCAL AMENITY, HEALTH AND WELL-BEING
Proposals for minerals development and minerals related development will be supported where it can be demonstrated that there will be no unacceptable impacts to local amenity, health, well-being and safety arising as a result of:

- Noise;
- Dust;
- Blast vibration and air over pressure;
- Emissions to air;
- Ground contamination;
- Land instability;
- Visual intrusion to adjoining land uses and users;
- Light pollution; or
- Transport.

Where appropriate, separation distances between a development and other land uses may be applied.

All proposals for minerals development and minerals related development will be expected to be accompanied by information sufficient to understand the impacts of the development on local amenity.

POLICY DM2: CRITERIA FOR ASSESSING THE BENEFITS OF MINERALS DEVELOPMENT PROPOSALS

1) With the exception of development proposals involving coal extraction, the MPA will give great weight to the benefits of minerals extraction.

2) In assessing the benefits of all proposals for minerals development, including coal extraction, consideration will be given to the following matters:

g) The extent to which the proposal assists in reducing greenhouse gas emissions through the use of sustainable technologies, climate change adaptation and mitigation measures (during both the operational and restoration phases), carbon offsetting or other appropriate mechanism;

i) The use of rail transport, water transport, conveyors and pipelines where these methods are used instead of road transport;

POLICY DM3: TRANSPORT OF MINERALS

All proposals for minerals development and minerals related development should seek to maximise sustainable modes of transport, including rail, barge, conveyor and pipeline.

Proposals for new minerals development and minerals related development utilising road transport will only be supported where it can be demonstrated that:

1) Road transport is the only practicable or environmentally preferable alternative;

2) Proposed access arrangements would not have any significant adverse impacts on highway safety, air quality including carbon emissions, local and residential amenity, the environment or the effective operation of the highway network; and

3) The highway network is of an appropriate standard for use by the traffic generated by the development or can be suitably improved.

Where proposals involve the transport of minerals by road, they will be expected to provide details, proportionate to the scale of the development, of proposed climate change adaptation and mitigation measures required to reduce or offset carbon emissions generated by traffic movements associated with the proposal.

In order to ensure these requirements are met and maintained, developments may be subject to the completion of appropriate planning obligations relating to signage, traffic routing, any necessary improvements to the highway or climate change adaptation and mitigation measures where these cannot be secured by planning condition.

POLICY SP19: SAFEGUARDING MINERALS RELATED INFRASTRUCTURE

Existing, planned and potential rail heads, rail links to quarries, sites for concrete batching and processing and distribution of recycled and secondary aggregate within quarries are safeguarded to ensure that they are taken into account when other forms of development are planned in or around the facility.

Should the facility be removed during the course of the Plan period or it can be proved that is no longer required, this will be taken into account when considering a proposal on or in the vicinity of the facility.

2.3 Assessment of Policies

2.3.1 As noted in the methodology for Stage One, the key issues in relation to HGV movements to and from minerals sites are usually taken as being:

- a safe form of access;
- suitable routes (geometric, safety, sensitive receptors) to and from the site; and
- encouragement of sustainable modes of export, such as rail or canal.

2.3.2 Matters relating to access and routeing are dealt with in draft Policy DM3 (Transport of Minerals). These are standard requirements and no changes to the draft wording are recommended.

2.3.3 In terms of transport sustainability, staff trips to and from work have traditionally been seen as less important for minerals sites than other forms of development (such as housing, office or retail etc), largely due to the nature of these sites meaning that they are often located away from core walking, cycling and public transport networks. Shift times also tends to discourage use of public transport by staff.

2.3.4 Notwithstanding this, there is now a much greater emphasis on carbon reduction across all policy areas, with the UK government adopting a Net Zero commitment by 2050. The draft Plan text recognises this by stating:

"Another major contribution to emissions from the minerals industry is transport, from vehicles used on site in the extraction process and off site, for transporting the mineral to the market. Despite comprising only 5% of UK road vehicles, heavy goods vehicles (HGVs) produce 17% of greenhouse gas emissions from the surface transport sector. The use of more sustainable modes of transport such as pipeline, conveyor, rail and water along with low carbon emission vehicles and fuels, such as hydrogen, would assist in reducing carbon emissions together with more efficient transport planning and logistics. Currently it is only the limestone quarries that are long-life (2042) and have large scale production (between 3 to 6 mtpa) which transport mineral by rail. Three limestone quarries are currently rail linked and a further two quarries that are resuming production intend to transport mineral by rail. On average approximately 50% of material is transported by rail."

2.3.5 Potential additions to the draft text could include:

- encouragement of sustainable haulage practices, such as:
  - promotion of the Fleet Operator Recognition Scheme (FORS), or equivalent;
  - encouragement of back-hauling, where practical, where practical to minimise the number of HGVs on the network. This is most common where there is some infill for restoration activities so HGVs both arrive and depart fully loaded;
  - liaison with local authority and regional partners (e.g. Midland Connect) in relation to the development, adoption and promotion of low emission HGV fuel choices (e.g. hydrogen and electric) and infrastructure as the technology develops.
- encouragement of sustainable staff trips, by:
  - requiring secure & covered cycle parking and e-bike charging
  - providing electric vehicle (EV) charging points; and
  - encouragement of car share schemes.

FORS is a voluntary accreditation scheme for fleet operators which aims to raise the level of quality within fleet operations, and to demonstrate which operators are achieving exemplary levels of best practice in safety, efficiency, and environmental protection.

FORS encourages operators to take a closer look at their operation and identify areas of strength to be exploited and areas for improvement to be addressed. The four key areas examined are management, vehicles, drivers and operations.

Operators can be accredited to Bronze, Silver and Gold standard. A successful Bronze audit provides an operator with reassurance that their operation is being run safely, efficiently and in an environmentally sound manner. The FORS logo allows potential customers to readily distinguish FORS operators from other operators.

Data from FORS shows both safety and environmental improvements for fleet operators joining the scheme. e.g. in 2019, FORS Gold accredited members showed a 12% improvement in fuel usage, 14% reduction in CO2, 32% reduction in incidents reported and 49% reduction in the number of PCNs received.

3. Cumulative Impact

3.1 Overview

3.1.1 The purpose of this chapter is to assess the potential traffic and highways impact of the existing and proposed sites. It considers potential impact locations, cumulative HGV movements, mineral site delivery schedules and finally assesses the cumulative impacts in terms of their impacts on the highway network.

3.2 Cumulative Impact Locations

3.2.1 The highway impacts of the HGV movements from all sites can be examined based upon assumed export vehicle sizes and operational hours of the sites. It has been assumed that all vehicles will be capable of carrying 20T loads from all sites (with an average 20T used for robustness, and to align with the analysis conducted within Stage One) and that all sites would export materials over a 10-hour period during the day. Cumulative impacts will be most important where several sites are in close proximity and the haul routes could reasonably be expected to be shared by the proposed sites.

3.2.2 Three areas have been identified where there are sites in close proximity to each other as shown in Table 3.1 below. Figure 3.1 locates these areas, whilst sub-maps are provided for each area (Figures 3.2, 3.3 and 3.4) to show these areas in more detail.

3.2.3 Sites within Area 3 (Figure 3.4) are not necessarily within close proximity; however, all sites are expected to utilise the same highway network (the A50) and therefore have been included to consider cumulative impacts.

Table 3.1: Sub maps showing sites within close proximity

Map	Site IDs						
Area 1	DH	TU	AD	HI	BL	DO	HL
Area 2	BR	GM	BO	SL	DE	BE	DK
Area 3	SD	FO	WN	SN	SW	SH	EV

Figure 3.1: Potential Areas of Cumulative Impacts

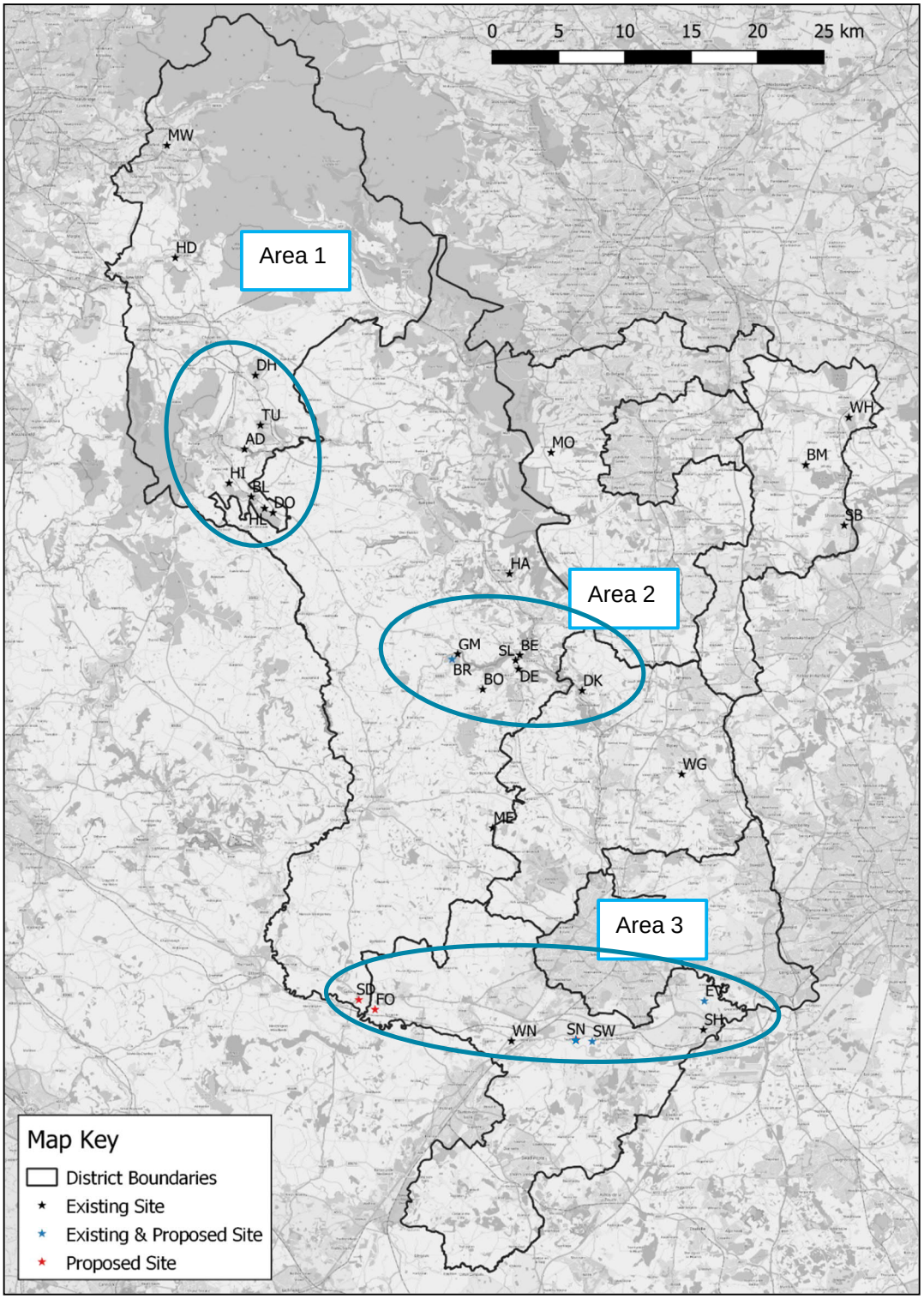


Figure 3.2: Cumulative Impact Area 1

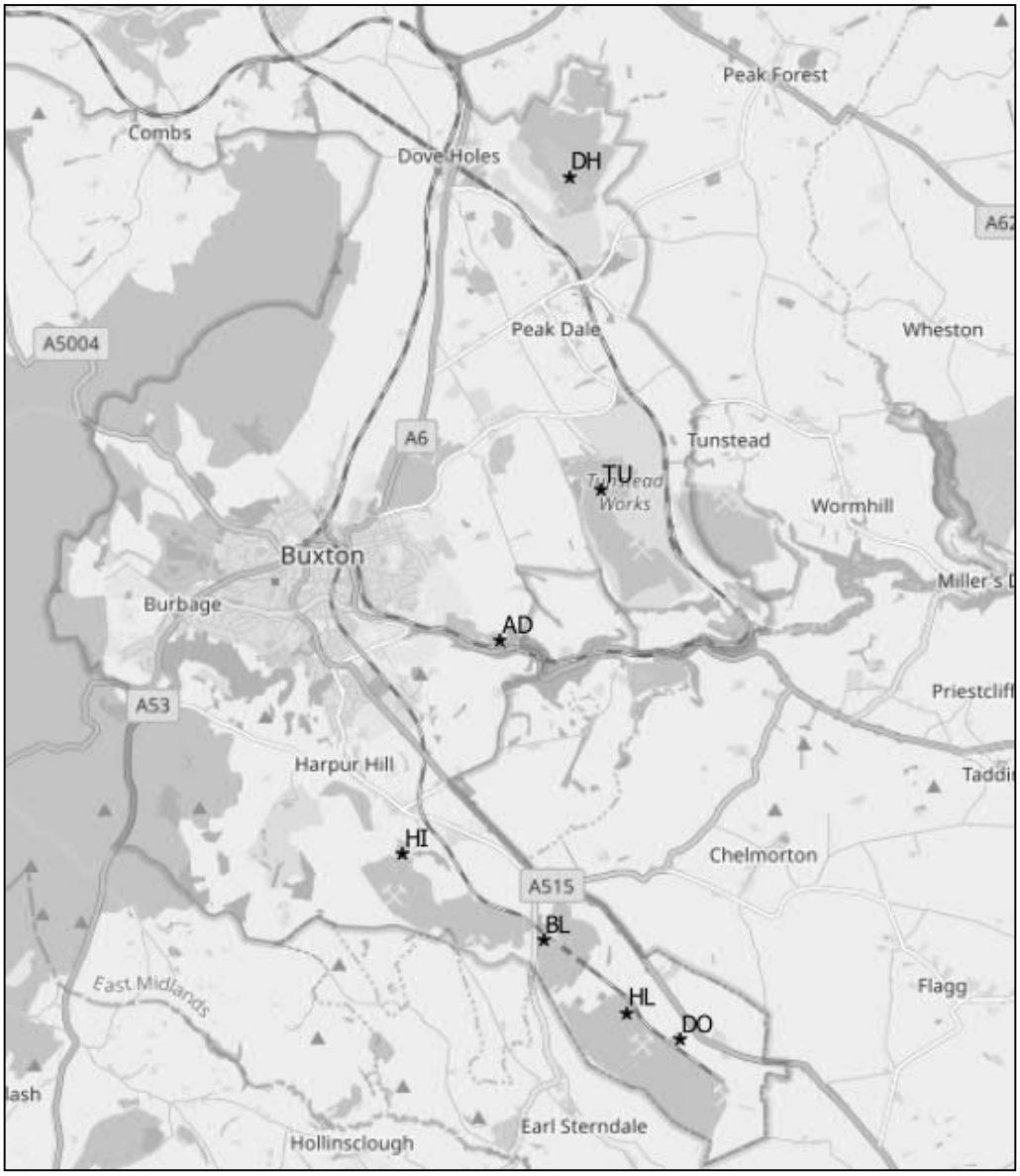
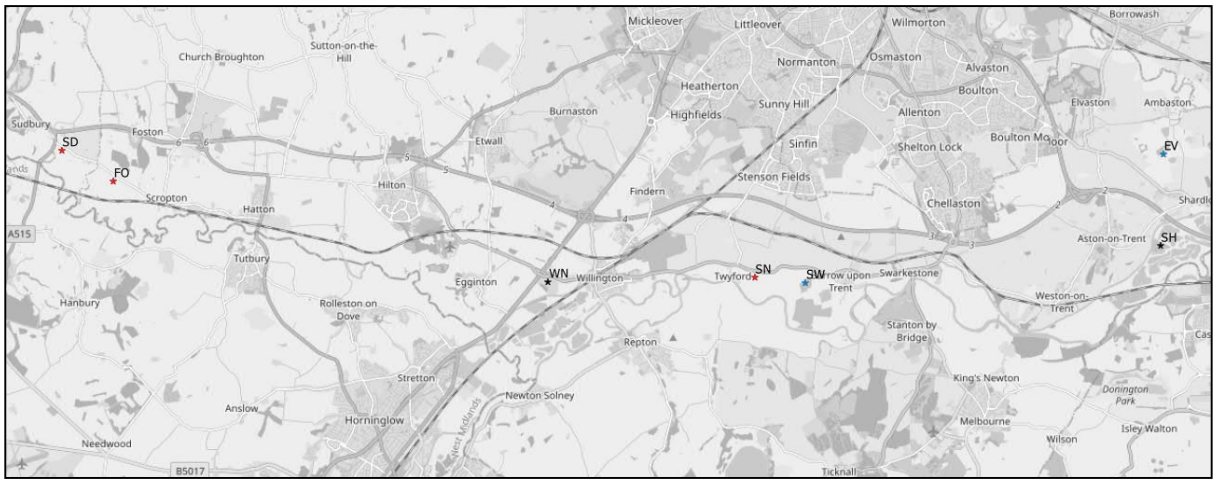


Figure 3.3: Cumulative Impact Area 2

Figure 3.4: Cumulative Impact Area 3



3.2.4 The daily two-way HGV flows at peak operation (i.e. the loaded and subsequent return journey over 10 hours) at each of the proposed Minerals Plan extraction sites are presented below for each of the inset maps. Sites that are currently non-operational and have no future plans to become operational and for which it is difficult to estimate when they are likely to become operational over the Plan period have been represented with '0' HGV movements within Figure 3.5 – 3.7.

3.2.5 Elvaston, which is currently non-operational, but for which DCC have an anticipated date for the site to become operational, has been included.

Figure 3.5: Daily two-way HGV movements (peak operation) – Area 1

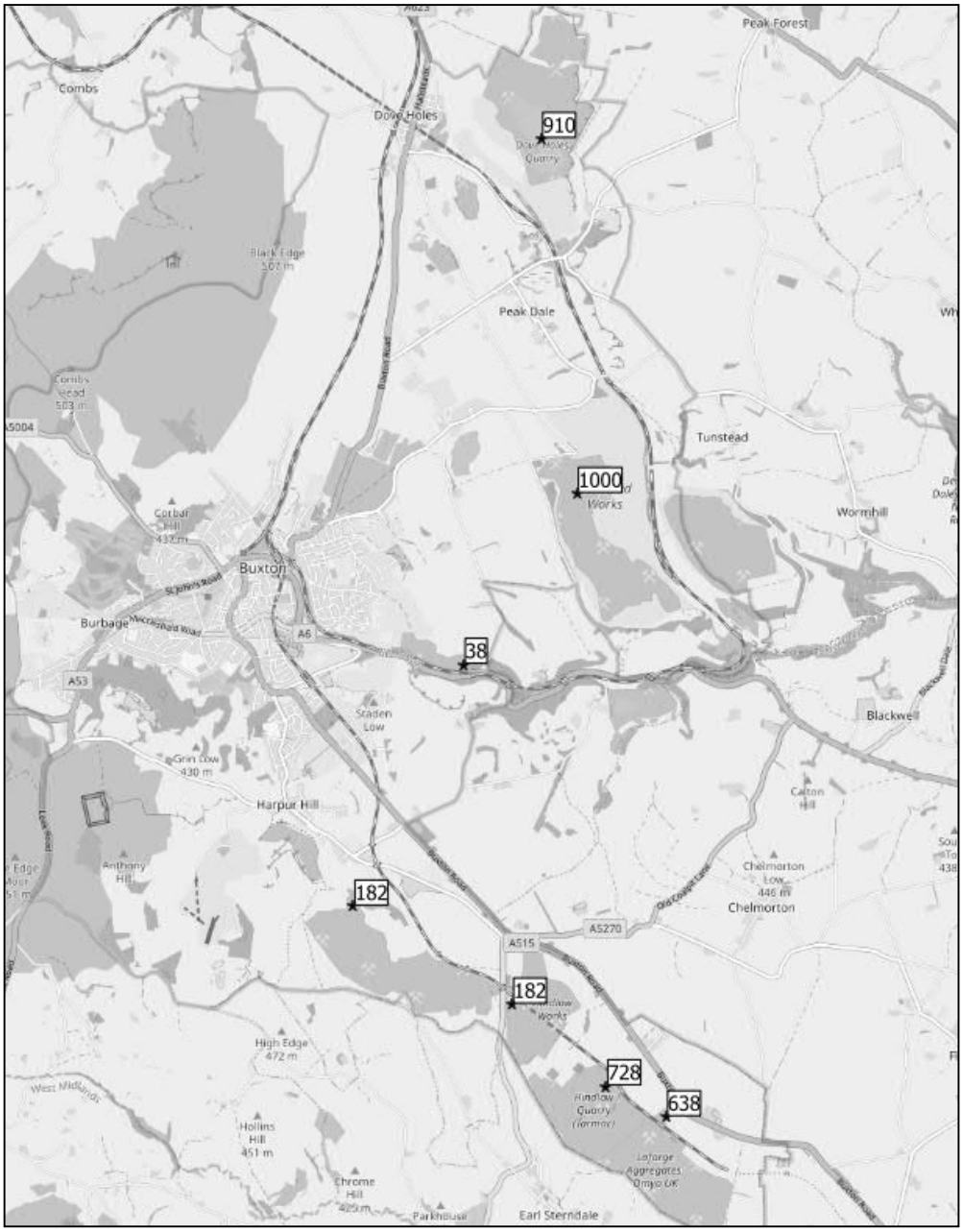


Figure 3.6: Daily two-way HGV movements (peak operation) – Area 2

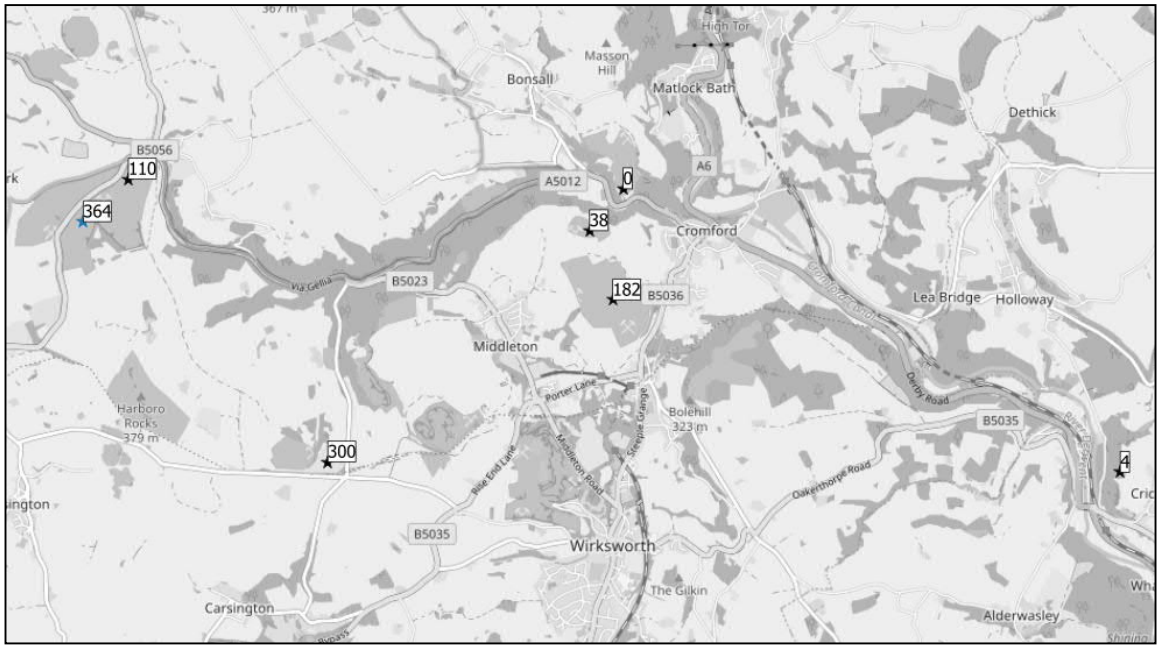


Figure 3.7: Daily two-way HGV movements (peak operation) – Area 3

3.2.6 The Derbyshire and Derby Minerals Plan is designed to provide a market led supply of a range of minerals over the whole life of the plan, up to the year 2038, for the local market. To achieve this, each of the Minerals Plan sites would become operational at different points in the future and, given the fixed amounts of suitable material available at each site and possible rates of extraction, they will be operational for a different number of years. As a result of this, the cumulative impacts of the workings of the Minerals Plan sites will not occur all at once and will instead be spread throughout the Plan period.

3.2.7 Where the cluster sites occur (Area 1, Area 2, and Area 3 above) there will be localised peaks in mineral output and therefore the cumulative traffic impacts from these sites will need to be assessed for the key years where maximum trip generations are likely to occur.

3.2.8 Table 3.2 shows the delivery schedule for each of the three map areas, with each cell shaded according to the type of exported material. It should be noted that some minerals operations extend beyond the end of the Minerals Local plan period (2038+), but that the delivery schedule only shows to the end of the Plan period (2038).

Table 3.2: Delivery Schedule

Map Area	Site	Highest Annual Output ('000 tpa)	Year (20XX)																
			22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
1	DH	2,500																	
	TU	2,750																	
	AD	100																	
	HI	500																	
	BL	500																	
	DO	1,750																	
	HL	2,000																	
2	BR	1,000																	
	GM	300																	
	BO	825																	
	SL	100 (non-operational beyond 2021)																	
	DE	500																	
	BE	Non-operational																	
	DK	10																	
3	SD	250																	
	FO	400																	
	WN (Existing)	350 (non operational beyond 2022)																	
	WN (Extension)	350																	
	SW (existing)	320																	
	SW (extension)	320																	
	SN	320																	
	SH	350																	
	EV (Existing)	300																	
	EV (Extension)	300																	

Carboniferous Limestone = Grey. Sandstone = Blue. Sand & Gravel = Orange

3.2.9 All mineral sites within the Area 1 cluster are anticipated to be working throughout the Plan period and therefore there is no peak operation.

3.2.10 Mineral sites in the Area 2 and Area 3 clusters are more varied in terms of operation. The peak period of operation (i.e. the years where most sites are operating) for the Area 2 cluster is likely to be between 2022 - 2026 (when Brassington Moor, Grangemill, Bone Mill, Dene Quarry and Dukes Quarry are expected to be operating).

3.2.11 The peak period of operation for the Area 3 cluster is likely to be between 2028 and 2037. For the purpose of analysis, the year 2030 has been taken as the peak year when Sudbury, Foston, Swarkestone (SW extension) and Elvaston are expected to be operating.

3.3 Cumulative Assessment

3.3.1 Figure 3.8 and Tables 3.3 (daily HGV movements) and 3.4 (hourly HGV movements) show the cumulative traffic impact assessment for clusters in Area 1, whilst Figures 3.9 and 3.10 and Tables 3.5 – 3.8 show the cumulative traffic impact assessment for the clusters in Area 2 and Area 3, respectively. Where operations are varied (i.e. in Area 2 and 3) all cumulative

traffic impacts have been considered at their peak operating years (i.e. 2022 - 2026 and 2028 - 2037, respectively). This represents a robust assessment of cumulative impacts.

3.3.2 Online mapping software has been used (in combination with the Derbyshire Freight Map and any existing HGV restrictions) to ascertain likely HGV routing. Where multiple routes are available (i.e. HGVs could route north or south) an even split has been assumed (e.g. 50% are assumed to route north and 50% south).

3.3.3 Traffic associated with mineral sites within the PDNPA boundary has not been considered within this section since most sites produce a negligible number of HGV movement per hour, and for larger sites (such as Ballidon) vehicles are likely to be distributed across the network prior to passing through any of the three cluster map areas.

3.3.4 To assess the impact of minerals traffic upon the highway network, the HGV movements in Tables 3.3 – 3.8 have been compared to AADT data available within the C2 database (which uses data from DCiC and DCC Manual Classified Counts (MCCs) and Automatic Traffic Counts (ATCs)). For roads managed by National Highways (Highways England), AADT data has been obtained from the Department for Transport's Road Safety Statistics database.

3.3.5 Owing to the on-going COVID19 pandemic, AADT data from 2019 has been used (since traffic levels in 2020 and 2021 are notably lower owing to several 'lockdowns' and advice to stay at home). This presents a robust assessment of traffic impact.

Figure 7.8: Two-way daily HGV movements – Area 1

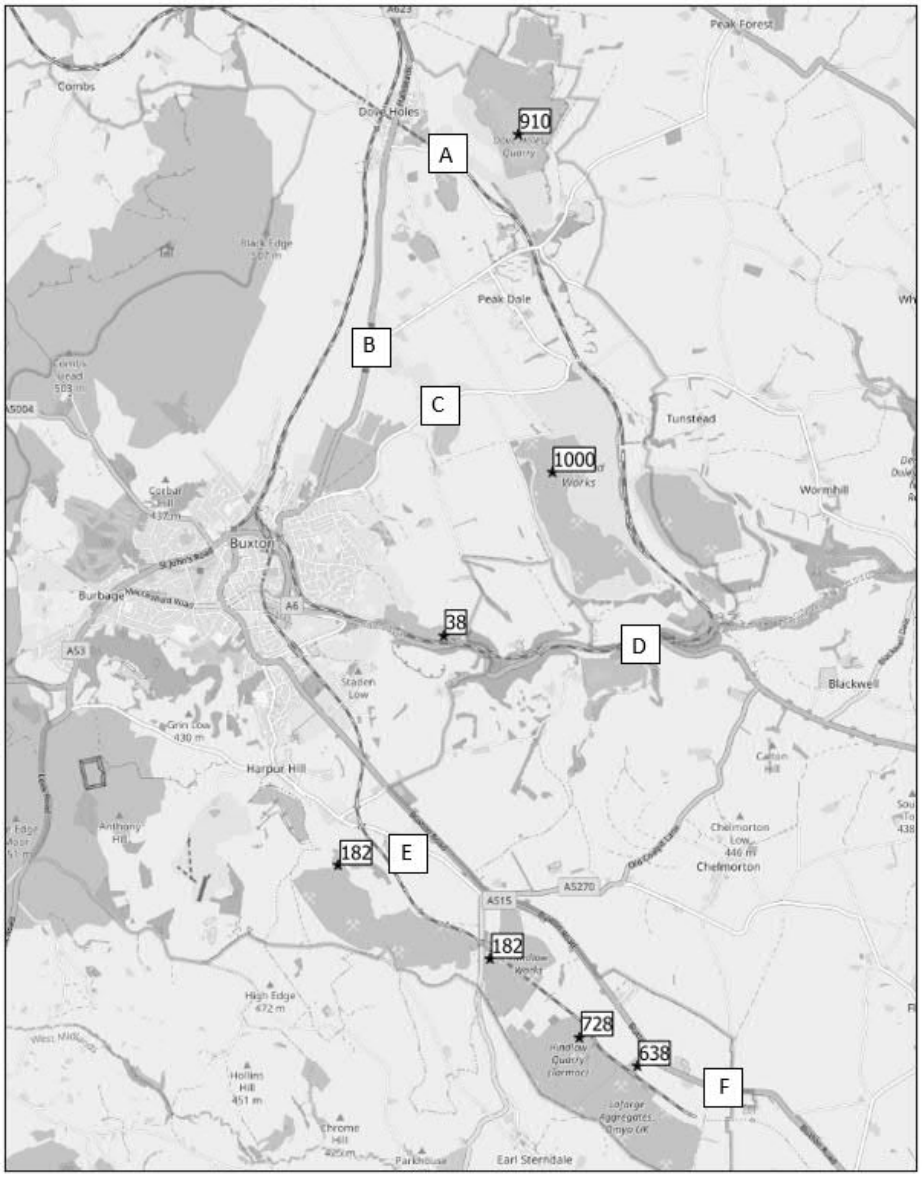


Table 7.3: Two-way daily HGV movements – Area 1 cumulative impacts

ID	Route	Daily HGV movements (vehicles)		
		Northbound / Eastbound	Southbound / westbound	**Two-way**
A	Dale Road	455	455	**910**
B	A6 (Fairfield)	699	699	**1,397**
C	Waterswallows Road	500	500	**1,000**
D	A6 (Blackwell Mill)	465	465	**929**
E	Burlow Road	91	91	**182**
F	A515 (Hurdlow)	676	676	**1,352**

Table 7.4: Two-way hourly HGV movements – Area 1 cumulative impacts

ID	Route	Hourly HGV movements (vehicles (PCUs))		
		Northbound / Eastbound	Southbound / westbound	**Two-way**
A	Dale Road	46	46	**91**
B	A6 (Fairfield)	70	70	**140**
C	Waterswallows Road	50	50	**100**
D	A6 (Blackwell Mill)	46	46	**93**
E	Burlow Road	9	9	**18**
F	A515 (Hurdlow)	68	68	**135**

3.3.6 The greatest level of HGV movements occurs on the A515 and on the A6 (to the north of Buxton). Traffic data from the A515 (near Harpur Hill) indicates a 2019 AADT value of 7,868. HGVs produced by Derbyshire minerals sites therefore comprises approximately 17.2% of vehicle movements on this section of the A515. The DMRB states that a road of its nature is able to accommodate approximately 13,000 vehicles per day. Traffic movements on the A515 therefore lies well below the DMRB figure, even with this concentration of HGVs.

3.3.7 AADT data is also available on the A6 to the east of Buxton, and on the A6 to the north of Buxton. The 2019 AADT values are 5,146 and 13,660, respectively. HGV movements associated with the Derbyshire minerals sites comprise approximately 18.1% of movements on the A6 (north of Buxton) and 10.2% of movements on the A6 (south of Buxton).

3.3.8 No AADT data is available for Dale Road, Waterswallows Road or Burlow Road.

Figure 3.9: Two-way daily HGV movements – Area 2

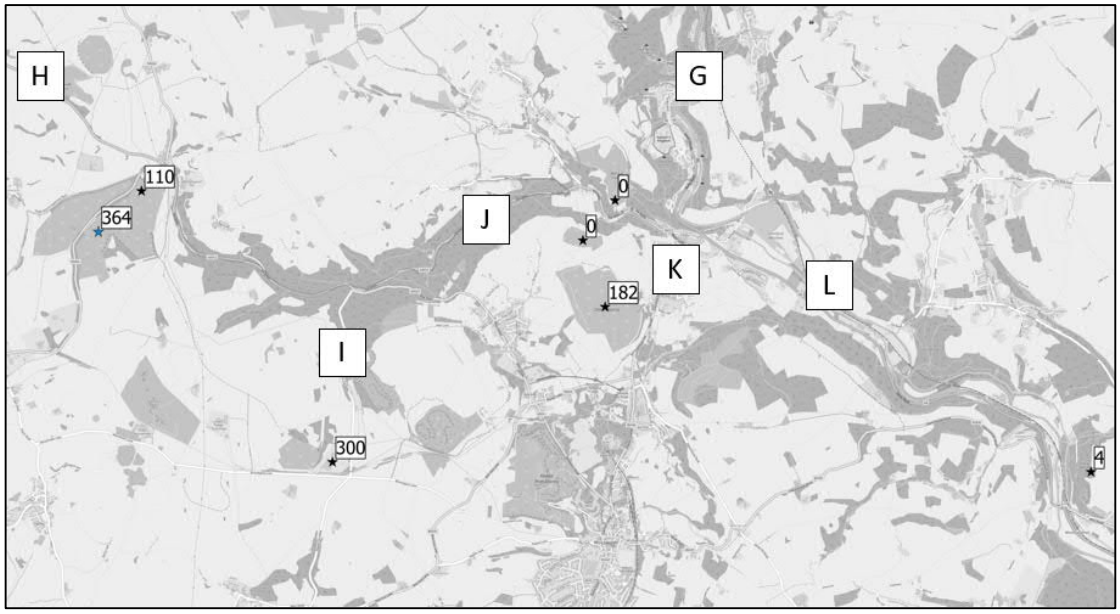


Table 3.5: Two-way daily HGV movements – Area 2 cumulative impacts

ID	Route	Daily HGV movements (vehicles)		
		Northbound / Eastbound	Southbound / westbound	**Two-way**
G	A5012 (W)	240	240	**480**
H	A5056	237	237	**474**
I	Hopton Via Gellia	150	150	**300**
J	A5012 (Via Gellia)	387	387	**774**
K	B5036 (Cromford Hill)	91	91	**182**
L	A6	240	240	**480**

Table 3.6: Two-way hourly HGV movements – Area 2 cumulative impacts

ID	Route	Hourly HGV movements (vehicles (PCUs))		
		Northbound / Eastbound	Southbound / westbound	**Two-way**
G	A5012 (W)	24	24	**48**
H	A5056	24	24	**47**
I	Hopton Via Gellia	15	15	**30**
J	A5012 (Via Gellia)	39	39	**77**
K	B5036 (Cromford Hill)	9	9	**18**
L	A6	24	24	**48**

3.3.9 The greatest level of HGV movements occurs on the A5012 (Via Gellia), which accommodates 774 HGV movements per day (approximately 77 per hour). Traffic data from 2019 indicates an AADT value of 4,392. As such, HGV movements associated with sites within Area 2 comprise 17.6% of all traffic movements. Notwithstanding this, the DMRB states that a road of its nature is able to accommodate approximately 13,000 vehicles per day. Total traffic movements on the A5012 therefore lies well below the DMRB figure.

3.3.10 AADT data is also available on the A6 near Site G and L. AADT values on the A6 to the north of Cromford (near Site G) are 12,088 and AADT values on the A6 to the south of Cromford (near Site L) are 9,523. At these locations, HGV movements associated with sites within cluster map 2 comprise 4.0% and 5.0% (respectively) of all traffic movements.

Figure 7.10: Two-way daily HGV movements – Area 3 (Peak Year: 2030)

Table 3.7: Two-way daily HGV movements – Area 3 cumulative impacts (Peak Year: 2030)

ID	Route	Daily HGV movements (vehicles)		
		Northbound / Eastbound	Southbound / westbound	**Two-way**
M	A50 (Doveridge Bypass))	102	102	**204**
N	A515 (north of Leathersley Lane / A515)	119	119	**238**
O	A38 (South of A50)	30	30	**59**
P	A38 (north of A50)	45	45	**89**
Q	A5132	30	30	**59**
R	A50 (Approaching M1)	87	87	**174**

Table 7.8: Two-way hourly HGV movements – Area 3 cumulative impacts (Peak Year: 2030)

ID	Route	Hourly HGV movements (vehicles)		
		Northbound / Eastbound	Southbound / westbound	**Two-way**
M	A50 (Doveridge Bypass))	10	10	**20**
N	A515 (north of Leathersley Lane / A515)	12	12	**24**
O	A38 (South of A50)	3	3	**6**
P	A38 (north of A50)	4	4	**9**
Q	A5132	3	3	**6**
R	A50 (Approaching M1)	9	9	**17**

3.3.11 The greatest level of HGV movements occurs on the A515 (north of Leathersley Lane / A515 junction), which sees 238 movements per day (or 24 two-way movements per hour). To put these figures into context, the A515 (within proximity of the A515 / Leathersley Lane junction) has an Annual Average Daily Flow (AADF) (in 2019) of 7,595 motor vehicles. HGV movements associated with the minerals sites in Area 3 comprise just 3.1% of total daily traffic on the A515.

3.3.12 DfT AADF count data is available on the A50 within proximity of Site M. The data shows an an Annual Average Daily Flow (AADF) (in 2019) of 60,182 and 5,979 HGVs. HGV movements associated with the minerals sites in Area 3 therefore comprise just 0.3% of total daily traffic and 3.4% of HGV movements on the A50.

3.3.13 DfT AADF data is also available on the A38 to the north and south of the A50 / A38 junction. AADF values for 2019 are 58,611 and 55,064, respectively. Traffic associated with the

Derbyshire minerals site comprise on a very small proportion of traffic movements on the A38 (0.2% and 0.1%, respectively).

3.4 Evaluation of Cumulative Impacts

3.4.1 Roads within Area 1 accommodate a large number of HGV movements, with the A6 to the north of Buxton (Site B) carrying approximately 1,400 two-way HGV movements per day (equivalent to 140 per hour assuming a 10-hour working day). The A515 also sees a large number of HGV movements (carrying approximately 1,350 two-way HGV movements per day).

3.4.2 All sites within Area 1 are, however, existing sites, with no additional sites planned in this location as part of the Minerals Local Plan. Indeed, all sites have planning permission to continue operations until 2042, well beyond end of the Plan period. As such, traffic conditions within this area are not likely to worsen compared to the existing baseline conditions.

3.4.3 Roads within Area 2 accommodate a relatively lower number of HGV movements, the A5012 sees the highest number of two-way movements at 774 (equivalent to approximately 77 two-way movements per hour). All sites within Cluster Map 2 are existing sites, with no additional sites planned in this location as part of the Minerals Local Plan (it should be noted than an extension to Brassington Moor is proposed, but this will result in an extension to the life of the quarry rather than an intensification of extraction). As such, traffic conditions within this area are not likely to worsen compared to the existing baseline conditions.

3.4.4 Two new sites are noted within cluster Area 3, Foston (FO) and Sudbury (SD). Foston (FO) will replace operations at Shardlow (SH), whilst Sudbury (SD) will replace operations at Willington (WN). Swarkestone South (SW) and Swarkeston North (SN) are extensions to the existing Swarkestone Quarry (SW) resulting in an extension to the life of the quarry rather than an intensification of extraction. Elvaston (EV) will begin operating after a period of being non-operational, and is expected to begin operations in 2028 utilising existing permitted reserves.

3.4.5 As such, the only net increase in HGV movements on the network compared to the baseline scenario within cluster Area 3 are those associated with Elvaston. This leads to an additional 55 two-way movements on the A50 per day. With an Annual Average Daily Flow (AADF) (in 2019) of 60,182 and 5,979 HGVs on the A50, the additional HGV trips associated with Elvaston represent just 0.1% of total traffic and 0.9% of HGVs

3.4.6 Whilst not contributing to a net increase, the replacement sites at Foston (FO) and Sudbury (replacing Shardlow and Willington, respectively) will lead to a redistribution of HGVs within the local highway network. Table 3.6 shows the changes in HGV numbers along key routes in 2030 (the Peak Future Year) compared to the baseline scenario associated with moving operations to the Foston and Sudbury replacement sites and the commencement of operations at Elvaston.

Table 3.6: Two-way daily HGV movements – changes associated with new sites (Foston and Sudbury) and re-opening Elvaston (Future Peak Year (2030) minus Baseline)

ID	Route	Daily HGV movements (vehicles)			Hourly HGV movements (vehicle)
		Northbound / Eastbound	Southbound / westbound	**Two-way**	**Two-way (rounded)**
M	A50 (Doveridge Bypass))	55	55	**110**	**11**
N	A515 (north of Leathersley Lane / A515)	119	119	**238**	**24**
O	A38 (South of A50)	-75	-75	**-149**	**-15**
P	A38 (north of A50)	-2	-2	**-4**	**0**
Q	A5132	0	0	**0**	**0**
R	A50 (Approaching M1)	4	4	**8**	**1**

3.4.7 Table 3.6 shows that the closure of Shardlow and Willington and the opening of Foston and Sudbury (as well as the re-opening of Elvaston) will lead to a reduction in HGVs using the A38 and a small increase in the number of HGVs using the A50 and A515.

3.4.8 **A515:** The number of HGVs sees the greatest increase on the A515 (north of Leathersley Lane / A515 junction), which increases by 238 two-way movements per day. Notwithstanding, the number of movements per hour does not exceed 30 vehicles per hour. The *Guidance on Transport Assessment* (GTA, DfT, 2007) gives 30 two-way movements in any one hour as the starting point for junction capacity testing.

3.4.9 AADF data from the DfT indicates a daily traffic flow of 7,595 vehicles (and 680 HGVs) on the A515 near to site N. The additional 238 two-way HGV movements associated with moving operations to the Foston and Sudbury replacement sites and the commencement of operations at Elvaston on the A515 will lead to a 3.1% increase in traffic flow along this route.

3.4.10 To put the above into context, the Institute for Environmental Assessment (IEA) *Guidelines for the Environmental Assessment of Road Traffic* (GEART) can be used to judge in broad terms the environmental impact of the development in terms of its traffic impact.

3.4.11 The IEA suggest that highway links (i.e. roads) should be separately assessed when:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%)
- Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% of more.

3.4.12 The IEA Guidelines go on to state that:

"At a basic level, it should…be assumed that projected changes in traffic of less than 10% create no discernible environmental impact," and that;

"Previous research has indicated that the most discernible environmental impacts of traffic are noise, severance, pedestrian delay and intimidation," and that;

"Other environmental impacts are less sensitive to traffic flow changes, and it is recommended that, as a starting point, a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment".

3.4.13 **A50:** It is expected that there would be an additional 110 daily HGV movements on the A50 associated with moving operations to the Foston and Sudbury replacement sites and the commencement of operations at Elvaston. AADF figures from the DfT indicate 60,182 total vehicles and 5,979 HGVs. The additional HGVs would increase the total traffic flow by only 0.2% and the HGV flow by only 1.8%.

3.4.14 Given the capacity of the A50 as a major distributer road within the region, it is considered that the proposed sites would have a negligible impact upon the highway network in this location.

3.5 Summary

3.5.1 Considered cumulatively, the existing and proposed Minerals Plan sites would not generate a 'severe' impact on the highway network that would be greater than otherwise expected based upon observations of the existing use of sites. The GEART guidelines for specific link assessment also confirm that there would be no discernible traffic impact overall in terms of production from the proposed sites.

3.5.2 Furthermore, any further planning applications associated with minerals sites would be required to produce a Transport Assessment (TA), which would evaluate the movement of HGVs on the localised highway network (together with any cumulative impacts).

4. Carbon Emissions Associated with Transport

4.1 Overview

4.1.1 According to Midland Connect, although HGVs account for 17% of transport carbon emissions nationally, the proportion of HGV emissions is higher than average in the Midlands and could be as much as 30%[1].

4.1.2 The movement of freight by rail, however, can reduce the level of carbon emissions associated with the transport of materials vis-à-vis road transport. Indeed, data from the *Guidelines to Defra / DECC's Greenhouse Gas (GHG) Conversion Factors for Company Reporting* indicates that rail freight produces only 53% of the greenhouse gas emissions of transporting materials by HGV on a per vehicle kilometre basis.

4.1.3 The National Planning Policy Framework (NPPF) notes that minerals "can only be worked where they are found". This necessarily means that many sites are not close to existing railway freight lines (or canals) and therefore export must be undertaken by HGV. In addition, it is noted that some materials (such as sand and gravel) have a low value per m^3 and therefore transport costs means that they are worked to provide for local markets which are better served by HGV.

4.1.4 This section estimates the carbon savings associated with the existing sites connected to the rail network within Derbyshire and Derby City, and concludes that the rail connected nature of several of the existing minerals sites leads to a positive level of carbon savings across the County.

4.2 Methodology

4.2.1 The most accurate method of determining the amount of CO_2 emissions related to the transport of freight is to record the amount of fuel used per kilometre in its transportation. However, it is recognised in the *Guidance on measuring and reporting Greenhouse Gas (GHG) emissions from freight transport operations*[2] that this is not always possible due to limits on the data routinely collected by freight operators. This data was also not available for this STA.

4.2.2 As such, the Department for Business, Energy & Industrial Strategy publish conversion factors to allow organisations and individuals to estimate greenhouse gas emissions from a range of activities, including energy use, water consumption, waste disposal, recycling and transport activities.

4.2.3 The 2021 Guidelines to Defra / DECC's Greenhouse Gas (GHG) Conversion Factors for Company Reporting represent the current official set of government emissions factors. These factors have been used to estimate GHG emissions associated with mineral freight movements.

4.2.4 **Heavy Goods Vehicles (HGVs)**: a distance (vehicle kilometres) factor based on average fuel consumption data for various sizes and weights of vehicle.

[1] https://committees.parliament.uk/writtenevidence/22800/pdf/
[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/218574/ghg-freight-guide.pdf

Articulated HGV >33T

Fully Loaded factor: 1.05656 Kg CO_2 per vehicle km

Empty factor: 0.63394 Kg CO_2 per vehicle km

4.2.5 **Rail**: given that the most commonly used metric in rail freight is tonne km, Defra, DECC and the Department for Transport (DfT) have calculated an emission factor which can be directly multiplied by tonne km data to give emissions. This emission factor is based on UK average fuel consumption data for various rail freight operations.

Rail Freight factor: 0.02749 Kg CO_2 per tonne km

4.2.6 It should also be noted that the analysis presented in this section relates to CO_2 equivalents (CO_2e), whereby CO_2e is the universal unit of measurement to indicate the global warming potential (GWP) of Green House Gases (GHGs), expressed in terms of the GWP of one unit of carbon dioxide.

4.2.7 CO_2e per annum associated with **HGV movements** (two-way) is calculated as follows:

$$Total\ CO2e\ (two-way) = (Vehicle\ kms\ per\ annum * Fully\ Loaded\ factor) + (Vehicle\ kms\ per\ annum * Empty\ factor)$$

Whereby:

$$Vehicle\ kms\ per\ annum = \sum_{All\ site\ destinations} (vehicle\ movements\ per\ annum * Destination\ distribution) * Road\ Kms\ to\ destination$$

4.2.8 Vehicle movements per annum is calculated by dividing the total tonnage exported by road per annum by an average payload of 25T[3].

4.2.9 CO_2e associated with **rail movements** is calculated as follows:

$$Total\ CO2e\ (two-way) = (Tonne\ kms\ per\ annum * Rail\ freight\ factor) * 1.25$$

Whereby:

$$Tonne\ kms\ per\ annum = \sum_{All\ site\ destinations} (Tonnage\ of\ freight\ per\ rail\ per\ annum * Destination\ distribution) * Rail\ Kms\ to\ destination$$

4.2.10 It is assumed that a return journey of an empty freight train contributes approximately 25% of the CO_2e compared to a fully laden freight train.

4.2.11 It should be noted that:

- Where a generic freight destination is given (e.g. 'London'), the centre point of that region has been used to calculate the distance between the quarry site and the destination (for both rail and HGV movements).

[3] Note: Stage One analysis considered average payloads at 20T (for robustness) and 30T, as such an average payload of 25T (i.e. the mid-point) has been assumed for the purpose of this analysis.

- Road kms are calculated as the fastest road route between the quarry and the destination according to online mapping, whilst rail KMs are calculated 'as the crow flies' (i.e. the straight line distance).
- HGV vehicles are assumed to depart the quarry site fully laden (i.e. 100%) and make a return journey 0% laden (i.e. no backloading).

4.3 Rail connected sites

4.3.1 The following minerals sites in Derbyshire are currently connected to the rail network:

- Dove Holes Quarry;
- Dowlow Quarry;
- Tunstead Quarry;
- Hillhead Quarry (not currently operational); and
- Hindlow Quarry (not currently operational).

4.3.2 It is understood that, at the operational quarries, 50% of freight is currently transported by rail. The following approximate level of freight is therefore transported by rail:

- Dove Holes Quarry – 2,500,000 tonnes per annum;
- Dowlow Quarry – 1,750,000 tonnes per annum; and
- Tunstead Quarry – 2,750,000 tonnes per annum.

4.3.3 As noted in the Stage One report, destination data has been obtained via a data request to Network Rail for the operational quarries (Dove Holes, Dowlow and Tunstead). This is shown in Figures 4.1 – 4.3. The regions are taken from the Strategic Freight Corridor (SFC) regions used by Network Rail.

Figure 4.1: Origins/Destination regions of trains at Tunstead sidings in 2019 (sourced as part of AECOM request made to Network Rail)

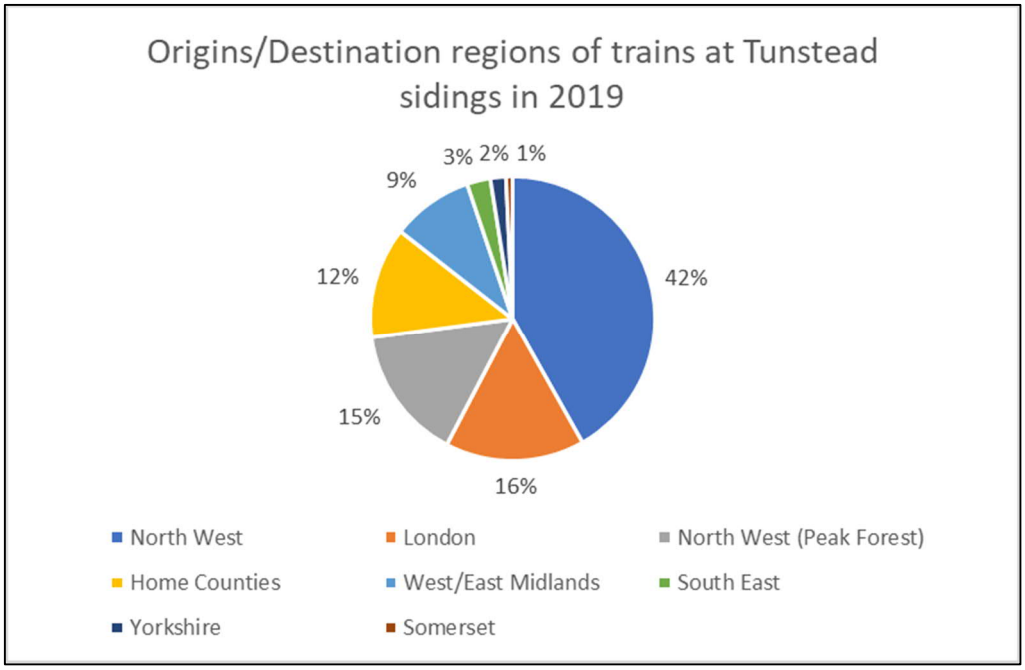


Figure 4.2: Origins/Destination regions of trains at Dowlow Briggs sidings in 2019 (sourced as part of AECOM request made to Network Rail)

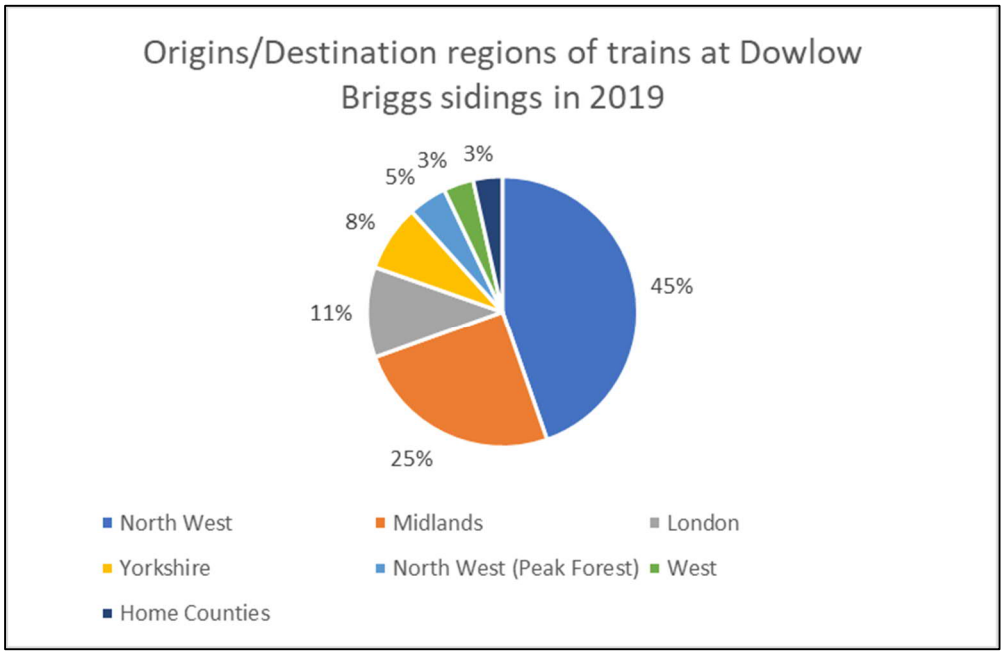
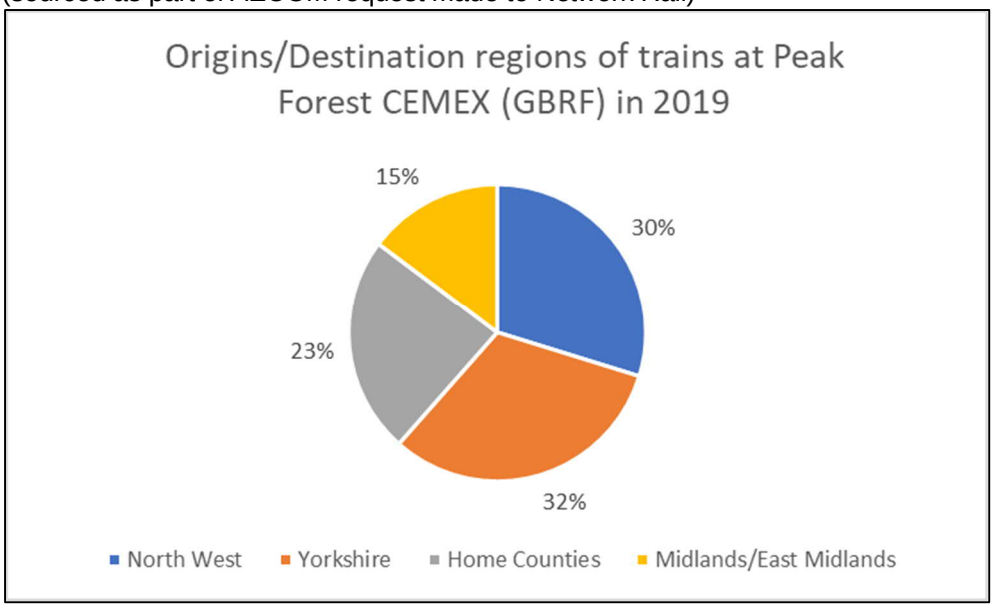


Figure 4.3: Origins/Destination regions of trains at CEMEX Dove Holes Quarry in 2019 (sourced as part of AECOM request made to Network Rail)



4.3.4 Approximate distances between the existing rail connected minerals sites and their key origins/destinations by road and rail have been calculated and shown in Table 4.1. It is recognised that these values are estimates only, since precise end-market data and routeing is not known.

Table 4.1: Approximate distance between existing (operating) quarry sites and freight destinations by Road and Rail in kilometres

	Dove Holes		Dowlow		Tunstead	
	Road (km)	Rail (km)	Road (km)	Rail (km)	Road (km)	Rail (km)
North West	100	75	100	85	100	75
London	Not served	Not served	265	230	277	230
North West (Peak Forest)	Not served	Not served	5	4	8	7
Home Counties	278	230	265	230	277	230
West/East Midlands	120	90	110	80	120	90
South East	Not served	Not served	Not served	Not served	310	250
Yorkshire	125	90	133	90	125	90
Somerset	Not served	Not served	Not served	Not served	315	270
West	Not served	Not served	260	200	Not served	Not served

4.4 Carbon savings

4.4.1 Table 4.2 estimates the total CO_2e emissions associated with the existing (operational) rail connected sites under their current level of rail exports (50% of production), whilst Table 4.3 shows the total CO_2e emissions should the sites export all material by road only.

Table 4.2: CO_2e emissions with 50% exports by rail and 50% exports by road

		Dove Holes	Dowlow	Tunstead
Road exports	Tonnage (by road)	2,500,000	1,750,000	2,750,000
	Vehicle movements per annum	100,000	70,000	110,000
	Vehicle kms per annum	15,194,000	9,295,300	16,116,100
	Fully Loaded Kg CO_2e	16,301,035	9,972,556	17,290,319
	Empty Kg CO_2e	9,879,595	6,044,083	10,479,172
	Total kg CO_2e (two-way)	***26,180,629***	***16,016,638***	***27,769,491***
Rail Exports	Tonnage (by rail)	2,500,000	1,750,000	2,750,000
	Tonne-kms per annum	294,250,000	181,737,500	321,887,500
	Kg CO_2e per annum	8,186,035	5,055,937	8,954,910
	Total kg CO_2e (two-way)	***10,232,544***	***6,319,922***	***11,193,638***
Total Kg CO_2e (Road and Rail)		**36,413,173**	**22,336,560**	**38,963,129**

Table 4.3: CO_2e emissions with 0% exports by rail and 100% exports by road

		Dove Holes	Dowlow	Tunstead
Road exports	Tonnage (by road)	5,000,000	3,500,000	5,500,000
	Vehicle movements per annum	200,000	140,000	220,000
	Vehicle kms per annum	30,388,000	18,590,600	32,232,200
	Fully Loaded Kg CO_2e	32,602,070	19,945,111	34,580,638
	Empty Kg CO_2e	19,759,189	12,088,166	20,958,343
	Total kg CO_2e (two-way)	***52,361,259***	***32,033,277***	***55,538,981***
Rail Exports	Tonnage (by rail)	0	0	0
	Tonne-kms per annum	0	0	0
	Kg CO_2e per annum	0	0	0
	Total kg CO_2e (two-way)	***0***	***0***	***0***
Total Kg CO_2e (Road and Rail)		**52,361,259**	**32,033,277**	**55,538,981**

4.4.2 Table 4.4 shows the total carbon saving associated with the current (operational) rail connected sites per annum compared to a scenario where all material were to be transported by road.

Table 4.4: Kg CO_2e saving – operational rail connected sites

	Dove Holes	Dowlow	Tunstead
Kg CO_2e per annum – with 50% exports by rail	36,413,173	22,336,560	38,963,129
Kg CO_2e per annum – without rail exports	52,361,259	32,033,277	55,538,981
Kg CO_2e saving	15,948,086	9,696,717	16,575,853
% CO_2e saving	**30.5%**	**30.3%**	**29.8%**

4.4.3 Across all existing operational rail connected sites, an estimated 42,220,656kg CO_2e is saved per annum by exporting 50% of material by rail from the Derbyshire rail-connected minerals sites which is equivalent to approximately 42,220 tonnes per annum. Between 2022 and 2042 (the end date of permission associated with the existing rail connected quarries), this equates to approximately 887,000 tonnes of CO_2e savings. It is noted that this calculation has been undertaken without access to actual fuel consumption data and with basic information relating to end-destinations; however, it does indicate that the rail connected sites are producing a saving of around 30% of the carbon emissions of an equivalent road-based site.

4.5 Carbon Savings for HGV Traffic

4.5.1 As noted in the preceding sections, HGV emissions could be reduced in the short term by encouraging greater adoption of FORS amongst operators in Derbyshire and Derby. In the longer term, more significant carbon reductions would require the maturing of electric HGVs and hydrogen HGVs which is a workstream being pursued by Midlands Connect.

4.6 Summary

4.6.1 By transporting mineral exports by rail at three operational rail connected sites within Derbyshire, approximately 30% of carbon emissions are saved vis-à-vis road transport. Future savings will rely on the development of the electric or hydrogen HGV fleet.

5. Summary and conclusions

5.1.1 This report presents Stage Two of the Derbyshire and Derby City Minerals Strategic Transport Assessment, which has been prepared in support of the emerging Minerals Local Plan.

5.1.2 Stage One concluded that the majority of existing minerals sites are either situated within a good location in terms of transport connectivity, or have appropriate planning controls to govern HGV movements to / from the site. All proposed minerals sites are located within a good location in terms of transport access.

5.1.3 Stage Two (this report) goes on to conclude that, considered cumulatively, the existing and proposed Minerals Plan Sites would not generate a 'severe' impact on the highway network that would be greater than otherwise expected based upon observations of the existing use of sites. Moreover, an assessment of carbon savings indicate that the rail connected nature of some of the sites is leading a positive level of carbon saving within the County, which contributes to mitigating some of the impact of HGV movements across the region.