



WHITESTONE
solar farm

WHITESTONE SOLAR FARM

Volume 6: Environmental Statement

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Contents

1	INTRODUCTION.....	5
1.1	Introduction	5
1.2	Background.....	5
1.3	Site Location	5
1.4	Study Area	9
1.5	Purpose of Report.....	9
1.6	Report Structure.....	9
1.7	Statutory Consultation and Highway Authority Engagement.....	10
2	POLICY CONTEXT	13
2.1	Introduction	13
2.2	National Policy	13
2.3	National Guidance	16
2.4	Local Policy and Guidance.....	17
2.5	Summary.....	18
3	ACCESSIBILITY APPRAISAL AND EXISTING CONDITIONS.....	19
3.1	Overview.....	19
3.2	Strategic Road Network	19
3.3	Local Highway Network	19
3.4	Baseline Traffic Flows.....	23
3.5	Collision Review.....	25
3.6	Public Transport Accessibility	32
3.7	Walking, Cycling and Equestrian Accessibility	34
3.8	Summary.....	36
4	THE PROPOSED DEVELOPMENT.....	37
4.1	Overview.....	37
4.2	Proposed Development Summary	37
4.3	Programme and Phasing	37
4.4	Vehicle Types, Plan Requirements and Abnormal Loads	38
4.5	Vehicle Access Arrangements and Routing.....	38
4.6	Car and Cycle Parking	39
4.7	Traffic Arrivals / Departures	39
4.8	Summary.....	39
5	TRIP GENERATION	40
5.2	Solar PV Sites.....	40
5.3	Grid Connection Corridor	43
5.4	Cumulative Trip Generation	46
5.5	Summary.....	46
6	TRIP DISTRIBUTION.....	47
6.2	Construction Worker Distribution	47
6.3	Construction HGV Distribution	47
6.4	Summary.....	48
7	TRIP ASSIGNMENT	49
7.2	Construction Worker Vehicle Assignment.....	49
7.3	Construction HGVs Assignment.....	51
7.4	Public Consultation Response	53

7.5	Summary.....	55
8	HIGHWAYS ASSESSMENT	56
8.1	Assessment Scenarios	56
8.2	Existing Baseline.....	56
8.3	Future Baseline (2028)	56
8.4	Peak Construction Phase (2028)	58
8.5	Future Baseline with Construction Traffic (2028)	58
8.6	Mitigation Measures.....	64
9	SUMMARY AND CONCLUSION	66
10	REFERENCES	68

Tables

Table 3-1	2025 Average Daily Two-Way Movements (AADT Baseline)	23
Table 3-2	Summary of Collision Data by Year (2019-2024).....	25
Table 3-3	Collisions within the W1 Study Area (2019-2024).....	26
Table 3-4	Collisions within the W2 Study Area (2019-2024).....	28
Table 3-5	Collisions within the W3 Study Area (2019-2024).....	30
Table 3-6	Junction Collision Clusters (2019-2024)	31
Table 3-7	Conisbrough Railway Station Timetable (Near W1).....	33
Table 3-8	Kiveton Bridge Railway Station Timetable	33
Table 3-9	Kiveton Park Railway Station Timetable	34
Table 5-1	Construction Worker Daily Trip Generation	41
Table 5-2	Construction Phase Total HGV Trip Generation (Solar PV sites)	42
Table 5-3	Construction Phase Daily Peak HGV Trip Generation (Solar PV sites)	42
Table 5-4	Daily Vehicle Trips by Access Point.....	42
Table 5-5	Construction Phase Daily Peak Worker Vehicle Trip Generation (GCC)	44
Table 5-6	Construction Phase Daily Peak HGV Trip Generation (GCC)	44
Table 5-7	Trip Generation by Access Point	44
Table 5-8	Total Solar PV and GCC Daily Peak Construction Worker Vehicle and HGVs - Two-Way Movements.....	46
Table 6-1	Worker Gravity Model	47
Table 7-1	Construction Worker Vehicle Trip Assignment (Solar PV sites and GCC)	49
Table 7-2	Construction HGV Trip Assignment (Solar PV sites and GCC)	51
Table 7-3	Concerns and Responses	53
Table 8-1	TEMPro Growth Factors (2025 to 2028).....	56
Table 8-2	2028 Average Daily Two-Way Movements (AADT Baseline)	56
Table 8-3	2028 AADT Future Baseline + Construction Traffic for Solar PV sites and GCC (Two-way)	59
Table 8-4	ATC Locations with an HGV Increase Greater Than 100%	63

Plates

Plate Number	Plate Title
1-1	W1 (Northern Site) Location
1-2	W2 (West of M18) Location

1-3	W2 (South of Long Lane) Location
1-4	W2 (M1) Location
1-5	W2 (A57) Location
1-6	W3 (Southern Site) Location

Appendices

Appendix Number	Appendix Title
A.1	ATC Locations
A.2	Collision Causation Factors
A.3	Solar PV Sites and Grid Connection Corridor Access Points
A.4	Proposed HGV Routing Strategy

Acronyms

Acronym	Meaning
AADT	Average Annual Daily Traffic
TS	Transport Statement
DCO	Development Consent Order
SRN	Strategic Road Network
PV	Photovoltaic
NPPF	National Planning Policy Framework
ES	Environmental Statement
AIL	Abnormal Indivisible Load
HGV	Heavy Goods Vehicle
TRICS	Trip Rate Information Computer System
W1	Whitestone 1
W2	Whitestone 2
W3	Whitestone 3
PRoW	Public Right of Way
GCC	Grid Connection Corridor

Glossary

Term	Meaning
<i>Long Lane 400kV Substation</i>	The new 400 kilovolt National Grid substation proposed on land immediately east of Long Lane, Brinsworth, S60 4JJ.
<i>Cable Corridors</i>	Corridors within which the high voltage cables would be constructed.

Term	Meaning
<i>Draft ES</i>	The Draft Environmental Statement which presented the preliminary environmental information relating to the Proposed Development. The Draft ES was prepared to present information for statutory consultation in accordance with current EIA regulation.
<i>Development Consent Order (DCO)</i>	A statutory order made by the relevant Secretary of State pursuant to The Planning Act 2008 to authorise a Nationally Significant Infrastructure Project which provides consent for the project and means that a range of other consents, such as planning permission and listed building consent, will not be required. A DCO can also include rights of compulsory acquisition.
<i>Environment Statement (ES)</i>	The Environmental Statement which presents the environmental information relating to the Proposed Development. The ES has been prepared to present information for formal consultation in accordance with current EIA regulation.
<i>National Grid Brinsworth Substation</i>	The existing 275 kilovolt substation at Brinsworth, located on Howarth Lane, Brinsworth, S60 5LW
<i>Point of Connection (PoC)</i>	The new National Grid substation at Brinsworth (Long Lane 400kV Substation) where the Proposed Development would connect to the National Grid.
<i>Order Limits</i>	Maximum extent of the Proposed Development comprising the Site and Cable Corridors.
<i>Statutory Body</i>	An organisation established by law with specific expert responsibilities or local knowledge.
<i>Study Area</i>	The spatial extent within which environmental receptors may experience likely significant effects from the Proposed Development.
<i>Temporary Possession</i>	Temporary possession refers to the legal power that allows the applicant to take control of land and rights over land for a limited period of time, without permanently acquiring it.
<i>The Applicant</i>	Whitestone Net Zero Ltd
<i>The Application</i>	The Application submitted to the Secretary of State for a Development Consent Order.
<i>The Proposed Development</i>	The proposed Whitestone Solar Farm.
<i>The Site</i>	The land planned to be used for solar PV array and associated infrastructure, BESS, substations, and landscaping and habitat enhancement. The Site is split into W1, W2, and W3.
<i>Whitestone 1 (W1)</i>	The northern parcels of the Whitestone Solar Farm.
<i>Whitestone 2 (W2)</i>	The middle parcels of the Whitestone Solar Farm.
<i>Whitestone 3 (W3)</i>	The southern parcels of the Whitestone Solar Farm.

1 INTRODUCTION

1.1 Introduction

- 1.1.1 This Transport Statement (TS) has been prepared in support of the proposed Whitestone Solar Farm (the 'Proposed Development') **ES Volume 2, Chapter 13: Traffic and Transport [EN0110020/APP/6.13]**, developed as part of the Development Consent Order (DCO) Application.

1.2 Background

- 1.2.1 The Proposed Development involves the construction, operation and maintenance, and decommissioning of more than 100 MW of solar photovoltaic (PV) array, Battery Energy Storage System (BESS), onsite substations and supporting infrastructure, and grid connection infrastructure. The grid connection infrastructure would connect the Proposed Development to the National Grid at the new National Grid substation Brinsworth (Long Lane 400kV Substation), located east of Long Lane, Rotherham. National Grid have applied to Rotherham Metropolitan Borough Council for the development of this new substation which is intended by National Grid to be operational in time for the Proposed Development to connect in 2029. This substation is therefore not included in the Proposed Development and has been submitted via a separate planning application by National Grid.
- 1.2.2 There will be three main phases associated with the Proposed Development: Construction, Operation and Maintenance, and Decommissioning.
- 1.2.3 During the construction phase, there will be a temporary increase in vehicle movements as equipment, materials, and workers are brought to the Site. Once construction is complete, the operational phase will generate negligible levels of traffic, limited to occasional maintenance visits by service vehicles. In the decommissioning phase, which will occur at the end of the solar farm's operational life, there will be a short-term increase in traffic similar to the construction phase, as equipment is removed and the Site is restored.

1.3 Site Location

- 1.3.1 The Proposed Development is located across three areas, namely Whitestone 1 (W1) near Conisbrough, Whitestone 2 (W2) to the east of Brinsworth, and Whitestone 3 (W3), near Harthill with Woodall. For the purposes of assessment, these areas will be used as specific study areas.
- 1.3.2 **Plates 1-1** through **1-6** show the locations of each site area.

Plate 1-1 W1 (Northern Site) Location

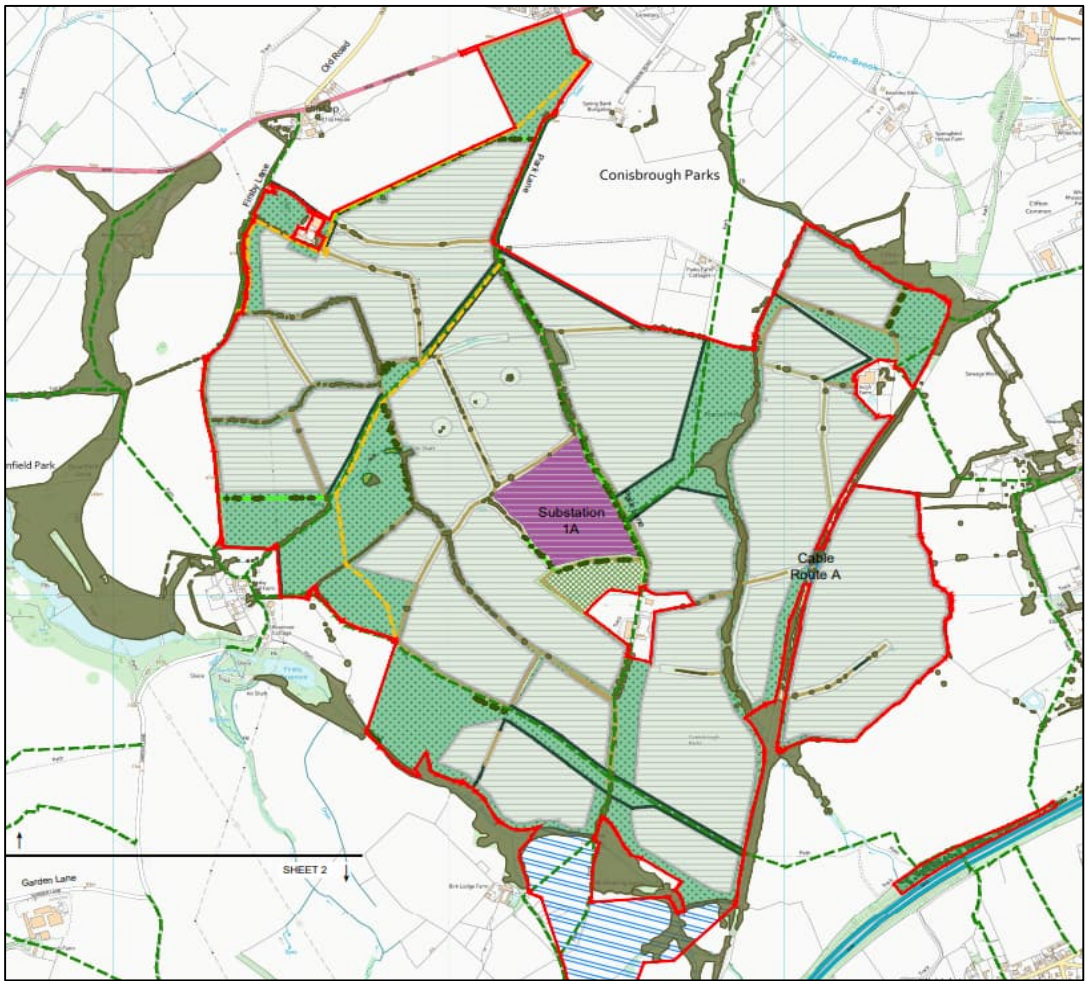


Plate 1-2 W2 (West of M18) Location

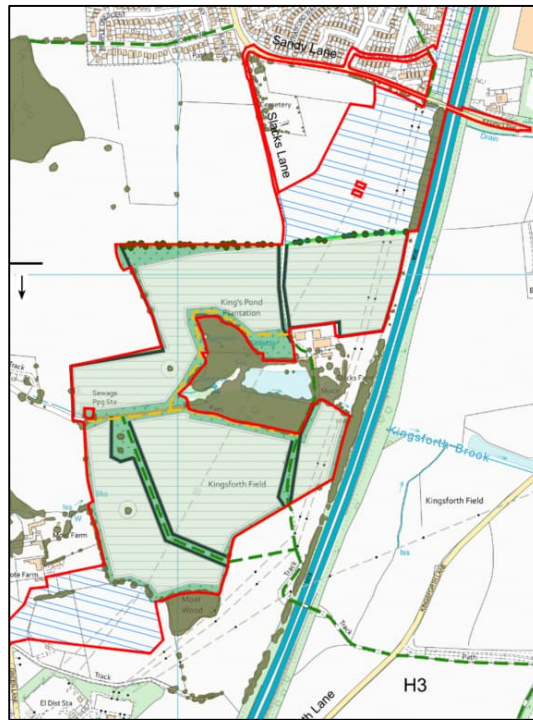


Plate 1-3 W2 (South of Long Lane) Location

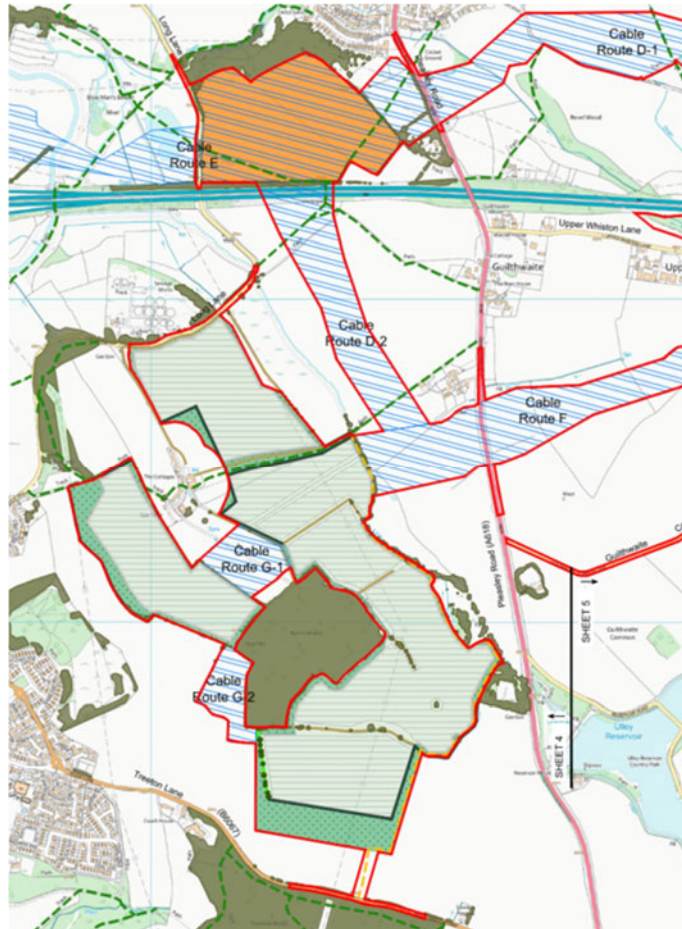


Plate 1-4 W2 (M1) Location

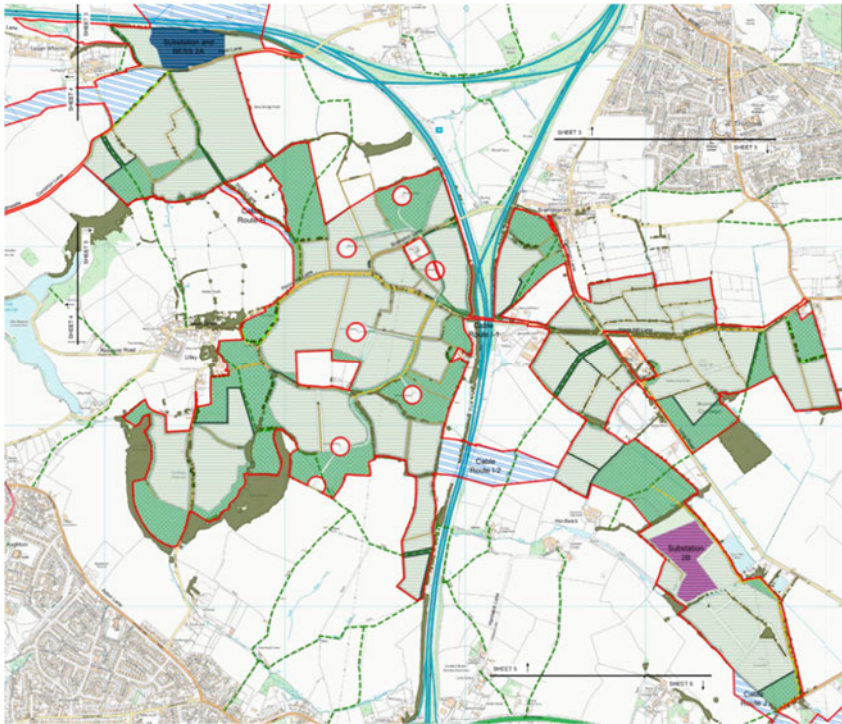


Plate 1-5 W2 (A57) Location

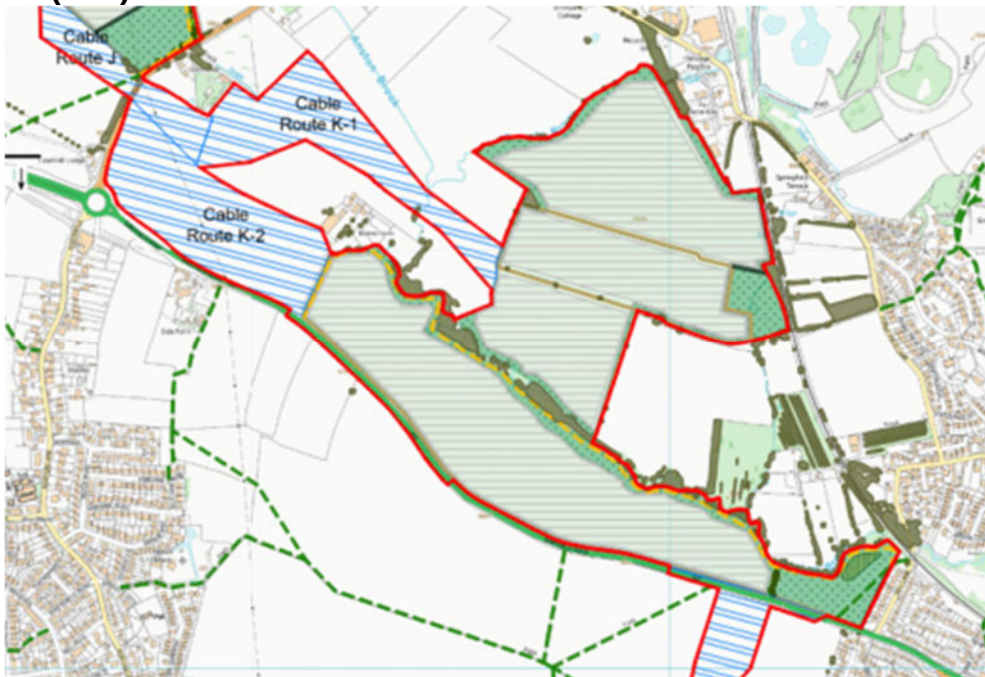
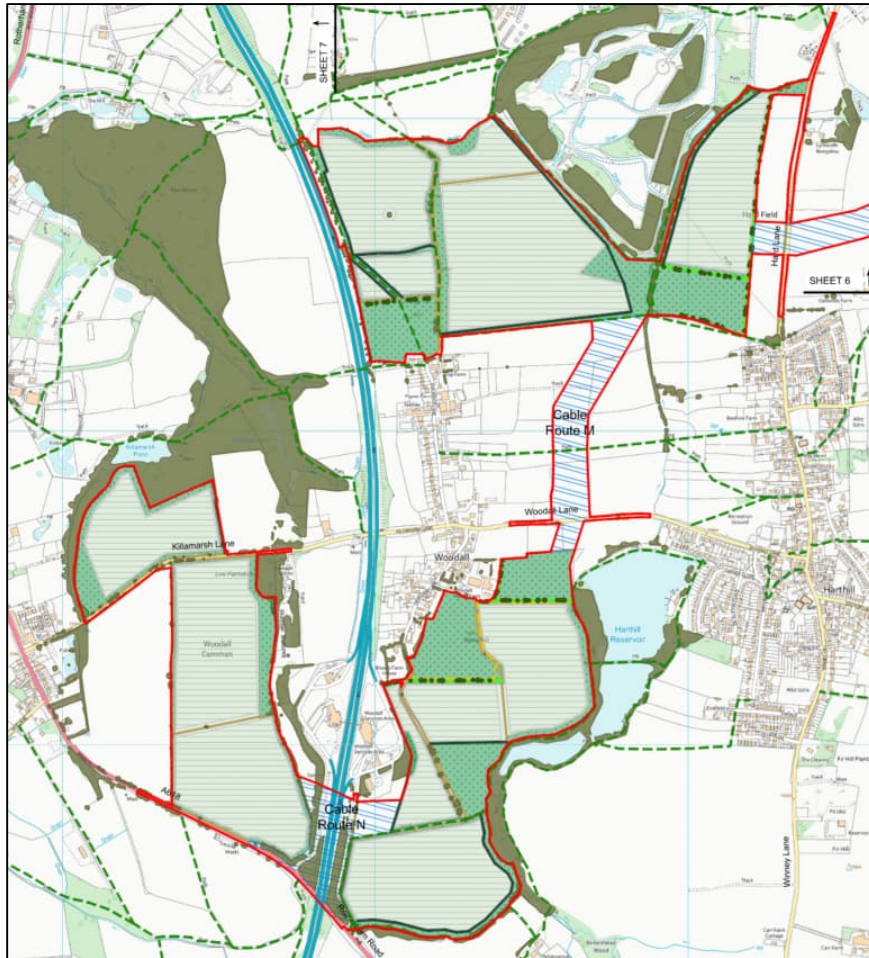


Plate 1-6 W3 (Southern Site) Location



1.4 Study Area

- 1.4.1 The Study Area for traffic and transport, hereafter referred to as the 'Study Area', has been defined based on an initial assessment of the roads that are expected to experience increased traffic flows associated with the construction of the Proposed Development. The study area is split into three defined areas, as described above.
- 1.4.2 These roads have been identified by routing traffic from the Strategic Road Network (SRN) and then using the hierarchy of roads to reach access points identified for the Sites. For example, for W1 (Northern Site), vehicle trips would originate from the A1 Junction 36).

1.5 Purpose of Report

- 1.5.1 The purpose of this TS is to present the transport-related implications associated with the Proposed Development¹. It has also been produced to reflect comments made by the relevant local highway authorities (Doncaster Council, Rotherham Metropolitan Borough Council, Derbyshire County Council and North East Derbyshire District Council) and the Planning Inspectorate within **ES Appendix 2.2: EIA Scoping Opinion [EN0110020/APP/6.20]**.

1.6 Report Structure

- 1.6.1 The remainder of this TS is structured as follows:

- **Section 2** provides an overview of relevant national and local transport policies;
- **Section 3** provides details of the Proposed Development accessibility by various travel modes, including by vehicle, public transport, on foot and by bicycle;
- **Section 4** provides details of the Proposed Development, including the anticipated programme and access arrangements;
- **Section 5** sets out the worker and HGV trip generation associated with the Proposed Development;
- **Section 6** sets out the worker and HGV trip distribution associated with the Proposed Development;
- **Section 7** sets out the worker and HGV trip assignment associated with the Proposed Development;
- **Section 8** presents the highway impact assessment for the Proposed Development; and
- **Section 9** provides a conclusion of the TS.

1.7 Statutory Consultation and Highway Authority Engagement

- 1.7.1 As part of the development of the TS, the Applicant has undertaken proactive engagement with the relevant highway authorities. This consultation was carried out during November 2025 and included meetings with City of Doncaster Council (CDC), Rotherham Metropolitan Borough Council (RMBC), North East Derbyshire District Council (NEDDC), Derbyshire County Council (DCC) and National Highways (NH). The purpose of this engagement was to ensure that the proposed access strategy, routing arrangements and construction traffic planning fully reflect local priorities and strategic network requirements.
- 1.7.2 Across all authorities, the early engagement approach was welcomed and has played a central role in shaping the TS. The feedback received has been incorporated into the refinement of access points, routing strategies, visibility considerations and the emerging **Outline Construction Traffic Management Plan (oCTMP)** [EN0110020/APP/5.12], which will accompany the DCO.

Engagement with City of Doncaster Council

- 1.7.3 A meeting was held with CDC on 04 November 2025 and confirmed their support for the use of established access points and the use of local traffic management measures where required. CDC provided useful advice on permit to work arrangements, visibility requirements and management of construction activities near sensitive frontages.
- 1.7.4 The project team has embedded this advice into the **Outline CTMP** [EN0110020/APP/5.12], ensuring construction traffic is scheduled to avoid locally sensitive periods such as school start and finish times.

Engagement with Rotherham Metropolitan Borough Council

- 1.7.5 A meeting was held with RMBC on 12 November 2025 and RMBC officers provided constructive guidance on preferred access locations and routing through the local highway network. Their feedback supported the use of routes that offer strong alignment, good forward visibility and minimal interface with residential areas. RMBC's input has informed refinement of the proposed access arrangements and confirmed the suitability of the broad routing principles included within this TS.

Engagement with North East Derbyshire District Council

- 1.7.6 A meeting was held with NEDDC on 22 January 2026, during which proposed access points falling within their area of interest were discussed. Only one of the proposed accesses falls within their jurisdiction, located on A618 Rotherham Road, close to Woodall Services. Comments were acknowledged and NEDDC were informed that re-engagement would take place once the project had developed further and more detailed information was available.

Engagement with Derbyshire County Council

- 1.7.7 A meeting was held with DCC on 22 January 2026, during which proposed access points falling within their area of interest were discussed. Only one of the proposed accesses falls within their jurisdiction, located south of Woodall Services on. Comments were acknowledged and DCC were informed that re-engagement would take place once the project had developed further and more detailed information was available.

Engagement with National Highways

- 1.7.8 A meeting was held with National Highways on 06 November 2025, where the Applicant confirmed that vehicles will use the SRN, including the M1, M18 and A1(M). National Highways emphasised the importance of avoiding peak hours on the SRN, and the Applicant has committed to scheduling the majority of construction HGV movements outside these periods. NH also supported the structured approach to preparing an **Outline CTMP [EN0110020/APP/5.12]**, recognising that this will secure the agreed routing and timing strategies.

Summary of Consultation Outcomes

- 1.7.9 The statutory consultation has enabled the Proposed Development to be fully informed by local and strategic transport priorities. Key outcomes include:
- Endorsement of the overall access and routing strategy.
 - Clear guidance on preferred construction traffic timing, now embedded within the **oCTMP [EN0110020/APP/5.12]**.
 - Agreement on the suitability of key access points and visibility arrangements.
 - Confirmation that SRN usage aligns with National Highways' expectations.
 - A collaborative basis for continued engagement as the design progresses.

- 1.7.10 This early and ongoing consultation demonstrates a coordinated and positive approach to transport planning, ensuring the Proposed Development aligns with local expectations and is supported by a robust and collaborative evidence base.

2 POLICY CONTEXT

2.1 Introduction

- 2.1.1 This section of the TS considers transport-related policy and guidance. Further details on relevant policy and legislation are provided in **Volume 3, Appendix 13.1 Legislation, Policy and Guidance [EN0110020/APP/6.20]**.

2.2 National Policy

Overarching National Policy Statement for Energy (NPS EN-1) (2025)²

- 2.2.1 Details of specific key policies within NPS EN-1 that are considered relevant to traffic and transport include:
- Paragraph 5.14.5, which states *“if a project is likely to have significant transport implications, the applicant ES should include a transport appraisal.”*
 - Paragraph 5.14.7, which states *“Applicants should consult with National Highways and Highways Authorities as appropriate on the assessment, including any reasonable future tested scenarios and mitigation to inform the application to be submitted.”*
 - Paragraph 5.14.12 states that *“Where mitigation is needed, possible demand management measures must be considered. This could include identifying opportunities to:*
 - *Reduce the need to travel by consolidating trips;*
 - *Locate development in areas already accessible by active travel and public transport;*
 - *Provide opportunities for shared mobility;*
 - *Re-mode by shifting travel to a sustainable mode that is more beneficial to the network;*
 - *Retime travel outside of the known peak times; and*
 - *Reroute to use parts of the network that are less busy.”*

- 2.2.2 The TS and further assessment will give due consideration to the key elements of this policy, related to traffic and transport.

National Policy Statement for Renewable Energy Infrastructure Energy (NPS EN-3) (2025)³

- 2.2.3 Details of specific key policies within NPS EN-3 that are considered relevant to traffic and transport include:
- Paragraph 2.10.112 states that *“Modern solar farms are large sites that are mainly comprised of small structures that can be transported separately and constructed on-site, with developers designating a compound on-site for the delivery and assemblage of the necessary components.”*

- Paragraph 2.10.115 states that “*Applicants should assess the various potential routes to the Site for delivery of materials and components where the source of the materials is known at the time of application and select the route that is most appropriate.*”
- Paragraph 2.10.116 states that “*Where the exact location of the source of construction materials, such as crushed stone or concrete, is not known at the time of application, applicants should assess the worst-case impact of additional vehicles on the likely potential routes.*”
- Paragraph 2.10.117 states that “*Applicants should ensure all sections of roads and bridges on the proposed delivery route can accommodate the weight and volume of the loads and widths of the vehicles. Although unlikely, where modifications to road and/or bridges are required, these should be identified, and potential effects addressed in the ES*”; and
- Paragraph 2.10.118 states that “*Where a cumulative impact is likely because multiple energy infrastructure developments are proposed to use a common port and/or access route and pass through the same towns and villages, applicants should include a cumulative transport assessment as part of the ES. This should consider the impacts of abnormal traffic movements relating to the Proposed Development in question in combination with those from any other relevant development. Consultation with the relevant local highway authority is likely to be necessary.*”

2.2.4 The TS and further assessment will give due consideration to the key elements of this policy, related to traffic and transport.

National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (2025)⁴

2.2.5 Details of specific key policies within NPS EN-5 that are considered relevant to traffic and transport include:

- Paragraph 2.9.19 states that Applicants should “*...make the design of the access, perimeter fencing, earth-shaping, planting and ancillary development an integral part of the Site layout and design, to fit in with the surroundings.*”

2.2.6 The TS and further assessment will give due consideration to the key elements of this policy, related to traffic and transport.

National Planning Policy Framework (2024)⁵

2.2.7 The National Planning Policy Framework (NPPF) (2024) was originally published in March 2012 and later revised (the latest of which was in February 2025), outlining the Government’s planning policies and how they will be applied.

2.2.8 This TS sets out the key guidance points of relevance to this application. The most relevant paragraphs in the context of transport are set out below:

2.2.9 Paragraph 109 outlines that “*...transport issues should be considered from the earliest stages of plan-making and development proposals*”. This is to ensure that:

- a. The potential impacts of development on transport networks can be addressed;
- b. Opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – e.g. in relation to the scale, location or density of development that can be accommodated;

- c. Opportunities to promote walking, cycling and public transport use are identified and pursued;
 - d. The environmental impacts of traffic and transport infrastructure can be identified, assessed, and considered, including appropriate opportunities for mitigation and net gains in environmental quality; and
 - e. Patterns of movement, streets, parking, and other transport considerations are integral to the design of schemes and contribute to making high-quality places.
- 2.2.10 Paragraph 110 states that significant development should focus on locations that can limit the need to travel and offer a genuine choice of transport modes, though this will vary between urban and rural areas, which should be accounted for in both planning and decision-making.
- 2.2.11 Paragraph 115 outlines the key considerations when assessing sites to be allocated for development in plans or specific development applications. These are:
 - a. Sustainable transport modes are prioritised, taking account of the vision for the Site, the type of development and its location;
 - b. Safe and suitable access can be achieved for all users;
 - c. The design of streets, parking areas, other transport elements and the content of associated standards reflect current national guidance; and
 - d. Any significant impacts from the development on the transport network (in terms of capacity and congestion), or highway safety, can be cost-effectively mitigated to an acceptable degree.
- 2.2.12 Paragraph 116 states that development should only be prevented or refused on highway grounds where there would be an unacceptable impact on highway safety or the residual cumulative impacts of development on the road network would be severe.
- 2.2.13 Within this context, Paragraph 117 states that development applications should:
 - a. Give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;
 - b. Address the needs of people with disabilities and reduced mobility in relation to all modes of transport;
 - c. Create places that are safe, secure, and attractive, which minimise the scope for conflicts between pedestrians, cyclists and vehicles;
 - d. Allow for the efficient delivery of goods, and access by service and emergency vehicles; and
 - e. Be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible, and convenient locations.
- 2.2.14 As outlined in Paragraph 118, all developments that generate significant amounts of movement should be required to provide a Travel Plan, and the application should be supported by a Transport Statement so that the likely impacts of the proposal can be assessed.
- 2.2.15 The TS and further assessment will give due consideration to the key elements of this policy, related to traffic and transport.

2.3 National Guidance

Institute of Environmental Management and Assessment (“IEMA 2023”) Guidelines for the Environmental Assessment of Road Traffic⁶

- 2.3.1 This document offers comprehensive guidelines for the assessment of traffic and movement associated with development projects which require an environmental impact assessment.

Department for Transport (DfT) publication “Design Manual for Roads and Bridges (DMRB)”⁷

- 2.3.2 The DMRB is a collection of standards, advice notes, and other documents that outline the design, assessment, and operation of road infrastructure in the UK.

Department for Transport (DfT) Circular 01/2022: The Strategic Road Network and the Delivery of Sustainable Development;⁸

- 2.3.3 This circular provides guidance to applicants on how to integrate sustainable development principles into the planning and operation of the SRN. This is the key guidance document that is referred to by National Highways.

Planning Practice Guidance on Travel Plans, Transport Assessments and Transport Statement⁹

- 2.3.4 The Government’s Planning Practice Guidance on Travel Plans, Transport Assessments and Transport Statements in Decision Taking (2014) provides advice on when Transport Assessments and Transport Statements are required for planning applications, and what they should contain. The most relevant paragraphs are set out below:
- a. Paragraph 002 states that Travel Plans, Transport Assessments, and Transport Statements are all ways of assessing and mitigating the negative transport impacts of development to promote sustainable development. They are required for all developments which generate significant amounts of movement.
 - b. Paragraphs 004 and 005 state that a TS primarily focuses on evaluating the potential transport impacts of a development proposal and may propose mitigation measures to promote sustainable development and avoid unacceptable or ‘severe’ impacts where necessary.
 - c. Paragraph 006 states that a TS supports national planning policy and can positively contribute to encouraging sustainable travel, reducing traffic generation and detrimental impacts, reducing carbon emissions and climate impacts, creating accessible, connected and inclusive communities, improving health outcomes and quality of life, improving road safety and reducing the need for new development to increase existing road capacity or provide new roads.

- d. Paragraph 007 states that a TS should be established at an early stage and tailored to local circumstances, as well as proportionate to the size and scope of the proposed development. In addition, they should be brought forward through collaborative ongoing working between the local planning authority/transport authority, transport operators, rail network operators, as well as National Highways, where there may be implications for the strategic road network and other relevant bodies.
- e. Paragraphs 013 to 015 provide further details of when a TS is required, how the need and scope of a TS should be established and what information should be included.

2.3.5 The TS and further assessment will give due consideration to the key elements of this policy.

2.4 Local Policy and Guidance

City of Doncaster Council (CDC), Doncaster Local Plan 2015-2035¹⁰

2.4.1 The Doncaster Local Plan 2015-2035 contains the following policies, which are relevant to traffic and transport:

- Policy 12: Strategic Transport Network (Strategic Policy);
- Policy 13: Promoting Sustainable Transport in New Developments (Strategic Policy);
- Policy 16: Cycling in Doncaster;
- Policy 17: Walking in Doncaster;
- Policy 18: Development Affecting Public Rights of Way; and
- Policy 19: Access, Design and Layout of Public Rights of Way.

2.4.2 The TS will be developed in adherence to the above policies.

Rotherham Metropolitan Borough Council (RMBC) Local Plan Core Strategy 2013-2028¹¹

2.4.3 The RMBC Local Plan Core Strategy 2013 - 2035 contains the following policies, which are relevant to traffic and access:

- Policy CS 3: Location of New Development – which establishes factors for consideration in new development, including access to public transport routes and the frequency of services.
- Policy CS 14: Accessible Places and Managing Demand for Travel, which sets out how accessibility will be promoted through the proximity of people to employment.
- Policy CS 15: Routes and the Strategic Road Network – which sets out how the Council will ensure the key routes and motorway network provide efficient access between the main Rotherham Urban Area, Principal Settlements, and the regional and national road network.

- Policy CS 16: New Roads – which sets out how the Council would ensure there will be no significant increase in the physical capacity of the highway network.

2.4.4 The TS will be developed in adherence to the above policies.

Rotherham Metropolitan Borough Council Transport Strategy 2016 - 2026¹²

2.4.5 This document outlines a comprehensive plan to improve transportation within the borough, supporting economic growth, sustainability, connectivity, and sustainable travel.

North East Derbyshire District Council, Adopted Local Plan 2014 – 2034¹³

2.4.6 The plan sets out a description of the area and the issues that North East Derbyshire faces, what kind of place North East Derbyshire might be by 2034 and the Council's policies and proposals to plan and manage growth and development to deal with the issues facing the district, and to achieve the Plan's vision for North East Derbyshire. The local plan also puts emphasis on accessibility and transport, noting key areas of existing congestion such as the A61 corridor and key links with the M1 J29-30.

Derbyshire County Council, Adopted Local Transport Plan 3 2011 – 2026

2.4.7 This plan is based on a long-term transport strategy for Derbyshire County Council's administrative area which looks towards 2026. It provides a basis for transport policy over the next 15 years and will help secure funding for transport initiatives. The strategy starts with identifying a set of challenges for Derbyshire in relation to achieving their transport goals:

- Supporting a resilient local economy
- Tackling climate change
- Contributing to better safety, security and health
- Promoting equality of opportunity
- Improving quality of life and promoting a healthy natural environment.

2.5 Summary

2.5.1 With respect to transport and access, the overarching aims of national and local policy are to ensure that development does not cause detriment to the operation of highway networks, and instead, provide opportunities for travel by sustainable modes.

2.5.2 This TS demonstrates that the Proposed Development aligns with relevant national and local policy, avoiding adverse impacts on highway safety or any severe residual cumulative mitigation on the road network.

3 ACCESSIBILITY APPRAISAL AND EXISTING CONDITIONS

3.1 Overview

- 3.1.1 This section provides a summary of the accessibility of the Study Area via the surrounding highway network, as well as by public transport, cycling and on foot.

3.2 Strategic Road Network

- 3.2.1 There are three roads forming part of Strategic Road Network (SRN) which travel close to or provide access to the Proposed Development.
- 3.2.2 In terms of vehicle routing, these roads will be the origins of trips to the Proposed Development.

A1

- 3.2.3 The A1 spans approximately 410 miles (660km) from London to Edinburgh, passing through major towns and cities such as Peterborough, Doncaster, Newcastle-upon-Tyne, and Berwick-upon-Tweed. The A1 includes sections that are designated as A1(M), which are upgraded to motorway standards.
- 3.2.4 Junction 36 of the A1 (M) will be utilised to provide SRN routing onto the local highway network for W1.

M18

- 3.2.5 The M18 motorway is a key route in Yorkshire, stretching approximately 26 miles (42km) from the east of Rotherham to Goole in a north-east to south-west direction. It connects several major motorways, including the M1, A1(M), M180, and M6212.
- 3.2.6 Junction 1 of the M18 motorway will be utilised to provide SRN routing onto the local highway network for W1 and W2.

M1

- 3.2.7 The M1 motorway connects London to Leeds and spans approximately 193 miles (311km). The motorway passes through several counties, including Greater London, Hertfordshire, Bedfordshire, Buckinghamshire, Northamptonshire, Leicestershire, Nottinghamshire, Derbyshire, and Yorkshire. It also intersects with other major motorways such as the M25, M6, M69, M18, M62, and M621.
- 3.2.8 Junction 31 of the M1 motorway will be utilised to provide SRN routing onto the local highway network for W2 and W3. Junction 33 will also provide routing to W2.

3.3 Local Highway Network

- 3.3.1 Once vehicles have left the SRN, they will be routed via the local road network, following the devised routing strategy, managed as part of the **Outline CTMP**

[EN0110020/APP/5.12]. The primary routes to be used are set out below for each section of the Proposed Development.

- 3.3.2 It should be noted that during the evolution of the scheme since Draft ES, certain roads that were initially included within the study area (that could potentially be used as construction access routes) were removed. This includes those that were originally within the description section below.

W1 (Northern Site)

A630

- 3.3.3 The A630 High Road is a major road providing access to residential and commercial areas. Street lighting is present, and the road supports two-way traffic. It runs west of the A1(M) Junction 36 in an east-west direction, connecting areas such as Warmsworth and Conisbrough. The speed limit varies, with sections having a limit of 40 mph through residential areas and 50 mph in all other areas.

Hellaby Lane

- 3.3.4 Hellaby Lane is a local road providing access to residential and employment areas, between ella Lane to the north and Denby Way / A631 Bawtry Road junction to the south. Street lighting is present, and the road supports two-way traffic. The speed limit is 30mph.

B6093

- 3.3.5 The B6093 is a secondary road, which connects the A630 with residential areas such as Woodlaithes and Bramley. Street lighting is present in urban sections, and the road supports two-way traffic. The speed limit varies between 40mph and down to 30mph through the residential areas.

W2 (Central Site)

A57

- 3.3.6 The A57 is a major road in northern England running from Liverpool to Lincoln, passing through cities like Manchester and Sheffield. Street lighting is present along urban sections, and the road supports two-way traffic. The speed limit is national speed limit of up to 60mph along the majority of the road sections.

A631

- 3.3.7 The A631 is a primary route and within the vicinity of the Proposed Development is a segregated dual carriageway, running between the M18 Junction 1 and Stag Roundabout (A6021 Wickersley Rd / A6123). Street lighting is present throughout, and the speed limit is 40mph along the majority of the road.

Flash Lane

- 3.3.8 Flash Lane is a secondary route between A631 Bawtry Lane to the north and the Slack Lane / Sandy Lane junction to the south. Street lighting is present, and the

road supports two-way traffic. The speed limit is 30mph along the majority of the road sections.

Long Lane

- 3.3.9 Long Lane is a local road providing access to agricultural zones. It runs from the A631 to the north, under the M1 and towards Treeton. Street lighting is present in residential areas, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

A618

- 3.3.10 The A618 is a secondary road serving residential and agricultural areas. Street lighting is present in residential areas, and the road supports two-way traffic. The road varies between single and dual carriageway, and the speed limit also varies between 30mph and 50mph.

Gulthwaite Common Lane

- 3.3.11 Gulthwaite Common Lane is a local road connecting the A618 with agricultural zones. There is no street lighting present, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Reservoir Road

- 3.3.12 Reservoir Road is a local road running from the A618 and over Ulley Reservoir to Ulley Lane. No street lighting is available, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Main Street

- 3.3.13 Main Street in Ulley is a local road serving residential areas and providing access to local schools and parks. Street lighting is present, and the road supports two-way traffic. The speed limit is 30 mph.

Penny Hill Lane

- 3.3.14 Penny Hill Lane is a local road providing access to residential areas and local amenities. Street lighting is present in residential areas, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Brampton Lane

- 3.3.15 Brampton Lane is a local road connecting residential areas with agricultural zones. No street lighting is present, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Common Lane (south of Thurcroft)

- 3.3.16 Common Lane is a secondary road serving residential areas and local businesses south of Thurcroft between Wood Lane / Brampton Lane and Penny Hill Lane / Hawk Hill Lane. No street lighting is present, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Long Road

- 3.3.17 Long Road is a local road providing access to agricultural zones. No street lighting is present, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Todwick Road

- 3.3.18 Todwick Road, between Pocket Handkerchief Lane and A57, is a secondary road serving residential and commercial areas. Street lighting is present in residential areas, and the road supports two-way traffic. The speed limit varies between 40 mph and national of up to 60mph.

Pocket Handkerchief Lane

- 3.3.19 Pocket Handkerchief Lane is a local road providing access to agricultural zones. No street lighting is present, and the road supports two-way traffic. road is subject to the national speed limit of up to 60mph.

W3 (Southern Site)

A57

- 3.3.20 The A57 is described above in the W2 section at paragraph 3.3.6.

A618

- 3.3.21 The A618 is described above in the W2 section at paragraph 3.3.10.

Kiveton Lane

- 3.3.22 Kiveton Lane is a local road serving residential areas and providing access to local schools and parks. Street lighting is present in residential areas, and the road supports two-way traffic. The speed limit varies between 30 and 40 mph.

Woodall Lane

- 3.3.23 Woodall Lane is a local road serving residential areas and providing access to local amenities. Street lighting is present in residential areas, and the road supports two-way traffic. The speed limit is up to 30 mph.

Killamarsh Lane

- 3.3.24 Killamarsh Lane is a secondary road providing access to agricultural zones. No street lighting is present, and the road supports two-way traffic. The road is subject to the national speed limit of up to 60mph.

Walseker Lane

- 3.3.25 Walseker Lane is a local road serving residential areas and providing access to housing. Street lighting is present, and the road supports two-way traffic. The speed limit is up to 30 mph.

3.4 Baseline Traffic Flows

- 3.4.1 Automatic Traffic Counts (ATCs) were undertaken in June 2025 for a duration of 7 days (24 hours per day) in order to assess the current traffic volumes of roads that would potentially be used by traffic associated with the construction, operation (and maintenance) and decommissioning periods. The counts were undertaken by Nationwide Data Collection.
- 3.4.2 **Appendix A.1 ATC Locations** of this TS provides a plan showing the locations of the ATCs.
- 3.4.3 The 2025 baseline two-way average daily flows are presented below in **Table 3-1**.
- 3.4.4 It should be noted that during the evolution of the scheme since Draft ES, certain ATCs that were initially included within the study area (that could potentially be used as construction access routes) were removed. Following removal, the numbering of ATCs has been kept the same for consistency, explaining the missing ATC numbers.
- 3.4.5

Table 3-1 2025 Average Daily Two-Way Movements (AADT Baseline)

ATC No.	Road Link	Total	HGV	% HGV
1	A630 High Road	26,257	556	2%
2	A630 Sheffield Road (Between Edlington Ln and Low Rd)	15,147	321	2%
12	Common Lane	5,137	41	1%
13	Hellaby Lane	5,366	132	2%
14	B6093	6,815	24	0%
15	A630 Doncaster Road (Between Old Rd and B6093)	13,332	178	1%
16	A630 Sheffield Road (Between Holywell Ln and Old Rd)	11,382	165	1%
17	A631 (Between M18 and Flash Ln)	29,393	887	3%
18	Moor Lane South	11,438	60	1%
19	Flash Lane	7,502	130	2%
20	A631 (Between Flash Ln and B6060)	26,417	664	3%
21	A631 (Between B6060 and A6123)	30,248	666	2%
22	A631 (Between A6123 and A618)	26,710	541	2%
23	A631 (Between A618 and Long Ln)	30,990	732	2%
24	Long Lane	1,462	11	1%
25	A630 Rotherway	34,488	2643	8%
26	A618 (Between A631 and Gulthwaite Common Ln)	13,309	68	1%
27	Gulthwaite Common Lane	944	6	1%
28	Reservoir Road	914	4	0%
29	A618 (Between Reservoir Rd and Treeton Ln)	14,069	105	1%

WHITESTONE SOLAR FARM

ATC No.	Road Link	Total	HGV	% HGV
31	Main Street Ulley	1,705	40	2%
32	Penny Hill Lane, West of M1	2,030	20	1%
33	Penny Hill Lane, East of M1	1,399	3	0%
34	Brampton Lane	540	2	0%
35	Common Lane South	2,812	17	1%
36	Long Road	3,650	21	1%
40	Todwick road Between Pocket Handkerchief Ln And A57	16,275	335	2%
41	Pocket Handkerchief Lane	2,113	33	2%
44	A57 (Near Greenscen Side Farm)	25,257	955	4%
45	A57 (West of Mill Ln)	25,144	940	4%
46	A57 (Between Todwick Rd and M1)	38,086	3149	8%
47	Kiveton Lane	6,425	60	1%
48	A57 (Between M1 and A618)	24,262	661	3%
52	B6060 (North of Second Ln)	9,400	65	1%
53	B6060 (South of Second Ln)	6,300	38	1%
54	Field Lane	1,360	14	1%
55	A618 (North of B6059)	15,923	220	1%
56	A618 (South of B6059)	11,881	196	2%
59	Kiveton Lane	6,154	44	1%
60	Hard Lane (North)	4,546	17	0%
61	Hard Lane (South)	4,412	17	0%
62	Woodall Lane	1,958	5	0%
66	A618 (North)	7,161	85	1%
67	A618 (South)	4,807	51	1%
68	Loverose Way	409	9	2%
69	A630	8,509	161	2%
72	Slacks Lane	27	0	2%
73	Morthen Lane	1,119	5	0%
74	Ulley Lane	364	1	0%
75	Common Lane (North)	2,806	10	0%
76	Hawk Hill Lane (West)	1,452	4	0%
77	Hawk Hill Lane (East)	1,486	27	2%
78	Killmarsh Lane	2,116	7	0%
80	Lidget Lane	2,914	13	0%
81	Long Lane	1,463	8	1%
82	Pleasley Road	13,097	122	1%
83	B6060 Morthen Road	11,783	74	1%

ATC No.	Road Link	Total	HGV	% HGV
84	Sandy Lane	3,331	6	0%
85	Newhall Lane	563	14	3%
86	A631	29,698	965	3%
87	Cumwell Lane	6,075	183	3%
89	Bramley Lane	1,833	11	1%
90	Common Lane	6,605	191	3%

3.5 Collision Review

- 3.5.1 Road collision data over the latest available six-year period (2019-2024) has been obtained from the Department for Transport (DfT) Mapping Application for Visualising Road Injury Casualties (MAVRIC) platform¹⁴. The data shows the number of collisions on the relevant roads in the Study Area, which is based on the ATC locations.
- 3.5.2 A total of 439 collisions occurred over the six years within the Study Area. These collisions are categorised by collision severity (slight, serious, and fatal). A slight collision is where at least one person has been slightly injured. A serious collision is where at least one person has been seriously injured, and a fatal collision is where at least one person has been killed.
- 3.5.3 **Table 3-2** presents the number of collisions and the level of severity for each year within the Proposed Development's study area. The greatest number of collisions occurred during 2019, with a total of 85 collisions recorded, with six of these collisions classed as fatal.

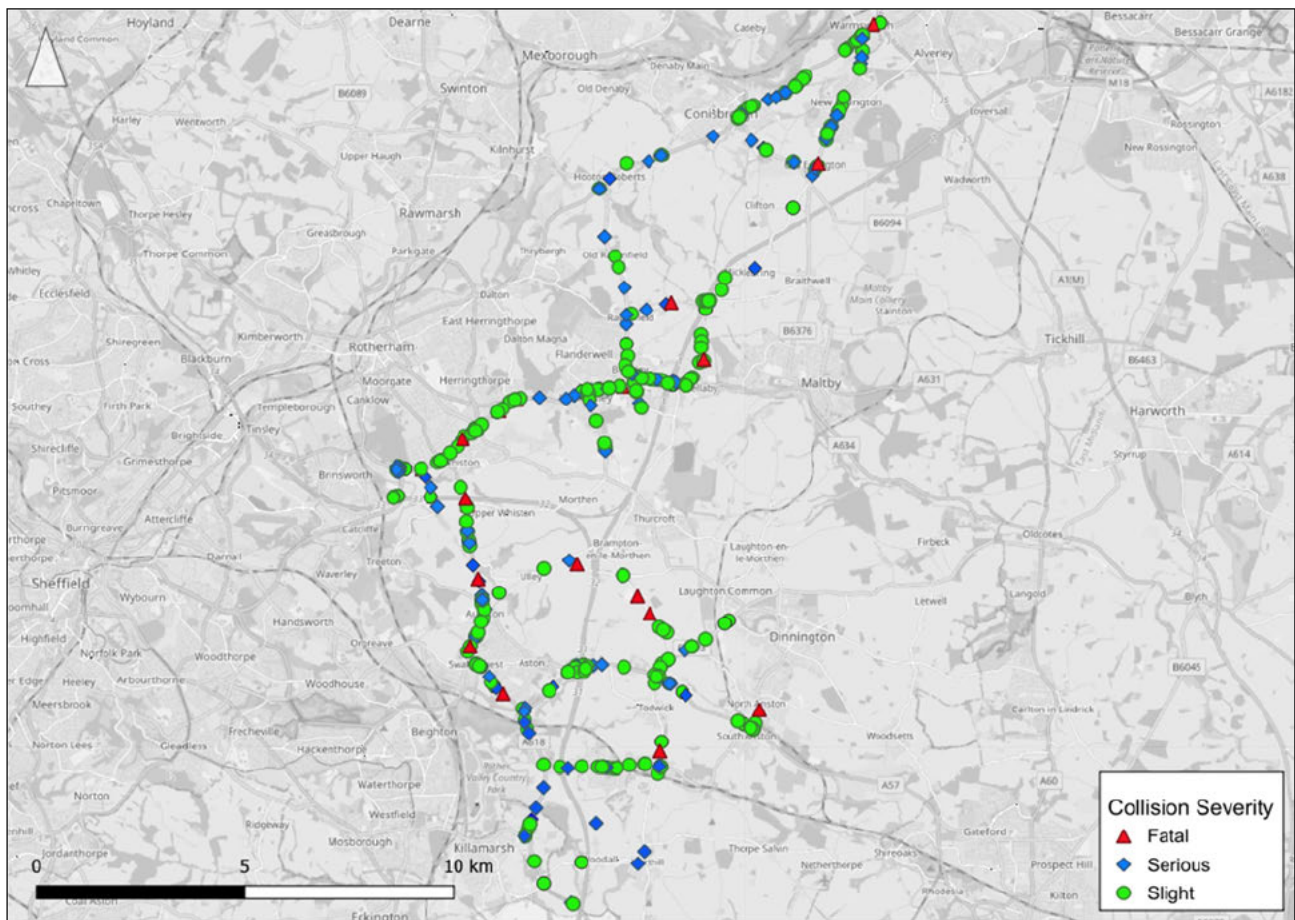
Table 3-2 Summary of Collision Data by Year (2019-2024)

Year	Slight	Serious	Fatal	Total
2019	59	20	6	85
2020	35	18	2	55
2021	50	20	4	74
2022	62	19	1	82
2023	41	28	5	74
2024	46	22	1	69
Total	293	127	19	439

Source: DfT

- 3.5.4 An overview map of collisions is presented in **Plate 3-1**.

Plate 3-1 Study Area Collision Overview



3.5.5 The following sections break down the collisions by each portion of the Proposed Development (Northern, Central and Southern).

W1 (Northern Site) Study Area

3.5.6 Table 3-3 shows the collisions on roads within the Northern Site Study Area.

Table 3-3 Collisions within the W1 Study Area (2019-2024)

Road Name	Slight	Serious	Fatal	Total
A631 Worrygoose Roundabout to M18 Junction 1 (4.86km distance along road)	49	18	3	70
B6060	7	3	0	10
Flash Lane to Slack's Lane	3	1	0	4
Hellaby Lane	10	0	1	11
B6093 Bramley	10	4	0	14
B6093 Ravenfield	2	2	0	4
Braithwell Road / Common Lane	8	5	1	14
A630 Hooton Roberts to Conisbrough (Clifton Hill Junction) (3.86km distance along road)	8	8	0	16

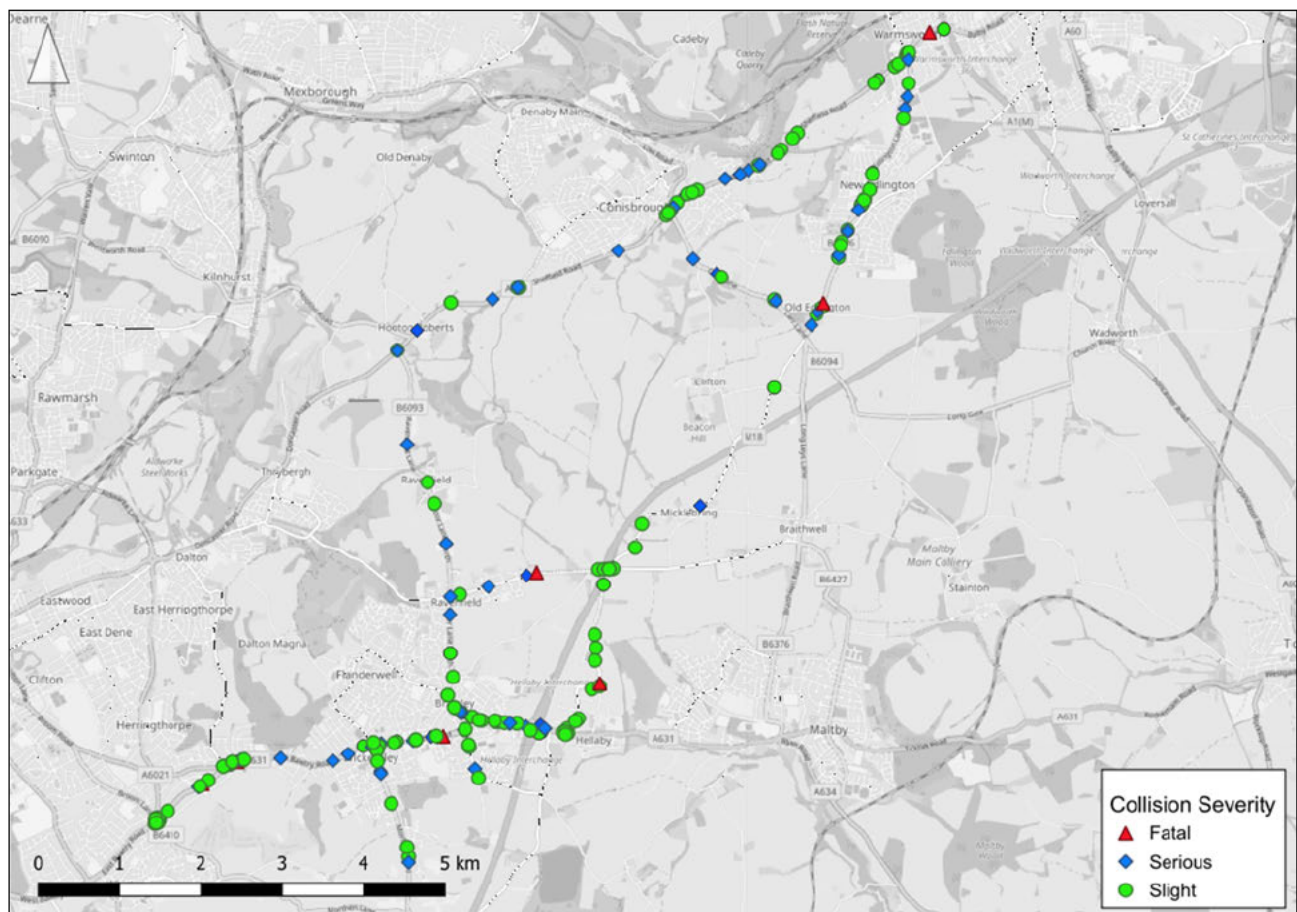
WHITESTONE SOLAR FARM

Road Name	Slight	Serious	Fatal	Total
Park Lane	0	0	0	0
A630 Conisbrough to Warmsworth	16	8	1	25
B6094	0	1	0	1
Denbrook Lane / Common Lane	0	0	0	0
Carr Lane	2	2	0	4
Shipman Balk	0	0	0	0
Beacon Lane	0	0	0	0
B6376 Edlington Lane	21	9	1	31
Ruddle Lane	4	2	0	6

Source: DfT

3.5.7 The collisions in this Study Area are presented below in **Plate 3-2**.

Plate 3-2 W1 Collision Map



3.5.8 The A631, between Worrigoose Roundabout and the M18 Junction 1, had the highest number of collisions (70) over the six-year period. This stretch of the road is approximately 4.9km.

- 3.5.9 In terms of vehicle routing for the Proposed Development, 53 two-way trips are proposed to travel through a small section (780m) of this A631 link (between the M18 Junction 1 and Flash Lane). A total of 20 two-way trips are also proposed between Flash Lane and Wickersley Roundabout, and 28 two-way trips between Wickersley Roundabout and Worrygoose Roundabout.
- 3.5.10 Although this route includes a stretch with a relatively high collision history, the proposed routing utilises only short segments of the A631, thereby limiting exposure to any perceived risks. Furthermore, the trips are distributed across different sections of the link, reducing concentrated traffic impacts.
- 3.5.11 The 40mph speed limit and existing residential context should also serve to encourage cautious driving behaviour, which, combined with the relatively low number of proposed trips, supports the continued use of this route from a safety perspective.

W2 (Central Site) Study Area

3.5.12 Table 3-4 shows the collisions on roads within the Central Site Study Area.

Table 3-4 Collisions within the W2 Study Area (2019-2024)

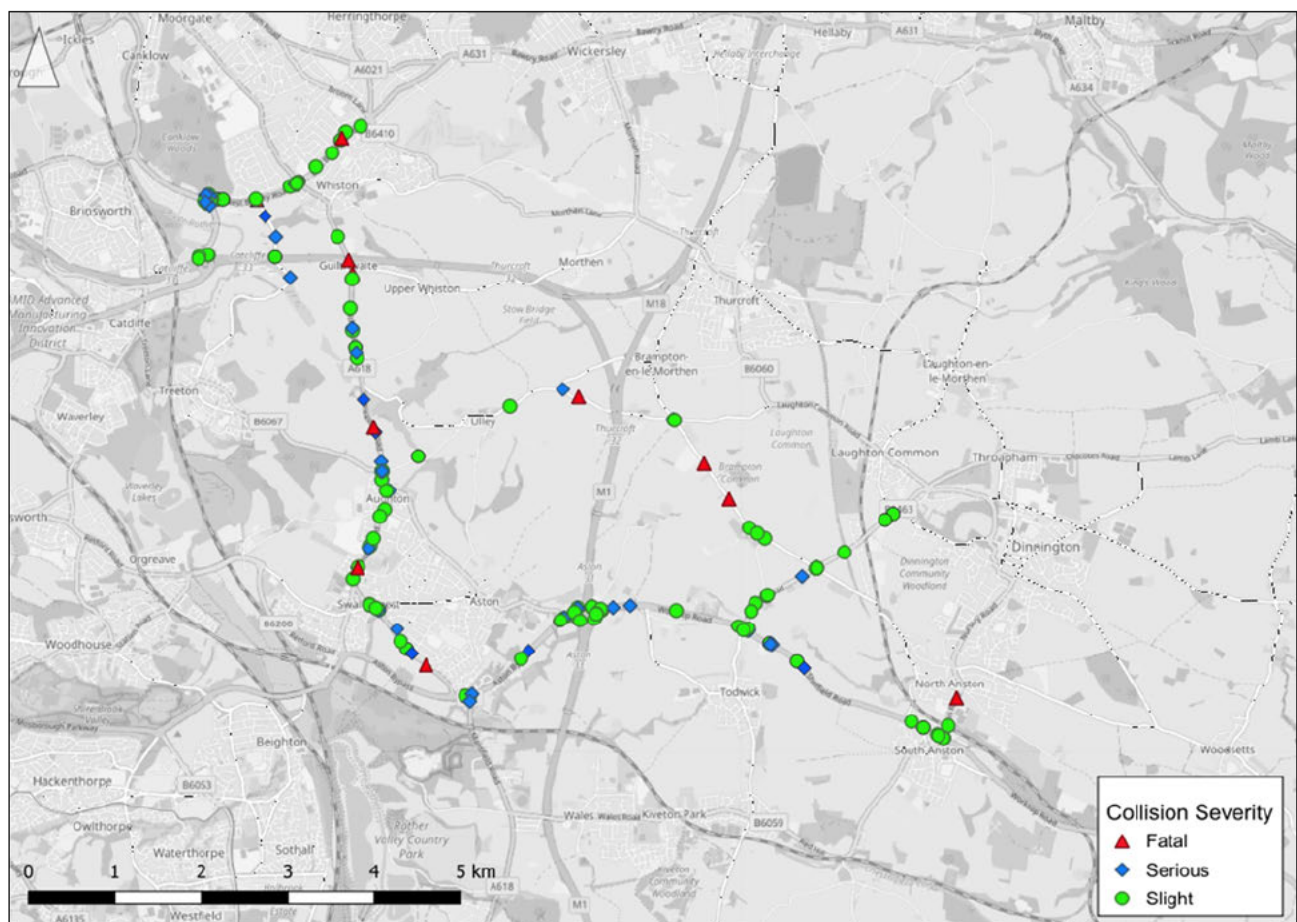
Road Name	Slight	Serious	Fatal	Total
A618 Aston Bypass to Aston Lane (Aughton) Junction	15	8	2	25
A618 Aston Lane (Aughton Junction) to A631 Junction	10	8	3	21
A57 Aston Bypass (Mansfield Road Junction) to M1 Junction 31	24	6	0	30
A57 Worksop Road	8	3	0	11
A57 (Todwick Roundabout) to Ryton Road Junction	13	6	0	19
Ryton Road	1	0	1	2
Main Street	0	0	0	0
New Road	0	0	0	0
Penny Piece Lane	0	0	0	0
Cramfit Road	0	0	0	0
Common Road	2	1	0	3
Long Road	3	2	2	7
Todwick Road	11	3	0	14
Penny Hill Lane	1	1	1	3
Hawk Hill Lane	0	0	0	0
Brampton Lane	0	0	0	0
Reservoir Road	0	0	0	0

Road Name	Slight	Serious	Fatal	Total
Ully Lane	1	0	0	1
Treaton Lane	0	0	0	0
Gulthwaite Common Lane	0	0	0	0
Field Lane	0	0	0	0
Second Lane	0	0	0	0
Long Lane	1	3	0	4
A630 (Rotherway Roundabout) to M1 Junction 33	11	5	0	16
A631 (Rotherway Roundabout) to Worrygoose Roundabout	16	2	2	20

Source: DfT

3.5.13 The collisions in this Study Area are presented below in **Plate 3-3**.

Plate 3-3 W2 Collision Map



3.5.14 While the A57 Aston Bypass has the highest number of recorded collisions (30) within the study period, the proposed routing involves a relatively low number of trips (60 two-way movements throughout the day), which helps limit additional exposure to risk.

3.5.15 Importantly, no trips from the Proposed Development are assigned to the A618 Aston Lane section of road, where the highest number of fatalities occurred (3 fatal collisions), thereby avoiding the area with the most critical safety concern.

W3 (Southern Site) Study Area

3.5.16 Table 3-5 shows the collisions on roads within the Southern Site Study Area.

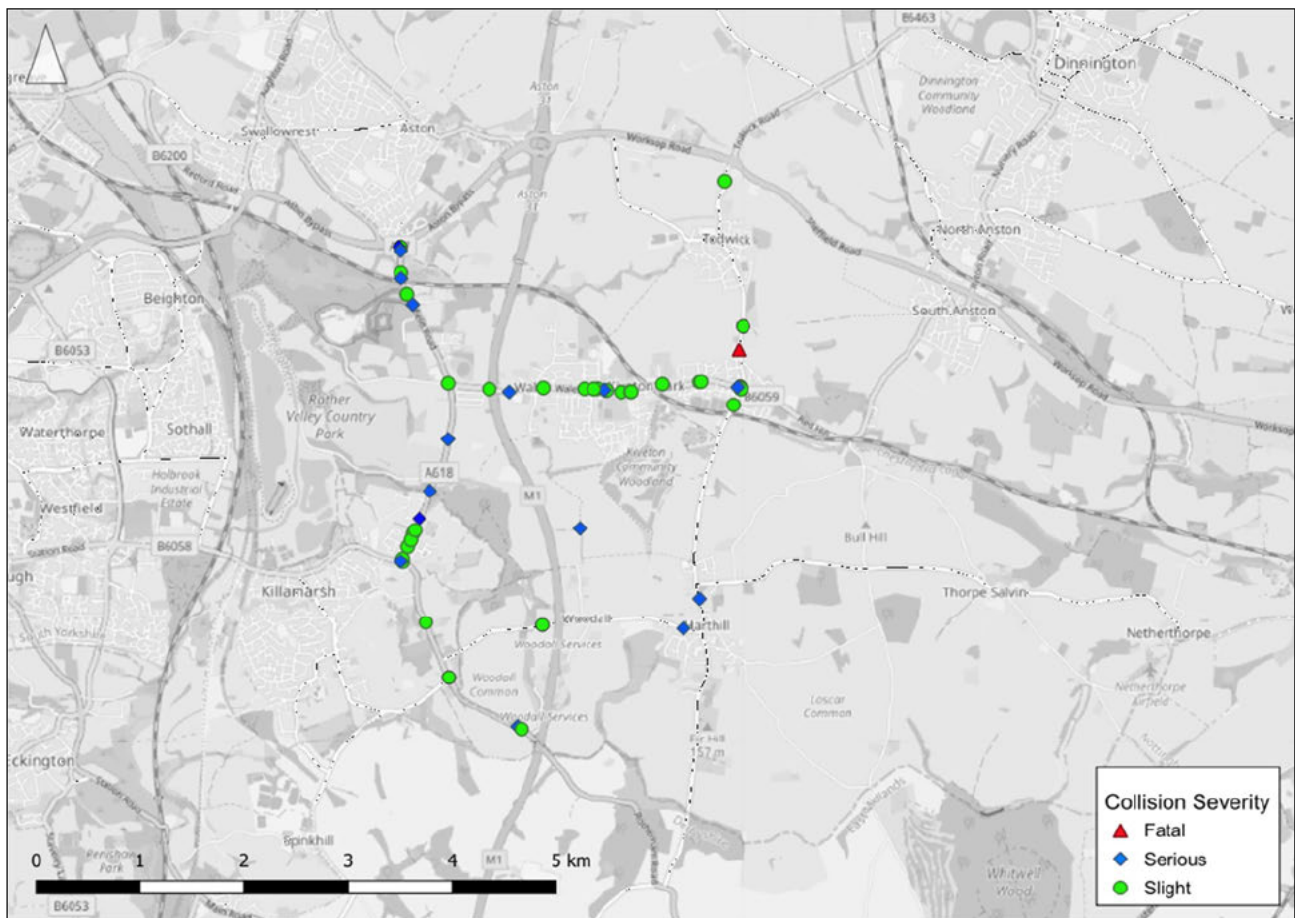
Table 3-5 Collisions within the W3 Study Area (2019-2024)

Road Name	Slight	Serious	Fatal	Total
A618 Aston Bypass to B6058 Junction	10	8	0	18
B6059	16	4	0	20
Church Street / Walseker Lane	0	1	0	1
Kiveton Lane	2	0	1	3
Hard Lane	2	1	0	3
Woodall Lane	0	1	0	1
Dowcarr Lane	0	0	0	0
A618 / B6058 Junction to Loverose Way Junction	3	1	0	4
White Rose Way	0	0	0	0
Loverose Way	0	0	0	0
Killamarsh Lane	1	0	0	1

Source: DfT

3.5.17 The collisions in this Study Area are presented below in **Plate 3-4**.

Plate 3-4 W3 Collision Map



- 3.5.18 The B6059 recorded the highest number of collisions (20), while Kiveton Lane had the most fatalities, with 1 fatal collision out of a total of 2 collisions.
- 3.5.19 No vehicle trips associated with the Proposed Development are proposed to travel along the B6059. 16 two-way trips are proposed to travel along Kiveton Lane through the daily peak construction phase. This increase is relatively low and temporary.
- 3.5.20 Overall, based on the information available from the DfT, the roads that have high numbers of recorded collisions are generally the busier, higher-speed-limit roads.

Junction Collision Clusters

- 3.5.21 It can be noted that some junction locations show evidence of collision clustering. These locations are summarised below in **Table 3-6**.

Table 3-6 Junction Collision Clusters (2019-2024)

Junction	Section	Slight	Serious	Fatal	Total
A630 Sheffield Road / Clifton Hill / Low Road	W1	7	2	0	9
A630 Sheffield Road / Mill Lane / Edlington Lane		8	0	0	8
Common Lane / Moor Lane / Hellaby Lane		6	3	0	9

Junction	Section	Slight	Serious	Fatal	Total
Bawtry Road / Denby Lane		6	0	0	6
Bawtry Road / Northfield Lane		8	4	0	12
A631 East Bawtry Road / Broom Lane / Worrygoose Lane		13	1	0	14
A631 West Bawtry Road / Rotherway	W2	7	5	0	12
A57 Worksop Road / M1 (Aston Interchange)		23	1	0	24
A57 Worksop Road / Todwick Road		6	1	0	7
Todwick Road / Common Road		4	2	0	6
A57 Sheffield Road / Ryton Road		7	2	0	9
A631 East Bawtry Road / West Bawtry Road / Pleasley Road		8	2	0	10
W3 has no additional junction collision clusters.					

- 3.5.22 Several junctions expected to be used by the Proposed Development have recorded collisions, with all involving slight or serious injuries and no fatalities. The junction with the highest number of collisions is the A57 Worksop Road / M1 (Aston Interchange), with 24 collisions, followed by A631 West Bawtry Road / Rotherway and A631 East Bawtry Road / Broom Lane / Worrygoose Lane with 14 collisions, both of which provide routing for W1 and W2 traffic.
- 3.5.23 Details of collision causation factors are included within **Appendix A.2 Collision Causation Factors**.
- 3.5.24 To ensure safe integration of Proposed Development traffic, a range of mitigation measures would be explored where necessary. Potential measures to be explored could include enhanced signage and road markings to improve driver awareness, signal timing reviews to reduce congestion and conflict points, and visibility improvements through lighting upgrades and vegetation clearance. These proactive steps would support the safe use of these junctions and demonstrate a commitment to minimising risk as part of the Proposed Development.

3.6 Public Transport Accessibility

- 3.6.1 This section outlines the accessibility of the Study Area in terms of public transport.

Bus

- 3.6.2 There are numerous bus stops within the vicinity of the Proposed Development. Given the scale and nature of the Proposed Development, the feasibility of travel by bus is dependent on the location that workers will be travelling to and from. The buses that currently serve the Study Areas are outlined below.
- 3.6.3 Within the vicinity of W1 (Northern Site) (within 400m of the nearest access point), the no. X3 bus service, operated by First South Yorkshire, runs between Sheffield Interchange and Doncaster Frenchgate Interchange. It travels via Meadowhall, Rotherham Interchange, Thrybergh, Conisbrough, and Balby. The service operates

at regular intervals, typically every 30 minutes during daytime hours. It connects with other local and regional transport services at major interchanges.

- 3.6.4 Within the vicinity of W2 (Central Site) (within 400m of the nearest access point), the no. 20 bus service, operated by TM Travel, runs between Rotherham Interchange and Dinnington Interchange. It serves locations including Whiston, Ulley, Thurcroft, Brookhouse, Laughton-en-le-Morthen, Laughton Common, and Woodsetts, with some journeys extending to Firbeck, Letwell, and Gildingwells. The route includes a hail-and-ride section in rural areas and operates at scheduled intervals throughout the day.
- 3.6.5 Within the vicinity of W3 (Southern Site) (within 400m of the nearest access point), the no. X30 bus service, operated by TM Travel, runs between Rotherham Interchange and Crystal Peaks, via Whiston, Aughton, Swallownest, Aston, Wales, and Kiveton Park. It links Rotherham with southeast Sheffield suburbs and retail centres.
- 3.6.6 Based on the above information, travel by bus may be a feasible option for some workers. However, this will be dependent on the access point that the workers are travelling to and from within the Proposed Development.

Rail

- 3.6.7 There are several railway stations within the surrounding vicinity of the Proposed Development. These include:
- Conisbrough Railway Station – approximately 3km from the Proposed Development nearest access point (W1);
 - Kiveton Bridge Railway Station – approximately 1.5km from the Proposed Development nearest access point (W3) (4km from W2); and
 - Kiveton Park Railway Station – approximately 2km from the Proposed Development nearest access point (W3) (4km from W2).
- 3.6.8 The timetables for these railway stations are presented below in **Table 3-7**, **Table 3-8**, and **Table 3-9**.

Table 3-7 Conisbrough Railway Station Timetable (Near W1)

Route	Key Destinations	First Train	Last Train	Frequency	Operator
Sheffield → Scunthorpe	Rotherham, Doncaster, Adwick, Scunthorpe	05:45	22:45	Hourly (approx.)	Northern
Sheffield → Hull	Doncaster, Goole, Hull	06:10	21:40	Hourly (approx.)	Northern
Scunthorpe → Sheffield	Adwick, Doncaster, Rotherham, Sheffield	06:00	23:00	Hourly (approx.)	Northern
Hull → Sheffield	Goole, Doncaster, Sheffield	05:50	21:15	Hourly (approx.)	Northern

Table 3-8 Kiveton Bridge Railway Station Timetable

Route	Key Destinations	First Train	Last Train	Frequency	Operator
Sheffield → Lincoln	Woodhouse, Worksop, Gainsborough, Lincoln	05:50	22:50	Hourly (approx.)	Northern

Route	Key Destinations	First Train	Last Train	Frequency	Operator
Lincoln → Sheffield	Gainsborough, Worksop, Woodhouse, Sheffield	06:10	22:30	Hourly (approx.)	Northern

Table 3-9 Kiveton Park Railway Station Timetable

Route	Key Destinations	First Train	Last Train	Frequency	Operator
Sheffield → Lincoln	Woodhouse, Worksop, Gainsborough, Lincoln	05:48	22:48	Hourly (approx.)	Northern
Lincoln → Sheffield	Gainsborough, op, Woodhouse, Sheffield	06:05	22:25	Hourly (approx.)	Northern

3.6.9 Based on the above information, travel by rail may be a feasible option for some workers. However, this will be dependent on the access point that the workers are travelling to and from within the Proposed Development.

3.7 Walking, Cycling and Equestrian Accessibility

- 3.7.1 This section outlines the accessibility of the Study area in terms of walking, cycling and equestrian activity and the impacts of construction and operation (and maintenance) on these links.
- 3.7.2 The potential for construction and operational workers to live locally and travel sustainably to / from the Site is also considered.
- 3.7.3 There are several Public Rights of Way (PRoW) which either cross or pass close to the Proposed Development. It is acknowledged that the presence of construction plant and equipment in works areas adjacent to PRoW during the construction phase may temporarily reduce the amenity value of the paths. However, it is anticipated that these effects would be temporary and short-term.
- 3.7.4 None of these routes will require permanent closure as a result of the construction, operation (and maintenance), or decommissioning of the Proposed Development. However, some temporary diversions and user management may be required to ensure the safe and uninterrupted usage of these routes throughout the construction phase. An **outline PRoW Management Plan (oPRoWMP) [EN0110020/APP/5.14]** will be provided as part of the DCO application, showing the interface between these routes and the Proposed Development.
- 3.7.5 Information on PRoWs in the Study Area (which contains PRoWs that either cross or pass close to the Proposed Development) has been obtained from:
- City of Doncaster (CDC) PRoW Map;
 - Rotherham Metropolitan Borough Council (RMBC) PRoW Map; and
 - North East Derbyshire PRoW Map.

Walking

- 3.7.6 In terms of walking, the PRoW Footpaths that run within or close to the Proposed Development are identified below:
- Braithwell Footpath No.1

- Conisbrough Parks Footpath No.3
- Conisbrough Parks Footpath No.5
- Conisbrough Parks Footpath No.8
- Conisbrough Parks Footpath No.14
- Conisbrough Parks Footpath No.16
- Wickersley Footpath No.9
- Wickersley Footpath No.8B
- Treeton Footpath No.4
- Ulley Footpath No.2
- Ulley Footpath No.3
- Ulley Footpath No.4
- Ulley Footpath No.5
- Whiston Footpath No.21
- Aston Footpath No.13
- Aston Footpath No.16
- Aston Footpath No.19
- Aston Footpath No.21
- Thurcroft Footpath No.8
- Thurcroft Footpath No.10
- Harthill Footpath No.3
- Harthill Footpath No. 5
- Harthill Footpath No. 30

3.7.7 The following PRow Bridleways, which can also facilitate cyclist and equestrian movements, have been identified:

- Conisbrough Parks Bridleway No.4
- Conisbrough Parks Bridleway No.14
- Whiston Bridleway No.20
- Aston Bridleway No.18
- Thurcroft Bridleway No.9
- Harthill Bridleway No.4

Cycling

3.7.8 A review of Sustrans' National Cycle Network (NCN) map indicates that a short section of the NCN Route 6 passes through the Site near Ulley and Woodall.

3.7.9 As per paragraph 3.7.7, the bridleways listed can also provide routing for cyclists.

Equestrian

- 3.7.10 Bridleways are designated paths in the UK countryside that legally permit equestrian use, allowing horse riders to travel safely off-road.
- 3.7.11 As per paragraph 3.7.7, the bridleways listed can provide routing for equestrian users.

3.8 Summary

- 3.8.1 In summary, there are opportunities for construction workers to travel to and from the Proposed Development via sustainable transport modes. However, the viability of these transport options will be dependent on the location of the Site that they will be accessing. The impact of construction and operation and maintenance on the existing links has also been considered.
- 3.8.2 For some Sites, opportunities to support sustainable travel are mostly related to car sharing and the potential for the contractor to operate a worker minibus.
- 3.8.3 Whilst the level of cycling will be dependent on where people live and the part of the Site that they are working on, there are a fair number of properties within a good cycling distance, e.g. for W1 there is Conisbrough - ~15 mins / Bramley ~20 mins / New Edlington - ~20 mins - 30 mins.
- 3.8.4 Bridleways and quiet roads provide the opportunity for cycling, particularly in the summer, therefore usage of these routes would be promoted to workers travelling by bicycle.

4 THE PROPOSED DEVELOPMENT

4.1 Overview

- 4.1.1 This section of the TS provides further details of the Proposed Development, including the proposed programme and access arrangements. Reference should be made to **Volume 1, Chapter 5: The Proposed Development [EN0110020/APP/6.5]**.

4.2 Proposed Development Summary

- 4.2.1 The Proposed Development involves the construction, operation and maintenance, and decommissioning of more than 100 MW of solar photovoltaic (PV) array, Battery Energy Storage System (BESS), onsite substations and supporting infrastructure, and grid connection infrastructure. The grid connection infrastructure would connect the Proposed Development to the National Grid at the new National Grid substation Brinsworth (Long Lane 400kV Substation), located east of Long Lane, Rotherham. National Grid have applied to Rotherham Metropolitan Borough Council for the development of this new substation which is intended by National Grid to be operational in time for the Proposed Development to connect in 2029. This substation is therefore not included in the Proposed Development and will be subject to a separate planning application taken forward by National Grid.

4.3 Programme and Phasing

- 4.3.1 The construction phase for the whole Proposed Development is expected to span approximately 24 to 36 months. While the exact timeline will depend on various factors, including the submission and determination of the DCO, the current plan is to commence construction in 2027 and conclude by 2029 (with the DCO submission having been submitted in May 2026). However, construction activity, and therefore peak construction traffic, will only occur in any one location for a limited portion of this overall 24–36 month period, as works will progress sequentially across the site.
- 4.3.2 The worst-case traffic is currently expected to be during the peak construction period between mid-2028 and mid-2029. Therefore, for the purposes of this assessment, it has been assumed that 2028 is the peak construction year to allow for delays that may occur.
- 4.3.3 The earliest date of operation would be 2029, in line with the grid connection date for the Proposed Development.
- 4.3.4 Once construction is complete, the operational phase will generate negligible levels of traffic, limited to occasional maintenance visits by service vehicles. In the decommissioning phase, which will occur at the end of the solar farm's operational life of 60 years, there will be a short-term increase in traffic similar to the construction phase, as equipment is removed and the Site is restored.

4.4 Vehicle Types, Plan Requirements and Abnormal Loads

- 4.4.1 It is expected that construction vehicles accessing the Proposed Development will consist of the following:
- Cars;
 - Small vans;
 - 10 m rigid vehicles;
 - Max articulated lorries (HGVs);
 - Tractor-trailer vehicle (up to 12 m in length) (for internal or ad-hoc movements of materials on the road network);
 - Mobile cranes;
 - Excavators and earthworks machinery; and
 - Abnormal Indivisible Loads (AILs).
- 4.4.2 All large vehicles and other AILs will be required to follow the routing strategy agreed with the Local Highways Authority when travelling to/from the Proposed Development. The measures will be secured through a DCO requirement, primarily by the **Outline CTMP [EN0110020/APP/5.12]**.

4.5 Vehicle Access Arrangements and Routing

- 4.5.1 It is anticipated that the main construction and decommissioning access points to the Proposed Development will be from the local road network. The proposed access points for the Solar PV sites and Grid Connection Corridor (GCC) are shown visually in **Appendix A.3 Solar PV Sites and Grid Connection Corridor Access Points**, as well as listed in **Table 5-4** (Solar PV sites) and **Table 5-7** (Grid Connection Corridor).
- 4.5.2 Workers will travel to the access points based on the origin of their trips. Further details are outlined in Section 6 of this document.
- 4.5.3 The proposed HGV routing strategy (see **Appendix A.4 Proposed HGV Routing Strategy** of this TS) will utilise the local road network to connect to the following SRN junctions:
- Junction 36 of the A1 (M) will be utilised to provide SRN routing onto the local highway network for W1.
 - Junction 1 of the M18 motorway will be utilised to provide SRN routing onto the local highway network for W1 and W2.
 - Junction 31 of the M1 motorway will be utilised to provide SRN routing onto the local highway network for W2 and W3.
 - Junction 33 of the M1 also provides routing to W2.
- 4.5.4 Access tracks will be constructed across the Site to enable deliveries to portion of the Site not accessible directly from the road network.

4.6 Car and Cycle Parking

- 4.6.1 During the construction and decommissioning phases of the Proposed Development, parking will be provided at the Proposed Development. Based on the anticipated number of workers, an appropriate allocation of car parking spaces will be provided, ensuring that local policy and guidance are adhered to.

4.7 Traffic Arrivals / Departures

- 4.7.1 To minimise the impact of construction-related traffic on the local highway network, construction staff will be scheduled to arrive on-site prior to the morning peak period (08:00-09:00) and depart after the evening peak period (17:00-18:00). This approach is intended to reduce the potential for congestion during typical commuter hours and ensure smoother traffic flow on surrounding roads. Staff travel patterns will be monitored and managed as part of the **Outline CTMP [EN0110020/APP/5.12]**.
- 4.7.2 HGV movements associated with the construction phase will be scheduled to occur throughout the working day, avoiding peak traffic periods (08:00-09:00 and 17:00-18:00). This strategy is intended to reduce the potential for congestion and disruption on the local highway network during times of highest demand. HGV routing and timing will be managed through a Delivery Management System to ensure compliance with agreed protocols and to maintain safe and efficient traffic flow. This would be included within the **Outline CTMP [EN0110020/APP/5.12]**., secured through the DCO.

4.8 Summary

- 4.8.1 The Proposed Development construction period is anticipated to take place between 2027 and 2029. The highest levels of traffic will occur during the construction period. Access to the Solar PV sites and Grid Connection Corridor (GCC) will use existing SRN junctions and local roads, with routing agreed with both local highway authorities and National Highways. Operational traffic will be minimal, and decommissioning traffic will be similar to that experienced during construction. Parking will largely be provided in line with local policy.

5 TRIP GENERATION

- 5.1.1 This section will present the number of trips that the Proposed Development is expected to generate during the peak construction phase. During this phase, there will be a temporary increase in vehicle movements as equipment, materials, and workers are brought to the Site. The peak number of vehicle movements during this phase will be assessed to represent a worst-case scenario.
- 5.1.2 It is noted that there is limited information within the Trip Rate Information Computer System (TRICS) trip generation database for solar farms, and a first principles approach has therefore been adopted to derive the anticipated vehicle trip generation. This methodology is based on worker vehicle and construction delivery vehicle requirement forecasts.
- 5.1.3 The vehicle trip generation will be associated with two components of the Proposed Development during the peak of construction (assumed as 2028):
- Solar PV sites; and
 - GCC.

5.2 Solar PV Sites

Construction Worker Trip Generation

- 5.2.1 The trip generation for construction workers travelling to and from the Solar PV sites has been calculated with modal splits applied to reflect anticipated travel behaviour.
- 5.2.2 It was assumed that 20% of workers would travel by sustainable modes as outlined in Section 3 (including walking, cycling, and public transport – a large number of roads and bridleways on the local network are considered appropriate for cycle use especially, therefore a figure of 20% is deemed reasonable), while another 20% would be transported via shared minibuses. The number of minibuses required was estimated using an average occupancy of eight workers per vehicle. For access points well serviced by public transport, internal site shuttles will also be used to transfer workers from that location to their final destinations within the Site.
- 5.2.3 The remaining 60% of workers would be assumed to travel by car. To reflect car-sharing initiatives and reduce single-occupancy vehicle trips, a car occupancy factor of 1.2 workers per car was applied. This adjustment provided a more realistic estimate of car-based movements and supported the development of targeted parking and access strategies.
- 5.2.4 Two-way vehicle trip totals were then calculated for both minibuses and cars, representing the full daily movement of vehicles to and from the Solar PV sites.
- 5.2.5 These figures informed the overall traffic impact assessment and are presented below in **Table 5-1**, which assumes that all construction worker peaks coincide and therefore represents a worst-case scenario.

WHITESTONE SOLAR FARM

Table 5-1 Construction Worker Daily Trip Generation

Total Workers	Walking, Cycling, Public Transport (20%)	Workers Using Minibus (20%)	Minibuses (Assuming 8-Seater)	Remaining Workers (by Car)	Total After Car Share Applied (1.2 per Car)	Two-Way Car	Two-Way Minibus	Daily Two-Way Total Movements
600	120	120	15	360	300	600	30	630

Construction HGVs Trip Generation

- 5.2.6 The trip generation for construction-related HGVs was calculated using a combination of unit-based and volume-based delivery estimates. These figures were aggregated to produce total HGV movements per location over the entire construction phase.
- 5.2.7 To account for potential variability in construction activity, delivery schedules, and site logistics, a contingency factor of 25% was applied to the total HGV estimates. This ensured that the assessment captured a realistic upper-bound scenario for vehicle movements.
- 5.2.8 The resulting figures were then converted into one-way and two-way trips to reflect daily vehicle movements to and from the Solar PV sites. This method provided a robust and precautionary basis for evaluating the impact of construction traffic on the surrounding highway network, and the total HGV trips are presented below in **Table 5-2**.
- 5.2.9 It should be noted that this is the worst case daily traffic numbers across the entirety of the scheme area, based on all peak activities occurring at once.

Table 5-2 Construction Phase Total HGV Trip Generation (Solar PV sites)

HGVs (Unit Based)	HGVs (Volume)	HGVs (Total)	HGVs (Total, inc. 25% Contingency)
5,072	15,501	20,573	25,716

- 5.2.10 **Table 5-3** presents the worst-case daily peak HGV trips during the construction phase.

Table 5-3 Construction Phase Daily Peak HGV Trip Generation (Solar PV sites)

Daily One-Way Movements	Daily Two-Way Movements
102	204

Solar PV Sites Total Trip Generation by Access Point

- 5.2.11 Details of the total daily number of worker vehicle and HGV trips generated by each proposed Solar PV site access point are presented in **Table 5-4**. The access point locations are shown visually in **Appendix A-3 Solar PV Sites and Grid Connection Corridor Access Points**.

Table 5-4 Daily Vehicle Trips by Access Point

Access Point	Worker Vehicles (Two-Way)	HGVs (Two-Way)
SR-01	189	69
SL-01	22	7
SL-02	22	7
PEHL-02	22	7

PEHL-03	22	7
LL-02	19	6
GCL-02	22	7
LL-01	22	7
WL-02	19	6
CL-01	21	6
HHL-01	21	6
HHL-02	21	6
HHL-03	21	6
CL-03	21	6
LR-05	21	6
SR-03	21	6
POHL-02	21	6
HL-02	35	11
RR-01	35	11
RR-02	30	10
Total	625	197¹⁵

5.3 Grid Connection Corridor

- 5.3.1 Traffic generated by the GCC will primarily consist of Workers (Cars / LGVs) and a limited number of HGVs during the construction phase. These movements will be scheduled to align with existing traffic management protocols and have been distributed across the same peak periods already assessed for the main development (Solar PV sites).
- 5.3.2 The corridor works are linear and will be delivered in phases, meaning that traffic demand will be spread out both spatially and temporally. This phased approach further reduces the likelihood of any concentrated traffic impact at any one location or time. Additionally, the nature of the works, primarily involving cable laying and associated minor civil works, means that vehicle types and volumes will be consistent with those already considered in the wider construction traffic assessment.

Construction Worker Trip Generation

- 5.3.3 The vehicle trip generation for workers will follow the same assumptions as those for the Solar PV sites (e.g., 20% sustainable travel). When these assumptions are

applied, the following forecast peak daily worker vehicle trips are produced, as shown in **Table 5-5**.

Table 5-5 Construction Phase Daily Peak Worker Vehicle Trip Generation (GCC)

Daily One-Way Vehicle Movements	Daily Two-Way Vehicle Movements
282	564

Construction HGV Trip Generation

5.3.4 The trip generation for HGVs will follow the same assumptions as those for the Solar PV sites. **Table 5-6** shows the forecast peak daily HGV trip generation.

5.3.5 It should be noted that this is the worst case daily traffic numbers across the entirety of the scheme area, based on all peak activities occurring at once.

Table 5-6 Construction Phase Daily Peak HGV Trip Generation (GCC)

Daily One-Way HGV Movements	Daily Two-Way HGV Movements
188	376

GCC Total Trip Generation by Access Point

5.3.6 In terms of access to the GCC, the vehicles will use either:

- Solar PV site access points; or
- GCC only access points.

5.3.7 The total number of GCC related worker vehicle and HGV trips travelling to and from each proposed access point is presented in **Table 5-7**. The access point locations are shown visually in **Appendix A-3 Solar PV Sites and Grid Connection Corridor Access Points**.

Table 5-7 Trip Generation by Access Point

Access Point	Worker Vehicles (Two-Way)	HGVs (Two-Way)
Solar PV Sites		
SL-01	10	6
SL-02	10	6
LL-01	6	4
GCL-02	12	8
PEHL-03	4	2
CL-03	12	8
LR-05	14	10

WHITESTONE SOLAR FARM

POHL-02	8	6
SR-03	26	18
HL-02	24	16
RR-01	4	2
RR-02	6	4
GCC Only Access Points		
CC-01	42	28
CC-02	6	4
CC-03	8	6
CC-04	12	8
CC-05B	36	24
CC-06	22	14
CC-07	8	6
CC-08	12	8
CC-09	20	14
CC-10	70	46
CC-11	10	6
CC-13	26	18
CC-14	36	24
CC-17A	54	36
CC-25	66	44
Total	564	376

5.3.8 With regard to vehicle access through CC-06, it should be noted that a secondary access (CC-06c) would be provided in place of CC-06 for a smaller volume of traffic, if required as a result of detailed design. This is to help enable key equipment to move in if required, such as drilling equipment, or cable deliveries. The volumes accessed here would be deducted from the volume of movements to CC-06. The cap on HGV one way movements would be two per day, and non-HGV 6 per day. Where possible, construction compounds in the Solar PV area would be used, and staff shuttled via minibus to avoid parking on residential streets.

5.4 Cumulative Trip Generation

- 5.4.1 To assess the worst-case scenario, it has been assumed that the Solar PV sites and GCC peak daily trip generation will occur during the same period.
- 5.4.2 The total peak daily construction vehicle movements (two-way) are presented below in **Table 5-8**.

Table 5-8 Total Solar PV and GCC Daily Peak Construction Worker Vehicle and HGVs - Two-Way Movements

Construction Worker Vehicle Movements (Car/LGV/Minibus)	HGV Movements	Total Movements
1,194	579	1,773

5.5 Summary

- 5.5.1 This section outlines the estimated vehicle movements during the construction phase of the Proposed Development, including trips by workers and HGVs. Worker vehicle trips were estimated using modal splits and car-sharing assumptions, while HGV movements were based on delivery volumes with a contingency factor applied. These estimates represent peak daily movements and inform the traffic impact assessment. Operational traffic will be minimal, with decommissioning assessed at a later stage.

6 TRIP DISTRIBUTION

6.1.1 This section outlines the methodology used to estimate the geographic distribution of construction workers and HGVs travelling to/from the Solar PV sites and GCC.

6.2 Construction Worker Distribution

6.2.1 Trip distribution for construction workers was established using a gravity-based approach that considered both the population size of origin areas and their proximity to the Proposed Development. Population data for each origin zone was combined with straight-line (crow-fly) distances to the centre of the entire Proposed Development extents within W2, between the Sites East and West of the M1.

6.2.2 The distribution was weighted to reflect the tendency for workers to travel from more populous areas that are closer to the Proposed Development, while accounting for the reduced likelihood of commuting from more distant locations. This method provided a realistic and data-driven estimate of worker origins. It should be noted that trip distribution only covers the 'vehicle' trip distribution (e.g. 80% of trips) and the locations do not include the very local towns / villages that people will travel sustainably to / from.

6.2.3 The gravity-based model is presented below in **Table 6-1**.

Table 6-1 Worker Gravity Model

Location	Population	Distance (km)	Distance ²	Pop/Dist ²	Distribution
North Sheffield	115,000	14	196	4,107	6%
East Sheffield	110,000	7	49	7,857	11%
West Sheffield	95,000	16	256	2,969	4%
South Sheffield	110,000	14	196	3,929	6%
Central Sheffield	100,000	13	169	3,846	6%
Rotherham	265,800	8	64	16,613	24%
Barnsley	244,574	22	484	5,559	8%
Doncaster	308,100	18	324	8,558	12%
Chesterfield	103,569	20	400	2,589	4%
Leeds	812,000	48	2,304	8,458	12%
Wakefield	353,300	36	1,296	4,907	7%

6.3 Construction HGV Distribution

6.3.1 As the specific origins of construction HGVs were not known at this stage of the assessment, a strategic approach was adopted to estimate their distribution based on access from the SRN. It was assumed that HGVs would enter the local network

from key SRN corridors, reflecting typical freight movement patterns and regional connectivity. This method prioritised major trunk roads and motorways that provide logical and efficient access to the Solar PV sites and GCC, ensuring that HGVs would approach from routes designed to accommodate heavy goods traffic.

6.3.2 HGV movements have been proportionally distributed across all access points for the Solar PV sites, ensuring that the total accounts for 100% of the movements associated with W1, W2, and W3.

6.3.3 For the GCC, the HGV movements to each access point are known, based on:

- Uniform construction duration (15 weeks per access point);
- 5-day working week; and
- The HGVs needed per km of cable corridor are known.

6.4 Summary

6.4.1 This section outlines the methodology used to estimate the geographic distribution of trips generated by construction workers and HGVs travelling to and from the Proposed Development. Worker distribution was based on a gravity model using population and proximity data, while HGV distribution was informed by strategic access from the SRN due to unknown origin points.

6.4.2 The following section will assign these distributed trips onto the local and strategic road network for assessment.

7 TRIP ASSIGNMENT

- 7.1.1 This section outlines how the construction vehicles have been assigned to specific routes within the local and strategic road network. It applied route choice assumptions, typically based on shortest travel time or distance. The analysis identifies the impact of the Proposed Development on each road link that vehicles would use. This informed whether mitigation measures were needed and where they should be targeted to manage the additional traffic effectively.

7.2 Construction Worker Vehicle Assignment

- 7.2.1 Construction worker vehicle routes were assigned through the use of a digital route planning tool (Google Maps¹⁶) that identified the most efficient and appropriate paths from the specific settlements based on the gravity model presented in Section 6 (see **Table 6-1**).
- 7.2.2 The routes prioritise the use of motorways and A-roads for longer journeys, followed by B-roads and distributor roads for intermediate travel, and local access roads only for the final approach, if required. This method ensured that workers avoided congested areas, particularly during peak hours.
- 7.2.3 The peak Solar PV site and GCC worker vehicle trip assignment is presented below in **Table 7-1**.
- 7.2.4 It should be noted that during the evolution of the scheme since Draft ES, certain ATCs that were initially included within the study area (that could potentially be used as construction access routes) were removed. Following removal, the numbering of ATCs has been kept the same for consistency, explaining the missing ATC numbers.

Table 7-1 Construction Worker Vehicle Trip Assignment (Solar PV sites and GCC)

ATC No.	Road Link	Two-Way (Daily)
1	A630 High Road	17
2	A630 Sheffield Road (Between Edlington Ln and Low Rd)	17
12	Common Lane	33
13	Hellaby Lane	38
14	B6093	5
15	A630 Doncaster Road (Between Old Rd and B6093)	172
16	A630 Sheffield Road (Between Holywell Ln and Old Rd)	0
17	A631 (Between M18 and Flash Ln)	58
18	Moor Lane South	5
19	Flash Lane	48
20	A631 (Between Flash Ln and B6060)	27
21	A631 (Between B6060 and A6123)	27
22	A631 (Between A6123 and A618)	121

WHITESTONE SOLAR FARM

ATC No.	Road Link	Two-Way (Daily)
23	A631 (Between A618 and Long Ln)	277
24	Long Lane	19
25	A630 Rotherway	248
26	A618 (Between A631 and Gulthwaite Common Ln)	140
27	Gulthwaite Common Lane	34
28	Reservoir Road	48
29	A618 (Between Reservoir Rd and Treeton Ln)	9
31	Main Street Ulley	48
32	Penny Hill Lane, West of M1	54
33	Penny Hill Lane, East of M1	0
34	Brampton Lane	5
35	Common Lane South	64
36	Long Road	146
40	Todwick Road Between Pocket Handkerchief Ln and A57	167
41	Pocket Handkerchief Lane	169
44	A57 (Near Greenscen Side Farm)	101
45	A57 (West of Mill Ln)	54
46	A57 (Between Todwick Rd and M1)	384
47	Kiveton Lane	116
48	A57 (Between M1 and A618)	62
52	B6060 (North of Second Ln)	0
53	B6060 (South of Second Ln)	20
54	Field Lane	3
55	A618 (North of B6059)	74
56	A618 (South of B6059)	74
59	Kiveton Lane	116
60	Hard Lane (North)	120
61	Hard Lane (South)	70
62	Woodall Lane	6
66	A618 (North)	74
67	A618 (South)	75
68	Loverose Way	36
69	A630	189
72	Slacks Lane	48
73	Morthen Lane	3
74	Ulley Lane	1
75	Common Lane (North)	35

ATC No.	Road Link	Two-Way (Daily)
76	Hawk Hill Lane (West)	64
77	Hawk Hill Lane (East)	21
78	Killmarsh lane	6
80	Lidget Lane	36
81	Long Lane	43
82	Pleasley Road	108
83	B6060 Morthen Road	11
84	Sandy Lane	22
85	Newhall Lane	0
86	A631	58
87	Cumwell Lane	55
89	Bramley Lane	24
90	Common Lane	11

7.3 Construction HGVs Assignment

- 7.3.1 Construction HGVs were assigned routes to and from the SRN using the established road hierarchy to ensure safe and efficient movement. This involved prioritising motorways and A-roads for long-distance travel, followed by B-roads and distributor roads for intermediate routing, and using local access roads only for the final approach to the access points, if required.
- 7.3.2 Where possible, routes were planned to avoid roads with weight, height, or width restrictions, as well as environmentally sensitive zones, school areas, and roads with high pedestrian activity. This approach minimises disruption to local communities and ensures compliance with local transport policies. This approach will be managed through the routing strategy as part of the **Outline CTMP [EN0110020/APP/5.12]**.
- 7.3.3 **Appendix A.3 Solar PV Sites and Grid Connection Corridor Access Points** of this TS shows the vehicle routing plans to and from the SRN for, including the ATC locations that these routings pass.
- 7.3.4 The peak Solar PV site and GCC HGV trip assignment is presented below in **Table 7-2**.

Table 7-2 Construction HGV Trip Assignment (Solar PV sites and GCC)

ATC No.	Road Link	Two-Way (Daily)
1	A630 High Road	69
2	A630 Sheffield Road (Between Edlington Ln and Low Rd)	69
12	Common Lane	0
13	Hellaby Lane	70
14	B6093	0
15	A630 Doncaster Road (Between Old Rd and B6093)	0

WHITESTONE SOLAR FARM

16	A630 Sheffield Road (Between Holywell Ln and Old Rd)	69
17	A631 (Between M18 and Flash Ln)	99
18	Moor Lane South	0
19	Flash Lane	25
20	A631 (Between Flash Ln and B6060)	74
21	A631 (Between B6060 and A6123)	0
22	A631 (Between A6123 and A618)	0
23	A631 (Between A618 and Long Ln)	68
24	Long Lane	6
25	A630 Rotherway	84
26	A618 (Between A631 and Gulthwaite Common Ln)	62
27	Gulthwaite Common Lane	15
28	Reservoir Road	0
29	A618 (Between Reservoir Rd and Treeton Ln) ¹⁷	6
31	Main Street Ulley	0
32	Penny Hill Lane, West of M1	15
33	Penny Hill Lane, East of M1	15
34	Brampton lane	0
35	Common Lane South	21
36	Long Road	72
40	Todwick Road Between Pocket Handkerchief Ln And A57	84
41	Pocket Handkerchief Lane	84
44	A57 (Near Greenscen Side Farm)	60
45	A57 (West of Mill Ln)	36
46	A57 (Between Todwick Rd and M1)	215
47	Kiveton Lane	71
48	A57 (Between M1 and A618)	27
52	B6060 (North of Second Ln)	74
53	B6060 (South of Second Ln)	74
54	Field Lane	0
55	A618 (North of B6059)	27
56	A618 (South of B6059)	27
59	Kiveton Lane	71
60	Hard Lane (North)	71
61	Hard Lane (South)	44
62	Woodall Lane	0
66	A618 (North)	27
67	A618 (South)	27

68	Loverose Way	14
69	A630	69
72	Slacks Lane	25
73	Morthen Lane	0
74	Ulley Lane	0
75	Common Lane (North)	6
76	Hawk Hill Lane (West)	19
77	Hawk Hill Lane (East)	6
78	Killmarsh lane	0
80	Lidget Lane	24
81	Long Lane	16
82	Pleasley Road	68
83	B6060 Morthen Road	0
84	Sandy Lane	14
85	Newhall Lane	0
86	A631	99
87	Cumwell Lane	14
89	Bramley Lane	38
90	Common Lane	70

7.4 Public Consultation Response

- 7.4.1 Statutory Consultation held between 16 September and 28 October 2025, which also included consultation with the public (see **Consultation Report [EN0110020/APP/5.1]**) highlighted several concerns relating to the usage of certain routes by construction vehicles and more general concerns related to the interaction between construction vehicles and various sensitive locations. The comments are referenced in the table below, including the potentially affected ATC locations and the proposed action.
- 7.4.2 Where possible, the Solar PV sites and GCC construction vehicle routing (for HGVs) has been designed to avoid sensitive locations, such as villages.

Table 7-3 Concerns and Responses

Concern / Comment	ATCs Affected	Response
Concern that the roads through Harthill and Woodall are unsuitable for construction traffic	60, 61, 62, 63, 65	Only 3 two-way movements are proposed through the centres of Harthill and Woodall (ATC 62), which would be cars associated with workers. The majority of traffic (48 to 130 two-way movements) will use Hard Lane to the north of Harthill (ATC 60 and 61), which is better suited to accommodate construction vehicles. Mitigation measures, including routing controls and signage, will be included in

		the Outline CTMP [EN0110020/APP/5.12] .
Concern that Kiveton and Aston are already congested and would be made worse by construction traffic	60, 58, 59, 92	No construction traffic is assigned to ATC 58 (Wales Road), Station Road in Kiveton, or ATC 92 (Red Hill). Routing has been designed to avoid these congested areas.
The only feasible routing to HL-02 and HL-03 on Hard Lane is to travel along A57 and then turn down Kiveton Lane through Todwick	n/a	Access point HL-03 has been removed from the assessment. Routing to HL-02 access point via the A57 and Kiveton Lane is necessary due to access constraints. Outline CTMP [EN0110020/APP/5.12] will include mitigation measures such as speed controls and monitoring to manage impacts.
Concern that increase in traffic will affect Conisbrough, Hooton Roberts and Dalton	2, 3, 4, 5, 6, 16, 69; 15 (Hooton Roberts); Dalton not in Study Area	Some increase in traffic in Conisbrough and Hooton Roberts is unavoidable due to existing access points. However, routing has prioritised roads with greater capacity. Mitigation measures will be considered in the Outline CTMP [EN0110020/APP/5.12] where necessary.
Concern that Clifton, Micklebring and Braithwell are served by single track roads unsuitable for construction traffic	6 (Clifton Village); 11 (Micklebring); Braithwell not in Study Area	No trips are routed through Clifton or Braithwell or Micklebring.
Concern that Clifton village is not suitable for through traffic	6 (Clifton Village)	No construction traffic is routed through Clifton village.
Request to avoid the Cuckoo Way and Chesterfield Canal	n/a	No construction traffic is routed through these areas.
Concern about an access being off Hard Lane	60, 61	The Outline CTMP [EN0110020/APP/5.12] will ensure safe and managed use of Hard Lane and any potential access requirements.
Concern that A630 will be the only A road to W1 and it is already busy	1, 2, 15, 16, 69	Use of the A630 is necessary due to existing access constraints. Routing has prioritised higher-capacity roads, and mitigation measures will be included in the Outline CTMP [EN0110020/APP/5.12] to manage traffic flow and safety.
Request that vehicle access must be from the	n/a	This request has been considered as part of ongoing design and routing reviews. A further access point has been

Whiston/Rotherham end of Long Lane		added at Wood Lane to reduce the number of vehicles requiring access from Long Lane.
Request to create access route off M18 directly rather than along A630	n/a	A construction access from the M18 is not currently feasible, and would not be acceptable to National Highways. It would require approval for a motorway standard entry and exit slip arrangement or roadworks and a speed reduction on the motorway to facilitate a safe access with significant impact to motorists.
Concern that site access to W1 will be on the track past Parks Farm Cottages	n/a	No traffic will use the track past Parks Farm Cottages.
Only access routes are bridleway which are not suitable for HGVs	n/a	Wherever possible, construction traffic will avoid using private tracks that are also designated as a PROW
Request to not use Toad Lane	n/a	No construction traffic is routed through Toad Lane.
Concern that there will be road safety problems for children and elderly residents, especially as there is no crossing at Harthill Primary School	n/a	No construction traffic is routed along Union Street where the school is located. Only up to 3 two-way trips are proposed through Harthill (car movements only), and safety will be managed through the Outline CTMP [EN0110020/APP/5.12] .
Concern about increased traffic on Walseker Lane posing a risk for walkers, cyclists and horse riders	63	No construction traffic is routed through Walseker Lane.

7.5 Summary

- 7.5.1 This section outlines how the construction vehicles have been assigned to specific routes within the local and strategic road network. Route choices were based on the road hierarchy and worker trips were routed from their home locations via appropriate road types, while HGVs were assigned from SRN corridors. This assignment identifies the road links impacted by the Proposed Development and informs the need for any mitigation measures to be detailed within the **Outline CTMP [EN0110020/APP/5.12]**.

8 HIGHWAYS ASSESSMENT

8.1 Assessment Scenarios

8.1.1 The assessment of daily vehicle movements will include the following scenarios:

- Existing Baseline (2025);
- Future Baseline (2028);
- Peak Construction Phase (2028) – Solar PV sites and GCC; and
- Future Baseline with Construction Traffic (2028).

8.2 Existing Baseline

8.2.1 Baseline traffic surveys were undertaken in June 2025. The traffic flows captured by these counts are presented in Section 3.4.

8.3 Future Baseline (2028)

8.3.1 To forecast future traffic flows to the peak construction year of 2028, growth factors were derived using the Department for Transport's TEMPro database. The selected areas were Rotherham and Doncaster, which reflect the local context of the Proposed Development. The local TEMPro growth factors are set out below in **Table 8-1**.

Table 8-1 TEMPro Growth Factors (2025 to 2028)

Area	Average Day Growth Factor
Doncaster	1.0359
Rotherham	1.0346
Average	1.03525

8.3.2 The average daily growth factor has been applied to the 2025 baseline traffic counts, with the resulting traffic numbers shown below.

Table 8-2 2028 Average Daily Two-Way Movements (AADT Baseline)

ATC No.	Road Link	Total	HGV	% HGV
1	A630 High Road	27,183	576	2%
2	A630 Sheffield Road (Between Edlington Ln and Low Rd)	15,681	332	2%
12	Common Lane	5,318	42	1%
13	Hellaby Lane	5,555	137	2%
14	B6093	7,056	25	0%
15	A630 Doncaster Road (Between Old Rd and B6093)	13,802	184	1%
16	A630 Sheffield Road (Between Holywell Ln and Old Rd)	11,783	171	1%

WHITESTONE SOLAR FARM

ATC No.	Road Link	Total	HGV	% HGV
17	A631 (Between M18 and Flash Ln)	30,430	918	3%
18	Moor Lane South	11,841	63	1%
19	Flash Lane	7,767	135	2%
20	A631 (Between Flash Ln and B6060)	27,348	687	3%
21	A631 (Between B6060 and A6123)	31,314	689	2%
22	A631 (Between A6123 and A618)	27,652	560	2%
23	A631 (Between A618 and Long Ln)	32,082	758	2%
24	Long Lane	1,514	11	1%
25	A630 Rotherway	35,704	2736	8%
26	A618 (Between A631 and Gulthwaite Common Ln)	13,778	70	1%
27	Gulthwaite Common Lane	978	7	1%
28	Reservoir Road	946	4	0%
29	A618 (Between Reservoir Rd and Treeton Ln)	14,565	109	1%
31	Main Street Ulley	1,766	42	2%
32	Penny Hill Lane, West of M1	2,102	21	1%
33	Penny Hill Lane, East of M1	1,449	3	0%
34	Brampton Lane	559	2	0%
35	Common Lane South	2,911	17	1%
36	Long Road	3,778	21	1%
40	Todwick road Between Pocket Handkerchief Ln And A57	16,848	347	2%
41	Pocket Handkerchief Lane	2,188	34	2%
44	A57 (Near Greenscen Side Farm)	26,148	988	4%
45	A57 (West of Mill Ln)	26,031	974	4%
46	A57 (Between Todwick Rd and M1)	39,429	3,260	8%
47	Kiveton Lane	6,651	62	1%
48	A57 (Between M1 and A618)	25,117	685	3%
52	B6060 (North of Second Ln)	9,731	67	1%
53	B6060 (South of Second Ln)	6,522	39	1%
54	Field Lane	1,407	15	1%
55	A618 (North of B6059)	16,484	228	1%
56	A618 (South of B6059)	12,300	203	2%
59	Kiveton Lane	6,371	45	1%
60	Hard Lane (North)	4,706	18	0%
61	Hard Lane (South)	4,568	18	0%
62	Woodall Lane	2,027	5	0%
66	A618 (North)	7,413	88	1%

ATC No.	Road Link	Total	HGV	% HGV
67	A618 (South)	4,977	53	1%
68	Loverose Way	424	9	2%
69	A630	8,808	166	2%
72	Slacks Lane	28	0	2%
73	Morthen Lane	1,158	5	0%
74	Ulley Lane	377	1	0%
75	Common Lane (North)	2,905	11	0%
76	Hawk Hill Lane (West)	1,503	4	0%
77	Hawk Hill Lane (East)	1,539	28	2%
78	Killmarsh Lane	2,190	7	0%
80	Lidget Lane	3,017	13	0%
81	Long Lane	1,515	9	1%
82	Pleasley Road	13,559	126	1%
83	B6060 Morthen Road	12,199	77	1%
84	Sandy Lane	3,449	6	0%
85	Newhall Lane	583	15	3%
86	A631	30,745	999	3%
87	Cumwell Lane	6,289	190	3%
89	Bramley Lane	1,897	12	1%
90	Common Lane	6,838	198	3%

8.4 Peak Construction Phase (2028)

- 8.4.1 The peak construction phase represents the period during which construction activities generate the highest volume of traffic movements to and from the Site and is expected to take place in 2028.
- 8.4.2 During the peak construction phase, all vehicles will arrive before the AM network peak (08:00-09:00) and depart before the PM network peak (17:00-18:00). Therefore, these peaks have not been included in the impact assessment. Instead, the increase in daily two-way traffic has been assessed against the baseline AADT. Details are set out in the **Outline CTMP [EN0110020/APP/5.12]**, and the measures contained within will be secured through a DCO requirement.

8.5 Future Baseline with Construction Traffic (2028)

- 8.5.1 This section compares the three scenarios: 2028 baseline traffic, peak construction traffic (Solar PV sites and GCC), and the combined impact of both.
- 8.5.2 **Table 8-3** presents traffic volumes, percentage increases, and HGV proportions to evaluate potential impacts on the local network and identify any required mitigation.

WHITESTONE SOLAR FARM

Table 8-3 2028 AADT Future Baseline + Construction Traffic for Solar PV sites and GCC (Two-way)

ATC No.	Road Link	Baseline All Vehicles	Baseline HGV	Baseline + Cons - All Vehicles	Baseline + Cons HGV	% Increase All Vehicles	% Increase HGV
1	A630 High Road	27,183	576	27,269	645	0.3%	12.0%
2	A630 Sheffield Road (Between Edlington Ln and Low Rd)	15,681	332	15,767	401	0.5%	20.8%
12	Common Lane	5,318	42	5,351	42	0.6%	0.0%
13	Hellaby Lane	5,555	137	5,663	207	1.9%	51.1%
14	B6093	7,056	25	7,060	25	0.1%	0.0%
15	A630 Doncaster Road (Between Old Rd and B6093)	13,802	184	13,974	184	1.2%	0.0%
16	A630 Sheffield Road (Between Holywell Ln and Old Rd)	11,783	171	11,852	240	0.6%	40.3%
17	A631 (Between M18 and Flash Ln)	30,430	918	30,587	1,018	0.5%	10.8%
18	Moor Lane South	11,841	63	11,846	63	0.0%	0.0%
19	Flash Lane	7,767	135	7,840	160	0.9%	18.8%
20	A631 (Between Flash Ln and B6060)	27,348	687	27,449	761	0.4%	10.8%
21	A631 (Between B6060 and A6123)	31,314	689	31,341	689	0.1%	0.0%
22	A631 (Between A6123 and A618)	27,652	560	27,773	560	0.4%	0.0%
23	A631 (Between A618 and Long Ln)	32,082	758	32,427	826	1.1%	9.0%
24	Long Lane	1,514	11	1,538	17	1.6%	51.3%
25	A630 Rotherway	35,689	2736	36,022	2,821	0.9%	3.1%

WHITESTONE SOLAR FARM

26	A618 (Between A631 and Gulthwaite Common Ln)	13,778	70	13,980	132	1.5%	88.6%
27	Gulthwaite Common Lane	978	7	1,026	21	5.0%	224.8%
28	Reservoir Road	946	4	994	4	5.1%	0.0%
29	A618 (Between Reservoir Rd and Treeton Ln)	14,565	109	14,579	115	0.1%	5.1%
31	Main Street Ulley	1,766	42	1,813	42	2.7%	0.0%
32	Penny Hill Lane, West of M1	2,102	21	2,171	36	3.3%	72.7%
33	Penny Hill Lane, East of M1	1,449	3	1,464	18	1.1%	573.2%
34	Brampton Lane	559	2	563	2	0.9%	0.0%
35	Common Lane South	2,911	17	2,995	38	2.9%	121.0%
36	Long Road	3,778	21	3,995	93	5.8%	335.8%
40	Todwick road Between Pocket Handkerchief Ln And A57	16,848	347	17,099	431	1.5%	24.2%
41	Pocket Handkerchief Lane	2,188	34	2,441	118	11.6%	247.7%
44	A57 (Near Greenscen Side Farm)	26,148	988	26,309	1,049	0.6%	6.1%
45	A57 (West of Mill Ln)	26,031	974	26,121	1,010	0.3%	3.7%
46	A57 (Between Todwick Rd and M1)	39,341	3260	39,941	3,476	1.5%	6.6%
47	Kiveton Lane	6,651	62	6,838	133	2.8%	114.9%
48	A57 (Between M1 and A618)	25,117	685	25,206	712	0.4%	3.9%
52	B6060 (North of Second Ln)	9,731	67	9,805	141	0.8%	110.5%

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53	B6060 (South of Second Ln)	6,522	39	6,616	113	1.4%	188.8%
54	Field Lane	1,407	15	1,410	15	0.2%	0.0%
55	A618 (North of B6059)	16,484	228	16,585	255	0.6%	11.8%
56	A618 (South of B6059)	12,300	203	12,401	229	0.8%	13.2%
59	Kiveton Lane	6,371	45	6,558	117	2.9%	156.8%
60	Hard Lane (North)	4,706	18	4,897	89	4.1%	401.2%
61	Hard Lane (South)	4,568	18	4,682	62	2.5%	243.9%
62	Woodall Lane	2,027	5	2,033	5	0.3%	0.0%
66	A618 (North)	7,413	88	7,513	115	1.4%	30.5%
67	A618 (South)	4,977	53	5,078	79	2.0%	50.9%
68	Loverose Way	424	9	474	23	11.8%	150.8%
69	A630	8,808	166	9,066	235	2.9%	41.5%
72	Slacks Lane	28	0	102	26	258.6%	5693.3%
73	Morthen Lane	1,158	5	1,161	5	0.3%	0.0%
74	Ulley Lane	377	1	378	1	0.3%	0.0%
75	Common Lane (North)	2,905	11	2,947	17	1.4%	60.7%
76	Hawk Hill Lane (West)	1,503	4	1,586	23	5.5%	445.9%
77	Hawk Hill Lane (East)	1,539	28	1,566	34	1.8%	22.7%
78	Killmarsh lane	2,190	7	2,197	7	0.3%	0.0%
80	Lidget Lane	3,017	13	3,077	37	2.0%	182.3%
81	Long Lane	1,515	9	1,575	25	3.9%	189.3%
82	Pleasley Road	13,559	126	13,735	194	1.3%	54.2%
83	B6060 Morthen Road	12,199	77	12,210	77	0.1%	0.0%
84	Sandy Lane	3,449	6	3,485	20	1.0%	225.4%
85	Newhall Lane	583	15	583	15	0.0%	0.0%
86	A631	30,745	999	30,903	1098	0.5%	9.9%

WHITESTONE SOLAR FARM

87	Cumwell Lane	6,289	190	6,358	204	1.1%	7.4%
89	Bramley Lane	1,897	12	1,959	50	3.2%	325.2%
90	Common Lane	6,838	198	6,920	268	1.2%	35.3%

- 8.5.3 Some locations within the Study Area show high percentage increases in traffic and HGV movements, but these are largely attributable to very low baseline flows. This means that a small absolute increase in vehicle numbers can result in a disproportionately high percentage change.
- 8.5.4 In terms of total traffic, the only ATC location that indicates a forecast increase of greater than 30% is Slacks Lane (ATC 72), with an increase of 259%. This is due to total traffic increasing from a very low baseline level of 28 to 128 vehicles. Therefore, the increase in total vehicles is 100 two-way trips throughout the day. Although the percentage change appears large, the absolute change in traffic volume is small. An increase of 100 vehicles spread across a full day is unlikely to create any operational issues on the local highway network, as existing roads typically have sufficient capacity to accommodate variations of this scale within normal daily fluctuation.
- 8.5.5 The majority of ATC locations experience an overall increase in total traffic of less than 1%.
- 8.5.6 In terms of HGVs, the high percentage increases (e.g. above 100%) are generally due to low baseline HGV flows (e.g. below 100 daily two-way movements). Any ATC location forecast to have an HGV increase of greater than 100% is summarised in **Table 8-4**. For Slacks Lane (ATC 72) the percentage increase in HGVs appears abnormally large at over 5,000%, which is as a direct result of the road having a baseline flow of zero HGVs with an addition of 26 daily two-way HGVs during construction. However, Slacks Lane itself, whilst not shown to have any HGVs using the route within the traffic surveys, is deemed suitable for use by HGVs.

Table 8-4 ATC Locations with an HGV Increase Greater Than 100%

ATC No.	Road Link	Baseline HGV	Baseline HGV + Construction HGV	% Increase in HGV
27	Gulthwaite Common Lane	7	21	217%
33	Penny Hill Lane, East of M1	3	17	573%
35	Common Lane South	17	38	121%
36	Long Road	21	92	336%
41	Pocket Handkerchief Lane	34	117	248%
47	Kiveton Lane	62	133	115%
52	B6060 (North of Second Ln)	67	147	111%
53	B6060 (South of Second Ln)	39	113	189%
59	Kiveton Lane	45	117	157%
60	Hard Lane (North)	18	89	401%
61	Hard Lane (South)	18	62	244%
68	Loverose Way	9	23	151%
72	Slacks Lane	0	26	5,693%

76	Hawk Hill Lane (West)	4	23	446%
80	Lidget Lane	13	37	182%
81	Long Lane	9	23	189%
84	Sandy Lane	6	20	225%
89	Bramley Lane	12	50	325%

It should be noted from the table above that due to the rounding of figures to whole numbers, some percentage increase figures may appear higher.

- 8.5.7 Therefore, while overall traffic impacts are expected to be minor across most of the network assessed, it is recognised that certain low-volume roads may experience proportionally higher increases in traffic. These roads, due to their limited capacity or residential nature, are more sensitive to change and play specific functional roles within the local transport network.
- 8.5.8 As such, their assessment will go beyond percentage increases to consider contextual sensitivity and operational importance, with mitigation measures identified and incorporated within the **Outline CTMP [EN0110020/APP/5.12]**.
- 8.5.9 It should be noted that construction vehicles will also access location WL-02 via Treeton Lane and Wood Lane. No traffic count data is available for this link and it has therefore not been assessed as a standalone link within **Table 8-3**. Construction traffic using this access is limited to 19 two-way worker trips and 6 two-way HGV trips per day. For this level of traffic to have a significant effect, baseline traffic flows on the link would need to be very low due to the relatively low numbers of daily construction vehicles.
- 8.5.10 ATC data from nearby local roads indicates that baseline traffic flows are substantially higher than the total of 25 two-way daily trips generated along the Wood Lane and Treeton Lane link. For example, ATC 24 (Long Lane) records a total AADT flow of 1,514 vehicles and is considered comparable in terms of road classification, condition, and the residential areas served. Applying ATC 24 as a representative link for Wood Lane and Treeton Lane results in an increase of approximately 1.65% in total vehicle flows.
- 8.5.11 On this basis, the increase in traffic associated with construction activity at this access is considered negligible. Vehicle movements using this route have been distributed across the wider highway network and are captured within the assessed ATC locations in accordance with the TS methodology.

8.6 Mitigation Measures

- 8.6.1 The following measures would be included as mitigation and be implemented to minimise the traffic impacts of the Scheme on the highway network during the construction and decommissioning phases. The measures would be secured through the **Outline CTMP [EN0110020/APP/5.12]** and outline Decommissioning Environmental Management Plan (oDEMP) **[EN0110020/APP/5.11]** which will later become finalised management plans, including:
- Design of Solar PV Site and GCC access points in accordance with national road design standards and in consultation with the local highway authority to ensure safety.

- Managing interactions with the public road network through visibility splays, signage, and traffic controls, with construction traffic yielding to other road users;
- Distributing details of vehicle routes to workers to reduce peak-time congestion in sensitive areas;
- Scheduling HGV movements outside of peak traffic hours to avoid additional congestion;
- Implementing a delivery management system to regulate HGV arrival times and monitor compliance with routing and scheduling;
- Monitoring HGV routes and delivery times to ensure adherence to agreed protocols and address any non-compliance;
- Employing specialised haulage services for abnormal loads, including necessary permits and coordination with relevant authorities.

9 SUMMARY AND CONCLUSION

- 9.1.1 This TS has been prepared to inform **ES Chapter 13: Traffic and Transport [EN0110020/APP/6.13]** of the draft ES, and later the ES chapter for the proposed Whitestone Solar Farm DCO application. It provides a comprehensive overview of the existing transport conditions, accessibility, and anticipated traffic impacts associated with the construction, operation and maintenance, and decommissioning of the Proposed Development.
- 9.1.2 The assessment has considered baseline and future traffic scenarios, including peak construction activity, and has demonstrated that the additional vehicle movements, particularly HGVs and construction workers, can be accommodated within the existing highway network without resulting in significant adverse impacts.
- 9.1.3 Mitigation measures, including agreed routing strategies and traffic management protocols, would be implemented to minimise disruption and ensure safety. The Proposed Development is therefore considered acceptable in transport and highways terms, and the findings of this TS will support the ES in demonstrating compliance with relevant planning and transport policy.



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10 REFERENCES

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- ¹⁴ Department for Transport (DfT) Mapping Application for Visualising Road Injury Casualties (MAVRIC) platform. [Online] Available at: [REDACTED] (Accessed: 10/09/2025)
- ¹⁵ These numbers have a small difference compared with the total worker vehicle (shown in Table 5-1) and HGV (shown in Table 5-2) trip generation due to rounding.
- ¹⁶ Digital route planning tool (Google Maps) [Online] Available at: [REDACTED] (Accessed 05/06/2025).
- ¹⁷ This route could potentially be used by HGV traffic depending on design decisions.