



Low Farm Solar Project Transport Assessment

For AARDVARK EM Limited.

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1. INTRODUCTION

1.1 Overview

1.1.1 Hydrock have been instructed by AARDVARK EM Ltd. to prepare a Transport Assessment [TA] relating to proposals for the installation of a Solar Photovoltaic Farm in Wakefield, West Yorkshire. This report has been prepared in support of a planning application.

1.1.2 The site comprises nine parcels of land in arable agricultural use totalling approximately 85 hectares, located north of Flockton and east of Grange Moor. The site is accessed via the A642 Wakefield Road. The site is located within a predominantly rural setting.

1.1.3 The proposed development comprises the installation of a stand-alone Solar Photovoltaic Farm, which would generate approximately 49MW plus ancillary infrastructure and equipment, landscaping and access.

1.1.4 It is proposed that the electricity generated by the scheme would be exported to the local electrical distribution network via a Point of Connection (POC) to the 132kV network via the pylon at Lady Ings Farm, 58 Low Lane, Middlestown, Wakefield, WF4 4PT. A 49MW solar site in this location is estimated to generate between approximately 65,000 MWh of renewable energy per annum, the equivalent of the annual energy consumption of 15,200 homes in Kirklees.

1.2 Site Location

1.2.1 The nine parcels of land are situated approximately 2.0km to the east of Grange Moor and circa 2.0km north of Flockton. The parcels are located to the north and south of the A642 Wakefield Road with Denby Grange Lane to the west and Denby Lane to the north.

1.2.2 **Figure 1.1** shows the site location below.

Figure 1.1 Site Location



Source: GoogleMaps©- Accessed 08/06/2021

- 1.2.3 This TA has been developed in accordance with the now superseded DfT document "Guidance on Transport Assessment" [GoTA] (2007) and gives due regard to the NPPG "Transport Evidence in Plan Making" document. It sets out the transport matters relating to the development site and provides details of the development proposals, including an assessment of the predicted traffic flows, the corresponding impact on the surrounding highway network and matters associated with accessibility and connectivity.
- 1.2.4 The report presents a justification that the proposed development can be accommodated without detriment to the operational capacity or safety of the local highway network and that it can be suitably accessed on foot, by cycle and by local public transport services.
- 1.2.5 This report should be read in conjunction with the Construction Traffic Management Plan.

1.3 Structure of Report

- 1.3.1 This report comprises six sections, including this introduction:
- Section 2 offers a site description and review of existing conditions;
 - Section 3 considers the national and local transport policy;
 - Section 4 outlines the development proposals;
 - Section 5 presents the traffic impact of the development; and
 - Section 6 sets out the summary and conclusions.

2. EXISTING CONDITIONS

2.1 Site Location and Description

2.1.1 The nine parcels of land are situated approximately 2.0km to the east of Grange Moor and circa 2.0km north of Flockton. The parcels are located to the north and south of the A642 Wakefield Road with Denby Grange Lane to the west and Denby Lane to the north.

2.1.2 A detailed location plan of the site and the surrounding local highway network is illustrated in Figure 2.1.

Figure 2.1: Local Highway Network



Source: GoogleMaps©- Accessed 08/06/21

2.2 Highway Network

2.2.1 The site is connected to the local highway network via the A642 Wakefield Road which is the primary route to link with the nine parcels of land located to the north and south of this the A642 Wakefield Road. The proposed site access points associated with each parcel are proposed to be located off the A642 Wakefield Road.

2.3 A642 Wakefield Road

2.3.1 The A642 Wakefield Road is a single carriageway which extends from Huddersfield in the west to meet with Wakefield in the east.

2.3.2 The road is governed by a 50mph speed limit within the vicinity of the site and contains speed enforcement measures in the form of regularly spaced speed cameras.

2.3.3 **Figure 2.2** below illustrates the A642 Wakefield Road extending in an easterly direction towards Wakefield via Overton and Middlestown.

Figure 2.2: Local Highway Network - A642 Wakefield Road



Source: Google Maps© - accessed 08/06/2021

2.4 Accident Analysis

2.4.1 The DfT document “Guidance on Transport Assessment” states that:

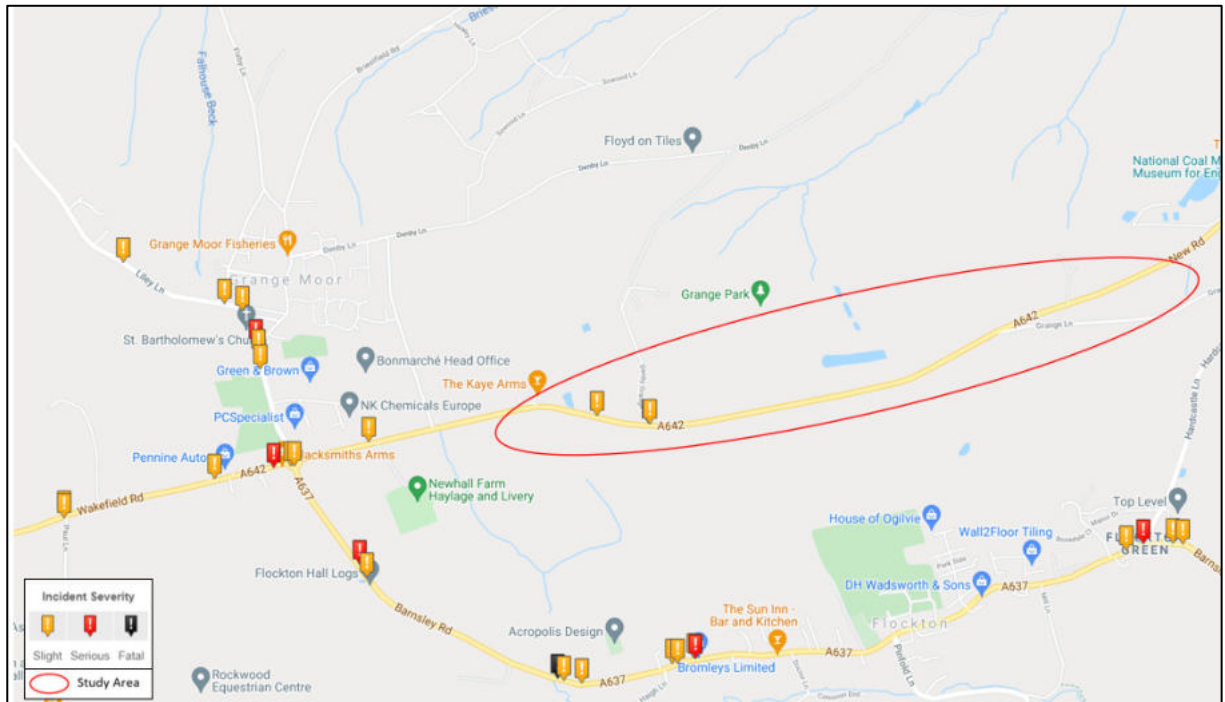
“Critical locations on the road network with poor accident records should be identified. This is to determine if the proposed development will exacerbate existing problems or, if proposed, whether highway mitigation works or traffic management measures will help to alleviate the problems”.

2.4.2 A review of the Personal-Injury Accidents (PIAs) available from the DfT recorded within the study area (along the immediate highway network) has been undertaken using the most recently available five-year data (1st January 2016 - 31st December 2020) and includes the following junction:

- A642 Wakefield Road/ Site Access.

2.4.3 **Figure 2.3** illustrates the recorded findings.

Figure 2.3 Study Area Accident Report



Source: CrashMap.co.uk © - accessed 08/06/2021

2.4.4 Table 2.1 below summarises the accident record and severity over the last 5 years in more detail.

Table 2.1: Study Area Accident Record Summary

Year/Severity	Slight	Serious	Fatal	Total
2016	1	-	-	1
2017	1	-	-	1
2018	-	-	-	-
2019	-	-	-	-
2020	1	-	-	1
Total	3	-	-	3

2.4.5 Figure 2.3 and Table 2.1 demonstrates that no Fatal or Serious accidents have occurred along the stretch of the A642 Wakefield Road where the proposed site access is located within the study area between 2016-2020. There have been three slight accidents within the study network along the A642 Wakefield Road, however this is not deemed to be as a result of the existing highway layout.

2.4.6 Although all accidents are regrettable, it is clear from the analysis that the recorded accidents are not related to the existing highway layout. Therefore, no evidence has been established to indicate any specific problems with the operation of the existing local highway network surrounding the site. Therefore, the road safety record is not considered to be a material concern in the context of the proposed development.

3. TRANSPORT POLICY CONTEXT

3.1 Preamble

- 3.1.1 In order to assess the proposals and develop a transport access strategy for the proposed development, it is necessary to review both local and national transport planning guidance.
- 3.1.2 The following sections outline the relevant policy and guidance documents in respect of the proposed development.

3.2 National Planning Policy Framework [NPPF]

- 3.2.1 The NPPF sets out the Government's policies for delivering sustainable development through the planning system. Local authorities are required to take these policies into account when formulating local development plans and when determining planning applications.
- 3.2.2 The most recent NPPF report was published in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied at a local level. The NPPF is a significant material consideration in plan making and decision taking.
- 3.2.3 Paragraph 104 seeks to encourage opportunities to promote walking, cycling and public transport use. This is supplemented by paragraph 105 which states that development should be focused in sustainable locations and offer a genuine choice of transport modes.
- 3.2.4 Development proposals should also give priority to pedestrian and cycle movements and facilitate access to high quality public transport. The needs of people with disabilities and reduced mobility should also be addressed (paragraph 112).
- 3.2.5 Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.
- 3.2.6 Priority should be given to walking, cycling and public transport movements; conflicts between vehicles and vulnerable road users should be minimised through effective layout design.
- 3.2.7 Having regard to the above objectives, the proposed site access strategy includes measures to connect the site with the adjacent community and sustainable travel network, including existing public transport services. The TA considers the accessibility of the site by all modes and proposes a layout and access strategy that seeks to maximise the use of sustainable modes.

3.3 Planning Practice Guidance: Travel Plans, Transport Assessments and Statements in Decision-Making

- 3.3.1 In March 2014, the Department for Communities and Local Government [DCLG] in conjunction with the Department for Transport [DfT], released advice on when transport assessments and transport statements are required and what they should contain, which is intended to assist stakeholders in determining whether an assessment may be required. If an assessment is required, the level and scope of that assessment is then outlined within the document.
- 3.3.2 The advice reflects current Government policy, promoting a shift from the 'predict and provide' approach to transport planning to one more focused on sustainability. The document focuses on encouraging environmental sustainability, managing the existing network and mitigating the residual impacts of traffic from the development proposals.

3.4 West Yorkshire Combined Authority Corporate Plan 2021-2022

- 3.4.1 The West Yorkshire Combined Authority have set out an ambitious vision for the future of the region beyond the pandemic with the development of the West Yorkshire Economic Recovery Plan, and invested £24.5 million to implement key elements while seeking support from the Government to unlock its full potential.
- 3.4.2 The Leeds City Region Enterprise Partnership (the LEP) and the West Yorkshire Combined Authority declared a climate emergency in June 2019 and are working towards enabling West Yorkshire to be a net-zero carbon economy by 2038 at the latest.
- 3.4.3 To support clean growth in the region, over the coming year the West Yorkshire Combined Authority are to begin detailed feasibility work on 10 projects within the new Energy Strategy and Delivery Plan that will enable us to meet the region's energy needs and generate clean, low carbon energy.

Net Zero Carbon by 2038

- 3.4.4 The aim for the West Yorkshire Combined Authority is as follows:

"To be net-zero carbon by 2038 and to have made significant progress by 2030."

- 3.4.5 Demand for energy in the region is met predominately by a combination of renewable and low carbon technologies coupled with energy storage solutions and innovative ways of balancing demand for energy.
- 3.4.6 Businesses and industry use the resources they need to operate efficiently reducing energy consumption and boosting regional productivity.
- 3.4.7 Emission reductions are embedded into decision making ensuring the climate emergency is being addressed through all investments.

3.5 Kirklees Local Plan - Adopted February 2019

- 3.5.1 The Kirklees Local Plan was adopted on 27 February 2019. The Local Plan is now the statutory development plan for Kirklees and has superseded the Kirklees Unitary Development Plan. Planning applications must be determined in accordance with the development plan unless material considerations indicate otherwise.

Policy LP19 - Strategic Transport Infrastructure

- 3.5.2 The Council is committed to ensuring that new developments have safe and convenient access to the West Yorkshire Key Route Network where possible, the main arterial routes and the West Yorkshire Core Bus Network that connect the region. Development will be strategically placed along core networks where available and the developing core cycle network, all of which will be improved and maintained where possible to reduce congestion and reliance on the private car.
- 3.5.3 Proposals will be encouraged where they assist to bring forward strategic transport infrastructure where possible, particularly where they would directly benefit from these schemes.

Policy LP26 Renewable and Low Carbon Energy

- 3.5.4 Renewable and low carbon energy proposals (excluding wind) will be supported and planning permission granted where the following criteria are met:

- the proposal would not have an unacceptable impact on landscape character and visual appearance of the local area, including the urban environment;
- the proposal would not have either individually or cumulatively an unacceptable impact on protected species, designated sites of importance for biodiversity or heritage assets;
- the statutory protection of any area would not be compromised by the development;
- any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;
- any significant adverse effects of the proposal are mitigated by wider environmental, social and economic benefits.

3.5.5 Where the above criteria are met, the council encourages dialogue with local community groups promoting community renewable and low carbon energy schemes.

3.5.6 The NPPF requires Local Plans to plan positively to deliver renewable and low carbon technology developments. This is to help tackle climate change and address the environmental role of planning as set out in the NPPF. This helps to meet the UK's legally binding target to reduce carbon emissions by 80% on 1990 levels by 2050.

3.5.7 The National Planning Policy Guidance (NPPG) provides further clarity, stating that policies should be set to promote renewable and low carbon technologies, and these should be based on evidence that considers the opportunities for different types of technologies, the possible opportunities for district heat networks and consideration of the landscape impacts of these technologies.

3.6 Summary

3.6.1 The above policy review summaries both local and national transport policies relevant to the proposed development site. As such it sets out the context in which the proposed development needs to be compliant.

4. DEVELOPMENT PROPOSALS

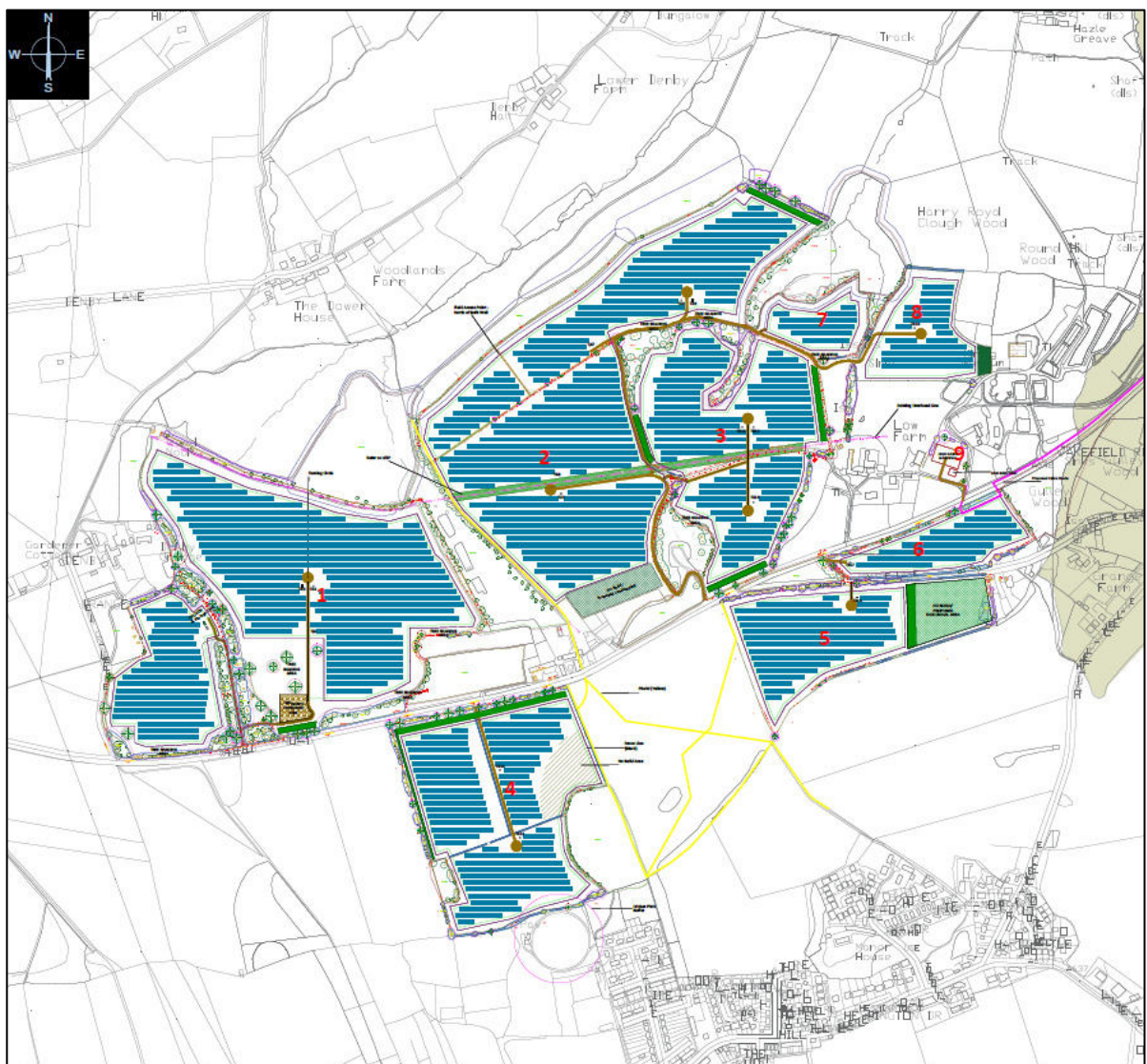
4.1 Introduction

4.1.1 The proposed development comprises the installation of a stand-alone Solar Photovoltaic Farm, which would generate approximately 49MW plus ancillary infrastructure and equipment, landscaping and access.

4.1.2 It is proposed that the electricity generated by the scheme would be exported to the local electrical distribution network via a Point of Connection (POC) to the 132kV network via the pylon at Lady Ings Farm, 58 Low Lane, Middlestown, Wakefield, WF4 4PT. A 49MW solar site in this location is estimated to generate between approximately 65,000 MWh of renewable energy per annum, the equivalent of the annual energy consumption of 15,200 homes in Kirklees.

4.1.3 An indicative site masterplan has been prepared by scheme architect Boom Power and is illustrated in **Figure 4.1** with a copy of the full plan provided in **Appendix A**.

Figure 4.1: Proposed Site Layout

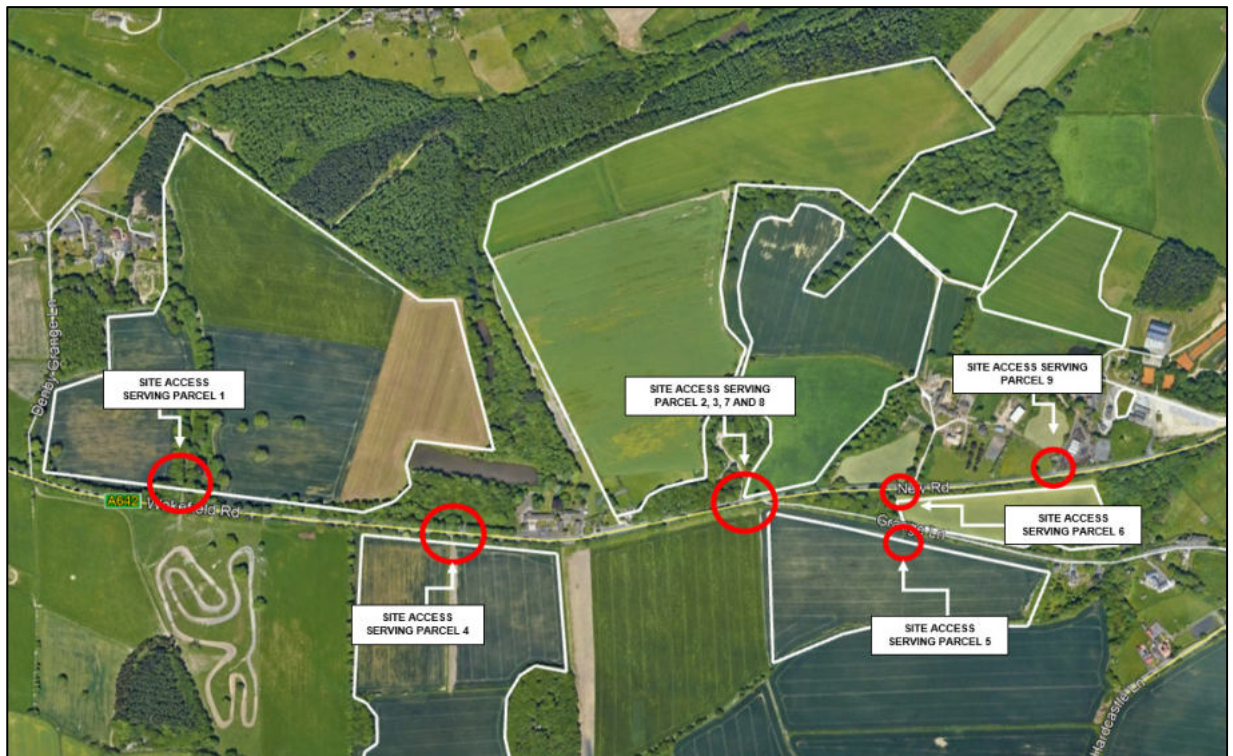


Source: Boom Power

4.2 Site Schedule and Site Access.

- 4.2.1 There are a total of nine parcels of land associated with the development site, with a total site area of 165 acres. Out of the nine parcels of land, eight of the parcels contain solar panels and the ninth is allocated for the sub-station.
- 4.2.2 There are proposed to be five primary access points to serve the solar farm including an additional access to serve the sub-station area. For ease, the access points and the corresponding parcel of land that the access serves are illustrated in **Figure 4.2** below.

Figure 4.2 Proposed Site Access Points



Source: GoogleMaps©- Accessed 08/06/2021

- 4.2.3 All of the proposed site access points are proposed to be taken via the A642 Wakefield Road via existing agricultural entrance points.
- 4.2.4 Due to the condition of the existing access roads, proposed site access drawings have been prepared illustrating the site accesses with a 5.5m wide carriageway and 6.0m radii to the east and west to accommodate HGV vehicular movements. The proposed site access drawings are illustrated in **Appendix B**.
- 4.2.5 In addition, a swept path manoeuvre of a 16.5m HGV and has been undertaken at Parcel 1 to demonstrate that they can safely enter this existing site access point off the local highway network and extend along the, manoeuvre within the site, and exit the site in a forward gear. The swept path manoeuvres of a 16.5m Articulated Vehicle are also presented in **Appendix B**.

- 4.2.6 In addition, swept path manoeuvres have been undertaken with a John Deere Tractor and Rolland Trailer for the other four proposed access points which is also illustrated in **Appendix B**.
- 4.2.7 With regards to the substation area access, there is anticipated to be only a small number of service deliveries required to erect the substation infrastructure. Future servicing requirements are expected to be minimal. Therefore, the access arrangement for the substation is considered suitable for purpose.
- 4.2.8 It is proposed that the site access will consist of temporary ground re-enforcements due to the small number of vehicle movements expected on site. The access track construction will consist of stripping the topsoil and storing it in an allocated area on site. The internal access tracks will be constructed using processed rockfill or MOT1 Sub -base equivalent. Each layer will be laid and vibro-rolled with 8-10 passes between layers. This is discussed further in Section 5.
- 4.2.9 There is likely to be disruption to the A642 Wakefield Road during the construction works for the site access due to the need for traffic management while excavation and construction occurs and this will be managed in accordance with Chapter 8 of the Traffic Signs Manual.

Site Access Visibility Splays

- 4.2.10 The site access points along the A642 Wakefield Road comprise of visibility splays that have an 'x' (minor arm setback distance) of 2.4m and a 'y' (major road visibility) distance of 149.0m to the east and west which is consistent with a 50mph road as presented in **Appendix C** for reference. These visibility splays are considered appropriate given the scale of volume of vehicles entering the site.
- 4.2.11 The site access associated with Parcel 5 is to be taken off Grange Lane which is governed by a 30mph speed limit and comprises of visibility splays that have an 'x' (minor arm setback distance) of 2.4m and a 'y' (major road visibility) distance of 43.0m to the east and west which is consistent with a 30mph road as presented in **Appendix C** for reference.
- 4.2.12 For the purposes of Parcel 1, it has been confirmed that the associated wall along the boundary line of Parcel 1 site access will be removed/repared during the construction period to allow for the appropriate visibility at this access point. Upon completion of the site, the wall will be re-instated and repaired to its original state.

4.3 Commissioning Construction Methodology

Ground Anchoring

- 4.3.1 The arrays will be supported on metal posts driven into the ground at a depth to be determined by soil penetration tests. Concrete footings will be required for the private and District Network Operator [DNO] switch gear enclosures.

Ground Re-Profiling

- 4.3.2 There is no requirement for any re-profiling of the ground as the arrays can be constructed over the existing landform.
- 4.3.3 Maps showing topsoil and subsoil types shall be made available base on geotechnical studies performed before construction. Areas of soil to be protected from construction activities shall be clearly marked and unnecessary vehicle movements across soil will be avoided.

Site Trenching and Cabling

4.3.4 Trenching comprises a layout of main trenches between inverters and switch enclosures circa 120.00cm deep with secondary trenches from each panel row and other isolated areas circa 60.0cm deep.

Completion Works

4.3.5 All areas of the solar farm will be made good on completion of the works with topsoil ready for reinstatement to its original condition within three months of commissioning.

4.4 The Formation and Position of the Construction Compound

4.4.1 A construction compound will be used in the construction of the development and will be positioned in Parcel 1. The location of the compound area has been chosen to ensure minimal disruption to its surroundings in terms of noise to surroundings and any impact to nearby watercourses, reens, ditches, etc.

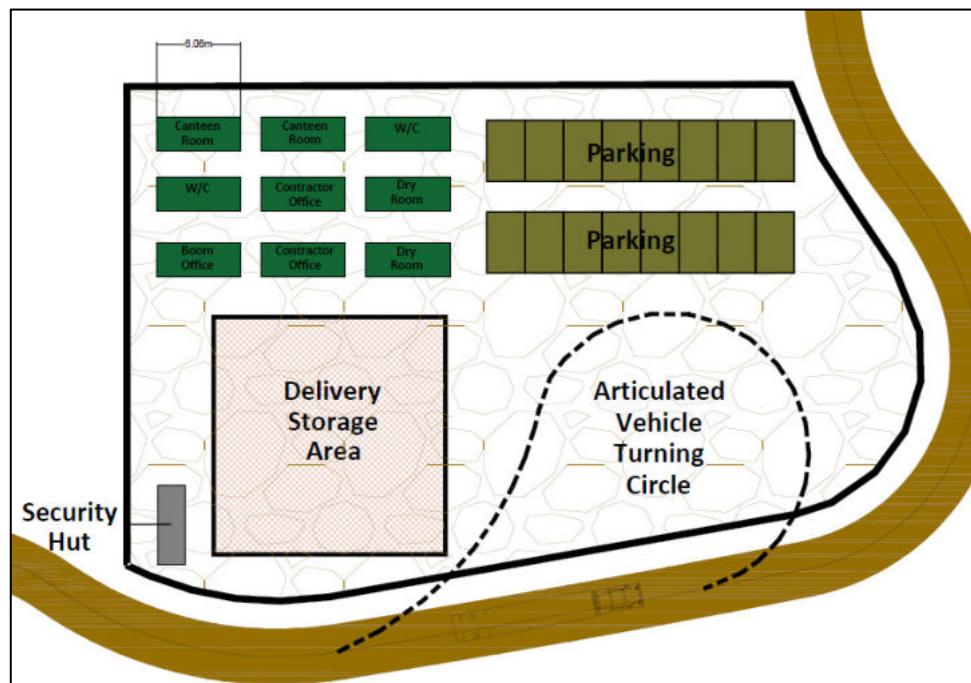
4.4.2 The compound will be offset at a distance of 12.5m from the top of bank of any main river and 7m from the top of bank of any other ditch.

4.4.3 The compound area will be cleared, levelled and have a suitable gravel base laid to allow site accommodation, materials storage and parking facilities for the construction period. This material is implemented in order to allow continued greenfield run off rates.

4.4.4 There is proposed to be a primary site compound located in Parcel 1 where materials will be delivered and stored. It is then proposed that agricultural traffic will distribute these materials to the other parcels accordingly on a just in time basis to minimise disruption to the local highway network.

4.4.5 **Figure 4.3** below illustrates an indicative compound layout including all necessary components and resources.

Figure 4.3: Indicative Construction Compound



Source: BoomPower

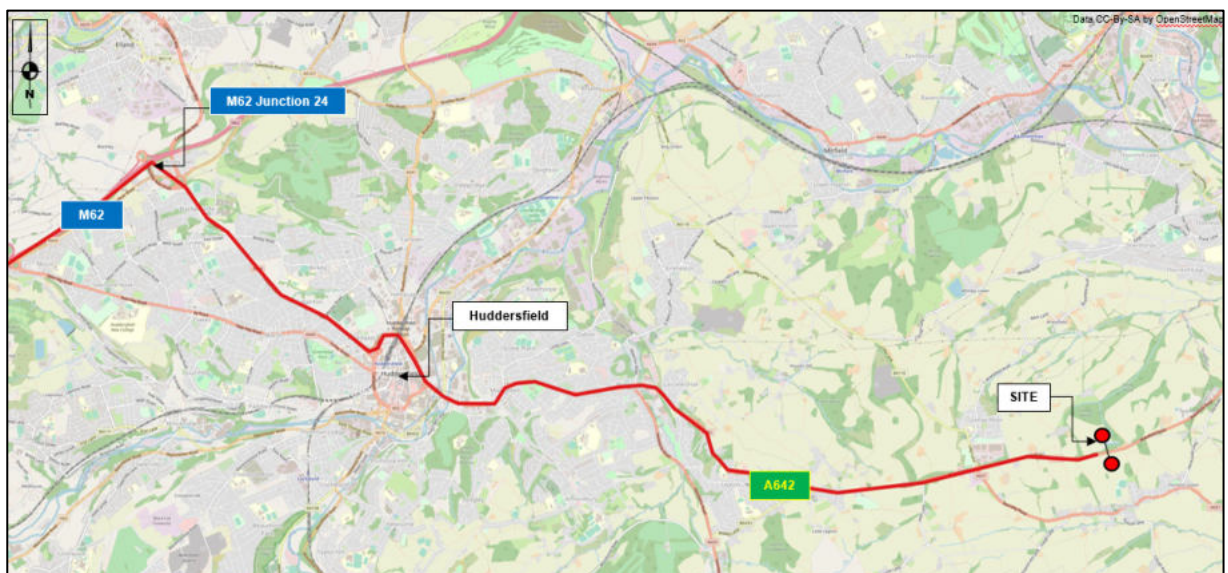
4.5 Construction Traffic Access

- 4.5.1 The construction requirements of the development have been considered to ensure that the site can successfully be accessed and maintained. It should however be noted that those full details will be provided within the Construction Traffic Management Plan.
- 4.5.2 All construction vehicles will enter and exit the site in forward gear. A construction compound will be provided within Parcel 1 where vehicles will be able to turn and will be set out as illustrated in the indicative compound drawing in Section 4.3.
- 4.5.3 Within the fields of the proposed solar farm, temporary access tracks may be laid to enable the support of the loading of HGVs and plant. Any temporary access track will be removed upon completion of the construction phase.

4.6 Construction Traffic Route

- 4.6.1 A proposed construction traffic route is illustrated in **Figure 4.3** below and also in **Appendix D** for reference. It is proposed that construction traffic is routed from the west off the M62, extending in an easterly direction through Huddersfield along the A642.
- 4.6.2 This route has been proposed as it avoids Environmental Weight Restricted [EWR] Zones such as the EWR in Flockton Green village. The route also avoids small villages with narrow routes such as Midgley and West Bretton. The proposed construction traffic route is deemed the most suitable as it is accessible off a primary M62 motorway northbound and southbound and extends on a primary A640 route that is suitable for Heavy Goods Vehicles.

Figure 4.4: Proposed Construction Traffic Routeing



Source: OpenStreetMaps© - Accessed 08/06/2021

4.7 Operational Traffic Access and Routeing

4.7.1 There is anticipated to be a maximum of two visits to the site per month that would typically be made by light van or 4x4 type vehicles. These vehicles would access the site via the aforementioned site access points located off the A642 Wakefield Road. As such the proposed access arrangements for the operational phase are considered suitable for purpose and the low level of vehicle numbers expected can be accommodated on the existing highway network.

4.8 Substation Area Access

4.8.1 As previously stated, with regards to the substation area access, there is anticipated to be only a small number of service deliveries required to erect the substation infrastructure. Future servicing requirements are expected to be minimal. Therefore, the access arrangement for the substation is considered suitable for purpose.

4.9 Decommissioning Methodology

4.9.1 Upon completion, all temporary works shall be dismantled and the soil re-instated including re-seeding the vegetation. Where significant disturbance to the land has occurred, an appropriate mix of vegetation will be implemented. The decommissioning methodology will be confirmed and elaborated in more detail within the Landscape and Ecology Management Plan [LEMP] which will be included as part of the planning application.

4.9.2 The site access points will remain in place to allow for the decommissioning to occur. All previously proposed vehicle traffic routeing will remain the same for decommissioning traffic.

5. VEHICLE TRIP ATTRACTION

5.1 Construction Phase Attraction

5.1.1 The applicant has confirmed from its experience of developing solar farms elsewhere in the UK that the construction of the solar farm will have the highest intensity of deliveries taking place over a six-week period (30 working days). The total construction period is anticipated to be 6 months.

5.1.2 The site construction opening times are as set out below:

- Site open for non-noise invasive works - no heavy machinery nor deliveries;
 - » Monday to Friday 07:30-18:30;
 - » Saturday 07:30-16:30
- Site fully open for all works including heavy machinery and deliveries;
 - » Monday to Friday 08:30-17:30;
 - » Saturday 09:00-13:00
- Site not open Sundays or Public Holidays;
- If schools are in the area or in busy commuter routes deliveries will be restricted to;
 - » Monday to Friday 09:00 - 15:00
 - » Saturday 08:00 - 13:00

5.1.3 The construction phase includes the preparation of the site, installing the temporary access polyethylene matting, erection of security fencing, assembly and erection of the PV strings, installation of the inverters/transformers and grid connection.

5.1.4 It is proposed that construction workers of the site will be ferried by a minibus and have their breaks staggered in the canteen. A temporary construction compound will be provided in Parcel 1 and will provide storage, parking for contractors and turning for HGVs. The location where staff will travel from is unknown at this stage as it will depend on the appointed contractor.

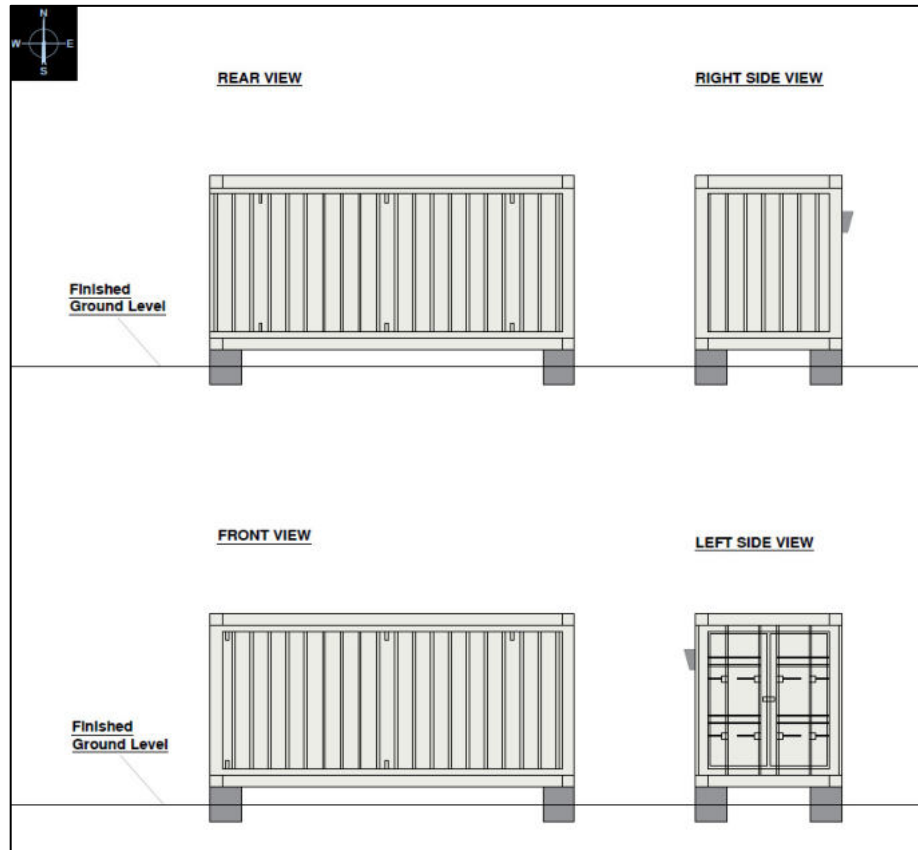
5.1.5 The construction period will include the use of HGVs using already established access points which can accommodate existing agricultural vehicles to service the existing farms. The agricultural vehicles will not be restricted in any way and the movement of construction traffic will be strictly managed to avoid peak hours. This is outlined further in the accompanying Construction Traffic Management Plan [CTMP] Document. It should be noted that unlike wind farms, the construction of a solar farm does not require equipment to be delivered by abnormal loads (i.e., vehicles over 16.5m in length).

5.1.6 Therefore, based on the above, there is no requirement for any Abnormal Invisible Loads [AIL] deliveries to the site. The components required to construct the solar farm will arrive in 40ft containers by vehicles that are a maximum length of 16.5m long articulated vehicles.

5.1.7 The largest item to be delivered to the site is the Distribution Network Operator's (DNO) substation (132kV and 33kV) and the crane which is capable of carrying 100 tonnes. The DNO substation (132kV) will require six deliveries and the crane will require two deliveries anticipated to be by a 16.5m articulated HGV. The DNO substation (33kV) will require two deliveries and one delivery for the crane anticipated to be by a 16.5m articulated HGV.

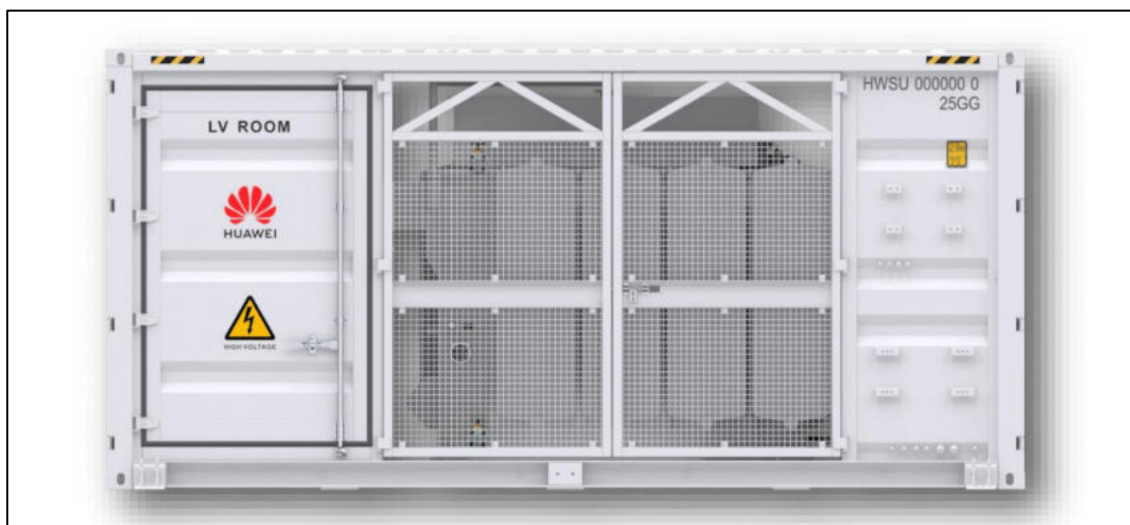
5.1.8 The Smart Transformer Station which connects the underground grid connection cable of the solar farm to the distribution network will arrive at the site by the smallest possible vehicle, which could be a 12m rigid lorry. A total of one delivery is required. The DNO Switchgear cabinet is illustrated in **Figure 5.1** and **Figure 5.2** below.

Figure 5.1: Switchgear Cabinet



Source: Boom Power

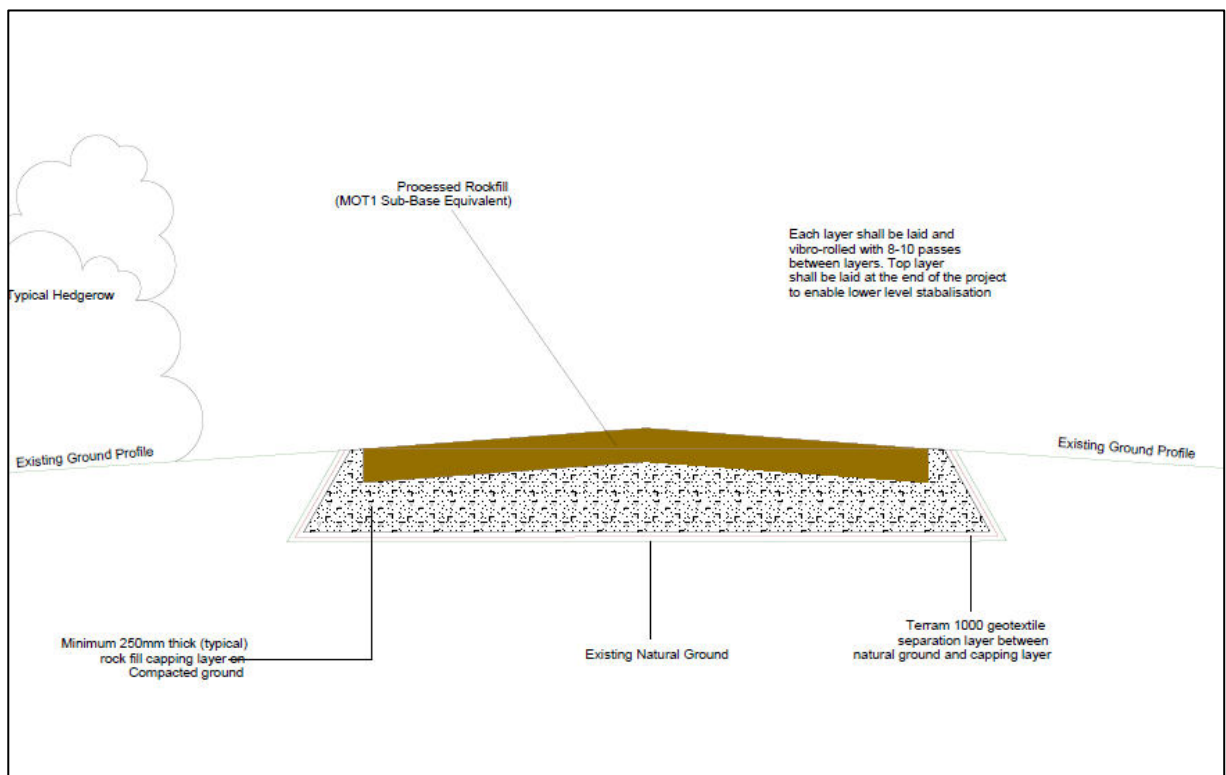
Figure 5.2: Transformer Station



Source: Boom Power

- 5.1.9 In addition, the site will not be using Central Inverters but individual Smart Inverter Strings of which there are 270. These are 1,035 x 700 x 665mm in size.
- 5.1.10 The internal access tracks will be constructed using processed rockfill or MOT1 Sub -base equivalent. Each layer will be laid and vibro-rolled with 8-10 passes between layers. Top layer shall be laid at the end of the project to enable lower-level stabilisation, as illustrated in **Figure 5.3** below. The material will arrive on 10m long tipper trucks. The precise number will depend on the amount of material required but based on around 1800m length of internal access tracks, around 1000 cubic metres of rockfill will be required.
- 5.1.11 A stone tipper lorry can typically carry around 15 cubic metres of stone and as such we have assumed a total of 67 deliveries.

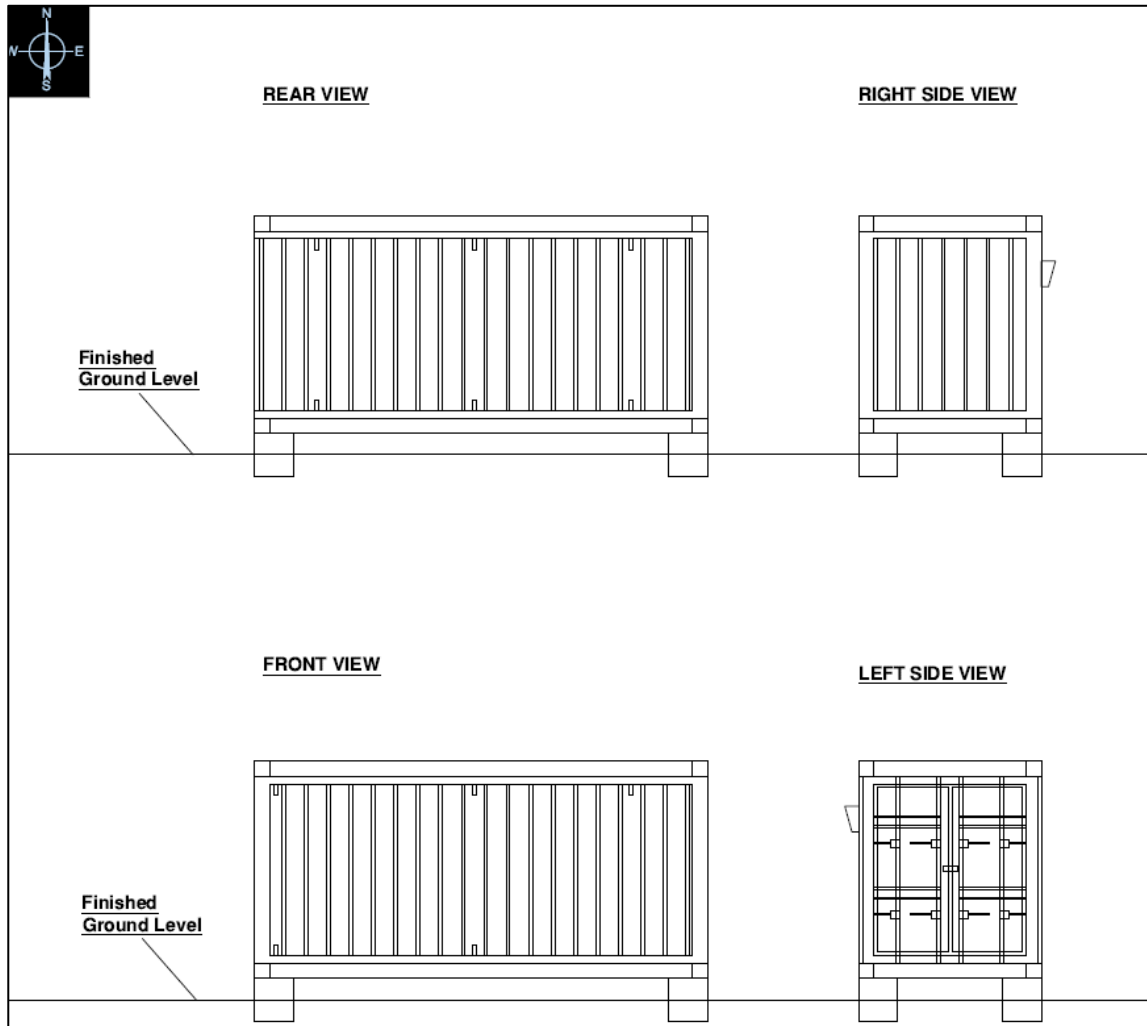
Figure 5.3 Internal Access Track Cross Section



Source: Boom Power

- 5.1.12 A Front end JCB will also be required to transport equipment around the site, and to distribute stone as necessary. This is a similar size to a tractor and will either be transported to the site or be driven to the site.
- 5.1.13 A container for the custom switchgear will also be provided on site. This will be transported by a 10m rigid vehicle. It would be transported individually due to its weight and as such this would equate to a total of one delivery per parcel. The Storage Container is illustrated in **Figure 5.4** below.

Figure 5.4: Storage Container Foundations



Source: Boom Power

5.2 Anticipated Overall Construction Traffic Movements

- 5.2.1 The applicant has advised that around 256 construction traffic movements (512 two-way movements) will be required for the construction of the whole site. Assuming all construction traffic movements arrive within a six-week period and Monday to Saturday, this equates to, on average, around eight deliveries (16 movements) per day.
- 5.2.2 With regards to 16.5m articulated vehicles, it is anticipated that there will be a total of 126 x 16.5m articulated vehicles (252 two-way movements) required to construct the site.
- 5.2.3 In summary, the following construction traffic movements could be associated with the construction period as set out in **Table 5.1**.

Table 5.1: Construction Traffic Movements – Construction Period

Activity	Type of Vehicle	Total Number of Deliveries
Solar Modules & Mounting Structures	16.5m Articulated	115 (230 two-way movements)
DNO Substations	16.5m Articulated	8 (16 two-way movements)
Crane	16.5m Articulated	3 (6 two-way movements)
Inverters	10m Rigid	10 (20 two-way movements)
DNO Cabinet	12m Rigid	1 (2 two-way movements)
Customer Switchgear	10m Rigid	1 (2 two-way movements)
Access Tracks	10m Rigid / Tipper Truck	67 (134 two-way movements)
Storage Compound	10m Rigid	1 (2 two-way movements)
Other (Cabling, Construction Material, Waste)	12m Rigid	45 (90 two-way movements)
General	Front End JCB by low loader	1 (2 two-way movements)
Temporary Ground Re-enforcement works	10m Rigid / Tipper Truck	4 (8 two-way movements)
TOTAL		256 Construction Traffic movements (average of 8 per day)

- 5.2.4 **Table 5.1** therefore confirms that a maximum of 256 deliveries (512 two-way movements) could be made by construction traffic associated with the construction of the solar farm, at an average of around eight deliveries or 16 two-way movements per day over the six-week period when construction traffic movements will be at their highest intensity.
- 5.2.5 The calculation undertaken to produce Hydrock's anticipated construction traffic movements per day is illustrated in the equation below and **Table 5.2** below summaries the construction, operation and traffic movements associated with the site.

$$\frac{\text{Total Construction Traffic Movements}}{(\text{Construction Period} \times \text{Operating Days})}$$

Table 5.2: Construction Traffic Movements

Proposed Development	Construction Period	Operating Hours	Operating Days	Total Construction Traffic Movements	Construction Traffic Movements per Day (Average)
Low Farm Solar	6 weeks	Monday to Friday 08:30-17:30 Saturday 09:00-13:00	5.5	512	8 deliveries per day (16 movements)

5.2.6 Based on the total 16 two-way movements, as described above, it is deemed unwarranted for any form of operational capacity assessment to be undertaken and **Table 5.1** and **Table 5.2** above provides evidence that an operational capacity assessment is not feasible in this instance.

5.2.7 In addition to the construction traffic movements identified in **Table 5.1** there may also be a small number of construction movements (maximum 10-two-way movements) associated with smaller vehicles such as the collection of skips for waste management, the transport of construction workers and sub-contractors, including cleaners throughout the length of the full construction period.

5.3 Uplift of the Construction Traffic flows

5.3.1 To provide comfort to the LHA, an uplift scenario has been applied to the proposed construction traffic movements to determine a worst-case scenario of traffic impact.

5.3.2 Hydrock have undertaken further calculations to emphasise that even if the vehicle trip generation were to triple to 1600 total construction traffic movements, the development would still not have a material impact on the local highway network.

5.3.3 Illustrated in **Table 5.3** below is a revised calculation with an increase in total construction traffic movements trips and a worst-case scenario in terms of increased construction period.

Table 5.3: Uplifted Total HGV Movements

Proposed Development	Construction Period	Operating Hours	Operating Days	Total Construction Traffic Movements	Construction Traffic Movements per Day (Average)
Low Farm Solar	25 weeks	Monday to Friday 08:30-17:30 Saturday 09:00-13:00	5.5	1600	6 deliveries per day (12 movements)

5.3.4 As illustrated in **Table 5.3** above, if the construction period of the proposed development is uplifted to a worst-case scenario, with a construction period of high intensity of 25 weeks, the number of daily average construction traffic movements is still a modest 12 movements per day.

5.4 Construction Traffic Distribution

- 5.4.1 As previously stated, there are a total of nine parcels of land associated with the development site, with a total site area of 165 acres. Out of the nine parcels of land, eight of the parcels contain solar panels and the ninth is allocation for the sub-station.
- 5.4.2 In addition, there are proposed to be five primary access points to serve the solar farm with an additional access to serve the sub-station area.
- 5.4.3 Therefore, Hydrock have distributed the total anticipated Construction traffic movements into the proposed five site access points, excluding the substation as there is anticipated to be only a small number of service deliveries required to erect the substation infrastructure, as discussed in Section 5.5 below. The assessment has been undertaken through a ratio of the size of the panelled area for which each access serves as shown in **Table 5.4** below.
- 5.4.4 The assessment also includes a breakdown of total anticipated daily movements anticipated along the A642 Wakefield Road during the construction of the parcel. Each parcel will be constructed individually.
- 5.4.5 This exercise has also been undertaken for the uplift scenario, as shown on **Table 5.5**.

Table 5.4: Proposed Construction Traffic Distribution - Site Accesses

Site Access Point	Panelled Area (acres)	Percentage Split	Total Construction Traffic Movements at each access (2-way)	Anticipated Daily Movements on the A642 Wakefield Road (2-way)
Serving Parcel 1	45	27%	139	4
Serving Parcel 2,3,7 and 8	79	48%	245	7
Serving Parcel 4	25	15%	77	2
Serving Parcel 5	11	7%	34	1
Serving Parcel 6	6	3%	17	1
Total	165	100%	512	16

Note Results Subject to Rounding*

Table 5.5: Proposed Construction Traffic Distribution - Site Accesses- Uplift Scenario

Site Access Point	Panelled Area (acres)	Percentage Split	Total Construction Traffic Movements at each access (2-way)	Anticipated Daily Movements on the A642 Wakefield Road (2-way)
Serving Parcel 1	45	27%	435	3
Serving Parcel 2,3,7 and 8	79	48%	767	6
Serving Parcel 4	25	15%	239	2
Serving Parcel 5	11	7%	105	1
Serving Parcel 6	6	3%	53	0
Total	165	100%	1600	12

Note Result Subject to Rounding*

- 5.4.6 To illustrate further, **Traffic Flow Figure 1** and **Traffic Flow Figure 2** illustrates the proposed Traffic Assignment across the local highway network which is in line with the Construction Traffic Routing Plan, as discussed previously in Section 4. A percentage split has been applied to each of the proposed site access points based on the size of the panelled area in acres.

5.4.7 **Traffic Flow Figure 3** and **Traffic Flow Figure 4** illustrates the proposed Traffic Assignment across the local highway network with the Uplift Scenario (a total of 1600 HGV movements) to demonstrate that even in the uplifted scenario, the number of total HGV movements is still a modest on the network and equates to only 12 2-way movements per day.

5.4.8 As can be seen from Traffic Flow Figures, the impact of the proposed development is deemed immaterial on the local highway network, particularly the impact on the A642 Wakefield Road, therefore the level of traffic during the temporary construction phase is not considered to be material and it is considered that this will not have an impact on the safety or operation of the local highway network.

5.5 Erection of the Substation - Parcel 9

5.5.1 In addition to the above, as previously stated, with regards to the substation area access, there is anticipated to be only a small number of deliveries required to erect the substation infrastructure. **Table 5.6** below outlines the number of construction movements required to erect the 132kV substation and 33kV substation. Future servicing requirements are expected to be minimal with emergency access only.

Table 5.6: Erection of the Substation - Parcel 9

Substation	Total Number of Deliveries for Construction
132kV Substation	8 Deliveries (6 x Articulated HGV/ 2 x Crane)
33kV Substation	3 Deliveries (2 x Articulated HGV/ 1 x Crane)

5.6 Operational Phase

5.6.1 After commissioning, there are anticipated to be a maximum of 2 vehicles per month to the site for equipment maintenance. These would typically be made by light van or 4x4 type vehicles. Whilst the contractor’s compound will have been removed, space will remain within the site on the access tracks for such a vehicle to turn around to ensure that reversing will not occur onto the highway.

5.6.2 The operational movements are illustrated in **Table 5.6** below.

Table 5.7: Anticipated Operational Traffic Movements

Activity	Type of Vehicle	Total Number of Deliveries
Maintenance of Solar Panels	7.5t Box Van	2 visits per month (4 two-way movements per month)

5.7 Summary

5.7.1 Based on the above, it is expected that there will be a maximum of around eight large vehicles per day accessing the site (i.e. eight arrivals and eight departures) over the six-week period when deliveries will occur. There will also be construction workers arriving at the site first thing in the morning and departing in the evening, although the numbers involved are forecast to be relatively low on a day-to-day basis. The level of traffic during the temporary construction phase is not considered to be material and it is considered that this will not have an impact on the safety or operation of the local highway network.

6. SUMMARY AND CONCLUSION

6.1 Summary

- 6.1.1 Hydrock have been instructed by AARDVARK EM Ltd. to prepare a Transport Assessment [TA] relating to proposals for the installation of a Solar Photovoltaic Farm in Wakefield, West Yorkshire. This report has been prepared in support of a planning application.
- 6.1.2 The site comprises nine parcels of land in arable agricultural use totally approximately 85 hectares, located north of Flockton and east of Grange Moor. The site is access via the A642 Wakefield Road. The site is located within a predominantly rural setting.
- 6.1.3 The proposed development comprises the installation of a stand-alone Solar Photovoltaic Farm, which would generate approximately 49MW plus ancillary infrastructure and equipment, landscaping and access.
- 6.1.4 It is proposed that the electricity generated by the scheme would be exported to the local electrical distribution network via a Point of Connection (POC) to the 132kV network via the pylon at Lady Ings Farm, 58 Low Lane, Middlestown, Wakefield, WF4 4PT. A 49MW solar site in this location is estimated to generate between approximately 65,000 MWh of renewable energy per annum, the equivalent of the annual energy consumption of 15,200 homes in Kirklees.
- 6.1.5 The swept path analysis undertaken has demonstrated that the proposed arrangement is suitable and all turning, access and egress manoeuvres can be performed safely.
- 6.1.6 It is expected that there will be a maximum of around eight large vehicles per day accessing the site (i.e. eight arrivals and eight departures) over the six-week period when construction traffic will be at its highest intensity. There will also be construction workers arriving at the site first thing in the morning and departing in the evening, although the numbers involved are forecast to be relatively low on a day-to-day basis. The level of traffic during the temporary construction phase is not considered to be material and it is considered that this will not have an impact on the safety or operation of the local highway network.
- 6.1.7 While Hydrock understand that any type of disruption to the local highway network would be unwelcomed, it is felt that a balance between a modest increase in traffic for a short construction period to facilitate approximately 65,000 MWh of renewable energy per annum, is a reasonable trade-off.

6.2 Conclusion

- 6.2.1 Having undertaken a comprehensive analysis of the development site and after reviewing planning policies, it has been demonstrated by this TA that the proposed development accords with highway access design recommendations and hence there is no basis for highway and transportation objections to the proposals.