

# AULTMORE WIND FARM REDESIGN

## TECHNICAL APPENDIX 11.1: ABNORMAL LOAD ROUTE ASSESSMENT

Prepared for: **Vattenfall Wind Power Ltd**

Client Ref: 404.03640.00016

SLR Ref: 404.03640.00016  
Version No:1  
December 2023



## BASIS OF REPORT

This document has been prepared by SLR with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it by agreement with Vattenfall Wind Power Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

## CONTENTS

<b>1.0</b>	<b>INTRODUCTION AND SCOPE .....</b>	<b>1</b>
1.1	Introduction .....	1
1.2	Background .....	1
1.3	Scope of Work.....	1
<b>2.0</b>	<b>PROPOSED DEVELOPMENT .....</b>	<b>1</b>
2.1	Description of Proposed Development.....	1
2.2	Turbine Details.....	1
2.3	Proposed Access Route.....	2
<b>3.0</b>	<b>TRANSPORT REQUIREMENTS .....</b>	<b>2</b>
3.1	Necessary Agreements .....	3
3.2	Time Restrictions .....	4
3.3	Escorts.....	4
<b>4.0</b>	<b>SWEPT PATH ANALYSIS VEHICLE CONFIGURATION .....</b>	<b>4</b>
<b>5.0</b>	<b>ROUTE REVIEW.....</b>	<b>6</b>
5.1	Buckie - Approx. 7 miles.....	6
5.2	Inverness – Approx. 54 miles .....	7
5.2.1	Nairn Diversion .....	8
5.3	Peterhead - Approx. 59 miles.....	9
5.4	Aberdeen – Approx. 62 miles.....	9
5.5	Fraserburgh – Approx. 50 miles .....	9
5.6	Invergordon – Approx. 75 miles.....	10
<b>6.0</b>	<b>SUMMARY OF THE ROUTE REVIEW .....</b>	<b>10</b>
6.1.1	Port of Buckie to Aultmore Site .....	10
6.1.2	Port of Inverness to A96.....	11
6.1.3	Port of Peterhead .....	11
6.1.4	Port of Aberdeen .....	11
6.1.5	Port of Fraserburgh .....	11
6.1.6	Port of Invergordon to Inverness (A96).....	12
<b>7.0</b>	<b>SWEPT PATH ASSESSMENT .....</b>	<b>12</b>
7.1.1	Port of Buckie to Aultmore Site.....	12
7.1.2	Port of Inverness.....	12

---

7.1.3	Port of Peterhead .....	14
7.1.4	Port of Aberdeen .....	14
7.1.5	Port of Fraserburgh .....	15
7.1.6	Port of Invergordon to Inverness.....	15
<b>8.0</b>	<b>SUMMARY AND RECOMMENDATIONS.....</b>	<b>15</b>

## DOCUMENT REFERENCES

### DRAWINGS

H001-6	A96 Roundabout Nairn – 83.3m Blade – DOLL Trailer
H002-6	A96/B9016 Roundabout Elgin – 83.3m Blade DOLL Trailer
H003-6	A96 Fochabers East Roundabout – 83.3m Blade DOLL Trailer
H004-6	A98/B9016 Junction Portgordon – 83.3m Blade DOLL Trailer
H007-20	A96/B9006 Junction – 83.3m DOLL Trailer
H007-21	B9090 Clephanton– 83.3m DOLL Trailer
H007-22	B9090 Bend – 83.3m DOLL Trailer
H007-23	B9090 Cawdor – 83.3m DOLL Trailer
H007-24	B9111/B9101 Crossroads – 83.3m DOLL Trailer
H007-25	B9111/B9101 – 83.3m DOLL Trailer
H007-26	B9111/A96 – 83.3m DOLL Trailer
H020-04	B9016 – 83.3m DOLL Trailer
H021-04	B9016 – 83.3m DOLL Trailer
H022-04	B9016 – 83.3m DOLL Trail
H023-04	B9016 – 83.3m DOLL Trail
H030-04	B9016 – 83.3m DOLL Trail

### FIGURES

Figure 1.1	Site Location
Figure 2.1	Routes to Site

### APPENDICES

Appendix A	Summary table of pinch points
------------	-------------------------------

---

## 1.0 Introduction and Scope

### 1.1 Introduction

SLR Consulting has been instructed by Vattenfall Wind Power Ltd ('the applicant') to prepare a detailed access report for the delivery of wind turbine components to the proposed Aultmore Wind Farm Redesign (the Site), located to the south of Buckie, Moray, Scotland.

The purpose of this report is to identify if the required blade length is able to be delivered to the Site.

### 1.2 Background

The applicant is seeking to redesign the consented Aultmore wind farm at Aultmore Forest, Moray. The location of the Site is shown in **Figure 1.1**. The proposed redesigned Aultmore development (the proposed development) would be sited within Aultmore Forest, which sits across two hill tops, between Keith and Cullen.

### 1.3 Scope of Work

This Abnormal Load Route Assessment has been prepared to assess if the required blade length can be delivered to the proposed windfarm.

The assessment focuses on the suitability of potential route options, with identification of specific areas likely to present significant constraints. Swept path analysis has been undertaken for those problem areas as part of our assessment.

Identification of road signage, etc. to be temporarily removed and clearance of trees and hedges has not been identified in this report as no detailed topographic survey has been undertaken at this stage. These elements will be considered as part of the detailed analysis completed by the company commissioned to transport the abnormal loads and as part of the detailed Abnormal Load Access Route Report which will be produced as part of the planning conditions should the proposed development receive consent.

SLR devised the following scope of works:

- Desk based study to identify potential routes and pinch points;
- Site visit undertaken on the 17<sup>th</sup> December 2021;
- Swept Path Analysis of identified potential pinch points; and
- Production of this Abnormal Load Route Assessment report.

## 2.0 Proposed Development

### 2.1 Description of Proposed Development

The proposed development would consist of approximately 16 turbines with an installed capacity in excess of 100MW when considered as a whole.

The duration of the construction works is expected to be in the order of 18 months.

### 2.2 Turbine Details

A final choice of wind turbine will be made through a competitive tendering exercise post consent and as such these details are yet to be finalised. It is anticipated that the turbines for the proposed development would not exceed the dimensions shown in **Table 2.1**.

**Table 2.1 Candidate Turbines**

Element	Candidate Turbine
Blade Tip Height	Up to 200m
Rotor Diameter	Up to 175m (blade length up to 87m)
Hub Height	Up to 125m

Split blade technology may be available by the time of construction; this could reduce the maximum blade length required to be transported by approximately 15m by splitting the blades into sections.

## 2.3 Proposed Access Route

A specific port of delivery has not yet been determined for the development. The nearest ports / harbours to the Site that may be suitable are identified below (measurements in road miles):

- Buckie - Approx. 7 miles
  - The route from Buckie would follow A98 -B9016
- Inverness – Approx. 54 miles
  - The route from Inverness would follow the A9 - A96 - A98 -B9016
- Aberdeen – Approx. 62 miles
  - The route from Aberdeen follows the A96 - A98 -B9016
- Fraserburgh – Approx. 50 miles
  - The route from Fraserburgh would follow A98
- Peterhead - Approx. 59 miles
  - The route from Peterhead would follow A950 – A98
- Invergordon – Approx. 75 miles
  - The route from Invergordon would follow the A9 - A96 - A98 -B9016

A desk-based study has been undertaken for each port to include the access route from it to the Site. Where a route was considered suitable from the desk study, it was reviewed during the Site visit undertaken on the 17<sup>th</sup> December 2021 to determine its suitability. Not all the ports identified above have traditionally been used for wind turbine component delivery, but more ports are considering offering such services and so have been considered in the initial assessment for completeness.

## 3.0 Transport Requirements

Wind farm developments can generate traffic impacts associated with the vehicles removing and delivering materials during preparation and construction of the wind farm. The delivery of the wind turbine components and any equipment associated with connection and distribution of generated power may bring about impacts beyond that of the general construction traffic.

Paramount during the consultation period is the need to consider the capacity of the highway network both locally and from the point of disembarkation to accommodate the extraordinary transport configurations necessary to deliver the various components comprising a wind turbine, as the various components are longer, wider and heavier than general construction traffic.

Movement of transport configurations in excess of 30m length, 5m width, or 44 tonnes gross weight are considered exceptional and are controlled by the Special Types General Order Regulations (STGO) or are subject to Special Order (SO or VR1) requirements depending on their size, which is outlined in Section 3.1. The application process regulating such movements may insist that a thorough examination of structural and negotiability aspects of the move are considered.

The movement of Abnormal Indivisible Loads (AILs) is controlled by the requirements of the Department of Transport who stipulate varying notice procedures dependent upon overall dimensions.

The access study has identified the transport configurations for the most onerous wind turbine components, transported by a specialist vehicle fleet.

### 3.1 Necessary Agreements

Anyone who requires to move an abnormal load on the public road network is obliged by law to give advance notification to the relevant local Road and Bridge Authority in order that the proposed route can be assessed for suitability. An abnormal load is defined as a vehicle which exceeds the dimensions set out in the Road Vehicle (Construction and Use) Regulations 1986. Generally, these dimensions are:

- Not exceeding 2.9m (9'6") overall width.
- Not exceeding 18.3m (60'0") overall length.
- Not exceeding 44,000kgs (44t) gross weight.

Vehicles exceeding any of the above but not exceeding the following dimensions require a Special Types General Order. These orders require giving a minimum of two days' notice of the intended move to the relevant authorities. In addition with regards to the gross vehicle weight, indemnities are required for the structures that are crossed.

- Exceeding 2.9m (9'6") but not exceeding 6.1m (20') overall width.
- Exceeding 18.3m (60'0") but not exceeding 30m (98'6") overall length.
- Exceeding 44,000kgs (44t) but not exceeding 80,000kgs (80t) gross weight (2 days' notice).
- Exceeding 80,000kgs (80t) but not exceeding 150,000kgs (150t) gross weight (5 days' notice).

Vehicles exceeding any of the above require a Special Order. These orders require giving a minimum of 5 days' notice to the relevant authorities, in addition with regards to the gross vehicle weight, indemnities are required for the structures that are crossed.

All new road bridges in the United Kingdom are designed to carry the maximum permitted 44 tonne vehicle in each available traffic lane (at the same time), and all existing bridges are assessed on a regular basis for the vehicle loading. Bridges that fail their assessment are required to display a warning sign giving the maximum permitted weight to prevent further damage to the structure.

Structures that are crossed along the access routes that do not have a warning sign, are capable of carrying the maximum legal weight vehicle.

There is no legal maximum height for loads being transported on public roads in the United Kingdom, however all new road bridges are built with a minimum height clearance of 5.2m. Any bridge that has a height clearance of 16 feet, 6 inches (5.03m) or less, legally has to have a warning sign on the road approaching it. Structures that

are passed under, along the access routes that do not display a height warning sign are considered to have 16ft 6in clearance. Further advice is available from Transport Scotland, and the relevant local roads authorities for the routes.

Prior to the movement of abnormal loads, extensive public awareness is required to allow residents to plan and time their journeys to avoid disruption. The haulage contractor shall remain responsible for obtaining all necessary permits from the relevant road and bridge authorities along the access route.

### 3.2 Time Restrictions

The movement of abnormal loads will need to be timed to avoid periods of heavy traffic flow to minimise disruption to the public. These include the normal daily rush hour periods, Saturdays and major public events, as detailed in **Technical Appendix 11.2: Outline Construction Traffic Management Plan**. Specific timing restrictions imposed by the police or local authority have not been determined at this stage.

### 3.3 Escorts

Through urban areas temporary parking restrictions may be necessary to guarantee a clear route for the abnormal loads, and these need to be arranged in advance through the appropriate local authority. The parking restrictions will need to be locally enforced.

Due to the size of vehicles required to transport these loads, escorts will be required for the entire route to control oncoming and conflicting traffic.

## 4.0 Swept Path Analysis Vehicle Configuration

Swept path has been undertaken for the development on OS base mapping using bespoke vehicle and load combinations appropriate for the size of turbines that are proposed. All vehicles are modelled by SLR from the generic standard vehicles contained in the AutoTRACK software library. The vehicles have been modified in length and number of axles on the trailer. The turning properties of the vehicles have not been modified.

Data used for determining the length of trailers has been obtained from various trailer manufacturers websites including Noteboom, Goldhofer and DOLL. SLR is therefore aware that the lengths of trailers used in the assessment would be available, but is not aware of which haulage companies will have these trailers available for use, how many are available, or which trailers are authorised for each component. Unless otherwise stated on the swept path drawings, manual override of rear axle steering has not been used in the analysis. The reason for this is that with conventional transport, the trailers are not usually powered and therefore they can only follow the tractor unit. There is therefore a small risk with using manual override of the rear axle steering which could generate an unachievable result.

With Goldhofer and DOLL trailers there is the option to power the trailers allowing greater flexibility with turning.

The swept path drawings do not identify specific items of street furniture that will need to be temporarily removed to allow the passage of the long vehicles, these will be identified prior to the movement of loads by the haulage contractor who will undertake a more detailed assessment for the specific vehicle they will use.

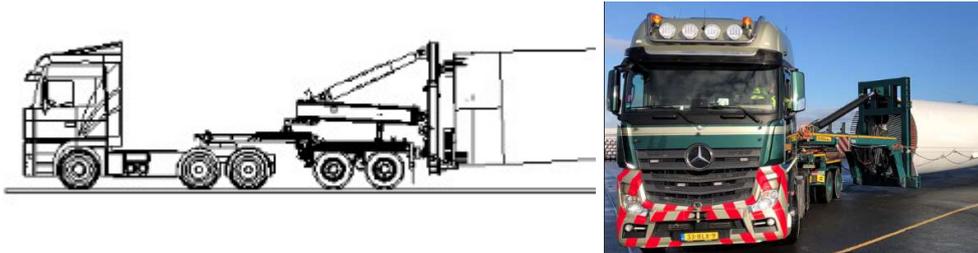
The proposed routes have previously been used to transport wind turbine components, and as such, swept path analysis has not been undertaken for the tower sections or the nacelles, as these components will be similar in size to those previously transported along the route. However, a blade length of up 83.3m is greater than that which has previously been transported, and swept path analysis has been undertaken for these longer components.

SLR are advised that an 83.3m long blade is not authorised for transport on a conventional trailer (super wing carrier). This assessment has therefore been undertaken using the DOLL Trailer system, towed by a standard tractor unit, the DOLL trailer system comprises of:

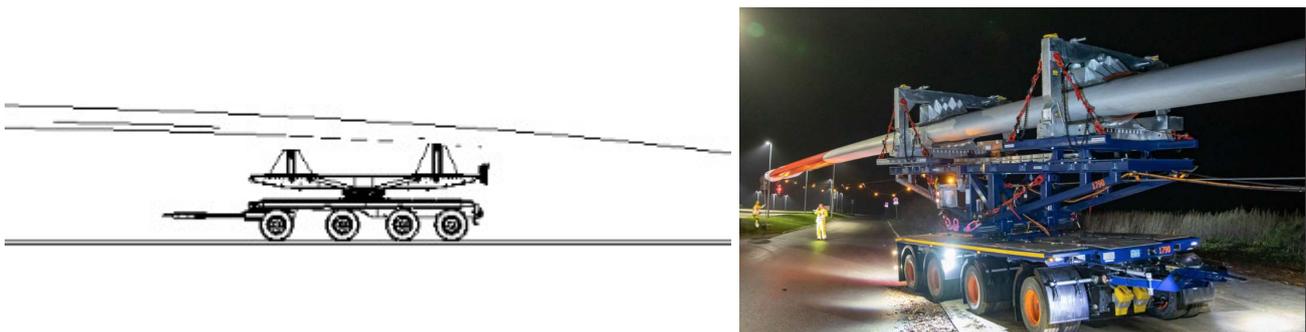
- A short-articulated trailer close to the tractor unit with a blade mounting for the rotor end,
- A short multi axle, self-steering trailer with a blade mounting for the tip end.

There is no physical connection between the two parts of the trailer, other than control cables and the load being carried. This coupled with the multiple pivot points in the transport configuration (two at the tractor and a fully steered rear dolly), allows for greater flexibility when passing through bends and over low height obstacles.

The front trailer has a pivot point in the articulation with the tractor unit and a further pivot point with the blade mount, as this can rotate on the trailer.



The rotor blade mount is not restricted to the height of the trailer bed, allowing the blade to be mounted at a lower height, close to the road surface, this enables it to pass under most restrictions. Hydraulic lifts can raise the rotor end of the blade as necessary to pass over small obstacles.



The blade tip support is mounted on a self-steering trailer capable of steering around its own axis. The blade will be mounted over 2m in height from the road surface. The mounting is capable of pivoting on the trailer and it is possible that it could be adjustable in height to overcome obstructions.

In addition to the use of a DOLL trailer, a trailer with a blade lifting attachment could also be utilised. The blade lifting attachment would be capable of raising the blade up to an angle of 60 degrees from the horizontal so that it can pass over roadside features, however the blade needs to remain in line with the trailer to maintain stability when raised which can create more onerous swept paths when the blade is in the horizontal position.

The blade lifter consists of a Volvo FH16 8x4 tractor towing a 18m long, 10 axle multi-trailer (Goldhofer trailer). A multi-trailer may be towed or can be self-propelled. A towed vehicle would have a maximum speed of around 80km/hr and a self-propelled vehicle would have a maximum speed of around 50km/hr

When raised the blade is susceptible to weather conditions and road gradients. The blade would conflict with overhanging trees and cables along the route, potentially requiring significant trimming of trees and substantial cable diversions.

When lowered the blade is typically around 2 to 5m in height at the tip, meaning that it can oversail most roadside obstructions. However those that are too high would need to be removed or the blade is lifted to pass over them. It is possible to change the transport configuration, however this will require the blade to be taken off one vehicle type and loaded onto the other vehicle type. This requires an off road loading area to be provided, which needs

to be large enough to hold multiple vehicles (as they travel in convoy) a crane, and storage for a number of blades.

The slower speed required to maintain stability, coupled with the length of the transport route and the potential for a large amount of work along the route, blade lift transport is not considered to be appropriate for this project.

Where verges and footways are overrun by the wheels of tractors or trailers, the surface will need to be strengthened and protected. Depending on ground conditions, it may be possible to simply provide plating to these areas.

## 5.0 Route Review

It should be noted that the routes have only been assessed at high level for the transport of the long turbine blades. Modifications that will be required along the route, which include construction of overrun areas, removal of street furniture, etc. are not specifically identified in this report.

A desk study has been undertaken using available internet mapping, aerial images and street view imagery. This has identified the nearest viable ports and routes from them to the proposed windfarm location.

The routes from the nearest ports to the Site have been identified in the desk study and those considered to be viable were reviewed during a Site visit on Friday 17<sup>th</sup> December 2021. The weather during the Site visit was bright and dry.

The purpose of the Site visit was to drive the identified routes to determine if they are viable and all constraints have been identified between the potential ports of delivery and the proposed wind farm location. A drive through of the routes has been video recorded.

Swept path drawings for each of the elements are found in Appendix A.

### 5.1 Buckie - Approx. 7 miles

The desk study shows that the harbour in Buckie is the nearest to the development and is approximately 7 miles from the Site. SLR is aware that substation transformers have previously been transported through Buckie Harbour.

The Harbour website confirms that the harbour is primarily a fishing / commercial port with four large basins. Vessels up to 86m length can be accommodated, though it is not clear if this is an absolute maximum or if this is a size that can be easily manoeuvred in the harbour with other vessels in port. The Site visit confirms that there are no permanent cranes at the harbour.

The harbour is located on the A942 Commercial Road which runs east-west along the quayside, the route to the main road is signed to the east along the A942 for a short distance before turning right onto Freuchny Road.

The route heading west along the A942 out of the harbour was reviewed and is considered not to be achievable for long loads due to a tight bend onto the high street that would not be navigable for long loads. The Site visit confirmed that the bend is located on a steep gradient, so there would be a high risk of overturning large loads.

The Site visit confirms that there is limited fencing between the A942 and the quayside and the quayside is widely used for parking and storage, requiring extensive restrictions to be imposed. The longest quay is however fenced from the road and the access to it is at an inappropriate angle for travelling east. This might require transport configurations to reverse out of the harbour to face in the correct direction for leaving the harbour or temporary removal of the fence is undertaken. Removal of the fence would be preferable.

The Site visit confirms that the turn from the quay onto Freuchny Road will be tight as it is constrained by buildings and walls, as such the blade tip will need to oversail the harbour. However at this location Buckie lifeboat is stationed, and there is a fuel tank on the quayside, so oversail might not be achievable or desirable.

At the end of Freuchny Road there is a left turn onto March Road. The Site visit also confirms that this turn will be tight as both the blade tip and tractor will be constrained by fences, however these could be temporarily removed if required. The centre of the vehicle will not be constrained as the inside of the turn is unfenced and the area is open.

March Road climbs out of the harbour area and passes through a bend in a cutting. The cutting is narrow and deep, therefore further investigation and potentially earthworks would be required to make this route viable.

March Road continues and passes through a roundabout which is flat and featureless with no surrounding constraints, the transport configurations will be able to pass straight over this roundabout without any turn but may require a temporary road to be constructed over the central island.

At the end of March Road there will be a right turn onto the A98, the junction is slightly angled so that it aids the turn and visibility splays at the junction will reduce the amount of third-party land required for oversail.

The route follows the A98 for a short distance before turning left onto the B9016. The junction of the A98 and B9016 previously formed a crossroads with the road to Portgordon but has been staggered for safety; the change has created lots of space at the junction which will aid turning of long vehicles from the direction of Buckie. There is only a post and wire fence along the boundary surrounding the junction and there are no hedges or trees in the areas that would be oversailed when turning from the direction of Buckie.

It is noted that there are plans to redevelop the harbour in Buckie. At the time of writing, these plans are not finalised and so no further assessment against them have been undertaken. If the port has been redeveloped, or detailed plans of the redevelopment are available during the construction phase of the development, further detailed assessment may be undertaken to ascertain if any components could be delivered via Buckie.

## 5.2 Inverness – Approx. 54 miles

The harbour in Inverness is located on Stadium Road, a short distance from the A9. The main entrance is an enlarged priority junction, constrained by fencing however there is also a temporary gate at the edge of the harbour limits that would be easier for long vehicles to exit the harbour and travel towards the A9.

Stadium Road passes under the Kessock Bridge and passes the Inverness football club stadium before joining the A9 at the Longman Roundabout. Transport would follow the A9 for a short distance before turning using the slip road to the roundabout to join the A96 towards Aberdeen. The A96 passes through two large roundabouts that should not cause any issues. The next roundabout at the Airport turn is large, but some overrun areas may be required. The A9 and the initial section of the A96 are both dual carriageways.

The A96 continues east to Nairn where a mini roundabout at the junction of King Street, Marine Road and St Ninian Road will be an issue. Measurements on Google Earth would suggest that a 65m load would be the longest that could get through the junction.

The mini roundabout in Nairn appears to be the most restrictive section of the route. The Site visit shows that the roundabout is surrounded by tall buildings that cannot be oversailed as they are only set back a footway's width from the road. Swept path analysis has been undertaken at this junction.

Leaving Nairn the A96 passes through a small roundabout, which can be overrun by vehicles.

The A96 continues east to Forres which has a bypass to avoid the town centre. There are two small flat roundabouts before the bypass at Forres and one at the end of the bypass. Some temporary removal of landscaping will be necessary at these roundabouts

A further roundabout is located at the Enterprise Park; however, this is large and would be easy for the long vehicles to pass through.

The A96 continues further east to Elgin. At Elgin the A96 bypasses the town centre but passes through nine roundabouts; through a number of these roundabouts the transport would need to pass the wrong side of the

island as this gives the straightest line and requires the least number of amendments. At the roundabout by Reiket Lane the transport would pass over the centre of the island, as clearly done by previous loads due to the surface of the island being clean. A new temporary road would be required to cross the roundabout by the Elgin Travelodge.

The A96 leaves Elgin and continues east bypassing Lhanbryde, Mosstodloch and Fochabers. The start and end of these bypasses include roundabouts, however none are considered to be a limitation for long vehicles, At some of the roundabouts the transport will need to pass the wrong side of the traffic islands and temporary overrun areas may be required.

At Fochabers the route turns onto the A98 at a large roundabout, where there is plenty of room for oversail.

The A98 continues east to the B9016 south of Port Gordon, which is a right turn for the transport configurations. Although this is the same junction as used for the route from Buckie, the approach is from the opposite direction.

Due to the opposite approach the wide verges do not aid the turn and some clearance of trees may be required or a temporary road across the corner of a field would be necessary.

The main concern for this route is the mini-roundabout junction in Nairn, which would be the most limiting location for the length of blades that can be transported along the route due to the surrounding buildings. Swept path analysis will determine if the required length of blade can get through this junction.

Blade lift transportation could be used to pass a longer blade through Nairn, as the vehicle would be capable of lifting the blade to an angle which would allow the blade tip to pass over obstructions. However, the use of blade lift transport for the full delivery is considered to be unnecessary, and will add time to the delivery schedule, therefore vehicle transfer facilities need to be provided either side of Nairn.

### 5.2.1 Nairn Diversion

As long turbine blades are being considered, and with the restriction identified in Section 5.2 in Nairn, a desk study has identified an alternative route around Nairn. This route commences at the Brackley crossroads (first crossroads after the airport roundabout). The transport route leaves the A96 and follows the B9006, B9090 south, both roads are acceptable two-lane roads with reasonable geometry.

There is a tight bend near a farm, around this bend the road corridor would only accommodate about a 60m blade; however, the road is only bounded by post and wire fencing which could be temporarily moved to allow a longer load. The B9090 passes through Cawdor village on a modern road and ends at a staggered crossroads with the A939.

The route crosses the staggered crossroads junction, which will require some temporary roadway to be provided to achieve this, however space is available to provide this as the junction was previously a crossroads.

Entering Auldearn, at the end of the road the route can turn left or right to reach the A96. The junction has post and wire fencing on one side and a dwarf wall bounding a pub car park to the other side.

The left turn towards Nairn would be easier to achieve but will require overrun surfacing to be provided along with temporary removal of the fence. This direction does not require passing through the village but will require a near U-Turn to join the A96, which will require some overrun area to be constructed around the junction.

Turning right towards Elgin requires passing through the village, which should be achievable, the dwarf-wall at the pub would need to be oversailed. The junction with the A96 would require clearance of trees and hedges to allow the long loads to make the turn.

The Site visit confirms that the route would be acceptable, however it needs to be checked with swept path analysis.

---

### 5.3 Peterhead - Approx. 59 miles

There are two ports at Peterhead; the town port appears to be a fishing port and Peterhead Bay appears to be used for commercial cargo, either could be used as both appear to have suitable quays.

The route from Peterhead would follow the A950 west to Longside where there are a number of tight bends, some constrained by buildings. Continuing west the A950 passes through Mintlaw and new Pitsligo before joining the A98 east of Macduff.

The A98 heads west to MacDuff and Banff and passes through the centre of both towns. There is a tight bend near the fishing harbour in Macduff, however the road is wide and measurements on Google Earth suggest it would be acceptable. There is a tight bend to cross the bridge to Banff where oversailing would be limited. Within the town of Banff, a sharp turn is required at a mini roundabout, this location is constrained by buildings and a war memorial. Measurements taken on Google Earth would suggest the longest load that could get through this junction would be no more than 30m.

The A98 continues west to Portsoy, where there is another bend constrained by buildings, limiting the length of a load to around 40m.

The A98 continues west to Cullen and Seatown, where there are two bends which are constrained by buildings including a former railway viaduct, limiting the length of a load to around 50m at the first bridge and less at the second due to the road passing through a chicane.

Due to the multiple constraints the route was not reviewed during the Site visit and is discounted from further consideration.

### 5.4 Aberdeen – Approx. 62 miles

Aberdeen is a commercial port that deals mainly with the servicing of the North Sea oil fields, but is also a general cargo and fishing port and a ferry terminal.

The route follows the A96 from the port of Aberdeen to Fochabers where it turns onto the A98 at a roundabout. The A98 continues east to the B9016 south of Port Gordon, which is a right turn for the transport configurations.

Passing through Aberdeen the A96 is constrained by surrounding buildings, which will create problems for long loads at roundabouts as there would be no ability to oversail the boundary. Although some of the roundabouts already include additional roadways for abnormal loads these are likely to require enlarging to accommodate the swept paths of the long blade lengths. However this is not possible at all the roundabouts as some include sunken footways and underpasses for pedestrians.

There would also be issues with passing the wrong way around some of the roundabouts as the majority of the route through the city is dual carriageway with no existing gaps where a crossover could be achieved.

Leaving Aberdeen, the A96 bypasses most towns and villages. There are a number of roundabouts along the route, some of which will need to be crossed by new temporary roads.

At Huntley the A96 passes under a railway bridge which has a clearance of 5.1m. this may require specialist transport to ensure that the load is low enough to pass under this bridge.

Due to the constraints through Aberdeen and the bridge at Huntley the route was not reviewed during the Site visit and is discounted from further consideration.

### 5.5 Fraserburgh – Approx. 50 miles

Fraserburgh is mainly a fishing port with multiple quays. The port is right in the centre of the town so access may be restricted for long loads. The transport configurations would follow South Harbour Road to access the bypass around the town, which it would follow to the A98 westbound.

The A98 heads west to MacDuff and Banff and passes through the centre of both towns. There is a tight bend near the fishing harbour in Macduff, however the road is wide and measurements on Google Earth suggest it would be acceptable. There is a tight bend to cross the bridge to Banff where oversailing would be limited. Within the town of Banff, a sharp turn is required at a mini roundabout, this location is constrained by buildings and a war memorial and measurements taken on Google Earth would suggest the longest load that could get through this junction would be no more than 30m.

The A98 continues west to Portsoy, where there is another bend constrained by buildings, limiting the length of a load to around 40m.

The A98 continues west to Cullen and Seatown, where there are two bends which are constrained by buildings including a former railway viaduct, limiting the length of a load to around 50m at the first bridge and less at the second due to the road passing through a chicane.

Due to the multiple constraints the route was not reviewed during the Site visit and is discounted from further consideration.

## 5.6 Invergordon – Approx. 75 miles

The harbour in Invergordon is located on the B817, with two links to the A9.

Traffic can either reach the A9 at Alness or at Tomich and there are locations along these routes that will require swept path analysis.

Once on the A9 the route follows the A9 south to Inverness, passing through a large roundabout before crossing the Cromarty Bridge. The A9 passes through another large roundabout where the A835 crosses the route, after this roundabout the A9 is dual carriageway through to Inverness. The A9 crosses the Kessock Bridge which will need to be checked for its suitability for heavy loads. At Inverness the route crosses the Longman roundabout at the end of Stadium Road, before taking the slip road to join the A96 towards Aberdeen.

The route to Site is then as described in Section 5.2 Inverness route.

## 6.0 Summary of the Route Review

It should be noted that the routes have only been assessed at high level for the transport of the long turbine blades. Modifications that will be required along the route, which include construction of overrun areas, removal of street furniture, etc. are not specifically identified in this report.

### 6.1.1 Port of Buckie to Aultmore Site

Given the close proximity of this port to the Site, the port needs to be considered as there will be significant benefit from using a reduced length of transport route for the abnormal loads.

However, to leave the port the route requires three turns to be made, all of which will be restrictive; these turns are at both ends of Freuchay Street and a bend along March Road.

The turns at the ends of Freuchay Street are restricted by buildings and walls (including the RNLI Lifeboat station), so are unlikely to be overcome with conventional trailers, whereas the bend on March Road is restricted by the road being in a cutting as the road climbs out of the port. Measurements taken using Google Earth would suggest that a load between 40-50m in length would be able to pass through all of these bends.

Due to only a 40-50m dimension being achieved it is considered that swept path analysis would not demonstrate a significant improvement, as such swept path analysis has not been undertaken for this route at this time.

Unfortunately, the restriction to a 40-50m load would be unsuitable for the turbine blades, however the tower sections and nacelle would be well within this size and these could use the port of Buckie, thus saving a considerable amount of haulage, which would have an environmental benefit.

---

Although transporting the blades by conventional trailer from the port of Buckie would not be achievable, the use of a blade lift transport configuration would allow the port to be used, however there are issues that would need clarification from the port or the appointed haulage contractor:

- The proposed vessel size needs to be confirmed as acceptable by the port authority. The port website states maximum vessel size of 86m length (the maximum blade length being assessed is 87m).
- The size of the quay does not allow for much storage, therefore loads need to be taken direct from the vessel to the transport configuration. This needs to be confirmed as suitable by the haulage contractor and the port authority as this will require additional vehicles to be used.
- The bend on March Road is on a gradient, the stability of a raised blade or tower section travelling around this bend would need to be confirmed by the haulage company.
- Details around the future development of Buckie Harbour need to be kept under review and the delivery potential reviewed as required.

### 6.1.2 Port of Inverness to A96

The port of Inverness is the nearest port that could handle all of the loads, and the route to the Site is generally acceptable for long loads. However, there is one major restriction along the route in the town of Nairn at a mini-roundabout, if this can be overcome then the port would be the most favourable to use.

The route is tried and tested for wind turbine developments, with many modifications along the route previously undertaken by other windfarm developments, either on a permanent or temporary basis that allow long delivery vehicles to use the route, albeit with smaller blades being successfully transited through Nairn.

Along the length of the route there are many roundabouts that need to be crossed, some of these are large and do not create an issue for long loads passing through them, however through Elgin in particular, the long loads have an easier route through one of the roundabouts by passing on the wrong side of the island. This is generally considered an acceptable solution as the abnormal loads move under licence.

Other roundabouts have been constructed in a manner that allows overrun as they contain a hard landscaped surface, or they are simply flat and temporary overrun areas can be easily provided.

The min-roundabout in Nairn is the main problem along this route as the route makes a right turn in a built-up area surrounded by buildings. Measurements taken using Google Earth would suggest that a load around 60m in length would be the maximum that could pass through the bend, however swept path analysis would be required to confirm the actual length.

However, the desk study identified an alternative route around the town of Nairn using lower class roads through the village of Cawdor and the Site visit has confirmed that this route is achievable with a small number of improvements.

### 6.1.3 Port of Peterhead

The route is discounted due to multiple restrictions along the A98 for long loads.

### 6.1.4 Port of Aberdeen

The route is discounted due to multiple restrictions passing through the city of Aberdeen for long loads, coupled with the low railway bridge on the A96 at Huntly.

### 6.1.5 Port of Fraserburgh

The route is discounted due to multiple restrictions along the A98 for long loads.

### 6.1.6 Port of Invergordon to Inverness (A96)

The port of Invergordon is a port that could handle the loads associated with a wind farm development, and the route from the port to the Site is generally acceptable for long loads.

Once the transport route reaches the A9 there are no restrictions that could prevent its use. The route passes through two roundabouts, and both are geometrically suitable and flat, therefore the load will be able to pass through with minor construction of overrun areas.

However, the distance from this port to the Site, would rank this port the least potential route.

## 7.0 Swept Path Assessment

Locations have been determined for swept path analysis from the desk study and the subsequent Site visit, most of the locations that have been identified require the blade delivery vehicle to make a turn.

The swept path analysis undertaken for this report is only concerned with the delivery of the turbine blades, swept paths for the delivery of other components, including tower sections and nacelles has not been undertaken.

Swept path analysis has been undertaken using AutoTrack Software using a vehicle configuration utilising a DOLL trailer carrying an 83.3m length turbine blade. The vehicle has been modelled from standard vehicles within the software vehicle library, with an appropriate wheelbase for the blade being carried.

The locations identified for assessment are as follows:

### 7.1.1 Port of Buckie to Aultmore Site

The route is considered unsuitable for the delivery of turbine blades by conventional or DOLL transport configurations due to the uncertainty around the port being able to accommodate the delivery of large turbine blades, as such swept path analysis has not been undertaken.

The route is considered potentially suitable for the delivery of turbine blades by blade lifter transport configuration. Swept path has not been undertaken as measurements on Google Earth indicate that although a raised blade can remain within the highway boundary there is insufficient space at the port for storage of blades whilst awaiting loading onto transport.

The route is considered to be suitable for the delivery of tower sections and nacelles, however as it is not clear if the route has been used previously for the delivery of these components, it would be prudent to undertake swept path analysis at the following locations:

- A942 / Freuchay Street
- Freuchay Street / March Road Junction
- March Road Bend
- March Road Roundabout
- March Road / A98 Junction
- A98 / B9016

### 7.1.2 Port of Inverness

The route from the Port of Inverness to the Site is proven for the delivery of abnormal loads associated with wind farm developments, as such swept path analysis would not be necessary except for the long blade lengths.

The desk study and route review has identified potential issues at the following locations for the long turbine blades:

- Nairn - mini roundabout by Church (**H001-6-R3**)
  - Swept path analysis at this junction has been completed and demonstrates that the blade loaded onto a DOLL trailer, cannot pass through the bend without conflicting with a number of buildings.
- Elgin – full route through town (**H002-6-R2**)
  - Outline swept path analysis through the town has been completed for DOLL transport.
  - Detailed swept path at the junction of the A96 and A941 has been completed, no issues are identified for any of the vehicle configurations.
  - The DOLL vehicle can pass wither side of the roundabout , however the easier path to take, requiring less clearance, would be to the wrong side of the roundabout.
- Fochabers A96-A98 Roundabout (**H003-6-R1**)
  - Swept path analysis has been undertaken at this junction, this demonstrates that the turn is possible, however the vehicle will need to position itself on the wrong side of the road on both the approach and departure to the roundabout, requiring the vehicle to pass over the splitter islands on entry and exit and overrun the central roundabout island. The centre of the vehicle load will pass close to a 1.5m stone retaining wall on the inside of the turn, but can be lifted to be high enough to not be in conflict with it.
- Portgordon - A98/B9016 junction (**H004-6-R4**)
  - Swept path analysis at this junction has been completed for DOLL transport
    - The transport configuration will require a slip lane and new junction roadway to be provided to avoid the blade tip from being in conflict with the cottages immediately before the junction and the small, wooded copse opposite the junction.
- A98/B9016 Junction to Site (**H020-04 to H022-04, and H030-04**)
  - Swept path analysis has been undertaken for DOLL Transport
    - Some oversail of third-party land may be required. The vehicle wheels remain within the highway at all times.
    - Some vegetation may require trimming.

The mini-roundabout in Nairn is not possible for the DOLL Trailer, therefore an alternative route avoiding the town has been assessed:

- Nairn - Alternative Route – A96 / B9090 junction Brackley (**H007-20-R2**)
  - Swept path demonstrates that the turn is possible with only small areas of hardstanding required for the tractor to overrun. Some lowering of planting along with removal of a bus stop shelter would be necessary along the A96. There may need to be some overrun of the boundary on the inside of the bend, with the blade passing close to the building.
- Nairn - Alternative Route – B9090 Clephanton (**H007-21-R2**)
  - There is a slight bend in the road at the crossroads in Clephanton with buildings close to the road on the inside of the bend. Swept path demonstrates that the long vehicle can pass through the bend without impacting on the buildings.
- Nairn – Alternative Route – B9090 bend by farm (**H007-22-R2**)

- There is a near right angle bend in the road alignment with a tight radius. Both sides of the road have either farmyard with storage of machinery or small animal holding pens Swept path shows the long vehicles can negotiate the bend with the blade tip oversailing the boundary of the farmyard and the blade body oversailing the farmyard on the inside of the bend. Small areas of overrun construction may be necessary around the bend and some fences or traffic signs may need to be lowered to allow for oversail.
- Nairn – Alternative Route – B9090 Cawdor Village (**H007-23-R3**)
  - Swept path has been undertaken which demonstrates that the vehicle can be driven without any requirement to oversail the churchyard.
- Nairn – Alternative Route – B9101 / A939 crossroads (**H007-24-R2**)
  - The crossroads have been staggered in the past for road safety, which creates a chicane for vehicles passing through the junction. It would be possible for the DOLL trailer to drive through the chicane without any hardstanding being created, but this will result in oversail of the highway boundary by the blade body and blade tip.
  - It may be easier to temporarily simply reinstate the original straight road through the crossroads, however this may have costs involved with service diversions.
- Nairn - Alternative Route – B9101 / B9111 junction Auldearn (**H007-25-R2**)
  - The field on the inside of the turn is a historic battlefield limiting the potential for building a new road across this land to make the turn easier.
  - Swept path shows the DOLL vehicle is capable of making the turn without the need for any additional road to be constructed.
  - The Blade tip will oversail the verge adjacent to a pub, at the time of the Site visit this area contained conifer trees, however, Google Streetview and a subsequent visit shows that some have since been removed and others are diseased or are now poor quality. This creates an opportunity to clear this area to allow for oversail.
  - The blade body will oversail the battlefield. Both ends of the blade will need to be raised to ensure that the blade is clear of the ground to avoid any excavation, however there may still remain a need to locally lower the ground in places.
- Nairn - Alternative Route B9111 / A96 Junction(**H007-26-R2**)
  - The junction geometry requires a U-Turn to be made to turn towards Aultmore.
  - The length of the blade will result in the requirement to provide additional road surfacing for the tractor unit to drive on, adjacent to the A96.
  - Additional surfacing will also be required for the trailer to drive up, adjacent to the minor road.
  - Trimming of vegetation as required.

It should be noted that all the roundabouts along the route would need areas of hardstanding provided to allow the long blades to pass through, however none of the roundabouts are considered to be restrictive.

### 7.1.3 Port of Peterhead

No Swept paths undertaken as port discounted.

### 7.1.4 Port of Aberdeen

No Swept paths undertaken as port discounted.

### 7.1.5 Port of Fraserburgh

No Swept paths undertaken as port discounted.

### 7.1.6 Port of Invergordon to Inverness

The route from the Port of Invergordon to Inverness is proven for the delivery of abnormal loads associated with wind farm developments, as such swept path analysis would not be necessary along the route except for the longer blade lengths.

There are two routes to the A9 from the port of Invergordon.

- The western route joins the A9 at Alness
- The eastern route joins the A9 at Tomich.
- Alness - B817 / A9 Junction
  - The swept path shows that the vehicle can make the turn, however trees and planting surrounding the junction will need to be cleared or lowered to allow the blade tip to oversail.
  - The slip road is in cutting, as such the area required for the blade to oversail will also require the level of the ground to be lowered, requiring significant earthworks and landscaping work to be undertaken.
  - There would be a need for additional hard surfacing to be provided around the junction. This is required as careful positioning of the tractor and rear wheels reduces the area required for the blade tip to oversail.
- Tomich – Academy Road / A9
  - There are two priority junctions along this route both at ends of a road, one requires a right turn the other requires a left turn.
  - At both locations trees will need to be removed

It should be noted that all the roundabouts along the A9 route between Alness and Inverness would need areas of hardstanding provided to allow the long blades to pass through, however none of the roundabouts are considered to be restrictive.

The route from Inverness to the Site is as described in Section 7.1.2

## 8.0 Summary and Recommendations

As turbine design progresses to give greater power generation, the size of the turbine increases which can lead to issues with delivery of larger components to the Site. Towers can be split into more sections to ensure that there is no adverse effect from a higher hub height and subsequent longer tower sections, however blade technology currently does not allow for turbine blades to be split into multiple sections.

The majority of the proposed transport route to the proposed development has previously been used to deliver wind turbine components.

This report only covers the delivery of the turbine blades, as the other components are considered to be acceptable for delivery along the previously used routes.

SLR understands that split blades are currently being developed, however this would only reduce the blade length to be transported by about 15m. With an 83.3m long blade this will make little difference to the swept path.

The blades are to be transported using a DOLL Trailer, due to its ability to manoeuvre through bends and junctions with the steered rear dolly.

Blade lift trailers have been considered but are discounted:

- Additional time required to undertake the deliveries,
  - Delays due to slower travel speeds,
  - delays with transferring load between vehicles,
- Additional permissions required for oversail.
- Additional works involved with tree trimming and cable diversions.

SLR Identified that the only location that specifically needs blade lift transport configuration to be used is the mini roundabout in Nairn, and then only for blades greater than 63m in length. The reason this location is restrictive is because it is the only location along the route that is fully surrounded by buildings, whereas all other locations have open land adjacent so can be overcome through negotiations with landowners.

The use of blade lift transport for the full delivery route, when it is only required for one location, would appear excessive as it will increase the delivery time and therefore disruption to other traffic using the roads. Transferring between vehicles either side of the pinch point, would require appropriate facilities to be provided, which will require land and will add delay to the deliveries.

SLR identified and assessed the local ports to the Site.

The nearest port to the Site is Buckie, at approximately 7 miles, and SLR's findings are that the port would be suitable for the delivery of the turbine tower, hub and nacelle, but the route out of the port is currently too restrictive for the turbine blades to be delivered by conventional transport and improvements would not be economically viable and may not be possible. There is the potential for the redevelopment of the port, which would be kept under review.

The port at Buckie is also currently restricted by a lack of space for storage of materials, requiring instant transport to the proposed windfarm, which will require a high number of vehicles to be provided.

The blades could be delivered through the port of Buckie by using blade lift transport, however detailed assessment by the haulage contractor would need to be undertaken to ensure the load is acceptable to the port authority due to the size of the loads, and due to the risk of the raised blade tip oversailing the highway boundaries and buildings as it leaves the port.

SLR's recommendation would be to utilise the harbour at Buckie for the delivery of turbine components that can fit through the port. The recommendation is made to minimise haulage as the next nearest suitable port is in the region of a further 50 miles away, thus using Buckie would save around 100miles per load, per round trip and would allow each vehicle to be used for at least two deliveries per day as opposed to just one delivery. With up to 6 abnormal loads per turbine (4 tower, hub & nacelle) this could save 9,600 miles and up to 48 vehicle days.

Ports to the east and south do not have a suitable route for the delivery of turbine components, either restricted by geometry or low structures, these ports have been discounted from further assessment.

There are two ports to the west, being Inverness and Invergordon, both have previously been used for wind turbine equipment. Both Ports use the same route along the A9 and A96 to reach Aultmore.

Inverness is the nearest port and there are no issues between the port and the A9.

Invergordon is roughly 20 miles further north along the A9. There are two routes to reach the A9 from the port, both of which have restrictive junctions. Once on the A9, the route is acceptable to Inverness.

---

SLR's recommendation would be to utilise the harbour at Inverness for the delivery of turbine blades. The recommendation is made to minimise haulage distance, and also due to the issues at Invergordon to gain access to the A9.

The route leaves the A9 at Inverness and joins the A96 to head east to Site. The A96 is generally good however there is a bend at a mini roundabout in the town of Nairn that is restrictive. Swept path analysis demonstrates that the long blade cannot pass through this location without the demolition of a house and its garden wall, and with the vehicle passing very close to other buildings. The analysis is heavily dependent upon manual override of rear axle steering. The swept path allows little scope for driver error.

Use of a blade lifter would allow the blade to pass through, however there are other issues to consider including permissions to oversail buildings, slower speeds, overhead cables and overhanging trees. Changing vehicles would require facilities to be provided both sides of the town, for these reasons the use of a blade lifter is not considered to be appropriate.

An alternative route has been identified around the town of Nairn and is demonstrated through swept path analysis to be achievable with improvements at multiple junctions and bends. These improvements affect farmland and should be achievable subject to negotiation.

SLR's recommendation would be to improve the route around Nairn as this is likely to be more achievable than trying to pass through the town on a blade lift transport where there are too many risks to be overcome.

The route bypasses the town for abnormal loads, which could benefit the Aultmore Windfarm and the residents of Nairn who would not be subjected to delays during the delivery of the turbine blades.

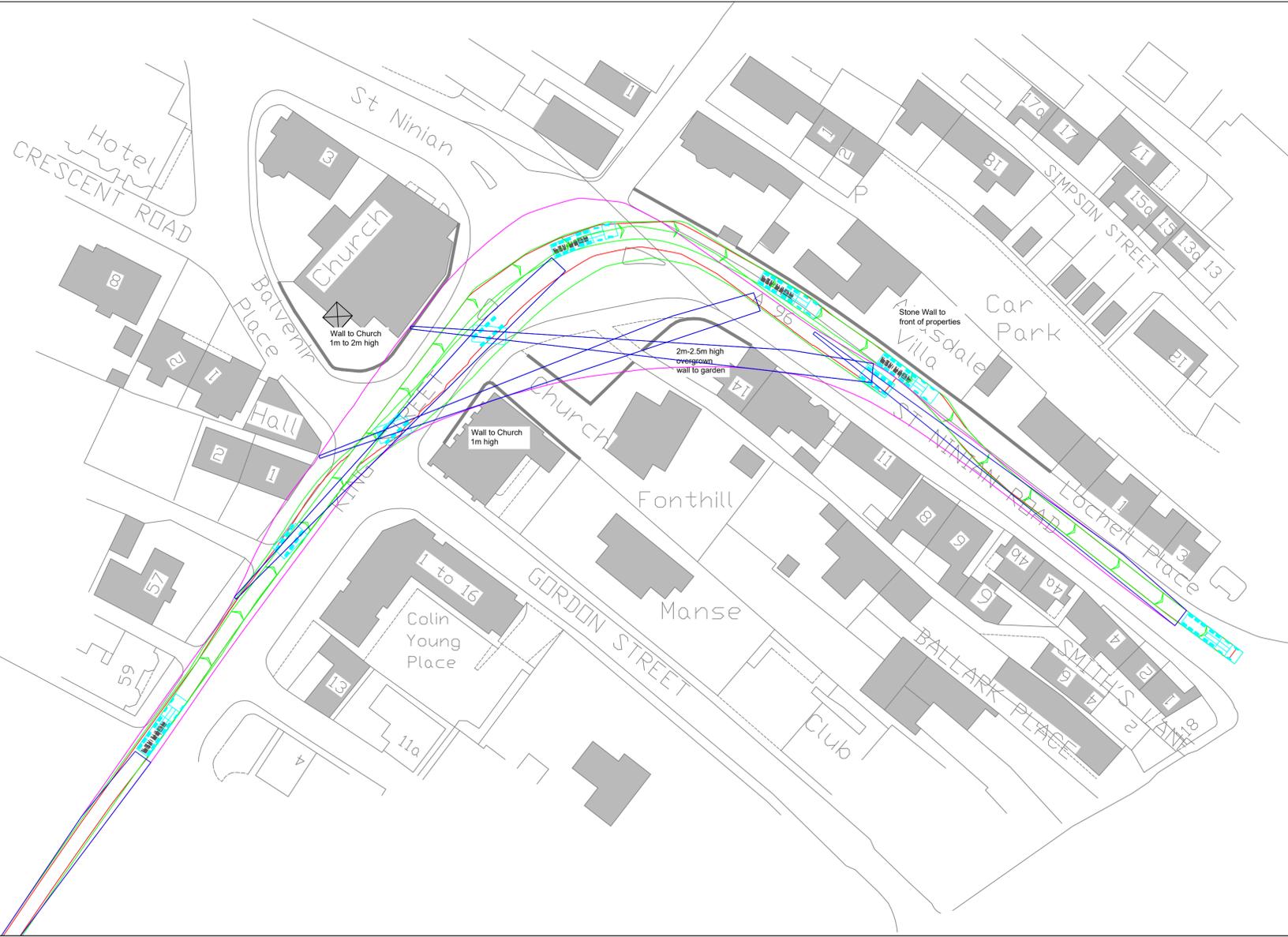
At Elgin the A96 passes through the town and crosses a number of roundabouts. At some of these roundabouts it would be necessary to pass the wrong side of the central island as this offers the route with least deflection and would be easier to negotiate keeping the long load within the highway boundary.

However, this would be extremely disruptive to westbound traffic on the A96 passing through Elgin and it is likely that restrictions on movements will be imposed. There are alternative routes for this traffic within the town to avoid the roundabouts where disruption would occur however signage would need to be provided and contingency plans need to be in place for the time of the movements.

In summary the swept paths demonstrate the following:

- Blades up to 87m in length can be transported by a DOLL trailer, with the following restrictions;
  - Areas of hardstanding will be required in locations.
  - It will be necessary to pass the wrong side of some roundabouts.
  - The blade tip will oversail the highway boundaries in locations.

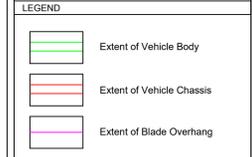
## APPENDIX A: SWEPT PATHS



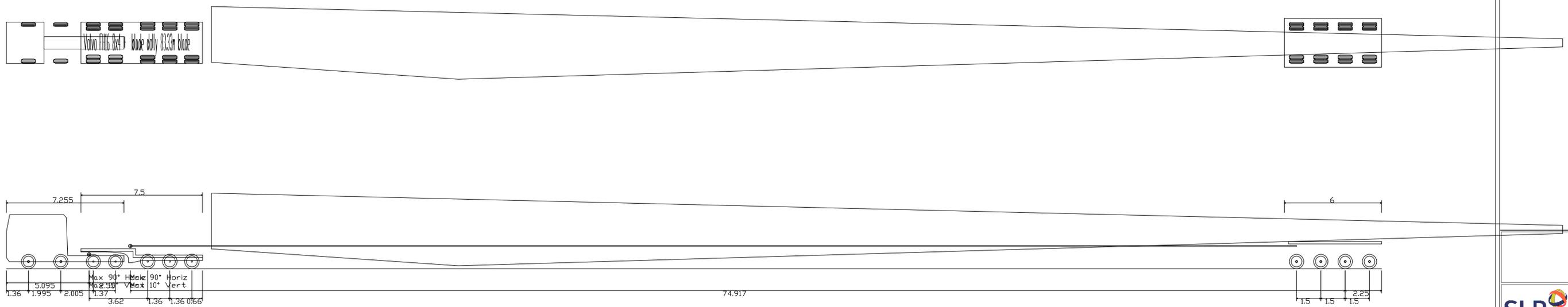
**NOTES**

The swept paths shown on this drawing are heavily dependent on manual override of rear axle steering being achievable.

It is not possible to get around this bend without demolishing a building.



**Vehicle Details**



Valvo FH16 8x4 + blade dolly 83.33m blade	
Overall Length	84.812m
Overall Width	3.000m
Overall Body Height	3.335m
Min Body Ground Clearance	0.375m
Max Track Width	2.550m
Lock to lock time	6.00s
Wall to Wall Turning Radius	9.800m

**SLR**

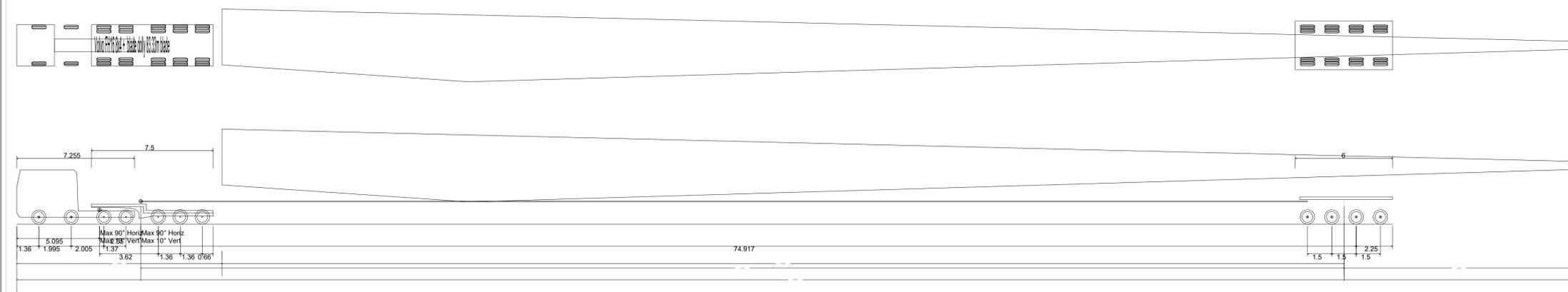
TREEMOOD HOUSE  
ROWDEN LANE  
BRADFORD ON AVON  
WILTSH. BA15 2AU  
T: 01225 308400  
F: 01225 308401  
www.slronline.co.uk

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS  
SWEPT PATH ANALYSIS  
A96 ROUNDABOUT NAIRN  
83.3m BLADE DOLL TRAILER

**H001 - 6 - R3**

Scale: 1:500@ A1 Date: SEPTEMBER 2023

H001-F02 Nairn church rd31 - sheet 6.dwg



Volvo FH16 8x4 + blade dolly 83.33m blade	84.812m
Overall Length	3.000m
Overall Width	3.335m
Overall Body Height	0.375m
Min Body Ground Clearance	2.550m
Max Track Width	6.00s
Lock to lock time	9.800m
Wall to Wall Turning Radius	

**NOTES**

Manual override of rear axle steering has been used in the analysis shown on this drawing.

Street furniture, including lighting and signs, will need temporary removal around the junction.

**LEGEND**

	Extent of Vehicle Body
	Extent of Vehicle Chassis
	Extent of Blade Overhang
	Oversail Beyond Highway Boundary

**SLR**

TREENWOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILTS. BA15 2AU  
T: 01225 309400  
F: 01225 309401  
www.slronline.co.uk

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS  
SWEPT PATH ANALYSIS  
NAIRN A96-B9006 JUNCTION  
83.3m BLADE DOLL TRAILER

**H007 - 20 - R2**

Scale: 1:500@ A1 Date: JANUARY 2022

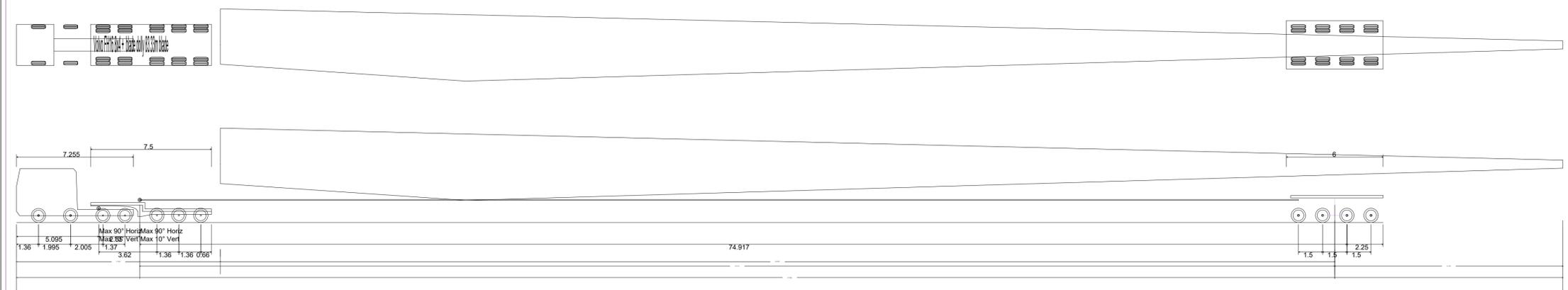
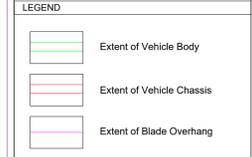
H007-20-R2 Nairn BYPASS SHEET 20.dwg



**NOTES**

Manual override of rear axle steering has been used in the analysis shown on this drawing.

Street furniture, including lighting and signs, will need temporary removal around the junction.



Volvo FH16 8x4 + blade dolly 83.33m blade

Overall Length	84.812m
Overall Width	3.000m
Overall Body Height	3.335m
Min Body Ground Clearance	0.375m
Max Track Width	2.550m
Lock to lock time	6.00s
Wall to Wall Turning Radius	9.800m

**SLR** GREENWOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILTS. BA15 2AU  
T: 01225 309400  
F: 01225 309401  
www.slronline.com

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS REVIEW

**SWEPT PATH ANALYSIS**  
NAIRN B9090 CLEPHANTON  
83.3m BLADE DOLL TRAILER

**H007 - 21 - R2**

Scale: 1:500@ A1 Date: JANUARY 2022

H007-21 R2 Nairn Bypass.dwg

© Crown copyright (and database right) 2015. 0100031673. Expires [DDMMYY]

This drawing and its content are the copyright of SLR Consulting Ltd and may not be reproduced or amended except by prior written permission. SLR Consulting Ltd accepts no liability for any amendments made by other persons.



Old Military Road

Newton of Budgate

GP 51.7m

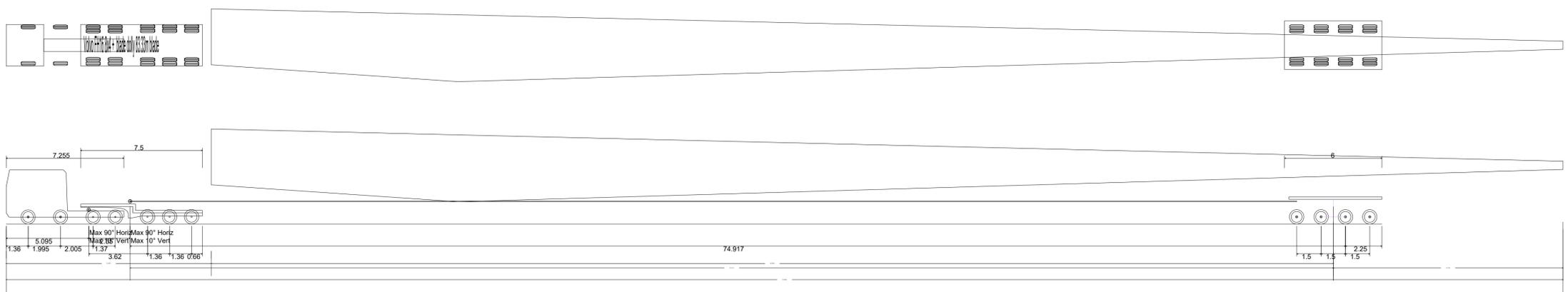


NOTES

Manual override of rear axle steering has been used in the analysis shown on this drawing.  
Street furniture, including lighting and signs, will need temporary removal around the junction.

LEGEND

- Extent of Vehicle Body
- Extent of Vehicle Chassis
- Extent of Blade Overhang
- Oversail Beyond Highway Boundary



Volvo FH16 8x4 + blade dolly 83.33m blade  
 Overall Length 84.812m  
 Overall Width 3.000m  
 Overall Body Height 3.335m  
 Min Body Ground Clearance 0.375m  
 Max Track Width 2.500m  
 Lock to lock time 6.00s  
 Wall to Wall Turning Radius 9.800m

H007-22-R2 Naim BYPASS SHEET 22.dwg

**SLR**  
 GREENWOOD HOUSE  
 ROWDEN LANE  
 BRADFORD-ON-AVON  
 WILTS. BA15 2AU  
 T: 01225 309400  
 F: 01225 309401  
 www.slrconsulting.com

AULTMORE WIND FARM  
 ABNORMAL LOAD ACCESS REVIEW  
 SWEPT PATH ANALYSIS  
 NAIRN B9090 BEND  
 83.3m BLADE DOLL TRAILER

**H007 - 22 - R2**

Scale: 1:500@ A1 Date: JANUARY 2022



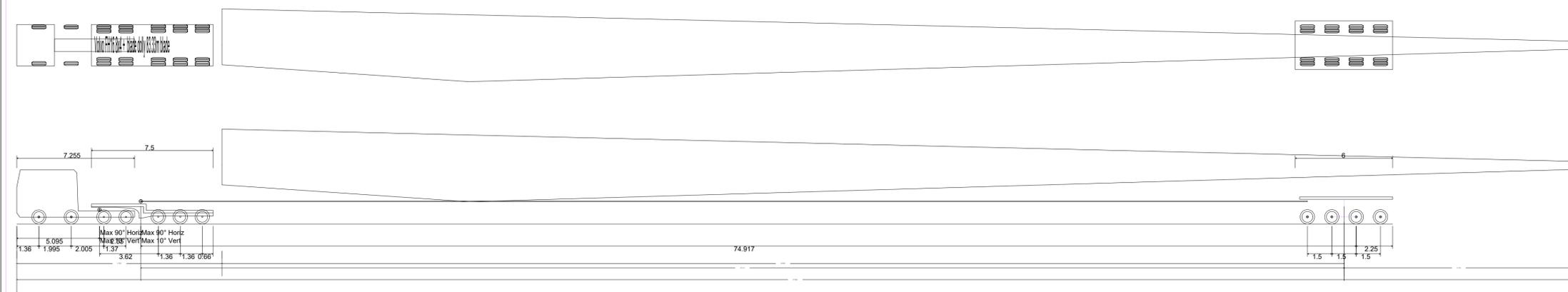
**NOTES**

Manual override of rear axle steering has been used in the analysis shown on this drawing.

Street furniture, including lighting and signs, will need temporary removal around the junction.

**LEGEND**

- Extent of Vehicle Body
- Extent of Vehicle Chassis
- Extent of Blade Overhang



Volvo FH16 8x4 + blade dolly 83.33m blade	
Overall Length	84.812m
Overall Width	3.000m
Overall Body Height	3.335m
Min Body Ground Clearance	0.375m
Max Track Width	2.550m
Lock to lock time	6.00s
Wall to Wall Turning Radius	9.800m

**SLR** GREENWOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILT. BA15 2AU  
T: 01225 309600  
F: 01225 309601  
www.slronline.com

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS REVIEW

**SWEPT PATH ANALYSIS**  
NAIRN B9090 CAWDOR VILLAGE  
83.3m BLADE DOLL TRAILER

**H007 - 23 - R3**

Scale: 1:1000@ A1 Date: JANUARY 2022

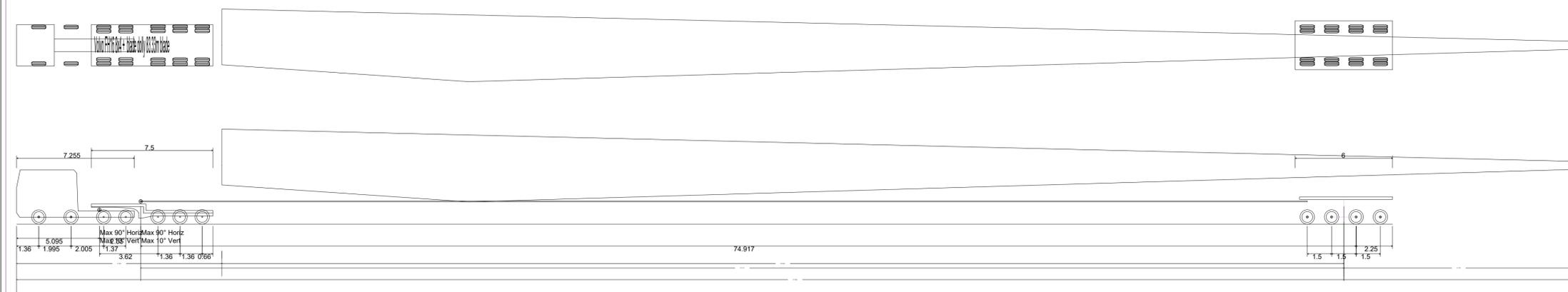
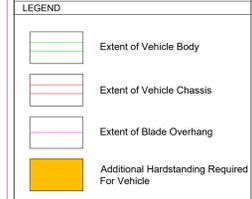
H007-23-R3 Nairn Bypass.dwg



**NOTES**

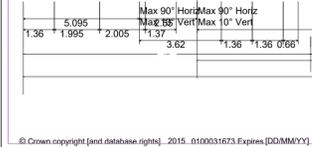
Manual override of rear axle steering has been used in the analysis shown on this drawing.

Street furniture, including lighting and signs, will need temporary removal around the junction.



Volvo FH16 8x4 + blade dolly 83.33m blade

Overall Length	84.812m
Overall Width	3.000m
Overall Body Height	3.335m
Min Body Ground Clearance	0.375m
Max Track Width	2.500m
Lock to lock time	6.00s
Wall to Wall Turning Radius	9.800m



**SLR**

TREEMWOOD HOUSE  
ROWDEN LANE  
BRADFORD ON AVON  
WILT. BA15 2AU  
T: 01225 309400  
F: 01225 309401  
www.slronline.com

AULTMORE WIND FARM  
ABNORMAL LOAD ACCESS REVIEW  
SWEPT PATH ANALYSIS  
NAIRN B9111/B9101 CROSSROADS  
83.3m BLADE DOLL TRAILER

**H007 - 24 - R2**

Scale: 1:500@ A1 Date: JANUARY 2022

H007-24-R2 Nairn Bypass.dwg

© Crown copyright (and database right), 2015. 0100031673. Expires [DDMMYY]

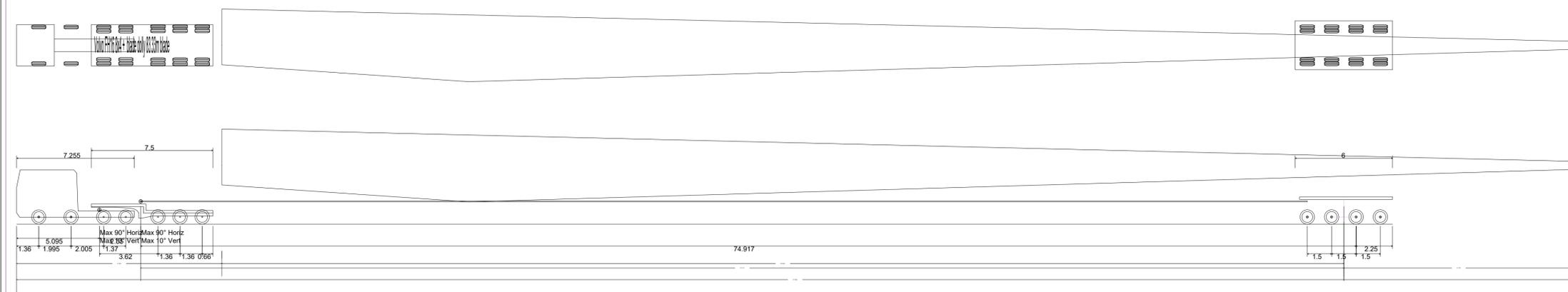
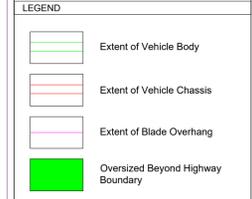
This drawing and its content are the copyright of SLR Consulting Ltd and may not be reproduced or amended except by prior written permission. SLR Consulting Ltd accepts no liability for any amendments made by other persons.



**NOTES**

Manual override of rear axle steering has been used in the analysis shown on this drawing.

Street furniture, including lighting and signs, will need temporary removal around the junction.



Volvo FH16 8x4 + blade dolly 83.33m blade

Overall Length	84.812m
Overall Width	3.000m
Overall Body Height	3.335m
Min Body Ground Clearance	0.375m
Max Track Width	2.550m
Lock to lock time	6.00s
Wall to Wall Turning Radius	9.800m

**SLR** TREEMOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILT. BA15 2AU  
T: 01225 309400  
F: 01225 309401  
www.slronline.com

**AULTMORE WIND FARM**

**ABNORMAL LOAD ACCESS**

**SWEPT PATH ANALYSIS**

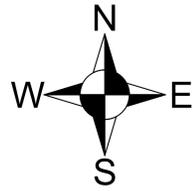
**NAIRN B9111 B9101 JUNCTION**

**83.3m BLADE DOLL TRAILER**

**H007 - 25 - R2**

Scale: 1:500@ A1 Date: SEPTEMBER 2023

H007-25-R2 Nairn Bypass.dwg



Blade tip overalls boundary, hedge to be reduced in height, ground may need to be lowered.

Tunnel

A96

Lay-by

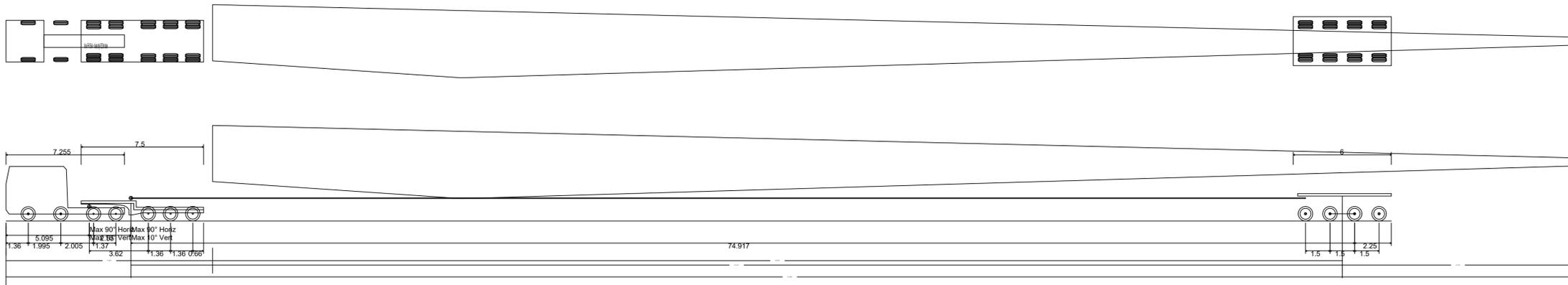


**NOTES**

Manual override of rear axle steering has been used in the analysis shown on this drawing.  
Street furniture, including lighting and signs, will need temporary removal around the junction.

**LEGEND**

-  Extent of Vehicle Body
-  Extent of Vehicle Chassis
-  Extent of Blade Overhang
-  Oversized Beyond Highway Boundary
-  Additional Hardstanding For Vehicle



Volvo FH16 8x4 + blade dolly 83.33m blade  
 Overall Length 84.812m  
 Overall Width 3.000m  
 Overall Body Height 3.335m  
 Min Body Ground Clearance 0.375m  
 Max Track Width 2.550m  
 Lock to lock time 6.00s  
 Wall to Wall Turning Radius 9.800m

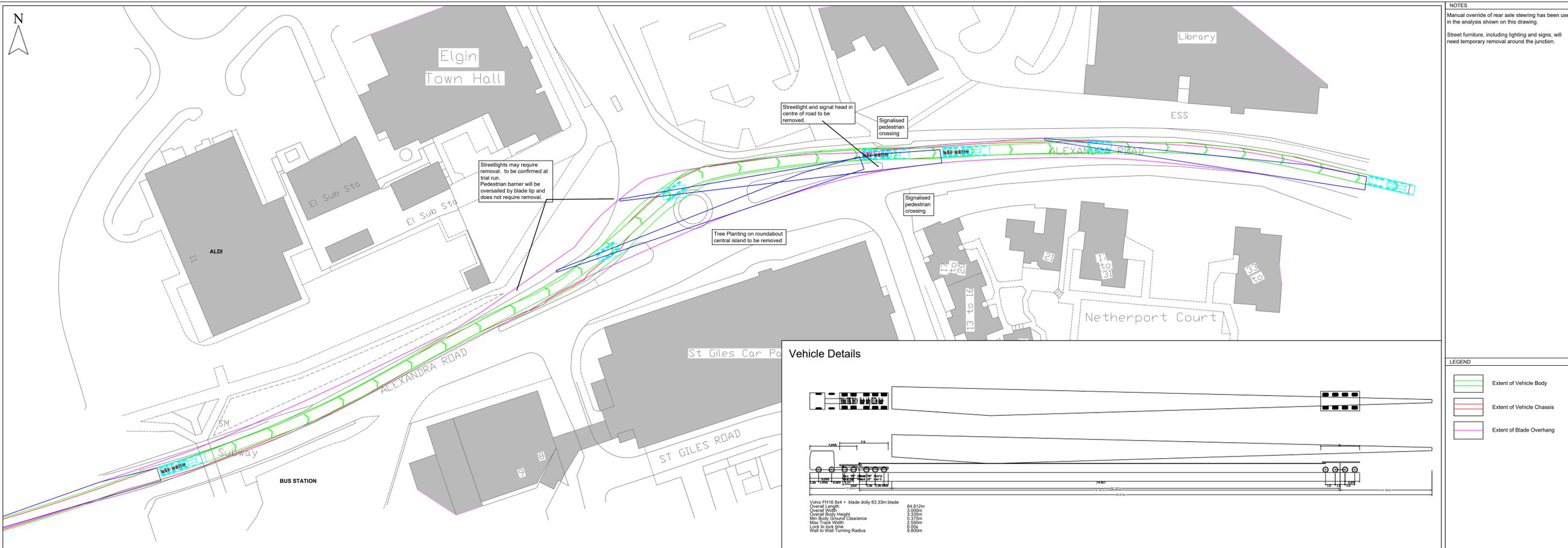
TREEMWOOD HOUSE  
 ROWDEN LANE  
 BRADFORD-ON-AVON  
 WILT. BA15 2AU  
 T: 01225 309400  
 F: 01225 309401  
 www.slrcivil.com

**SLR**  
 AULTMORE WIND FARM  
 ABNORMAL LOAD ACCESS  
 SWEPT PATH ANALYSIS  
 NAIRN B9111 A96 JUNCTION  
 83.3m BLADE DOLL TRAILER

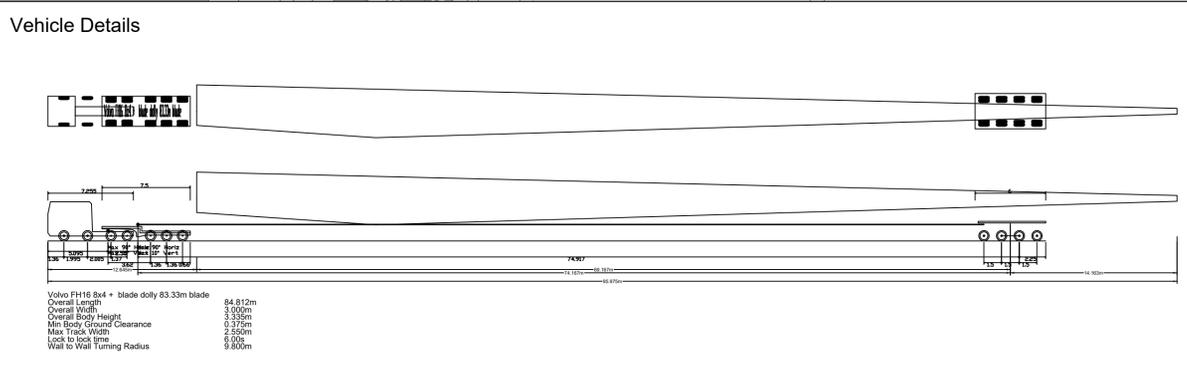
**H007 - 26 - R2**

Scale: 1:500@ A1 Date: SEPTEMBER 2023

H007-26-R2 Nairn Bypass.dwg

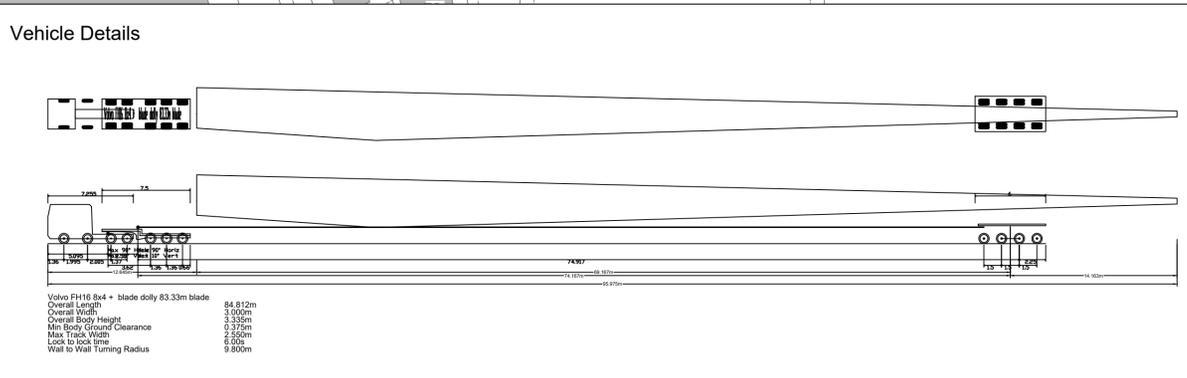
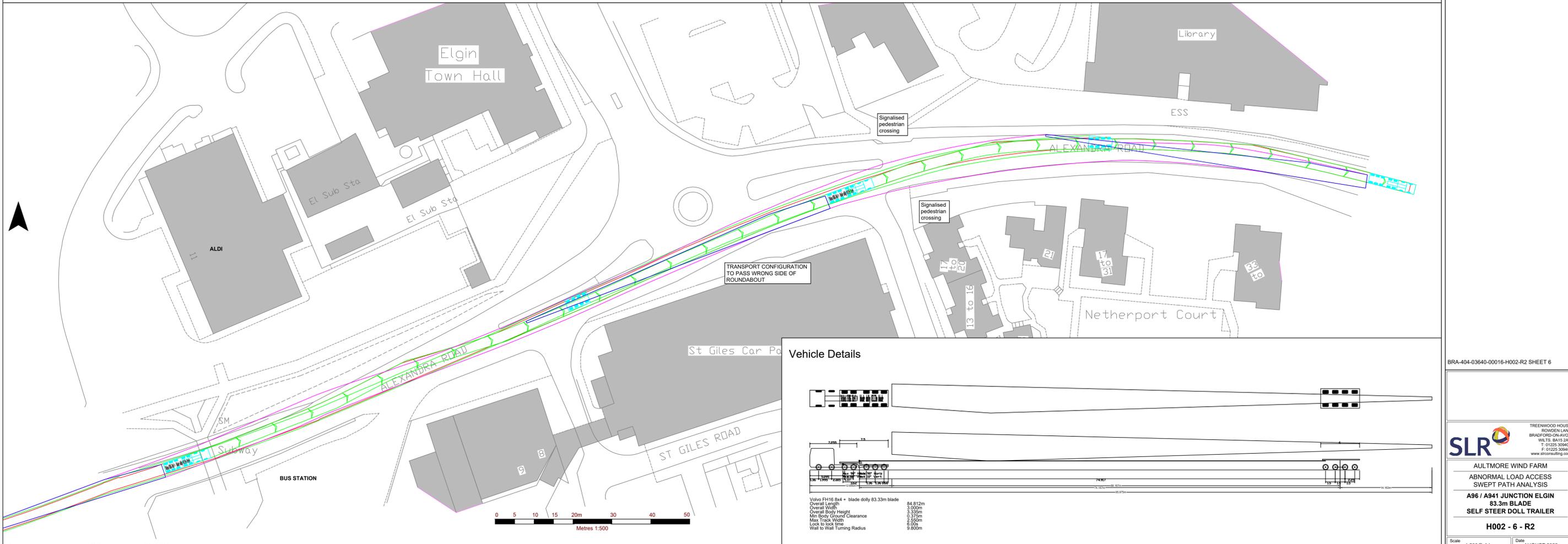


**NOTES**  
 Manual override of rear axle steering has been used in the analysis shown on this drawing.  
 Street furniture, including lighting and signs, will need temporary removal around the junction.



**LEGEND**

- Extent of Vehicle Body
- Extent of Vehicle Chassis
- Extent of Blade Overhang



BRA-404-03640-00016-H002-R2 SHEET 6

**SLR**  
 TREEMOOD HOUSE  
 ROWDEN LANE  
 BRADFORD-ON-AVON  
 WILT. BA15 2AU  
 T: 01225 309400  
 F: 01225 309401  
 www.slrconsulting.com

**AULTMORE WIND FARM**  
 ABNORMAL LOAD ACCESS  
 SWEEP PATH ANALYSIS  
**A96 / A941 JUNCTION ELGIN**  
**83.3m BLADE**  
**SELF STEER DOLL TRAILER**

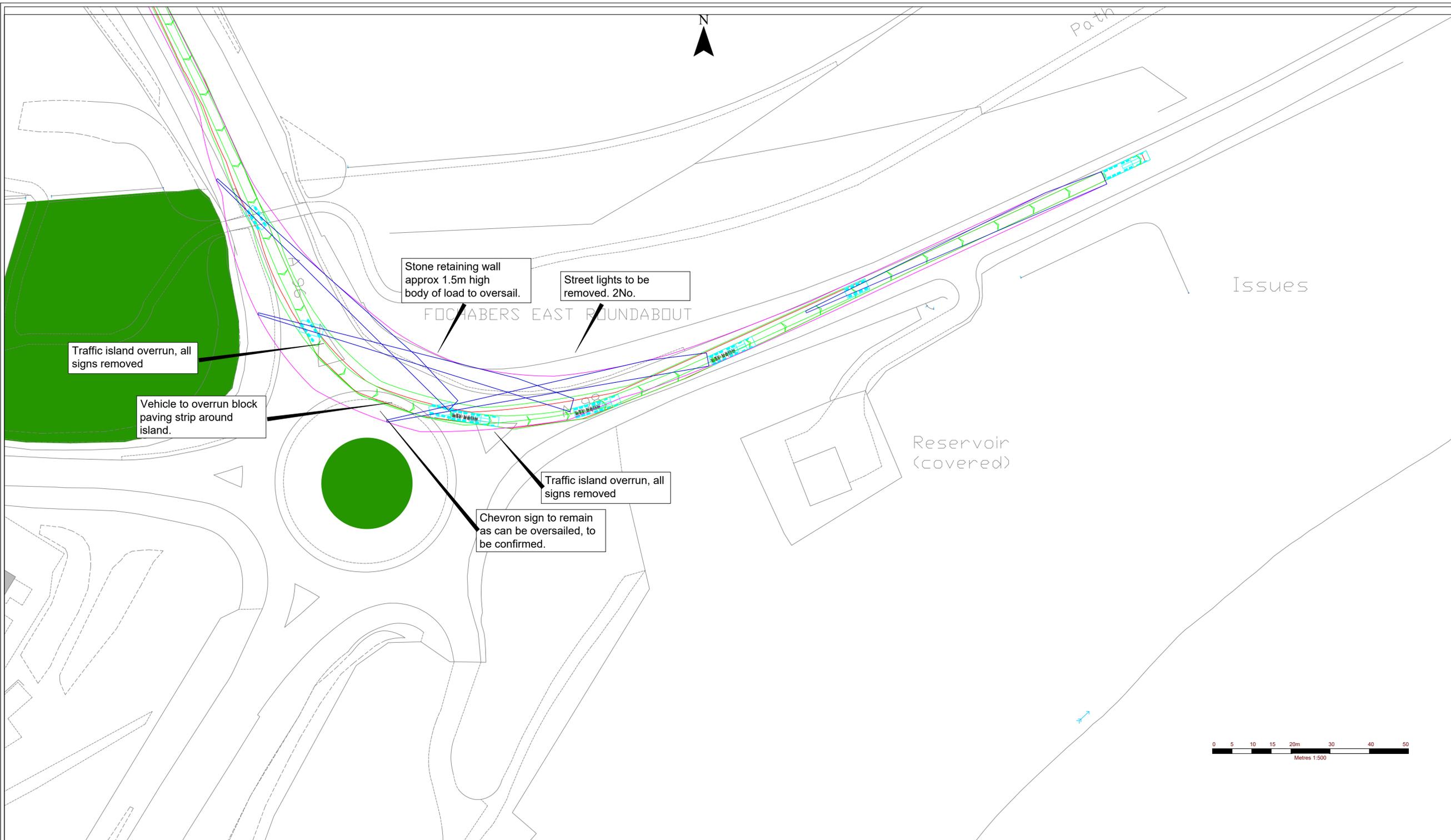
**H002 - 6 - R2**

Scale: 1:500@ A1 Date: AUGUST 2023

H002-R2 Elgin.rvt - sheet 6.dwg

© Crown copyright (see database.rgn) 2015. 0100031623.Express (D08MAY15)

This drawing and its content are the copyright of SLR Consulting Ltd and may not be reproduced or amended except by prior written permission. SLR Consulting Ltd accepts no liability for any amendments made by other persons.



**NOTES**

**NOTES TEXT**  
 Manual override of rear axle steering has been used in the analysis shown on this drawing.  
 Street furniture, including lighting and signs, will need temporary removal around the junction.

**LEGEND**

- Extent of Vehicle Body
- Extent of Vehicle Chassis
- Extent of Blade Overhang
- Area of Woodland

Traffic island overrun, all signs removed

Vehicle to overrun block paving strip around island.

Stone retaining wall approx 1.5m high body of load to oversail.

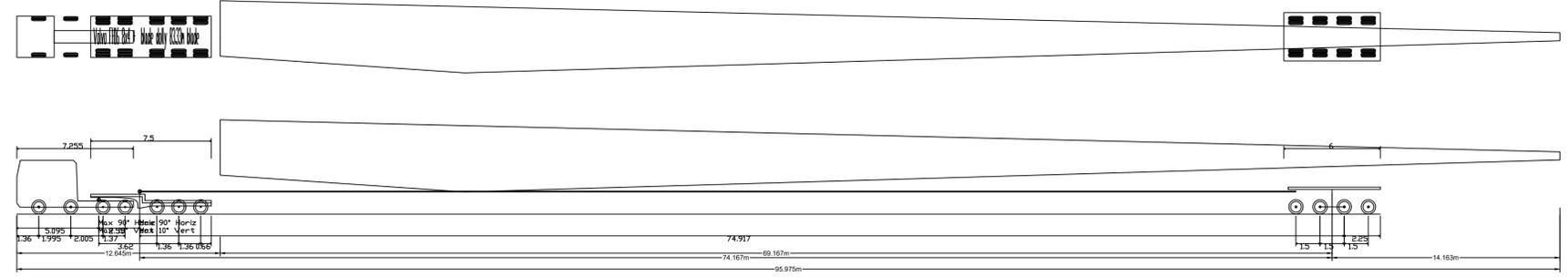
Street lights to be removed. 2No.

Traffic island overrun, all signs removed

Chevron sign to remain as can be oversailed, to be confirmed.



**Vehicle Details**



Volvo FH16 8x4 + blade dolly 83.33m blade	84.812m
Overall Length	3.000m
Overall Width	3.335m
Overall Body Height	0.375m
Min Body Ground Clearance	2.550m
Max Track Width	6.00s
Lock to lock time	9.800m
Wall to Wall Turning Radius	

**SLR** GREENWOOD HOUSE  
 ROWDEN LANE  
 BRADFORD ON AVON  
 WILT. BA15 2AU  
 T: 01225 308400  
 F: 01225 308401  
 www.slrcouk.org

**AULTMORE WIND FARM**  
 ABNORMAL LOAD ACCESS  
 SWEEP PATH ANALYSIS  
 A96 - A98 ROUNDABOUT FOCHABERS  
 83.3m BLADE - DOLLY TRAILER

**H003 - 6 - R1**

Scale: 1:500@ A1 Date: AUGUST 2023

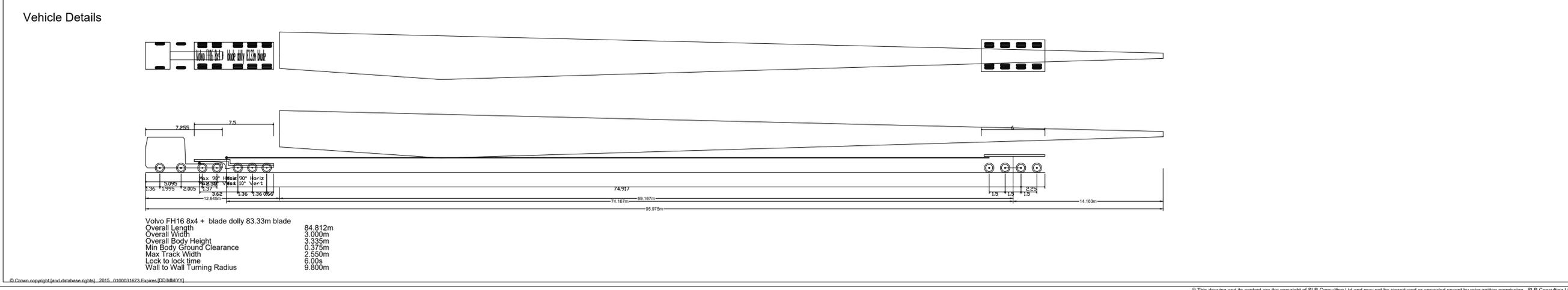
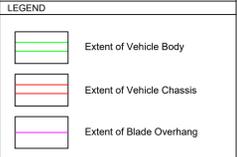
H003-R1 Fochabers east.rdb - SHEET 6 of 6



**NOTES**

Manual override of rear axle steering has been used in the analysis shown on this drawing.

Street furniture, including lighting and signs, will need temporary removal around the junction.



BRA-404-03640-00016-H004-R4 SHEET 6

**SLR**

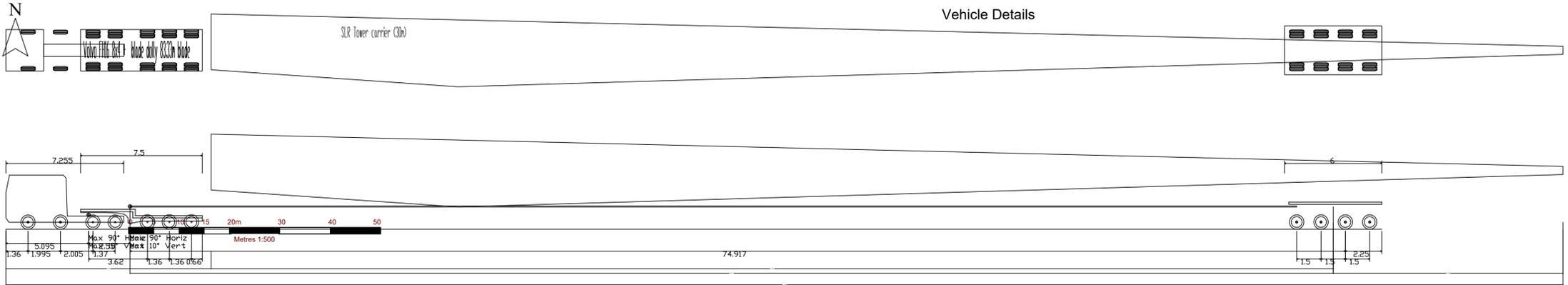
TREEMOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVONON  
WILTS. BA15 2AU  
T: 01225 309600  
F: 01225 309601  
www.slrcivil.com

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS  
SWEPT PATH ANALYSIS  
A98/B9016 JUNCTION  
83.33m BLADE DOLLY TRAILER

**H004 - 6 - R4**

Scale: 1:500@ A1 Date: AUGUST 2023

H004 R4 A98 B9016 Junction - SHEET 6.dwg



Volvo FH16 8x4 + blade dolly 83.33m blade	84.812m
Overall Length	3.000m
Overall Width	3.335m
Overall Body Height	0.375m
Min Body Ground Clearance	2.550m
Max Track Width	6.00s
Lock to lock time	9.800m
Wall to Wall Turning Radius	

**NOTES**  
Manual override of rear axle steering has been used in the analysis shown on this drawing.



**LEGEND**

	Extent of Vehicle Body
	Extent of Vehicle Chassis
	Extent of Blade Overhang



**SLR**

TREENWOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILTS. BA15 2AU  
T: 01225 304400  
F: 01225 309401  
www.slrc consulting.com

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS  
SWEEP PATH ANALYSIS  
B9016 BURN OF TYNET BRIDGE  
78m BLADE CONVENTIONAL TRAILERS

**H030 - 4**

Scale: 1:500@ A1 Date: NOVEMBER 2023

H030\_R0-R1\_B0016\_scene\_bridge.dwg

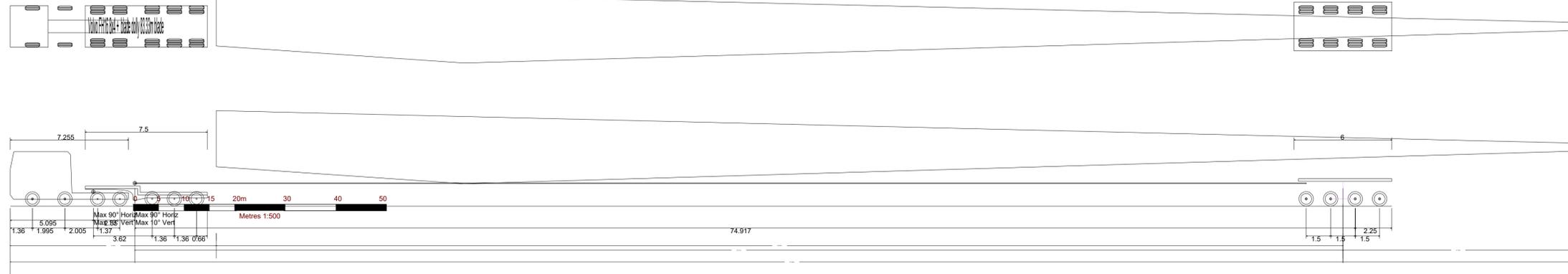
© Crown copyright [and database right] 2015. 0100031673 Expires [DOMMAY]

© 2023 Microsoft Corporation © 2023 Maxar ©CNES (2023) Distribution Airbus DS

© This drawing and its content are the copyright of SLR Consulting Ltd and may not be reproduced or amended except by prior written permission. SLR Consulting Ltd accepts no liability for any amendments made by other persons.

BRA-404-03640-00016

Vehicle Details



Volvo FH16 8x4 + blade dolly 83.33m blade	84.812m
Overall Length	3.000m
Overall Width	3.335m
Overall Body Height	0.375m
Min Body Ground Clearance	2.550m
Max Track Width	6.00s
Lock to lock time	9.800m
Wall to Wall Turning Radius	

NOTES  
Manual override of rear axle steering has been used in the analysis shown on this drawing.



LEGEND

	Extent of Vehicle Body
	Extent of Vehicle Chassis
	Extent of Blade Overhang

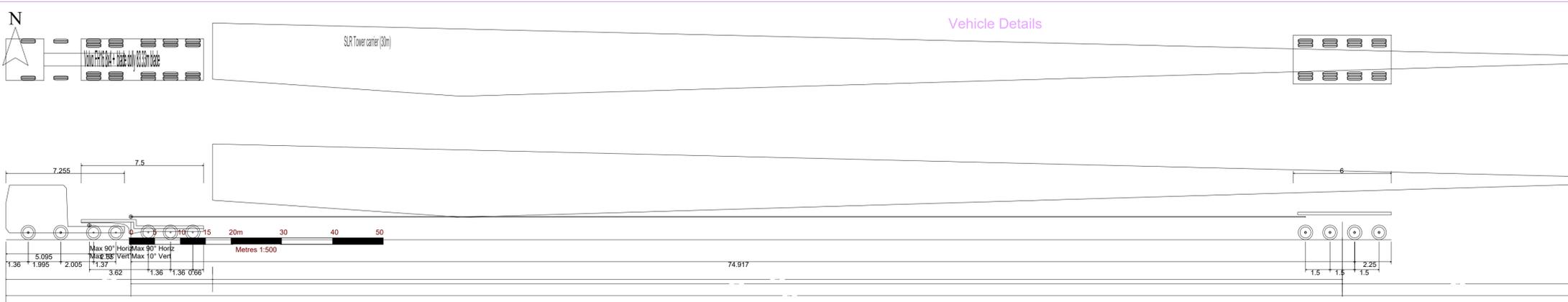
SLR  
TREENWOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILT. BA15 2AU  
T: 01225 309400  
F: 01225 309401  
www.slrcouk.com

AULTMORE WIND FARM  
ABNORMAL LOAD ACCESS  
SWEEP PATH ANALYSIS

B9016  
83.3m BLADE  
SELF STEER DOLL TRAILER

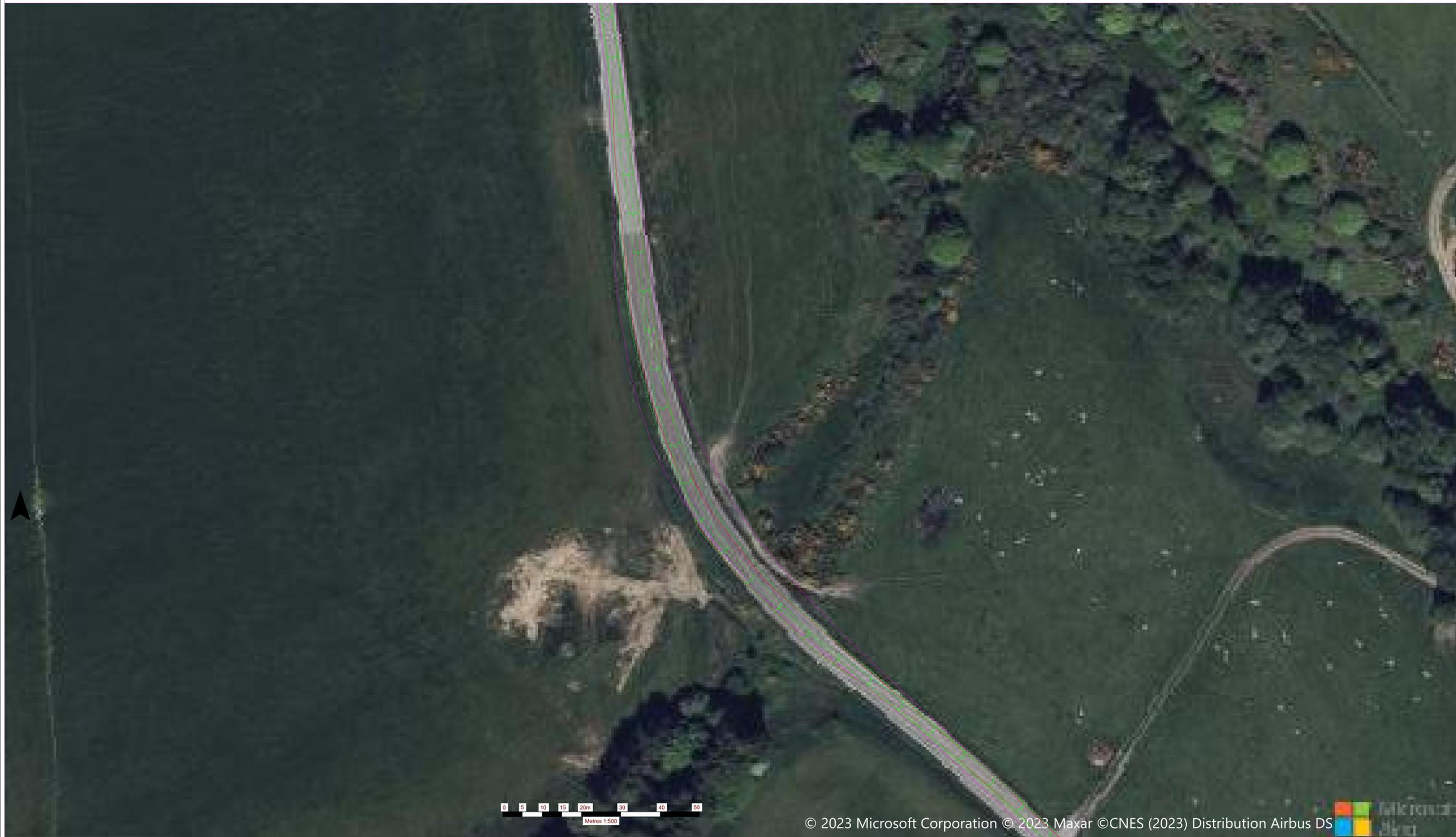
H020-4

Scale: 1:500@ A1 Date: NOVEMBER 2023



Volvo FH16 8x4 + blade dolly 83.33m blade	84.812m
Overall Length	3.000m
Overall Width	3.335m
Overall Body Height	0.375m
Min Body Ground Clearance	2.550m
Max Track Width	6.00s
Lock to lock time	9.800m
Wall to Wall Turning Radius	

NOTES  
Manual override of rear axle steering has been used in the analysis shown on this drawing.



LEGEND

	Extent of Vehicle Body
	Extent of Vehicle Chassis
	Extent of Blade Overhang

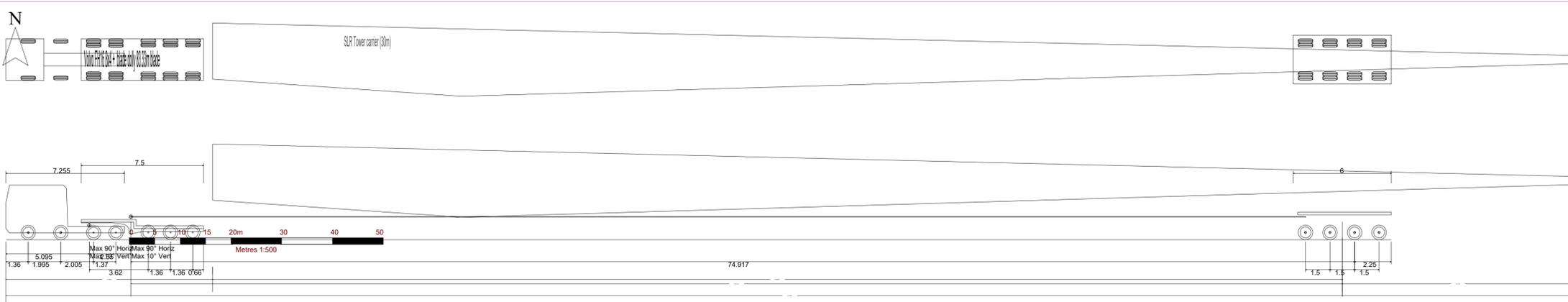
**SLR** GREENWOOD HOUSE  
ROWDEN LANE  
BRADFORD-ON-AVON  
WILT. BA15 2AU  
T: 01225 309400  
F: 01225 309401  
www.slrcollating.com

**AULTMORE WIND FARM**  
ABNORMAL LOAD ACCESS  
SWEPT PATH ANALYSIS

**B9016**  
83.3m BLADE  
SELF STEER DOLL TRAILER

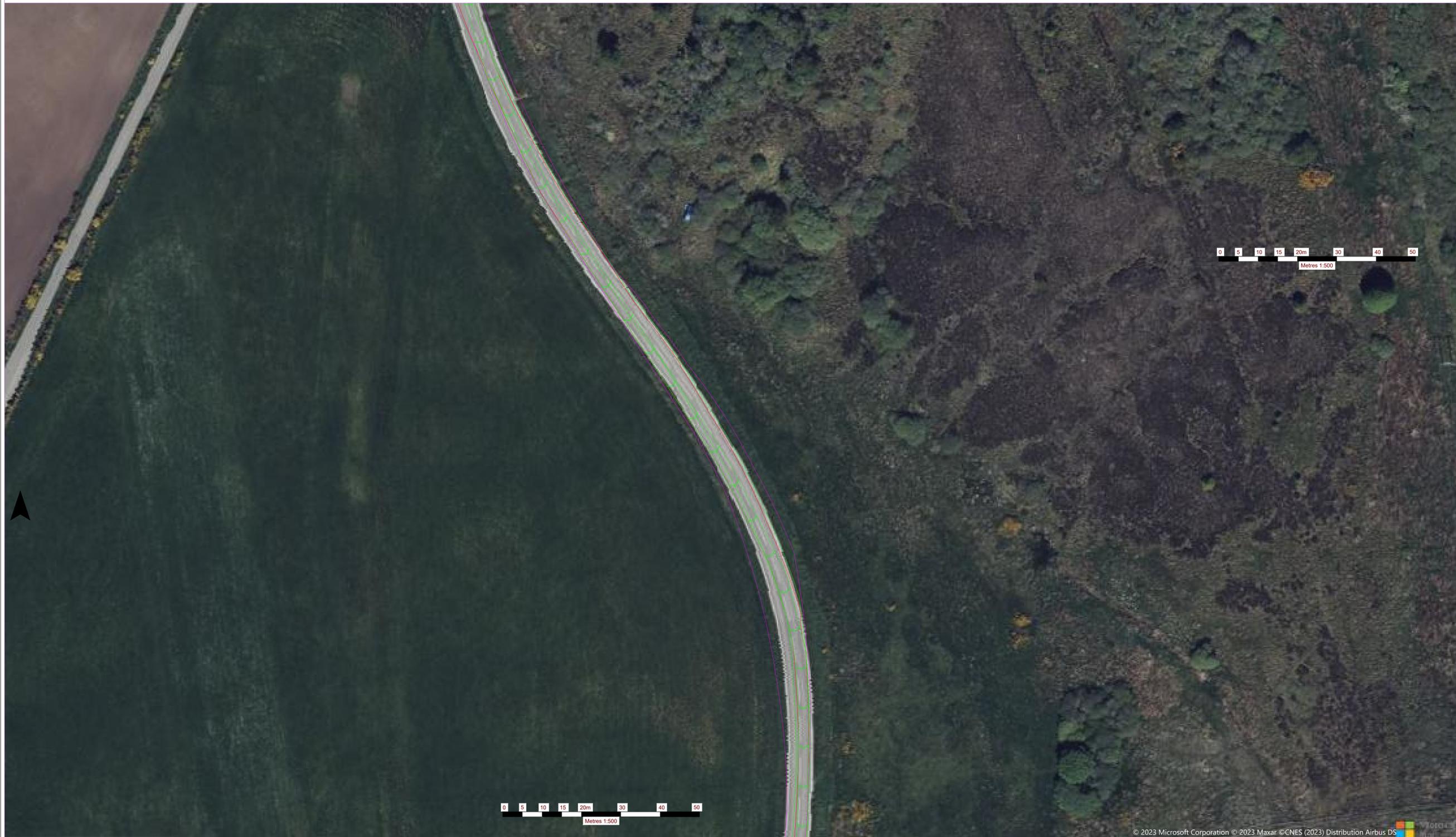
**H021-4**

Scale: 1:500@ A1 Date: NOVEMBER 2023



Volvo FH16 8x4 + blade dolly 83.33m blade	
Overall Length	84.812m
Overall Width	3.000m
Overall Body Height	3.335m
Min Body Ground Clearance	0.375m
Max Track Width	2.550m
Lock to lock time	6.00s
Wall to Wall Turning Radius	9.800m

**NOTES**  
Manual override of rear axle steering has been used in the analysis shown on this drawing.



**LEGEND**

	Extent of Vehicle Body
	Extent of Vehicle Chassis
	Extent of Blade Overhang

H022-04-R1\_B010.dwg

© Crown copyright (and database right), 2015. 0100031673 Expires 31/05/2025

© 2023 Microsoft Corporation © 2023 Maxar © CNES (2023) Distribution Airbus DS

**SLR**  
 GREENWOOD HOUSE  
 ROWDEN LANE  
 BRADFORD-ON-AVONON  
 WILT. BA15 2AU  
 T: 01225 309400  
 F: 01225 309401  
 www.slrcorating.com

**AULTMORE WIND FARM**  
 ABNORMAL LOAD ACCESS  
 SWEPT PATH ANALYSIS

**B9016**  
**83.3m BLADE**  
**SELF STEER DOLL TRAILER**

**H022-4**

Scale: 1:500@ A1 Date: NOVEMBER 2023

© This drawing and its content are the copyright of SLR Consulting Ltd and may not be reproduced or amended except by prior written permission. SLR Consulting Ltd accepts no liability for any amendments made by other persons.

## EUROPEAN OFFICES

### United Kingdom

#### AYLESBURY

T: +44 (0)1844 337380

#### BELFAST

belfast@slrconsulting.com

#### BRADFORD-ON-AVON

T: +44 (0)1225 309400

#### BRISTOL

T: +44 (0)117 906 4280

#### CARDIFF

T: +44 (0)29 2049 1010

#### CHELMSFORD

T: +44 (0)1245 392170

#### EDINBURGH

T: +44 (0)131 335 6830

#### EXETER

T: + 44 (0)1392 490152

#### GLASGOW

T: +44 (0)141 353 5037

#### GUILDFORD

T: +44 (0)1483 889800

#### LONDON

T: +44 (0)203 805 6418

#### MAIDSTONE

T: +44 (0)1622 609242

#### MANCHESTER

T: +44 (0)161 872 7564

#### NEWCASTLE UPON TYNE

T: +44 (0)191 261 1966

#### NOTTINGHAM

T: +44 (0)115 964 7280

#### SHEFFIELD

T: +44 (0)114 245 5153

#### SHREWSBURY

T: +44 (0)1743 23 9250

#### STIRLING

T: +44 (0)1786 239900

#### WORCESTER

T: +44 (0)1905 751310

### Ireland

#### DUBLIN

T: + 353 (0)1 296 4667

### France

#### GRENOBLE

T: +33 (0)6 23 37 14 14