



Njord Energy Ltd

Hendy Wind Farm, Nr Llandrindod Wells, Powys

Transport Assessment

May 2014



Document Control

Document: Transport Assessment

Project: Hendy Wind Farm

Client: Njord Energy Ltd

Job Number: A085582

Revision: Draft

Date: April 2014

Prepared by
Liz Hunter

Checked by
Gordon Buchan

Approved By
Gordon Buchan

Description of Revision: **Draft for Comment**

Revision: 1

Date: 21 May 2014

Prepared by
Liz Hunter

Checked by
Gordon Buchan

Approved By
Gordon Buchan

Description of Revision

Revision:

Date:

Prepared by

Checked by

Approved By

Description of Revision



Contents

1	Introduction	1
	Report Structure.....	1
2	Proposed Wind Farm.....	3
	Site Description and Location	3
	Proposed Turbine Details.....	5
3	Policy Context	6
	Introduction	6
	Planning Policy Wales 2014.....	6
	Planning Policy Wales Technical Advice Note 18: Transport (TAN18)	6
	National Transport Plan	7
	Regional Transport Plan	7
	Powys Unitary Development Plan.....	7
	Strategic Traffic Management Plan for Mid Wales Wind Farms	8
4	Study Methodology	9
	Introduction	9
	Project Phases – Transport Overview	9
	Assessment Scope	9
5	Baseline Conditions	1
	Data Collection Methodology.....	1
	Existing Traffic Conditions.....	1
	Future Traffic Conditions	3
	Speed Survey	4
	Accident History	5
	Path Network and Cycle Routes.....	6
6	Development Trips.....	7
	Derivation of Development Traffic	7
	Staff Traffic.....	7
	Construction Traffic.....	8
	Turbine Transport.....	9
	Total Construction Traffic	10
	Development Traffic Distribution	11
	Impact Identification.....	12
7	Impact Review	15
	Construction Phase – IEMA Assessment	15
	Operational Traffic.....	17
	Decommissioning Traffic.....	17
	General Construction Traffic Mitigation.....	17



	Operational Phase Mitigation.....	20
	Decommissioning Phase Mitigation	20
	Residual Impact Assessment	20
8	Abnormal Load Access Review	21
	Component & Transport Details.....	22
	Port of Entry (POE)	24
	Route from POE to Site	24
	Constraint Assessment	24
9	Framework Traffic Management Plan	26
	Proposed Management Measures	26
	Component & Transport Details.....	26
	Potential Route Conflict Areas	26
	Advance Warning Signage	27
	Pedestrian Warning Signage	28
	Convoy System.....	30
	Other	31
10	Summary & Conclusions	33
	Summary.....	33
	Conclusions.....	33

Figures

Drawings

Appendices



1 Introduction

- 1.1 WYG was commissioned by Njord Energy Ltd to undertake a Transport Assessment (TA) of the transport issues associated with the development of a proposed 7 turbine wind farm at Hendy, near Llandrindod Wells, Powys.
- 1.2 This report has been prepared in accordance with instructions from Njord Energy Ltd on the above project details. No liability is accepted for the use of all or part of this report by third parties. This report is © Copyright of WYG 2014. No section of this report may be reproduced without prior written approval.
- 1.3 WYG has reviewed the transport issues associated with the development along with the route for abnormal loads from the strategic highway network to the development site.
- 1.4 The report identifies the key transport and access points and issues associated with the development of the site that may require remedial works to accommodate the predicted loads. The detailed design of these remedial works, however are beyond the agreed scope of works. It is the responsibility of the turbine supplier to ensure that the access routes to the site are fit for purpose and that appropriate consideration for all road users has been made in accordance with the relevant health and safety legislation and ruling transport requirements at the time the project commences on site.

Report Structure

- 1.5 Following this introductory chapter the report is structured as follows:
- Chapter Two describes the proposed wind farm development along with details of the proposed abnormal loads.
 - Chapter Three reviews the relevant transport and planning policies.
 - Chapter Four sets out the methodology used within the Transport Assessment (TA).
 - Chapter Five details the baseline transport conditions encountered within the study area.
 - Chapter Six describes the trip generation and distribution of construction traffic in the study area.
 - Chapter Seven provides a review of the impacts likely to occur during the construction phase along with suggested mitigation measures.
 - Chapter Eight outlines the access to the site for abnormal loads.



- Chapter Nine presents a framework Traffic Management Plan.
- Chapter Ten summarises the findings of the Transport Assessment and outlines the key conclusions.



2 Proposed Wind Farm

Site Description and Location

- 2.1 The proposed development is for a 7 turbine wind farm At Hendy Farm to the east of Llandrindod Wells and south east of Crossgates close to the A44. The site lies approximately 6.2km east of Llandrindod Wells and 2km west of the A44 and the location is illustrated in Figure 2.1 to the rear of this document.
- 2.2 Turbines will be located on approximately 19.25ha of land although the area available extends to about 250ha. The land is currently predominantly grazed.
- 2.3 Two connections with the public highway will be used by construction vehicles to access the site:
- The first will be a new priority junction located to the south of the junction of the A44 with the U1574 (Pye Corner) and will provide for all vehicles approaching from the south to turn left from the A44 and all vehicles leaving the site to turn left and head north on the A44. The left in left out arrangement will be enforced through central coloured surfacing, white lining and reflective bollards on the A44. Abnormal Indivisible Loads, which will approach the site from the north under civilian escort and police control, will be permitted to turn right into the site; this will require the temporary removal of the central bollards. The new access will connect to the U1574 approximately 80m southwest of the existing junction of the U1574 with the A44. No construction vehicles will be permitted to use the existing entrance onto the A44 due to inadequate visibility splays.
 - The second access will use an existing lane off the A44 to the north of Pye Corner which will be modified to permit all inbound movements by general construction traffic. The access will be used by inbound vehicles only; the access track leading from the junction to the site will operate as one way only and no egress will be permitted onto the A44.
- 2.4 Drawings indicating the proposed access arrangements are included at the end of this report.



- 2.5 Improvements will be required to the U1574 between the point at which the new link road connects with it and its terminus to the south west. Details of these improvements are included in Figures 1.2.1 – 1.2.3 of the ES (Volume II).
- 2.6 From the terminus of the U1574 and the secondary access, vehicles will access the site using existing improved and new tracks which meet at a roughly central point on the study area’s eastern boundary. Existing tracks will require improvement and extension. A suitable junction will be created between the site access road and the existing tracks.
- 2.7 Approximately 3.3km of new access tracks will be constructed within the site at a minimum width of 4.5m, the width varying for junctions, bends and passing places and at turbine base locations where wider working areas will be required.
- 2.8 Material for access track construction will be sourced from an existing quarry located to the south of the site and if necessary from local quarries to minimise disruption.
- 2.9 The U1574 public highway between the A44 and Pye Corner and the following track form part of a Byway Open to All Traffic (BOAT)/ footpath which is also marked as a cycle route. Measures will be put in place to ensure that users are protected from construction traffic – this may require a temporary diversion of the route over the length being used by construction traffic.
- 2.10 In summary the proposed wind farm development would consist of the following:
- 7 turbines up to 110m to tip;
 - Electrical cables;
 - Substation, control building and satellite link;
 - Approximately 3.3km new tracks on site;
 - Upgrading of existing highway and tracks – approximately 1.1km; and
 - Temporary construction compound including office, storage and staff welfare facilities.
- 2.11 An indicative site layout is shown in Halcrow Drawing Hendy-SK-018 to the rear of this document.



Proposed Turbine Details

2.12 WYG has been advised by Njord Energy Ltd that the maximum capacity of each turbine is up to 2.5MW and that while no firm decision on turbines has yet been made, transport assessments should be based on 'worst case' turbine components as follows:

- Repower MM82 blade; and
- Repower MM82 mid tower.

2.13 The final turbine model and specification would be agreed with the consenting authorities prior to construction. With the ongoing advances in turbine design, by the time of construction a number of turbine options may be available.



3 Policy Context

Introduction

- 3.1 A review of relevant transport and planning policies has been undertaken and is summarised below. The review provides the basis for the wider development context of the wind farm proposals.

Planning Policy Wales 2014

- 3.2 Planning Policy Wales (PPW) Chapter 8: Transport states that the following should be taken into account when determining a planning application for development that has transport implications:

- “the willingness of a developer ...to provide infrastructure or measures to manage traffic, to overcome transport objections to the proposed development...;
- the environmental impact of both transport infrastructure and the traffic generated; and
- the effects on the safety and convenience of other users of the transport network.”

Planning Policy Wales Technical Advice Note 18: Transport (TAN18)

- 3.3 TAN 18 was published in March 2007 and reinforces the principle aims of PPW. It describes how to integrate land use and transport planning and explains how transport impacts should be assessed and mitigated.

- 3.4 Key requirements of TAN18 that are applicable to this development include:

- Ensuring that transport infrastructure or service improvements necessary to serve new development allow existing transport networks to continue to perform their identified functions (para 2.3, page 3);
- Submission of Transport Assessments to accompany planning applications for developments that are likely to result in significant trip generation (para 9.2, page 36);
- Access to be provided that reflects the nature and type of road and the volume and character of traffic likely to use the access and the road (para 9.16, para 39);
- Any works to the Trunk Road resulting from the development to be constructed to the standards applied to its own schemes (para 9.17, page 39);



- Where transport improvements are required in the vicinity of the scheme and beyond to accommodate trips associated with the development, conditions may be imposed to make its commencement/ occupation subject to the completion of those works or a developer may be invited to conclude an agreement under section 278 of the highways Act 1980 for the provision of highway works (para 9.18, page 40).

National Transport Plan

- 3.5 The National Transport Plan (NTP) was first published by the then Welsh Assembly Government (WAG) in July 2009 and was updated in March 2010. It sits alongside the Regional Transport Plans in delivering the Wales Transport Strategy and sets out a series of proposed transport interventions across Wales, as well as targeted proposals along specified main movement corridors.

Regional Transport Plan

- 3.6 Trafnidiaeth Canolbarth Cymru (TraCC) is the Regional Transport Partnership for Mid Wales. It is a voluntary partnership between the three Mid Wales unitary authorities – Ceredigion, Gwynedd and Powys. TraCC published its Regional Transport Plan (RTP) in September 2009.
- 3.7 The RTP refers to the number of turbines likely to be constructed in Mid Wales to achieve WAG's renewable energy targets. It outlines the anticipated increase in heavy goods vehicle movements, associated disruption to the travelling public and roadside communities, and resulting impact on highway surfaces and structures. The RTP does not set out a strategy for mitigating these effects but does state that TraCC will work with WAG and other affected parties to develop a strategic approach.

Powys Unitary Development Plan

- 3.8 The Powys Unitary Development Plan (UDP) was adopted in March 2010. It provides the policy framework for guiding development across Powys through to 2016.
- 3.9 Policy E3 of the UDP specifically relates to wind power development and states that applications for wind farms will be approved where they do not *"unacceptably adversely affect the enjoyment and safe use of highways and the public rights of way network, especially bridleways (including during the construction phase)"*. It also states that wind farm approvals



will be granted where *"they are capable of being served by an acceptable means of highway access and any new or improved roads and accesses required would not have unacceptable environmental impacts"*.

- 3.10 Powys County Council is currently in the process of preparing a Local Development Plan (LDP) that will ultimately replace the UDP.

Strategic Traffic Management Plan for Mid Wales Wind Farms

- 3.11 The RenewableUK Cymru's Strategic Traffic Management Plan (sTMP) has been developed to address the likely cumulative impacts of the transportation of wind turbine components as abnormal loads to potential wind farms in Mid Wales (TAN 8 Strategic Search Areas (SSA) B and C of Mid Wales). The sTMP sets out the general principles for managing the delivery of turbine components as abnormal loads from Ellesmere Port to the proposed Mid Wales wind farms. The sTMP has been based on a 45m blade length and tower sections up to 4.5m in width.
- 3.12 The sTMP addresses abnormal load movements originating from Ellesmere Port to both SSA B and C in Mid Wales.
- 3.13 For their Llanbadarn Fynydd Scheme, Vattenfall have proposed a revision to the sTMP section 6 to include the use of Mochdre Link, a privately owned link road at Newtown. The proposed revision is under consideration by the Welsh Government.
- 3.14 Abnormal loads associated with the Hendy development will follow the sTMP route to the SSA C on the A483 to the south of Newtown. As the components for Hendy are smaller than those which have been included within the sTMP, no additional work would be required on the route to SSA C to accommodate the proposed loads.
- 3.15 The Traffic Management Plan for the Hendy site will assess abnormal load movements from SSA C in Mid Wales (the Llanbadarn Fynydd Wind Farm site) on the A483 to the proposed site access on the A44 using the same principles detailed within the approved sTMP.



4 Study Methodology

Introduction

4.1 There are three stages that this assessment needs to consider:

- The Construction Phase of the project;
- The Operational Phase of the project; and
- The Decommissioning Phase of the project (typically undertaken 25 years following completion).

Project Phases – Transport Overview

4.2 Of these phases, the greatest traffic volumes are associated with the project construction phase. The operational phases are restricted to occasional maintenance operations which generate much lower volumes of traffic that are not considered to be in excess of daily traffic variation levels on the highway network.

4.3 The decommissioning phase involves fewer trips on the network than the construction phase as elements of infrastructure such as access tracks are often left in place, adding to local infrastructure.

4.4 The worst case transport scenario is therefore the construction phase and this assessment concentrates on that element of the project's life. It should be borne in mind however that the construction impacts are temporary in nature and very short lived i.e. circa 12 months.

Assessment Scope

4.5 The scope of this assessment has been discussed with the Powys County Council; other than that, the assessment has been carried out using the Transport Assessment advice contained within the Department for Transport's Guidance on Transport Assessment and other relevant guidance.

4.6 A review of the traffic impact and the feasibility of transporting turbines to the development site has been undertaken.



5 Baseline Conditions

Data Collection Methodology

5.1 WYG obtained traffic flow and speed data from 7-day Automatic Traffic Count (ATC) surveys undertaken during week commencing 12th November 2012 to allow an accurate estimate to be made of the potential impact of the construction phase of the proposed wind farm development.

5.2 Seven relevant survey sites were identified as follows:

- A44 west of Crossgates;
- A44 east of Penybont;
- A44 north of its junction with A481;
- A481 west of its junction with A44;
- A488 east of Penybont;
- A483 north of Crossgates; and
- A483 between Crossgates and Llandrindod Wells.

5.3 A further week long speed survey was undertaken on the A44 in close proximity to its junction with the U1574 during week commencing 14th January 2014.

5.4 The locations of the traffic survey sites are illustrated in Figure 5.1.

Existing Traffic Conditions

5.5 Tables 1 and 2 summarise the Average Weekday Traffic Flow and Average Weekend Day Traffic Flow data at the seven count sites.

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	2053	25	37	2115
	24 Hour Flow	2318	26	47	2391
A44 east of Penybont	12 Hour Flow	1719	28	46	1793
	24 hour Flow	1950	30	67	2047
A44 north of its junction with A481	12 Hour Flow	1377	46	41	1464
	24 hour Flow	1577	51	61	1689





Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A481 west of its junction with A44	12 Hour Flow	467	13	21	501
	24 hour Flow	542	13	26	581
A488 east of Penybont	12 Hour Flow	1462	27	11	1500
	24 hour Flow	1647	28	15	1690
A483 north of Crossgates	12 Hour Flow	2914	64	38	3016
	24 hour Flow	3309	71	46	3426
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	5915	56	68	6039
	24 hour Flow	6674	61	84	6819

Table 1: Existing Traffic Flows - Average Weekday

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	1741	5	8	1754
	24 Hour Flow	1984	5	12	2001
A44 east of Penybont	12 Hour Flow	1576	4	12	1592
	24 hour Flow	1773	6	17	1796
A44 north of its junction with A481	12 Hour Flow	1269	39	12	1320
	24 hour Flow	1439	43	17	1499
A481 west of its junction with A44	12 Hour Flow	439	2	3	444
	24 hour Flow	514	4	3	521
A488 east of Penybont	12 Hour Flow	996	18	6	1020
	24 hour Flow	1143	20	7	1170
A483 north of Crossgates	12 Hour Flow	1866	241	10	2117
	24 hour Flow	2216	48	14	2278
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	3753	22	17	3792
	24 hour Flow	4381	25	23	4429

Table 2: Existing Traffic Flows - Average Weekend Day

5.6 The road network is not observed to be under any capacity pressures and is constructed to accommodate the movement of all vehicle classes.





Future Traffic Conditions

- 5.7 Construction of the project is due to commence in 2015 if consent is granted. For the purpose of this assessment, a 12 month construction period was assumed.
- 5.8 Any lengthening in the programme however will have a reduced impact on the surrounding highway network in peak period trip generation terms.
- 5.9 To assess the likely impacts during the construction phase, base year traffic flows were assessed by applying National Road Traffic Forecast (NRTF) high growth factors to the surveyed traffic flows. Applying high growth factors provides a robust assessment as they represent higher than average growth. The NRTF high growth factors applied to the survey data to estimate 2015 traffic flows was: 2012 to 2015 – 1.074.
- 5.10 The final Baseline 2016 traffic flows are shown in Tables 3 and 4.

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	2165	26	39	2230
	24 Hour Flow	2444	27	50	2521
A44 east of Penybont	12 Hour Flow	1813	30	49	1892
	24 hour Flow	2056	32	71	2159
A44 north of its junction with A481	12 Hour Flow	1452	49	43	1544
	24 hour Flow	1663	54	64	1781
A481 west of its junction with A44	12 Hour Flow	492	14	22	528
	24 hour Flow	571	14	27	612
A488 east of Penybont	12 Hour Flow	1542	28	12	1582
	24 hour Flow	1737	30	16	1783
A483 north of Crossgates	12 Hour Flow	3073	67	40	3180
	24 hour Flow	3489	75	49	3613
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	6237	59	72	6368
	24 hour Flow	7037	64	89	7190

Table 3: Future Year Traffic Conditions - Average Weekday

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	1836	5	8	1849



Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
	24 Hour Flow	2092	5	13	2110
A44 east of Penybont	12 Hour Flow	1662	4	13	1679
	24 hour Flow	1869	6	18	1893
A44 north of its junction with A481	12 Hour Flow	1338	41	13	1392
	24 hour Flow	1517	45	18	1580
A481 west of its junction with A44	12 Hour Flow	463	2	3	468
	24 hour Flow	542	4	3	549
A488 east of Penybont	12 Hour Flow	1050	19	6	1075
	24 hour Flow	1205	21	7	1233
A483 north of Crossgates	12 Hour Flow	1968	254	11	2233
	24 hour Flow	2337	51	15	2403
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	3957	23	18	3998
	24 hour Flow	4619	26	24	4669

Table 4: Future Year Traffic Conditions - Average Weekend Day

Speed Survey

5.11 As noted above, speed data was collected at the seven ATC sites and an additional site on the A44 in close proximity to the proposed site entrance. The 5-day average and 85th percentile speeds observed at the count locations are summarised below in Table 5.

	Average Speed (MPH)	85 th Percentile Speed (MPH)	Speed Limit (MPH)
A44 west of Crossgates	45.8	55.3	60
A44 east of Penybont	46.1	53.3	60
A44 close to junction with U154	50.8	58.4	60
A44 north of its junction with A481	47.1	53.2	60
A481 west of its junction with A44	36.1	39.6	60
A488 east of Penybont	50.6	57.4	60
A483 north of Crossgates	48.8	54.5	60
A483 between Crossgates and Llandrindod Wells	49.4	55.0	60

Table 5: Speed Data Summary



5.12 In summary, the speed data indicates that the average and 85th percentile speeds on all links surveyed are below the legal speed limit.

Accident History

5.13 Accident data from the online resource Crashmap¹ was reviewed for the five year period starting on 1st January 2007 for the A44 between its junctions with the A481 and A483 at Crossgates, a length of some 12km.

5.14 A summary of the data is set out in Table 6 below:

Severity			No Vehicles		Vehicle Types					Road Feature		Surface Condition			Lighting	
Slight	Serious	Fatal	Single	Multiple	Car Only	Motorcycle Only	Goods Only	Car + MC	Car + Goods	Junction	Bend	Dry	Wet or Damp	Snow or Ice	Daylight	Darkness
33	9	1	31	12	22	15	2	2	2	4	32	24	17	2	34	9

Table 6: Accident Data Summary

5.15 The table indicates that of the 43 personal injury accidents recorded on the link from which the site will take access:

- 33 or 76% were slight, 9 or 21% were serious and one was fatal;
- 31 or 72% were single vehicle incidents while 12 or 28% involved more than one vehicle;
- 26 or 60% of all the accidents involved cars while 17 or 39% involved motorcycles;
- 4 accidents involved good vehicles though it is noted that none of the vehicles was over 3.5 tonnes. This is important to note as the majority of traffic associated with the development will be heavy traffic;

¹ www.crashmap.co.uk





- 32 or 74% of the accidents occurred at locations on the road where there is a bend with just 7 or 17% occurring away from a junction or bend;
- 19 or 44% of accidents occurred when the road surface was affected by rain, snow or ice; and
- 9 or 21% of the accidents occurred during hours of darkness.

5.16 In summary, it is noted that accidents were spread along the full length of the route, the majority of accidents involved single vehicles, a high proportion were associated with motorbikes and a very high percentage occurred at bends on the link.

Path Network and Cycle Routes

5.17 A network of Byways Open to All Traffic, footpaths, cycle routes and tracks is present within the site as indicated in Figure 5.2 at the end of this document.

5.18 The main access road into the site is designated as a Byway Open to All Traffic - a highway over which the public have a right of way for vehicular and all other kinds of traffic. At the junction of the site access with the A44 it is also marked with a finger post sign as a Llwybr Cyhoeddus or Public Footpath and is denoted on the OS Landranger as a cycle route which connects with a wider network leading on to Llandrindod Wells to the north and Hundred House to the south west

5.19 Where necessary during the construction period, alternative safe provision to the existing routes will be made. The detail of this will be developed closer to the commencement of construction. Following construction, any tracks that have been altered will be appropriately reinstated. Signage will also be erected at locations to be agreed but particularly at any crossing points to warn users to be aware of heavy traffic.





6 Development Trips

Derivation of Development Traffic

6.1 During the assumed 12 month construction period, the following traffic will require access to the site:

- Staff transport (cars and/or staff minibuses);
- Construction equipment and materials, deliveries of machinery and supplies such as steel and cement;
- Abnormal loads consisting of the wind turbine sections and also a heavy lift crane; and
- Abnormal load escort vehicles.

6.2 Average monthly traffic flow data was used to establish the construction trips associated with the site based on the assumptions detailed in the following sections.

Staff Traffic

6.3 Staff will arrive in non-HGV vehicles and where possible will be encouraged to car share. The workforce on-site will depend on the activities undertaken, but, based on previous wind farm construction site experience, the average number is expected to be around 11 for the full duration of the project. The peak of staff numbers occurs for a short time period (months 7 to 10) and is likely to be based on three staff per turbine resulting in a maximum number of 21 staff on site.

6.4 For the purposes of estimating traffic movements, it has been assumed that 66% of staff would be transported by minibus carrying up to 16 people and 33% would arrive by car (single car occupancy has been assumed as the worst case at this stage with potentially fewer movements through car sharing).

6.5 Based on these assumptions, staff transport cars and light vehicles would account for 18 vehicle trips (9 trips inbound and 9 trips outbound) per day during the peak of staffing numbers on site.





Construction Traffic

6.6 An estimate of concrete and steel reinforcement requirements for the turbine foundations was based on a worst case scenario in which the concrete is batched off-site and arrives in mixers for immediate pouring. The total estimated trips required for the delivery of the concrete and reinforcement is summarised in Table 7 and Table 8 respectively.

Foundation Volume (m ³)	No. Turbines	Total Volume (m ³)	Lorry Capacity (m ³)	No. Lorries	No. of Movements
425	7	2,975	6	496	992

Table 7: Ready Mix Deliveries

Foundation Volume (t)	No. Turbines	Total Weight (t)	Lorry Capacity (t)	No. Lorries	No. of Movements
40	7	280	30	9	18

Table 8: Steel Reinforcement Deliveries

6.7 Electrical cables will be laid in trenches. The total estimated number of trips required to deliver the cabling is summarised in Table 9.

Length of Cable Run (m) and No. cables	Length Per Drum (M)	No. of Drums	Drums Per Lorry	No. Lorries	No. of Movements
3,319 x 3	500	20	9	3	6

Table 9: Cabling Movements

6.8 The cables will be buried in sand to protect them from damage. Cabling sand would be imported to the site. The total estimated number of trips required to deliver the cabling sand is summarised in Table 10.

Length of Cable Run (m)	Trench Cross-Section (m ²)	Total Volume (m ³)	Density (te/m ³)	No. Lorries	No. of Movements
3,319	0.338	1,120	2	90	180

Table 10: Cabling Trench Movements





6.9 Materials will be required to construct the wearing course of the access tracks. The total estimated volume of material required to provide road foundations is 23,530m³. The volumes required and associated estimated number of trips required to deliver aggregate are summarised in Table 11 below.

Volume Required (m ³)	Density (te/m ³)	Total (te)	Tipper Capacity	No. Lorries	No. of Movements
23,530	2	47,060	20	2,353	4,706

Table 11: Imported Aggregate Movements

6.10 Aggregate is proposed to be used from within the site, i.e. cut and fill, to limit HGV traffic on the public road and therefore the figures in Table 11 are very much a worst case scenario.

6.11 It is assumed that there will be one service delivery (food/drink) per working day throughout the 10 month programme. This equates to 44 vehicle movements per month (22 trips inbound and 22 trips outbound). A 22 day working month has been assumed.

6.12 In addition, further items will be required to be transported to the site during the construction phase. These items are detailed in the main delivery schedule table provided in Appendix A of this Transport Assessment.

Turbine Transport

6.13 The turbines are broken down into components for transport to the site. The nacelle, blade and tower sections are classified as Abnormal Indivisible Loads (AIL) due to their weight, length, width and height when loaded. For the purposes of the report, the worst case numbers of components requiring transport are illustrated in Table 12 below. It should be noted that the actual turbines installed may have fewer tower sections, resulting in fewer loads being transported to the site.

Component	No. per Turbine
Rotor Blades	3
Tower Top	1
Mid Tower	1



Tower Base	1
Nacelle	1
Hub	1
Container	1
Nose Cone	1
Footings	1
Site parts (shared Containers)	0.2
Total Movements	11.2
Number of Turbines	7
Total Vehicle Trips	78
Total Vehicle Movements	156

Table 12: Turbine Components

Total Construction Traffic

- 6.14 The total estimated construction traffic movements are detailed in the main delivery schedule table provided in Appendix A of this document.
- 6.15 To enable comparison of the observed survey data and estimated 2015 base traffic flows with total volumes including predicted construction traffic, the monthly data was converted to average daily flows for each month of the construction period as shown in Appendix A of this Transport Assessment.
- 6.16 The results conclude that Month 6 is likely to be the peak period for the construction period which corresponds with the delivery of aggregate for access track construction and off-site batched concrete. During this month an average of 78 movements per day (39 trips in and 39 trips out) would be anticipated, of which 64 movements (32 trips in and 32 trips out) would be made by HGV.
- 6.17 The subsequent traffic impact assessments will therefore focus on the peak period traffic flows to illustrate the potential impacts on the study network





Development Traffic Distribution

- 6.18 The distribution of development trips on the network will vary depending on the types of loads being transported.
- 6.19 All construction traffic will enter the site by way of one of the two proposed access junctions on the A44. All construction traffic leaving the site will turn left onto the A44 via the new junction south of Pye Corner. Any traffic with an ultimate destination to the south would U-turn at the A44/ A483 roundabout junction in Crossgates.
- 6.20 Staff trips were assumed to be distributed in line with the proportional volumes of traffic flow on the main routes as collected during the traffic surveys. The proposed distribution of these trips is provided in Table 13.

Origin Point	Percentage Distribution
A44 west of Crossgates	26%
A483 north of Crossgates	30%
A488	15%
A44 south of site	22%
A481	7%

Table 13: Turbine Components

- 6.21 More specialist deliveries have different distributions on the network. The distributions for these trips were based on the following assumptions:
 - All abnormal turbine loads will originate from Ellesmere Port and ultimately access the site via A44 north;
 - All crane trips will access and egress by way of the A44 north;
 - All imported stone is sourced from local quarries. There are a number of quarries in the vicinity, located close to Builth Wells and Kington. It is therefore assumed that vehicles would route equally via A481/ A44 south and A44 south;
 - All concrete deliveries are sourced from local ready mix sites. There are a number of ready mix providers in the vicinity, located close to Builth Wells and Kington. It is therefore assumed that vehicles would route equally via A481/ A44 south and A44 south; and
 - All other deliveries assumed to route equally via A44 north/ A44/ A481/ A483 north/ A483 south and A488.





Impact Identification

6.22 The future year traffic data was combined with the estimated peak daily construction traffic flows to estimate the total trips on the study network during the construction phase.

6.23 Table 14 details estimated levels of daily construction traffic.

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	2	1	0	3
	24 Hour Flow	2	1	0	3
A44 east of Penybont	12 Hour Flow	14	1	62	77
	24 hour Flow	14	1	62	77
A44 north of its junction with A481	12 Hour Flow	3	1	60	64
	24 hour Flow	3	1	60	64
A481 west of its junction with A44	12 Hour Flow	1	0	30	31
	24 hour Flow	1	0	30	31
A488 east of Penybont	12 Hour Flow	1	0	0	1
	24 hour Flow	1	0	0	1
A483 north of Crossgates	12 Hour Flow	3	0	1	4
	24 hour Flow	3	0	1	4
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	5	0	1	6
	24 hour Flow	5	0	1	6

Table 14: Construction Phase Trips

6.24 Table 15 details 2016 Base average weekday traffic flows plus estimated levels of daily construction traffic, or 2016 Total traffic flows while Table 16 details the percentage increase in Total traffic flows over 2016 Base flows.

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	2167	27	39	2233
	24 Hour Flow	2446	28	50	2524
A44 east of Penybont	12 Hour Flow	1827	31	111	1969
	24 hour Flow	2070	33	133	2236



Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 north of its junction with A481	12 Hour Flow	1455	50	103	1608
	24 hour Flow	1666	55	124	1845
A481 west of its junction with A44	12 Hour Flow	493	14	52	559
	24 hour Flow	572	14	57	643
A488 east of Penybont	12 Hour Flow	1543	28	12	1583
	24 hour Flow	1738	30	16	1784
A483 north of Crossgates	12 Hour Flow	3076	67	41	3184
	24 hour Flow	3492	75	50	3617
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	6242	59	73	6374
	24 hour Flow	7042	64	90	7196

Table 15: 2016 Total Traffic Flows

Survey Location	Time Period	Flow			
		Car/Light	OGV1	OGV2	Total
A44 west of Crossgates	12 Hour Flow	0.09%	3.85%	0.00%	0.13%
	24 Hour Flow	0.08%	3.70%	0.00%	0.12%
A44 east of Penybont	12 Hour Flow	0.77%	3.33%	126.53%	4.07%
	24 hour Flow	0.68%	3.13%	87.32%	3.57%
A44 north of its junction with A481	12 Hour Flow	0.21%	2.04%	139.53%	4.15%
	24 hour Flow	0.18%	1.85%	93.75%	3.59%
A481 west of its junction with A44	12 Hour Flow	0.20%	0.00%	136.36%	5.87%
	24 hour Flow	0.18%	0.00%	111.11%	5.07%
A488 east of Penybont	12 Hour Flow	0.06%	0.00%	0.00%	0.06%
	24 hour Flow	0.06%	0.00%	0.00%	0.06%
A483 north of Crossgates	12 Hour Flow	0.10%	0.00%	2.50%	0.13%
	24 hour Flow	0.09%	0.00%	2.04%	0.11%
A483 between Crossgates and Llandrindod Wells	12 Hour Flow	0.08%	0.00%	1.39%	0.09%
	24 hour Flow	0.07%	0.00%	1.12%	0.08%

Table 16: Weekday Percentage Impact - Construction Phase Trips vs 2016

Weekday Base Traffic Flows

6.25 No significant weekend working is anticipated as it is highly likely that weekend activities will be restricted through planning conditions to only allow general site maintenance,



rather than full construction. No assessment has therefore been made of the impact on weekend traffic flows.

- 6.26 The greatest impact of the construction traffic associated with the project is on the A44 between its junction with the A481 and Penybont and the A481.





7 Impact Review

Construction Phase – IEMA Assessment

7.1 In accordance with the Institute of Environmental Management Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic, an assessment should be undertaken:

- On road links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
- Traffic flows are predicted by 10% or more in any other specifically sensitive areas.

7.2 With reference to the IEMA guidelines, total traffic flows are not predicted to increase by more than 30% on any links so none would be considered critically impacted. However, the A44 between the A481 and Penybont and the A481 west of its junction with the A44 are considered to be the most impacted links due to the predicted uplift in HGV traffic. Overall traffic flows are anticipated to rise by less than 10% but HGV levels are predicted to more than double over the course of the construction period. The high percentage increase is a reflection of the current low levels of HGV traffic on these links.

7.3 It should be noted that aggregate from an existing quarry on site is likely to be used for the construction of new tracks. Additionally, if suitable borrow pits are identified on site, aggregate from these will be used. Therefore the volume of imported stone and the number of associated HGV movements affecting the external road network could be significantly reduced. Further, reductions in vehicle movements could be achieved through on site batching of concrete. This assessment therefore represents a worst case scenario.

7.4 A route evaluation has been carried out for these links against a number of environmental criteria. Table 14 summarises the potential impact of the increase in traffic on different environmental receptors identified in the IEMA Guidance.

7.5 The impacts of statistical significance are restricted to the local highway network. No impacts on the trunk road network are considered significant enough to warrant further assessment.



Receptor	Potential Impact	Magnitude of Impact	Comment
Humans	Traffic Noise	Minor/ Moderate	Increase in traffic could result in additional noise impacts, although this would only be temporary during the construction period and on properties abutting the road which are limited in number.
	Vibration	Minor/ Moderate	Increase in traffic could result in additional vibration impacts, although this would only be temporary in nature and localised to properties immediately abutting the road which are limited in number.
	Visual Impact	Minor/ Moderate	The increase in movements by high-sided vehicles could result in visual intrusion, although this would be limited to the construction period only.
	Severance	Minor/ Moderate	Increase in traffic could result in difficulties for people crossing the delivery route during the construction period. With limited pedestrian facilities or residential properties in the vicinity of the site, crossing demand is likely to be low. Access to an existing BOAT/ footpath will be affected by construction.
	Driver Delay	Minor/ Moderate	Driver delay would largely occur during the movement of the abnormal loads.
	Pedestrian Delay	Minor/ Moderate	Increase in traffic could result in delays for pedestrians during the construction period. However with limited pedestrian facilities or residential properties in the vicinity of the site, pedestrian movements are likely to be low. Access to an existing BOAT/ footpath will be affected by construction.
	Pedestrian Amenity	Moderate	Access to an existing BOAT/ footpath will be affected by construction.
	Accidents and Safety	Minor	There is limited potential for impact on safety due to driver frustration, particularly with regards to the transport of the abnormal loads.
	Hazardous Loads	Negligible	Highly unlikely that any abnormally hazardous materials would be transported to / from site.
	Air Pollution	Negligible	An increase in traffic is often associated with an increase in air pollution; however it is unlikely the volume of movements and temporary nature would pose a significant impact.
Ecology		Minor/ Moderate	There is the potential for dust and dirt to be distributed on the public road by vehicles exiting the site.
			Some side vegetation may need to be removed from the roads. To avoid any impact upon nesting birds this should be removed outside of the breeding season (March to August).
Material Assets	Heritage and Conservation Areas	Minor	No significant receptors identified at level of assessment undertaken. No significant impacts are considered likely.

Table 17: A44 Link Review



Operational Traffic

- 7.6 It is predicted that during the operation of the site there will be up to 2 vehicle movements per week for maintenance purposes. Also, there may be occasional abnormal load movements to deliver replacement components in the event of a major failure.

Decommissioning Traffic

- 7.7 Prior to decommissioning of the site, anticipated to be 25 years from the opening year, a traffic assessment will be undertaken and appropriate traffic management procedures followed. It is anticipated the number of associated movements will be less than during the construction phase and that the number of abnormal loads will be drastically reduced.

General Construction Traffic Mitigation

- 7.8 During the construction period the developer (through their consultant) and contractor will update the Developments' website (www.hendywindfarm.co.uk) to ensure it contains the latest information relating to traffic movements and potential disruptions associated with vehicles accessing the development site. The detail of any alerts will be agreed with the local highways authority.

- 7.9 The following measures are recommended in terms of site operation and maintenance during the construction phase;

- All materials delivery lorries (dry materials) should be covered with a sheet to reduce dust and stop spillage on public roads;
- Specific training and disciplinary measures should be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway, wheel wash facilities will be established at the site entrance;
- Site working hours would be limited to between 7am and 7pm (Monday to Friday);
- Appropriate traffic management measures would be put in place at the site access junctions to avoid conflict with general traffic and cyclists/ walkers, subject to the agreement of the roads authority. Typical measures would include HGV Turning and Crossing signs and/ or banksmen during busy periods;
- All drivers would be required to attend an induction to include:



- a safety briefing;
- the need for appropriate care and speed control;
- a briefing on driver speed reduction agreements (to slow site traffic at sensitive locations);
- identification of specific sensitive areas;
- identification of the specified route;
- the requirement not to deviate from the specified route; and
- the need to be aware of walkers and cyclists using the BOAT/ footpath; and
- A Traffic Management Plan.

7.10 The local authority may require an agreement, a standard condition, to cover the cost of abnormal wear and tear on roads not designed for that purpose.

7.11 Video footage of the pre-construction phase condition of the abnormal loads access route and the construction vehicles route would be recorded to provide a baseline of the state of the road prior to any construction work commencing. This baseline would inform any change in the road condition during the construction stage of the proposed wind farm and an appropriate proportion of the responsibility for the resulting repairs and maintenance would be agreed with the relevant road authority at the end of the construction phase. Any damage caused by traffic associated with the proposed wind farm, during the construction period that would be hazardous to public traffic, would be repaired immediately.

7.12 Road improvements would be carried out in agreement with the Powys County Council and the appropriate statutory authorities to ensure that during delivery of turbine components minimal damage is caused to road surfaces, verges, street furniture and surrounding vegetation. Damage to road infrastructure caused directly by construction traffic would be made good, and street furniture that is removed on a temporary basis would be fully reinstated.

7.13 Table 18 indicates the proposed mitigation measures that the developer intends to use to mitigate or reduce the impact of the potential effects of the development.





Potential Effect	Proposed Mitigation
Traffic Noise and Vibration	As there are very limited numbers of properties directly abutting the construction route, traffic noise and vibration are unlikely to be a significant issue. However, as noise and vibration are speed dependant, vehicles will be fitted with identification numbers to allow the public to identify any vehicles that may be speeding or causing specific issues. Further, drivers will be required to pass through sensitive areas at low speed.
Visual Impact	All mitigation works to accommodate abnormal load traffic will be designed to be temporary in nature and will be restored to their original condition (unless requested otherwise by the Highways Authorities)
Severance	<p>Based on the average daily increase in total construction movements, the severance impact is estimated to be negligible along the route as a whole. The draft Construction and Decommissioning Management Plan will be used to minimise the severance impact of vehicles along the construction route and specifically through Pembroke.</p> <p>All construction traffic would have a speed limit applied through the various contracts used to engage those working on the wind farm site. This speed limit would be checked and rigorously applied by the developer as part of their commitment to having a considerate construction period.</p> <p>Abnormal load movements will be fully escorted and movements will be controlled using a detailed Traffic Management Plan.</p>
Driver Delay	<p>General construction traffic is unlikely to create significant levels of driver delay.</p> <p>The detailed Traffic Management Plan will set out measures to help reduce delays encountered with abnormal load transport. This will include measures such as timing deliveries during off-peak periods.</p> <p>Other measures such as advance warning signs will help drivers consider non-impacted routes as alternatives for their journeys.</p>
Pedestrian Delay	The Traffic Management Plan associated with the transport of abnormal loads will address any pedestrian delay issues that could occur during convoy movements.
Pedestrian Amenity	The Traffic Management Plan associated with the transport of abnormal loads will address any pedestrian amenity issues that could occur during convoy movements.
Accidents and Safety	The abnormal loads will be escorted by the Police and operated in accordance with a Traffic Management Plan that reviews all risks for all road users. Advance warning signs will be used to provide advice and warnings to road users and a wheel wash facility will be provided to ensure that no mud and debris is brought onto the public highway.
Air Pollution	Wherever possible, contractors will be encouraged to use low emissions vehicles through the Construction Management Plan.
Dust and Dirt	A wheel wash facility is to be provided on site and contractors will be required to sheet over all loose material deliveries. A road sweeper will also be deployed on the section of the unclassified road adjacent to the site access to ensure that the road is kept clean and free running.
Ecology	The trimming back of tree canopy cover and side vegetation is unlikely to have a significant long lasting adverse impact outside the breeding season (May to September).

Table 18: Summary of the Proposed Mitigation





Operational Phase Mitigation

- 7.14 Site entrance roads will be well maintained and monitored and road cleaners will be available to remove material carried onto public roads by any maintenance traffic travelling to the site when operational.

Decommissioning Phase Mitigation

- 7.15 Similar to the construction phase, a Traffic Management Plan and Construction Management Plan will be prepared for the decommissioning phase.

Residual Impact Assessment

- 7.16 With mitigation measures in place no significant residual impacts are anticipated.





8 Abnormal Load Access Review

- 8.1 The Welsh Government (WG) describes an Abnormal Indivisible Load (AIL) as “any load that can’t be broken down into smaller loads without undue expense or risk of damage”.
- 8.2 There are four main pieces of legislation that cover AIL movements as defined by the WG:
- The Road Vehicles (Construction & Use) Regulation 1986;
This covers all aspects of the vehicles setup from the weights and dimensions through to the braking system and environmental standards.
 - The Road Vehicles (Authorised Weight) Regulations 1998;
This regulation sets the limited maximum weight of the vehicle and axle loading of different vehicle categories.
 - The Road Vehicles (Authorisation of Special Types)(General) Order 2003;
The STGO is for vehicles not covered by either of the above Regulations and covers wind turbine component delivery vehicles which are categorised as N3 for the tractor units and O4 for the specifically designed trailers. It states that the Police, the relevant highway and bridge authorities or the Secretary of State may need to be notified of vehicle movement, dependent on the size of the load. .
Notifications can be made online through the ‘Highway Agency’s Electronic Service Delivery for Abnormal Loads (ESDAL) System’ or in paper form using the BE16 form for Special Orders.
 - The Road Vehicles Lighting Regulation 1989 (Authorisation of Special Types)(General) Order 2003;
This regulation defines whether front, side and rear lamps and reflectors are mandatory and which ones are permitted and which are not permitted.
- 8.3 Applications for a ‘Vehicle Special Order’ (VSO) should be made to the Vehicle Certification Agency (VCA) and it is recommended that applications are applied for at least 8 weeks prior to planned vehicle movements.
- 8.4 To support the movement of abnormal loads the Police may be required to stop other traffic. In order to bolster existing powers, a Temporary Traffic Regulation Order (TTRO) will be required to cover the delivery period.

8.5 Wherever possible in this study, WYG has referred to specific WG guidance on the transport of abnormal wind farm loads.

Component & Transport Details

8.6 The turbines are broken down into components for transport to the site. The nacelle, blade and tower sections are classified as Abnormal Indivisible Loads (AIL) due to their weight, length, width and height when loaded.

8.7 The components can be delivered on a variety of transport platforms, with typical examples illustrated in Photograph 1 and Photograph 2.



Photograph 1: Typical Blade Transporter





Photograph 2: Typical Tower Transporter

- 8.8 The blades and tower sections are considered as abnormal loads due to their size, whilst the hub and nacelle join this category due to their weight. Other components such as the transformer and switchgear are transported using standard HGV vehicles. A typical turbine of this scale can be delivered in up to 12 deliveries (of which 8 are considered abnormal).
- 8.9 The total number of abnormal loads associated with the construction of the Hendy development is 56. This may vary slightly depending upon the final choice of turbine.
- 8.10 The Welsh Police have advised that they will escort up to two abnormal loads as a single convoy (although if the delivery process is successful, it may be possible to increase the number of components per convoy to three). Assuming the worst case scenario of two component parts per convoy, up to 28 individual convoys would deliver to the site.
- 8.11 In addition to the turbine deliveries, a large erection crane would be needed to offload a number of components and erect the turbine. The crane is likely to be a mobile crane with a capacity up to 800 tonnes that is escorted by boom and ballast trucks to allow full mobilisation of the crane on site. This is not considered an AIL; but may require escorting and permits or licences for transit. These would be arranged by the crane operator. A smaller erector crane will also be present to allow the assembly of the main crane and to ease overall erection of the turbines.



- 8.12 The decommissioning of the turbines would result in a similar number of abnormal loads as during the construction phase, with the blades, nacelle, hub and towers being removed. However, it is possible that the turbines could be cut up on site meaning they could be transported off site using standard vehicles. Environmental investigations would be undertaken at an appropriate time to determine whether in situ breakdown would be acceptable.
- 8.13 At this point in time, it is predicted that the foundations will remain in situ.

Port of Entry (POE)

- 8.14 Following desktop reviews of all potential access routes from the PoE to the Hendy Wind Farm and an Abnormal Access Review undertaken by WYG, Ellesmere Port has been chosen as the Port of Entry (PoE) for all loads associated with the Hendy Wind Farm.

Route from POE to Site

- 8.15 It is proposed that all loads will follow the sTMP route from Ellesmere Port and head south on the M53, A55, A483 (using the proposed Mochdre Link detailed in the February 2014 updated section 6 of the sTMP) then turning left onto the A44 at Crossgates and heading east to the proposed site access. Loads would turn right into the site access fully escorted, with appropriate traffic management in place and under Police control. Figure 8.1 to the rear of this document illustrates the route that the abnormal loads will take from the port to the wind farm site.
- 8.16 The total route from Ellesmere Port to site is approximately 90 miles.

Constraint Assessment

- 8.17 Njord Energy Ltd commissioned WYG to undertake a review of the access route from the end of the sTMP route through to the site access. The inspection and subsequent swept path assessments identified the need for minor mitigation works at the A483/A44 Roundabout in Crossgates to facilitate the movement of components.
- 8.18 At the Roundabout, loads turn left and will oversail the verge and footway on the inside. A lighting column and traffic sign will require to be relocated from this area. The bollard on the splitter island on the A44 arm will require to be removed during delivery. A load





bearing surface is required for the splitter island on the A483 to allow loads to over-run and a bollard removed during delivery.

- 8.19 The swept path assessment and mitigation works are indicated in the Drawing A078181/01 towards the rear of this report.





9 Framework Traffic Management Plan

Proposed Management Measures

9.1 This Chapter introduces a number of traffic management measures that could help reduce the impact of construction traffic and Abnormal Indivisible Load (AIL) convoys. These measures are currently presented as indicative to be confirmed with the relevant local and trunk road authorities and Police closer to the time.

9.2 All deliveries would be undertaken at appropriate times with the aim to minimise the impact on the trunk and local road network.

Component & Transport Details

9.3 Traffic to the site during construction will fall into two categories, namely:

- General Construction Traffic; and
- Abnormal Indivisible Loads (AIL) – vehicles for the transport of the largest turbine components.

9.4 The turbines are broken down into components for transport to the site. The nacelle, hub, drive train, blade and tower sections are classified as AIL due to their weight, length, width and height when loaded.

Potential Route Conflict Areas

9.5 The majority of potential conflicts between construction traffic and other road users will potentially occur with AIL traffic. General construction traffic is not likely to come into conflict with other road users as the vehicles are smaller and road users are generally more used to them.

9.6 Potential conflicts between the AIL turbine loads and other road users can occur at a variety of locations and circumstances. The main potential conflicts are likely to occur at:

9.7 In rural areas where the loads may straddle the centre line, where fast moving oncoming traffic may be encountered, etc.;

- Where traffic turns at a road junction, requiring other traffic to be restrained on other approach arms; and



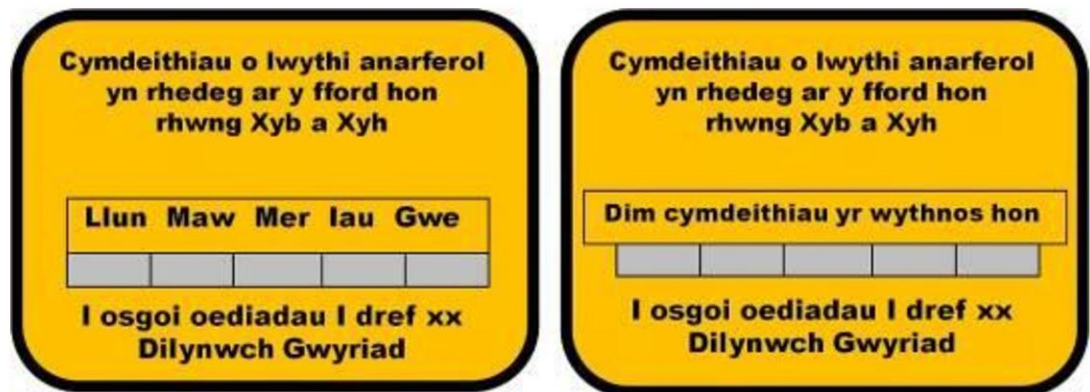
- In locations where high speeds of general traffic are predicted.

9.8 The urban areas along the route pose different challenges for the abnormal loads. Whilst the vehicle speeds will be less than those in the rural or motorway sections of the route, there are more potential conflicts with other road users to be aware of. These include:

- Pedestrians and cyclists;
- Local vehicular traffic;
- Parked vehicles;
- Side junctions; and
- Street furniture.

Advance Warning Signage

9.9 Advance warning signs would be installed on the approaches to the affected roads network. Temporary signage advising drivers that abnormal loads will be operating would be erected on sections of the proposed route through to the site access to be agreed with Powys County Council. Signs such as the example shown in Figure 9.1 below would be installed to help assist drivers.



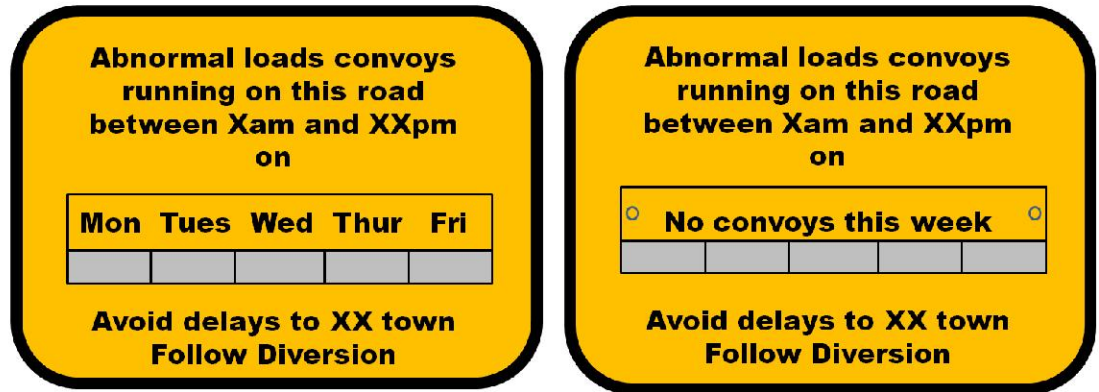


Figure 9.1 Indicative Information Signs

- 9.10 The purpose of this type of signage is to help improve driver information and allow drivers of oncoming traffic to consider proceeding to the nearest convenient passing point, or breaking their journey until the convoy has moved on.
- 9.11 To further improve driver information, it is suggested that Variable Message Signs (VMS) operated by the trunk roads agencies, are used to warn drivers of abnormal loads operating on the trunk road sections of the route. This would display information warning of possible delays and would allow drivers to consider alternative routes if possible.

Pedestrian Warning Signage

- 9.12 Temporary pedestrian warning signs should be erected within rural villages to alert pedestrians and those parking cars of the proposed loads. Signs such as the example shown in **Error! Reference source not found.** could be installed.





Figure 9.2 Indicative Pedestrian Information Sign

- 9.13 The time and date section of the sign could be written in marker pen so to allow re-use of the sign during the life of the project.
- 9.14 The signs would be placed at the major turns within the urban areas and fixed by means of cable ties (or similar) to existing street furniture.
- 9.15 Information on the movement of abnormal load convoys should be provided to local media outlets to help assist the public. Information could be provided to local newspapers and radio stations, which may include:
- BBC Radio Wales;
 - BBC Radio Cymru;
 - Heart North West and Wales; and





- [Powys] County Times.

9.16 Information on the movement of abnormal load convoys should be provided to local media outlets to help assist the public. Information could be provided to local newspapers and radio stations, which may include:

- BBC Radio Wales;
- BBC Radio Cymru;
- [Powys] County Times.
- Cambrian News (Aberystwyth Edition);
- Bay Radio;
- Radio Ceredigion; and
- BBC Mid Wales Aberystwyth.

9.17 Information would relate to expected vehicle movements from Ellesmere Port through to the site access. It is hoped that this level of information will make residents aware of convoy movements and help reduce any potential conflicts.

9.18 WYG also suggest that the developer may wish to consider producing a local newsletter for distribution to properties along the most affected sections of the proposed access routes, advising of convoy movements and the measures put in place to ensure the safe and efficient operation of the road network.

Convoy System

9.19 A police escort will be required to facilitate the delivery of the predicted loads. The police escort would be further supplemented by a civilian pilot car to assist with the escort duty. It is proposed that an advance escort would warn oncoming vehicles ahead of the convoy, with one escort staying with the convoy at all times. The escorts and convoy would remain in radio contact at all times where possible.

9.20 The Police have the ultimate authority in deciding convoy composition and escort numbers and would also have are the ultimate authority during the convoy movement. The Police have indicated that, at least initially, convoy movements will be made up of no more than two AIL vehicles to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic where it is safe to do so.





- 9.21 Where designated passing bays are provided to allow oncoming vehicles to pass the convoy, these would be controlled by one of the escort vehicles. The passing bays would also be marked to discourage people parking in them during delivery periods. The passing bays are predominantly required for the delivery of turbine tower and nacelle components.
- 9.22 The times in which the convoys would travel will need to be agreed with the local constabulary. Typical delivery times for similar projects have seen the early morning periods used in constrained sections, as traffic levels are generally lighter than those found in the afternoon.
- 9.23 A full convoy operation plan will be developed in consultation with the various highways agencies and Police along the route and agreed before deliveries commence to the site.
- 9.24 For return journeys, the extendible low loaders used for the delivery of the longer wind turbine components, would be retracted to ensure they leave the proposed site with a trailer length of no more than 16 m.

Other

- 9.25 The Framework Traffic Management Plan would also include:
- procedures for liaising with the emergency services to ensure that police, fire and ambulance vehicles are not impeded by the loads. This is normally undertaken by informing the emergency services of delivery times and dates and agreeing communication protocols and lay over areas to allow overtaking;
 - procedures for avoiding transit through rural communities at school arrival and departure times (this is assumed to be one hour in the morning and one hour in the afternoon);
 - a communications protocol to avoid delays with emergency vehicle traffic;
 - a diary of proposed delivery movements to liaise with the communities to avoid key dates such as fetes etc;
 - a protocol for working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic; and
 - proposals to establish a construction liaison committee to ensure the smooth management of the project/public interface with Njord Energy Ltd, the construction contractors, the local community, and if appropriate, the police



forming the committee. This committee would form a means of communicating and updating on forthcoming activities and dealing with any potential issues arising.





10 Summary & Conclusions

Summary

- 10.1 WYG was commissioned by Njord Energy Ltd to undertake a Transport Assessment (TA) of the transport issues associated with the development of a proposed 7 turbine wind farm at Hendy, near Llandrindod Wells, Powys.
- 10.2 Recently collected traffic data factored to future levels was used to establish a base point for determining the impact during the construction phase.
- 10.3 The maximum traffic impact associated with construction of the wind farm is predicted to occur in month 6 of the construction programme. During this month, an average of 64 HGV movements are predicted per day and it is estimated that there will be a further 14 car and light van movements per day to transport construction workers to and from the site.
- 10.4 In addition, the impact of the development on overall road capacity has been examined.
- 10.5 The construction traffic will result in a temporary increase of traffic flows within the study area. During the construction of the wind farm the associated traffic impacts are predicted to be greatest on the section of the A44 between Penybont and the A481 and the A481 west of the A44.
- 10.6 A review of the local highway network was undertaken to assess the feasibility of transporting turbines to the development site.
- 10.7 No significant capacity issues are expected on any of the roads within the study area due to the additional construction traffic movements associated with the development.
- 10.8 In addition, the impact of the development on overall road capacity has been examined.

Conclusions

- 10.9 The assessment has clearly identified the following:
 - The impact of construction traffic on the surrounding highway network is short lived and not significant;



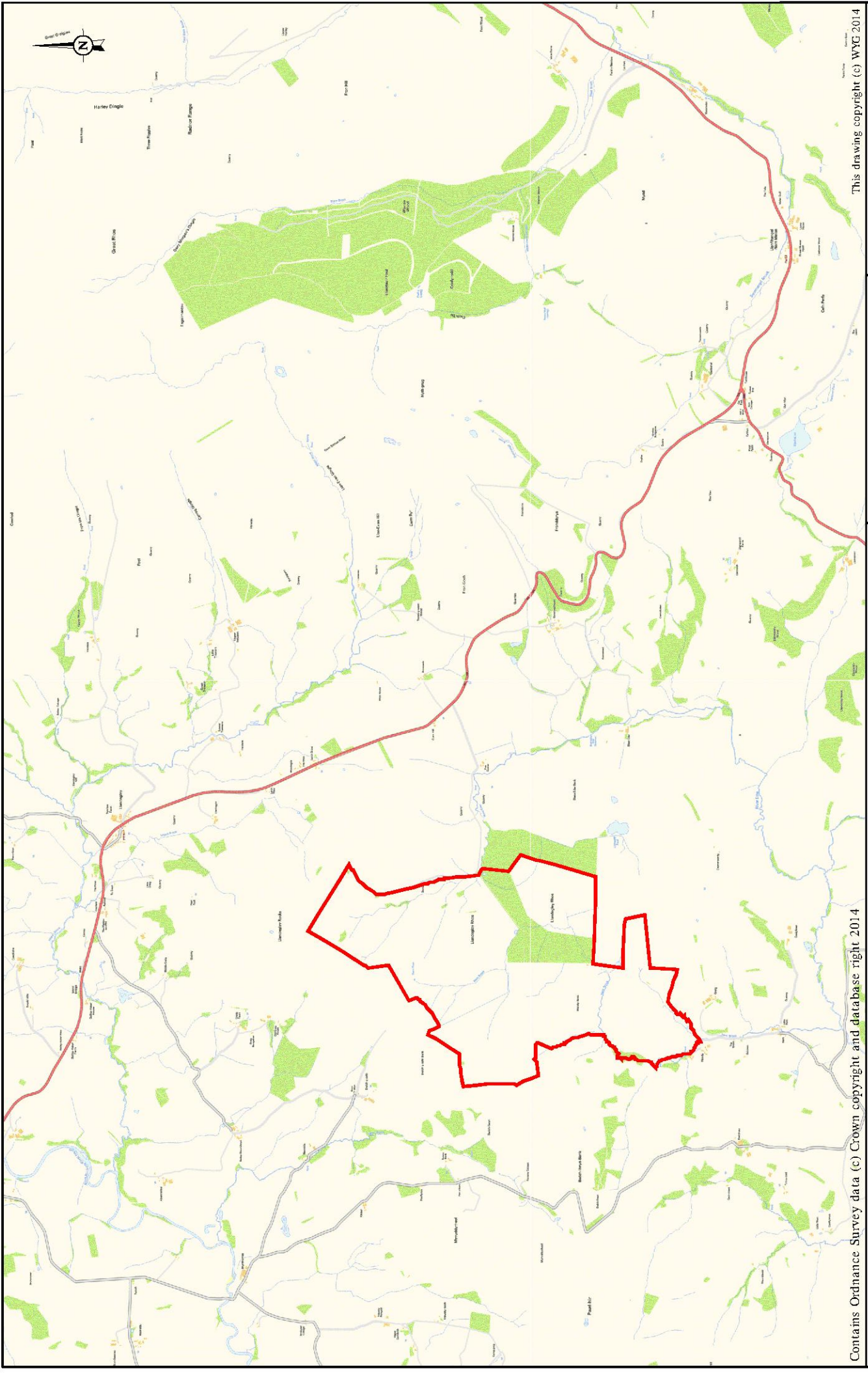


- That the surrounding highway network has sufficient capacity to accommodate the temporary construction traffic;
- That the construction phase of the project will generate the highest level of traffic;
- That the route from the Ellesmere Port is suitable for turbine delivery; and
- That a traffic management plan is required to control construction traffic in the interests of road safety and efficiency and can be prepared in consultation with the relevant authorities if planning permission is granted by Powys County Council.





FIGURES



Contains Ordnance Survey data (c) Crown copyright and database right 2014

This drawing copyright (c) WYG 2014

Hendy Wind Farm

Figure 2.1 - Site Location Plan

Njord Energy Ltd

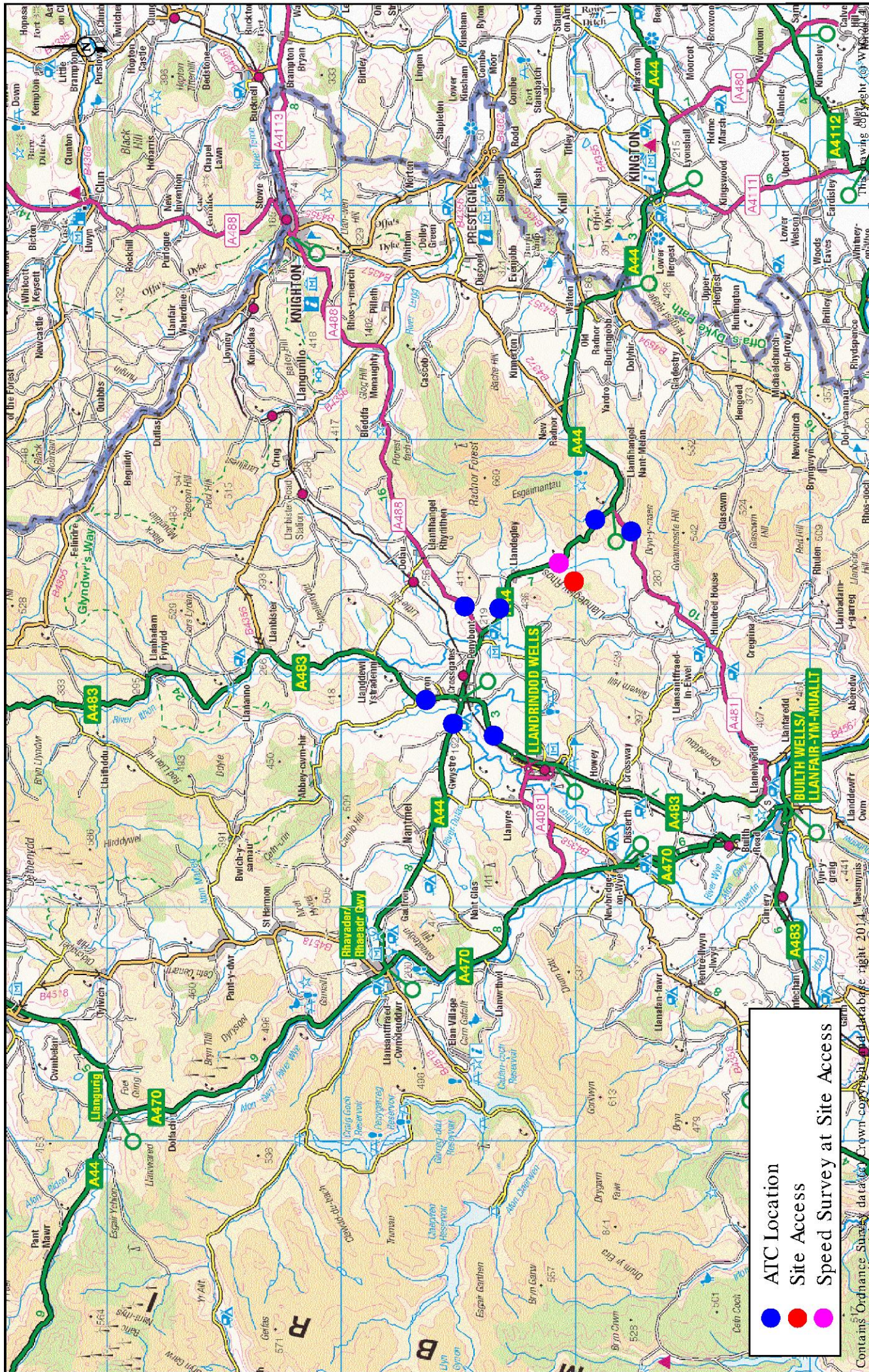
DATE: March 2014

DRAWN: CRJ

WYG Transport Planning
part of the WYG group



39 George Street, Edinburgh EH2 2HN
t: +44 (0)131 577 5700 f: +44 (0)131 577 5799 e: enquiries@wyg.com



Hendy Wind Farm

Figure 5.1 - Proposed ATC Counter Locations

Njord Energy Ltd

March 2014

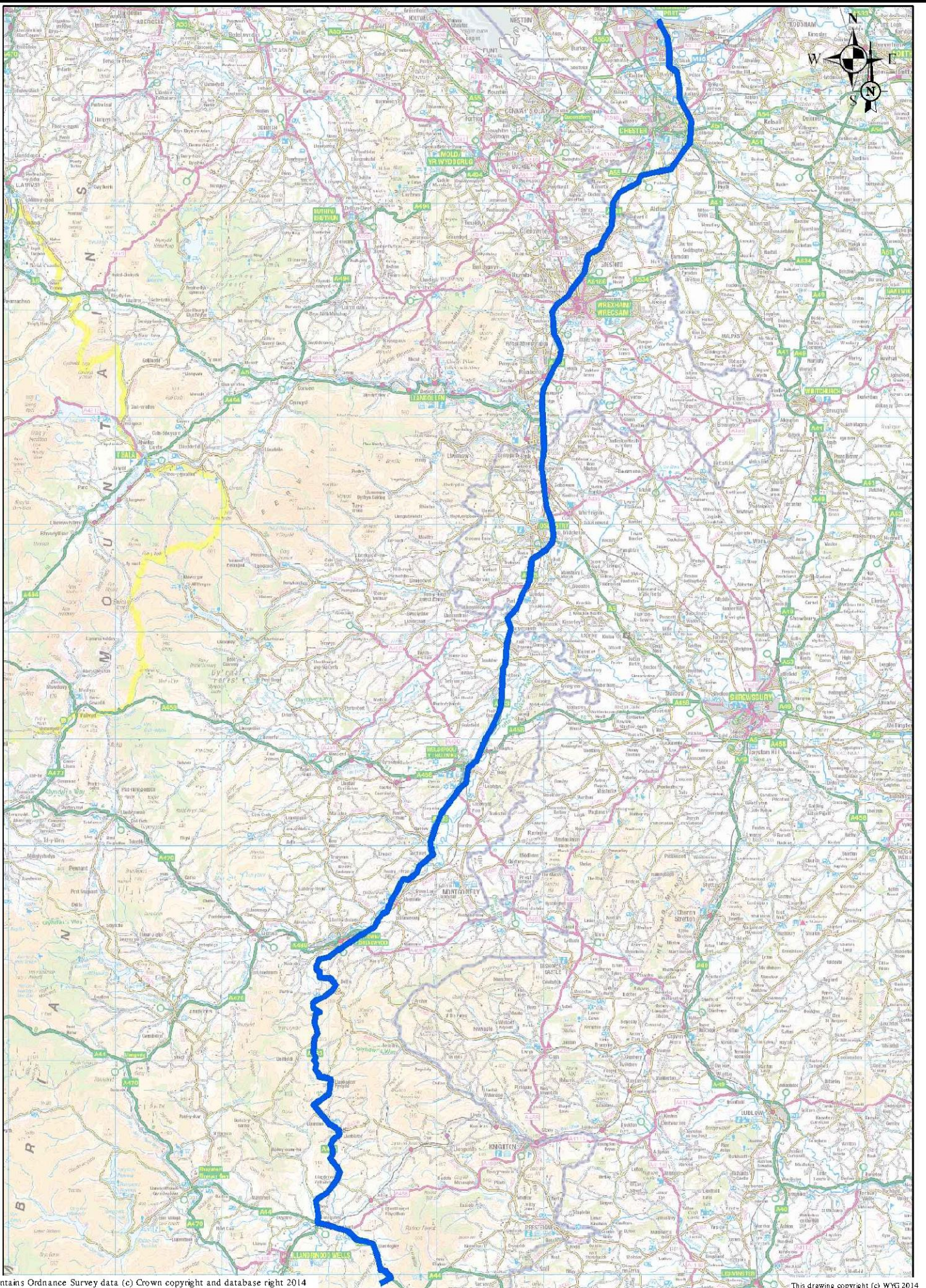
CRJ

WYG Transport Planning
part of the WYG group

39 George Street Edinburgh EH2 2HN
t: +44 (0)131 571 5700 f: +44 (0)131 571 5799 e: info@wyg.com



Contains Ordnance Survey data © Crown copyright and database right 2014



Contains Ordnance Survey data (c) Crown copyright and database right 2014

This drawing copyright (c) WYG 2014

Hendy Wind Farm

Njord Energy Ltd

WYG Transport Planning
part of the WYG group



Figure 8.1 - Proposed AIL Route

DATE: March 2014

DRAWN: CRJ

39 George Street Edinburgh EH2 2HN
t: +44 (0)131 247 5700 f: +44 (0)131 247 5795 e: edinburgh@wyg.com



DRAWINGS

DRAFT

This layout has not been finalised and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.

All construction traffic to exit using link road to new A44 junction.

Removable Reflective Bollards: During turbine deliveries these will be unsocketed during a road closure under police control in line with all AIL turning movements.

Left in / left out junction for construction traffic

Metalled surface

Stone road construction

Metalled surface

306.5m

Note: this layout plan excludes provision for drainage & SUDS work

REV	DETAILS	DRAWN	CHECKED	DATE

Notes:
1. This is not a construction drawing and is intended for illustrative purposes only.


- New carriageway construction
- New verge construction
- Indicative white lining
- Indicative new kerb line
- Emis Prismo / Similar differential surfacing
- Type 1 compacted stone base

(c) Crown copyright and database rights 2014 Ordnance Survey 0100031673 This drawing copyright (c) SBA 2014

Hendy Wind Farm - New Route

Site Access (POI 37) - Indicative Access Option B

Njord Energy Ltd



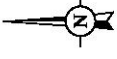
SBA
part of the WYG group

39 George Street, Edinburgh EH2 2HN
t 0131 247 5780 f 0131 247 5799 e: edinburgh@sba.co.uk

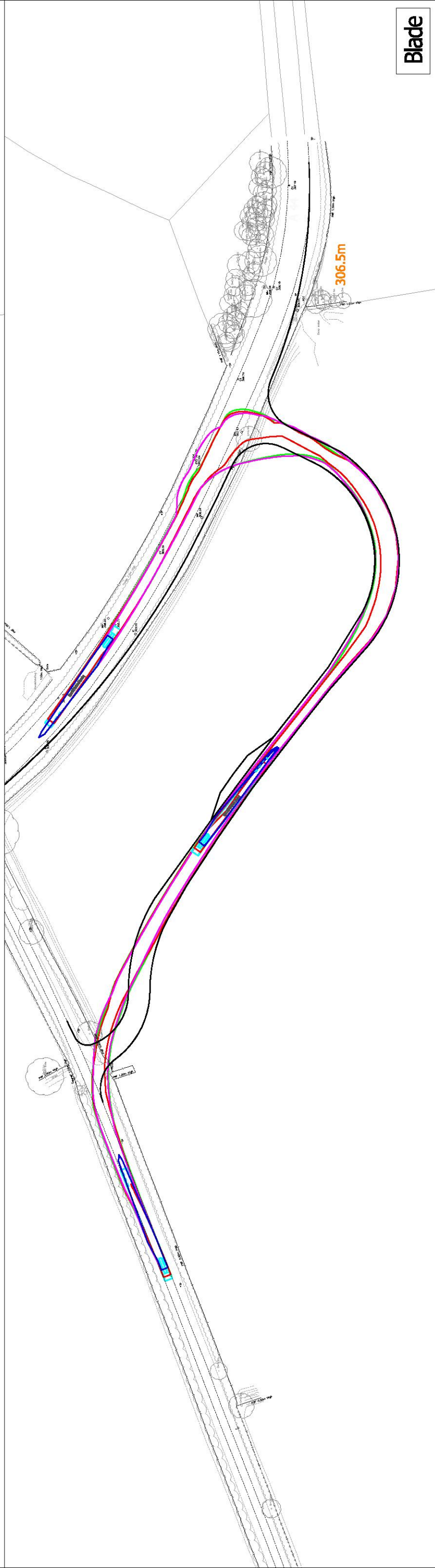
DRAWING NUMBER: **A078181/01/SPA035-1**
REVISION: **B**

DRAWN: **CJ** CHECKED: **TL** DATE: **Jan 2014** SCALE: **1:1000 @ A3**

DRAFT
 This layout has not been finalized and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.



Mid Tower



Blade

REV.	DETAILS	DRAWN	CHECKED	DATE

Notes:
 1. This is not a construction drawing and is intended for illustrative purposes only.


Legend:

- Load Swept Path
- Vehicle Swept Path
- Wheel Swept Path
- Indicative Access Road Layout

(c) Crown copyright and database rights 2014. Ordnance Survey 0100031673

Hendy Wind Farm - New Route			
Site Access (POI 37) - Option B - REpower MM82			
Mid Tower & Blade - Swept Path Assessment - Approach from the North			
DRAWN: CJ	CHECKED: TL	DATE: Jan 2014	SCALES: 1:1250 @ A3

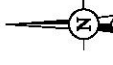
Njord Energy Ltd



SBA
part of the WYG group

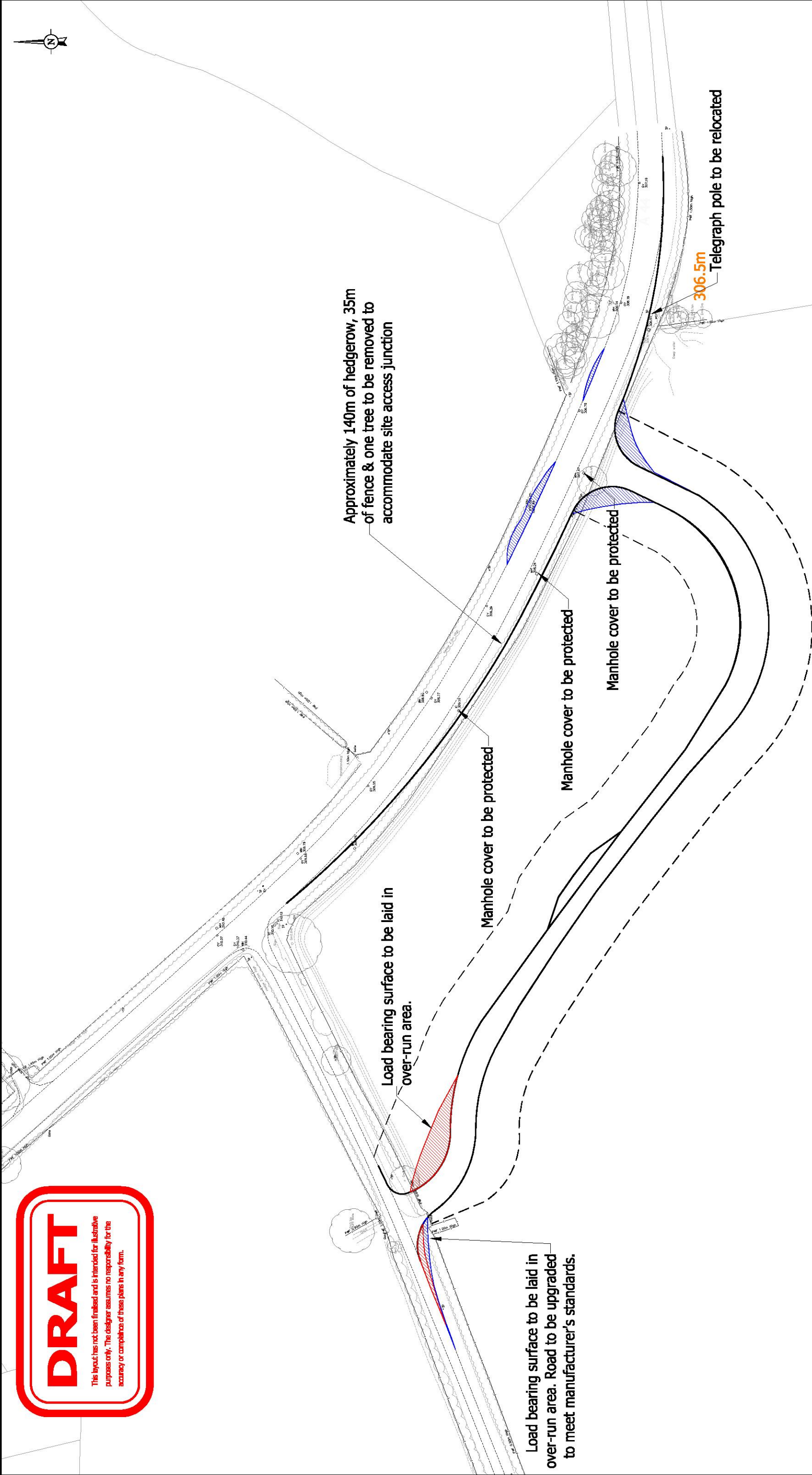
39 George Street Edinburgh EH2 2HN
 t: 0131 247 5780 f: 0131 247 5799 e: edinburgh@sba.co.uk

DRAWING NUMBER: A078181/01/SPA035-2	REVISION: B
---	-----------------------



DRAFT

This layout has not been finalized and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.



REV.	DETAILS	DRAWN	CHECKED	DATE

Notes:
 1. This is not a construction drawing and is intended for illustrative purposes only.

- Over-sill Required
- Over-run Required
- 12m Construction Buffer
- Indicative Access Road Layout


(c) Crown copyright and database rights 2014 Ordnance Survey 0100031673 This drawing copyright (c) SBA 2014

Hendy Wind Farm - New Route

Site Access (POI 37) - Option B - REpower MM82
Mid Tower & Blade - Required Remedial Works

DRAWN: CJ CHECKED: TL DATE: Jan 2014 SCALES: 1:1000 @ A3

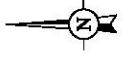
Njord Energy Ltd



part of the WYG group

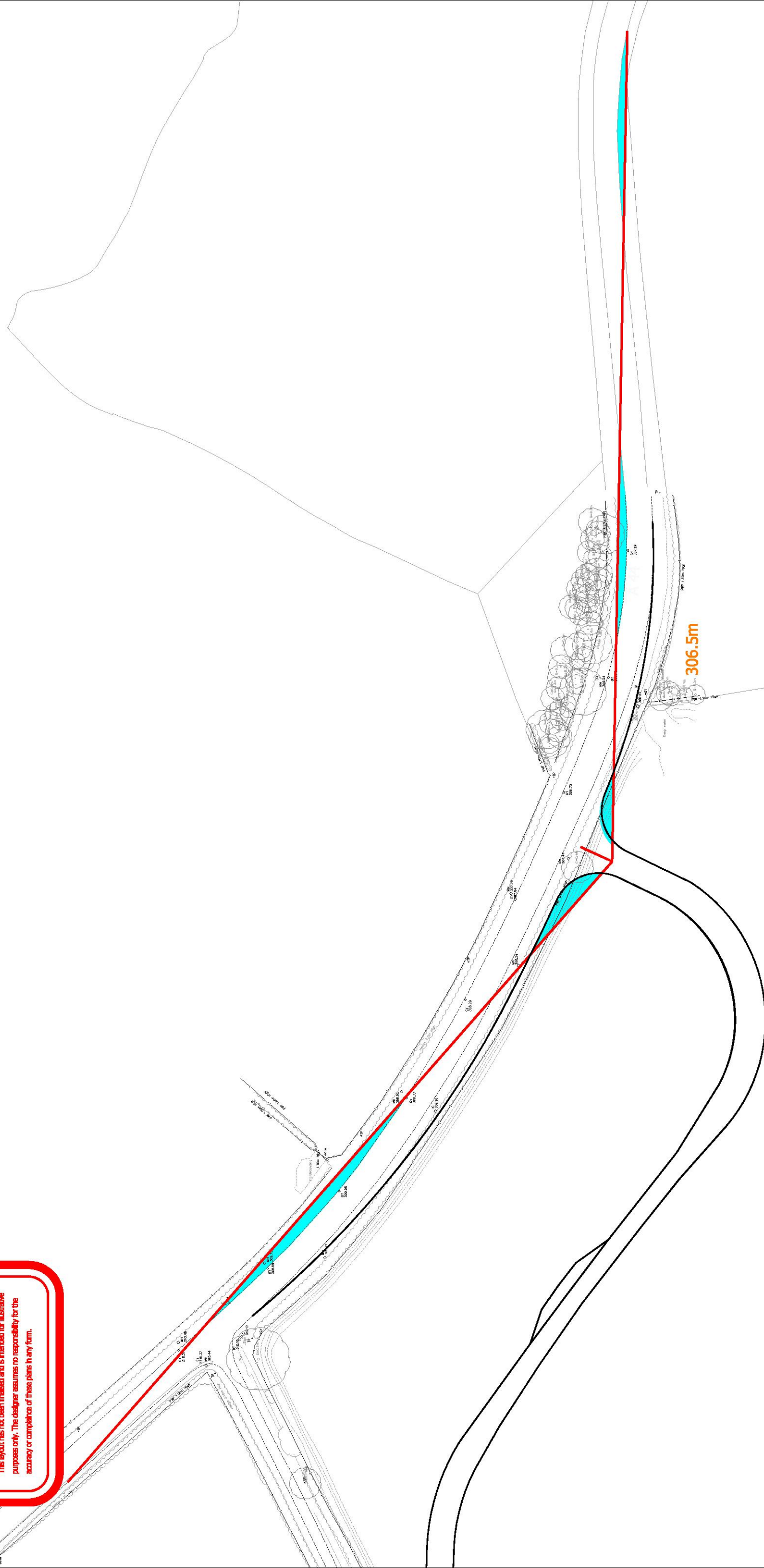
39 George Street Edinburgh EH2 2HN
 t: 0131 247 5700 f: 0131 247 5799 e: edinburgh@sba.co.uk

DRAWING NUMBER: **A078181/01/SPA035-4** REVISION: **B**



DRAFT

This layout has not been finished and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.



REV.	DETAILS	DRAWN	CHECKED	DATE

Notes:

- This is not a construction drawing and is intended for illustrative purposes only.


- Indicative Visibility Splays
- Area to be cleared for visibility
- Indicative Access Road Layout

Hendy Wind Farm - New Route

Site Access (POI 37) - Option B - Indicative 9m x 215m Visibility Splays

DRAWN: CJ CHECKED: TL DATE: Jan 2014 SCALES: 1:1000 @ A3

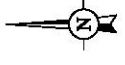
Njord Energy Ltd



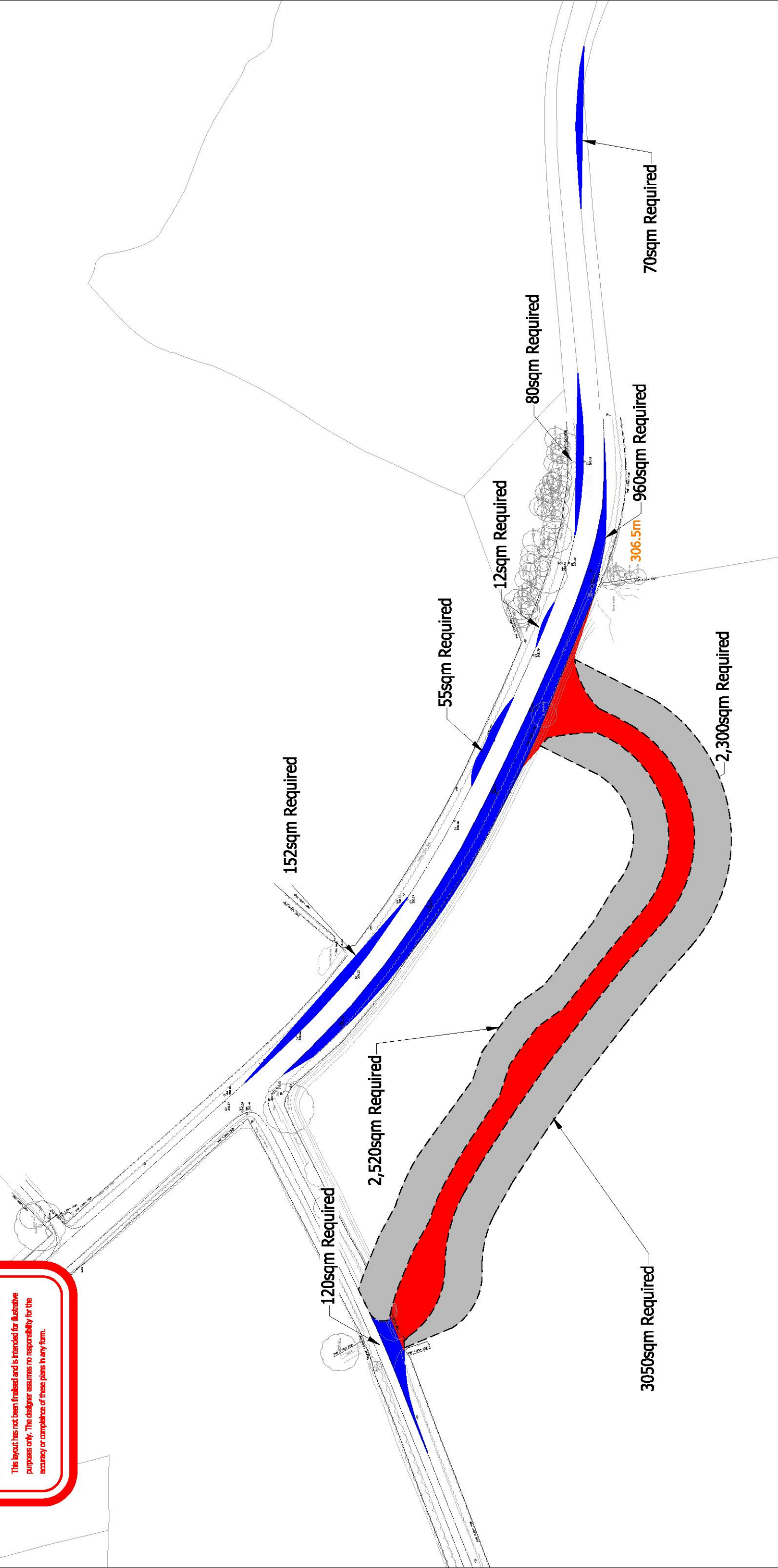
SBA
part of the WYG group

39 George Street Edinburgh EH2 2HN
t: 0131 247 5700 f: 0131 247 5799 e: edinburgh@sba.co.uk

DRAWING NUMBER: **A078181/01/SPA035-5** REVISION: **B**



DRAFT
 This layout has not been finalized and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or completeness of these plans in any form.



REV.	DETAILS	DRAWN	CHECKED	DATE

Notes:
 1. This is not a construction drawing and is intended for illustrative purposes only.

■ Required Area Within Highway Boundary
■ Required Area Outwith Highway Boundary
■ Required Area for Construction Boundary

Hendy Wind Farm - New Route

Site Access (POI 37) - Option B - Areas of Land Required for Access Option

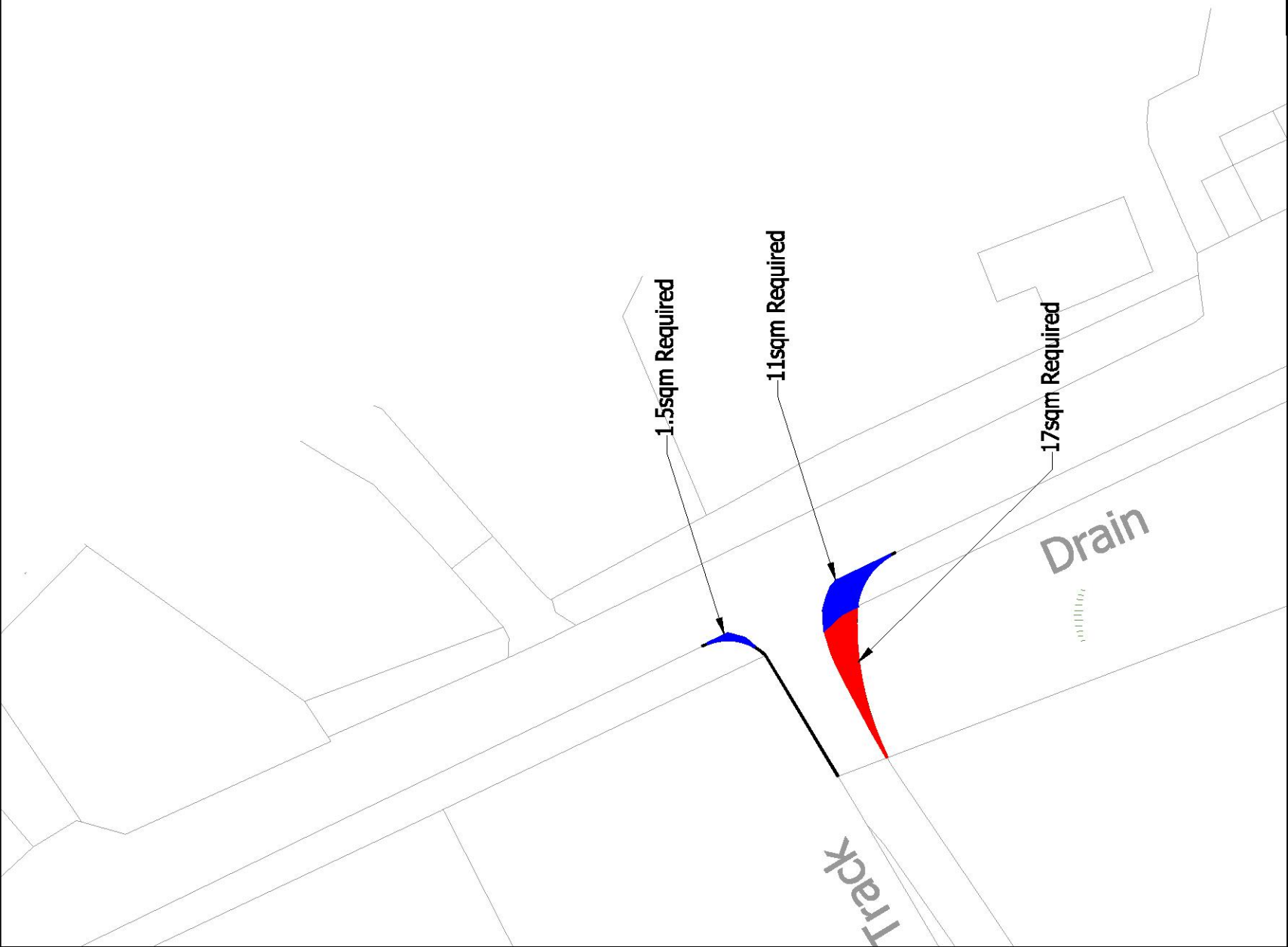
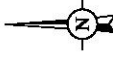
DRAWN: CJ CHECKED: TL DATE: Jan 2014 SCALES: 1:1250 @ A3

Njord Energy Ltd

SBA
 part of the WYG group

39 George Street Edinburgh EH2 2HN
 t: 0131 247 5700 f: 0131 247 5799 e: edinburgh@sba.co.uk

DRAWING NUMBER: **A078181/01/SPA035-6** REVISION: **B**




DRAFT

This layout has not been finalized and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.

One-way operation - only for construction traffic entering site. No exit to A44.

Vegetation to be cut back within existing road boundary

Njord Energy Ltd



SBA
part of the WYG group

39 George Street Edinburgh EH2 2HN
t: 0131 247 5780 f: 0131 247 5799 e: edinburgh@sba.co.uk

DRAWING NUMBER: **A078181/01/SPA036-1**

REVISION: **B**

Hendy Wind Farm - New Route

Secondary Access - Indicative Access Layout & Required Remedial Works

DRAWN: **CJ**

CHECKED: **TL**

DATE: **Jan 2014**

SCALES: **1:500 @ A3**

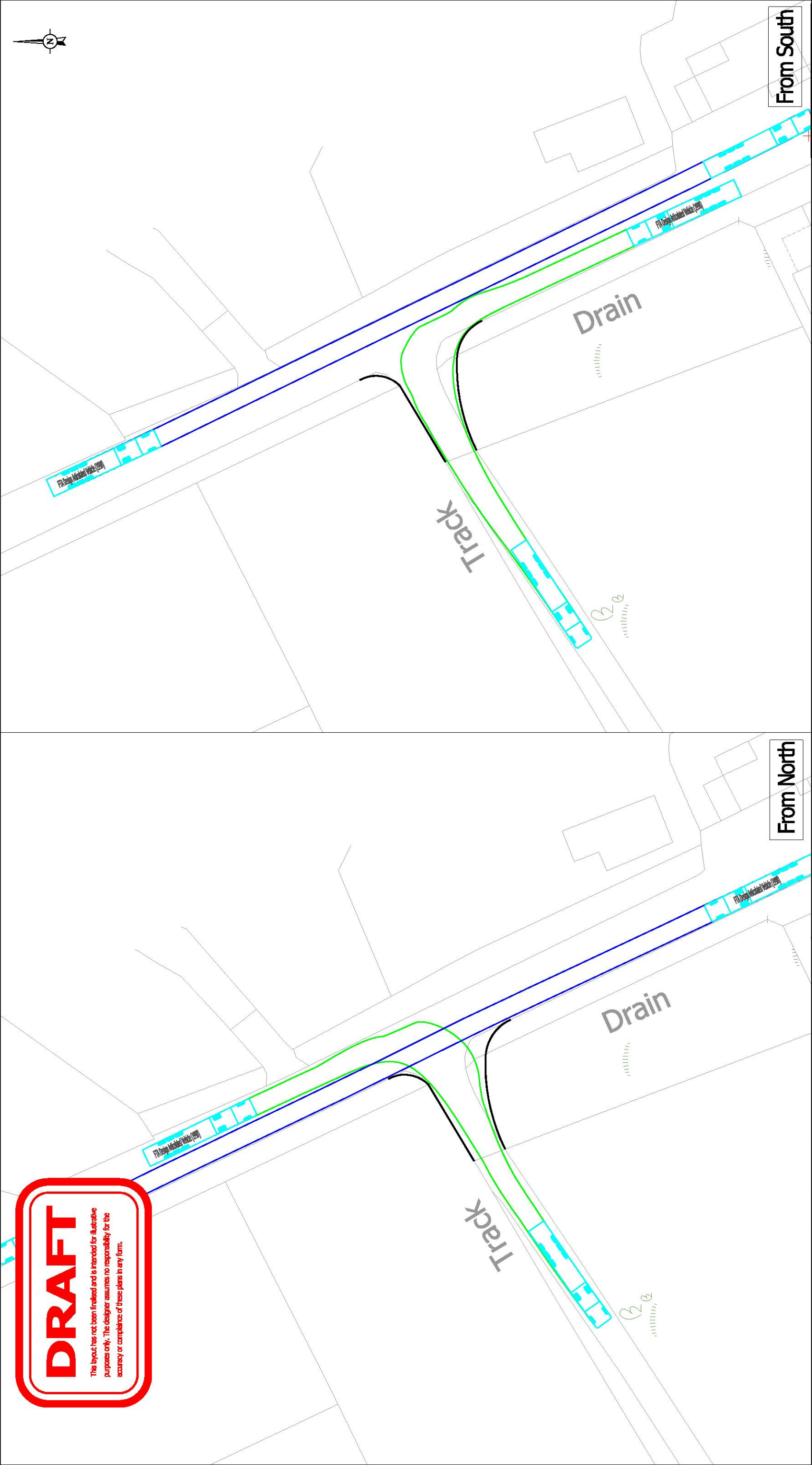
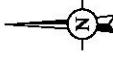
Notes:

- This is not a construction drawing and is intended for illustrative purposes only.

- Area to be cleared
- Site Access Upgrade
- Required Area Within Highway Boundary
- Required Area Outwith Highway Boundary

REV.	DETAILS	DRAWN	CHECKED	DATE

(c) Crown copyright and database rights 2014. Ordnance Survey 0100031673
This drawing copyright (c) SBA 2014




DRAFT
 This layout has not been finalized and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.

REV.	DETAILS	DRAWN	CHECKED	DATE

Notes: 1. This is not a construction drawing and is intended for illustrative purposes only.				
<ul style="list-style-type: none"> — Turning 16.5m HGV Swept Path — Passing 16.5m HGV Swept Path — Site Access Upgrade 				

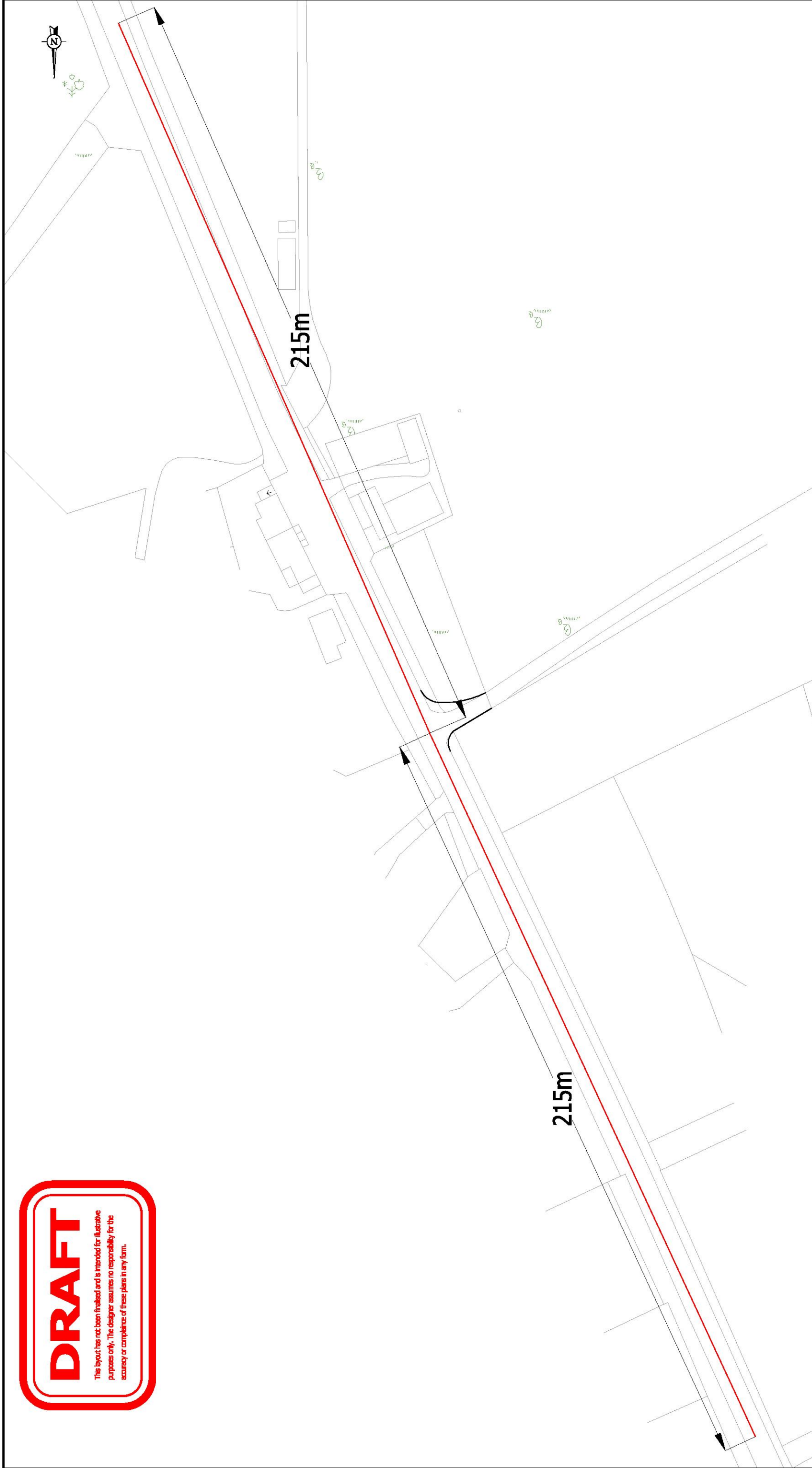
From North		From South	
Hendy Wind Farm - New Route			
Secondary Access - 16.5m HGV Swept Path Assessment			
DRAWN: CJ	CHECKED: TL	DATE: Jan 2014	SCALES: 1:500 @ A3
DRAWING NUMBER: A078181/01/SPA036-2			REVISION: B

Njord Energy Ltd	
 SBA part of the WYG group 39 George Street Edinburgh EH2 2HN t: 0131 247 5780 f: 0131 247 5799 e: edinburgh@sba.co.uk	

(c) Crown copyright and database rights 2014. Ordnance Survey 0100031673
 This drawing copyright (c) SBA 2014

DRAFT

This layout has not been finalized and is intended for illustrative purposes only. The designer assumes no responsibility for the accuracy or compliance of these plans in any form.



REV.	DETAILS	DRAWN	CHECKED	DATE
.

Notes:
1. This is not a construction drawing and is intended for illustrative purposes only.

— Stopping Sight Distance
— Site Access Upgrade

(c) Crown copyright and database rights 2014. Ordnance Survey 0100031673
This drawing copyright (c) SBA 2014

Hendy Wind Farm - New Route

Secondary Access - 215m Stopping Sight Distance to North & South of Access

DRAWN: CJ
CHECKED: TL
DATE: Jan 2014
SCALES: 1:1000 @ A3

Njord Energy Ltd

SBA
part of the WYG group

39 George Street Edinburgh EH2 2HN
t: 0131 247 5780 f: 0131 247 5799 e: edinburgh@sba.co.uk

DRAWING NUMBER: **A078181/01/SPA036-3**
REVISION: **B**



APPENDIX A

Indicative Construction Profile



Hendy Wind Farm
Indicative Construction Programme

Activity	Month												Total Movements	Vehicle Class	
	1	2	3	4	5	6	7	8	9	10	11	12			
Site mobilisation	120	120										120	120	480	OGV2
General site delivery vehicles	4	12	20	24	30	32	40	40	40	40	20	20	20	322	OGV2
Earth moving plant	10	20			20							30		80	OGV2
Imported stone		942	942	942	942	942								4710	OGV2
Reinforcement					6	6	6							18	OGV2
Off-Site Batched Concrete				248	248	248	248							992	OGV2
Cable Deliveries					3	3								6	OGV2
Cabling Sand					90	90								180	OGV2
Geotextile separators					9	9								18	OGV2
Delivery of HV electrical items				16		16								32	OGV2
Craneage and related vehicles						30					30			60	OGV2
All Escorts						56	56	56	56	56				224	Car+LGV
Turbine transporters						39	39	39	39	39				156	OGV2
Staff	40	119	188	238	297	317	396	396	396	396	198	40		3031	Car+LGV
Service (food/water etc)	44	44	44	44	44	44	44	44	44	44	44	44	44	528	OGV1
Total estimated movements	218	1257	1204	1512	1689	1707	859	575	575	575	442	224	10837		
Working Days	22	22	22	22	22	22	22	22	22	22	22	22	22		
Daily Average	10	57	55	69	77	78	39	26	26	26	20	10			