Pell Frischmann

Limekiln Wind Farm

Transport Assessment

June 2021

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1 Introduction

1.1 Purpose of the Report

Pell Frischmann (PF) has been commissioned by Infinergy Ltd. to undertake a Transport Assessment (TA) for the proposed Limekiln Wind Farm, on behalf of Limekiln Wind Limited.

The site is located 1.5 km to the south of the Village of Reay and 3 km south / south west of the Dounreay Nuclear Power Station, in Caitness, Highland. The location of the site in the context of the wider area is shown in Figure 1.

Figure 1: General Site Location

The report identifies the key transport and access issues associated with the proposed development, including the route for abnormal loads. The TA identifies where the proposed development may require mitigation works to accommodate the predicted traffic; however, the detailed design of these remedial works is beyond the agreed scope of this report.

1.2 Background

Limekiln Wind Farm was previously granted Section 36 consent and deemed planning permission from Scottish Ministers in June 2019 (PAN 16/02752/S36). This planning application is hereafter referred to as 'Consented Development', and consisted of 21 wind turbines, as well as associated infrastructure. Of the 21 wind turbines, six turbines were proposed to have a maximum blade tip of 126m and 15 wind turbines were proposed to have a maximum blade tip height of 139m.

Limekiln Wind Limited now intends to submit an application to the Energy Consents Unit to alter the already consented Limekiln Wind Farm. It is proposed that the revised application, hereafter referred to as the 'Revised Consented Development', will include the following amendments to the already 'Consented Development':

- Increase the height of all turbines to 149.9m;
- Reroute certain access tracks;
- Removal of one borrow pit;
- Increase the operational period from 25 years to 40 years; and
- Relocated the construction compound and increase its size from (100m x 100m) to (150 m x 100m).

1.3 Report Structure

Following this introduction, the TA report is structured as follows:

- Chapter Two describes the proposed development;
- Chapter Three reviews the relevant transport and planning policies;
- Chapter Four sets out the methodology used within this assessment;
- Chapter Five describes the baseline transport conditions;
- Chapter Six describes the trip generation and distribution of traffic in the study area;
- Chapter Seven summarises the traffic impact assessment;
- Chapter Eight considers mitigation proposals for development related traffic within the study network; and
- Chapter Nine summarises the findings of the TA and outlines the key conclusions.

2 Site Background

2.1 Site Location

The site is located on the Limekiln Estate, Reay, Caithness. The location of the site and the revised site layout pertaining to the Revised Consented Development are shown in Figure 2.

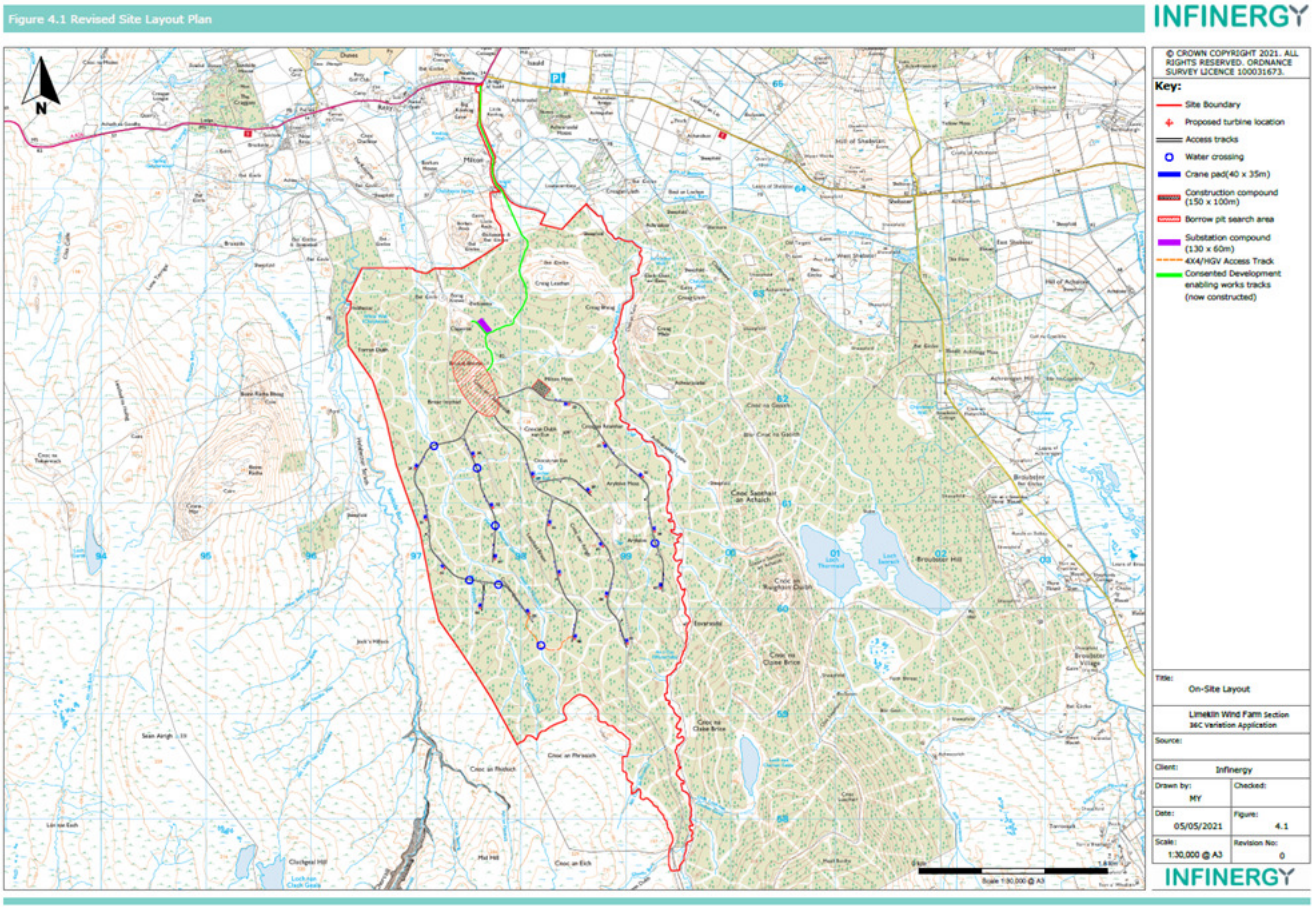

Figure 2: Site Location (courtesy of Infinergy Ltd.)

The site is bound to the north by a mixture of moorland and agricultural land, to the east by woodland and to the west and south by mainly open moorland. Reay village is located to the north of the site.

2.2 Planning Information – Consented Development

A Section 36 Application (PAN 16/02752/S36) was submitted in 2016 which sought the erection of 24 wind turbines (15 No. with a maximum blade tip height of 139m and 9 No. with a maximum blade tip height of 126m) with an installed capacity in excess of 50 MW.

In February 2017, The Highland Council's planning committee voted to object to the application on grounds of loss of recreational amenity close to the village of Reay, as well as an unacceptable impact on Wild Land Area 39 – East Halladale Flows. The Section 36 Application was therefore referred to the Directorate for Planning and Environmental Appeals by the Scottish Ministers in order to be examined at Public Local Inquiry (PLI).

Following feedback, it was decided that three turbines would be removed from the Section 36 Application. Further Environmental Information (FEI) was submitted in September 2017 to support the layout which was consented by the Scottish Ministers in June 2019. It should be noted that all the planning conditions required for the commencement of enabling works construction have been discharged.

A Section 11 Application for temporary closure of the existing Core Path to allow access to a number of turbines was submitted to THC for health and safety reasons. Following consideration, THC refused the Section 11 Application in November 2020.

2.3 Revised Consented Development

It is proposed that the main elements of the Revised Consented Development will comprise the following:

- Up to 21 wind turbines with blade tip heights of up to 149.9m;
- Turbine foundations;
- Access tracks connecting infrastructure elements;
- A vehicular access point from the public road;
- Hard standing areas e.g. crane pads;
- On site power collection system (transformers and underground cables);
- Control building and substation compound;
- Construction compound; and
- One borrow pit.

2.4 Candidate Turbines

The selection of the final turbine model is yet to be determined and specification will be subject to a commercial procurement process following consent of the application. For the purposes of assessing the route a Nordex N133 turbine has been used.

An Indicative Route Survey Report (IRSR) is provided in Appendix A and was prepared to provide information on the likely issues associated with the development of the site with regards to off-site transport and access for Abnormal Indivisible Loads (AIL) traffic.

The worst case loads for route assessment for the Nordex N113 are:

- Blade; and
- Mid Tower.

These sections were used for the subsequent swept path assessment of the proposed loads along the access route.

The selection of the final turbine model and specification will be subject to a commercial procurement process following consent of the application. The assumed dimensions may therefore vary slightly from those assumed as part of the route assessment.

To provide an accurate assessment scenario based upon the know issues along the access route, it was assumed that all blades would be carried on a Super Wing Carrier trailer to reduce the need for physical mitigation in constrained sections of the route.

Given the sizes of the proposed mid and top tower sections, these along with other loads such as the hub and nacelle housing would be caried on a six-axle step frame trailer. The base tower would be carried in a 4+7 clamp trailer.

Examples of the vehicles and trailers that are likely to transport loads are shown in Figure 2 and 3.

Figure 3 Typical Blade Transport using Super Wing Carrier

Figure 4 Typical Tower Transport Trailer

3 Policy Context

3.1 Introduction

An overview of relevant transport planning policies has been undertaken and is summarised below for national and local government policies.

3.2 National Policy

3.2.1 National Planning Framework 3 (2014)

Scotland's National Planning Framework (NPF3) sets the context for development planning in Scotland and provides a framework for the spatial development of Scotland as a whole. It sets out the Scottish Government's development priorities over the next 20 to 30 years and identifies national developments which support the development strategy. Scotland's third NPF was laid in the Scottish Parliament on 23 June 2014.

3.2.2 Planning Advice Note (PAN) 75

Planning Advice Note (PAN) 75: Planning for Transport provides advice on the requirements for Transport Assessments. The document notes that:

"… transport assessment to be produced for significant travel generating developments. Transport Assessment is a tool that enables delivery of policy aiming to integrate transport and land use planning."

"All planning applications that involve the generation of person trips should provide information which covers the transport implications of the development. The level of detail will be proportionate to the complexity and scale of the impact of the proposal...For smaller developments the information on transport implications will enable local authorities to monitor potential cumulative impact and for larger developments it will form part of a scoping exercise for a full transport assessment. Development applications will therefore be assessed by relevant parties at levels of detail corresponding to their potential impact."

3.2.3 Transport Assessment Guidance (2012)

Transport Scotland's (TS) Transport Assessment Guidance was published in 2012. It aims to assist in the preparation of Transport Assessments (TA) for development proposals in Scotland such that the likely transport impacts can be identified and dealt with as early as possible in the planning process. The document sets out requirements according to the scale of development being proposed.

The document notes that a TA will be required where a development is likely to have significant transport impacts but that the specific scope and contents of a TA will vary for developments, depending on location, scale and type of development.

3.3 Local Policy

3.3.1 Highland-wide Local Development Plan (2012)

The Highland-wide Local Development Plan (LDP) was adopted by The Highland Council (THC) in April 2012 and is the established planning policy for the Highlands. It sets out a settlement strategy and spatial framework for how the Council foresees development occurring in the forthcoming twenty-year period.

The LDP does not contain any specific transport policy guidance for the proposed development. However, Policy 56 is relevant with regards general transport policy. The relevant transport elements from this policy are:

"Development proposals that involve travel generation must include sufficient information with the application to enable the Council to consider any likely on- and off- site transport implications of the development and should:

• incorporate appropriate mitigation on site and/or off site, provided through developer contributions where necessary, which might include improvements and enhancements to the walking/cycling network and public transport services, road improvements and new roads; and

• incorporate an appropriate level of parking provision, having regard to the travel modes and services which will be available and key travel desire lines and to the maximum parking standards laid out in Scottish Planning Policy or those set by the Council.

When development proposals are under consideration, the Council's Local Development Strategy will be treated as a material consideration.

The Council will seek the implementation and monitoring of Green Travel Plans in support of significant travel generating developments."

3.3.2 Guidance on the Preparation of Transport Assessments (2014)

THC has prepared guidance on how Transport Assessments (TA) should be prepared for development sites within The Highlands. The guidance was published by THC in November 2014.

This TA has noted the guidelines and has provided the required assessment.

3.4 Policy Summary

The proposed development can align with the stated policy objectives and the design of the site and proposed mitigation measures will ensure compliance with national and local objectives.

4 Study Methodology

4.1 Introduction

There are three phases of the life of the proposed development. All three phases have been considered in this assessment and are as follows:

- The Construction Phase;
- The Operational Phase; and
- The Decommissioning Phase.

4.2 Project Phases – Transport Overview

Of all of the three phases, the construction phase is considered to have the greatest impact in terms of transport. Construction plant, bulk materials and turbine sections will be transported to site, potentially have a significant increase in traffic on the study network.

The decommissioning phase involves fewer trips on the network than the construction phase, as minor elements of infrastructure are likely to be left in place, adding to local infrastructure that can potentially be used for further agricultural or leisure uses in the future.

The operational phase is restricted to occasional maintenance operations which generate significantly lower volumes of traffic that are not considered to be in excess of daily traffic variation levels on the road network.

It should be noted however the construction effects are short lived and transitory in nature, whilst the operational phase assessment has been assumed to be based on a typical launch event.

4.3 Scoping Discussions

The applicant submitted a request for scoping opinion to the Scottish Ministers in respect of the Environmental Impact Assessment which included a section considering traffic and transport. A full review of that scoping opinion and other correspondence relating to the scope of the study including pre-application advice is provided in the Traffic and Transport Chapter of the EIA (Chapter 7).

As part of the EIA scoping response, THC provided transport planning advice which is relevant to the Consented Development in relation to roads, traffic and transportation matters.

5 Baseline Conditions

5.1 Access Arrangement

The Revised Consented Development shall be accessed from the existing road network via the A836 and subsequently through the adopted U4724 Milton Road, to the south of Isauld. This existing access junction layout at the A836 / U4724 Milton Road will be subject to minor upgrades to accommodate the larger turbine components.

Access to the turbines, construction compound and substation will then be via private access tracks. It is proposed that some of the tracks will follow a different alignment than that set out as part of the Consented Development and therefore the existing Core Path will no longer be required to be used in order to access the Revised Consented Development. In locations where it is required to upgrade existing tracks, these will be constructed of a graded stone and will be up to a maximum of 6m in width.

5.2 Study Area Determination

The proposed delivery route of the AILs (Abnormal Indivisible Loads) was previously assessed as part of the Consented Development's application to deliver the turbine components. This AIL delivery route involves travelling from the Scrabster Harbour via the A9, A836 and finally along the adopted U4724 Milton Road, where access will be taken from. The selection of this route was informed by an Access Study (Appendix A).

The study area for the highway links which are to be assessed as part of this assessment are:

- A9 between Thurso and Scrabster Harbour;
- A9, south of Thurso (near Sordale);
- A9, Thurso (east of River Thurso);
- A9, Thurso (west of River Thurso); and
- A836 (between Thurso and Revised Consented Development)

The study area network is illustrated in Figure 5. The purple route is the route that the AILs will take from Scrabster Harbour to the site, while the green route is a section of the construction route along the A9. Construction traffic will then join the A836 and subsequently travel along the AIL route towards the site.

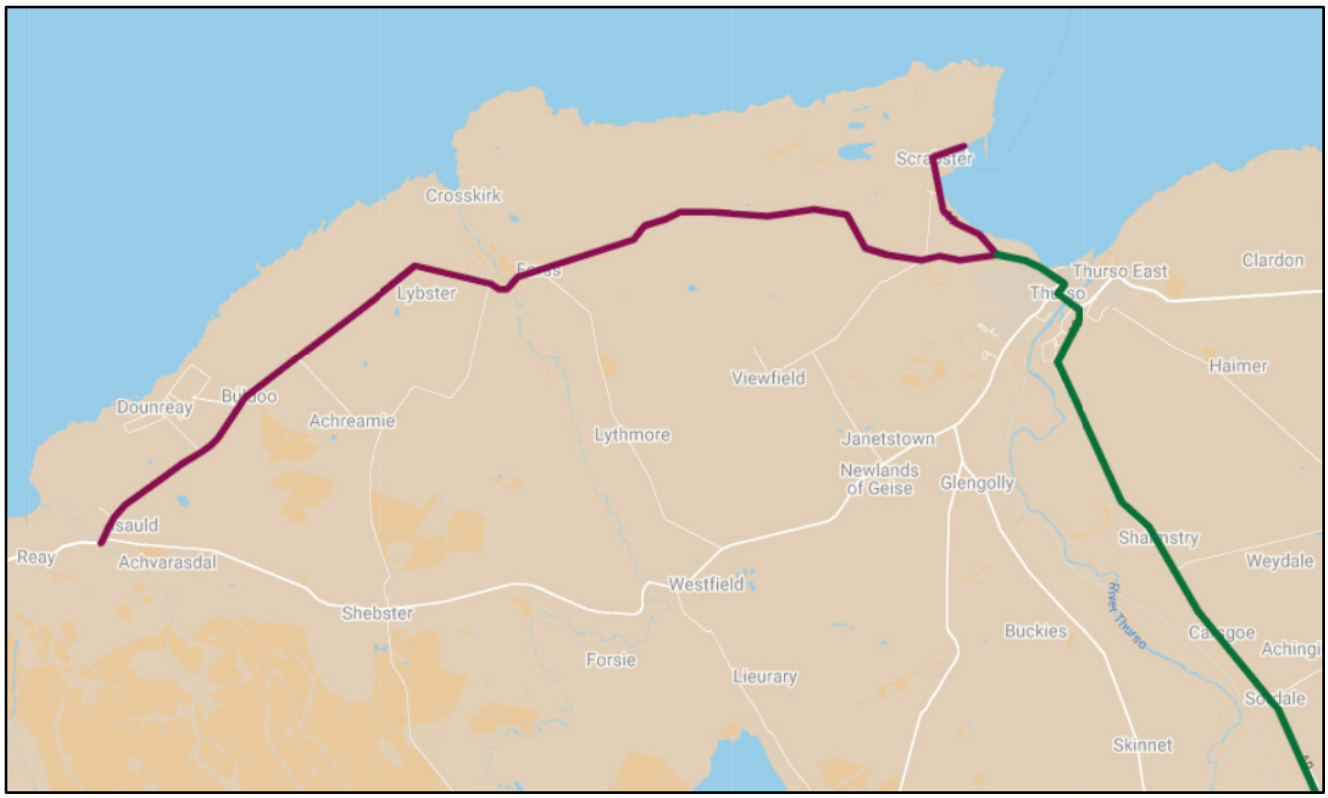

Figure 5 Assessment Study Area (contains Google Map data © 2021 Google)

5.3 Pedestrian and Cyclist Networks

A review of Map: 1a-c Reay, Crosskirk & Westfield – Caithness Core Paths Plan shows that one Core Paths runs through the site, Core Path No. CA11.03 (illustrated in Figure 6).

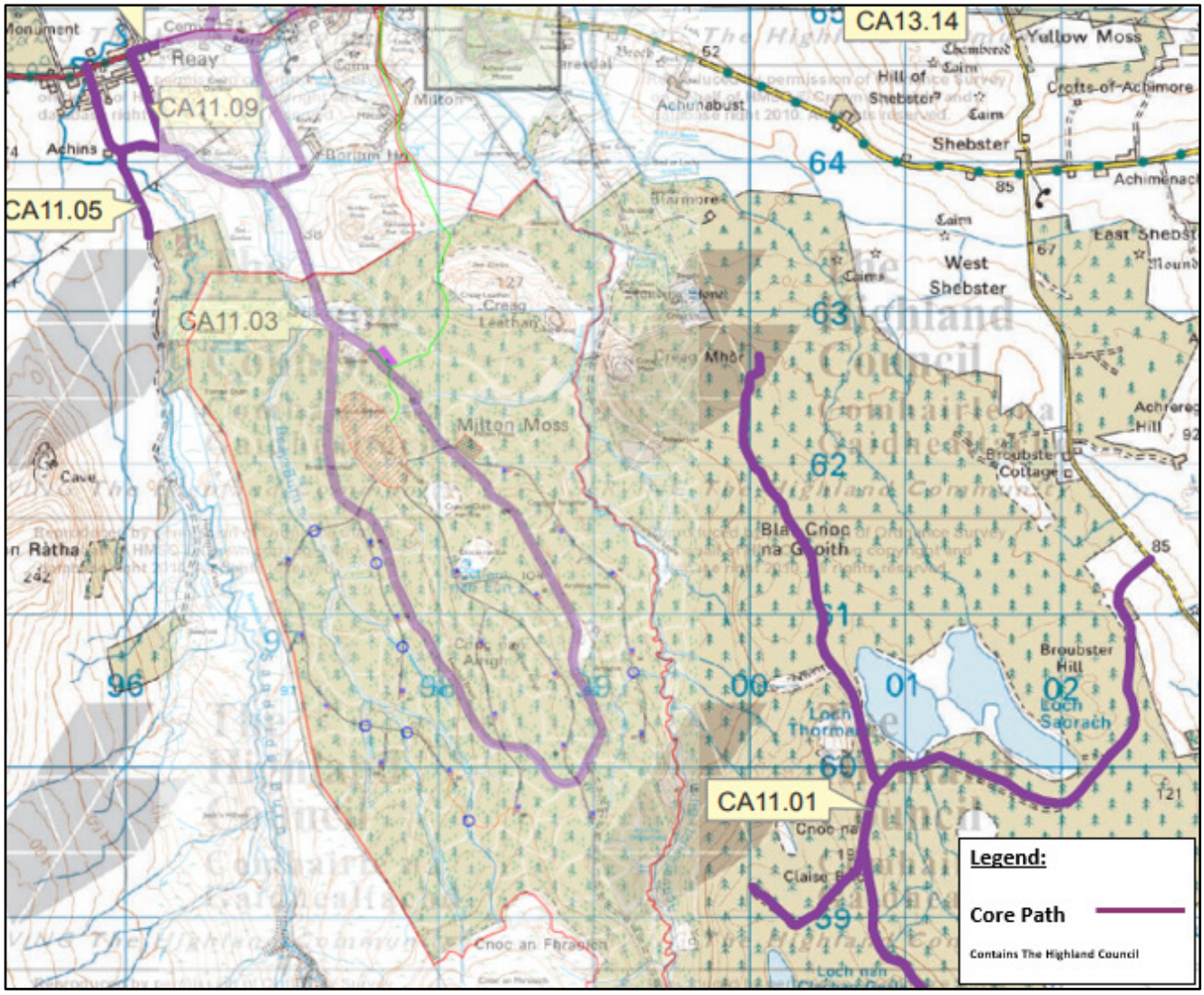

Figure 6 Core Path Plan in the vicinity of the Site (courtesy of The Highland Council)

Core Path No. CA11.03 Limekiln Forest comprises a track which is 8.4 km in length.

While there are no National Cycle Network routes in the vicinity of the site, a review of the Map of the National Cycle Network (https://www.sustrans.org.uk/national-cycle-network) highlights parts of the A836 and the C1001 road, to the north of the site, as an “On-road route not on the National Cycle Network”. This is shown in the context of the Development Site in Figure 7.

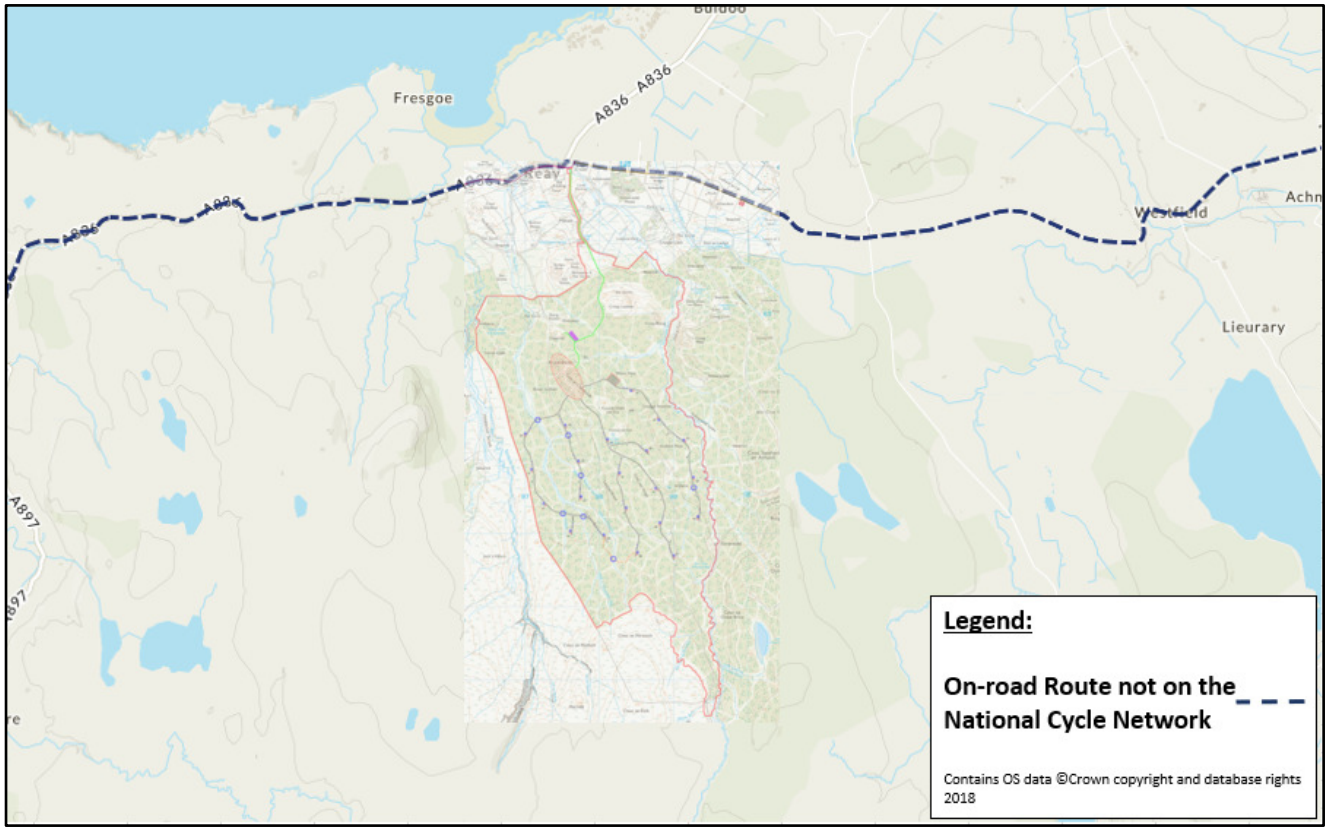

Figure 7 Local Cycle Routes (courtesy of Sustrans)

5.4 Road Access

The route to the Site for abnormal loads is via the A9 southbound from Scrabster Harbour, and then continuing on the A836 westbound towards the site entrance. Other construction materials will be imported to the Site by road and it is expected that the majority of which will travel from the south by way of the A9 and A836.

The existing A836 / U4724 Milton Road junction will be upgraded, as well as the access tracks to accommodate HGV movements associated with the Revised Consented Development.

Within the study area, the A9 is a two-way single lane road of approximately 7m in width. It is a long-distance route of strategic national importance connecting Thurso with Perth via Inverness. This route has been used previously for the transportation of wind turbine components, including abnormal loads. The A9 is subject to a 60mph speed limit before reducing to 40mph and then subsequently to 30mph as it enters Thurso town.

The A836 is a rural single carriageway approximately 6m in width and is a route of strategic national importance, connecting the Highlands and routing Thurso to Tain. The A836 is subject to the national speed limit in the vicinity of the Development Site access.

5.5 Existing Traffic Conditions

Due to the travel restrictions associated with the COVID-19 outbreak, the collection of meaningful traffic count data within a neutral flow period has not been possible. Traffic data used in the assessment has therefore been sourced from historic traffic count data provided by the UK Department for Transport (DfT) for the year 2019. In order to calculate the 2021 flows, a high National Road Traffic Forecast (NRTF) was applied to the 2019 flows. The NRTF high growth for 2019 to 2021 is 1.030.

The count site used were as follows:

1. A9, South of Scrabster Harbour, Count ID 20801;
2. A9, South Thurso (near Sordale), Count ID 10800;
3. A9, Thurso, east of River Thurso, Count ID 40956;
4. A9, Thurso, west of River Thurso, Count ID 40800; and
5. A836, Between Thurso and the site access, Count ID 10934.

The locations of the traffic surveys are shown in Figure 8.

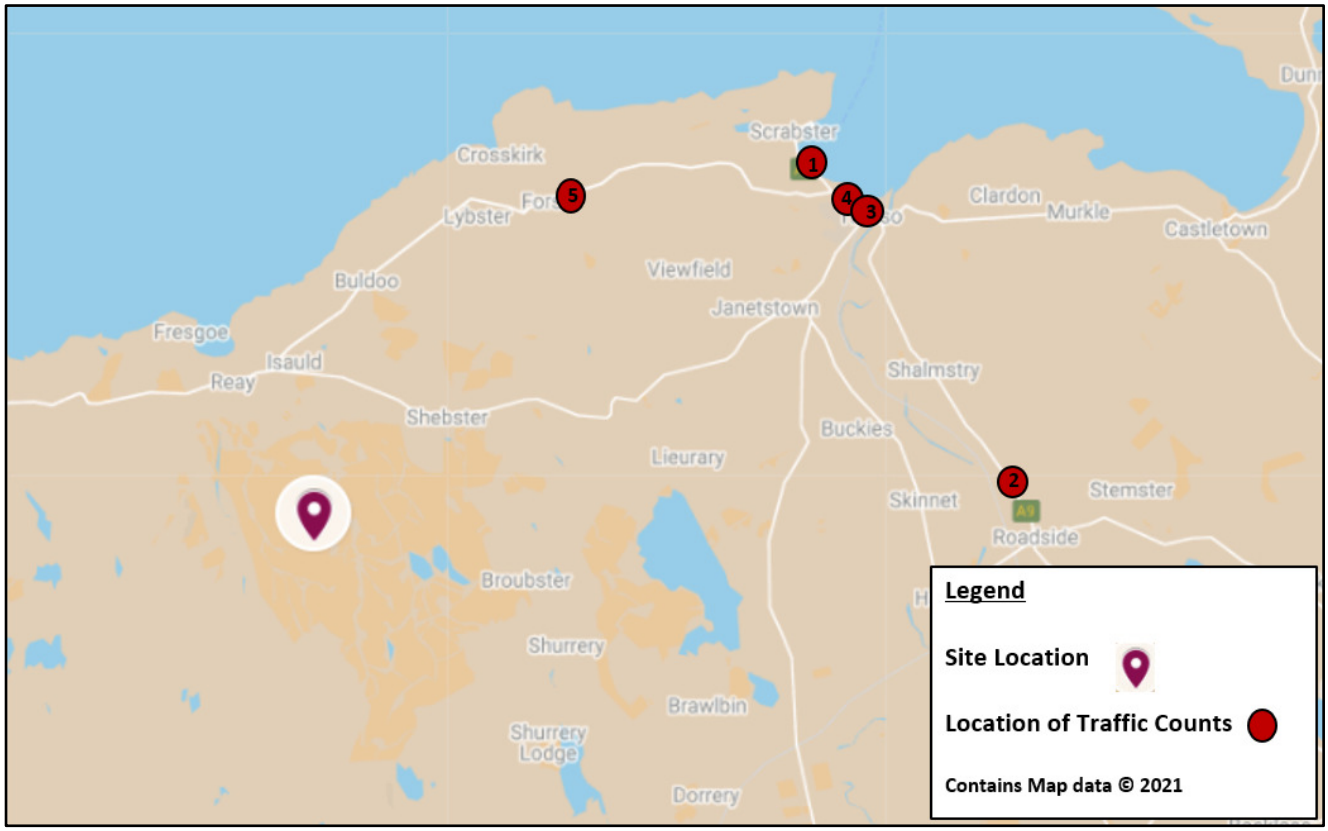

Figure 8 Count Site Locations

These sites were identified as being areas where sensitive receptors on the access route would be located. A full receptor sensitivity and effect review is prepared in the Transport and Access Chapter of the EIA Report.

The traffic data allowed the traffic flows to be split into vehicle classes and the data have been summarised into cars / light good vehicles (Lights) and Heavy goods vehicles (HGVs) (all goods vehicles > 3.5 tonnes gross maximum weight).

Table 1 summarises the 24-hour average daily traffic data collected at the count sites.

Table 1 24-hour Average Traffic Data (2021)

Survey Location	Cars & Lights	HGV	Total
A9, between Thurso and Scrabster Harbour	3,222	108	3,330
A9, South of Thurso (near Sordale)	3,220	288	3,508
A9, Thurso, east of River Thurso	14,149	356	14,505
A9, Thurso, west of River Thurso	3,145	204	3,349
A836, between Thurso and Revised Consented Development	2,332	67	2,399

5.6 Accident Review

Traffic accident data was obtained from CrashMap UK for the study network from the A9 to the site via A836 for the preceding three-year period. The results are summarised in Table 2.

Table 2 Summary of recorded PIAs between 2018 and 2020

Year	Severity of injury			Vulnerable road user		
	Slight	Serious	Fatal	Pedestrian	Cyclist	Motorcyclist
A9 Thurso to Scrabster Docks						
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
A9 Thurso to Sordale						
2018	0	0	0	0	0	0
2019	2	0	0	0	0	1
2020	2	0	0	0	0	0
A836 Thurso to Sordale						
2018	2	0	1	0	0	2
2019	1	0	0	0	0	0
2020	0	0	0	0	0	0
Total	7	0	1	0	0	3

A total of eight accidents were recorded during the three-year period within the accident assessment area. Of the eight accidents, seven wee classified as ‘Slight’ and one was classified as ‘Fatal’. Three accidents involved motorcyclists, of which one was ‘Fatal’. One HGV was recorded as being involved in an accident.

The accidents suggest that there are no specific accident patterns or trends within the accident assessment area.

5.7 Baseline Traffic Conditions

Construction of the project is expected to commence in 2023 if consent is granted and it is expected to take up to 24 months, depending on weather conditions and ecological considerations.

To assess the likely effects during construction and typical operational phase, base year traffic flows were determined by applying a National Road Traffic Forecast (NRTF) high growth to the obtained traffic flows.

The factored Baseline traffic flows shown in Table 3. This will be used in the Construction Peak Traffic Impact Assessment.

Table 3 Baseline 2023 24-hour Average Traffic Data

Survey Location	Cars & Lights	HGV	Total
A9, South of Scrabster Harbour	3,259	109	3,369
A9, South Thurso (near Sordale)	3,257	292	3,549
A9, Thurso, east of River Thurso	14,314	361	370
A9, Thurso, west of River Thurso	3,181	206	3,388
A836, Between Thurso and the Site Access	2,359	68	2,427

6 Trip Generation and Distribution

6.1 Construction Phase

6.1.1 Trip Derivation

During the 24 month construction period, the following traffic will require access to the Site:

- Staff transport, in either cars or minibuses;
- Construction equipment and materials, deliveries of machinery and supplies such as concrete and crushed rock; and
- Abnormal loads comprising wind turbine sections and also heavy lift crane(s).

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

6.1.2 Construction Staff

Staff would arrive in non-HGV vehicles and where possible will be encouraged to car share. The workforce onsite will depend on the activities undertaken, but, based on previous wind farm construction site experience for a project of this scale which suggests three staff per turbine during the short peak period of construction is likely, the maximum number of staff expected onsite could be around 63 per day.

For the purposes of estimating traffic movements, it was assumed that 40% of staff would be transported by minibus and 60% would arrive by car (single car occupancy was assumed as the worst case at this stage with potentially fewer movements through car sharing).

Based on these assumptions, staff transport cars and light vehicles would account for a maximum of 84 vehicle trips (42 inbound and 42 outbound) per day during the peak period of construction.

6.1.3 Abnormal Indivisible Load Deliveries

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 4.

In addition to the turbine deliveries, two high capacity erection cranes would be needed to offload a number of components and erect the turbines. The cranes are likely to be mobile cranes with a capacity up to 1,000 tonnes that are escorted by boom and ballast trucks to allow full mobilisation onsite. Smaller erector cranes would also be present to allow the assembly of the main cranes and to ease the overall erection of the turbines.

Escort vehicles would accompany the AIL convoys to support the traffic management measures. Up to four vehicles would be deployed and it is assumed that three turbine components would be delivered per convoy.

Table 4 Turbine Components

Component	Number of Components per Turbine
Rotor Blades	3
Tower Sections	3
Nacelle	1
Hub	1
Drive Train	1
Nose Cone	1
Transformer	1
Ancillary	1
Site Parts	0.2

6.1.4 General Deliveries

Throughout the construction phase, general deliveries will be made to the site by means of HGV. These would include fuel, site office and staff welfare. At the height of construction, it is assumed that up to 40 journeys to site are made (20 in and 20 out) per month.

6.1.5 Material Deliveries

Various materials will need to be delivered to site to form the site-based infrastructure. At the outset, HGV deliveries will deliver plant and initial material deliveries to the site to enable the formation of the site compound and to delivery construction machinery.

The site is large enough to warrant on-site batching of concrete. All turbine and substation foundation concrete will be mixed on site, with deliveries of cement powder and water being delivered by HGV tankers. Sand and aggregate will be delivered by tipper HGV and is expected to originate at quarries located southeast of Thurso.

Individual deliveries associated with the raw materials required for onsite batching have been estimated and result in inbound trips of 30 cement tankers, 432 sand & aggregate tippers and 173 water tankers.

Reinforcement required in the foundations across the site are detailed in Table 5 below.

Table 5 Steel Reinforcement Deliveries

Element	Weight / Installation (t)	Total Weight (t)	Lorry Capacity (t)	Inbound Trips	Total Journeys
Turbine Foundation	80	1680	30	56	112
Substation / Control Building Foundation	20	20	30	1	2

The on-site access tracks will be constructed from crushed rock and material won from the site via the borrow pit. This material would also be used to help create the crane pads and has already been assessed as being suitable for use on the site.

The access tracks would generally be 5 m in width and would be designed to accommodate 13 tonne axle loads. In addition to the roads, crane pads will be constructed to enable the turbine erection process. The tracks, crane pads and compounds will require geotextile in the foundations.

Geotextile will be delivered to site in rolls. A total of 238 large rolls may be required at site and would be delivered by HGV.

Cables will connect each turbine to the internal substation and control building. Trip estimates for the cable materials are provided below in Tables 6 and 7.

Three cables are to be provided within each cable trench and would be backfilled with cable sand. The cable materials would be likely sourced from sites along the A9 corridor, to the southeast of Thurso and would be transported on the A9 and A836 to the site.

Table 6 Cable Trip Estimate

Element	Total Cable Length (m)	Length per Drum (m)	Number of Drums	Inbound Trips	Total Journeys
Cables	12,150	500	73	9	18

Table 7 Cable Sand Trip Estimate

Element	Volume / Installation (m3)	Lorry Capacity (t)	Inbound Trips	Total Journeys
Cable Sand	4,101	20	329	658

A substation and control building will be constructed on the site. This will require deliveries of building materials and structural elements and would result in 56 journeys.

The resulting traffic generation estimates have been plotted onto the indicative construction programme to illustrate the peak journeys on the network. Table 8 illustrates the trip generation throughout the construction programme.

The construction programme includes for a three month break period during winter when weather conditions are likely not be suitable for all construction activities.

Table 8 Construction Traffic Profile

Activity	**Month**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Site Establishment & Remediation	100	50	0	0	0	0	0	0	150	0	0	0
General Site Deliveries	40	40	40	40	40	40	40	40	40	0	0	0
Borrowpit & Batching Plant	40	24	0	0	0	0	0	0	64	0	0	0
Batching Plant Raw Materials	0	159	159	159	159	159	159	159	159	0	0	0
Reinforcement	0	29	0	29	0	29	0	29	0	0	0	0
Cable & Ducting Deliveries	0	0	0	0	0	14	0	14	0	0	0	0
Cabling Sand	0	0	0	0	0	165	165	165	165	0	0	0
Geotextile Deliveries	0	4	4	4	0	4	4	4	0	0	0	0
Substation & HV Building	0	0	0	0	0	28	28	0	0	0	0	0
AIL Cranage	0	0	0	0	0	0	0	0	0	0	0	0
AIL Deliveries	0	0	0	0	0	0	0	0	0	0	0	0
AIL Escorts	0	0	0	0	0	0	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	0	0	0	0
Staff	462	924	1848	1848	1848	1848	1848	1848	1848	0	0	0
Total HGV	180	305	203	231	199	438	395	410	577	0	0	0
Total Cars / LGV	462	924	1848	1848	1848	1848	1848	1848	1848	0	0	0
Total Movements	642	1229	2051	2079	2047	2286	2243	2258	2425	0	0	0
Total HGV per Day	8	14	9	11	9	20	18	19	26	0	0	0
Total Cars / LGV per Day	21	42	84	84	84	84	84	84	84	0	0	0
Total per Day	**29**	**56**	**93**	**95**	**93**	**104**	**102**	**103**	**110**	**0**	**0**	**0**

Continued overleaf

Activity	Month											
	13	14	15	16	17	18	19	20	21	22	23	24
Site Establishment & Remediation	100	0	0	0	0	0	0	0	0	0	50	50
General Site Deliveries	40	40	40	40	40	40	40	40	40	40	40	40
Borrowpit & Batching Plant	0	0	0	0	0	0	0	0	0	0	0	0
Batching Plant Raw Materials	0	0	0	0	0	0	0	0	0	0	0	0
Reinforcement	0	0	0	0	0	0	0	0	0	0	0	0
Cable & Ducting Deliveries	0	0	0	0	0	0	0	0	0	0	0	0
Cabling Sand	0	0	0	0	0	0	0	0	0	0	0	0
Geotextile Deliveries	0	0	0	0	0	0	0	0	0	0	0	0
Substation & HV Building	0	0	0	0	0	0	0	0	0	0	0	0
AIL Cranage	40	0	0	0	0	0	0	40	0	0	0	0
AIL Deliveries	0	209	209	209	209	209	0	0	0	0	0	0
AIL Escorts	0	106	106	106	106	106	0	0	0	0	0	0
Commissioning	0	0	0	0	0	0	0	0	88	88	0	0
Staff	1848	1848	1848	1848	1848	1848	1848	1848	1848	1848	924	924
Total HGV	180	249	249	249	249	249	40	80	40	40	90	90
Total Cars / LGV	1848	1954	1954	1954	1954	1954	1848	1848	1936	1936	924	924
Total Movements	2028	2203	2203	2203	2203	2203	1888	1928	1976	1976	1014	1014
Total HGV per Day	8	11	11	11	11	11	2	4	2	2	4	4
Total Cars / LGV per Day	84	89	89	89	89	89	84	84	88	88	42	42
Total per Day	**92**	**100**	**100**	**100**	**100**	**100**	**86**	**88**	**90**	**90**	**46**	**46**

The peak of construction occurs in Month 10 with 110 journeys (84 Car / Lights and 26 HGV journeys).

6.1.6 Distribution of Construction Trips

The distribution of development traffic on the network would vary depending on the types of loads being transported. The assumptions for the distribution of construction traffic during the peak months would be as follows:

All construction traffic enters the site via the site access junction leading from the A836.

- Deliveries associated with the batching of concrete on site will arrive via the A836 and A9 to the south of Thurso;
- Sand and aggregate for use in the on-site batching plant will be sourced from local quarries. For the purposes of the assessment, it is assumed that all material will be taken from the quarries located to southeast of Thurso. The Balance of Plant (BoP) contractor will confirm final quarry and material sourcing with The Highland Council in the Construction Traffic Management Plan (CTMP);
- HGV deliveries associated with the HV electrical installation, control buildings, batteries, etc will arrive via the A9 to the south of Thurso;
- Staff working at the site are likely to be based locally. It is assumed that 10% will be based to the west of the site, 20% between the site and Thurso and 70% based in Thurso itself; and
- General site deliveries will be via the A9 and A836 to site. These are generally smaller rigid HGV vehicles.

Loads relating to the turbine components would be delivered from Scrabster Harbour. The access route would be as follows:

- Depart the harbour and enter the A9;
- Proceed southbound on the A9 to the junction of the A9 / A836;
- Turn right using the existing over run area at the A9 / A836 junction;
- Proceed westbound on the A836;
- Turn left onto the U4724 Milton Road; and
- Proceed to the Development Site via the upgraded public road and new access tracks.

The peak traffic flows have been developed and are illustrated in Table 9.

Table 9 Peak Construction Traffic

Survey Location	Cars & Lights	HGV	Total
A9, South of Scrabster Harbour	0	0	0
A9, South Thurso (near Sordale)	0	26	26
A9, Thurso, east of River Thurso	59	26	85
A9, Thurso, west of River Thurso	59	26	85
A836 Between Thurso and the Site	76	26	102
Site Access Junction	84	26	110

6.2 Committed Developments

There are no consented wind farm developments that contribute to the transport effects to be considered in the assessment. There are several that are pending in the planning process and as such, can be considered as committed development.

The use of high NRTF growth factors for background traffic is considered robust for addressing smaller, non-significant traffic generation caused by smaller developments within the study area. As such, a robust assessment case has been provided in this report.

6.3 Decommissioning Phase

Prior to decommissioning of the site, a traffic assessment would be undertaken and appropriate traffic management procedures followed.

The decommissioning phase would result in fewer trips on the road network than the construction or operational phases as it is considered likely that elements of infrastructure such as access tracks would be left in place and structures may be broken up onsite to allow transport by a reduced number of HGV.

7 Traffic Impact Assessment

7.1 Construction Impact

The peak month traffic data was combined with the future year (2023) traffic data to allow a comparison between the baseline results to be made. The increase in traffic volumes is illustrated in percentage increases for each class of vehicle. This is illustrated in Table 10.

Table 10 2023 Peak Monthly Daily Traffic Data

Survey Location	Cars & Lights	HGV	Total Traffic	Cars & Lights % Increase	HGV % Increase	Total Traffic % Increase
A9, South of Scrabster Harbour	3314	111	3425	0.00%	0.00%	0.00%
A9, South Thurso (near Sordale)	3312	323	3635	0.00%	8.76%	0.72%
A9, Thurso, east of River Thurso	14616	393	15009	0.41%	7.08%	0.57%
A9, Thurso, west of River Thurso	3294	236	3530	1.82%	12.41%	2.47%
A836 Between Thurso and the Site	2475	95	2570	3.17%	37.60%	4.13%

The total traffic movements are not predicted to increase by more than 30% on all of the study network. HGV traffic flows on the A836 between Thurso and the site increase by 37.6%, however this increase is temporary and the actual increase in HGV numbers on this section of the route is 26 vehicle movements per day, on average an increase of 3 HGV per hour during a day at the peak of construction activity.

A review of the existing road capacity has been undertaken using the Design Manual for Roads and Bridges, Volume 15, Part 5 “The NESA Manual”. The theoretical road capacity has been estimated for each of the road links for a 12-hour period that makes up the study area. The results are summarised in Table 11.

Table 11 2023 Peak Traffic Flow Capacity Review

Location	2023 Baseline Flow	2023 Base + Development Flows	Theoretical Road Capacity (12hr)	Spare Road Capacity %
A9, South of Scrabster Harbour	3425	3425	19200	82.16%
A9, South Thurso (near Sordale)	3609	3635	21600	83.17%
A9, Thurso, east of River Thurso	14924	15009	19200	21.83%
A9, Thurso, west of River Thurso	3445	3530	19200	81.62%
A836 Between Thurso and the Site	2468	2570	21600	88.10%

The results indicate there are no road capacity issues with the Revised Consented Development and ample spare capacity exists within the trunk and local road network to accommodate construction phase traffic.

8 Proposed Traffic Mitigation Measures

8.1 Construction Phase

The following measures would be implemented through a Construction Traffic Management Plan (CTMP) during the construction phase. The CTMP would be agreed with The Highland Council prior to construction works commencing:

- Where possible the detailed design process would minimise the volume of material to be imported to site to help reduce HGV numbers;
- A site worker transport and travel arrangement plan, including transport modes to and from the worksite (including pick up and drop off times);
- A Traffic Management Plan;
- All materials delivery lorries (dry materials) should be sheeted 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 cleaning facilities may be established at the site entrance, depending the views of The Highland Council;
- Normal site working hours would be limited to between 0700 and 1900 (Monday to Friday) and 0700 and 1300 (Saturday) though component delivery and turbine erection may take place outside these hours;
- Appropriate traffic management measures would be put in place on the A836 in the vicinity of the junction providing access to the site to avoid conflict with general traffic, subject to the agreement of the roads authority. Typical measures would include HGV turning and crossing signs and/ or banksmen at the site access and warning signs;
- Provide construction updates on the project website and or a newsletter to be distributed to residents within an agreed distance of the site.
- Adoption of a voluntary speed limit of 15 mph for all construction vehicles through Thurso;
- All drivers would be required to attend an induction to include:
    - A tool box talk safety briefing;
    - The need for appropriate care and speed control;
    - A briefing on driver speed reduction agreements (to slow site traffic at sensitive locations through the villages); and
    - Identification of the required access routes and the controls to ensure no departure from these routes.

THC may require an agreement to cover the cost of abnormal wear and tear on the A836 within 200 m of the site access junction and on the affected section of the U4724 Milton Road.

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 development. Any necessary repairs would be coordinated with the Roads Authority. Any damage caused by traffic associated with the proposed development, during the construction period that would be hazardous to public traffic, would be repaired immediately.

Any 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.

There would be a regular road edge review and any debris and mud would be removed from the public carriageway to keep the road clean and safe during the initial months of construction activity, until the construction junction and immediate access track works are complete.

8.2 Abnormal Load Management Plan

There are a number of traffic management measures that could help reduce the effect of abnormal load convoys.

All abnormal load deliveries would be undertaken at appropriate times (to be discussed and agreed with the relevant roads authorities and police) with the aim to minimise the effect on the local road network. It is likely that the abnormal load convoys would travel in the early morning periods, before peak times while general construction traffic would generally avoid the morning and evening peak periods.

The majority of potential conflicts between construction traffic and other road users will occur with abnormal load 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 accustomed to them.

Advance warning signs would be installed on the approaches to the affected road network. Information signage could be installed to help assist drivers and an example is illustrated in Figure 9. Flip up panels (shown in grey) would be used to mask over days where convoys would not be operating. When no convoys are moving, the sign would be bagged over by the Traffic Management contractor.

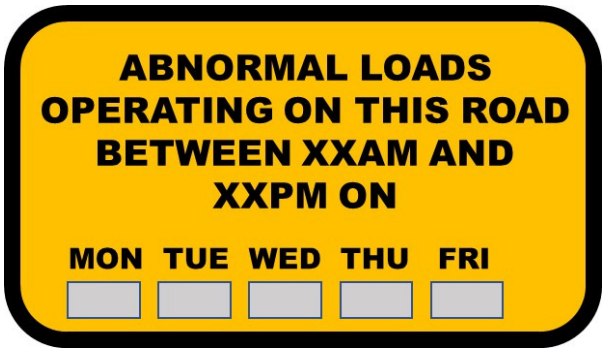

Figure 9: General Site Location

This signage will assist in helping improve driver information and allow other road users to consider alternative routes or times for their journey (where such options exist).

The location and numbers of signs would be agreed post consent and would form part of the wider Traffic Management Proposal for the project.

The Abnormal Load Transport 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;
- A diary of proposed delivery movements to liaise with the communities to avoid key dates;
- 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 the applicant, 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.

8.3 Public Information

Information on the turbine convoys would be provided to local media outlets such as local papers and local radio to help assist the public.

Information would relate to expected vehicle movements from the port of entry through to the site access junction. This will assist residents becoming aware of the convoy movements and may help reduce any potential conflicts.

The applicant would also ensure information was distributed through its communication team via the project website, local newsletters and social media.

8.4 Convoy System

A police escort would 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.

The abnormal loads convoys would be no more than three AILs long, or as advised by the police, to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic where it is safe to do so.

The times in which the convoys would travel will need to be agreed with Police Scotland who have sole discretion on when loads can be moved.

8.5 Operational Phase Mitigation

Site entrance roads will be well maintained and monitored during the operational life of the development. Regular maintenance will be undertaken to keep the site access track drainage systems fully operation and to ensure there are no run-off issues onto the public road network.

9 Summary and Conclusions

Pell Frischmann was commissioned to undertake a Transport Assessment (TA) for the proposed Limekiln Wind Farm, on behalf of Limekiln Wind Limited.

Existing traffic data established a base point for determining the impact during the construction phase and was factored to future levels to help determine the effect of construction traffic on the local road network.

The construction traffic would result in a temporary increase in traffic flows on the road network surrounding the Revised Consented Development. The maximum traffic effect associated with construction of the Revised Consented Development is predicted to occur in Month 10 of the construction programme. During this month, an average of 26 HGV movements is predicted per day and it is estimated that there would be a further 84 car and light van movements per day to transport construction workers to and from the Site.

A series of mitigation measures and management plans have been proposed to help mitigate and offset the impacts of both the construction and operational phase traffic flows.

No link capacity issues are expected on any of the roads assessed due to the additional movements associated with the Revised Consented Development. The effects of construction traffic are temporary in nature and are transitory.

Appendix A Route Survey Report

Pell Frischmann

Limekiln Wind Farm Extension

Abnormal Indivisible Load Route Survey

February 2021
105033

Revision Record

Document2

Rev	Description	Date	Originator	Checker	Approver
A	Draft	24/02/2021	G Buchan	T Lockett	G Buchan
B	Issue	05/03/2021	G Buchan	T Lockett	G Buchan

Prepared for:

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Edinburgh
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INFINERGY

Pell Frischmann

Contents

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1 Introduction

1.1 Purpose of the Report

Pell Frischmann (PF) has been commissioned by Limekiln Extension Limited to undertake a desk top review of the delivery route for wind turbine Abnormal Indivisible Loads (AIL) associated with the construction and development of Limekiln Wind Farm Extension, located to the west of Thurso, Caithness.

The report identifies the key issues associated with component deliveries and notes where remedial works, either in form of physical works or as traffic management interventions will be required to accommodate the predicted loads.

The detailed designs of any remedial works are beyond the agreed scope of works between PF and Infinergy at this point in time.

This report has been prepared in accordance with instructions from Limekiln Extension Limited on the above project details. No liability is accepted for the use of all or part of this report by third parties.

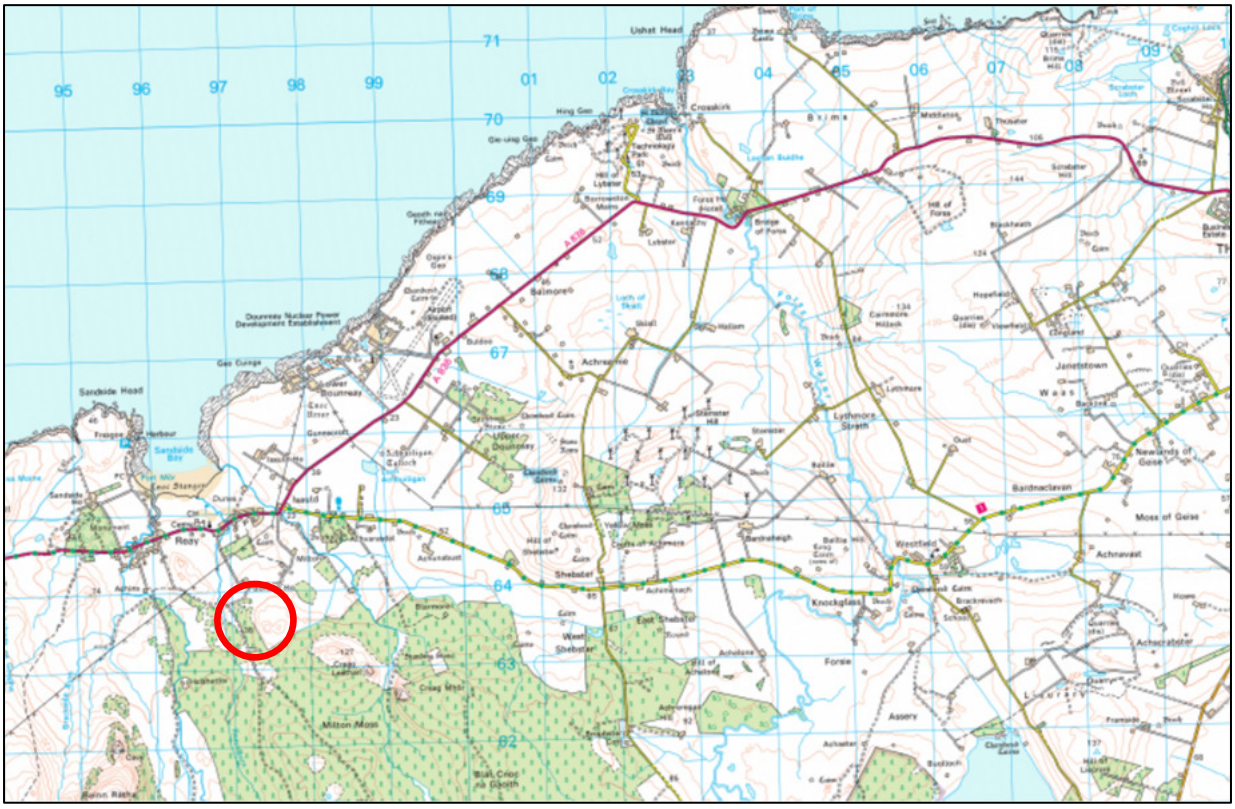
PF has been commissioned to prepare this abnormal load route assessment report as a source of guidance. The report identifies the key points and issues associated with the route that may require remedial works to accommodate the predicted loads.

2 Site Background

2.1 Site Location

The development site is located to the west of Thurso, Caithness. Figure 1 illustrates the general site location.

Figure 1: Site Location Plan



2.2 Candidate Turbines

Limekiln Extension Limited have indicated that they wish to consider the use of a Nordex N133 turbine at a tip height of 149.9m to identify all the likely access issues.

The details of the components are summarised in Table 2-1.

Table 2.1: Nordex N133 with 83m HH Tower - Turbine Size Summary

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Blade	65.500	4.200	3.320	15.700
Base Tower	21.020	4.300	4.020	67.000
Mid Tower	24.030	4.020	4.020	47.800
Top Tower	34.250	4.020	3.260	50.610

2.3 Proposed Delivery Equipment

To provide a robust assessment scenario based upon the known issues along the access route, it has been assumed that all blades would be carried on a Super Wing Carrier trailer to reduce the need for mitigation in constrained sections of the route.

Towers would be carried in a 4+7 clamp adaptor style trailer, whereas loads such as the hub, nacelle housing and top towers would be carried on a six axle step frame trailer.

Figure 2: Super Wing Carrier Trailer

Figure 3: Tower Trailer

3 Access Route Review

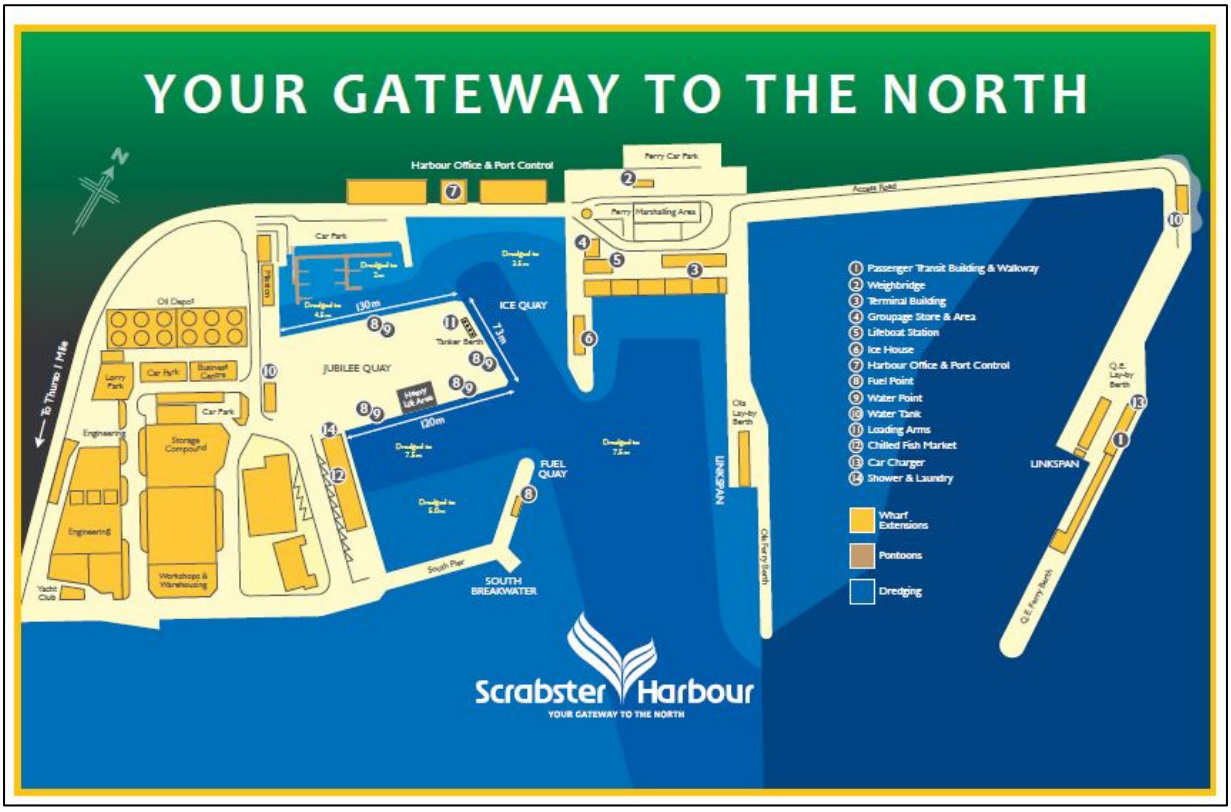
3.1 Port of Entry

The proposed Port of Entry (POE) is Scrabster. The port is the closest and only suitable port to site and as such is in line with the Government's "Water Preferred" policy towards AIL movements.

The port has been used by renewables deliveries in the past for a number of wind farms, including Strathy North.

The port has sufficient quay and is well located for the north coast road network. The layout of the port is illustrated below in Figure 4.

Figure 4: Scrabster Port Layout



Access from other ports in the north is not feasible given the nature of constraints that exist within the town of Thurso.

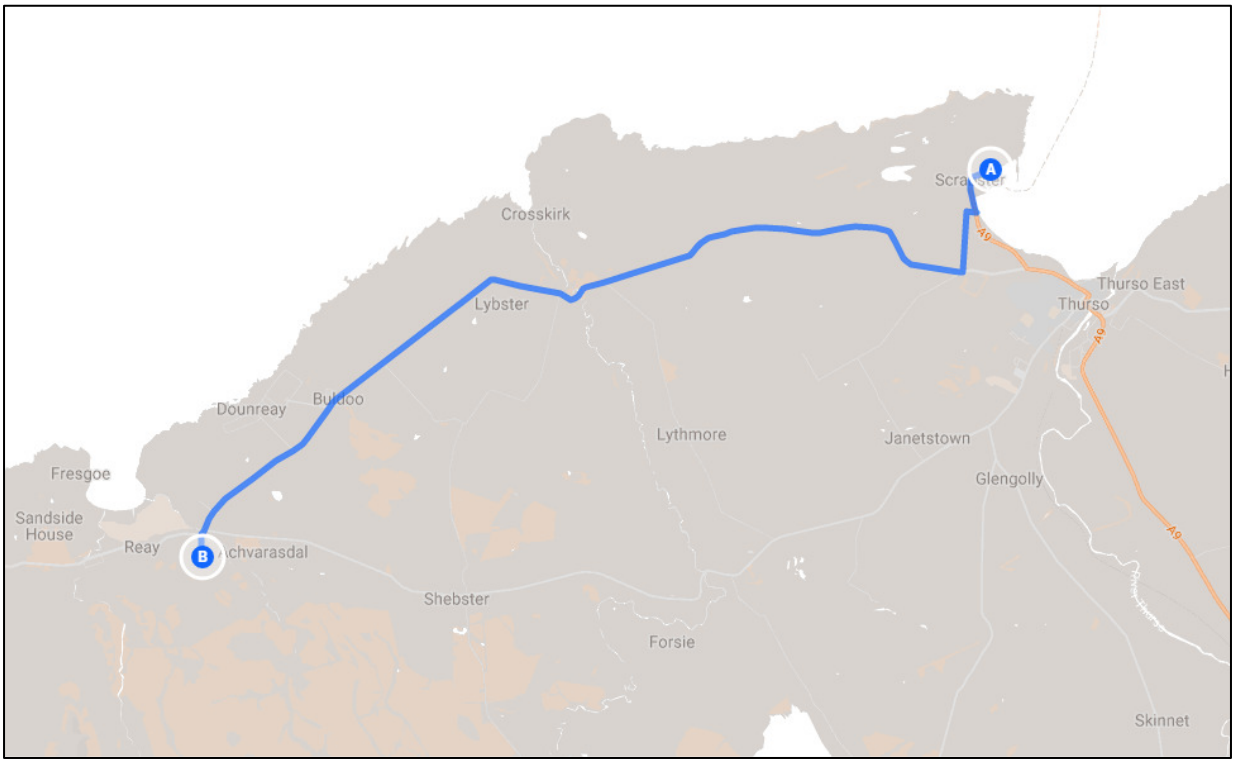
3.2 Proposed Access Route

The proposed access route to site is as follows:

- Depart the port and enter the A9;
- Proceed southbound on the A9 to the junction of the A9 / A836;
- Turn right using the existing over run area at the A9 / A836 junction;
- Proceed westbound on the A836;
- Turn left onto the unclassified road following the Quiet Waters Junction;
- Proceed to site by means of the upgraded public road and new access tracks.

The proposed route is illustrated in Figure 5.

Figure 5: Proposed Access Route



This study has been undertaken using site survey data collected in 2020, outwith Covid 19 travel restriction periods.

3.3 Route Constraints

The constraints noted on the site visit are detailed in Table 3-1. These cover all constraints from the port access gate through to the site access junction. No consideration of the transport issues within the port or within the development site have been undertaken and this includes the design of the site access junction.

Plans illustrating the location of the constraints and a detailed list of POI are provided in Appendix A.

Table 3-1: Constraint Points Detail

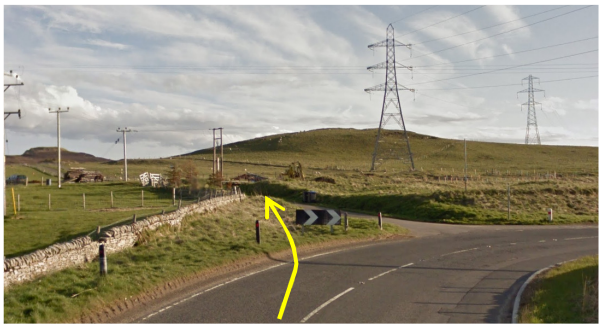
POI	Constraint	Details
1, 2	**Exit from Scrabster Port** 	The loads will exit the port turning left and will join the A9 southbound. The turn from the north pier onto the access road should have all obstructions removed to enable loads to oversail both sides of the turn. The clearance for blade oversail of the seawall should be confirmed during the test run or on a topographical map. When joining the A9 the central parking traffic barrier and road signage within the port should be removed. Swept path drawing SK01 is included in Appendix B.
3	**A9 Left Bend, Scrabster** 	Loads will continue southbound on the A9 at this location. Loads will oversail the footway on the inside of the left bend. No physical mitigation is required. Swept path drawing SK02 is included in Appendix B.

POI	Constraint	Details
4	**A9 / A836 Junction**  	Loads will turn right onto the A836. Loads will oversail the north eastern footway of the A9 on approach to the junction. Loads will overrun and oversail the footway on the inside of the right turn where a load bearing surface should be laid and existing utilities should be protected. The existing over-run area in the land to the south of the junction will be required. Use of this will need to be agreed with SSE who are understood to control the area. **Third party land will be required.** The existing load bearing surface should be extended. Two lighting columns, a section of wall / fence and two traffic signs will need to be removed. Swept path drawing SK03 is included in Appendix B.
5	**A836 Right Bend, Burnside** 	Loads will continue westbound on the A836 at this location. Loads will occupy the entire carriageway through the bend and oncoming vehicles will need to be held in advance. Vegetation trimming can be subject to ecological constraints and early engagement with The Highland Council is suggested.
6	**A836 Right Bend West of Burnside** 	Loads will continue on the A836 at this location. Loads will occupy the entire carriageway through the bend and oncoming vehicles will need to be held in advance.

POI	Constraint	Details
7	**A836 Right Bend South West of Scrabster** 	Loads are likely to project over the road centre line at this location. In order to ensure the safety of the convoy and other road users, escort vehicles will need to be deployed ahead of this section to hold traffic at a safe location for the loads to pass. A traffic management plan for the A836 should be prepared.
8	**A836 Left Bend South West of Scrabster** 	Loads will continue on the A836 at this location. Loads will oversail the south western verge, however no physical works are required at this location. Swept path drawing SK06 is included in Appendix B.
9	**A836 Right Bend South West of Scrabster** 	Loads are likely to project over the road centre line at this location. In order to ensure the safety of the convoy and other road users, escort vehicles will need to be deployed ahead of this section to hold traffic at a safe location for the loads to pass. The management of oncoming traffic should be addressed through a Traffic Management Plan
10	**A836 Bends East of Crosskirk** 	Loads are likely to project over the road centre line at this location. In order to ensure the safety of the convoy and other road users, escort vehicles will need to be deployed ahead of this section to hold traffic at a safe location for the loads to pass.

POI	Constraint	Details
11	**A836 Overhead Utilities** 	At this location the height from the road to overhead utilities should be confirmed by the utility providers to ensure that there is a minimum of 5m clear head height from the road for all expected temperature ranges.
12, 13	**A836 Forrs Bends**  	Loads will continue west through a left / right bend section. Loads will oversail both verges through the initial left bend with a load bearing surface to be laid in the north western verge on the outside of the bend. One road sign, three bollards and trees should be removed. Loads will continue to oversail both verges through the following right bend with the blade tip oversailing the safety barrier on the outside of the bend. Swept path drawing SK05 is included in Appendix B.
14	**A836 Left Bend – Lybster** 	Loads will continue westbound on the A836 at this location. Loads will oversail both verges through the section. Two chevron signs should be removed from the northern verge and the blade tip will oversail the traffic bollards. Road deterioration was noted at this location. This should be addressed prior to the first load being transported. Swept path drawing SK06 is included in Appendix B.

POI	Constraint	Details
15	**A836 Bends – Buldoo** 	Loads will continue on the A836 at this location. Loads will occupy the entire carriageway through the bend. Oncoming vehicles should be held in advance of the bend by escorts.
16	**A836 Bend – Isauld** 	The vertical profile of the road at this location is pronounced and the blade trailer suspension should be raised to avoid the need for any intrusive road works.
17	**A836 Bends – Isauld Cottage** 	Loads will continue on the A836 at this location. Loads will oversail the eastern verge, however no physical works are required. Swept path drawing SK07 is included in Appendix B.

POI	Constraint	Details
18	**A836 / Milton Road Junction**  	Loads will turn left onto the unclassified Milton Road at the junction. Limekiln Extension Limited have provided a drawing showing the access junction, road widening and construction compound which has been used for the swept path assessment. Loads will oversail the eastern verge of the A836 on approach to the junction. Loads will overrun and oversail into the construction compound which should be cleared of all obstructions during deliveries. A minor extension of the load bearing surface to the south should be provided. Swept path drawing SK08 is included in Appendix B.
19	**Milton Road** 	The existing road will need to be widened to a minimum of 4.5m to comply with turbine supplier minimum standards
20	**Proposed New Access Track Junction** 	Loads would proceed ahead onto a new access track to bypass the existing bend on the public road. A metalled road surface is suggested at the start of this new trackway to reduce the potential for mud and debris to be deposited on the public road. Visibility splays in either direction from the new access track should be provided to THC standards to ensure road safety for traffic departing from the site.

POI	Constraint	Details
21	**Proposed Crossing Point** 	Loads will cross the public road at a new crossroads at this location. From this point onwards, loads would travel to the turbine locations using bespoke access tracks. The access tracks leading to and from the crossing should be in a metalled surface to reduce the potential for mud a debris to be left on the public road. THC visibility splays will need to be provided in both direction and the land agreements should include for this. Road signage should be provided to warn other road users of traffic crossing the road.

3.4 Land Ownership

The limits of road adoption can vary depending upon the location of the site and the history of the roads agency. The adopted area is generally defined as land contained within a defined boundary where the road agency holds the maintenance rights for the. In urban areas, this usually defined as the area from the edge of the footway across the road to the opposing footway back edge.

In rural areas the area of adoption can be open to greater interpretation as defined boundaries may not be readily visible. In these locations, the general rule adopted by The Highland Council s that the area of adoption is between established fence / hedges lines or a maximum 3m from the road edge. This can vary between areas and location.

3.5 Summary Issues

It is strongly suggested that following a review of the report, Limekiln Extension Limited should undertake the following prior to the delivery of the first abnormal loads, to ensure load and road user safety:

- That any necessary topographical surveys are undertaken and the swept path results repeated;
- A revised review of axle loading on structures along the entire access route with the various road agencies is undertaken;
- A review of clear heights with utility providers and the transport agencies along the route to ensure that there is sufficient space to allow for loads plus sufficient flashover protection (to electrical installations);
- That any verge vegetation and tree canopies which may foul loads is trimmed prior to loads moving;
- That a review of potential roadworks and or closures is undertaken once the delivery schedule is established in draft form;

- That a test run is completed to confirm the route and review any vertical clearance issues; and

- That a condition survey is undertaken to ascertain the extents of road defects prior to loads commencing to protect Infinergy from spurious damage claims.

4 Summary

4.1 Summary of Access Review

PF has been commissioned by Limekiln Extension Limited to prepare desk top Route Survey Report to examine the issues associated with the transport of AIL turbine components from Scrabster through to the development site at Limekiln.

This report identifies the key points and issues associated with the proposed route and outlines the issues that will need to be considered for successful delivery of components.

The access review has been based upon a worst case of Nordex N133 turbine sections and has been undertaken on the basis of a Super Wing blade trailer.

The report is presented for consideration to Limekiln Extension Limited. Various road modifications and interventions are required to successfully access the site. If these are undertaken, access to the consented wind farm site is considered feasible.

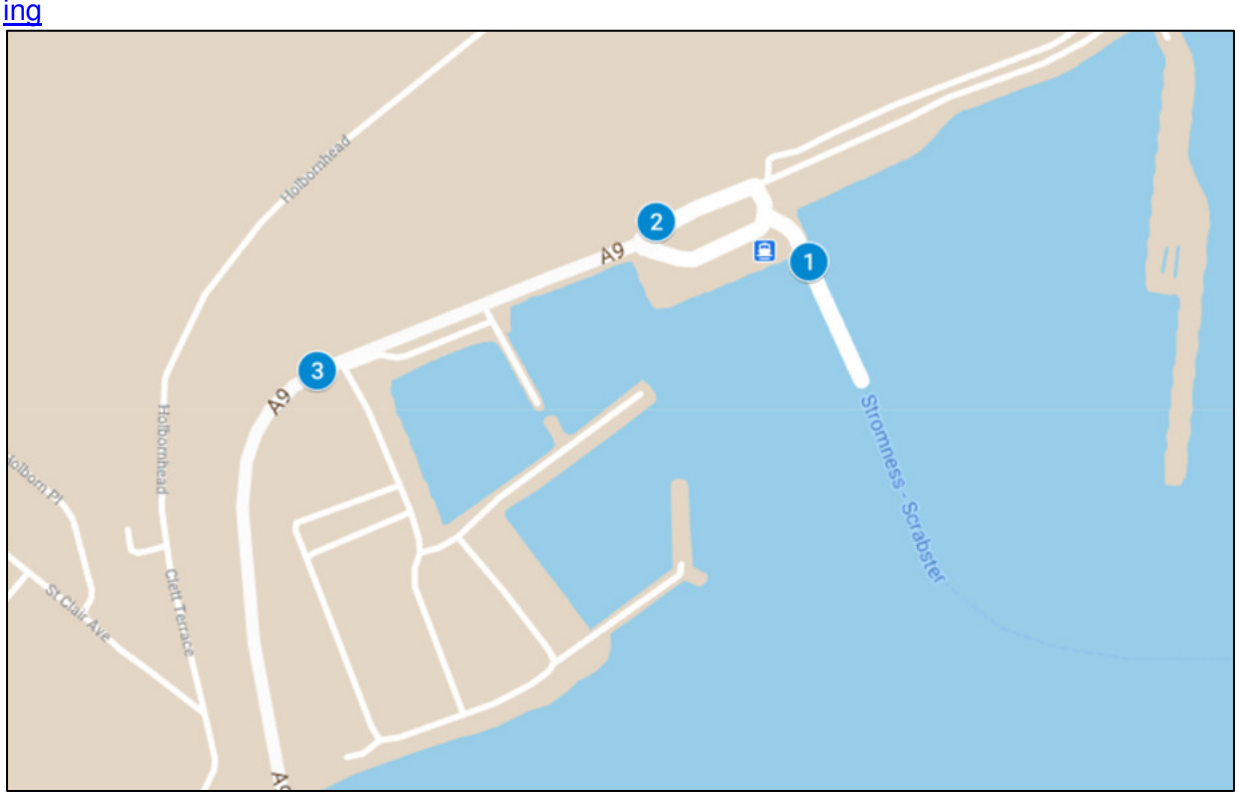
4.2 Further Actions

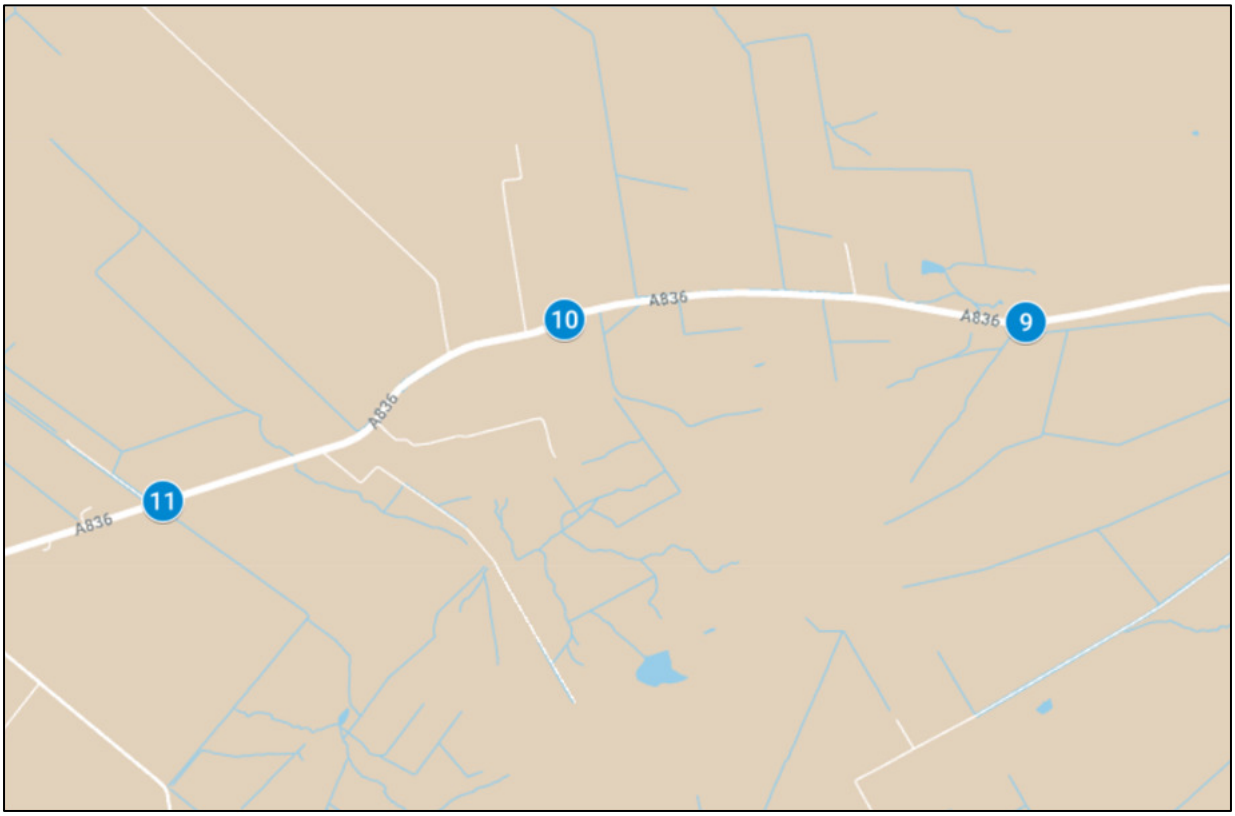
The following actions are recommended to pursue the transport and access issues further:

- Prepare detailed mitigation design proposals to help inform the land option / consultee discussions;
- Obtain the necessary land options;
- Undertake discussion with the affected utility providers and roads agencies;
- Obtain the necessary statutory licences to enable the mitigation measures; and
- Develop a detailed operational Transport Management Plan to assist in transporting the proposed loads.

Appendix A
Points of Interest Locations

An electronic copy of this POI plan is available here:
https://www.google.com/maps/d/edit?mid=1_EnEvHK_pNLnfJIb68Gv7iEek92uh3v9&usp=sharing




A836
A836
A836
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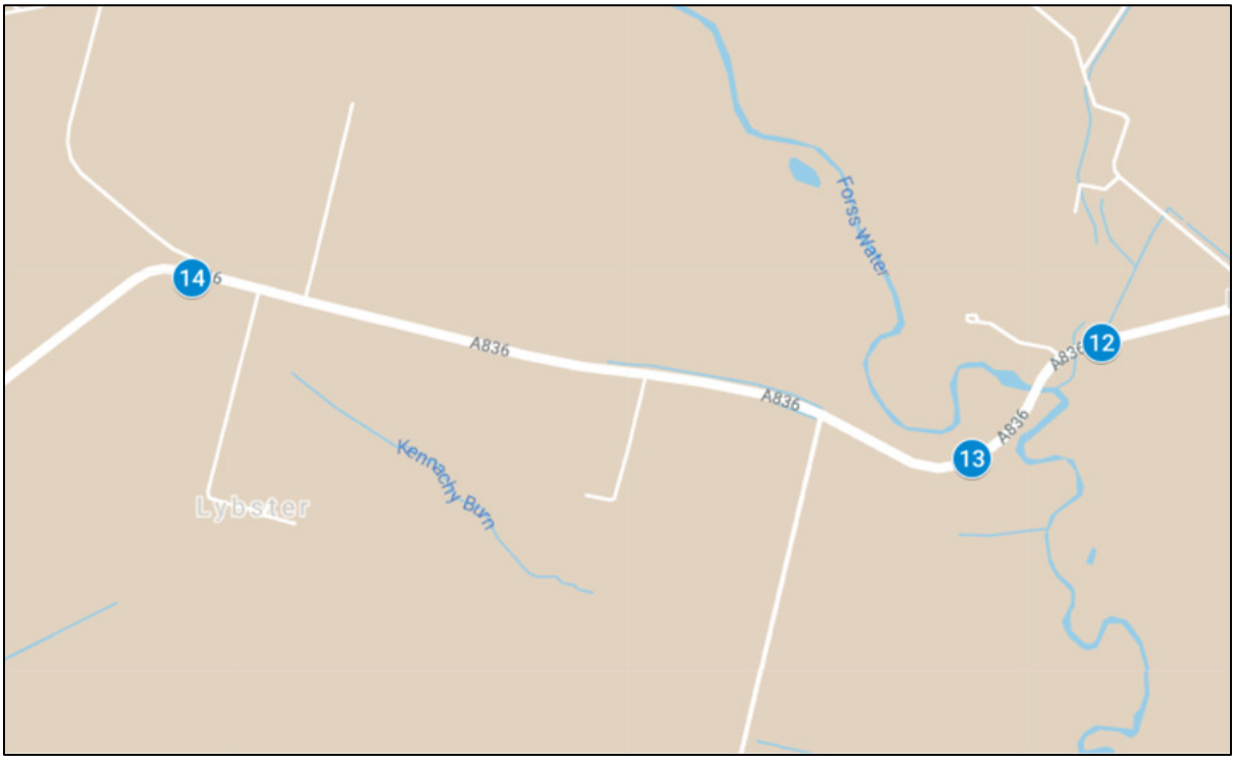
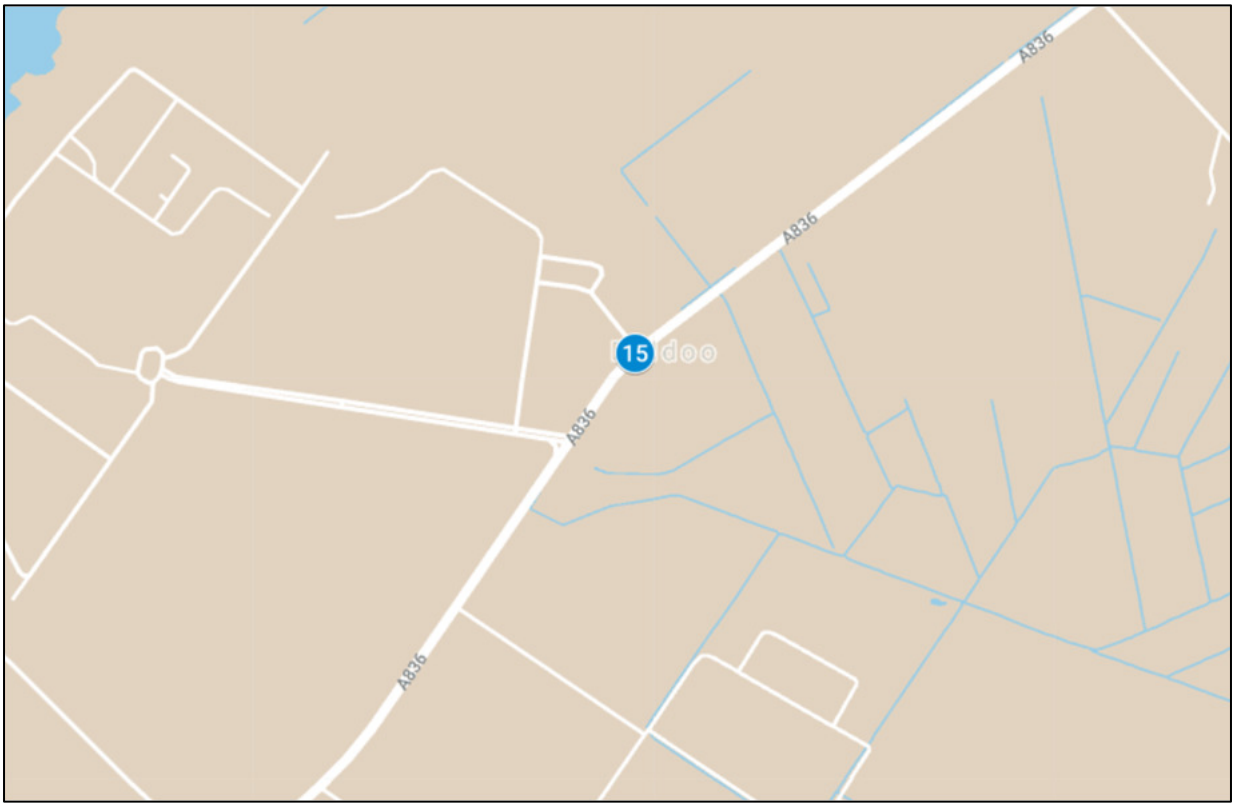
9
11


Forss Water
14
A836
A836
A836
12
13
Kennachy Burn
Lybster


A836
A836
15
A836


16
A836
17
Isauld
Burn of Isauld
A836
A836
18
19
Dounreay Burn
Achvarasdal
20
21

Appendix B

Swept Path Assessments

Blade

Tower

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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: Scrabster Harbour Pier

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		1

Scale: 1:1000 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK01

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: Scrabster Harbour Pier

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		1

Scale: 1:1000 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

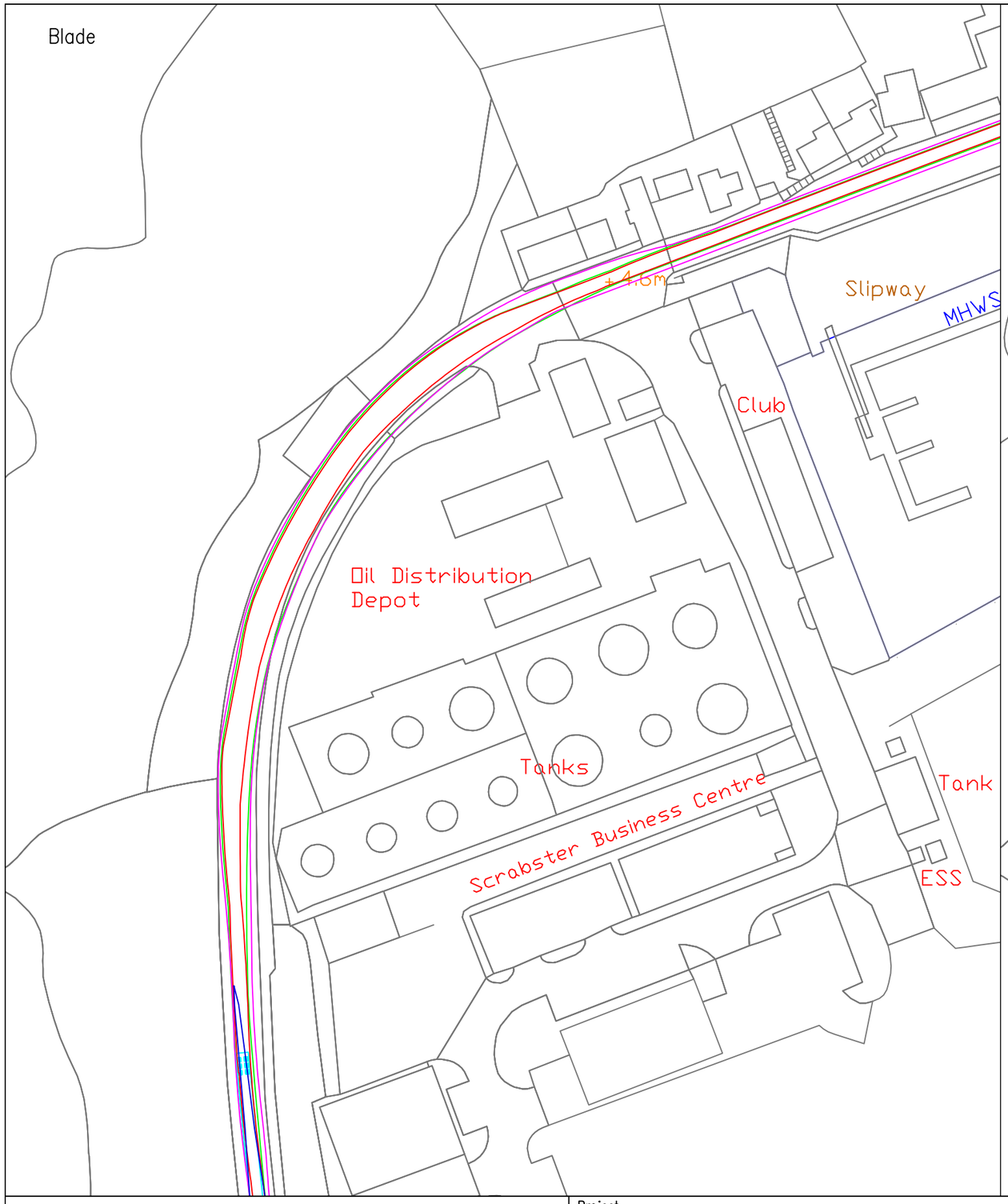
Drawing No.: SK01A

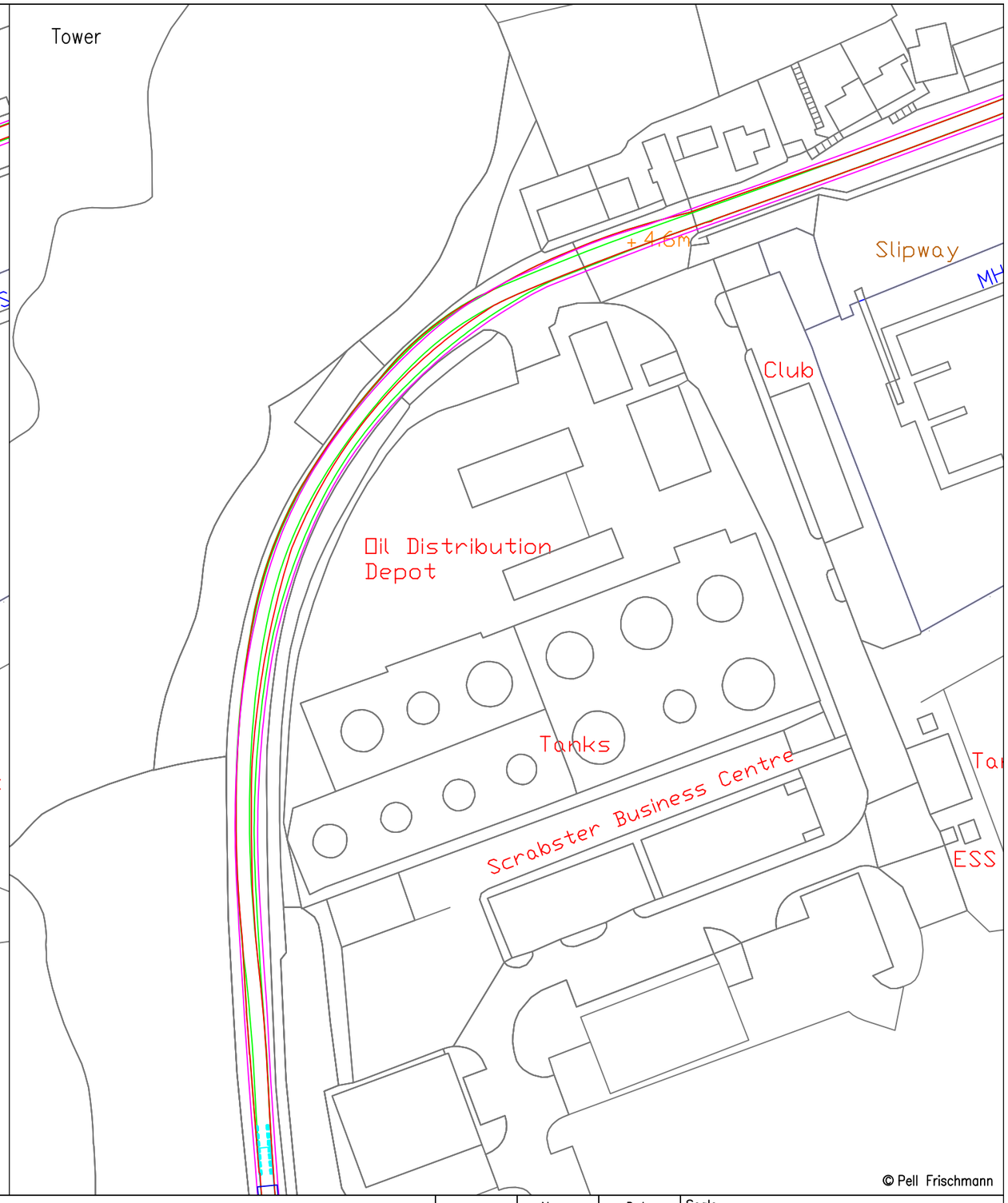
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower





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www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: Scrabster Harbour Exit

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		3

Scale: Custom @ A3

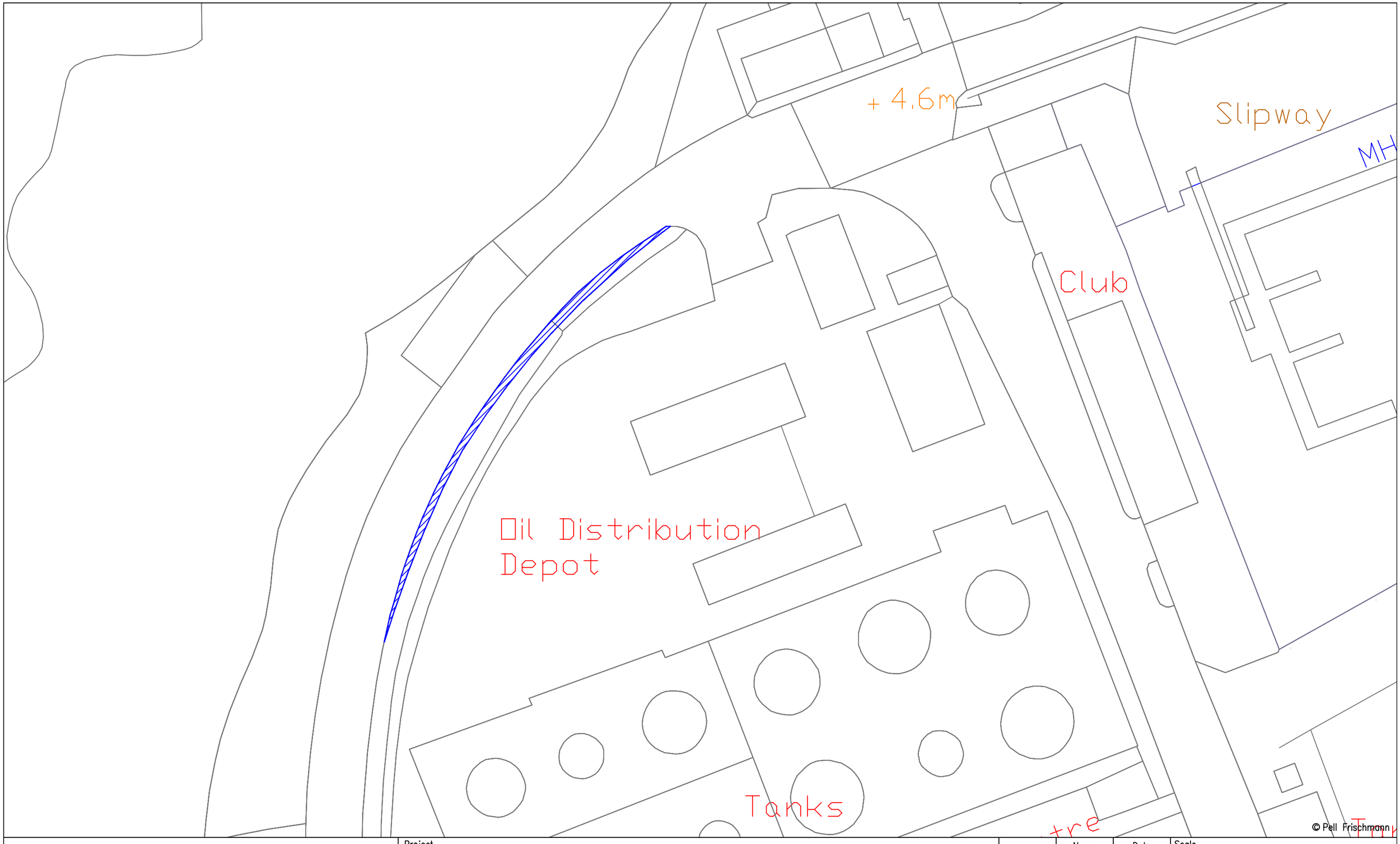
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK02

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: Scrabster Harbour Exit

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		3

Scale: 1:500 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK02A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A9 / A836 Junction, Scrabster

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		4

Scale: 1:1000 @ A3

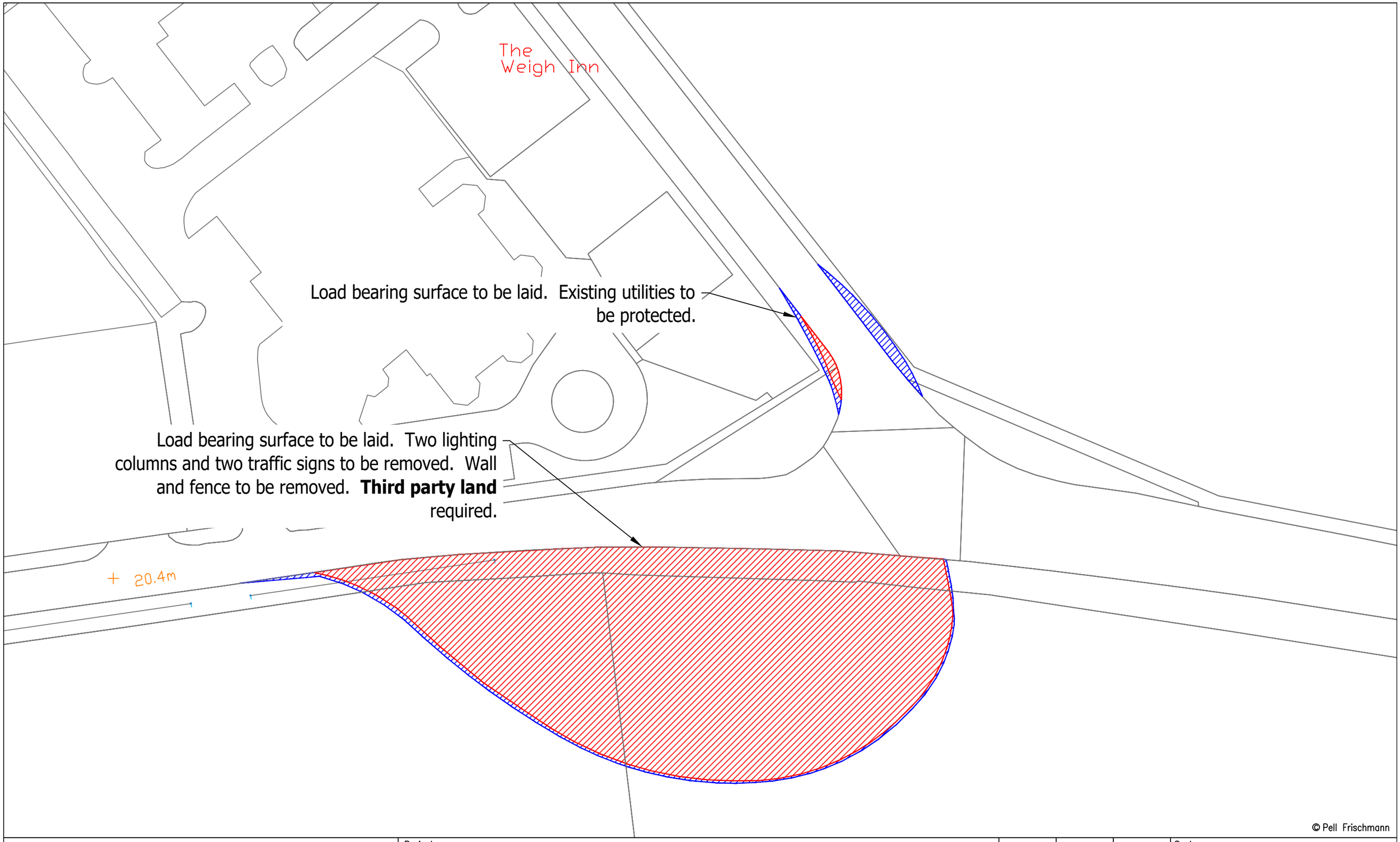
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK03

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A9 / A836 Junction, Scrabster

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		4

Scale: 1:500 @ A3

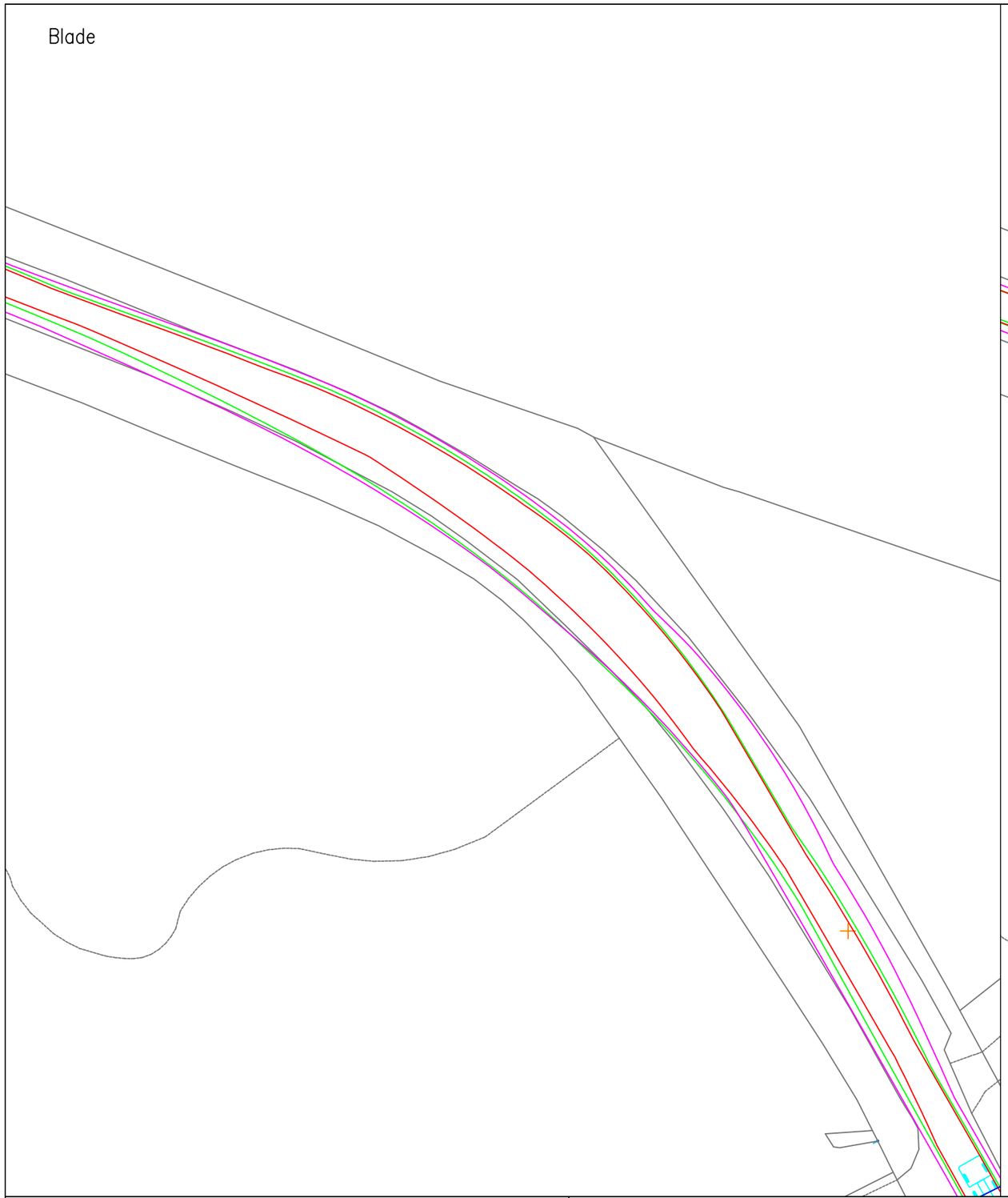
File No.: 210305 Limekiln 2021.dwg

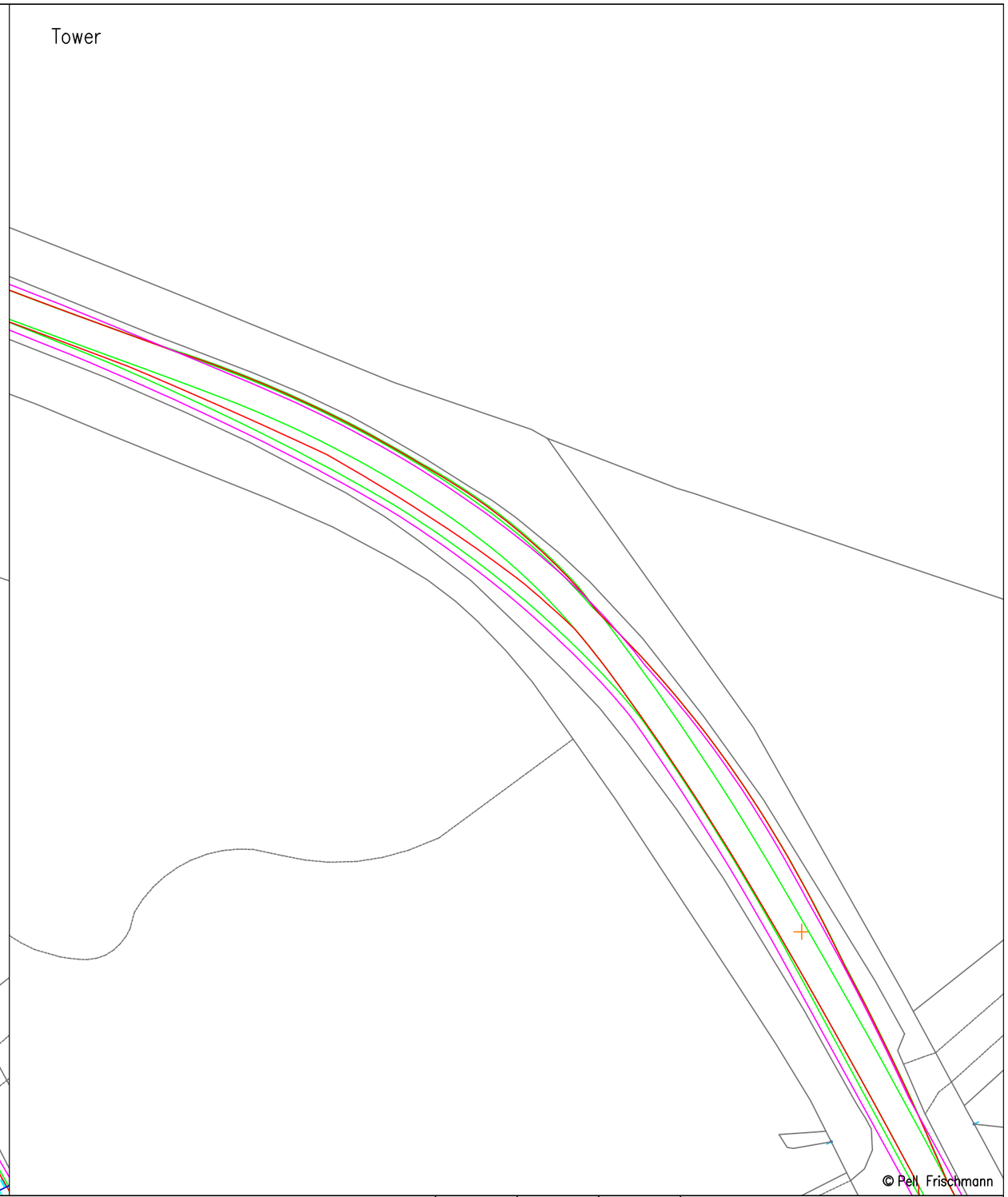
Drawing Status: Draft

Drawing No.: SK03A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Left Bend South West of Scrabster

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		8

Scale: 1:500 @ A3

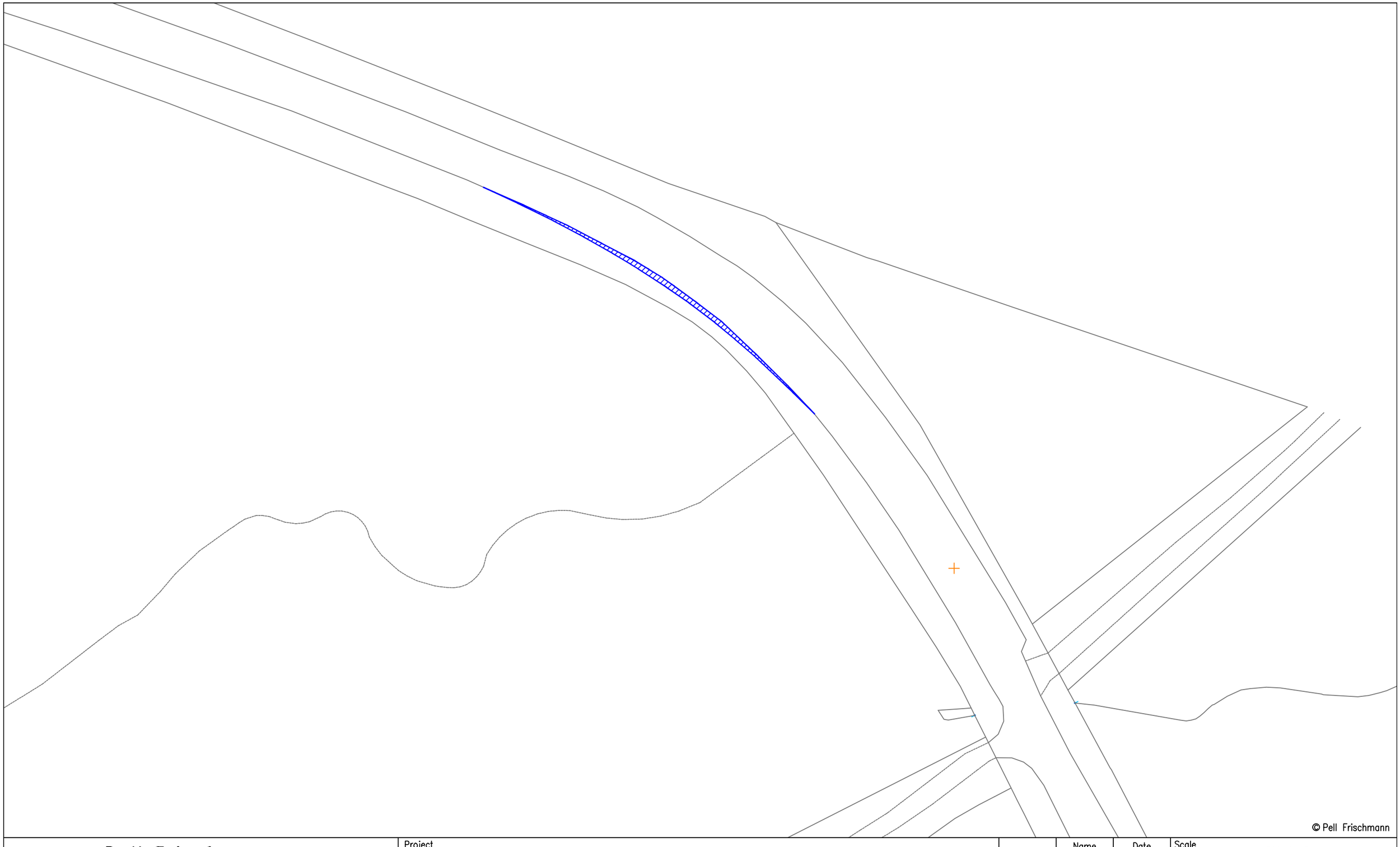
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK04

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Left Bend South West of Scrabster

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		8

Scale: 1:500 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK04A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Forrs Bends

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		12, 13

Scale: 1:1000 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK05

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Forrs Bends

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		12, 13

Scale: 1:1000 @ A3

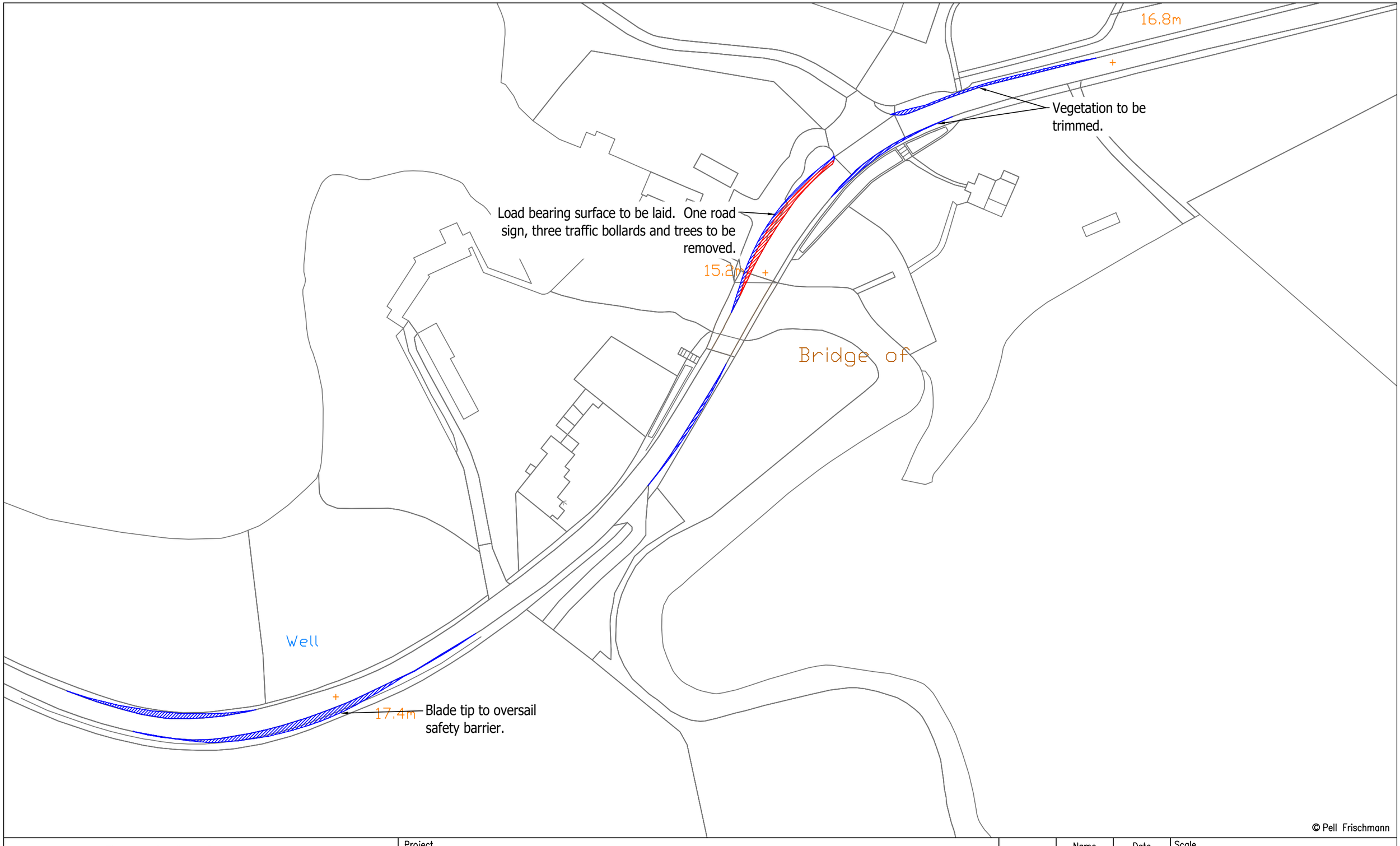
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK05A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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www.pellfrischmann.com

Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Forrs Bends

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		12, 13

Scale: 1:1000 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK05B

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Lybster Bends

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		14

Scale: 1:1000 @ A3

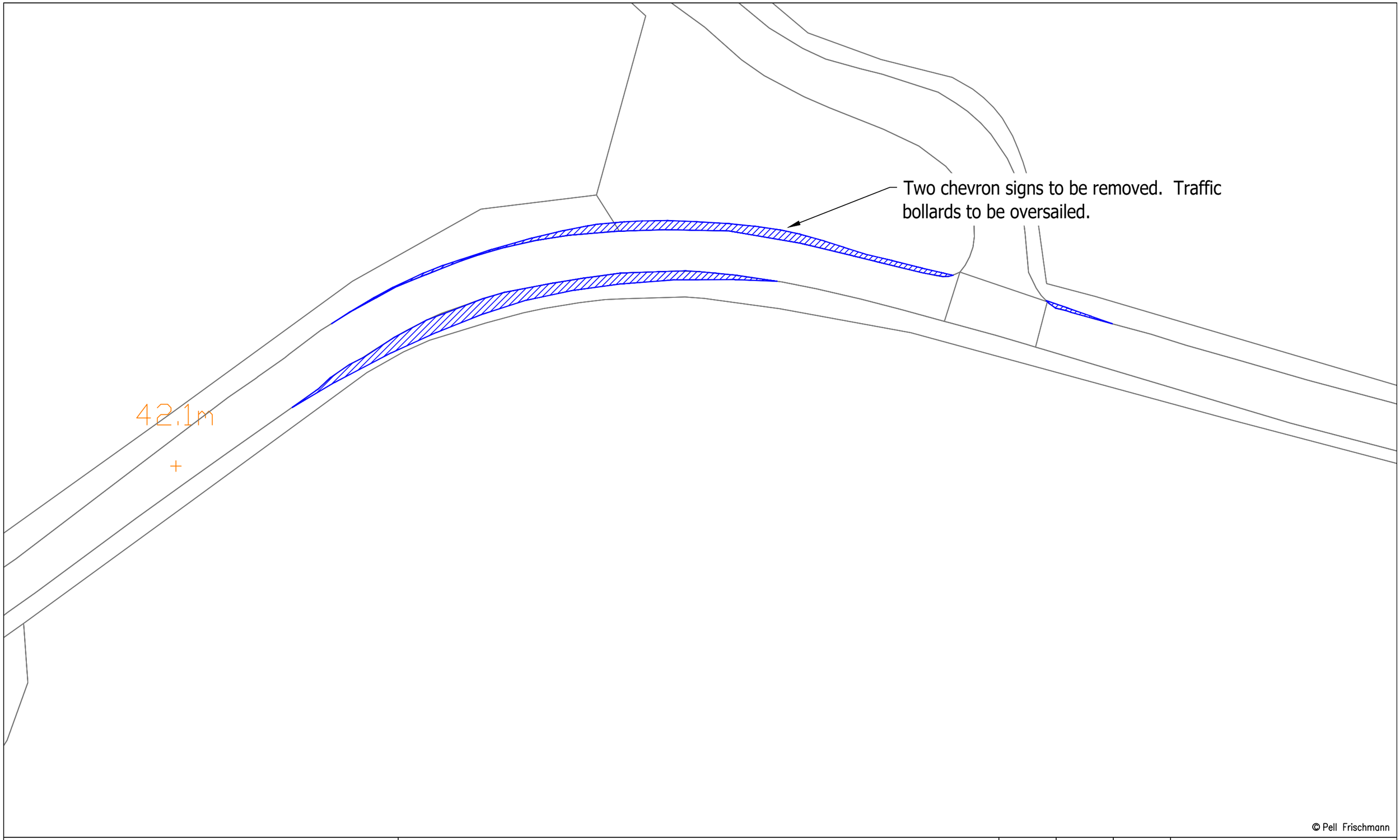
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK06

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Lybster Bends

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		14

Scale: 1:500 @ A3

File No.: 210305 Limekiln 2021.dwg

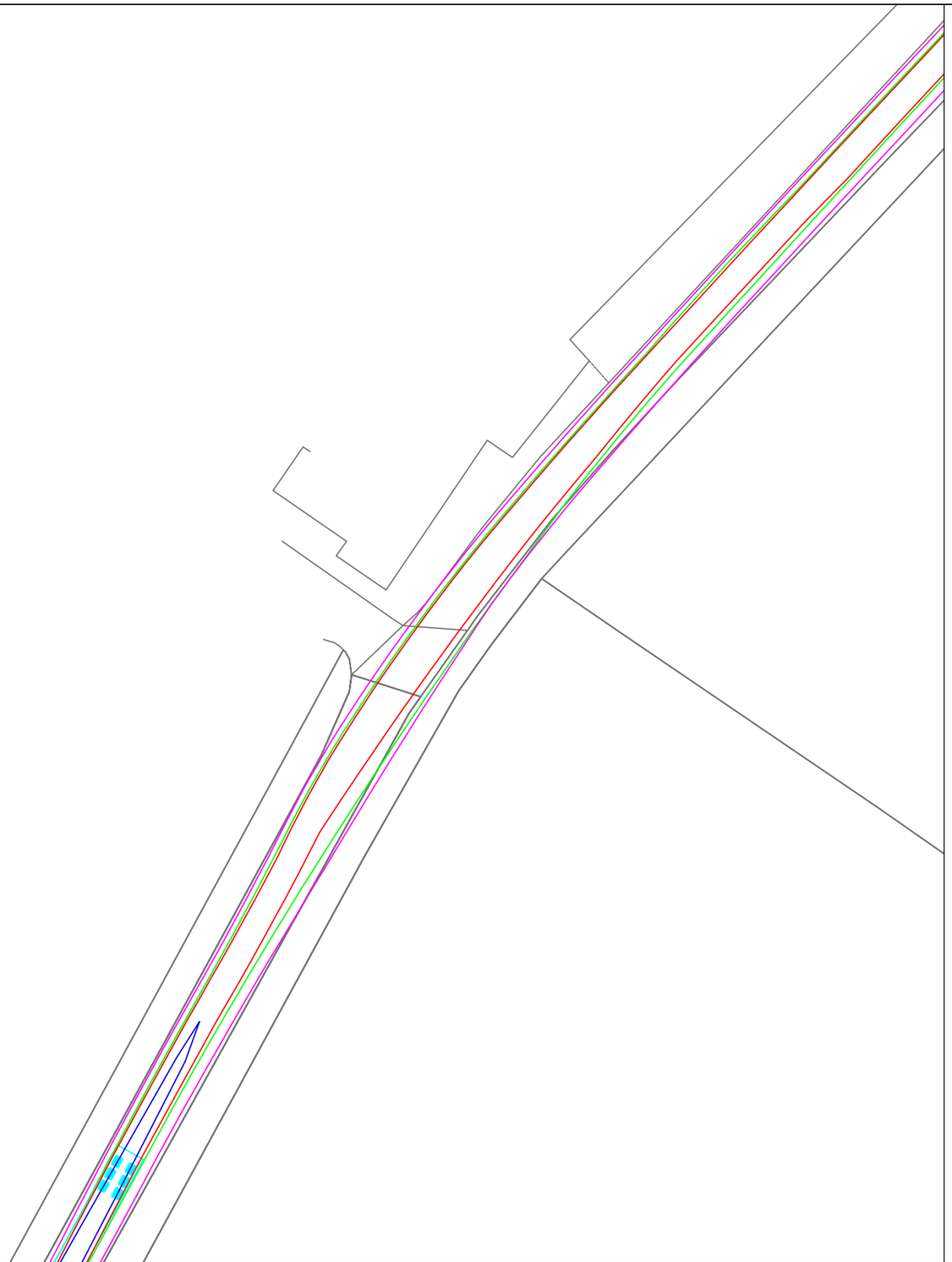
Drawing Status: Draft

Drawing No.: SK06A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower

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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Bends – Isauld Cottage

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		17

Scale: 1:500 @ A3

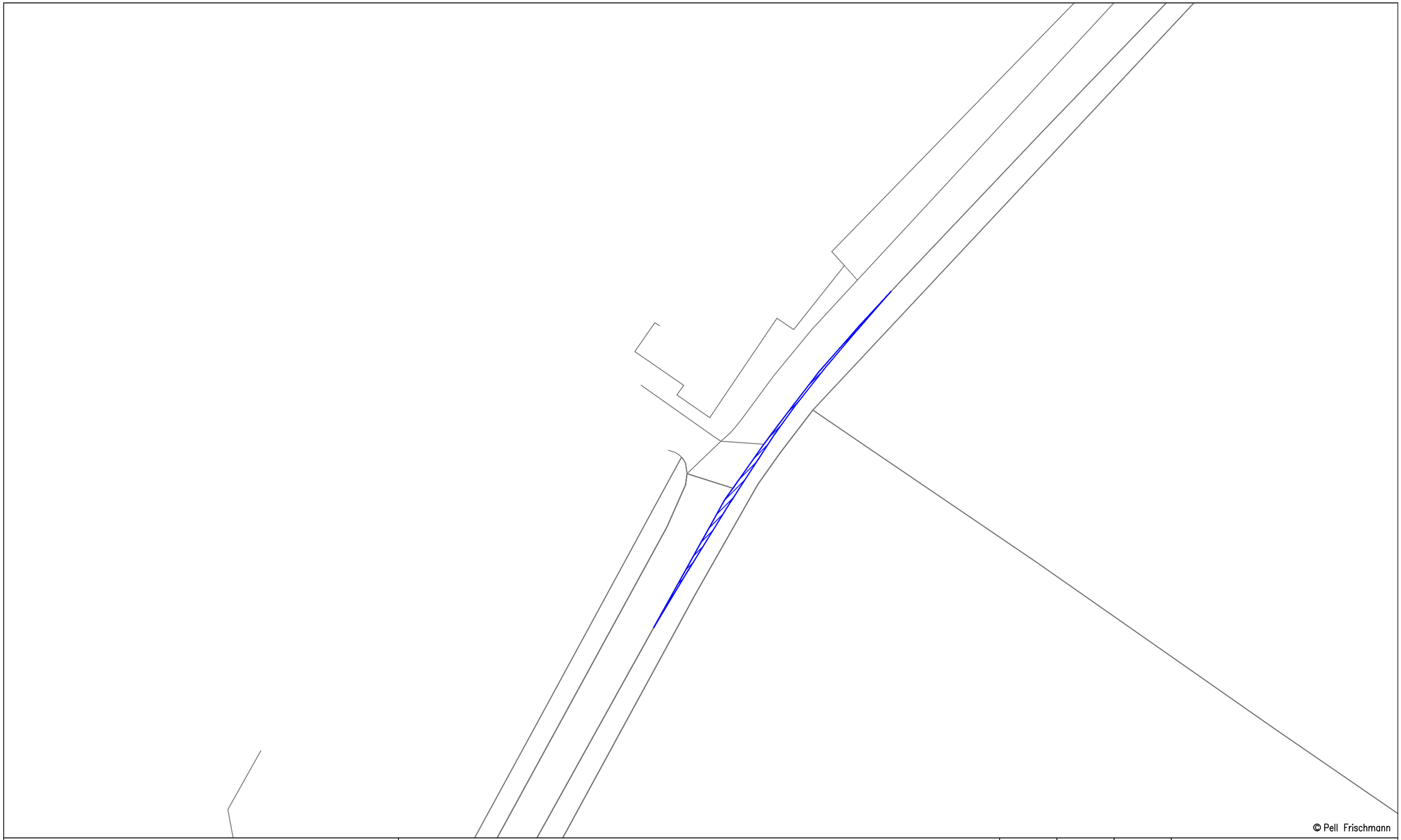
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK07

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 Bends – Isauld Cottage

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		17

Scale: 1:500 @ A3

File No.: 210305 Limekiln 2021.dwg

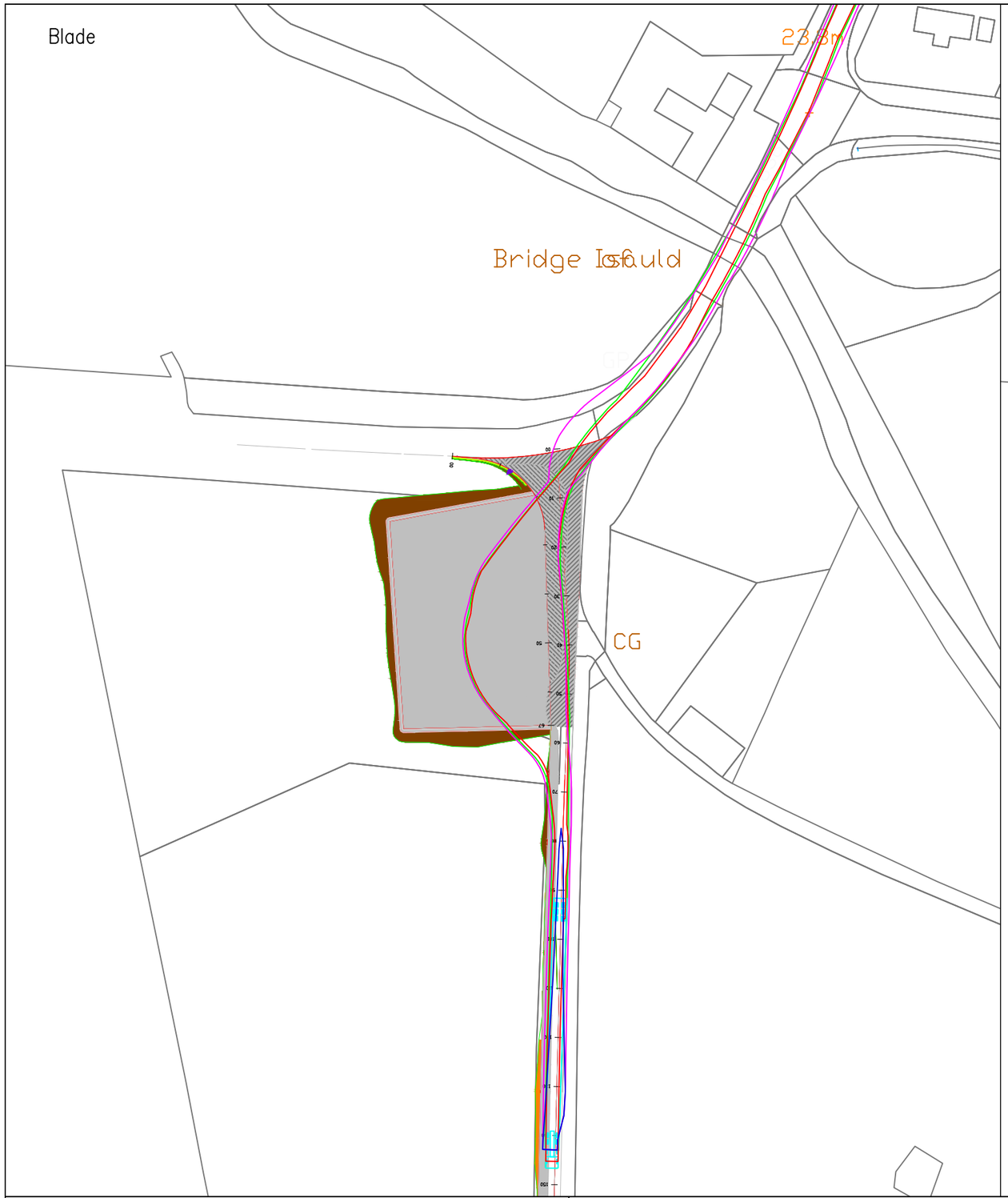
Drawing Status: Draft

Drawing No.: SK07A

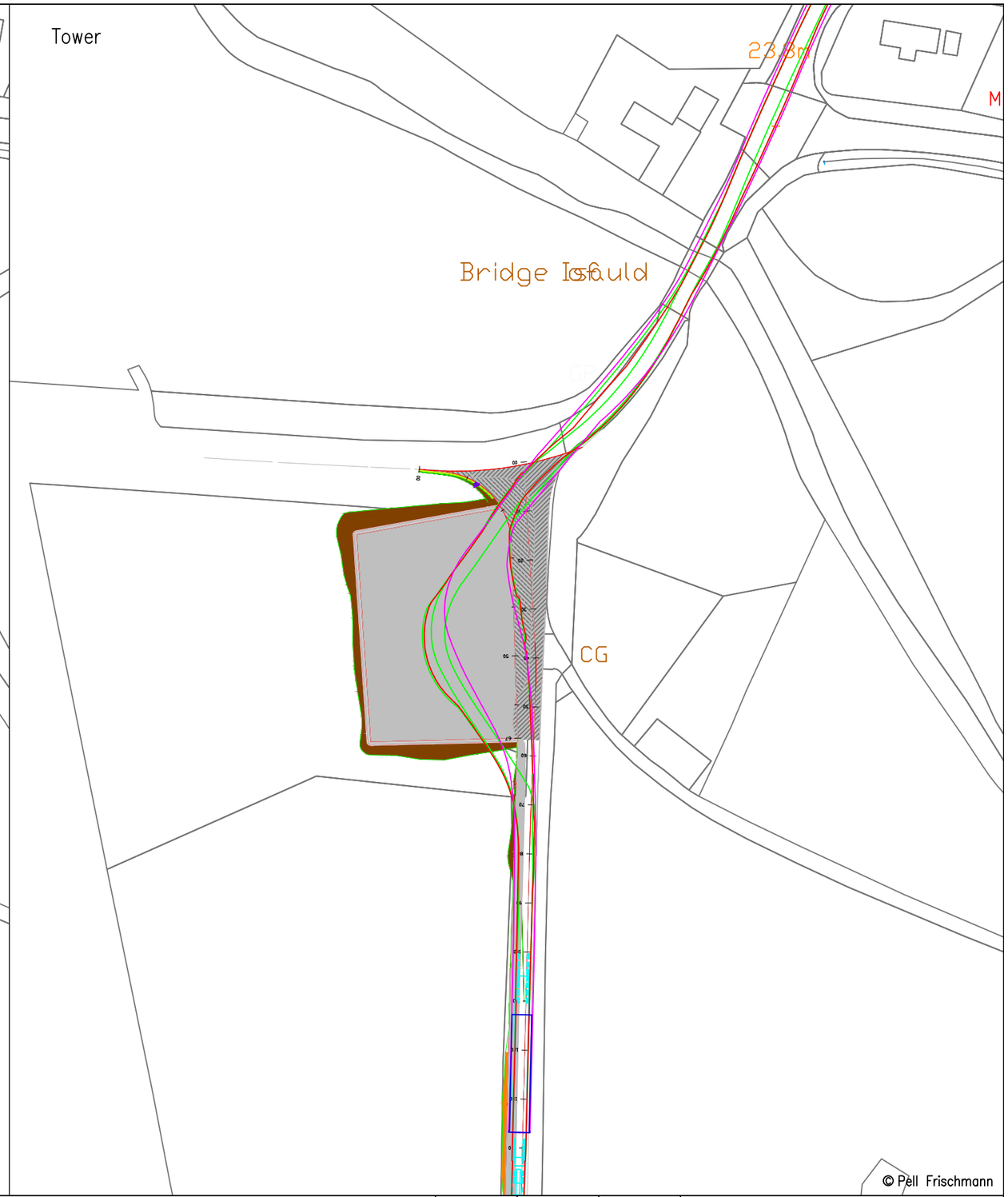
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower



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Client: Limekiln Extension Limited

Key: Wheel SPA; Body SPA; Load SPA; Indicative; Over-run; Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 / Milton Road Junction

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		18

Scale: 1:1000 @ A3

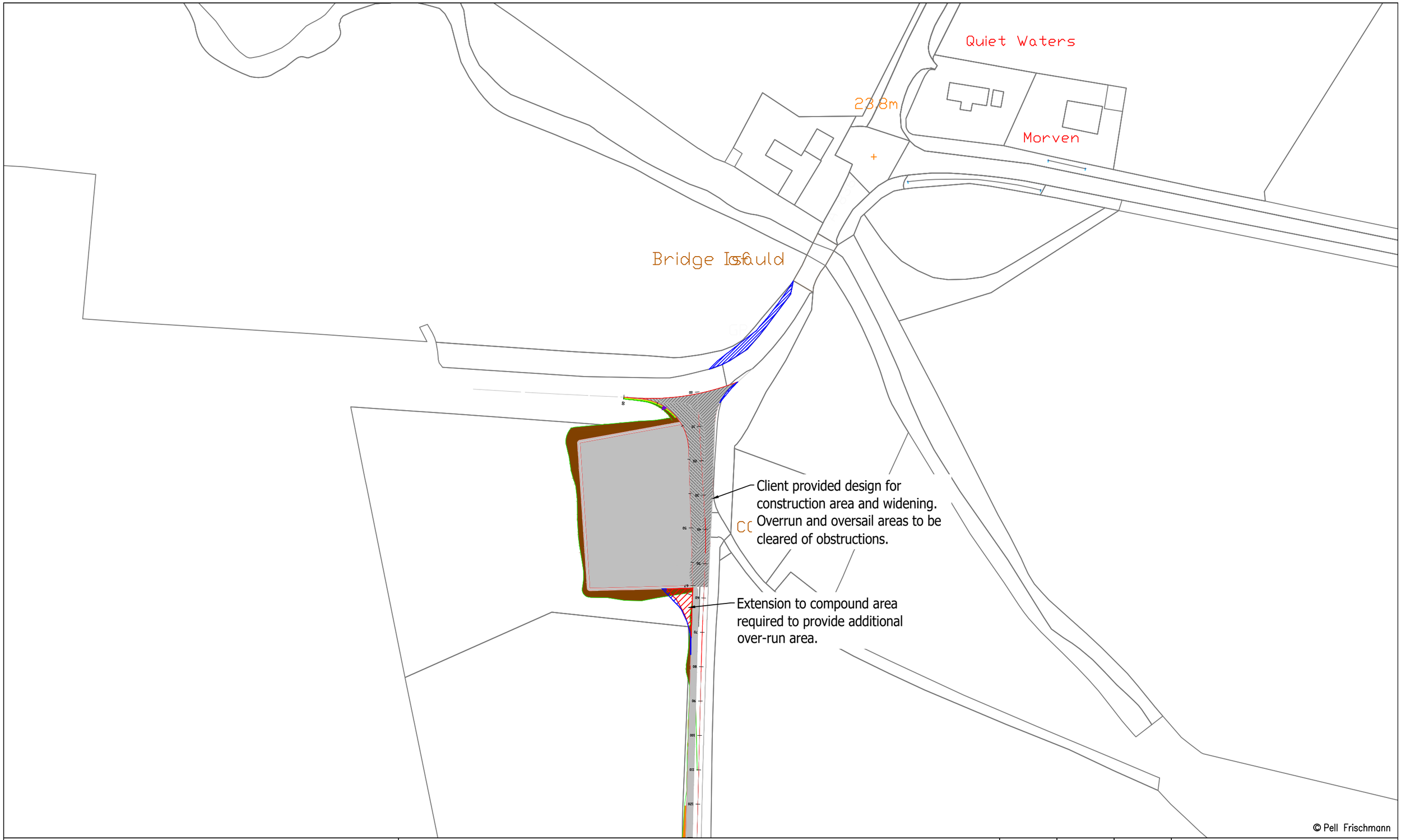
File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK08

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Limekiln Extension Limited

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Limekiln Wind Farm Extension

Drawing Title: Nordex N133 Blade and Mid Tower

SPA Location: A836 / Milton Road Junction

	Name	Date
Drawn	TL	05/03/2021
Designed	GB	05/03/2021
Checked	GB	05/03/2021
Point of Interest		18

Scale: 1:1000 @ A3

File No.: 210305 Limekiln 2021.dwg

Drawing Status: Draft

Drawing No.: SK08A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX