## Contents

1. Introduction ........................................ 1
2. Mast Specification .................................. 2
3. Commissioning ...................................... 3
4. Avoidance of Adverse Impacts to Ecological Receptors  11
5. De-Commissioning .................................. 12

TA reference: PEEM2100

Date of issue: 20 January 2014

---

1 New York Street
Manchester
M1 4HD

T: 0161 233 7676
1 Introduction

1.1 This Construction Method Statement has been prepared on behalf of Scout Moor Wind Farm Expansion Limited ("SMWFE"), previously known as Peel Wind Farms (Scout Moor) Limited. SMWFE is a joint venture company formed by Peel and United Utilities. This application provides detailed information in relation to the proposed erection of a temporary meteorological mast ("met mast") on land to the north of Scout Moor Windfarm.

1.2 The existing Scout Moor windfarm comprises 26 no. wind turbines and associated ancillary infrastructure. Each turbine stands to a height of 100 metres to blade tip.

1.3 In the autumn of 2011, Peel Wind Farm (Scout Moor) Limited announced that it was investigating the potential to expand the wind farm through the erection of additional turbines. Because the expansion proposals would constitute a Nationally Significant Infrastructure Project (NSIP) it would be promoted through the submission of an application for a Development Consent Order to the Planning Inspectorate.

1.4 The proposed met mast is required in order to assist SMWFE in obtaining a better understanding of the prevailing wind regime in the potential location of the additional turbines and the information will, in turn, assist the iterative design process for the expansion proposal.

1.5 The proposed met mast will be erected for a period of 36 months.

1.6 Details of the proposed mast location are provided at Table 1 below.

<table>
<thead>
<tr>
<th>Mast Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>382256, 420340</td>
</tr>
<tr>
<td>Latitude: 53° 40' 45.185&quot; N</td>
</tr>
<tr>
<td>Longitude: 2° 16' 12.373&quot; W</td>
</tr>
</tbody>
</table>

Table 1: Proposed Met Mast Locations
2 Mast Specification

2.1 The proposed mast is an 80 metre high Nexgen H1 meteorological mast.

2.2 The mast will be delivered in sections and assembled on site. For the height proposed there will be:

- 8 no. 2.7m long, 25.4cm diameter tubes
- 12 no 3.0m long, 22.0cm diameter tubes
- 7 no. 3.0m long, 20.0cm diameter tubes
- 1 no. 1.5m long, 20.0cm diameter tube

2.3 The general arrangement of the mast is shown on drawing 1-MA-80-001. Instruments will be mounted on booms at heights of 30mAGL, 50mAGL, 75mAGL and 78mAGL. The orientation of the booms is typically 180° and 270°.
3 Commissioning

3.1 This Chapter details the processes that will be undertaken to commission the met mast on site. Photographs of the erection of a similar met mast are provided for context.

Stage 1: Siting

3.2 Peat is a valuable natural resource supporting key habitats and represents an important store of sequestrated carbon. The location of the met masts has been carefully selected by SMWFE in order to avoid areas of deep peat, i.e. those areas with an organic-rich upper horizon deeper than 0.5 metres. The proposed location has also been chosen as it is outside of any area designated for biodiversity or geodiversity interest.

3.3 Using a compass, GPS and tape measure, the site will be marked out with pegs showing anchor positions and base plate. Clearance from power lines, buildings, public walkways etc. will be ensured. Wherever possible the mast will be laid out uphill, with the side anchors on level ground and with the prevailing wind coming from the direction of the lift anchor.

3.4 The mast anchoring configuration is detailed at Table 2 below.

<table>
<thead>
<tr>
<th>Anchor Distance from Mast Centre (metres)</th>
<th>Guys</th>
<th>Load Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 – 36</td>
<td>1, 2, 3</td>
<td>1,500 kg</td>
</tr>
<tr>
<td>49 – 51</td>
<td>4, 5, 6, 7</td>
<td>3,900 kg</td>
</tr>
<tr>
<td>23m lift anchor</td>
<td>1&amp;1to1</td>
<td>&gt; 5,000 kg</td>
</tr>
<tr>
<td>7m rear lift anchor</td>
<td>N/A</td>
<td>&gt; 3,000 kg</td>
</tr>
</tbody>
</table>

There must be a 35m and 50m anchor on all four sides of the mast. In addition to this there must be a 23m lift anchor and 7m rear anchor. Only guy set 1 and the 1 to 1 can be connected to the lift anchor, all other guys must connect to the outer anchors as specified.

Table 2: Mast Anchoring Configuration

Ground Conditions

3.5 Damage to the moorland vegetation and soils would be prevented by adhering to the following methods:

- Wet ground would be avoided. Unavoidable movement of machinery over wet ground would require the laying down in advance of >15mm plywood boards.
• No heavy tracked vehicles would be used unless on metalled roads and existing stone tracks.
• Only low ground pressure vehicles and machines would be used.
• Vehicles and machines would be confined to designated service tracks and work areas and movement kept to an absolute minimum to complete the work.
• There would be no slewing of vehicles that can form ruts and damage the vegetation and soil.
• There would be no change to the shape and form of the ground surface that could alter site hydrology.
• No bare ground would be left following works where not already present.

3.6 Suitable vehicles (e.g. 4×4 Land Rover or equivalent) to gain access to the mast location and plant and equipment will be used as needed to complete the work efficiently and safely.

**Underground Services**

3.7 The site plan will be checked and local land management contacted (or other knowledgeable source) for any known underground services.

3.8 CAT scan will be used to check for underground cables or pipe work in the vicinity of anchor locations.

**Stage 2: Installation of Ground Anchors and Load Testing**

3.9 The exact method of ground anchoring is typically determined by the ground conditions encountered on site. In this instance the ground consists of a shallow layer of peat (<10cm) which overlays soil. Nevertheless, efforts will be made to minimise the number of machine traverses over the ground.

**Installation of ‘dead-man’ anchors**

3.10 A trench is dug at the anchor position using a small backhoe or excavator, approximately 0.5m wide by 2.4m long by 2m deep, resulting in removal of approximately 2.4m³ of material. A small sloping trench is cut in front of the anchor to allow the anchor rod to sit at an angle of 45° to the mast centre. The ‘dead man’ is made from a tanalised timber gate post approximately 250mm round by 2m long, through the middle of which is passed a 2.5m long 24mm dia. galvanised anchor rod. The anchor rod is terminated on the underside of the timber using a 175mm × 175mm × 8mm steel washer plate and nut. The timber is then lowered into the hole with the eye of the anchor rod above ground. The following measures would be employed to reduce damage / disturbance to the ground:

• The turf/vegetation will be cut with a spade or the blade of the bucket, held vertically to cut down, and not at an angle. The cut turf should fit the bucket. It is anticipated that would be a need to only remove 2 or 3 turves at each anchor point.
• Turves would be cut to the depth of the roots (probably about 200-300mm although this will be assessed on site at each of the anchor points).
• Turves would be extracted intact and carefully placed in the order they were extracted on a geotextile (or heavy duty plastic sheet) in a location that is convenient for the works but where they will not be damaged by other activities. They will not be placed on top of each other. Turves from one anchor point will not be mixed with those from another.

• If there is organic-rich soil beneath the cut turf, this would be extracted in as complete a form as possible i.e. as bricks or box-shapes, and placed carefully to avoid them breaking, and stored on geotextile.

• The lower mineral soil horizons and substrate would be excavated and stored separately on geotextile.

• Following the completion of the trench and the installation of the anchor, the trench would be backfilled initially with the mineral soil and tampered down every 300mm with the back of the excavator bucket to get even compaction and support for the anchors. This would be followed by the infilling of any remaining organic-rich material.

• The turves would be replaced in the same order as they were extracted to maintain the integrity of the vegetation community, and gently compressed but not compacted, so they are not significantly proud of the of the adjacent ground surface.

• Any excess soil would be removed from site. However, the majority of the soil would be used to infill excavation trenches and it is not thought that there would be a significant amount of material to be removed.

3.11 The hole is backfilled with the soil and tamped down every 300mm with the bucket to get even compaction.

**Load Testing**

3.12 In order to test the holding capacity of the anchor the rod is pulled using the backhoe or excavator at an angle of approximately 45° to the mast centre. A load cell is placed in between the anchor and the machine in order to measure the holding capacity. In all except very weak ground a dead man anchor will provide extremely good holding characteristics. If the ground is very weak such as in peat then the hole dug will need to be backfilled with other material, and or the amount of buried timber will need to be increased. A typical dead man anchor layout is demonstrated at Figure 1 below; whilst a photograph of an example anchor point excavation is provided at Figure 2.

![Figure 1: Typical dead man anchor layout](image1.png)

![Figure 1: Example anchor point excavation (dug in soft sand)](image2.png)
Stage 3: Mast Assembly

3.13 The tubes that make up the mast exceed 25 kg and will be lifted carefully by at least 2 people. The mast and guys are assembled in the horizontal position on level ground to avoid undue flexing of the mast tower sections.

![Figure 2: Mast assembly on level ground](image)

Stage 4: Gin-Pole Assembly

3.14 The gin-pole will be assembled and erected. A winch load will be applied to the lifting cable and the mast raised off the ground. The security of winch anchor under load will be checked, and mast lifting points checked before commencing the mast erection.

Stage 5: Mast Test Lift

3.15 Before any instrumentation is attached to the mast a ‘dry’ lift will be carried out to allow the tube joints to settle and correct any misalignments in the shape of the mast. Once the full weight of the mast has been taken by the lift anchors the mast is lowered to a working height. Only then can personnel approach the mast to install instrumentation.

![Figure 3: Test lift of mast (with no instrument attached)](image)
**Stage 6: Instrumentation**

3.16 Instrumentation is attached as well as signal cables, data logger, and grounding conductors. All components are tested prior to lifting.

**Stage 7: Rear Guy Replacement**

3.17 Before lifting the mast, the rear guys are uncoiled and run through the rear anchor. The end of the guys are terminated in a loop secured by at least two rope grips, a shackle and rope extension are connected to the loops to allow control of the mast as it approaches mast vertical.

**Bird Deflectors**

3.18 Bird deflectors are fitted to the outer guy wires at specified intervals (typically every five meters) whilst cables are on the ground.

![Figure 4: Bird deflector attached to guy wire](image)

**Stage 8: Mast Erection**

3.19 The area under the mast will be cleared of personnel, equipment, and vehicles. The area will remain clear throughout the lifting procedure. The mast will then be raised.

**Zones of Safety**

3.20 The safety zone for site visitors and inexperienced crew members during the erection of the mast is beyond the ‘topple distance’ from the mast base (‘topple distance’ comprising height of mast + 10m).

3.21 Personnel approved by the site manager as competent and experienced in the process of lowering / raising tilt-up masts are required to work nearer to the mast, in an area of acceptable risk. This is beyond the gin pole radius (15m) whilst the mast is on the floor, and outside of the quadrilateral boundary ‘lift anchor to side anchor to mast layout tip to side anchor and back to lift anchor’ whilst the mast is being raised / lowered.
3.22 If there is any reason for personnel to approach closer to the mast than the boundaries described above, the mast raising / lowering process must halt and approval agreed with site manager or the winch operator.

**Stage 9: Guy Wire Tension, Side Guys**

3.23 It is very important that the correct tension of the side guys is maintained throughout the lifting process. The side guys hold the mast in the correct alignment while lifting. Personnel will be stationed at the side anchors to monitor this. The geometry of the site can cause tension in the guys to change as the mast is lifted. Too much tension may cause the tower to buckle, or guys to fail. Too little tension will allow the mast to bend or sway.

3.24 The guys can be adjusted using the rope grips. This must be done one at a time. Winching must stop while adjustments are made.

*‘Whipping’*

3.25 The gin stay wires and side guy wires will be continuously monitored to ensure that excessive tension does not develop. Guy failure during installation will therefore only be evident on the lift guys. Previous (and rare) experience has shown that guy failure occurs during the initial stage of the lift when the load is greatest, and that the guys do not travel beyond the quadrilateral boundary described in the zones of safety above.

**Stage 10: Rear Guys**

3.26 To support the rear of the mast as it approaches the vertical position, tension must be applied to the rear guys. This is achieved by means of ropes attached to the end of alternate rear guy wires. In this way, the mast can be controlled by personnel stationed at the side anchors.

3.27 Once the mast is vertical, it is held in place by tension in these ropes, while the rear guys are secured one at a time to the rear anchors. Careful observation of the rear guys has to be maintained at all times, to ensure free progress of the mast. Any snags or loops must be immediately rectified.

3.28 Due to the large weight of the gin pole it is necessary to control the rear guy attached to guy plate 1 with a Tirfor winch (TU8). The guy is run through a turning block on the rear anchor and run out to the side anchor where the Tirfor is positioned. Tension is applied to the rear guy using the Tirfor once the mast reaches 450 of tilt, and continuously up to 900. The load on the Tirfor must be enough to maintain the correct shape of the mast and gin pole as the mast approaches vertical (this is in the region of 600kg). Good coordination between the winch operator and the Tirfor operator is essential.
3.29 It may also be required to control the tension in rear guy 3 using a Tirfor depending on the site conditions/discretion of the supervisor.

<table>
<thead>
<tr>
<th>Mast Height</th>
<th>80m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear guys to be held with rope (minimum requirement)</td>
<td>1+3+5+7</td>
</tr>
</tbody>
</table>

**Stage 11: Final Guy Attachment**

3.30 Once all the rear guys have been secured, the remaining guys still attached to the Gin-pole can be transferred to their respective anchor point.

3.31 Some tension must be maintained at all times on these guys as they are transferred. Each guy must be firmly attached to the ground anchor before the next guy is removed from the Gin-Pole.

3.32 Attention must be given to supporting the Gin-Pole weight as the last guy is removed. This is done by means of a cable grabber and chain hoist. The tension in the last guy is relieved using the chain hoist and the shackle is then removed. The gin pole can then be lowered in a safe manner to the ground ready for dismantling. An additional chain hoist is needed to support the middle gin pole support wire during lowering.

**Stage 12: Secure Guys**

3.33 The mast is straightened by adjusting the guys one at a time. Once upright and straight, final security of the guys can be completed.

3.34 Apply security rope grips, three grips to each guy, and carry out final inspection of anchor points, tighten all fixings, and lock shackles.

3.35 After all guy adjustments have been made, it will be necessary to replace any faulty rope grips and re-torque all nuts. Ensure at least three wire rope grips are used on each guy, with the saddles on the live part of the rope, and the U-bolt pressing on the less heavily loaded tail of the rope. Each rope grip is double checked before leaving the site.

![Figure 5: Rope Clipping](image-url)
Stage 13: Instrument Check

3.36 Final tests of instruments and logger are undertaken and then padlocks are fitted as required.

Figure 6: Instruments being checked and secured
4  Avoidance of Adverse Impacts to Ecological Receptors

4.1 The moorland contains a number of important habitats which support valued species of plants and wildlife.

4.2 Every precaution will be taken to avoid harm and / or damage to vegetation and faunal species that are known to or may be potentially present.

4.3 This will be achieved by adopting the following:

- Avoiding potential disturbance to ground-nesting birds by completing all works, including decommissioning, outside the bird breeding season (March – September). In the event of works being required within the bird-breeding season a detailed ground search for nests would be carried out by a suitably experienced ecologist. If a nest is found no works likely to disrupt breeding would be permitted. Mitigation and avoidance measures would be recommended as appropriate, which may involve cordonning off areas until the nests are no longer active.

- Immediately prior to the installation of the masts, a walkover survey would be carried out by a suitably experienced ecologist to carry out a final check for any signs of species of interest such as badger setts. This could be carried out in conjunction with the siting of the mast where pegs are put in the ground to identify the working areas and/or in conjunction with the breeding bird check if works are timed between March and September,

- It is anticipated that any excavations for the dead man anchors will be backfilled as specified within the same day. However if this is not possible, the excavated area would be covered overnight to reduce the risk of any nocturnal species such as badgers becoming trapped.

- Existing records of white-clawed crayfish have been provided showing this species to be present within Dearden Brook on site. The watercourse itself is approximately 100m south of met mast 1. Whilst no direct impacts will occur as a result of the mast installation, operation or decommissioning, indirect impacts such as effects from the access route to/from the mast may occur. Therefore the access route will specifically avoid any watercourse crossings (except where they already exist). In addition, efforts will be made to reduce sediment entering watercourses such as avoiding work during periods of heavy rainfall and micrositing of any anchor points as relevant.

- The access to / from the mast locations will follow existing tracks or routes where possible.

- If any species are encountered during the works, such as reptiles, these will be removed to a suitable safe location as relevant by a qualified ecologist.

TURLEY ASSOCIATES

11
5 De-Commissioning

5.1 At the end of the period of planning approval, the mast will be removed entirely from the site. This will be achieved by lowering the mast to the ground and removing all instrumentation. The tubular sections that comprise the main body of the mast will then be disassembled and the guy wires removed.

5.2 The methods adopted to safeguard wildlife and the soil resource as part of the installation would also be followed for decommissioning.

5.3 In summary:

- Decommissioning would be targeted outside the bird breeding season. In the event of this not being possible a detailed search for active nests and any other species that may represent a constraint would be carried out in advance of works by a suitably experienced ecologist.
- No heavy tracked vehicles would be used and only low ground pressure vehicles. Works would be confined to service tracks and work areas with no unnecessary trafficking over vegetation and all movement kept to an absolute minimum.
- Intact turves would be cut around the anchors and set aside on geotextile and saved separately from mineral soil.
- The material surrounding the anchor would be removed and / or de-compact ed in order to extract the anchor.
- Mineral soil would be returned to the trench and compacted with the excavator bucket.
- Turves would be returned to their original position and gently compressed so they are slightly (about 400mm) above the surrounding ground level to allow for minor subsidence to avoid a depression in the surface.
We are a leading planning consultancy operating in key development sectors from offices across the United Kingdom.

Belfast  Glasgow
Birmingham  Leeds
Bristol  London
Cardiff  Manchester
Edinburgh  Southampton