APPENDIX 4-7

SPOIL MANAGEMENT PLAN

Malachy Walsh and Partners
Engineering and Environmental Consultants

Seven Hills Wind Farm

Spoil Management Plan (SMP)

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1 Introduction

Seven Hills Wind Farm is located between Dysart and Brideswell, County Roscommon. The proposed wind farm comprises 20 no. wind turbines with associated infrastructure including hardstands, access roads and substation, as well a temporary construction compound.

The purpose of this Spoil Management Plan is to ensure the wind farm is constructed safely and that the landscape is not adversely impacted as a result of the proposed development.

2 Purpose of the Spoil Management Plan

The purpose of this Spoil Management Plan is to describe how it is planned to construct Seven Hills Wind Farm in a manner that ensures the landscape is not adversely impacted as a result of the proposed development and that site management practices are carried out to complete the development safely and in the interest of orderly development.

The plan also sets out a methodology to prevent:

1. Rock or soil excavated during the construction phase from being adversely stockpiled on site following the completion of construction works in areas not suitable for same,
2. Adverse local effects on sensitive habitats.

The ultimate aim is to construct the wind farm project in a manner that facilitates regeneration of all-natural habitats at all locations affected by construction works and that will minimise the damage incurred on sensitive habitats.

3 Spoil Management

Site investigations were carried out along the proposed internal access road routes, at each turbine location and at the sites of all other infrastructural elements. This detailed information allowed a location-specific assessment of ground conditions to be carried out. Based on this information, adjustments to the site infrastructure were carried out. The outcome of identifying all of the environmental, technical and engineering constraints for the site was that an infrastructural layout could be provided in the most sensitive way considering the need for spoil storage.

3.1 Excavated Spoil Management

Spoil will invariably be generated during excavations for roads, hardstands, wind turbine foundations, etc. Minimisation of the production of this spoil is to be treated as a high priority, but it is nevertheless accepted that there will be generation of excess spoil in the form of a mixture of topsoil, rock and glacial till.

It is proposed that spoil material will be stored around each turbine and hardstand. The remainder of the excavated spoil should be transported directly from the excavation for disposal within the proposed deposition areas. This helps reduce the need for transportation of spoil across large areas and results in a reduced risk of dirty water generation.

3.2 Permanent Disposal of Excavated Spoil

Owing to the good geotechnical conditions on site the works can be constructed on the existing surface without the need to strip topsoil in a large number of areas. This cuts down the quantity of spoil generated. In areas of sloping ground there is a need to cut into the ground to facilitate the necessary road and hardstand gradients. This results in a number of large cuts that will generate large volumes of spoil. Foundation excavations will also require excavation to depth. Other areas of construction, the substation for example, will also require the stripping of topsoil as a minimum. All of this infrastructure generates material that contributes towards the total cut spoil volume for the site.

The management of spoil deposition areas will involve the following:

- Any point-source drainage from disposal areas will empty into a series of silt control measures designed in accordance with the surface water management plan.
- Water build-up within deposition areas will not be permitted.
- Excavated mineral shall be excavated and stored separately to topsoil; this will prevent mixing of materials and facilitate reuse afterwards.
- All materials which require storage will be stockpiled at low angles (< 5-10°) to ensure their stability and secured using silt fencing where necessary. This will help to mitigate erosion and unnecessary additions of suspended solids to the drainage system.
- If necessary, mineral soils will be covered while stored to minimise run-off.
- Sediment management systems, such as silt fencing, will be provided around the proposed deposition areas where necessary.

3.3 Temporary Storage of Excavated Material

No permanent stockpiles will be left on site after the completion of the construction phase works outside of the indicated spoil storage areas. After completion of the turbine base reinstatement works all remaining stockpiles are to be removed for permanent disposal at the proposed deposition areas within the site.

Any materials excavated during the construction phase which are to be used in the site reinstatement and landscaping process shall, in the first instance, be stored on site in an environmentally safe manner that will not result in the pollution of waters or the smothering of ecologically sensitive habitats.

The following principles will be adhered to when considering the temporary storage of excavated materials;

- Spoil will be deposited, in layers of 0.50m and will not exceed the thickness as indicated on the drawings.
- Spoil will only be deposited on slopes of less than 5 degrees to the horizontal and greater than 10m from the top of a cutting. The exact location of such areas will be confirmed on consultation with the geotechnical engineer.
- Once reinstatement is complete the disposal sites will be re-vegetated with the "top mat" removed at the commencement of disposal operations.
- Upon commencement of the restoration phase, guidance from a suitably qualified environmental professional will be sought to confirm the methodology and programme.

3.4 Reinstatement

Reinstatement works will commence at an early stage of construction. Such reinstatement will occur following the completion of individual sections of work, such as the completion of a turbine foundation or hardstand. Ongoing restorative programming facilitates the immediate relocation of material from one turbine base excavation to another completed area and in doing so can limit the requirement for temporary storage of material on site.

Excess stone and spoil which is unsuitable as a vegetation layer shall be placed in the deposition areas. Suitable material of sufficient density excavated during the works will be reused as ballast on the turbine foundations.

3.5 Control Measures

The following generalised control measures will be enforced during construction:

- No storage of excavated material other than in areas selected for such activities; temporary storage within the development footprint and deposition at proposed areas.
- Exclusion zones delineating the working corridor will be installed around all working areas using post and rope fences. No activity will be permitted past this fence.
- Water build-up in excavations will be avoided.
- Upslope cut-off drains will be installed in advance of construction.
- Existing drainage patterns will be maintained as far as is practicable.

- Deviation from the agreed work methodology must be approved by a suitably qualified environmental professional or site geotechnical engineer.
- The site supervisor will suspend work if work practices or weather conditions are unsafe.
- Where suitable material is available, it will be used for the immediate backfilling of any excavations.

4 Site Specific Spoil Management Plan

4.1 Method of Excavation

The general principles of extraction set out in this plan will be adhered to at all times during the construction phase.

4.2 Method of Construction

For the construction phase the activities that are considered likely to generate spoil are as follows:

- Construction of new excavated roads,
- Excavation and reinstatement areas for spoil,
- Excavations for turbine bases, crane hardstands, substation and the temporary site construction compounds.

Prior to the commencement of construction work on the required infrastructure above, the following will be considered:

- Existing ground profile,
- Existing ground soil type,
- Bearing capacity of required roads, turbine bases and hardstands,
- Existing natural drainage regimes on site,
- Proposed turbine manufacturer assembly and transport delivery specifications,
- Environmental buffer areas and zones.

4.2.1 Excavated Infrastructure

New roads and hardstands will generally be constructed using imported stone aggregate obtained from local quarries and placed over a layer of geogrid. Where large cuts are required a limited amount of stone will be generated that can be reused in construction. A similar approach will be taken for other infrastructure required for the project.

Typically the sequence of constructing new access roads and hardstands will comprise the following:

I. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
II. Excavators will first remove any topsoil / vegetative layer which may be present if deemed required. Hardstands and roads will be constructed on grade where possible. This material will be transported to an agreed storage area and maintained for re-use during the restoration phase of the wind farm construction. Material to be reused will generally be kept adjacent to the location for reuse where possible. Topsoil / vegetation removal will be kept to a minimum in order to prevent any runoff of silt during heavy rainfall.
III. Excavators will continue to strip and excavate the softer subsoil where required which will be temporarily stored adjacent to the works in accordance with approved methods with the use of an articulated dumper truck. Excavated material will only be temporarily stored on slopes under 10° and to a maximum height of under 1.0m at the required setback from streams until

they are transported to the selected deposition areas where they will be permanently stored if not reused.

IV. All excavations to be carried out will be battered back to a safe angle of repose and comply with the final Construction and Environmental Management Plan (CEMP).

V. Once a section of the excavated infrastructure is exposed to formation a layer of geogrid will be laid out which will be covered with imported aggregate stone as required.

VI. The stone will be delivered to the required work area and spread out locally with the use of excavators and compacted with the use of a roller which will roll the stone aggregate in maximum 250mm layers on top of the geogrid / geotextile material in order to achieve the required design strength.

VII. Drains as outlined in the relevant civil drawings will be constructed to manage clean and dirty water runoff in sensitive areas.

VIII. The final running surface of the new excavated access roads will be capped with a layer of hard wearing Cl 804 stone or similar using a road grader.

IX. Any surplus spoil material generated from the excavated infrastructure will be transported back to the deposition areas. Excavated topsoil and subsoil will be kept separate at the excavation and storage areas.

X. The appointed contractor will ensure that on-site personnel are aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.

4.3 Permanent Deposition Areas

There are a number of permanent deposition areas proposed within the site. These areas have been selected based on the locations of spoil generation, areas suitable for spoil storage, constrained areas, etc.

Prior to the use of areas for storage an interceptor drain will first be excavated upslope in order to intercept existing overland flow and divert it around the storage area prior to discharge via a buffer zone on the downslope side. A dirty water cut-off drain will be provided on the downhill side of the storage area to catch dirty water run-off and transfer it to a settlement pond prior to discharge via a buffered outfall.

Inspections of the storage areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil deposition areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.

The surface of the deposited spoil will be profiled to a gradient not exceeding 10^0 and vegetated or allowed to vegetate naturally as indicated by the project ecologist

Approximately 126,500m³ of spoil material will be generated on site. Of this, an estimated 8,100m^3 will be rock and 118,400m^3 will be spoil (clays/gravels/topsoil). 20,000m^3 of the spoil will be reused as ballast for the backfilling around the turbine foundations. 1,500m^3 will be stored local to each turbine foundation and hardstand in allowable areas (16 of 20 turbines), totalling 24,000m^3. 7,500m^3 will be used for miscellaneous landscaping. The remainder of the surplus excavated spoil material, estimated at 66,900m^3 will be stored within the deposition areas.

The breakdown of the surplus spoil material into the northern and southern parts of the project is 17,300 and 49,600m^3 respectively. The storage areas proposed can accommodate these volumes of material without the need to transport spoil from the northern part of the project to the southern, and vice versa.

The quantity of spoil material requiring management on site has been calculated as shown in Table 1 below.

Development Type	Approx. Volume (m^3) North	Approx. Volume (m^3) South
Infrastructural Spoil Generation	+ 40,700	+ 85,800
Storage at hardstands and turbines	- 10,500	- 13,500
Reuse of material for ballast	- 7,000	- 13,000
Reuse of rock	- 3,900	- 4,200
Landscaping	- 2,000	- 5,500
Total Spoil to be Managed	**17,300**	**49,600**

Table 1 Spoil excavation volumes

A summary of the spoil storage volumes is shown in Table 2.

Spoil Storage Area	Approx. Volume (m^3)
Northern Site Spoil Storage Areas	17,300
Southern Site Spoil Storage Areas	49,600
Total	**66,900**

Table 2 Spoil storage volumes

It should be note that volumes are based on a computer-generated model of the site and actual site works will likely result in less spoil generation than calculated here.

4.4 Temporary Spoil Storage Areas

Temporary storage of spoil may be required on a turbine by turbine basis. Such areas will be managed by a suitably qualified and experienced environmental professional or the site geotechnical engineer. Temporary stockpile heights on site will be limited to <1m and built to a safe batter angle.

4.5 Role of Environmental Manager

An environmental manager will be appointed for the construction phase of the development. As part of this role the environmental manager will conduct the following works in relation to surplus spoil management:

- Mark ecological constraints on the working areas and route corridors, in consultation with the Geotechnical/Civil Designer as necessary,
- Agree proposals for temporarily side casting and temporary storage areas as development

proceeds,

- Agree methodology for stripping existing vegetation and locations where material is to be deposited,
- Agree timing of restoration and reinstatement of access track sides,
- Issue instruction to cease work if unexpected risks arise, until an agreed alternative solution is identified, and risks are avoided or minimised.

5 Conclusion

The ground conditions at this site are such that the creation of spoil can be minimised. This is owing to a solid formation expected at relatively high levels. No peat is present on site and much of the excavated spoil can be reused. Spoil will be reused or stored locally to it's point of generation, reducing the impact of long-haul routes. Sufficient storage areas are provided for material that cannot be reused or stored adjacent to turbines and hardstands.