Appendix 11.2 Stage 1 Flood Risk Assessment

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Appendix 11.2 Level 1 Flood Risk Assessment

1 Introduction

1.1 *Background*

1.1.1 Douglas West Wind Farm Ltd is proposing amendments to a consented renewable energy development, Douglas West Wind Farm (the Revised Development), 11 km south west of Lanark, in South Lanarkshire. An Environmental Statement (ES) has been prepared in support of a planning application submitted to South Lanarkshire Council (SLC) under the Town and Country Planning (Scotland) Act 1997 (as amended) seeking permission to construct and operate the Revised Development.

1.1.2 The purpose of this report is to identify and quantify any potential flooding issues associated with the Revised Development. This report will take into account the recommendations of the Scottish Planning Policy (SPP) issued by the Scottish Government in June 2014, Planning Advice Note (PAN) 61 Planning and Sustainable Urban Drainage Systems and PAN 69 Planning and Building Standards Advice on Flooding issued by the Scottish Government in August 2004 which is now superseded by the Online Planning Advice on Flood Risk (updated July 2015).

1.2 *Policies and Guidance*

1.2.1 The following represent the key Scottish planning policies and guidance in relation to flooding:

- **National Planning Framework 3:** Provides the long term spatial strategy for Scotland's development.
- **Scottish Planning Policy (SPP):** Scottish Government's policy on nationally important land use planning matters. Provides policy on flooding and drainage (paragraphs 254-268).
- **Planning Advice Note (PAN) 61 – Planning and Sustainable Urban Drainage Systems:** Good practice advice for planners and the development industry complementing the Sustainable Urban Drainage Systems Design Manual for Scotland and Northern Ireland.
- **PAN 69 – Planning and Buildings Standards Advice on Flooding:** Scottish Government advice on planning and building standards in areas where there is a risk of flooding.
- **PAN 79 – Water and Drainage:** PAN 79 clarifies the role of the planning authority in setting the direction of development to inform the planning and delivery of new water infrastructure in a co-ordinated way. It explains the roles of Scottish Water and SEPA and encourages joint working in order to ensure a common understanding of capacity constraints and agreement on the means of their removal.
- **SEPA Guidance Note 8 - SEPA standing advice for planning authorities and developers on development management consultations:** Outlines methodologies that may be appropriate for hydrological and hydraulic modelling and what information SEPA requires to be submitted as part of a Flood Risk Assessment.
- **SEPA Technical flood risk guidance for stakeholders:** Outlines methodologies that may be appropriate for hydrological and hydraulic modelling and what information SEPA requires to be submitted as part of a Flood Risk Assessment.

- **Clyde and Loch Lomond LFRMP (2016):** Describes the actions which will make a difference to managing the risk of flooding and recovering from any future flood events, setting out the Local Plan District wide actions together with other flood risk management activities. The plan provides information on the funding and co-ordination arrangements for the delivery of actions set out in the Plan and confirms the commitment to use natural features to manage flood risk where beneficial.
- **CIRIA C624 – Development and Flood Risk – guidance for the construction industry:** Provides guidance to developers and the construction industry on the implementation of good practice in the assessment and management of flood risk as part of a sustainable development process.

2 Requirements of a Flood Risk Assessment (FRA)

2.1.1 Paragraph 255 of SPP notes that planning policy should promote:

- A precautionary approach to food risk from all sources;
- Flood avoidance;
- Flood reduction; and
- Promoting the use of Sustainable Drainage Systems (SuDS).

2.1.2 The updated SEPA Policy 41 - Development at Risk of Flooding: Advice and Consultations (2016), provides guidance on requirements and protocol for undertaking flood risk assessments

2.1.3 The Technical Guidance notes that the purpose of an FRA is to 'predict and assess the probability of flooding from all sources for a particular site or area and should recommend mitigation measures, including maintenance. The four key risk receptors to consider are human healthy, economic activity, environment and cultural heritage'. The scale, nature and location of the Revised Development will inform the scope of the FRA required.

2.1.4 The Technical Guidance advises that the detail and technical complexity of an FRA will be proportionate to the scale and potential significance of the study but, in all cases, it should address or comply with the following basic requirements, where relevant:

- the flood risk to the development itself;
- assessment of any mitigation measures proposed by the developer or planning authority;
- the impact upstream and downstream and to adjacent sites /existing development;
- any comments on any nearby hydraulic structures, including formal flood prevention measures;
- any comments on potential erosion related hazards;
- sustainability considerations such as climate change;
- any comments on habitats issues.

3 Site Information

3.1 *Site Location*

3.1.1 The site is located approximately 11 km south west of Lanark, 1.6 km north of Douglas and 1.3 km south of Coalburn (to the nearest turbine) in rural South Lanarkshire.

3.2 *Site Description*

3.2.1 The site forms part of the former Dalquhandy Opencast Coal Site that was once the largest opencast in Europe which operated between 1988 and 2004. The Revised Development lies within two landscape character types (LCT); the Plateau Farmland Open Cast Mining LCT and the Rolling Moorland LCT. The site of the Revised Development is composed of low grade agricultural land, much of which has been disturbed by previous opencast operations. Figure 3.1 shows the extent of the mining operations which are largely concentrated to the north of the existing access road, used for transporting coal from the site to market.

3.3 *Revised Development*

3.3.1 The Revised Development will comprise 13 wind turbines of up to 149.9 m maximum tip height, each with a typical generating capacity of around 3.8 MW. A number of ancillary development components are also proposed, including a construction compound; hardstandings adjacent to the wind turbines for construction, maintenance and decommissioning cranes; access tracks; underground cables between turbines; an onsite substation and maintenance building with welfare facility and removal of the existing meteorological monitoring mast after a new permanent meteorological monitoring mast is installed.

3.3.2 The final Revised Development layout is illustrated in Figure 3.5 (and Figure 1.2 aerial mapping).

3.4 *Topography*

3.4.1 The elevation of the site ranges from 220 m to 320 m above ordnance datum (AOD). The site occupies an area of approximately 2.45 km². The central grid reference for the site is NS 81791 32782. The site location and site boundary are shown in Figure 1.1.

3.5 *Climate*

3.5.1 The Drumalbin climate station is the nearest station to the Revised Development. Averages for temperature and rainfall at this station between 1981 – 2010 are represented in Table 1 below:

Table 1: Monthly temperature and rainfall averages for Drumalbin

Month	Max. temp (°C)	Min. temp (°C)	Rainfall (mm)
Jan	5.2	0.3	89.9
Feb	5.5	0.0	67.1
Mar	7.6	1.3	71.8
Apr	10.4	2.9	49.1
May	13.8	5.2	50.7
Jun	16.1	7.9	57.0
Jul	18.0	9.9	71.1
Aug	17.7	9.8	78.3
Sep	15.0	8.1	78.1
Oct	11.4	5.3	104.1
Nov	7.8	2.5	93.3
Dec	5.4	0.2	89.9
Annual	11.2	4.5	157.4

3.6 *Geology and Soils*

3.6.1 The site is mainly underlain by sandstone and limestone bedrock, namely Swanshaw Sandstone in the southern extent of the site, and Kinnesswood Formation to the north west of the site. Limestone from

the Lawmuir Formation and the Clackmannan Group is evident in the northern and north eastern parts of the site area.

3.6.2 The site is mainly underlain with till, although SNH identified peat in the southern area of the site, this is not identified from the BGS mapping (refer to ES Figures 11.3 and 11.4) nor borne out by the peat probe surveys undertaken on site.

3.6.3 Soil cover on site is identified as mainly that of non-calcareous gleys (some brown forest soils with gleying and peaty gleys). Gleys are termed as wet soils that have poor drainage. There was no evidence of blanket peat on site.

3.7 *Hydrogeology*

3.7.1 The site is a moderately productive aquifer. Low yields of groundwater are evident from the sandstone on site, except where disturbed by mining. Locally, fracture flow yields between 10-12 L/s.

3.8 *Hydrology*

3.8.1 As shown on Figure 11.1 of the ES, the Poniel Water, which is a tributary of the Douglas Water, flows into the western side of the site, through a steeply sided valley before flowing through a pipe culvert beneath an existing haul road and then into a man-made channel which was created during the opencast operations in the north of the site, flowing in an easterly direction.

3.8.2 The Poniel Water, which is a tributary of the Douglas Water, flows from west to east along the north-western boundary of the site. It forms part of the overall catchment of the River Clyde. In 2008 SEPA classified the Poniel Water as having an overall status of moderate with high confidence. SEPA has set an overall objective of increasing this status to good by 2027. Similarly, to the underlying groundwater body, the key pressures on the watercourse are associated with former mining and quarrying of coal. In this regard, it is noted that the original course of this stretch of the Poniel Water used to run further south prior to it being diverted to facilitate the Dalquhandy Opencast operations in the early 1990s.

3.8.3 Shiel Burn, Longhill Burn and Alder Burn are tributaries of the Poniel Water and flow from south to north through the western, central and eastern parts of the site respectively. These watercourses do not have a SEPA classification regarding status. However, as tributaries of the Poniel Water, they are anticipated to have a similar overall status.

3.8.4 There are four main ponds on the site at the following locations:

- To the north east of Turbine 9 (T09), fed by the Alder Burn;
- Between T08 and T09, fed by a small, unnamed watercourse which then feeds into the Alder Burn;
- To the east of T05 and south west of T06, which is fed by the Longhill Burn. This pond was created as part of the restoration of the previous opencast operation; and
- Between T03 and T04, which is fed by an unnamed watercourse within the plantation woodland.

3.8.5 During a site visit on 03 July 2017, there was no indication of surface water flooding or issues with drainage in the Revised Development area.

4 Flood Risk

4.1 *SEPA Flood Map*

4.1.1 The online SEPA flood risk map indicates that most of the site has no identified flood risk. The banks of the Poniel Water and a small pond located to the east of T05 and southwest of T06 are indicated to be at risk of localised flood events.

4.2 *Anticipated Fluvial Flooding*

4.2.1 All turbines have been located at least 50 m from all watercourses described in Section 3.8 above.

4.2.2 Turbines T01, T02 and T03 are located between 100 m and 120 m from the Poniel Water, however, it flows through a steep sided, incised valley and therefore the turbines are all at a considerably higher elevation than the burn.

4.2.3 Should the water levels within the burn overtop its south bank (i.e. towards site infrastructure), the flood waters will be contained within the incised valley and would flow to the east, with no turbines located directly in the flow route.

4.2.4 The catchment area of Poniel Water as it enters the site is very small, and so peak flows within the watercourse are also likely to be relatively small.

4.3 *Anticipated Pluvial Flooding*

4.3.1 The small ponds are located at various low points and depressions in the ground throughout the site, and are likely accumulation points for any surface water flow.

4.3.2 The proposed site infrastructure, including the turbines and substation building, are all located on areas of ground which are raised above these low points, or located on slopes. This will ensure that any overland surface water flows are not likely to pond and impact on them in any way.

4.4 *Flood Routing and Risk*

4.4.1 As noted above, it is considered that fluvial flood risk to the site in general is low, however consideration should be given to the possibility of high flows routing east from the Poniel Water. This is considered highly unlikely to affect any site infrastructure.

4.4.2 Drainage for the access tracks and hardstandings within the site will be designed to ensure that runoff from these does not adversely impact any of the site infrastructure or increase the risk of flooding downstream of the site.

5 Conclusions

5.1.1 The site is located approximately 11 km south west of Lanark, 1.6 km north of Douglas and 1.3 km south of Coalburn (to the nearest turbine) in rural South Lanarkshire. The site has been assessed to identify and quantify flooding issues associated with all potential flood sources.

5.1.2 The Poniel Water, flows into the western side of the site, through a steeply sided valley before flowing through a pipe culvert beneath an existing haul road and then into a man-made channel north of site, eventually flowing in an easterly direction.

5.1.3 The risk of fluvial flooding is considered to be very low and therefore insignificant due to the incised nature of the valley through which the Poniel Water flows.

5.1.4 The proposed site infrastructure including turbines, access tracks and substation building, are all located on areas of ground which are raised above low points, or located on slopes. This will ensure that any overland surface water flows are not likely to pond and impact them in any way. As such, it is considered that the risk of pluvial flooding to the site is low.

5.1.5 As noted above, drainage for the access tracks and hardstandings within the site will be designed to ensure that runoff from these does not adversely impact any of the site infrastructure or increase the risk of flooding downstream of the site.

6 References

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- Glasgow City Council (2016), Clyde and Loch Lomond Local Plan District - Local Flood Risk Management Plan June 2016;
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