13. Shadow Flicker & Safety

13.1 Non-Technical Summary

13.1.1 This Chapter addresses Shadow Flicker and Safety. Due to the 2km distance from the nearest turbine of the Proposed Development to a residential property, the Applicant requested that an assessment of Shadow Flicker could be scoped out from this application (this application will be based on a Nordex N133 turbine with a 133m rotor diameter); Highland Council agreed with this request.

13.1.2 The Applicant has requested a 40-year operational lifetime for this application, Applications for extensions to operational lifetime are increasingly common from wind farm developers and asset owners. An operational wind farm would be subject to planning conditions ensuring that noise emissions are not breached and the asset continues to operate. Studies which have been completed show that, subject to the ongoing operation and maintenance of a wind farm and additional investment in key components, significant health & safety impacts are not predicted to arise.

13.2 Summary

13.2.1 This Chapter considers Safety issues relating to the operation of the Proposed Development.

13.2.2 Wind turbine technology is now well proven with many years of safe turbine operation across the world, particularly in Germany, Holland, Spain and Denmark, but also across the UK.

Context for appraisal

13.2.3 Relevant guidance on wind energy is provided in the Scottish Government's Online Planning Advice on Onshore Wind Turbines (May 2014), whilst wind turbine manufacture, installation and operation is undertaken in accordance with the relevant European and British Standards.

13.2.4 Renewable UK has also published health and safety guidelines for the operation of wind developments which will be fully adhered to during this project. By adhering to such guidance operational health and safety risks will be minimised and fully mitigated.

13.2.5 It is now common for wind farm developers and asset owners to consider an application for extending the lifetime of an operational wind farm scheme, and applying in the original application for an operational lifetime of greater than 25 years.

Baseline

13.2.6 The application site is located within an area of upland moor, with turbines and related infrastructure located away from existing built development and footpaths.

Potential effects

13.2.7 Notwithstanding the above, the following section briefly considers some of the frequently raised health and safety questions regarding wind turbine operations.

Electrical risk

13.2.8 A wind turbine is, in effect, a power station with high voltage equipment. To minimise injury by electrocution, the turbine and the associated external substation and switch house will be secured against intruders. Electrical equipment will be contained within the tower structure and external transformers and all cables will be underground.

Mechanical risk

13.2.9 A possible but rare source of danger to human or animal life from a wind turbine would be the loss of a piece of the blade or, in the most exceptional circumstances, of the whole blade. Many blades are composite structures with no bolts or other separate components. Even for blades with separate control surfaces on or comprising the tips of the blade, separation is most unlikely.

13.2.10 Wind turbines have an exemplary safety record with no recorded instances of fatalities to any member of the public anywhere in the world. The turbines are also designed to shut down automatically during high wind speed conditions, typically in excess of 60 mph.

Ice throw

13.2.11 There is a risk of ice accumulation on turbine blades, nacelles and towers under certain conditions such as periods of very cold weather with high humidity. In those instances where icing of blades does occur, fragments of ice might be released from blades, particularly when the machine is started.

13.2.12 Research indicates that the maximum potential disturbance for ice falling from turbines is approximately 1.5 times rotor diameter plus hub height. This equates to 258m for the proposed scheme. There are no properties or roads within this distance of a turbine.

13.2.13 The wind turbines would in any event be fitted with vibration sensors to detect any imbalance which might be caused by icing of the blades. This enables the operation of machines with iced blades to be inhibited.

Lightning risk

13.2.14 The possibility of attracting lightning strikes applies to all tall structures and wind turbines are no different. Appropriate lightning protection measures are incorporated in wind turbines to ensure that lightning is conducted harmlessly past the sensitive parts of the nacelle and down into the ground.

Aviation safety

13.2.15 Aviation safety issues have been fully assessed within Chapter Fourteen: Infrastructure.

Risk to road users, railways and members of the public

13.2.16 The Online Renewables Planning Advice on Onshore Wind Turbines states: 'Although wind turbines erected in accordance with best engineering practice

should be stable structures, it may be advisable to achieve a set-back from roads and railways of at least the height of the turbine proposed, to assure safety.

The distance between the nearest proposed turbines and public roads is well in excess of tip height. In respect of footpaths, many wind farms in Scotland are open access and allow members of the public to walk close to the turbine towers.

40-year Operational Lifetime

13.2.17 Wind Farms in the UK have typically requested in their planning applications an operational lifetime of 25 years. There is ever-present pressure on developers and asset owners to increase the potential income generated by a wind farm by increasing blade tip heights, and extending the operational lifetime of existing wind farms.

13.2.18 The Engineering Review completed in respect of Ben Aketil Wind Farm for an extension in operational lifetime to 32 years (see **Appendix 13.A**), in the THC area, came to the following conclusions:

- Feasible (for 32 years operational lifetime) with additional investment in adapters, blade, ring, main carrier;
- Feasible (*beyond* 32 years operational lifetime) with additional investment in pitch actuators and supports and the pitch bearing.

13.2.19 The type of turbine to be installed post any potential consent for the Proposed Development will be subject to a tendering exercise, however the turbines currently installed at the Operational Scheme, Siemens SWT 101 (3MW), do not have a gearbox which removes a potential source of both wear and tear and potential for some noise issues to arise.

13.2.20 The asset operator of a consented Proposed Development would be subject to a noise condition for the operational lifetime of a consented project. This ensures that turbines would operate within legal parameters, and subject to enforceable action if they do not. In the same way, an asset operator would also be expected to remove a turbine if it is no longer operational for a stated period of time. For an asset owner, the clear trend is that extensions to the operational lifetime of a wind farm are a low-risk commercial decision.

Conclusion

13.2.21 The study of safety considerations has confirmed that appropriate mitigation measures have been incorporated during the site selection and design stages to minimise safety risks, and that adherence to the relevant British and European Standards and regular operation & maintenance of the wind farm with additional investment in key components, will ensure that risks can be managed during the operational stage.

References

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