

Chapter 14

Health and Public Safety

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Glossary

Term	Definition
Health and Safety File	A file of information compiled to protect people on construction projects
Ice throw	Under certain conditions, ice may form on turbine blades. If the turbine is operational and the ice becomes detached while the blades are rotating, it may be projected away from the turbine.
Shadow flicker	The effect caused when turbine blades cast shadows over neighbouring properties as they turn, through constrained openings such as windows.
Thermal runaway	A chain reaction within a battery cell that is caused when the temperature inside a battery reaches the point that causes a chemical reaction, which produces heat, driving the temperature higher and causing further chemical reactions. This chain reaction can lead to batteries being damaged or catching fire.

List of Abbreviations

Abbreviation	Description
AQA	Air Quality Assessment
AQMA	Air Quality Management Area
BCBC	Bridgend County Borough Council
BMS	Battery Management System
CDM	Construction Design Management
CDM 2015	Construction (Design and Management) Regulations 2015
DECC	Department for Energy and Climate Change
EIA	Environmental Impact Assessment
ES	Environmental Statement
GW	Gigawatt
HSE	Health and Safety Executive
IEC	International Electrotechnical Commission
LPA	Local Planning Authority
Natural Power	Natural Power Consultants Ltd
NPTCBC	Neath Port Talbot County Borough Council
PD	Principal Designer
PC	Principal Contractor
PRoW	Public Rights of Way
TMP	Traffic Management Plan

14.1 INTRODUCTION

14.1.1 This chapter has been prepared by Natural Power Consultants Ltd (Natural Power) and examines the following aspects of the proposed development as they relate to health and public safety:

- Historic Coal Mining;
- Shadow Flicker;
- Ice Throw;
- Lightning;
- Air Quality;
- Battery energy storage fire risk; and
- Health and Safety.

14.2 CONSULTATION

14.2.1 Consultation regarding health and public safety undertaken during the course of the Environmental Impact Assessment (EIA) is recorded in Table 14.1.

Table 14.1: Consultee scoping responses relating to health and public safety

Consultee	Comments/ issues raised/ recommendations	Addressed responses/ outcomes
Planning Inspectorate Wales	The site is located within an area at risk of unmapped historic coal mining (see comment below) which could lead to major accidents, considering the scale of the development. The Environmental Statement (ES) should ensure that risks of accidents are accounted for and mitigated in line with Schedule 4.	A Preliminary Coal Mining Risk Assessment (Appendix 10.2 in Volume 3 of the ES) has been carried out to identify potential risks, and intrusive site investigation will be undertaken to establish specifics prior to construction works starting. Any remediation works identified shall be carried out to the satisfaction of the Local Planning Authority (LPA) in consultation with the Coal Authority.
Planning Inspectorate Wales	The Planning Inspectorate disagrees that shadow flicker could be scoped out at this stage. The scale of the proposed development is such that the general rule of 10 rotor diameter distance from sensitive properties may not be enough to ensure that a significant effect will not be generated. More evidence is required to establish the impact of the proposal alone and in combination on sensitive properties.	Shadow Flicker has been assessed in this chapter. A shadow flicker protocol to reduce impacts on receptor locations where exceedance of acceptable limits has been predicted will be agreed with LPAs as a planning condition before construction begins.
Planning Inspectorate Wales	It is noted that battery storage is proposed. At this stage it is not clear which type of batteries are proposed. The Inspectorate notes that there is a potential fire risk associated with certain types of batteries such as lithium-ion and that safety measures are required in the design to minimise the risk of fire. The Inspectorate considers this to be part of the	Potential fire risk from batteries has been assessed in this chapter and found to be not significant. In addition, it is suggested that the final design of any battery storage system can be agreed with LPAs as a planning condition.

Consultee	Comments/ issues raised/ recommendations	Addressed responses/ outcomes
	Environmental Impact Assessment (EIA) process in line with Schedule 4 of the EIA Regulations (Wales) 2017.	
Neath Port Talbot County Borough Council (NPTCBC)	It is understood that the development areas are crossed extensively by Public Rights of Way (PRoW), cycle paths and tracks. As such, it is considered that at this stage it cannot be agreed that the above issues (ice throw, lightning and shadow flicker) can be scoped out of the ES. Particularly given the tourism uses of these tracks and in particular their use of the cycle network within these areas.	Ice Throw, lightning and shadow flicker all addressed within this chapter. Discussions have been held with PRoW officers from Neath Port Talbot County Borough Council (NPTCBC) and Bridgend County Borough Council (BCBC), and a position agreed on ice throw. Turbines will feature mitigation for lightning.
	It is noted that the application site falls within areas where there is Historic coal mining with various spoil tips within or adjacent to the boundary. Any permanent structures could be affected by ground gas from old mine workings and spoil tips and be a human health risk to site workers. It is therefore recommended that a Preliminary Risk Assessment and desk study is carried out to assess these risks. These potential impacts must be fully assessed and addressed within any ES submitted in support of the development proposal.	A Preliminary Coal Mining Risk Assessment has been carried out to identify potential risks, and intrusive site investigation will be undertaken to establish specifics prior to construction works starting. Any remediation works identified shall be carried out to the satisfaction of the LPA in consultation with the Coal Authority.
NPTCBC	It is also understood that the proposed development would intend bringing the turbines to site using the M4 motorway. The area adjacent to the motorway as shown on the attached plan (Appendix 2) shows the extent of the Air Quality Management Area (AQMA). The Council's progress in attempting to bring about improvements in the air quality within this area are detailed within the 2019 Air Quality Progress Report (September 2019) which is available on the Council's website at https://www.npt.gov.uk/1566 . As such consideration should be given to the increase in traffic congestion on the M4 during the AIL deliveries to the development sites during the construction process and the resultant impact upon air quality.	An Air Quality Assessment (AQA) (Appendix 14.2 in Volume 3 of the ES) has been produced to assess the effects of the proposed development on the AQMA, as well as relevant ecological receptors. Effects on human health have been shown to be not significant.
BCBC	With respect to shadow flicker, even if it is scoped out, a condition should be included that if complaints arise from shadow flicker, that they are investigated by the developer and remedial action undertaken if shadow flicker is	Shadow Flicker has been assessed, and a shadow flicker protocol to reduce impacts on receptor locations where exceedance of acceptable limits has been predicted will be

Consultee	Comments/ issues raised/ recommendations	Addressed responses/ outcomes
	found to occur. A previous and justifiable complaint was lodged about another wind farm where shadow flicker was found to be occurring at properties where it was originally anticipated that they were not going to be affected in the original assessment, which resulted in remedial action being undertaken.	agreed with LPAs as a planning condition before construction begins.

Source: DNS: EIA Scoping Direction 3264571: Y Bryn Wind Farm

14.3 HISTORIC COAL MINING

- 14.3.1 The proposed development is located in an area where coal mining has historically taken place. In order to evaluate the risks to health and public safety, and to the infrastructure of the proposed development, a preliminary coal mining risk assessment has been produced. The full assessment can be found in Appendix 10.2.
- 14.3.2 The assessment found that all features have the potential to be underlain by historical workings, and five features are within areas defined by the coal authority as being 'high risk', however that most effects can be mitigated through micro-siting, treatment of workings, and/or deepening infrastructure foundations. The assessment also flags that the access track from the M4 motorway/Brombil farm crosses a mapped landslide, and that there are several other mapped landslides in the area, therefore the stability of the access track in relation to landslides will need to be considered. It recommends a more detailed desk study and further investigative works to confirm the presence/absence of historical workings and associated risks, including hazardous ground gasses.
- 14.3.3 Prior to construction works starting on-site, intrusive site investigation shall be undertaken to establish the exact situation regarding the coal mining legacy on site. The findings of this site investigation shall be submitted to the LPA for written approval in consultation with the Coal Authority. Any remediation works identified shall be carried out to the satisfaction of the LPA in consultation with the Coal Authority, and it is expected that a planning condition is imposed of a planning consent relating to coal mining.

14.4 SHADOW FLICKER

- 14.4.1 'Shadow flicker' is the effect caused when turbine blades cast shadows over neighbouring properties as they turn, through constrained openings such as windows. The magnitude of the shadow flicker depends on several environmental conditions coinciding at a given time, including the position and height of the sun, wind speed, wind direction, cloud cover, position of the turbine relative to a sensitive receptor, and the position of any windows together with intervening line-of-sight screening (e.g. trees or buildings).
- 14.4.2 There is no specific guidance on shadow flicker in Welsh planning policy. However, the Update to Shadow Flicker Evidence Base (2011)¹, published by the then Department for Energy and Climate Change (DECC), states that assessing shadow flicker effects within ten times the rotor diameter of wind turbines has been widely accepted across different European countries, and is deemed to be an appropriate study area. In addition, the report cites a study by Predac, a European Union sponsored organisation that promotes best practice in energy use and supply, which recommends that shadow flicker does not exceed 30 hours per year or 30 minutes per day. Within the UK, the most commonly quoted acceptable limit for theoretical shadow flicker is less than 30 hours per year.
- 14.4.3 A shadow flicker assessment has been undertaken for the proposed development analysing 28 receptor locations situated in the vicinity of Y Bryn Wind Farm. First, the worst-case scenario for shadow flicker was calculated at these locations, using a 'bare-earth' model that does not take into account screening effects from vegetation and

buildings. Next, meteorological data was applied to the worst-case results to give a more realistic assessment of shadow flicker at the chosen receptors. Receptors were chosen to represent the worst-case scenario for settlements closest to the proposed development. Full details of the methodology, and the results of the assessment, can be found in Appendix 14.1.

- 14.4.4 It is important to note that not all properties within a study area will experience shadow flicker. In order for it to occur, the weather must be sunny, and the blades must also be rotating. The effect is also reduced if the turbine rotors are perpendicular to the location experiencing flicker, so will be dependent upon wind direction because turbines turn to face into the wind when operating. Vegetation such as trees or hedgerows or intervening buildings, and the topography of the land itself, will also have a screening effect. Finally, the absence of windows facing the direction of relevant turbines, and the nature of use of any affected rooms, may mitigate any impacts.
- 14.4.5 The 'real-case' assessment results showed that two receptors (R10 and R13) could theoretically exceed 30 hours per year of shadow flicker due to the proposed development. It should be noted here that these results do not account for factors such as any screening from vegetation, orientation of windows at the receptor, or the function of rooms theoretically affected by shadow flicker. Taking these into account will further reduce the hours of shadow flicker experienced at these receptors. Properties adjacent to both receptors have been analysed in the Residential Visual Amenity Assessment (Appendix 8.12), which has provided the following additional contextual detail.
- 14.4.6 Receptor 10 is adjacent to a group of three properties at Hafod Farm, west of the proposed development. Views of turbines 17 and 18 are from a primary view of the property. While the property will experience views of another eight turbines, these are not in the primary view, and are also likely to be filtered by the mature trees at the eastern end of the gardens, and by intervening properties and buildings, which could reduce the number of hours of shadow flicker experienced at this receptor.
- 14.4.7 Receptor 13 is adjacent to a property named Highland Heights, east of the proposed development. The primary view of the property faces east, away from the proposed development, and so will not experience shadow flicker effects. Turbines are seen from the property's secondary view, and while some are partially filtered by productive forestry in close proximity to rear of property, some turbines are likely to be visible above the trees.
- 14.4.8 Another receptor, R2, could theoretically experience cumulative shadow flicker effects from the proposed development and the consented Foel Trawsnant wind farm. However, the assessment shows that the vast majority of shadow flicker hours (46 of 47.2) the receptor could theoretically experience are attributable to Foel Trawsnant (although acknowledging that the consented Foel Trawsnant scheme includes a shadow flicker planning condition to limit actual impacts to no more than the guidance thresholds). A shadow flicker scheme of mitigation will be put in place by planning condition, to ensure cumulative shadow flicker time experienced at this receptor does not exceed the guidance thresholds.
- 14.4.9 Prior to commissioning of the proposed development, a shadow flicker protocol to reduce effects to below 30 minutes a day and/or 30 hours per annum for any relevant properties existing or with planning permission at the time of consent will be agreed by means of a planning condition with the LPAs. In the event of a substantiated complaint to the LPAs from owners of the aforementioned properties, this protocol would be enacted. With this measure in place, no significant shadow flicker effects would arise from the proposed development.

14.5 ICE THROW

- 14.5.1 Blade icing is a rare occurrence that will only happen when the blades of the turbine are stationary and under near freezing temperatures and relatively high humidity, with either freezing rain or sleet. When ice becomes detached from the blades (through temperature increase or activation of blade heating systems), it can be thrown from the blades if they are rotating or fall vertically to the ground if the blades are at standstill.²

¹ Department of Energy and Climate Change. *Update of UK Shadow Flicker Evidence Base*. Available from - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48052/1416-update-uk-shadow-flicker-evidence-base.pdf [Accessed 03/04/2023]

² Iea wind, (2018). *International Recommendations for Ice Fall and Ice Throw Risk Assessments*. Available from - https://iea-wind.org/wp-content/uploads/2021/09/Task19_Recommendations_ice_throw_2018.pdf [Accessed 03/04/2023]

- 14.5.2 The risk of ice throw³ is dependent on the local climate and weather conditions in which the wind turbines are situated. Met Office statistics for the nearby Mumbles Head weather station suggest a long-term average of 6.86 days of air frost per year, versus a Welsh average of 44.92 days⁴.
- 14.5.3 Siting the turbines away from occupied buildings, roads and public areas can mitigate the risk, and this has been done as far as is practical with the proposed development. However, as the proposed development is located on publicly accessible Welsh Government owned forestry land, some residual risk remains. To mitigate this, warning signs will be installed at entry points to the proposed development as well as in proximity to turbines.
- 14.5.4 There are specific sensors that can identify the likelihood of the climatic conditions that cause icing, so if ice accumulation is expected, or occurs, the turbines can be shut down. This works when icing on the blades results in reduced performance, unusual loads, and/or vibrations. These are then detected by a control system and trigger an automatic shutdown of the turbine. Project operators use these detection systems to halt operation of the relevant turbines during icing events to prevent ice throw and equipment damage and, in these cases, the turbine may remain off-line until an operator visually inspects and manually restarts the turbine when the blades are clear of ice.
- 14.5.5 Turbine manufacturers offer anti-icing and de-icing technological solutions to mitigate against icing of turbines. Anti-icing solutions aim to prevent ice build-up and include water and ice repellent blade coatings. De-icing solutions free turbine blades of ice if icing does occur by heating turbine blades, causing the ice to melt while the blades are stationary or moving slowly.
- 14.5.6 The overall view is that modern turbines which are fitted with climatic detection systems and passive/active de-icing solutions - like the models being considered for the proposed development - will help to mitigate against the occurrence of ice throw. Turbine procurement, together with good practice site management procedures, including the use of visual warnings signs and curtailment during periods of ice build-up on blades, will mitigate and manage this potential hazard and therefore effects are considered to be not significant.
- 14.5.7 Discussions have been held with PRoW officers from NPTCBC and BCBC to ensure the proposed development adopts appropriate mitigation to protect the public from the risk of ice throw. Details of these discussions can be found in Appendix 3 in Volume 3 of the ES.
- 14.5.8 Prior to the start of commercial operation, confirmation of the application of ice monitoring and/or de-icing systems and/or protocols for all turbines located within 1 x tip-heights distance of any registered public footpaths on the definitive map shall be provided to the relevant LPAs.

14.6 LIGHTNING

- 14.6.1 The turbines being considered for the proposed development will be equipped with lightning protection equipment in accordance with IEC 61400-24:2019⁵ so that strikes will be conducted from the nacelle down the tower into the earth, mitigating the impact of lightning strikes on users of PRoW near the proposed development. As a result of this, lightning effects are considered to be not significant.

14.7 AIR QUALITY

- 14.7.1 A qualitative assessment has been made on the air quality impacts associated with construction traffic emissions on human health, especially within the NPTCBC AQMA, and also potentially impacted ecological habitats. The full

assessment, including methodology and results, is presented in Appendix 14.2. The assessment concludes that the overall impacts of traffic generated by the construction phase of the proposed development on both human health and locally designated ecological sites are anticipated to be not significant. The assessment also states that, while there could be cumulative effects from the consented Wildfox Resort development due to overlapping construction phases with the proposed development, this could not be verified as there are no construction phase traffic volumes available for the Wildfox development. The assessment proposes use of a robust Traffic Management Plan (TMP), developed in collaboration with relevant highways authorities, to mitigate significant effects on air quality. This would be agreed prior to the construction phase on either project.

14.8 BATTERY FIRE RISK

- 14.8.1 The proposed battery energy storage facility would be expected to utilise a modern lithium-ion cell chemistry and surrounding systems. There is very limited risk of fires starting or spreading through what is called 'thermal runaway' with the latest generation of lithium-ion battery energy storage systems, which benefit from a layered protection strategy. Firstly, the internal condition of individual battery cells, stacks and racks are monitored and managed by a battery management system (BMS), which detects and mitigates for signs of potential overheating and developing fire risk. In the event of any early warning signs being detected, individual cell stacks can be easily deactivated and replaced as part of regular maintenance. Fire and gas detection and suppression systems also monitor for early signs and then seek to dispel any fires within battery housing. The modular design nature of most battery energy storage systems (as illustrated on Figure 5.4b) also reduces the risk of fire spreading between battery housings by incorporating adequate internal spacing. Finally, in the specific forested context of the proposed development, an external buffer of 10 m from the very edge of the battery storage hardstanding area to any trees mitigates the risk of any uncontrolled fire spreading.
- 14.8.2 The location of the proposed battery energy storage facility does not sit upon any 'development high risk' areas identified by The Coal Authority, as indicated in Appendix 10.2, so there is no direct risk of igniting known coal resources.
- 14.8.3 As of the end of 2021⁶, there was estimated to be a total of 1.7 gigawatts (GW) of utility stage battery storage operating in the UK, with a pipeline of over 27 GW. The applicant is not aware of fires within any UK battery storage sites, and the risks are evidently low enough (with application of appropriate systems and design mitigations) not to dissuade from substantial growth and planning approvals.
- 14.8.4 It is therefore concluded that fire risks from the proposed battery energy storage are low. However, the final design details of any battery energy storage, including fire monitoring and suppression systems, can be approved by the local authorities via planning condition.

14.9 HEALTH AND SAFETY

Construction Phase

- 14.9.1 The construction site will be managed and operated in accordance with Health and Safety at Work etc. Act 1974⁷ and comply with relevant Health and Safety Regulations, including:
- The Management of Health and Safety at Work Regulations 1999⁸;

³ LRQA. Available from - <https://www.lrq.com/en-gb/search/?q=winter+wind+2019> [Accessed 03/04/2023]

⁴ Met Office. Available from - <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcijm7j5g> [Accessed 03/04/2023]

⁵ IEC, (2019). *Wind energy generation systems – Part 24: Lightning protection*. Available from - <https://webstore.iec.ch/publication/32050> [Accessed 03/08/2023]

⁶ Energy Storage News, (2022). *The numbers behind the record-breaking rise of the UK's battery storage market*. Available from - <https://www.energy-storage.news/the-numbers-behind-the-record-breaking-rise-of-the-uk-battery-storage-market/> [Accessed 03/04/2023]

⁷ *Health and Safety at Work etc. Act 1974*. Available from - <https://www.legislation.gov.uk/ukpga/1974/37/contents> [Accessed 03/04/2023]

⁸ *The Management of Health and Safety at Work Regulations 1999*. Available from - <https://www.legislation.gov.uk/uksi/1999/3242/contents/made> [Accessed 03/04/2023]

- Construction (Design and Management) Regulations 2015⁹ (CDM 2015);
- Electricity Safety, Quality and Continuity Regulations 2002¹⁰; and
- The Quarries Regulations 1999.¹¹

- 14.9.2 In awarding any civil, electrical or other contracts for the construction of the proposed development, the appointed contractor is obligated by law to follow the Construction Design Management (CDM) Regulations implemented by the Health and Safety Executive (HSE). These are based on standard procedures that are adapted to take account of all site-specific requirements. The CDM regulations require due consideration is given to construction workers and the public, with risk assessments and method statements created to cover all risks identified including access rights across the site.
- 14.9.3 A Principal Designer (PD), as has been done for the planning phase, will be contracted by the applicant to take overall control of the pre-construction phase, and be responsible for planning, managing and coordinating health and safety for any pre-construction activities. The PD ensures all relevant information is provided to other CDM duty holders, seeking to identify, eliminate or control foreseeable risks, ensuring Designers comply with their duties as well as liaising with the Principal Contractor (PC) to help with planning, management and monitoring of the construction phase, including compiling of the Health and Safety File.
- 14.9.4 Under CDM 2015, the applicant is not expected to manage the project themselves, however they remain ultimately responsible and must ensure all required duty holders are appointed and that suitable arrangements are in place for the work to be carried out safely.
- 14.9.5 Throughout the construction phase of the proposed development, the relevant statutory requirements would be adhered to. All potentially hazardous areas would be fenced off and all unattended machinery would be stored in the site compounds or immobilised to prevent unauthorised use. In addition, temporary construction safety signs, as well as access and information signs, would be placed at each possible entrance to the site, areas where there may be further danger (such as settlement lagoons and borrow pits), and also relevant visitor attractions.
- 14.9.6 Throughout construction, measures to manage diversion routes would be put in place where required on PRoW. The diversion routes would be clearly marked, and for safety reasons would direct the user away from any areas of construction.
- 14.9.7 Traffic risks to workers and the general public from construction activities relating to the proposed development will be managed by the construction contractor post-consent. This will be done through a detailed, site specific Construction Management Plan and TMP, to be agreed with the relevant local authorities.

Operational Phase

- 14.9.8 Companies supplying products and services to the wind energy industry operate to a series of international, European and British standards. A set of product standards for wind energy equipment has been developed by the International Electrotechnical Commission (IEC) – IEC 61400. There are a number of British Standards that correspond to it, for example BS EN IEC 61400-1:2019¹² 'Wind turbine generation systems. Design requirements'.
- 14.9.9 The applicant would commit to installing wind turbines and components that meet BS EN IEC 61400-1:2019 or IEC 61400 as appropriate.
- 14.9.10 Appropriate warning, directional and identification signs would be installed on the turbines, transformers and on-site electrical control building, and access to these would be restricted to wind farm personnel. At all times these facilities would be locked. Additionally, safety and/or directional signs would be placed at strategic points across the site area, particularly on any PRoW to inform members of the public that they are entering a wind farm area,

⁹ *The Construction (Design and Management) Regulations 2015*. Available from - <https://www.legislation.gov.uk/uksi/2015/51/contents/made> [Accessed 03/04/2023]

¹⁰ *The Electricity Safety, Quality and Continuity Regulations 2002*. Available from - <https://www.legislation.gov.uk/uksi/2002/2665/contents/made> [Accessed 03/04/2023]

to make them aware of potential hazards and provide direction for emergency services should the need arise. Any signage would be agreed with the relevant authorities prior to installation and indicative signage is shown on Figure 5.8 in Volume 2 of the ES.

- 14.9.11 No resulting safety risks are expected as a result of public access to Y Bryn site boundary. Turbine models being considered for the proposed development would operate automatically and have sensors to detect any instabilities or unsafe operation during high wind speeds. Should sensors detect any such malfunction in operation or should wind speeds increase over maximum operational thresholds, the brakes would be automatically applied to rapidly shut the affected turbine down.
- 14.9.12 If the cause of the shutdown was high wind speeds, then the turbine would automatically begin operation once the average wind speed reduced to within operational levels. Under other causes of shutdown, e.g. through malfunction, the turbine would remain shut down and in a safe condition (commonly with the blades oriented 90° (parallel) to the wind direction) until restarted by a member of the operations and maintenance team following satisfactory investigation. This procedure ensures safe operation of turbines to protect members of the public walking, cycling or riding past turbines during the operational phase. In addition, the vibrometers in the nacelles would detect rotor imbalance in blades caused by icing and the wind turbine's control and monitoring system would shut the turbines down under these conditions.

Decommissioning Phase

- 14.9.13 Health and safety during the decommissioning phase of the proposed development will be carried out in the same way as described above for the construction phase.

14.10 SUMMARY

- 14.10.1 The Preliminary Coal Mining Risk Assessment in Appendix 10.2 concludes that although there is the potential for historical coal mining to have a significant impact on features of the proposed development, in most cases this can be mitigated through micrositing, the treatment of workings and/or the deepening of foundations beneath zones of workings/collapse. The assessment also flags the need to give consideration to landslides in the area in relation to the stability of the proposed access track from the M4/Brombil Farm. Prior to construction works starting on-site, an intrusive site investigation shall be undertaken to establish the exact situation regarding the coal mining legacy on Y Bryn site boundary, and any remediation works identified shall be carried out to the satisfaction of the LPA in consultation with the Coal Authority.
- 14.10.2 In relation to shadow flicker, modelling has shown three receptor locations to be potentially in exceedance of the guidance thresholds, two attributable to the proposed development and one with cumulative effects from the proposed development and the consented Foel Trawnant wind farm. At the receptor experiencing cumulative effects, these are almost entirely attributable to the other scheme, which is subject to a planning condition limiting its impact to no more than 30 hours per annum and 30 minutes per day. A similar scheme to satisfactorily alleviate the incidence of shadow flicker at any affected premises lawfully in existence at the date of this permission to within the guidance thresholds will be agreed with the LPAs prior to commissioning.
- 14.10.3 In terms of the potential impact of ice throw it is considered that with turbine procurement together with good practice site management procedures with appropriate embedded mitigation in place there will be no significant effects for the public or for site workers using Y Bryn site boundary. These will include, but not limited to, the use of visual warnings signs and curtailment during periods of ice build-up on blades. The proposed development will also apply ice monitoring and/or de-icing systems and/or protocols to all turbines located within 1 x tip-heights

¹¹ *The Quarries Regulations 1999*. Available from - <https://www.legislation.gov.uk/uksi/1999/2024/contents/made> [Accessed 03/04/2023]

¹² BS EN IEC 61400-1:2019, (2019). *Wind energy generation systems – Design requirements*. Available from - <https://shop.bsigroup.com/products/wind-energy-generation-systems-design-requirements/standard> [Accessed 03/04/2023]

distance of any registered public footpaths on the definitive map and provide details of this system to the relevant LPAs.

- 14.10.4 In terms of lightning, it is concluded that the lightning protection equipment present on the turbines under consideration will ensure no significant impact to the public.
- 14.10.5 In relation to air quality, the AQA concludes that overall impacts of traffic generated by the construction phase of the proposed development on both human health and locally designated ecological sites are anticipated to be not significant. Cumulative assessment identifies potential effects with the consented Wildfox Resort; however effects could not be assessed as this proposed development has no publicly available construction phase traffic volumes. A TMP developed in collaboration with relevant highways authorities is proposed to mitigate significant effects on air quality.
- 14.10.6 The features of the proposed development described in this chapter will ensure that access to PRow in close proximity to it can continue to be enjoyed safely for recreational purposes by members of the public. This ties in with Well-being of Future Generations (Wales) Act 2015¹³ goals a Healthier Wales, '*A society in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood*'.
- 14.10.7 Due to the safety features of modern wind turbines and battery energy storage systems, the results of detailed assessments into coal mining, shadow flicker, ice throw and air quality, and planning conditions to mitigate the potential effects, it is concluded that the proposed development would not present a significant safety risk to the public.

¹³ *Well-being of Future Generations (Wales) Act 2015*. Available from - <https://www.legislation.gov.uk/anaw/2015/2/contents/enacted> [Accessed 03/04/2023]