

Crossflow Energy Turbine Technology Demonstration Facility

Design and Access Statement For Crossflow Energy

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1 INTRODUCTION

1.1 Preface

- 1.1.1 This Design and Access Statement (DAS) has been drawn up on behalf of Crossflow Energy ('the Applicant') to accompany a planning application for the proposed Crossflow Energy Turbine Technology Demonstration Facility (the 'proposed scheme') on land near the breakwater at Port Talbot ABP Docks, Margam Sands, in the County of Neath Port Talbot (the 'Site') (see Figure 1 – Site Location). The application site is centred at grid reference E275909 / 187418.
- 1.1.2 A temporary period of up to four years is applied for, both to continue to operate the existing demonstration turbine and associated infrastructure, and for an additional eco test demonstration turbine and ancillary components located within the existing compound.
- 1.1.3 The Applicant secured previous temporary permission for an earlier vertical axis demonstration turbine at the Site, which has been operational since 2014. This early stage demonstration turbine is a single 25m tall vertical axis wind turbine generator alongside subsidiary infrastructure, including turbine foundation, fencing, storage containers and an on-site wind monitoring mast. No connection to the local electricity distribution network was required during this testing phase of the proposed turbine.
- 1.1.4 The Applicant is Crossflow Energy, a Wales-based company located in Baglan Energy Park. Crossflow is focussed on supporting the delivery of clean, reliable energy solutions for remote locations, enabling both a reduction in reliance on fossil fuels for power generation for remote sites and the provision of essential communications and data services. Crossflow Smart Towers act as beacons, delivering reliable wind and solar power, and secure locations for essential communications and data services.

1.2 Guidance

- 1.2.1 This DAS has been prepared following the guidelines established in *Design and Access Statements in Wales – Why, What and How* (April 2017), published by the Design Commission for Wales on behalf of the WG. The guide responds to the legislative requirements for DASs under the Planning (Wales) Act 2015, and is a guidance document to enable developers to meet the objectives of good design set out in Planning Policy Wales Edition 11, February 2021 and Technical Advice Note 12: Design.
- 1.2.2 The purpose of this DAS is to demonstrate and communicate, on behalf of the Applicant, the nature, location and scale of the development proposal and to explain the design requirements undertaken, which have responded to local characteristics and resulted in the meeting of appropriate design standards.
- 1.2.3 The information contained herein explains the design concept for the scheme alongside an understanding of the site and its broader context, and how the final design of the scheme was achieved following several modifications and improvements. Such information is expected to support the decision-making process.

2 SUMMARY OF THE PROPOSAL

2.1 Proposal Outline

- 2.1.1 Crossflow Energy is proposing to utilise its existing site at the Margam Sands ABP facility to operate its next generation wind turbine and a temporary pop-up telecoms mast, alongside its existing older demonstration turbine and associated infrastructure.
- 2.1.2 The Turbine Technology Facility will showcase the Crossflow wind and hybrid energy technology solutions to a wide range of key UK and international customers to support the company's drive for domestic roll out and export, and to enable technology partnerships to be developed with key Mobile Network Operators including Vodafone and BT. Capture of operational data will in turn demonstrate the performance of the turbines over a range of wind resource conditions, plus test the ability to co-locate communications and other technologies on the turbine mast without impacting normal operation.
- 2.1.3 Some elements of the scheme have already been operating under a previous planning permission (P2013/1006) for a temporary period only, that was subsequently extended on two occasions. This planning permission seeks approval for a further permission for a period of 4 years for the existing infrastructure and the new elements.

2.2 Proposal Site

- 2.2.1 The demonstration facility is located on the edge of the breakwater at the ABP Margam Sands port facility, in the County of Neath Port Talbot.
- 2.2.2 See Section 4 for further details on the site and its context.

3 BRIEF AND VISION - DESIGN

3.1 Vision

- 3.1.1 The proposed scheme forms part of the process of the design evolution of a Welsh-based clean energy system, at the core of which is reliable small wind generation, to deliver guaranteed power for both on and off grid locations, with a key focus on powering global connectivity through communications and data services.
- 3.1.2 The turbines will offer operators, landowners and communities simple, effective on-site assembly wind turbine generators that operate efficiently and safely in all locations, making them suitable for localised power generation and remote deployment. Crossflow's focus is on supporting the roll-out of clean, reliable hybrid energy solutions, thereby reducing reliance on fossil fuels and supporting the supporting decarbonisation in the Welsh economy.
- 3.1.3 In combination with Crossflow's turbines, telecoms equipment and other technologies are co-hosted on the turbine tower alongside conventional solar and battery technologies to create a 24/7, self-powered communication mast, the Eco-Tower. The Eco-Towers are specifically designed to provide a reliable & affordable clean energy to the telecoms sector without the need for additional mast infrastructure, facilitating 4G/5G connectivity in off-grid rural 'not spots', and increasing on-site renewable generation at grid connected sites.
- 3.1.4 Diesel displacement and reduced site fuel and maintenance visits will deliver effective CO2 savings, helping customers, including Mobile Network Operators, in achieving their carbon reduction targets.

3.2 Concept and Approach

- 3.2.1 From 2008, Crossflow employed the world leading advanced Computational Fluid Dynamics (CFD) capabilities at Swansea University's Centre for Computational Engineering to model the complex air flow for the conceptual Crossflow turbine. The purpose was to identify the optimum blade and shield shapes required to maximise the greatly enhanced aerodynamic efficiency of the Crossflow Turbine and shield concept. This analysis was validated by 2017 using the full scale turbine that incorporates a rotor shield to enhance energy capture.
- 3.2.2 The concept of the design has been to utilise the wind resource at the Site for the test phases of the turbines whilst ensuring that the qualities and features of the receiving environmental and local amenity remain unaffected.
- 3.2.3 Extensive market research resulted in the decision to focus on continuous and reliable distributed energy supplies and the development, by combining Crossflow's novel wind turbine with solar PV and battery storage of an Integrated Energy Solution (IES) offering reliable, clean energy as a viable and cost effective alternative to diesel generation in remote off/weak-grid locations. This is complimented by the development of an in-house Smart Energy Management system to optimise energy capture and ensure continuous clean energy output.
- 3.2.4 The Crossflow Pre-production Prototype (PPP) was successfully installed and commissioned at the company test site in Port Talbot, Wales in 2019 and the operational data gathered has confirmed the energy capture and operational performance of both the turbine and Energy Management Software.
- 3.2.5 In discussion with Mobile Network Operators, Crossflow have since repackaged the turbine layout design to incorporate a split-blade vertical hoist rotor, photovoltaic coated shield plus compact

storage for batteries. This allows the Applicant to combine communications and clean energy generation in one structure on a much smaller footprint, with the erection and maintenance of the turbine is achievable at ground level without the necessity for cranes or hoists.

- 3.2.6 Crossflow wish to utilise the current site as a technology demonstration and showcase facility to support technology partnership and enhance commercial exploitation of the technology through both domestic sales, particularly in support of high-profile UK government backed plans for expanding Telecom Network coverage through the Shared Rural Network program (SRN) and international sales to target markets such as Africa, the Caribbean and Europe.

4 SITE AND CONTEXT ANALYSIS

4.1 Introduction

- 4.1.1 This section describes the location and nature of the proposed site, and provides an understanding of the qualities of the Site and its context.

4.2 The Site and its Context

- 4.2.1 The proposed scheme would be operated on the southern edge of the breakwater located between Margam Sands and Aberavon Sands to the south of Port Talbot. The construction of the Port Talbot Tidal Harbour was completed in 1970, creating the first dry-bulk terminal in the UK capable of accepting large vessels over 100,000 tonnes. The main harbour breakwater is over 1.25 miles long, whilst the lee breakwater is one third of a mile long. The proposed scheme is to be located on the eastern edge of the breakwater close to where it comes onto land.
- 4.2.2 The direct surroundings of the Site are industrial within the area of the Port Talbot itself, defined by considerable retaining walls of the docks which surrounds an area of enclosed water and the substantial facility of the Tata steelworks. To the south of the turbine location is the large, panoramic seascape of Swansea Bay.
- 4.2.3 The Site is not located within any national or local area designation for landscape, nature conservation or heritage.
- 4.2.4 The Site adjoins the Swansea Bay and Porthcawl national marine character area and resides within the Swansea Bay landscape character area.
- 4.2.5 The specific landscape attributes to the Site, drawn from the Natural Resources Wales LANDMAP series, provides some limited information on the landscape characteristics of the development site. The demonstration facility is located in the following LANDAMP character areas:
- **Visual & Sensory:** *Large scale heavy industry and disused docks on coastal plain... The skyline to the area is dominated by the steel works which acts as a significant landmark in the flat landscape... Smaller industrial units lie around the docks and next to the town centre... A network of railways, both passenger and industrial, cross the area including the main London to Swansea line... The disused docks and a large reservoir within the area, although large in scale are fairly well hidden... This area has a low scenic quality as a major detractor although its character of a threatening, overpowering and uninviting landscape is very strong... The works have a strong integrity but overall comprise a degraded landscape. The character is evident to some degree from a distance and is intense at close quarters.. Works of this scale are a rarity.*
 - **Cultural:** *This area has a low scenic quality as a major detractor although its character of a threatening, overpowering and uninviting landscape is very strong... The works have a strong integrity but overall comprise a degraded landscape.*
 - **Geological:** *Broad belt of coastal sand dunes seaward of marine alluvium along NW-SE coastline, fringed by storm gravel beach along S (Margam) end.*
 - **Landscape Habitat:** *the land is formed by infilled material on previous sand dunes. The Site has little habitat value. (The Phase 1 habitats identified are running water, amenity grassland and buildings. There is a large number of sites of nature conservation interest but the overall*

evaluation for habitats and species is low on the basis that the area is urban, man-made and so not a natural habitat.)

- **Historic:** *Port Talbot Industrial is an entirely industrial aspect area situated on the coastal margin of the Margam Moors, which includes the site of Port Talbot Steelworks. This flat expanse of moor is more than two kilometres deep and extends over six kilometres from the Kenfig Burrows in the south to Aberavon Sands (HL002) to the north. The Neath Port Talbot Urban Corridor (HL054) delineates much of the eastern, and part of the northern boundary, with Margam Rural and the Margam Moor defining the southern boundary ... The High value assigned to this area reflects the significance of the late 19th-20th century industrialisation (represented by the Port Talbot Docks (NPRN 913949) and Steelworks (NPRN 913992), which are genuinely rare survivors of the heavy industries which once dominated Wales, and the later industrial estate. The area is also notable for its archaeological record, which clearly shows that this was once a rich, multi-period landscape, with evidence of human activity dating back to early prehistoric period.*

4.3 Site Identification

- 4.3.1 Crossflow Energy originally sought to identify an appropriate site for the deployment of the wind demonstration scheme that would not cause any unacceptable environmental or amenity impacts. Several potential sites, focussed on existing wind farm sites where the original demonstration turbine would be subsumed within a much larger wind farm array and on heavy industrial sites where the turbine structure would be on a far smaller scale than the surrounding installations, have been investigated. These include:
- Swansea Docks
 - Taff Ely Wind Farm
 - Port Talbot docks breakwater
- 4.3.2 Following preliminary investigations into these options, the Port Talbot site was preferred and permission for temporary operation subsequently secured. The location offers the possibility of non-turbulent wind over the sea which is advantageous for the validation of the computer modelling and performance of the turbines.
- 4.3.3 The Site has no imminent plans for development, is not visible to or accessible by the public and is in close proximity to the fabricators and Crossflow Energy offices.

5 INTERPRETATION

5.1 Site Characteristics and Constraints

- 5.1.1 The industrial setting and port facilities define the characteristics of the site and the surroundings, and there are no identifiable sensitivities or constraints at the proposed test facility or its environs.
- 5.1.2 The test facility site is not subject to any environmental designations, other land-uses or visual sensitivities associated with recreational or residential interests.
- 5.1.3 LANDMAP characterisation describes the site as dominated by the landmark of the steel works, smaller industrial units, railway networks, and disused docks, resulting in a degraded landscape with low scenic quality.
- 5.1.4 For these reasons, there are no identifiable features at the test facility test that are key influences on its design, and the facility will readily sit within the industrial setting with no associated harm to other purposes or land-uses.

5.2 Wider Context

- 5.2.1 The nature of wind turbines as tall structures results in potential effects beyond the immediate site boundary and over a wider geographical area. Visual effects to a variety of receptors, such as protected landscapes, national trails and residences, and national monuments, and physical impacts on, for example transport networks and aviation, often to be taken into consideration.
- 5.2.2 Within the wider context to the site, the proposed wind turbines, pop-up mast and wind monitoring mast will have no demonstrable effect upon the wider area in which very tall structures dominate the skyline. The test facility infrastructure will be insubstantial within the context of the Steelworks and Port facility, and as such will have no significant effects upon the visual characteristics of the area.

5.3 Ecology and Nature Conservation

- 5.3.1 There are a number of statutory nature conservation areas within a 5 km radius of the proposed development site. These include the following:
 - *Swansea Bay - Blackpill Important Bird Area*
 - *Pant y Sais Local Nature Reserve*
 - *Crymlyn Bog and Pant y Sais National Nature Reserve*
 - *Crymlyn Bog Ramsar*
 - *Crymlyn Bog / Cors Crymlyn SAC*
 - *Cors Crymlyn / Crymlyn bog SSSI*
 - *Crymlyn Burrows SSSI*
 - *Earlswood Road cutting and ferryboat inn quarries SSSI*

- *Pait y sais SSSI*

- 5.3.2 None of these areas are within the site boundary and on the basis of the scale and location of the development relative to such features no effects are anticipated.
- 5.3.3 A Preliminary Ecological Appraisal (PEA) of the development site was conducted by Chris Forster Brown, MCIEEM, on 6th October 2021 at the request of the Council. The report of the survey is included with the application documents. The PEA has confirmed that the site is assessed as being of local value for vascular plants and invertebrates. The biodiversity interest at the site was confined to the northernmost section, and running along the immediate western edge. These areas are at least 10m from the proposed location of the wind turbines and no impacts on existing biodiversity interest are predicted.
- 5.3.4 It is recommended that those parts of the site that are not built on, are kept open, conditions which will favour a similar range of plants to those currently present. This will provide suitable habitats for ruderal vascular plants, reptiles and, in particular, invertebrates.
- 5.3.5 Biodiversity enhancement at the site will be in accordance with the Environment (Wales) Act 2016 and Neath Port Talbot County Borough Council Local Development Plan (2016).

5.4 Heritage

- 5.4.1 Owing to the presence of Port Talbot Docks, which was constructed in the mid 1800s, there is no archaeological evidence located on the dockland area that may be affected by the proposed scheme.
- 5.4.2 Principal features of historic and cultural heritage interest within a 5km distance of the proposal site are as follows:
- *St Margaret's Chapel;*
 - *Llandarcy Round Cairn;*
 - *Gelli-Bwch Round Cairn;*
 - *Landore New Quay;*
 - *Hafod Copper Works Musgrave Engine and Rolls;*
 - *Original Swansea Castle;*
 - *Swansea Castle;*
 - *Bon y Maen Standing Stone;*
 - *Morris Castle;*
 - *Morfa Bridge and Quays;*
 - *Earthwork on Kilvey Hill;*
 - *Foxhole river staithes; and*
 - *White rock copper works.*

- 5.4.3 On the basis of the location of the proposed wind turbine a significant distance away from such features, and given its location on the docks which is an industrial area clearly disassociated from such historic features, it is not anticipated that any harm would be caused to the listed features as a result of the proposed scheme.

5.5 Noise

- 5.5.1 A combination of factors lead to a confident expectation that no noise effects to local residential receptors will arise from operation of the wind turbine. Such factors include:

- *Location within an industrial and urban setting with high background noise levels associated with industry and road networks;*
- *Scale of the turbines and operational characteristics, which are such that noise emissions from the turbines would be imperceptible beyond 200m of the turbine (the existing PPP turbine has received no noise complaints); and*
- *Situation of residential receptors relative to the proposal site, the separation being of greater than 1000m.*

- 5.5.2 In April 2017, leading acoustic specialist, Hayes McKenzie Partnership, undertook background noise measurements at the proposed Crossflow Energy site. The evaluation, undertaken by Robin Woodward, concluded as follows:

- *I visited your turbine at Port Talbot 5th April 2017 to attempt to ascertain whether it would be possible to carry out a sound power level test (according to IEC 61400-11 or another methodology). During this site visit a large conveyor in the vicinity of the turbine was operating, and this dominated the noise environment throughout the site visit. Measurements made during this site visit at various locations showed that the turbine operating had an insignificant contribution to the noise levels.*
- *Following this site visit, an audio recording was sent to your [Crossflow Energy] office to allow you to carry out recording when the conveyor was not operating. Two sets of recording were carried out several weeks apart, one at ~26 m horizontal distance from the turbine at rotor centre height, and one at ~ 26 m horizontal distance from the turbine at ground height.*
- *In both cases recordings with the turbine on and off were sent to Hayes McKenzie for analysis. Analysis of the overall levels and 1/3 octave levels showed again that the turbine was contributing insignificant levels of noise to the overall noise present. This indicated that it would not be possible to carry out a sound power level estimation using IEC 61400-11 or any rigorous methodology. This implied that the turbine noise emission was relatively low, however the relatively high background noise levels present makes determining anything more specific impractical for that turbine in the operating conditions recorded in the environment where the turbine was installed.*

- 5.5.3 For the reasons stated above, and on the basis that the demonstration wind turbines are currently undergoing trials and warranted noise emission data has yet to be established, it is concluded that the proposed turbines would not be audible to residential properties in the context of the background noise level associated with ongoing industrial activities at the port complex.

5.6 Land Contamination

- 5.6.1 A Phase 1 Contamination Assessment was conducted by Tweedie Evans Consulting in late October 2021 and the results are included in the report submitted with the planning application.
- 5.6.2 There are low, or low to moderate, risks, present at the site due to potential exposure to contaminants associated with made up ground and former coal mining activities, and two recommendations are put forward for further geotechnical and geo-environmental surveys as a precaution. Given that activities for the turbine demonstration projects have been ongoing at the site for several years, and there are no incidents report of exposure to contaminants or uncontrolled releases to controlled water, these recommendations are not considered necessary unless as an essential precaution, and would then only reasonably be required as pre-commencement conditions.

5.7 Land Use and Rights of Way

- 5.7.1 The land on which the turbine is situated is used for predominantly for industrial purposes, related to the docklands and ferry port. Currently the dockland wall at Queen's Gate is hardly used and there is little activity in this part of the port.
- 5.7.2 There are no rights of way at or close to the proposed turbine site.
- 5.7.3 The Wales Coastal Path is routed to the east and west of the site along the coastline, but detours around the docklands by approximately 1.1km. Also, there is considerable infrastructure present between the wind turbines and the coastal path which inhibits views and provides an urban/industrial setting. As such the experience of users of the coastal path would not be unduly affected by the proposed turbines.

6 DESIGN DEVELOPMENT

6.1 Design Balance

- 6.1.1 The past 10 years of Crossflow Energy Company's Research and Development has been developing a new, disruptive, renewable energy technology, with applications for wind, water and a direct drive pump. The core of the technology is the development of a Crossflow Wind Turbine, in the small power range (5-25kW) which has been identified with an immediate market opportunity given the current shifts in the energy market and the need for clean distributed energy supply worldwide.
- 6.1.2 In 2019 the Crossflow Pre-production turbine was successfully installed and commissioned at the company test site in Port Talbot, Wales. The turbine was conceived and has been designed to utilise the strengths of both traditional Horizontal and Vertical axis turbines, and to avoid their recognised weaknesses. The turbine has been designed from the ground up, focusing on simplifying and "ruggedizing" key components which are frequently the cause of breakdowns, forced outages and inefficiency. Crossflow has developed an innovative hybrid design utilising both drag and lift characteristics resulting in low tip speed ratio ('TSR'), low noise and vibration, high reliability, long life and low maintenance requirements, with a smart control system for optimal integration with other energy sources and energy storage systems.
- 6.1.3 In 2021, following a period of research and consultation with Mobile Network Operators (MNOs), Crossflow's next generation turbine has been developed to sit atop its designed telecom tower to capture wind energy, with accompanying solar PV and storage, while requiring minimal maintenance – the whole unit comprising a stand-alone Eco-Tower. The next generation Eco-Tower is a unique communication mast for the Telecom sector comprising tower with 3.62 kW Crossflow turbine, Solar Halo and co-hosted Telcom equipment; integrated into the latest ground based solar/battery systems to create a reliable self-powered communication mast. The blend of wind and solar and their complementary generation profiles offers greatly increased energy capture from a given geographic footprint, reducing the real estate required and the environmental impact via habitat losses, and creating the potential for 100% clean energy on site generation.
- 6.1.4 With a low maintenance intervention strategy and extended operational lifetime, in accordance with the strict design and operational criteria of telecoms towers, the turbine has been designed so that telecons transponders and other technologies can be co-located on the Smart turbine tower with minimal vibration and sway (0.7' maximum), and no scatter or interference from moving blades. As such Crossflow's self-powered Eco-Towers enable reliable and affordable 4/5G connectivity in rural 'not spots'. By not needing grid power, Crossflow's masts can be located in areas that offer the best vantage points for connectivity.
- 6.1.5 The Eco Tower turbine head is designed to move up and down the tower by way of an advanced winch system for ease of installation and maintenance of both the turbine and any co-hosted Telecom equipment. The system is also designed to autonomously slowly lower the turbine head to a safe level under a centrifugal clutch mechanism on detection of very high wind speeds to provide added protection of equipment and personnel safety. This is a design feature specific to the Crossflow turbine and is ideal for use in the Telcom sector.

6.2 Design Iteration

- 6.2.1 The Eco-Tower addresses the Telcom industry's drive for reinforcement and in-fill of existing networks, diesel displacement at remote off-grid sites and renewable generation at grid connected

sites as part of the drive to meet carbon reduction targets.

- 6.2.2 Unlike many conventional wind turbines, the slow rotating Crossflow turbine is virtually silent and presents a 'solid' shape thus providing a bird & bat friendly's structure. With a 'low' overall profile and silent operation the Crossflow turbine is a considerate wind solution for deployment in urban, remote and environmentally sensitive sites.
- 6.2.3 The Crossflow Eco-Tower will be incorporated into a Smart Hybrid Energy System, combining the latest in solar PV and battery storage technologies, integrated with a back-up generator. This provides users with reliable, 24/7, affordable energy from multiple renewable sources with minimal maintenance requirements, whilst the combination of wind and the tower mounted 'Solar Halo' reduces the extensive footprint required for a meaningful renewable contribution from ground based solar.
- 6.2.4 The Smart Energy management software maximises renewable energy capture, reducing the use of fossil fuels and minimising carbon footprint. With site specific environmental consideration, the sizing of the PV array, the battery capacity and back-up generator are determined by assessment of the various renewable energy resources (site annual wind and solar irradiation); the user's demand for electrical power; and also, the available site 'footprint' for installation. The back-up generator can be replaced by an industry standard grid connection to facilitate high levels of renewable generation on grid connected sites where customers are specifically targeting on-site renewable generation targets.
- 6.2.5 The addition of a wind turbine to a solar-battery system greatly increases the renewable energy density from a small site footprint. When a Crossflow wind turbine is integrated with solar pv and battery storage as a Hybrid Energy System, the complementary annual and diurnal energy generation allows greater renewable power potential on each site, reducing the use of fossil fuel generation and greatly minimising carbon footprint.
- 6.2.6 The modularity of components gives the ability to supply 100% clean energy with reduced carbon footprint and real estate requirements, and higher reliability than solar/battery hybrid solutions.

7 THE PROPOSAL

7.1 Character

- 7.1.1 From a landscape perspective, it is not expected that there will be any adverse effects to the current characteristics of the docks, which are considered an appropriate location for turbine siting, as the docks provide an industrial setting landscape with existing tall, upright features. As such the turbines and infrastructure would not unacceptably add to the existing landscape baseline; indeed, the turbines and supporting infrastructure are insubstantial in the context of the wider setting.
- 7.1.2 Due to the scale of the proposed turbines, it is not expected that they would form a feature with undue prominence in the local area and they would not dominate views. There is potential for the turbine to be seen intermittently from some local residential receptors, the Wales Coastal Path and the local road network. However, the height of the turbines when combined by the existing character of the dockland area leads to an expectation that no views would be unacceptably affected by the proposed scheme.
- 7.1.3 Given the general lack of sensitivity of the landscape character established through LANDMAP, it is expected that the turbine would have a very marginal effect on the characteristics of the surrounding area and would not add unacceptably to the presence of visual elements on the Port Talbot Dock. It may even be argued that the proposed wind turbine would be appropriate to the general industrial setting of the area. In terms of amenity, visual receptors in the locality would not be significantly affected by the presence of the wind turbines over the temporary period of 4 years.

7.2 Access

- 7.2.1 Access to the site for installation and operational purposes is attained by the existing private road network within the ABP facility, which itself is accessed via the M4 and the A4241.
- 7.2.2 For the installation phase, the fabricated and partially assembled components for the turbine will be delivered on 4 lorries from our manufacturers in UK at Bridgend, Nottingham and Iver. In addition, installation site personnel will need to access the site. In both instances, vehicle movements are negligible in the context of wider site traffic at the Port facility, and it is not anticipated that there will be a necessity for a Transport Management Plan as a condition to planning permission, if granted.
- 7.2.3 During the operational phase, similarly, site traffic will be negligible in the wider context of the Port facility and it is very unlikely that highway safety, congestion or deterioration to running surfaces would arise.

7.3 Environmental Sustainability

- 7.3.1 Crossflow Energy's operations have the potential to generate significant and almost exclusively positive environmental and social impact.
- 7.3.2 Every Eco Tower in operation delivers benefits to our environment through the production of clean energy and mitigates the harmful effect of carbon emissions produced by diesel generation. Having undertaken extensive site analyses, the following typical benefits can be achieved depending on site location / load:
- 65-90+% renewable energy generation on-site;

- >80% CO₂ reduction compared to stand-alone diesel generation, depending on site. Significant further CO₂ reduction achieved from reduction in transport costs associated with both re-fueling and maintenance visits.
- 7.3.3 By powering communication network towers, with a 50% reduction in the Total Cost of Ownership (TCO) vs diesel generation, Crossflow Eco-Towers can help accelerate the provision of Internet access to communities in rural and remote communities. A secure power supply, which results in access to the Internet is deemed a key driving force to enhance education, socio-economic development, and economic growth. This is the case in a wide range of remote communities in both developed and developing countries, where the slow roll-out of grid-based electricity holds back many communities.
- 7.3.4 In addition to the significant international market opportunity presented by diesel displacement and rural connectivity, Crossflow's Eco-masts are positioned as essential infrastructure behind the UK government's Shared Rural Network programme boosting rural 4g connectivity – bringing online an additional 280,000 telecom sites and providing coverage for a further 16,000 km of road.
- 7.3.5 Crossflow has its Head Office and Technology Demonstration site in Port Talbot, with a firm high quality supply chain for the Eco-Tower, with confirmed capability to support commercial production, in the UK, with many of its suppliers based in South Wales. Although the foundation and basic tower support structure could be sourced within the deployed country, the specialist high value turbine rotor components must be fabricated to extremely high precision and tolerance, before being interface tested at the company's Port Talbot site prior to onward shipping. The company plans to remain in South Wales beyond commercialization, growing its R&D facility for product development and establishing a volume manufacturing supply chain for export.

7.4 Community Safety

- 7.4.1 Due to the presence of the facility on private land, there will no threats to community safety arising from the proposed scheme.

7.5 Response to Planning Policy

Relevant National Planning Policy

- 7.5.1 Planning Policy Wales (PPW) 2021 (Edition 11) forms part of the policy framework for land-use planning in Wales, the purpose of which is to deliver sustainable economic development, the conservation of natural assets and improve the quality of life of individuals and communities in Wales. The document also provides the policy framework for the preparation of local planning authorities' development plans. Planning Policy Wales, and associated Technical Advice Notes and circulars may be material to decisions on individual planning applications.
- 7.5.2 Section 5.9 of PPW on Renewable and Low Carbon Energy requires “... *local authorities to facilitate all forms of renewable and low carbon energy development and to ensure the area's full potential for renewable and low carbon energy generation is maximised* ...”. This is to be achieved through positive development control decision for new clean energy proposals, where they meet other relevant policy tests, and the adoption of supplementary guidance that will support the fulfilment of renewable energy targets.
- 7.5.3 Section 5.9.11 identifies that Welsh Government encourages the use of local renewable and low carbon energy “... *as part of the imperative to reduce carbon emissions*”, explaining that such technologies offer “... *significant potential for communities and small businesses to develop their own projects for local benefit*”. The proposed test facility, which will inform the development and

commercialisation of small scale wind generators and energy control systems for remote locations and as off-grid solutions, is therefore a technology that meets these objectives.

7.5.4 In determining applications for renewable and low carbon energy technologies, Section 5.9.19 instructs planning authorities to take account of:

- *the contribution a proposal will make to meeting identified Welsh, UK and European targets;*
- *the contribution to cutting greenhouse gas emissions; and*
- *the wider environmental, social and economic benefits and opportunities from renewable and low carbon energy development.*

7.5.5 In the case of the proposed test facility, the scale of generators will not significantly contribute to targets in the short term, but in the medium- to long-term the production and commercialisation of the Crossflow patented clean energy technology will make a valuable contribution to emissions reductions and create wider sustainability benefits to the Welsh economy.

7.5.6 In making determinations on new proposals, local authorities are also required to take account of the impacts of new development, including:

- *the need to minimise impacts on local communities, such as from noise and air pollution, to safeguard quality of life for existing and future generations;*
- *the impact on the natural and historic environment;*
- *cumulative impact;*
- *the capacity of, and effects on the transportation network;*
- *grid connection issues where renewable (electricity) energy developments are proposed; and*
- *the impacts of climate change on the location, design, build and operation of renewable and low carbon energy development. In doing so, consider whether measures to adapt to climate change impacts give rise to additional impacts.*

7.5.7 Developers are instructed (Section 5.9.21), prior to an application being submitted, to ensure the avoidance or minimisation of adverse impacts through careful consideration of location, scale, design and other measures.

7.5.8 In respect of the above national planning policy requirements, the proposed demonstration test facility will support and accord with the ambitions for renewable energy deployment and associated emissions reductions associated with fossil fuel energy. The facility will further contribute in a small but important way to the sustainability goals for economic, social and environmental improvements in the region and Wales, once the technology is available in the energy market, as encouraged by PPW and The Well-being of Future Generations (Wales) Act 2015 (see below).

Relevant Local Policy

7.5.9 The Local Development Plan (LDP) for Neath Port Talbot County Borough Council for the period 2011-2026 was adopted in January 2016. The purpose of the LPD is to guide the future development of the Council and establishes where, when and how much new development can take place over the next 15 year period of the Plan.

7.5.10 Relevant policies in the LDP to this development proposal include:

- **EC2 – Existing Employment Areas**, whereby the Council will protect the employment function of the Tata Steelworks area at Margam, among other areas, to ensure that a range of sites are retained to allow for the needs of existing businesses and potential expansion.
- **TR4 – Safeguarding Freight Facilities**, whereby the Port Talbot Docks, among other areas, are to be safeguarded for the transportation of freight.
- **SP18 – Renewable and Low Carbon Energy**

A proportionate contribution to meeting national renewable energy targets and energy efficiency targets will be made while balancing the impact of development on the environment and communities.

This will be achieved by:

- 1. Encouraging where appropriate, all forms of renewable energy and low carbon technology development;*
- 2. Encouraging energy conservation and efficiency measures in all new major development proposals;*
- 3. Ensuring that development will not have an unacceptable impact on the environment and amenity of local residents.*

- **RE1 – Criteria for the Assessment of Renewable and Low Carbon Energy Development**

Proposals for renewable and low carbon energy development will only be permitted subject to the following criteria:

- 1. Large scale wind farm developments (>25MW) will be expected to be located within the boundaries of the refined Strategic Search Areas.*
- 2. Proposals for wind farms of any size outside the SSAs will only be permitted where it is demonstrated that there will be no unacceptable impact on visual amenity or landscape character through the number, scale, size, design and siting of turbines and associated infrastructure.*
- 3. Small scale wind farm developments (<5MW) will be required to demonstrate that impacts are confined to the local scale.*
- 4. All renewable energy or low carbon energy development proposals will be required to demonstrate that:*
 - (a) Measures have been taken to minimise impacts on visual amenity and the natural environment;*
 - (b) There will be no unacceptable impacts on residential amenity;*
 - (c) The development will not compromise highway safety;*
 - (d) The development would not interfere with radar, air traffic control systems, telecommunications links, television reception, radio communication and emergency services*

communications; and

(e) There are satisfactory proposals in place for site restoration as appropriate.

- BE1 – Design

All development proposals will be expected to demonstrate high quality design which fully takes into account the natural, historic and built environmental context and contributes to the creation of attractive, sustainable places.

Proposals will only be permitted where all of the following criteria, where relevant, are satisfied:

1. It complements and enhances the character and appearance of the site, building or area in terms of siting, appearance, scale, height, massing and elevation treatment;

2. It respects the context of the site and its place within the local landscape, including its impact on the important arterial gateways into the County Borough, its effects on townscape and the local historic and cultural heritage and it takes account of the site topography and prominent skylines or ridges;

3. It utilises materials appropriate to its surroundings and incorporates hard and soft landscaping and screening where appropriate;

4. It would not have a significant adverse impact on highway safety, the amenity of occupiers of adjacent land or the community;

5. Important local features (including buildings, amenity areas, green spaces and green infrastructure, biodiversity and ecological connectivity) are retained and enhanced as far as possible;

6. It achieves and creates attractive, safe places and public spaces, taking account of ‘Secured by Design’ principles (including where appropriate natural surveillance, visibility, well-lit environments and areas of public movement);

7. It plays a full role in achieving and enhancing an integrated transport and communications network promoting the interests of pedestrians, cyclists and public transport and ensures linkages with the existing surrounding community;

8. It uses resources, including land and energy, as efficiently as possible through:

(a) Making the best and most efficient use of the land available through being of appropriate density taking into account the character and appearance of the area, normally a minimum of 35 dwellings per hectare in the Coastal Corridor Strategy Area or a minimum of 30 dwellings per hectare in the Valleys Strategy Area;

(b) The layout and form of the development does not preclude the reasonable use of other adjacent land;

(c) Developing brownfield land in preference to greenfield land where possible;

(d) Minimising building exposure while maximising solar gain.

9. Its drainage systems are designed to limit surface water run-off and flood risk and prevent

pollution;

10. The layout and design of the development achieves inclusive design by ensuring barrier free environments, allowing access by all and making full provision for people with disabilities.

- 7.5.11 The proposal for the demonstration facility at the ABP Margam location appears to be supported under Policies SP18 and RE1, and the development is not in conflict with the specific criteria to each of these Policies or the provisions of Policies TR4 and EC2.

Other Relevant Legislation

- 7.5.12 The Environment Act 2016 places a duty on Welsh Ministers to set targets for reducing greenhouse emissions and also to set carbon budgets, the purpose being to accelerate progress towards the headline targets and build resilience to extreme weather events such as flooding and intense storms. Statutory carbon reduction targets and a robust governance framework set out in the Act will evaluate progress towards these targets and provide certainty in driving investment for a low-carbon Wales.
- 7.5.13 The Well-being of Future Generations (Wales) Act 2015 is pertinent to all public bodies in Wales and the WG. One of the well-being goals is for a globally responsible Wales, explaining that action on climate change benefits both the people and communities in Wales as well as making a contribution to the wider global effort to tackle the causes of climate change and reduce its effects.
- 7.5.14 The proposed demonstration facility will make a small but important contribution to these legislative aims.