Aviva Wind Turbine

Design & Access Statement

September 2018

Prepared for Aviva plc by Purple Renewables

FOREWORD

This document is the Design and Access Statement which accompanies the Environmental Statement (ES) for the proposed Aviva Wind Turbine. The Design and Access Statement and ES has been prepared by Purple Renewables to accompany an application for planning permission submitted to Perth and Kinross Council.

Inspection of the planning application, Environmental Statement and Supporting Documents

Copies of the Environmental Statement may be inspected free of charge at the following location:

Perth and Kinross Council
Pullar House
Kinnoull Street
Perth
PH1 5GD

Digital copies of the Non-Technical Summary are available free of charge from Perth and Kinross Councils Planning Portal or from www.aviva-renewables.co.uk

Further hard copies of the Environmental Statement are available at a cost of £400.

DVD copies are also available at a cost of £25.

For further information please contact:

Purple Renewables Ltd
3-2-4 Storey House
White Cross Business Park
Lancaster
LA1 4XQ

www.purple-renewables.co.uk

Contents

1. Background Information

1.1.2 This Design and Access Statement accompanies the Environmental Statement (ES) which has been prepared to accompany the submission of a planning application under the Town and Country Planning (Scotland) Act 1997, as amended to Perth and Kinross Council for planning permission to construct a wind turbine at Aviva, Pitheavlis, Perth, PH2 0NH . It has been prepared in accordance with Planning Advice Note 68 (PAN 68): Design Statements.

1.1.3 Aviva plc (the applicant) approached Purple Renewables Ltd (the agent) in 2016 to assess the feasibility of wind turbines on their UK owned sites to provide electricity directly to their facilities. On the basis of a feasibility report, Aviva subsequently decided to proceed with developing a wind turbine at their Perth site.

1.1.4 The proposed development is for a single wind turbine located at Aviva's commercial premises in Pitheavlis, Perth. The proposed development site is located on the south west fringe of Perth and is bounded by the M90 motorway running north-west / south-east, Craigie Hill golf club to the east and residential housing to the north west.

1.1.5 The proposed development site can be seen within its regional context in **Figure 1**. **Figure 2** shows the site in its local context and **Figure 3** provides further detailed plans of the proposed development.

1.1.6 The Aviva UK Insurance building was designed and built between 1979 and 1983 as the world headquarters for the General Accident Fire and Life Assurance Corporation. The company changed its name to Aviva Insurance in 2006. In August 2017 the Aviva UK Insurance Building was listed a Category A building by Historic Environment Scotland. Aviva currently operate from the Pitheavlis site and have approximately 1200 employees working across a range of departments.

1.1.7 The planning application is for a single wind turbine up to 77 metres (m) tip height with associated infrastructure such as a crane hardstanding, upgraded access track, and a temporary construction compound. The candidate turbine is between 800 and 900 kilowatts (kW) capacity.

1.1.8 Aviva take climate change very seriously, its impact on air quality, weather events and flooding, and its impact on people. Aviva want to do all they can to try to reduce global greenhouse gas emissions. Aviva began purchasing electricity from renewable sources for their UK estates in 2004 and they have reduced their worldwide carbon emissions by 53% since 2010. Aviva strongly believe that where it is feasible to produce green energy on their own sites they should be reinvesting to make the business as economically and environmentally sustainable as possible for the future.

1.1.9 Aviva would like to make their Perth site 100% supplied by on-site renewable generation and would like to make their Perth site an exemplar site for the Aviva Group worldwide.

1.1.10 The installation of a single 77m high 800-900kW wind turbine could potentially provide enough electricity to power over 50% of Aviva's site. For further information on Aviva Perth's Zero Carbon Journey, please see Appendix 1.

2. Site Context and Appraisal

2.1 Site Description

2.1.1 The Aviva site consists of a large commercial office building, a landscaped concourse, a number of smaller building including a former sports centre, an extensive car parking area and landscaped gardens.

2.1.2 The Aviva facility occupies an area of approximately 12.5 hectares and is primarily used as commercial office space.

2.1.3 The site's north-west / south-east boundary is the M90 motorway which has a mature band of conifer planting separating the site from the motorway. Craigie Hill golf club is located to the east of the site and is separated by woodland cover. To the north west of the site, along Necessity Brae there is residential housing, which is largely separated from the site by a tree belt of conifer planting.

2.1.4 An assessment of the proposed development on cultural heritage is included in the Environmental Statement accompanying the planning application. The assessment concluded that the setting of the Aviva Building which contributes to its significance are affected to a limited extent, resulting in an appreciable but partial loss of the assets cultural significance.

2.1.5 An assessment of the proposed development on landscape and visual impact is included in the Environmental Statement accompanying the planning application. The assessment concluded that the proposed turbine would have no significant effect upon the rural landscape character types or the urban area of Perth or adjoining settlements. The turbine would be clearly visible from a small number of localised visual receptors, however no significant effects upon visual amenity are predicted.

2.1.6 The elevation of the Aviva site at around 91 AOD, makes the site an ideal location for a wind turbine, in terms of wind resource.

2.2 Service

2.2.1 An assessment of the proposed development on Infrastructure services is included in the Environmental Statement accompanying the planning application. Appropriate buffers have been applied and suitable separation distances have been maintained.

2.2.2 There will be need to divert Aviva's onsite services, surface water drainage and electricity cabling for carpark lighting, away from the wind turbine foundation. Details are included in the Environmental Statement.

2.2.3 It is envisaged that the electricity from the wind turbine will be connected to the existing switchgear house on the Aviva site. No overhead lines will be required to connect the turbine with the sites electrical system. All cables between the turbine, the electrical enclosure, and the switchgear house would be buried below ground and materials extracted from the trench excavation used in the backfilling of the cables.

2.3 Surrounding Buildings

2.3.1 The Aviva UK Insurance building is approximately 50m from the proposed wind turbine. '*The building consists of five modular terrace levels with landscaped rooftop gardens, stepped back into the hillside. The plan form adheres to a 10 x 10 metre 'tartan grid' system. The building is clad in ribbed pre-cast concrete and quartz aggregate panels with matching cills and copes. The pre-cast panels are vertically ribbed suggesting the appearance of striated rock.*

2.3.2 *The 'ground-scraping' designs sought to reduce and soften apparent bulk by stepping floor levels back into the surrounding landscape. Interest in the surrounding environment and an understanding of how the building was to be used*

and experienced resulted in a more holistic and humanistic approach to building design. The flexibility of office space was also given increased consideration to allow the buildings to adapt to technological and social change.

2.3.3 *Flexibility, functionality, sense of place and the experience of the user were primary design considerations. These concerns are expressed through the deep, open-plan office spaces, circulation between floor levels and communal spaces throughout the building. A 'top-servicing' system was specially developed by Arup for this building, using vertical poles to deliver power from ceiling to each desk to facilitate flexible use of the deep-plan office areas, anticipating the widespread implementation of personal computers in the work place. A central automated building management system ensured that all services operated at optimum levels of performance. An emphasis on achieving a minimum energy consumption and ease of use was built into the design'.*[1]

2.3.4 Aviva considers the addition of a wind turbine to the Aviva UK Insurance building will assist in allowing the building to continue to function as a commercial office space, making the building fit for purpose in the 21st century.

2.3.5 The on-site leisure centre (not listed) is currently vacant and in a poor state of repair.

2.4 Use of Space

2.4.1 The Aviva UK Insurance building is privately owned and has no public access to the site, apart from visitors, who need to be registered and accompanied at all times.

2.4.2 The site is operated 24 hours a day, all days of the year, and has permanent security on site.

2.4.3 During the construction period, access will be governed under the Health and Safety of Work Act 1974 and associated legislation and for safety reasons all public access will be prohibited during the construction period. During the operational period appropriate warning signs will be installed concerning restricted areas such as transformers, switchgear and metering systems.

[1] http://portal.historicenvironment.scot/designation/LB52450

2.5 Landscaping

2.5.1 The site is extensively landscaped with established coniferous boards along Necessity Brae and the M90. There is an area of woodland separating the site from the adjacent golf course.

2.5.2 Additional landscape screening proposals, whilst not essential, are proposed to minimise the close range visual effects upon a localised part of the urban area of Perth to the north of the Site along the B9112 corridor.

2.5.3 The mitigation planting would comprise a belt of semi-mature conifer planting to infill a 20m long gap near the main access to the site (see Viewpoint 1 photomontage). Trees planted would be conifers up to 6m high and selected from species already present near the road corridor within the Aviva grounds to ensure that they fitted in with the character of existing planting.

2.6 Connections

2.6.1 The Aviva UK Insurance building is privately owned and has no public access to the site, apart from visitors, who need to be registered and accompanied at all times.

2.6.2 No public transport routes and stops, taxi stances, cycle ways will be affected by the proposed development.

2.6.3 The site will continue to have an operational car park.

3. Identification of the Design Principles

3.1.1 The selection and design of a site is an important component of a renewable energy development. Purple Renewables applies a stringent site selection process involving reference to national and regional/local development plan policy provisions as well as a range of environmental and technical considerations.

Site Selection

3.1.2 The feasibility assessment and selection of Perth as a suitable site has considered the following aspects:

- Suitable separation distances from international designations (Ramsar sites, Special Protection Areas, Special Areas of Conservation);
- Suitable separation distances from national designations (Sites of special Scientific Interest, National Parks, National Scenic Areas);
- Suitable separation distances from important tourist destinations and Scheduled Monuments.
- Suitable separation distances from World Heritage sites.
- Suitable separation distances from residential properties
- Suitable separation distances from aviation interests (Civil and Military)
- Ability to integrate into the existing electrical grid network
- Availability of wind resource.

3.1.3 Alternative areas within Aviva's land holding have been assessed for suitability of wind turbine development. In this instance it was not deemed appropriate to search for alternative locations suitable for wind energy development outside the land holding as this project is an on-site wind turbine designed to supply Aviva directly with green electricity.

4. Analysis and the Development of the Design Concept

4.1.1 The individual turbine location was informed by technical and environmental requirements. In accordance with EIA regulations the main design alternatives have to be studied with key reasoning, taking into account the potential environmental effects. The proposed development at Aviva has been considered a suitable site for wind energy development because it has met the following criteria:

Technical requirements

4.1.2 Technical requirements which influence wind turbine siting are as follows:

4.1.3 **Land Availability** - the turbine should be placed as not to over-sail adjacent land holdings.

4.1.4 **Site Access** - should utilise existing roads where possible in order to minimise the need to build new roads.

4.1.5 **Wind Resource** – the site should have a high annual wind speed across the proposed development site.

4.1.6 **Grid Connection** – the site should have an available grid connection in close proximity to the site.

Environmental Requirements

4.1.7 In addition to the technical parameters of wind turbine development, the following environmental requirements influence directly on the site design, these were identified and considered during the development of the project:

4.1.8 **Separation from Dwellings** - the turbine should be located so that no dwelling could experience noise nuisance. Noise considerations are discussed in further detail in **Chapter 10 of the Environmental Statement** which follows the methodology outlined in ETSU-R-97. The turbine should also be a sufficient distance away from dwellings to prevent them being visually overbearing, this is discussed in **Chapter 5 of the Environmental Statement**.

4.1.9 **Archaeology and Heritage** - the turbine should not significant impact any sites of archaeology or heritage significance, nor significantly affect the setting of such sites where it is practicably possible. Historic Environment Scotland's methodology of avoid, reduce and offset is followed. The cultural heritage assessment for this project is contained within **Chapter 6 of the Environmental Statement.**

4.1.10 **Ecology** - the turbine should be located so that it does not significantly impact upon species or habitats that may occur in close proximity to the site or further afield for species such as birds or bats. The ecological assessment for the project is contained within **Chapter 7 of the Environmental Statement.**

4.1.11 **Infrastructure** - the turbine layout should be such that it does not interfere with the operation of aviation organisations and regulators such as the Ministry of Defence (MoD), Civil Aviation Authority (CAA) and regional or local airports. Careful consideration needs to be given regarding interference with telecommunication links and television reception. Infrastructure issues are discussed in **Chapter 11 of the Environmental Statement** of this volume.

4.1.12 Further information relating to the detailed assessment of these aspects is considered in each of the technical assessments within this Environmental Statement.

Stakeholder and Public Consultation

4.1.13 A number of statutory and non-statutory consultees were approached for information and guidance regarding the proposal. The details of the responses are included in each of the technical assessments in the Environmental Statement.

4.1.14 Public consultation comprising of a dedicated consultation website and an open day to discuss the proposal have been undertaken to gather information for consideration in the EIA and subsequent design of the proposal.

5. The Design Solution

5.1.1 All of the above factors, environmental and technical requirements of the wind turbine along with feedback received from consultees and the public consultation exercise, were analysed in relation to each element of the proposed wind turbine development. This led to a process of design development.

Layout

5.1.2 The layout of the site was determined with reference to the constraints of the site as detailed in section 4 - analysis and the development of the design concept.

5.1.3 The available developable area of Aviva's land holding is limited to a small section of the car park. The M90 motorway runs along the site boundary. The appropriate buffer distance of 1.5 x tip height has been applied.

5.1.4 An additional buffer distance of 350m from residential dwellings has been applied to minimise impact on residential amenity due to potential visual impact and noise considerations.

5.1.5 The turbine is to be located within the land ownership of Aviva, therefore the blades do not over-sail into adjacent land holdings.

Design Iterations

5.1.6 Aviva has committed to purchase and or generate 100% of their electricity from renewable sources on a worldwide basis by 2025. Aviva would like to make their Perth site the exemplar site for the group with ambitions to make the site zero carbon.

5.1.7 In order for the site to be 100% supplied by wind energy the proposed development would need to be of the scale of a 2MW wind turbine, which would be approximately 110 to 130m in height.

5.1.8 **Design 1** represents the original technically based desktop design for the site. The initial design consisted of one wind turbine upto 80 m in height. The height was limited due to the proximity of the M90 motorway and nearby residential dwellings.

5.1.9 **Design 2** resulted in a slight relocation of the turbine position, to place the turbine away from the centre of the road into an area currently used for car parking. There was a slight reduction in height of the turbine due to the size of the candidate turbines currently available.

5.1.10 The turbine is located in an area which is considered to be the least constrained by operational requirements and which best respects current policy on separation distances between turbines and neighbouring land uses.

Diagram 1 – Constraints Overlay Map

Key – Orange: 350m housing buffer, Purple: 116m motorway buffer, Blue: land ownership boundary.

Landscape/Landscaping

5.1.11 The site is extensively landscaped with established coniferous boards along Necessity Brae and the M90. There is an area of woodland separating the site from the adjacent golf course.

5.1.12 Additional landscape screening proposals, whilst not essential, are proposed to minimise the close-range visual effects upon a localised part of the urban area of Perth to the north of the Site along the B9112 corridor.

5.1.13 The mitigation planting would comprise a belt of semi-mature conifer planting to infill a 20m long gap near the main access to the site (see Viewpoint 1 photomontage). Trees planted would be conifers up to 6m high and selected from species already present near the road corridor within the Aviva grounds to ensure that they fitted in with the character of existing planting.

Scale and Mix

5.1.14 The extent of the development was limited by constraints on-site as detailed above in the layout section. A range of turbine types (of varying heights) and layout options with reference to the constraints on site and in the surrounding environment and have been assessed with regard for the need to achieve an efficient use of the available wind resource.

5.1.15 Purple Renewables believe that the scale and design of the proposed development effectively balance the need to utilise the wind resource whilst not unduly impacting on the surrounding environment or community.

Appearance

5.1.16 The exact model of wind turbine to be used at the site would be decided following a tendering process. It is however anticipated that a Enercon E53 turbine or similar would be used. As such the key technical parameters of the candidate turbines are summarised below.

Table 1 Candidate Turbine Models

	Enercon 44	Enercon 48	Enercon 53	EWT DW54
Rated Power	900kW	800kW	800kW	900kW
Cut-in Speed	3.0m/s	3.0m/s	3.0m/s	3.0m/s
Cut-out Speed	34.0m/s	34.0m/s	34.0m/s	25.0m/s
Rotor Diameter	44m	48m	52.9m	54m
Hub Height	55m	50m	50m	50m
IEC Wind Class	IA	IIA	IIIA	IIIA

5.1.17 In the environmental assessments the maximum turbine dimensions and the lower rated power have been used in calculations.

5.1.18 The nacelle and rotor of the turbine will rotate to face into the wind.

5.1.19 The turbine tower would be of tapered tubular steel construction and the blades of fibreglass with lightning protection, protecting the entire turbine. The finish of the turbine would be of a low-reflectivity, semi-matt white to mid-grey hue to reduce the contrast with the background sky and landscape. The turbine will contain no logos or advertising.

6. Access

6.1.1 The Aviva UK Insurance building is privately owned and has no public access to the site, apart from visitors, who need to be registered and accompanied at all times.

6.1.2 During the construction period, access will be governed under the Health and Safety of Work Act 1974 and associated legislation and for safety reasons all public access will be prohibited during the construction period. During the operational period appropriate warning signs will be installed concerning restricted areas such as transformers, switchgear and metering systems.

6.1.3 Only trained personal will be afforded access to within the turbine itself, through secure locked doors.

Internal Access Tracks

6.1.4 From the existing entrance, an existing road will be used to reach the position of the crane pad.

6.1.5 The layout has been designed to minimise any impact upon current operations and so that land take is kept to a minimum. The location of the internal access track is illustrated in **Figure 3**.

Access Route

6.1.6 Currently there are no wind turbine manufacturers (of this scale of turbine) based within the UK. Therefore, it is envisaged that the turbine components will be brought into the UK from mainland Europe via the ports of Dundee or Grangemouth. These docks cater for the deep draft of vessels required for the transport of turbine components. From the port of entry abnormal loads are envisaged to reach the M90 with little hinderance via the UK's network of A-Roads and Motorways. The route from the M90 is as follows; M90 junction 12, A93, B9112 to the site entrance.

6.1.7 An access route assessment has been undertaken and the results from the analysis indicate that both the blades and tower transporters can be accommodated by the access route if selected minor highways improvements and minor works are conducted. This would include removal of the bollards in the central island on the junction of the A93/Necessity Brae, and some minor tree trimming works on the A93. All of the improvements proposed along the access route would be undertaken in agreement with the relevant highways authority.

7. Conclusion

7.1.1 General Accident was a Scottish company (founded in 1885) that wanted to show its corporate ambition and status with a new world headquarters building in central Scotland. The massive scale of its new building, the high material specification and engineering achievement were clear expressions of an intent to create a major centre of commercial insurance in Scotland.[2]

7.1.2 Aviva today want to continue to demonstrate its corporate ambition and lead the way on a transition to a low carbon economy. Aviva wish to make their Perth site 100% supplied by on-site renewable generation and would like to make their Perth site an exemplar site for the Aviva Group worldwide, the proposed wind turbine is an essential part of this journey.

7.1.3 Aviva has reduced their carbon emissions by 53% since 2010 worldwide and have committed to purchase/generate 100% of their electricity from renewables on a worldwide basis by 2025. The addition of a wind turbine to the Aviva UK Insurance building will assist in allowing the building to continue to function as a commercial office space, making the building fit for purpose in the 21st century.

7.1.4 If the Scottish Government are going to meet their ambitious climate change and energy generation targets of generating the equivalent of 100% of Scotland's electricity demand from renewable sources by 2020, it needs companies such as Aviva to *lead the charge in innovative, high-specification commercial office development*[3] for the future, just the same as it did when the original building was commissioned in 1979.

[2] http://portal.historicenvironment.scot/designation/LB52450

[3] http://portal.historicenvironment.scot/designation/LB52450

Aviva Perth Wind Turbine

Figure 1 - Regional Context

Legend

- Proposed Turbine Locaton
- Land Boundary
- Figure Buffer 1km
- Figure Buffer 2km
- Figure Buffer 3km

0 0.5 1 1.5 km

Scale 1:20,000

Purple Renewables

Aviva Perth Wind Turbine

Figure 2 - Local Context

Legend

- Proposed Turbine Locaton
- Land Boundary

0 100 200 300 400 m

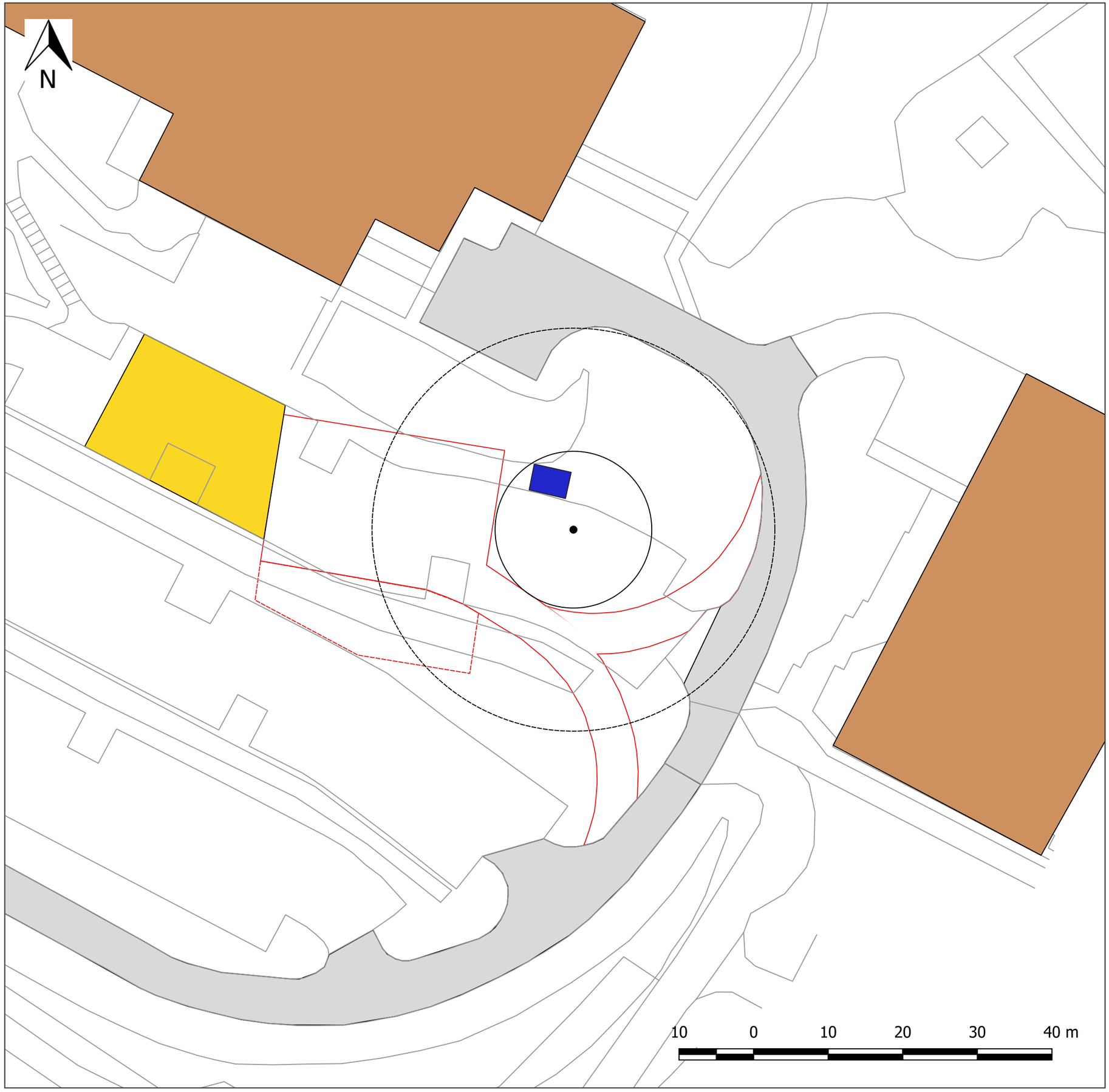
Scale 1:5,000

Purple Renewables

This map should be printed at A3 only

Aviva Perth
Wind Turbine

Figure 3 - Proposed Site Layout



Legend

- Proposed Turbine Location
- Foundation Radius
- Blade Swept Area
- Site Tracks
- Temporary Laydown Area
- Transformer Kiosk
- Temporary Construction Compound
- Existing Building
- Existing Road

Scale 1:500

Drawn By: NM	Date: 24/08/18	Purple Renewables
Checked By: RG	Revision: 001	

AVIVA

Making Aviva Perth an Energy Independent and Zero Carbon Location

Our long-term goal is to be self-sufficient in the energy that we use here in Perth, helping us to reduce our carbon impact and meet our climate change commitments.

In 2017 we used 12,027,425 kWh of energy, costing just over **£1 million**

5,400,708 kWh

6,626,717 kWh

That's equivalent to the energy used by over

800 houses!

What have we done so far?

We've been working hard to reduce the energy we use on site and to generate renewable electricity.

Since 2010 we've reduced our electricity use by nearly 30%

Here are some of the projects that have helped us to achieve this reduction.

2015

Installed energy efficient LED lighting

Saving 10% of the electricity we used in 2015.

2017

Installed solar panel on the roof

Generates 63,000 kWh a year, which is like charging **17.5 million mobile phones.**

2018

Installed variable speed drives to make our heating and ventilation system more efficient.

Saving 10% of the electricity we used in 2018.

What are we planning to do next?

To achieve our long-term goal to be energy independent we've got a lot more work to do. Here are some of the projects that we're hoping to start work on soon.

Smart building controls

We're investing in new technology and data capabilities to further reduce consumption.

Saving 10% of our annual energy use.

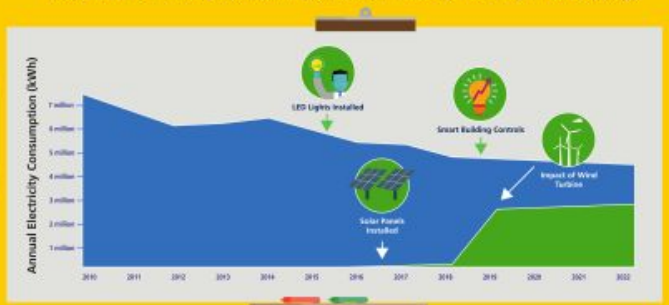
Wind turbine

We're hoping to install a wind turbine to generate clean energy that we can use here on site.

Expected to generate 2,500,000 kWh a year, which is over 50% of our annual electricity use.

Our Journey to 2022

The chart below shows the impact that our projects have had so far on our electricity use, and the incredible positive impact we can have by investing in wind energy.



Prepared for Aviva plc by Purple Renewables