Design Statement

Greenside Extension

Client: Greenside Wind Energy Ltd.
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Report Prepared for:
Greenside Wind Energy Ltd.

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1 Design Statement

1.1 Introduction

This Design Statement has been prepared by Green Cat Renewables (GCR) to accompany the planning application for Greenside Wind Farm Extension. The final proposed development design comprises three wind turbines and associated infrastructure. This statement sets out the criteria and principles that have guided the design of the development in order to minimise the environmental effects.

This statement provides a description of the site selection process and demonstrates how the site and its surroundings have been fully appraised to ensure that the final design solution is the most suitable for the site. Details are also provided on the site alternatives that were considered, including the design iterations that were undertaken prior to arriving at the final design, as well as access arrangements for the proposed development.

This statement should be read in conjunction with the other chapters of the Environmental Impact Assessment Report (EIAR), which contains a detailed description of the development and its predicted environmental effects.

1.2 Scene Setting

1.2.1 Background to Development

The Scottish Government has challenged the renewables industry to develop onshore wind projects in the post subsidy market, as the renewable sector is vital for reaching the Scottish Governments ambitious carbon reduction targets outlined in their Fourth National Planning Framework (NPF4) and the onshore wind policy statement. In order for Scotland to achieve the legally binding goal of achieving net zero target by 2045, a further growth in renewable energy developments is necessary. Both Green Cat Renewables (GCR) and the applicant, GWEL Operating Company Ltd recognise the national targets for renewable energy generation and the contribution which wind energy projects make in tackling climate change and reducing Scotland's dependence on fossil fuels.

The proposed development will comprise three wind turbines with an expected power rating of 2.35MW each, giving a total installed capacity of 7.05MW. GCR have been appointed to undertake the Environmental Impact Assessments and act as Planning Agent for the application.

The final design of the proposed development has been carefully selected through an iterative design process in order to minimise environmental impacts and to comply with technical constraints present on site, whilst optimising the efficiency and performance of the site.

1.2.2 Need for the Development

Renewable energy is now Scotland's largest source of power, and onshore wind provides the bulk of that capacity. Onshore wind farms have demonstrated affordability, predictability, alongside a whole raft of other social, environmental and economic benefits.

The UK Government's own figures show that onshore wind is already the lowest-cost form of new power generation: cheaper than gas, and almost half the cost of electricity from new nuclear power stations. Advances in technology, in particular a move to bigger and more efficient turbines, have been driven by a growing global market which has reduced costs by a quarter since 2010.

Pressure is mounting for governments to take more action on climate change, particularly after the Scottish Government declared a climate emergency in June 2019. The Scottish Government published the *Draft Scottish Energy Strategy and Just Transition Plan* in January 2023. which sets out the vision for the future of the energy system in Scotland. The strategy sets out clear policy positions and a route map of actions the UK Government must deliver, including an ambition for more than 20 GW of additional low-cost renewable electricity generation

capacity by 2030, including 12 GW of onshore wind. The Strategy and Plan provides policy certainty for consumers, businesses and investors and sets a clear direction for the future of Scotland's energy sector.

The message from the Scottish Government is clear – Scotland will be a world leader and trailblazer for low-carbon and sustainable technologies. Furthermore, on the 28th of April 2019, First Minister for Scotland, Nicola Sturgeon, declared a climate emergency and that Scotland would live up to the responsibility to tackle it[1] by setting a target to become a 'net-zero emissions society by 2045'.

Further renewable energy projects, when sited appropriately, will help achieve the full potential for renewable energy generation within Angus. The proposed development will provide a positive contribution to the governments, and Aberdeenshire Council's, low carbon and sustainable targets.

1.3 Overview of Development

The site at Greenside is located approximately 2-3km southeast of Crimond, Aberdeenshire.

In terms of other wind energy developments in the area, the site is associated with the existing Greenside Wind Farm, which currently features four turbines, and there are a handful of individual turbines in the vicinity of the site.

The main components of the final design will consist of the following infrastructure elements:

- Three, three-bladed horizontal axis wind turbines measuring up to 100m tip height;
- Hardstanding areas for cranes at each turbine location;
- Turbine foundations;
- Access tracks;
- One borrow pit;
- Drainage works;
- An on-site electrical sub-station and control network of buried cables;
- A temporary construction compound, including parking, and welfare facilities; and
- Associated ancillary works.

A full site and development description can be found in Chapter 3 - Project Description.

[1] https://www.bbc.co.uk/news/uk-scotland-scotland-politics-48077802

Figure 1.1 -Site Location Plan

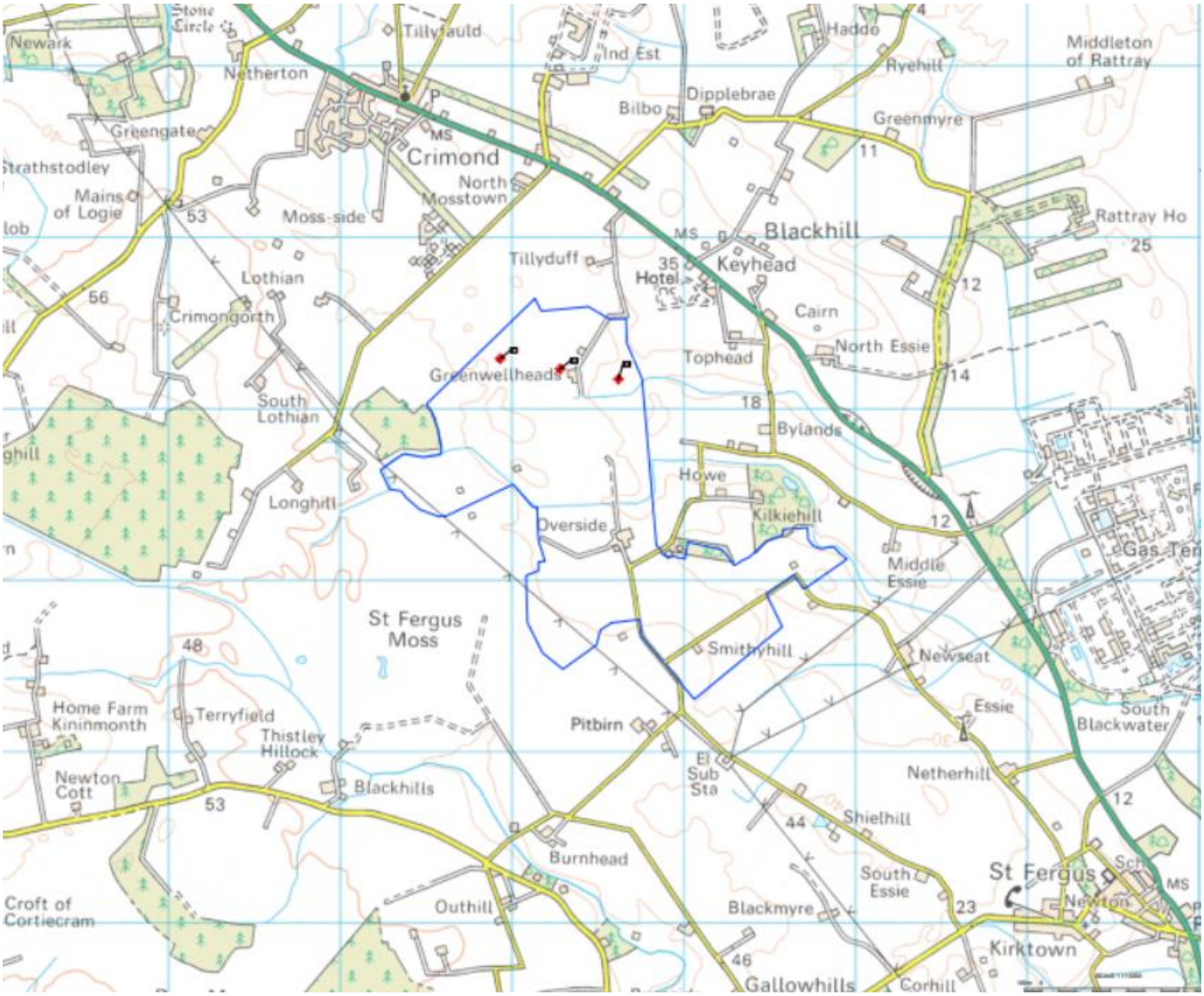
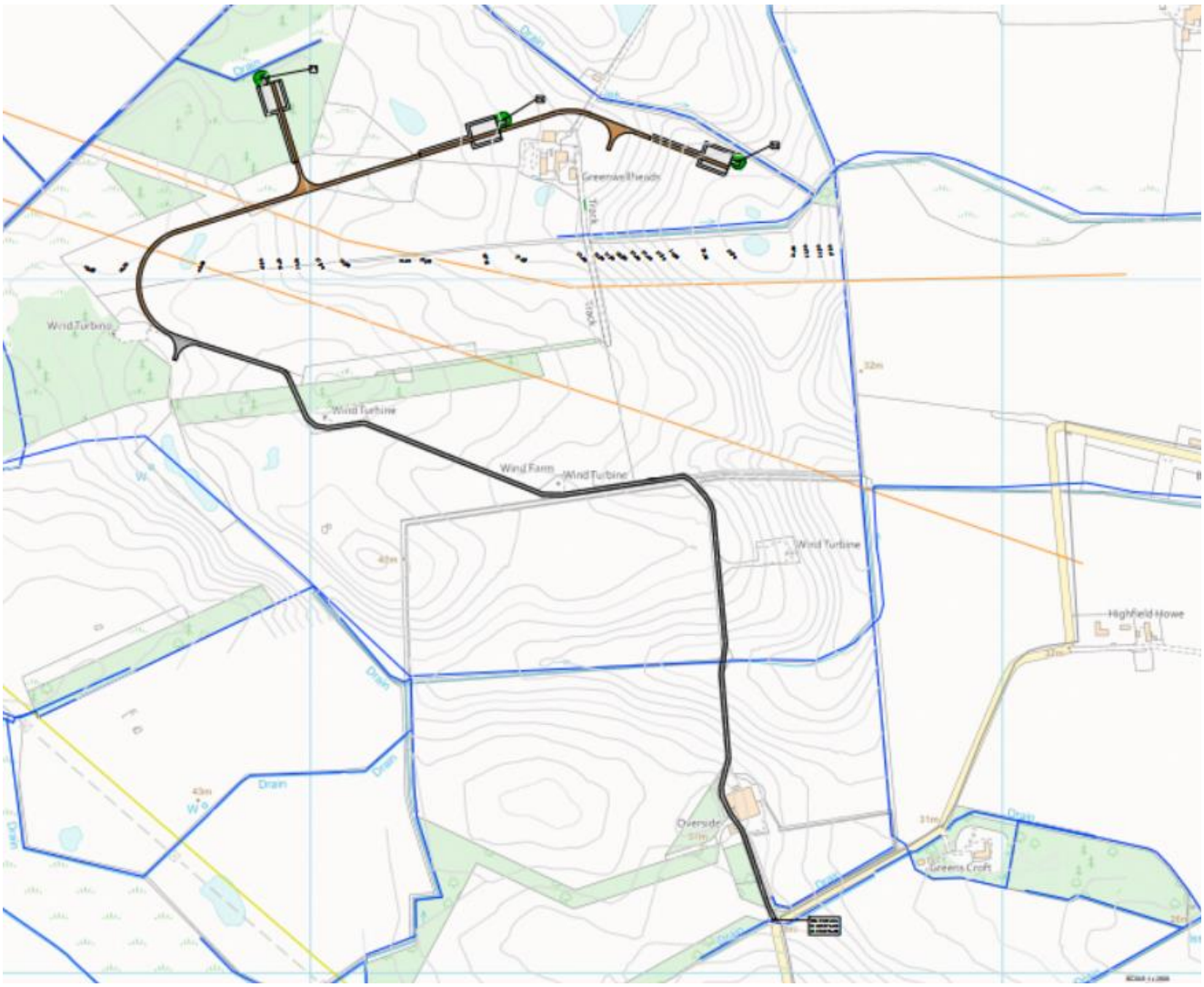


Figure 1.2 – Site layout Plan



1.4 Site Selection

The design of any wind energy development is an iterative process that begins with the selection of a suitable site. There are a range factors to consider when searching for a suitable development site, outlined in this section.

1.4.1 Site Selection and Design Process

The overall site selection and subsequent design process involved two main phases:

- A consideration of the overall design objectives.
- The iterative site selection phase which looked at site-specific constraints and opportunities.

The extension of existing wind farms comes with intrinsic benefits, including valuable wind speed data, an understanding of ground conditions and significant constraints on site, existing infrastructure such as grid connections and an established presence in the landscape.

With the existing Greenside Wind Farm providing wind speed data, and an established presence of wind turbines at that location, an expansion of the existing wind farm provided a good starting point.

Following the initial identification, environmental impacts and technical constraints were identified and mapped to ensure the development would not result in adverse impacts. Such initial studies confirmed that there was sufficient space to accommodate a modest extension to the existing wind farm.

1.4.2 Key Site Criteria

Following the identification of the site, the following key factors for suitability for a renewable energy development were considered:

- The wind resource: The proposed site is expected to receive a strong and reliant wind speed that will be sufficient for the proposed development. Additionally, the area within the land boundary allows for the turbines to be sited at an appropriate distance from any neighbouring developments.
- A viable access route to the site: The road to the site has already been used for the existing Greenside Wind Farm. The area has been assessed for delivery of the proposed turbines. Approximately 1,217m of new internal access tracks will be required, but initial assessments showed that there would be a minimal disruption to the public road network.
- Significant environmental impacts: In order to initially assess any potential for environmental impacts, an environmental constraints map was drawn, and a suitable scale of site determined. Potential interference with telecommunications infrastructure, aviation interests and potential impacts from noise on neighbouring residential properties were fundamental to the final design concept.
- Planning policy: National and Local planning and energy policy was reviewed to ensure that the design of the development would comply with policy.

The site boundary was deemed appropriate and viable to accommodate the proposed development. Design iterations to reduce identified impacts were made within the proposed site boundary.

1.5 Alternatives Considered

National planning and energy policy recognise the need and the benefit of developing renewable energy projects. The policy documents make it clear that energy has to be more sustainable and is striving towards a smart energy network throughout Scotland and the UK. On this understanding, national policy does not require renewable energy developments to justify or demonstrate the overall need for renewable energy generation.

However, EIA legislation dictates that the EIA must describe “reasonable alternatives studied” and provide reasoning for the selection of the final design. Reasonable alternatives must be relevant to the project and its specific characteristics (for example in terms of development design, technology, location, size and scale), except where limited by commercial confidentiality constraints (as noted in PAN 58). The consideration of alternatives in the EIAR is therefore restricted as appropriate to alternative design iterations that were considered for the site in question in terms of factors such as site layout / design / turbine height and turbine numbers, and the environmental effects of the options considered.

Following the identification of a site and an assessment of the site’s suitability, the iterative design process was commissioned. The main purpose of the iterative design process was to ensure that the proposed development:

- Avoided significant environmental impacts;
- Kept potential impact on local residents to a minimum;
- Respected the identified infrastructure and services separation requirements;
- Fitted visually with the scale of the existing wind farm development;
- Could be accommodated by the landscape;
- Provided a reliable source of sustainable power to the electricity grid network.

Various design iterations were tested against the main design principles. The design alternatives that were considered in the process of selecting the final design are detailed in Section 1.7 Site Design below.

1.6 Site Constraints

Having confirmed the potential for the site to accommodate an expansion to the existing wind farm, the next stage of the process is to identify all of the potential constraints associated with the site, to allow the development of an environmentally acceptable and technically feasible layout.

Constraints were identified through the consultation process, site survey and desk-based assessment. Key constraints include:

- Fixed links/aviation;
- Residences (noise, shadow flicker and visual impacts);
- On site archaeology;
- Yield;
- Landscape; and
- Hydrology and topography.

1.6.1 Separation Distances

There are a number of features surrounding the site that require appropriate separation distance requirements, namely:

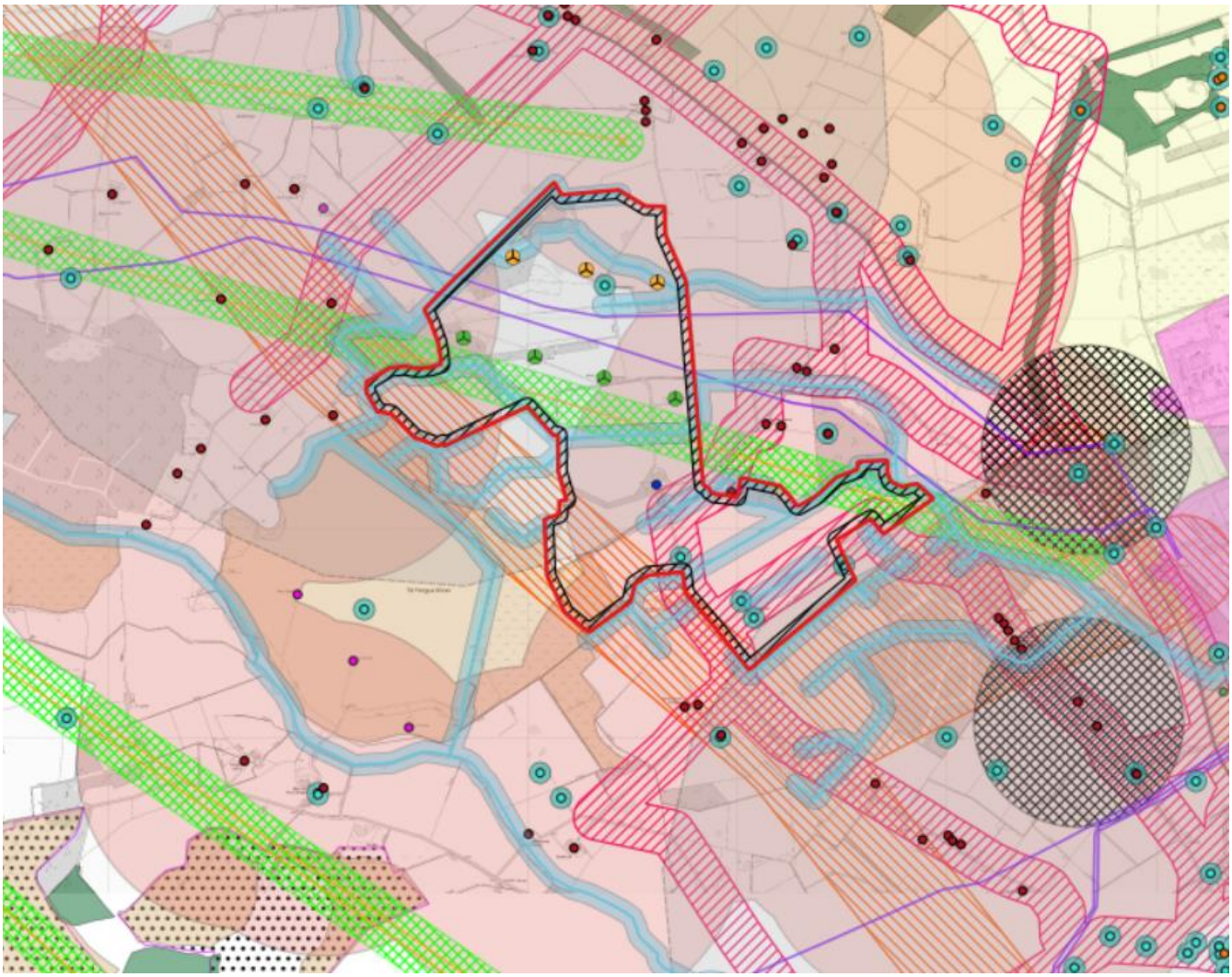
- The site boundary;
- The residential properties in proximity to the site;
- The adjacent operational wind turbines;
- The archaeological features on site; and
- The water features on site.

Appropriate separation distances from these features have been applied to the baseline constraints map, making the areas suitable for development easily identifiable from the offset. This is shown in Figure 1.3.

1.6.2 Summary of On-site Design Constraints and Objectives

The site was deemed to have the capacity to accommodate a modest extension to the existing wind farm following the identification of the initial constraints of to the proposal site. The final wind development design would need to satisfy on-site constraints, whilst attempting to achieve preferable objectives relating to energy generation and carbon reduction, while minimising residential and visual impacts.

Figure 1.3 – Final Constraints Plan



1.7 Site Design

1.7.1 Overview of the Design Process

Having confirmed the potential for the site to accommodate an extension to the existing wind farm, and having identified the key site constraints, the next step was to develop an appropriate design concept, respecting all of the identified constraints. This included avoiding identified constraints where possible and proposing suitable and robust mitigation where avoidance was not possible, in order to develop an environmentally acceptable and technically feasible layout design.

The design process had two main components to consider: the siting and scale of the proposed turbines, and the design of the associated infrastructure.

The goal of the final layout of the turbines and associated infrastructure is to be sited in a manner that has the least environmental impact on potential receptors and seeks to avoid significant impacts, whilst maintaining the technical and commercial viability of the overall project. The key principles, stages and changes of the proposed development have been highlighted in the following sections.

1.7.2 Design Principles

Current best practice guidance provides a framework for the consideration of key design issues including turbine size and layout composition, to minimise landscape and visual impacts (*Siting and Designing Wind Farms in the Landscape v3a, SNH, 2017*). Best practice for environmental considerations is discussed in detail in the corresponding chapters of this EIAR.

The following fundamental principles were adopted during the design iterations to ensure that the final design of the proposed development was the most appropriate and optimal for the site:

- The turbines should appear in scale with the landscape and in balance with the existing wind farm and surrounding developments. This cumulative landscape impact is an important element for both nearby views, as well as longer range views where the development will marginally increase the extent of wind farm development.
- All residential properties have been considered during the design phase, in order to minimise impacts on noise, shadow flicker and visual impact. This involved keeping the turbines within the northern area of the site and maintaining suitable distance from the properties.
- Areas of GWDTE and areas 50m from water courses have been avoided in order to minimise impact on these habitats and to aid with buildability.
- The contours of the site have been utilised for the setting out of turbines, access and crane hardstanding areas to ensure environmental and construction best practice can be adhered to.
- Sensitive areas of archaeological interest are avoided where possible.
- Ensure other environmental constraints and associated buffers are to be respected.

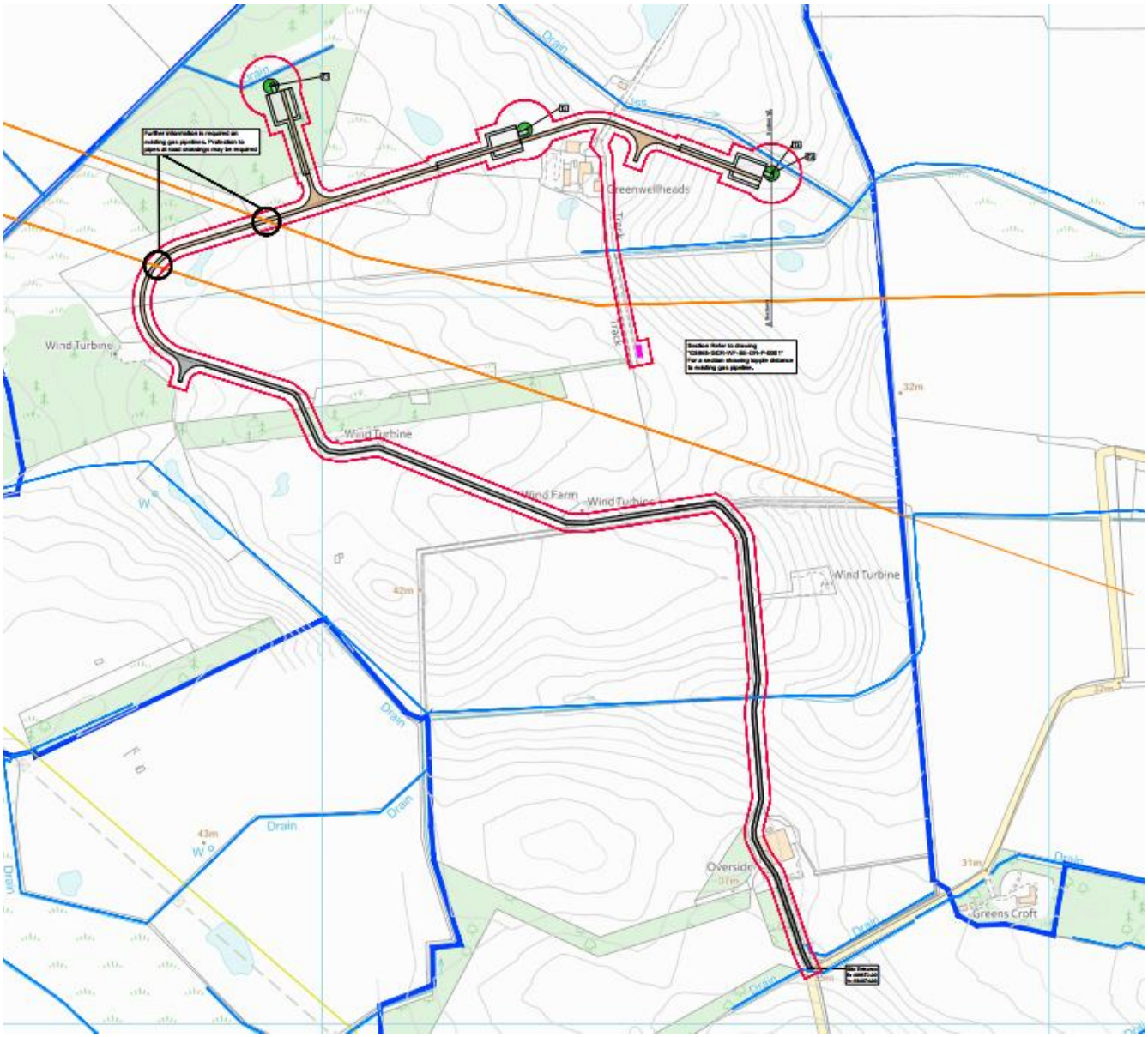
1.7.3 Final Design

Having confirmed the potential for the site to accommodate an extension to the existing wind farm, and having identified the key site constraints, the next step was to develop a robust design respecting all of the identified constraints. This included avoiding identified constraints where possible and proposing suitable and robust mitigation where avoidance was not possible, in order to develop an environmentally acceptable and technically feasible layout.

The design process was undertaken in two phases: the siting of the proposed turbines and the design of the associated infrastructure.

The final layout of the turbines and infrastructure associated with the development have been sited in a manner that has the least environmental impact on potential receptors and seeks to avoid significant impacts.

Figure 1.4 – Final Site Layout



1.7.4 Turbine Scale

The scale of the turbines has been specifically chosen in order to meet a range of criteria: firstly, ensuring that the proposed turbines are similar in scale to those existing on site; that a visual balance of scale was achieved with the existing Greenside Wind Farm; the selected model is the optimum turbine model class to provide sufficient energy ensuring commercial viability the turbines are and are of a scale that accords with the capacity set in supplementary guidance.

The final dimensions and scale of the turbines were found to be a balance between utilising the most efficient turbines, which would not significantly breach the overall height of the existing turbines, when their relative positions in the topography was factored in.

1.8 Conclusion

The final design of this proposal is the result of a diligent design process aimed at mitigating potentially significant impacts through design.

The design principles behind the proposed scheme have taken into account potential environmental, landscape and visual effects, cultural heritage impacts, physical constraints and engineering requirements. The design of the proposed development considered baseline data from various sources including available wind speed data, previous environmental information, and energy yield optimisation assessments. A final layout was created based on the design criteria, which has been assessed alongside the findings of extensive site-specific assessment and survey work.

The final layout has been presented throughout the EIAR as the proposed development, a full description can be found in Chapter 3 - Project Description. The resulting proposed development comprises three wind turbines, up to 100m in height with associated infrastructure, including new access tracks and hardstandings.

The final wind turbine and site layout has been designed to strike the optimum balance between minimising environmental impact, respecting engineering requirements and ensuring the construction of a viable wind energy scheme in terms of energy production.

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