Chapter 02
Site Selection & Design

2 Site Selection & Design

Contents

Figures

Appendices

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2 Site Selection and Design

2.1 Introduction

2.1.1 The Environmental Impact Assessment (EIA) Regulations require the consideration of alternatives and an indication of the reasons for selecting the site, except where limited by constraints of commercial confidentiality. Paragraph 5(2)(d) of the EIA Regulations requires that an EIA Report includes "*a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*".

2.1.2 Part 2 of Schedule 4 of the EIA Regulations similarly notes the following requirement: "*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*".

2.1.3 This chapter provides information on how the Proposed Development site was identified by the Applicant as a suitable location for a hybrid wind, solar photovoltaic (PV) and battery energy storage system (BESS) energy development, as well as the design iteration process undertaken to arrive at the final Proposed Development layout and design.

2.1.4 The EIA process provides an opportunity to integrate technical and environmental considerations into the iterative design of a development, allowing potential environmental effects to be considered and minimised so that the environment is considered within the Proposed Development design layout from the earliest stage.

2.1.5 The final design of the Proposed Development represented in this EIA Report was arrived at following iterative consideration of many alternative design configurations, including location of turbines, turbine scale, layout and design of tracks and ancillary infrastructure, as well as alterations to the solar, BESS and substation layouts. This chapter describes the design iteration process from which the Proposed Development design was selected.

2.1.6 The final design for the Proposed Development is described in **Chapter 3: Project Description** and is shown in **Figure 1.2.Proposed Development Layout**.

Policy Context

2.1.7 The UK and Scottish Governments are clear in their objectives in relation to encouraging the increased implementation and application of renewable energy technologies, consistent with sustainable development policy principles and national and international obligations on climate change. The Scottish Government, having declared a climate emergency in 2019, has since published a number of policy documents and has set its own targets which will require the deployment of renewable energy generating technology at scale throughout the 2020s in order to meet them.

2.1.8 The Fourth National Planning Framework (NPF4) (Scottish Government, 2023) sets out the national spatial strategy for Scotland and states in relation to renewable energy generation, '*A large and rapid increase in electricity generation from renewable sources will be essential for Scotland to meet its net zero emissions targets*.'

2.1.9 The Proposed Development relates to the generation of electricity from renewable energy sources, complimented by energy storage technology, and comes as a direct response to national planning and energy policy objectives.

Development Context

2.1.10 Against a backdrop of emerging renewable energy and climate change policy imperatives, 3R Energy Solutions Ltd (3R Energy) established a new group company (Spirebush Ltd – the Applicant) in 2021 to take forward the development of a Western Expansion of the Hagshaw Energy Cluster. The 3R

Energy Group is both a landowner and developer within the Hagshaw Energy Cluster who has to date developed over 330 MWs of onshore wind, and 80 MWs of energy storage projects, within the Hagshaw Energy Cluster which are all now either in operation or under construction. Together these projects will make a substantial contribution to the local area and to national renewable energy and climate change targets.

2.1.11 3R Energy is also a founding partner of the award-winning Hagshaw Energy Cluster Development Framework project which represents an ambitious vision for the future of the Hagshaw Energy Cluster and surrounding area, identifying opportunities to enhance and invest in the local environment, communities and place.

2.2 Site Selection and Alternatives

Hagshaw Energy Cluster – Western Expansion (HEC-WE)

2.2.1 The Western Expansion project was initially proposed as it presented a significant opportunity to build on the positive outcomes of the Hagshaw Development Framework at scale, extending the benefits from the Cluster west to Muirkirk and north to Sandford and Upper Avondale, with the local communities and surrounding environment, namely the Muirkirk and North Lowther Uplands Special Protection Area (SPA), standing to receive significant investment from the project.

2.2.2 The Western Expansion project as initially scoped in 2022 would have extended the Hagshaw Energy Cluster westwards towards the Kype Muir / Bankend Rig wind farm cluster (as shown in **Figure 2.1**). The former Spireslack and Ponesk Opencast Coal Sites (under final restoration, for forestry) and the former Tardoes Opencast Coal Site (restored to farmland) adjoin the originally scoped site to the south (refer to **Figure 2.1**). The village of Muirkirk lies approximately 1.4 km south of the site, with Gilmourton (the closest settlement in Upper Avondale) lying approximately 4 km to the north.

2.2.3 Importantly, it is acknowledged that part of the Western Expansion project site as scoped in 2022 overlaps with part of the Muirkirk and North Lowther Uplands SPA. The SPA was designated for its breeding and non-breeding hen harrier (*Circus cyaneus*) as well as breeding populations of short-eared owl (*Asio flammeus*), merlin (*Falco columbarius)*, peregrine (*Falco peregrinus*) and golden plover (*Pluvialis apricaria*). It also overlaps with the commensurate area of the Muirkirk Uplands Special Site of Scientific Interest (SSSI), designated for its breeding bird assemblage, as well as breeding and non-breeding hen harrier and breeding short-eared owl. Through its programme of site condition monitoring, NatureScot (NS) has identified that the SPA in general is in unfavourable condition for most of its qualifying features, and a range of data conclude that it supports a fraction of the qualifying species for which it was designated. The SSSI is also designated for upland habitats including blanket bog.

2.2.4 When considering the generally unfavourable condition of the SPA bordering the Hagshaw Energy Cluster and the emerging climate change imperatives set out above, it was considered that the Western Expansion project presented a significant opportunity to expand the generating capacity of the Hagshaw Cluster westwards whilst delivering substantial funding to invest in the recovery of the neighbouring SPA (and SSSI) and the regeneration of surrounding coalfield communities.

2.2.5 The Western Expansion of the Hagshaw Energy Cluster, as scoped in 2022, was considered to embody the aims and objectives of Scotland's Just Transition to a fairer, greener Scotland by contributing to key government objectives of:

- More investment in nature recovery, peatland restoration and designated sites;
- More renewable energy; and
- More vibrant rural communities.

2.2.6 More generally from a spatial perspective, the Western Expansion site was selected and considered an appropriate and viable location for a wind, solar and energy storage project due to:

- Being within an established wind farm landscape, where there is an opportunity to progress a coordinated layout, phasing, access, grid connection, landscape and benefits strategy through the Hagshaw Energy Cluster Development Framework principles;
- Easily accessible direct from the M74 motorway;
- Ability to re-use existing access tracks (both to and within the Proposed Development site);
- Ability to extend existing borrow pits used previously for forestry access track construction;
- In close proximity to a viable grid connection point;
- Good average wind speeds and generation capacity, evidenced by the surrounding operational sites;
- Opportunity to positively contribute to regional and national renewable energy and carbon reduction targets;
- Opportunity to provide significant investment in the natural environment much of which could be secured directly for improvements to the Muirkirk and North Lowther Uplands SPA and SSSI; and
- Opportunity to provide significant social and economic investment to surrounding communities within South Lanarkshire Council (SLC) and East Ayrshire Council (EAC).

Project Phasing

2.2.7 As noted above, the Western Expansion project was originally scoped in 2022 and a formal Scoping Opinion was received from the Scottish Ministers in March 2023. It is the view of the Applicant that there were no significant issues raised by consultees which gave rise to a conclusion that the Western Expansion project could not be realised in full, with the exception of the responses from NS and Royal Society for the Protection of Birds (RSPB) Scotland in relation to the potential impact of the project on the Muirkirk and North Lowther Uplands SPA and the Muirkirk Uplands SSSI.

2.2.8 Conversely, the South Strathclyde Raptor Study Group (SSRSG) wrote in support of the project, as originally scoped, as a result of the investment it could bring to the recovery of the SPA. Muirkirk Community Council and Muirkirk Enterprise Group both also wrote in support of the project, as previously scoped, because of the level of investment it could have delivered in the regeneration of Muirkirk (the closest community).

2.2.9 Extensive subsequent consultation was held with both NS and RSPB on the initial development proposals, however, the concerns raised by NS and RSPB about the elements of the Western Expansion proposal located within the SPA and SSSI could not be overcome. The decision was subsequently taken by the Applicant to split the project into two separate phases which was the subject of a Scoping Update Report to the Scottish Government Energy Consents Unit (ECU) in February 2024.

Phase 1: Dungavel and Netherwood (Wind, Solar and BESS)

2.2.10 Phase 1, the Proposed Development, comprises wind turbines within the northern development area and solar, long duration and short duration BESS and substations within the southern development area, which all lie outwith the SPA and SSSI. The site boundary for the Proposed Development does however include a stretch of the existing B743 public highway which crosses the SPA/SSSI in order to connect the two areas of the Proposed Development (see **Figure 2.1**).

2.2.11 As can be seen on **Figure 2.1**, the Proposed Development site is no longer contiguous with the Hagshaw Energy Cluster, however, it was considered too confusing to change the project name halfway through the process. Therefore, the Proposed Development is known as the Hagshaw Energy Cluster – Western Expansion (Phase 1).

2.2.12 The site boundary for the Proposed Development is shown outlined in red on **Figure 2.1** with a full description of the Proposed Development provided in **Chapter 3**. The Proposed Development is considered an appropriate location for renewable energy development for the reasons listed in **paragraph 2.2.6**, noting that the Proposed Development will now require longer use of the public road network from the M74 to access the site.

2.2.13 The founding objectives of the Western Expansion project to contribute to key government priorities of:

- more investment in nature recovery, peatland restoration and designated sites;
- more renewable energy; and
- more vibrant rural communities.

remain at the core of the Proposed Development, albeit on a smaller scale than was first envisaged.

2.2.14 The Applicant intends to continue discussions with relevant stakeholders about the potential to bring forward proposals for a Phase 2 project in the future. Any future proposal for Phase 2 would be subject to a separate EIA and consenting process.

2.3 Design Principles

2.3.1 The following principles were adopted during the design iterations made by the Applicant to ensure that the final design of the Proposed Development was the most suitable for the site:

- Create a scheme which maximises the potential of the site to generate renewable energy, while observing technical and environmental constraints.
- Siting and Designing Wind Farms in the Landscape (SNH, 2017) provides a current best practice guidance and a framework for the consideration of key design issues including turbine size, layout composition, wind farm design in relation to landscape character and designing for multiple wind farms. This guidance was taken into account when considering of other physical and environmental constraints, avoiding inconsistent turbine spacing, such as relatively large gaps, outliers or excessive overlapping turbines to minimise visual confusion and ensure a balanced / compact array from key views.
- Design advice contained within the Hagshaw Energy Cluster Development Framework was also considered.
- Create a layout that fits the existing pattern of development in the surrounding landscape context.
- Minimise impacts on the setting of Dungavel Hill Cairn (SM2848).
- Maintain intervisibility between Dungavel Hill Cairn, Cairn Table (SM4631), Blacksidend cairn (SM2924), and Glen Garr cairn (SM2469).
- Observe a suitable distance between the Proposed Development and uninvolved residential properties and minimise impacts on residential amenity (visual, noise, shadow flicker, and glint and glare) wherever possible.
- Avoid of areas of deep peat wherever possible.
- Maintain appropriate buffers around watercourses except where crossings are required.
- Minimise impacts on the existing forestry resource and operations within the site.
- Use existing infrastructure as far as practicably possible.

- Minimise woodland removal by positioning turbines in areas where restructuring was already planned in the Baseline Forest Plan, such as existing open ground along access tracks.
- Utilise existing infrastructure where possible by placing turbines near established forest roads and rides to reduce crop loss due to new infrastructure.
- Reduce impact on planned forestry operations by situating turbines in younger crop areas or compartments already scheduled for felling.
- Minimise keyhole clearings to the smallest area necessary to accommodate turbines and associated bat protection zones.
- Minimise impact on Dungavel Wind Farm's Habitat Management Plan HMP areas (see **paragraph 2.3.2** below).
- Implement a Felling Corridor to facilitate the safe construction of the Proposed Development, reducing the risk of windblown trees striking personnel. Restocking will be carried out up to the tree-free buffer, ensuring a managed transition between forested areas and open infrastructure while maintaining long-term forestry and safety objectives.
- Position the solar array and BESS in agricultural fields rather than shelterbelt woodlands, ensuring woodland removal is limited to that required for access road construction.
- Avoid sensitive archaeology areas within southern development area.
- Carefully consider potential for glint and glare effects from solar arrays on surrounding receptors.
- Consider potential of noise from BESS units in respect of positioning relative to residential receptors.
- Utilise existing access points off the B743.
- Lay cables within the existing B743 carriageway to avoid any impact on the SPA/SSSI.

2.3.2 The Proposed Development looked to minimise impacts on the operational Dungavel Wind Farm's Habitat Management Plan (DHMP) areas which include parcels of land within the Proposed Development site for habitat enhancement measures for hen harrier. As many of these areas are still to be implemented, and following consultation with SLC, NS and RSPB, it is now proposed to substitute the (largely yet to be implemented) hen harrier enhancement areas (208 ha) proposed within Dungavel Forest as part of the DHMP with a long-term pilot project on a much larger area (592 ha) of more suitable habitat within the neighbouring Muirkirk and North Lowther Uplands SPA (and SSSI) where hen harrier and other SPA qualifying species used to breed . Further information is provided within **Appendix 7.5 Outline Habitat Management and Enhancement Plan**.

2.3.3 The above factors were carefully evaluated, as evidenced by the number of design iterations of the proposed site. The final development layout is the 52nd iteration; noting some iterations comprised only minor changes.

2.4 Design Iterations

2.4.1 The layout of the Proposed Development has been an iterative process which started in March 2021, each time taking into consideration information gathered at the site or comments from consultees, as well as the professional judgement of the technical experts.

2.4.2 It should be emphasised that the most notable layout change made throughout the EIA process was the decision to phase the project in response to concerns raised by NS and RSPB. This section highlights two main layout iterations prior to phasing the project but for the purposes of the EIA the focus is on layout changes made to the Proposed Development (Phase 1 only).

2.4.3 Since the submission of the EIA Scoping Update Report (February 2024) and the receipt of the EIA Scoping Update Opinion (May 2024) the Applicant has undertaken design iterations to further avoid and minimise potential environmental impacts while maximising the capacity of the Proposed Development.

Site Access

2.4.4 The proposed access to the site has been carefully considered throughout the design process. The Proposed Development site is to be accessed from the B743 at either two existing points at Dungavel Forest for access to the northern development area, or at an amended entrance to Linburn Farm for access to the southern development area. The three access points are shown on **Figure 1.2**, and here after referred to as Access Points A to C.

Wind Turbines, Associated Infrastructure, and Access Tracks

2.4.5 The main turbine and associated infrastructure changes are described within **Table 2.1** and shown on **Figure 2.3** to **Figure 2.9**. These iterations have taken into consideration use of the existing tracks, on-site environmental and engineering constraints, reducing the impacts on residential amenity and the wider landscape, and avoiding watercourses and sensitive habitats wherever possible. **Figure 2.9** shows the final layout and the on-site constraints.

Table 2.1: Turbine and Associated Infrastructure Design Iterations

Turbine Iteration	Infrastructure Iteration	Turbine No.	Date	Description of Amendments	Access Route & Point of Access (abnormal loads)
Main Pre-Phasing Layout Iterations					
AB	V4	72	September 2022	This is the layout outlined in the Scoping Report submitted to the Energy Consents Unit (ECU) in September 2022. This layout comprised approximately 72 stand-alone, three bladed horizontal axis, wind turbines with a total generating capacity of approximately 500 MW. The proposed turbines had a maximum tip height of 230 m, and an individual generating capacity of up to approximately 7 MW.	J11 on the M74 and direct to site.
AH	V10	57	February 2023	In order to try to address concerns raised by NS and RSPB Scotland about the scale of development within the SPA/SSSI, reductions were made to the Scoping Layout. This layout saw a reduction in the number of turbines to 57. The number of turbines proposed within the SPA/SSSI was reduced from 44 to 28 (36% decrease). In addition to reducing the footprint of turbines and associated infrastructure within the SPA/SSSI, turbines were re-located outside the Peatland ACTION restoration area in response to comments made by officers at the Scottish Environment Protection Agency (SEPA). This reduced the overall land-take of the project within the SPA to 0.23% of the total SPA land area. An alternative substation location was also considered at Lightshaw Farm on the A70 east of Muirkirk.	J11 on the M74 and direct to site.
Phase 1 (Proposed Development) Layout Iterations					
AO	V16	26	November 2023	Scoping Update layout – showing a reduction in turbines from previously consulted 57 turbines to 26 turbines. All infrastructure moved outside the SPA/SSSI. Abnormal load access to the northern development area at Dungavel Forest via the northern access point (shown as 'A' on **Figure 2.4**).	Access through Muirkirk Access Point A.
AP	V17	26	December 2023	T17 moved c.105 m north-west and T18 moved c.95 m north to avoid deeper areas of peat. Track between T17 and T18 realigned due to turbine and hardstand moves.	Access through Muirkirk, Access Point A.

Turbine Iteration	Infrastructure Iteration	Turbine No.	Date	Description of Amendments	Access Route & Point of Access (abnormal loads)
AQ	V18	26	January 2024	All hardstands updated to a new candidate turbine model. Change in access point from Access Point 'A' to the Access Point 'B'. Hardstands of T5 and T6 flipped to be accessed from the south. Additional track for turning added north-west of Dungavel Hill to allow access to T2 and T4. Some minor track realignments made and hardstand rotations to optimise layout. T8, T21 and T23 adjusted along with hardstands to improve cut and fill volumes.	Access through Muirkirk, Access Point B.
AR	None	21	March 2024	In consultation with Historic Environment Scotland (HES) A number of changes were made to improve views from Dungavel Hill Cairn including: ▪ Removal of T2 and relocation of T3 (now T2) c.180 m west to improve views north from Dungavel Hill Cairn. ▪ Removal of T7 to improve views south from Dungavel Hill Cairn, giving direct view of Cairn Table respecting the intervisibility of cairns in the surrounding landscape. These are shown in **Technical Appendix 2.1**. A number of turbines were removed or relocated in order to avoid the core areas of the operational Dungavel Wind Farm HMP. This included: ▪ Relocation of T15 (now T13) c.150 m east to take it out of HMP areas. ▪ Removal of T16 and T20 as they were in HMP areas. T22 removed to improve spacing between turbines. Following the removal of the 5 turbines, a number of other turbines were moved to optimise spacing between the remaining turbines on-site, creating a less cluttered layout visually. Turbines moved to improve spacing were T6 (now T5), T17 (now T14), T19 (now T16), and T23 (now T18). T4 (now T3) moved c.80 m east to increase set back from Glengavel House residential property.	
AS	None	20	April 2024	T6 moved c.40 m west to reducing felling requirements. T10 moved c.80 m south-west to avoid impacts on the Dungavel WF HMP further. T13 removed due to large cut and fill requirements on steep slope near Powbrone Burn. T11 removed due to proximity to neighbouring Bankend Rig 3 turbines, and T12 (now T11) moved c.112 m north to further improve spacing with Bankend Rig 3 turbines.	

Turbine Iteration	Infrastructure Iteration	Turbine No.	Date	Description of Amendments	Access Route & Point of Access (abnormal loads)
				The addition of T15 to keep generation up but noting that further peat surveys would be needed in this area. T18 (now T17) moved c.220 m south-east to improve spacing with the neighbouring Kype Muir Extension turbines.	
AT*	V19a	19	May 2024	See Turbine Iteration AU below – both V19 iterations looked to reduce potential impacts on heritage, aviation infrastructure and habitats.	
AU	V19b	19	May 2024	Civil engineer review and infrastructure design led to some minor turbine moves in order to optimise hardstanding orientations and reduce earthwork requirements. The turbines moved were T6 c.50 m north-west, T10 c.30 m north-east, T12 c.60 m east, T14 c.80 m south-east, and T15 c.55 m east. Project engineer advised T17 was not going to be feasibly accessible due to surrounding watercourse network. T17 was removed and T16 was relocated c.245 m north to a more optimal location with improved turbine spacing. T6 tip height reduced to 200 m to further reduce impacts on the setting of Dungavel Hill cairn following further consultation with HES on the changes since March 2024. For the purpose of investigating aviation mitigation strategies T14, T15, T17, T18 and T19 tip heights were also dropped to 200 m.	Access through Muirkirk, Access Point B.
AV	V20	18	August 2024	Following additional peat probing and consultation with SEPA, T15 was removed due to its location within an area of deeper peat. Adjustment to T11 c.82 m south-east, T14 c.24 m south-east, and T17 (now T16) c.64 m west, to reduce track lengths and improve track alignments.	Access through Muirkirk, Access Point B.
AW*	V21a	17	August 2024	As per Turbine Iteration AX below. An additional turbine was removed from the east of the site but on balance it was decided to proceed with Turbine Iteration AX.	
AX	V21b	18	August 2024	Further consultation with aviation stakeholders revealed a potential alternative mitigation solution which would not require a reduction in turbine height from 230 m to 200 m. As a result, turbine heights were returned back to 230 m across the layout with the exception of T6 which is to remain at 200 m due to the improved effect on the setting of Dungavel Hill cairn.	Access through Strathaven or Muirkirk, Access Point A.

Turbine Iteration	Infrastructure Iteration	Turbine No.	Date	Description of Amendments	Access Route & Point of Access (abnormal loads)
				Following detailed analysis of the abnormal load route assessment it was determined that access through Strathaven from the north was a viable option to be included. The access point was amended to the northern forestry access point (Access Point A) and hardstands of T3 and T4 flipped to accommodate the change. Relocation of T11 c.240 m north-west and T12 c.175 m west to improve internal turbine spacing and spacing with neighbouring Bankend Rig 3 turbines. Civil optimisation of T16, T17 and T18 and hardstandings was undertaken to improve track alignments and reduce earth works.	
AY	V21c	18	September 2024	Gatecheck Layout. Relocation of T16 to improve spacing with the neighbouring Kype Muir Extension turbines. Further investigation of felling requirements leading to the inclusion of forestry spur roads to facilitate wind farm felling. Visible aviation lighting included in layout (8 turbines).	Access through Strathaven or access through Muirkirk to Access Point A.
AY	V22	18	November 2024	Design Freeze Layout. There has been no change made to the turbine positions or dimensions since Gatecheck Layout. Changes made to site access tracks and hardstandings: ▪ Additional track added at Access Point A to facilitate abnormal load deliveries from either the north or the south (refer to **Figure 3.15**). Once the final abnormal load route is confirmed only one of these tracks will be constructed. ▪ Rotation of T9 and T12 hardstands to better align with access tracks for blade deliveries. ▪ Removal of approximately 3 km of access track connecting T10 to T12 and T15 and a number of water crossings by introducing a new stretch of track and bottomless arch culvert from T09/T10 to T11. Additional small changes made to track alignment, turning heads and forestry spur roads following further civil engineering review.	Access through Strathaven or access through Muirkirk to Access Point A.

**Iteration not included within figures.*

Solar PV

2.4.6 The area of the site identified for solar PV is on south facing slopes within the southern development area, on land outside the boundary of the Muirkirk and North Lowther Uplands SPA and Muirkirk Uplands SSSI.

2.4.7 There have been four main iterations to the design of the solar element of the Proposed Development these layouts are presented in **Figure 2.10** and **Figure 2.11** and the amendments made are described in **Table 2.2** below.

2.4.8 The final layout of the southern development area and the environmental constraints considered in the design iteration process are presented in **Figure 2.12**.

Table 2.2: Solar PV Design Iterations

Solar Layout Iteration	Description of Amendments
Layout A – Scoping Layout (**Figure 2.10**)	This layout was a maximised solar layout for the land available within the southern development area while taking account of known constraints at the time such as the Muirkirk and North Lowther SPA/SSSI designation, watercourses, Ancient Woodland, and residential properties.
Layout B – Scoping Update Layout (**Figure 2.10**)	Removal of an area of panels west of Lamon Burn as cultural heritage surveys identified there is an area of well-preserved rig and furrow associated with the farmstead. Addition of two fields of panels in replacement to the east of Burnfoot Farm in an area which was not environmentally constrained.
Layout C – Gatecheck Layout (**Figure 2.11**)	Removal of panels to avoid potential impact on a Private Water Supply at Laigh Hall in the south-central part of the site. Removal of an area of panels in the east, near Linburn Farm to increase serration distance from the property. Adjustment to panel areas to maintain existing field boundaries and allow landowner to continue to manage livestock. Following a utility search, appropriate buffers were put in place to avoid existing cables and links.
Layout D – Final Design Freeze Layout (**Figure 2.11**)	Removal of field of panels to the east of Middlefield to increase separation distance between residential properties at Middlefield and Forkings. Removal of three small fields of panels southwest of Linburn farm to increase separation distance from the property and allow for a better arrangement of the substations and short duration BESS infrastructure. Removal of area of panels west of Lamon Burn to accommodate the increased footprint required by the long duration BESS.

Substations and BESS

2.4.9 The four main changes made to the substations and BESS layouts and locations are presented in **Table 2.3** below and shown on **Figures 2.9, 2.10, 2.11** and **2.12**. Further information on the final substations and BESS arrangement, including an alternative substation / short duration BESS option in the northern development area, is presented in **Chapter 3: Project Description**.

Table 2.3: Substations and BESS Design Iterations

Substation and BESS Layout Iteration	Description of Amendments
Layout A – Scoping Layout	This layout included approximately c.100 MW BESS and substations proposed to be located within the southern development area adjacent to Linburn Farm in the east of the southern development area.
Layout B – Scoping Update Layout	This layout included c.200 MW BESS and substations located in a similar location to the previous iteration within the southern development area but with a greater footprint to accommodate the higher capacity BESS.
Layout C – Gatecheck Layout	This layout included c.200 MW BESS and substations as in the previous iteration (Layout B). However, this layout also had the inclusion of an alternative substation and 25 MW BESS compound location in the northern development area.
Layout D – Final Design Freeze Layout	Following discussion with National Electricity System Operator (NESO and Scottish Power Energy Networks (SPEN) to determine the optimum grid connection solution for the Proposed Development the final design includes c.225 MW of BESS. ▪ Substations and 25 MW short duration BESS in the southern development area next to Linburn. ▪ An alternative location for the substations and 25 MW short duration BESS in the northern development area. ▪ 200 MW of long duration BESS within one of the previous solar PV fields in the southern development area (long duration BESS requires a larger footprint than short duration BESS).

Borrow Pits

2.4.10 Borrow pits are required as a source of rock to be used in the construction of the tracks, hardstandings and foundations. During design optimisation, the locations of infrastructure and track design was refined to minimise the volume of earthworks and cut and fill required to construct the Proposed Development. Potential locations for the borrow pits were identified based upon a review of geological mapping and site reconnaissance. The total number and size of borrow pit search areas was selected to meet the estimated volume of rock required to construct the tracks, areas of hardstanding and foundations.

2.4.11 There are four borrow pit locations included as part of the Proposed Development. The borrow pits have been through a design iteration process along with all other infrastructure, the previous borrow pit locations are shown in **Figures 2.4 to 2.7**.

2.4.12 If the Proposed Development is consented, further intrusive geotechnical investigation would be carried out at the four borrow pit locations to establish more detail on the volume and quality of rock from each location (refer to **Borrow Pit Assessment** in **Appendix 8.6**).

Construction Compounds

2.4.13 The locations of the five temporary construction compounds have also been considered through the iterative design process as shown in **Figures 2.3 to 2.9.** They have been sited to avoid areas of deep peat and watercourses. Steep areas have been avoided where possible to reduce the requirement for cut and fill. The construction compounds have also been located for practical purposes; to control traffic entering the site, to be located close to infrastructure, and to facilitate construction of the substation and energy storage facilities.

Micrositing

2.4.14 To be able to address any localised environmental sensitivities, unexpected ground conditions or technical issues that are found during detailed intrusive site investigations and construction, it is proposed that agreement is sought for a 100 m micrositing allowance around all infrastructure. The technical assessments (presented in **Chapters 6** to **15**) have considered the potential for micrositing and it is considered that the proposed infrastructure could be microsited without resulting in potential new effects. During construction, the need for any micrositing would be assessed and agreed with the on-site Environmental Clerk of Works (ECoW) and Archaeological Clerk of Works (ACoW).

2.5 Summary

2.5.1 The final Proposed Development layout has been informed by a robust design iteration process over a number of years, taking into account potential environmental, landscape and visual impacts and their effects, physical constraints, and health and safety considerations, alongside advice from consultees. The information used to inform the design iteration process included baseline data, review of preliminary visualisations, ongoing impact assessments and energy yield optimisation.

2.5.2 The final layout and scale has been designed to maximise renewable energy generation from the site, as well as the social, economic and environmental benefits, whilst avoiding and minimising potential adverse impacts on the environment wherever possible.

2.5.3 The EIA Report is based on the final layout selected for the Proposed Development. The final layout comprises 18 wind turbines up to 230 m in height, approximately 60 MW of solar PV, approximately 25 MW of short duration BESS, and 200 MW of long duration BESS, as well as associated infrastructure. The final layout of the Proposed Development is described in detail in **Chapter 3: Project Description** and shown on **Figures 1.2, 3.1** and **3.2**.

2.6 References

Scottish Government (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made

Scottish Government (2023). National Planning Framework 4. Available at: National Planning Framework 4

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