



Tormywheel Extension Wind Farm

Application under Section 42

March 2020

Supporting Statement

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1 Introduction

1.1 The Applicant

Tormywheel Extension Wind Farm Limited ('The Applicant'), a project company of Muirhall Energy Limited ('The Developer'), is submitting an application to West Lothian Council ('WLC') under Section 42 of the Town and Country Planning (Scotland) Act 1997 (as amended), to amend the design of the consented Tormywheel Extension Wind Farm (the "Consented Development").

1.2 Background

The Consented Development (WLC ref: LIVE/0226/FUL/17) comprises of two wind turbine generators with a maximum tip height of 126.5m, and associated infrastructure, including access tracks, and temporary construction compounds.

The UK Government announced on 18 June 2015 that they would end all new subsidies for onshore wind. As Tormywheel Extension did not meet the Renewables Obligation subsidy cut off point, which was 31 March 2017, the project will be reliant solely on electricity generated and sold to the wholesale energy market. Optimisation of the site from an increased generation perspective is therefore essential in order to remain economically viable and this requires consideration of higher capacity turbines, with larger rotors and higher tip heights, than those which have been installed previously.

Alongside this there is an increasing public realisation that the threat of impacts of climate change demand urgent attention and this is reflected in Government policy with many recent changes. For instance, on 26 June 2019 the UK Government introduced a legally binding net zero target to end the UK's contribution to global warming entirely by 2050¹. The Scottish Government published "Protecting Scotland's Future: the Government's Programme for Scotland 2019-2020"² on 3rd September 2019. This is unequivocal in the language it uses about the size of the threat that Climate Change poses, and the urgency with which action must be taken, stating: "Scotland is facing a climate emergency. Like the rest of the world, we must act to mitigate the worst impacts of climate change on our people and our planet.". The Scottish Government passed legislation on the 25th September 2019 committing Scotland to becoming a net-zero society by 2045 – five years before the rest of the UK³ and stated: "The Scottish Government will also respond to the global climate emergency by adopting an ambitious new target to reduce emissions by 75% by 2030 – the toughest statutory target of any country in the world for this date"⁴. These are clearly ambitious targets which require further very significant deployment in low carbon technologies and in energy policy in order that they are met.

¹ The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (S.I. 2019/1056)

<http://www.legislation.gov.uk/ukxi/2019/1056/contents/made>

² Protecting Scotland's Future: the Government's Programme for Scotland 2019-2020

<https://www.gov.scot/publications/protecting-scotlands-future-governments-programme-scotland-2019-20/>

³ Climate Change (Emissions Reduction Targets) (Scotland) Bill

[https://www.parliament.scot/S5_Bills/Climate%20Change%20\(Emissions%20Reduction%20Targets\)%20\(Scotland\)%20Bill/SPBill30BS052019.pdf](https://www.parliament.scot/S5_Bills/Climate%20Change%20(Emissions%20Reduction%20Targets)%20(Scotland)%20Bill/SPBill30BS052019.pdf)

⁴ Scottish Government News Published: 25 September 2019. 'Scotland to become a net-zero society'

<https://www.gov.scot/news/scotland-to-become-a-net-zero-society/>

The Scottish Government's Onshore Wind Policy Statement published in December 2017⁵ states: *"In order for onshore wind to play its vital role in meeting Scotland's energy needs, and a material role in growing our economy, its contribution must continue to grow. Onshore wind generation will remain crucial in terms of our goals for a decarbonised energy system, helping to meet the greater demand from our heat and transport sectors, as well as making further progress towards the ambitious renewable targets which the Scottish Government has set"*.

Against the Renewables Obligation closure, the Onshore Wind Policy Statement recognises that there is a need for further cost reductions in the onshore wind sector to allow deployment in a post subsidy era and this will be in the form of larger turbines able to capture more energy. Paragraph 23 states that the Scottish Ministers *"acknowledge that onshore wind technology and equipment manufacturers in the market are moving towards larger and more powerful (i.e. higher capacity) turbines and that these by necessity – will mean taller towers and blade tip heights"*

More explicitly in an address to industry in 2016 the Head of the Scottish Government Energy Consents, Frances Pacitti the then head of Energy Consents Unit said *"We will acknowledge the need for us to be much more realistic in where the onshore wind industry is as a market and how to attract investment into Scotland"*. She said Holyrood will work towards "normalcy" around higher tip heights. *"The dialogue to date has been capped at 132 metres but it's time to move that on. The discussion is 150 metres-plus for most applications going forward."*⁶

Taking into consideration the revision of political, economic, social, and environmental concerns it is now considered desirable to propose a revision to the Tormywheel Extension proposal that maximises the benefit of the project by increasing the allowable tip height for the turbines.

2 Section 42 Application Details

2.1 Consented Development

The current Tormywheel Extension consent, hereafter referred to as the 'Consented Development', is for 2 wind turbines, with tip height up to 126.5m, associated access tracks, crane hardstandings, and a containerised battery storage facility.

Extended planning permission for the existing Tormywheel Wind Farm substation and meteorological mast also form part of the Consented Development as these would be required for the continued operation of Tormywheel Extension wind turbines after the Tormywheel Wind Farm consent expires.

2.2 Site Description

The Application site lies immediately adjacent to the Levenseat Waste Management facility approximately 2.3km south of Fauldhouse and 2.6km north of Forth within the jurisdiction of West Lothian Council.

The land is presently used as rough grazing with the local landform influenced by historical mining activity with industrial developments in the form of the waste management facility to the west, an

⁵ Scottish Government Onshore Wind: Policy Statement. <https://www.gov.scot/publications/onshore-wind-policy-statement-9781788515283/>

⁶ 'Scotland set to raise roof for turbines', Renewable Energy News, Issue 346 October 2016, Page 9.

established commercial aggregate premise to the north, and the existing 15 turbine Tormywheel Wind Farm to the east, significant features of the local setting.

Vehicular access to the site will be gained from the existing Levenseat Waste Management site access off the A706 public road. This access will be used by abnormal loads, associated support vehicles and HGVs throughout the construction, operational and decommissioning phases of the development.

2.3 Section 42 Proposed Development

The development to which this Section 42 application relates to is hereafter refer to as the 'Proposed Development'.

The primary reason for this application is to increase the tip height of the proposed turbines from 126.5m maximum tip height to 149.9m. There is also a proposal to revise the turbine locations and access tracks.

Figure V1.1 provides a location plan of the Proposed Development and **Figure V2.1 Rev 4** illustrates the proposed site layout.

2.3.1 Turbine Tip Height

The Applicant has reviewed the Consented Development design and is seeking a Section 42 revision to the consent to allow larger turbines, maximising electricity generation whilst ensuring that environmental effects remain acceptable. This Section 42 application seeks to revise the turbine dimensions to allow turbines with a tip height of up to 149.9m. This is changing from the previously consented 125.6m maximum height to blade tip.

An updated typical turbine elevation drawing is provided in **Figure V2.2**.

With the increase in tip height there will be an increase in the required foundation size, and changes to the track and crane pad geometry.

An updated typical turbine elevation drawing is provided in **Figure V2.3**.

2.3.2 Turbine Locations

It is proposed that the turbine locations be revised to take account of optimisation that have become desirable due to the deletion of two of the originally proposed turbines, and further detailed site investigation information.

The proposed turbine location co-ordinates and tip heights are provided in **Table 2.2** below.

Table 2.1: Turbine Locations as per the Consented Development

Consented Turbine Number	Easting	Northing	Tip Height
T17	294,454	657,367	126.5m
T18	294,468	657,725	126.5m

Table 2.2: Turbine Locations for Proposed Development Turbine Heights

Proposed Turbine Number	Easting	Northing	Tip Height	Move from Consented Location
T17	294,483	657,384	149.9m	33.6m
T18	294,412	657,759	149.9m	65.5m

2.3.3 Track Layout

Along with the revised turbine layout it is proposed that the on-site wind turbine access track layout be updated.

In the original proposal there was a loop of track that would have allowed access to the Tormywheel Extension wind turbines from the Tormywheel Wind Farm tracks without entering the Levenseat Waste Management compound, however due to environmental concerns the track directly linking Tormywheel Extension to the Tormywheel Wind Farm tracks was removed from the proposal leaving only the access via the waste management facility.

Whilst the Consented Development could have been built and operated using the consented access, the loss of the circular route creates additional construction and management issues:

- The management and operation of the Levenseat site would mean that access through the Levenseat facility would be constrained. Operational access to the wind turbines is normally required to be available at any time and this could result in an increase in down time.
- The consented access includes a tight turn within the Levenseat site. Engineering this for larger turbine components would be complicated and maintaining the availability of the space required over the lifetime of the project could impinge on Levenseat's operations.
- The revised arrangement removes potential interaction between the proposed track and existing services, such as buried 11kV electrical cable, and also water quality monitoring boreholes.
- The proposed arrangement reduces the scope for interaction between wind farm and waste management vehicles.

For these reasons a revised access arrangement, taking access off the existing bell mouth where the Tormywheel Wind Farm track leaves the Levenseat main entrance road, as shown in **Figure V2.1**, is proposed as part of this Section 42 application.

The revised track consists of 610m of new track, which whilst more than the consented application, is less than was in the originally proposed application and could still be considered a very limited footprint for a development of this scale.

2.4 Section 42 Changes to Existing Conditions

The above changes will require changes to conditions as follows

2.4.1 Condition 7

Condition 7 of the Consented Development reads as follows:

7: Except as otherwise required by the terms of this permission, the development shall be undertaken in accordance with the application and the accompanying Environmental Impact Assessment (EIA) Report dated March 2017 (including

additional information submitted pursuant to the EIA Report), including all mitigation and monitoring measures stated in it, and other documentation lodged in support of the application.

It is proposed that this is updated to read:

*7: Except as otherwise required by the terms of this permission, the development shall be undertaken in accordance with the application and the accompanying Environmental Impact Assessment (EIA) Report dated March 2017 (including additional information submitted pursuant to the EIA Report), including all mitigation and monitoring measures stated in it, and other documentation lodged in support of the application **including the Section 42 Supporting Statement submitted March 2020.***

2.4.2 Condition 11

Condition 11 of the Consented Development reads as follows:

11: Wind turbines, buildings, compounds, areas of hardstanding and tracks shall be constructed in the position indicated on Figure 2.1 Rev 3 (Site Layout) within the EIA Report. A variation of the indicated position of any turbine or other development infrastructure detailed on the Figure 2.1 Rev 3 shall be notified on the following basis:

(a) If the micro-sited position is less than 50 metres it shall only be permitted following the approval of the Ecological Clerk of Works (ECoW). (b) If the micro-sited position is between 50 metres and 100 metres it shall only be permitted following written approval of the planning authority. The said provisions relating to micro-sited position shall not have the effect such that any micro-sited position will:

(i) Take place within areas of peat of greater depth than the original location.

(ii) Result in non-compliance with the turbine noise limits set out in this permission.

It is proposed that this is updated to read:

*11: Wind turbines, buildings, compounds, areas of hardstanding and tracks shall be constructed in the position indicated on **Figure V2.1 Rev 4** (Site Layout) within the EIA Report. A variation of the indicated position of any turbine or other development infrastructure detailed on the **Figure V2.1 Rev 4** shall be notified on the following basis:*

(a) If the micro-sited position is less than 50 metres it shall only be permitted following the approval of the Ecological Clerk of Works (ECoW). (b) If the micro-sited position is between 50 metres and 100 metres it shall only be permitted following written approval of the planning authority. The said provisions relating to micro-sited position shall not have the effect such that any micro-sited position will:

(i) Take place within areas of peat of greater depth than the original location.

(ii) Result in non-compliance with the turbine noise limits set out in this permission.

(iii) Takes the turbine location further than 100m from the originally consented locations, specifically OS 294454 657367 and 294468 657725

2.5 Generation Comparison

The total capacity of the site will depend on the final turbine model selection. The candidate turbine considered for the environmental assessment work is the N133, which can be accommodated within the 149.9m tip height parameter although the final choice of turbine will be confirmed following a tendering exercise. The N133 rated capacity is 4.8 megawatts (MW), and the indicative capacity at which the site would be operated at using the N133 would be 9.6MW.

Based on the above the following comparison can be made with the currently consented candidate turbine, this being the GE 103.

Table 2.3: Energy Generation Comparison

	Consented Development	Proposed Development
Candidate Turbine	GE 103	N133
Max Capacity per Turbine	3.2MW	4.8 MW
Max Capacity of Site	6.4MW	9.6 MW
Energy Production Estimate⁷		
Site (per annum)	17,098 MWh/year	28,224 MWh/year
Percentage	61% of Proposed	165% of Consented
Homes Powered⁸		
Site (per annum)	4,585 Homes	7,569 Homes
CO2 Reductions⁹		
Site (per annum)	7,694 Tonnes	12,701 Tonnes
Site (lifetime)	192,353 Tonnes (25 years)	444,528 Tonnes (35 years)

With a 65% increase in production the above figures demonstrate that there is a clear case for the larger turbines in terms of energy generation.

Due to continuous evolution of turbine technology, the Developer is cognisant of the fact that the candidate turbine and the Maximum Generating Capacity of the turbine is subject to change.

⁷ Wind yield estimate derived from Weibull Curve for average wind speed recorded at site, adjusted for hub height, turbine power curves, and typical losses. Whilst the estimates are approximate, they are derived on the same basis for both candidate turbines and therefore provide a fair comparison

⁸ RenewableUK, 'Wind Energy Statistics', 3.729MWh annual consumption of homes, %, [accessed online 3/12/19], ><https://www.renewableuk.com/page/UKWEExplained><

⁹ RenewableUK, 'Wind Energy Statistics', 450 tonnes of carbon dioxide per GWh of electricity supplied, [accessed online 3/12/19], ><https://www.renewableuk.com/page/UKWEExplained><

3 Environmental Assessment

3.1 Environmental Impact Assessment

A full Environmental Impact Assessment (EIA) of the site was undertaken and submitted for the consented development in March 2017, and along with the Further Environmental Information (Ornithology FEI), Submitted 20/06/2018, pertaining to the potential impact on Herring Gulls, these form the basis of the environmental assessment for the Consented Development. That consent was issued in March 2020. These documents should be considered as supporting documents for the Proposed Development, along with the Section 42 Further Environmental Information (S42 FEI) provided in this document, which update the original EIA information where required.

3.2 Scope of Further Environmental Information for Section 42

An exercise has been undertaken considering where the proposed amendments to the consent conditions could result in any additional significant environmental impacts not identified in the original EIA and Ornithology FEI to determine areas where updates to the EIA are required.

This S42 FEI Report contents:

- Chapter 5 assesses the potential and residual effects on landscape and visual amenity;
- Chapter 6 assesses the potential and residual effects on ornithology;
- Chapter 7 assesses the potential and residual effects on ecology and nature conservation;
- Chapter 8 assesses the potential and residual effects on hydrology, geology and hydrogeology;
- Chapter 9 assesses the potential and residual effects on Cultural Heritage;
- Chapter 10 assesses the potential and residual effects on noise and demonstrates that the existing noise condition can be met;
- Chapter 11 assesses the potential and residual effects on traffic and transport; and
- Supporting figures and appendices.

A number of revised and new figures are provided for each chapter and include plans and visualisations of the Proposed Development. For ease of cross referencing with the original ES, Figure number references used for this application, have the addition of a prefix 'V' (variation).

3.3 FEI Team

The assessment was undertaken by the following team, with references as appropriate to assessment work previously undertaken as part of the EIA for the consented development.

Table 3.1: Technical Assessment Team

Technical Chapter	Consultant
Landscape and Visual Amenity	Optimised Environments (Op-En)
Ecology	Cameron Ecology
Ornithology	Cameron Ecology
Hydrology, Geology and Hydrogeology	Muirhall Energy
Cultural Heritage	Muirhall Energy
Noise	SLR
Traffic and Transport	Muirhall Energy

Other Considerations	Muirhall Energy
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3.4 Scope of Assessment

Table 3.2 below provides an appraisal of the potential for significant environmental impacts to occur as a result of the proposed changes detailed previously.

Table 3.2: Appraisal of Impacts of the Proposed Development Compared to Original ES Scheme

Original Environmental Statement Chapter	Potential for Material Change/Significant Effects	Comments
Landscape and Visual Impact Assessment	<p>The increase in turbine tip height has the potential to affect the assessment as follows:</p> <ul style="list-style-type: none"> • Change to the level of landscape and cumulative landscape effect; • Change to the level of and type of visual and cumulative visual effect; • Increased number and range of effected receptors due to an increased area of visibility. <p>The change to the turbine dimensions could affect the type or nature of visual effects from some viewpoints, relating to the manner in which the proposed turbine would relate to the scale of the landscape in which they are located and viewed and in relation to the scale of other wind farms.</p>	Given the potential for landscape and visual effects occurring as a result of the proposed changes, further assessment has been undertaken.
Socio-Economics, Tourism and Recreation	There are no expected material changes in effect in relation to Socio-Economics, Tourism and Recreation.	No significant change is predicted.
Ecology	The Developer consulted with Cameron Ecology, the Chartered Ecologist who undertook the original assessment, and they have confirmed that no significant impact on terrestrial ecology is predicted from the Proposed Development. In fact, the impact is less than when originally proposed as a four-turbine site. As such, there are no expected material changes in effect from the consented development to the terrestrial ecology.	No significant change is predicted.
Ornithology	With the increase in the blade swept area (with increase in tip height, and lower ground clearance), the collision risk envelope will also increase. A revision of the Collision Risk Model (CRM) and assessment was therefore considered necessary	Revised Collision Risk Model presented
Hydrology , Geology and Hydrogeology	As the proposed turbine locations are considered to be in areas with similar ground conditions as the consented locations, it is therefore concluded that no significant change is predicted, and the mitigation measures proposed in the Environmental Statement are therefore still relevant.	No significant change is predicted.

Cultural heritage	<p>The findings of the Environmental Statement consented under LIVE/0226/FUL/17 have been reviewed regarding whether the proposed increase in turbine height and access track realignments could alter the findings. With reference to Figure V9.1 it can be seen that there are no cultural heritage interests that could be directly affected.</p> <p>Indirect effects have been considered within an area of 5km. The closest identified sensitivity is Wilsontown Ironworks (SM2654) at 2.15km from the nearest turbine. Wireline drawings have been provided for all viewpoints and show the effect of the change in turbine scale at the nearest viewpoint. Due to the combination of the distance from the development and the apparent scale change, it is not considered that any cultural heritage interests would be likely to experience significant effects as a result of the increased turbine height.</p>	No significant change is predicted.
Noise and Vibration	There is potential for changes to the operational noise character of the wind farm from the revised candidate turbine.	An updated assessment has been provided.
Traffic and Transport	<p>Suitability of routes to site for components of a comparable size to the Proposed Development has been previously demonstrated by the delivery of similarly sized turbines (147m to tip) at Muirhall Wind Farm. The proposed development at Tormywheel Extension is intended to use the same route. There are no significant problems envisaged to deliver the larger components to site.</p> <p>There is potential for a change to the number of construction loads with the change of layout and foundations.</p>	Commentary on potential for changes to traffic and transport assessment discussed in Chapter 11. Conclusion is that there no significant change is predicted.
Other Considerations	The proposal is to install modern, more efficient turbines. This should only improve the carbon balance as assessed within the EIA. All previous mitigation still be implemented.	No further assessment is required.
Shadow Flicker	A revised shadow flicker figure was produced and provided as Figure V12.1 and it remains the case that there are no sensitive receptors within the area of potential effect	No further assessment is required.
Aviation	The Aviation solution agreed with NATS for the existing consent will also cover the Proposed Development and a height just short of 150m there would be no requirement for visible aviation lighting.	No further assessment is required.

4 Landscape and Visual

A full Landscape and Visual Impact Assessment was prepared by Open Environments on behalf of The Developer. This report is included as Appendix 4.

This report concludes that:

“the proposed changes to the layout and turbine dimensions of the Currently Consented Tormywheel Extension Wind Farm will result in no material changes to the findings of the 2017 ES in landscape and visual terms.”

5 Socio Economic

5.1 Introduction

This chapter should be read in conjunction with the Socio Economics chapter contained within the original application.

5.1.1 Assessment

The original socio-economic assessment was undertaken for 4 turbines with a total capacity of between 8MW and 10MW whilst the Proposed Development, for 2 turbines, is also anticipated to have a total capacity of between 8MW and 10MW. The overall socio-economic benefit is considered to be of a similar magnitude to the original application and greater than the Consented Development due to the increase in productivity that would be a consequence of the increase in turbine size.

5.1.2 Conclusion

The review of the revised proposals has not raised any new concerns and concludes that the impact of the revised layout would remain broadly the same as the original socio-economic assessment.

6 Ecology

6.1 Introduction

This chapter should be read in conjunction with the Ecology chapter contained within the original Environmental Assessment.

6.1.1 Assessment

A Statement of Significance has been produced by Cameron Ecology which is contained within **Appendix A6**. This statement concludes that:

*“This layout is thus predicted to have a lower magnitude of effect on habitats and bats as was predicted in the ES, with effects on both these receptors remaining **not significant** after mitigation. The mitigation measures described in the ES remain valid.”*

6.1.2 Conclusion

The review of the revised proposals has not raised any new concerns and concludes that the impact of the revised layout would remain “not significant”.

7 Ornithology

7.1 Introduction

This Chapter assesses the effects of the Proposed Development on the ornithological features of the development site and its surroundings, covering its construction, operation and decommissioning phases. It should be read in conjunction with Chapter 7 of the Environmental Statement and its associated Technical Appendices.

This Chapter has been written in accordance with the 2017 EIA Regulations, which require inclusion of the effects of the Proposed Development that differ from the 2016 ES.

7.1.1 Assessment

The potential impact on Herring Gulls had previously been a concern for the Consented Development, and before proceeding with the Proposed Development the Developer wished to check whether an increase in tip height would have the potential to give rise to unacceptable effects on Ornithology. A collision risk assessment was undertaken by Cameron Ecology Ltd and this is presented in Appendix 7.1. This report concludes that:

“the Development, in combination with other projects, would not adversely affect the integrity of the Forth Islands SPA with respect to herring gull.”

Due to the Collision Risk Model (CRM) being commissioned prior to the consent, the CRM included as **Appendix A7.1**, was commissioned prior to the consent being issued and this was whilst the three turbine layout was still under consideration.

Whilst the removal of T16 from the layout might have the potential to warrant a revision to the CRM, however on this occasion it was apparent from the observed flight data that very few flights passed through the collision zone of T16. As a result there could only be a marginal improvement in the number of predicted collisions and the conclusion of the CRM would remain unchanged by a revision. The CRM submitted is therefore for the three turbine layout.

To confirm and clarify this point the consultant Ornithologist has provided an additional supporting statement on the validity of the CRM for the consented two turbine site. This is included as **Appendix A7.2**. This letter concludes that:

“Given that the 8 November 2019 letter [As presented in Appendix 5.1] found that the predicted effects on herring gull, (both the regional population and the herring gull populations of the Forth Islands SPA) were not significant (both alone and in combination with other projects in the Forth and Tay region), this finding remains valid for the revised layout, now comprising two turbines.”

7.1.2 Conclusion

The revised collision risk analysis concludes that the proposed development would result in low rates of change in survival of Herring Gull and therefore the Proposed Development, in combination with other projects, would not adversely affect the integrity of the Forth Islands SPA.

8 Hydrology, Geology, and Hydrogeology

8.1 Introduction

This chapter should be read in conjunction with the Hydrology, Geology and Hydrogeology chapter contained within the original Environmental Assessment.

8.1.1 Assessment

The potential for the Proposed Development to give rise to new or altered impacts when compared to the Consented Development was assessed. This assessment included a consideration of the impact on peat and water courses.

8.1.2 Analysis and Conclusion

The footprint of the Proposed Development is entirely within the extent of the area surveyed by the original EIA and potential micro-siting distance of the Consented Application. As these are the same conditions experienced by the consented application, there is therefore no significance change and the mitigation measures mentioned in the original Environmental Assessment are still of relevance.

9 Cultural Heritage

9.1 Introduction

This Chapter considers the potential impacts of the Proposed Development upon cultural heritage assets. These are defined as buildings, monuments, archaeological landscapes, sites and deposits, townscapes, parks, gardens, battlefields and other features that merit consideration in the planning system because of their architectural, archaeological or historic interest.

9.2 Assessment

Due to the change in tip height regarding the Proposed Development with the Consented Development, a revised Zone of Theoretical Visibility (ZTV) has been produced in order to allow a comparative assessment. **See Figure V9.1: 'Comparative ZTV with Heritage Assets'**. This is to establish whether the increase is likely to result in any effect of the setting of cultural heritage assets.

9.3 Analysis and Conclusion

A ZTV has been produced showing heritage assets comprising of category A, B and C Listed Buildings and Scheduled Monuments within a 5km radius. The ZTV **Figure V9.1** demonstrates that there are no additional heritage assets that will potentially be affected by the Proposed Development and all assets have been thoroughly assessed in the previously submitted Environmental Statement.

10 Noise

A noise assessment was undertaken for the Proposed Development prepared by SLR Consulting on behalf of The Developer. This report is presented as Appendix 10.

This report demonstrates that the Proposed Development will be compliant with the existing noise condition.

11 Traffic and Transport

11.1 Introduction

An assessment of the traffic and transport effects associated with the Consented Development was undertaken and produced as part of the original Environmental Statement. This section provides an update to the Traffic and Transport chapter and should be read in conjunction with the original Chapter 11 of the Environmental Statement.

The following points were considered, in relation to the changes pertaining to the Proposed Development, to have the potential to alter the traffic and transport arrangements and thereby have a bearing on the traffic and transport assessment:

- Number of turbine components
- Size and Weight of turbine components
- Size of foundations
- Size of crane hard standing
- Changes to the onsite access track alignment
- Transport Routes

Each of these points are considered in detail below.

The original Traffic and Transport assessment was undertaken on the basis of there being four turbines and the reduction to two will mean that many impacts will be reduced when compared to the original assessment.

11.2 Number of Turbine Components

Any difference in the number of deliveries per turbine will arise from a change to the number of sections into which the tower is broken down. The candidate turbine for the Consented Development, which was a GE 103, comes in three sections and the candidate turbine for the Proposed Development is a Nordex N133, which also comes in three tower sections, as do other turbines in this class. There is therefore no change to the number of turbine component delivery loads anticipated and no change to the traffic and transport assessment from the number of turbine components.

11.3 Size of Weight of Loads

With the increase in maximum tip height proposed there will be an increase in the maximum size of the components both in terms of length and weight. Turbine components are transported in a manner which keeps the axle weight below 12 tonnes and are therefore within the normal operating parameters for use of public roads.

The access route for the Muirhall Wind Farm extensions, which have tip heights of close to 150m came past the proposed Tormywheel Extension site entrance and the viability of the route for turbines of the scale under consideration has been proven.

The final dimensions and weights of turbine components will be subject to the choice of turbine, however maximum axle weights will be 12 tonnes and no additional third-party land will be required

to deliver the turbines components. No significant additional impact is therefore anticipated from the increase in the size or weight of the turbine components.

11.4 Foundations

The Proposed Development is anticipated to have a foundation with a diameter of up to 26m, with up to 600m³ of concrete, and 90 tonnes of steel reinforcement. This compares quantities for the Consented Development of at a 25m diameter, 450m³ concrete and 85 tonnes of steel. This will result in an increase in the number of loads associated with the delivery of these materials. An estimate of the increase in materials is provided in Table 10.1 below based on a 14 tonne capacity for concrete deliveries, and 25 tonne for steel. This results in an increase in the number of deliveries, associated with foundation concrete and steel, of 52 vehicle movements.

11.5 Crane Pad Size

An increase in the turbine size, and in particular hub height, may typically lead to additional requirements in terms of crane pad size and additional smaller 'auxiliary crane pads' to assist with the rigging and de-rigging of a lattice crane if this is required.

In the case of Proposed Development the dimensions of the Current Consent crane pads are sufficient to meet with the specification of most turbine manufacturers. The Developer has previously constructed turbines of this scale using a telescopic crane and additional crane pad hard standing areas are not anticipated to be required. Whilst the specifics of the crane pad arrangement may need to be adjusted in order to meet the specific requirements of the final choice of turbine and the turbine suppliers requirements, it is expected that any such changes could be accommodated within a micro-siting allowance and therefore no additional impacts are anticipated.

11.5.1 Onsite Access Track and Hard Standing Alignment

The revised track proposal consists of 610m of new track.

With the removal of the circular route there was a need to construct a turning head and with longer loads associated with the larger turbines a slightly larger turning head will be required. The depth of the turning head in the Proposed Development has been increased by 15m, from 55m to 70m in order to accommodate longer turbine blade loads. The turning radius has also been increased making for a wider turning head funnel.

The change to the design of the wind farm access track will result in additional aggregate loads.

It is assumed that, as was the case for the Tormywheel Wind Farm, recycled stone material suitable for the construction of the base layer of tracks and hardstanding will be available from within the Levenseat site. Quantities for a running course of MOT Type 1 have been calculated for all track and hardstanding areas, based on 100mm depth and 20 tonne aggregate loads, and the figures are provided in the Table 11.1 below.

11.6 Transport Routes

The Consented Development has two possible routes to site proposed as shown in **Figure 11.1** 'Abnormal Load Route Options' from the original ES (included with this submission). The Route 1 Option was utilised by Muirhall Wind Farm Extension to deliver turbines, where the tip height was

147m, whilst Route 2 was used by Tormywheel Wind Farm. Both routes have therefore been shown to be suitable for wind farm component deliveries in the past.

It is proposed that a full transport assessment would be undertaken once the precise turbine model has been determined and the final route determined in consultation with the local authority.

11.7 Vehicle Movements Comparison

The following table contains a comparison on the total number of vehicle movements (2-way) for the types of delivery that may be affected by the changes in the Proposed Development as discussed above.

Table 11.1: Total Vehicle Movements

Type of Delivery	Original Proposal (4WTG 126.5m to tip)	Consented Development (2WTG 126.5m to tip)	Proposed Development (TWG 149.9m to tip)
Turbine Components	32	16	16
Aggregate (Type 1 top course of tracks and hardstanding)	169	86	91
Foundations - Concrete	302	151	202
Foundations - Steel	14	7	8
Total	517	260	317

From Table 10.1 'Total Vehicles Movements' it can be seen that there is a relatively small increase in the number of loads, of around 22%, from the Consented Development. This is still below the numbers deemed to be acceptable in the Original Proposal and still very low for a development of this type.

11.8 Conclusion

The access route to site has been proved for turbines of a comparable size to the Proposed Development. No significant traffic and transport issues are anticipated from the additional requirements arising from the Proposed Development.

12 Other Considerations

12.1 Introduction

The Other Considerations section considers the potential for impacts which have not been discussed previously. This section should be read in conjunction with the respective chapter within the original ES and addendum Chapter 12 – Other Considerations.

The following sensitivity and subject area were assessed to consider the potential for a change in the assessment. This is followed by further discussion where a revised assessment due to variations in the turbine tip height and rotor diameter is required:

Table 12.1: Other Consideration Scoping

Area	Comment	Potential Change
Aviation	Existing solution will apply to revised proposal	No Change
Telecommunications	No object previously received and turbine moves within micro-siting	No Change
TV and radio reception	No issue previously identified and with reduced number of turbines from original proposal any possible effects could only be reduced	No Change
Recreational Access	No significant change to recreational access will arise from the Proposed Development	No Change
Shadow Flicker	Taller turbines with larger rotors would extend the area of potential shadow flicker	Increase in area of potential impact
Forestry	With the removal of T16 and T19 there is now no impact on forestry	No Change
Carbon Balance	Large more efficient machines will result in an improvement to the Carbon Balance	Positive change

12.2 Shadow Flicker

A shadow flicker assessment of the revised turbine layout was implemented using the software WindPro 3.0 following the same methodology discussed in the ES, Chapter 12. Again, all residential properties within the vicinity of the turbines were considered.

The calculated Shadow Flicker Plan, **Figure V12.1**, illustrates the worst-case scenario within the recommended 10 times rotor diameter, beyond which shadow flicker is not usually considered to be a problem.

Within 10 rotor diameters, for a 138m diameter rotor (which is the largest of all currently available turbines within the 149.9m tip height limit), there are no receptors which fall within an area susceptible to Shadow Flicker. As such, there is no proposal to programme the turbines to be constrained at certain periods and therefore no significant change from the consented proposal.

12.3 Carbon Balance

Table 12.3 of the Tormywheel ES contained an estimate of the electricity production based on an assumption of 10MW installed. Whilst the Proposed Development is likely to be a little short of

10MW the increase in the size of the turbine is likely to more than make up for this in terms of an increase in capacity factor.

Table 2.3, above, presented likely production for the proposed Development and the Consented Development, using a method that captures the benefit of the increase capacity factor that arises from larger turbines. It also used figures for average house energy consumption and CO2 emission avoidance that are updated from the original ES to use the latest figures published.

In order allow for a like for like comparison the 'Homes' and 'CO2 Avoided' values for the 'Original Proposal' have been revised to use the updated figures. The results are presented in Table 12.2 below.

Table 12.2: Carbon Balance

Type of Delivery	Original Proposal (4WTG 126.5m to tip)	Consented Development (2WTG 126.5m to tip)	Proposed Development (TWG 149.9m to tip)
Annual Energy Production Estimate ¹⁰	24,440 MWh	17,098 MWh	28,224 MWh
Homes ¹¹	6,554	4,585	7,569
Annual CO2 Avoided ¹²	10,998	7,694	12,701

This shows that the overall carbon balance will not change significantly from the original proposal and this will be a significant improvement on the consented development.

¹⁰ Energy yield estimate for the Consented and Proposed Development are derived from a Weibull Curve for average wind speed recorded at site, adjusted for hub height, turbine power curves, and typical losses.

¹¹ Calculation uses the annual UK average electricity consumption of 3,729kWh. Figure from original ES was 3,938 See URL: <http://www.renewableuk.com/page/UKWEDEExplained>)

¹² Calculation uses 450kg/MWh. Figure from original ES was 430kg/MW. See URL: <http://www.renewableuk.com/page/UKWEDEExplained>)