

APPENDIX 2.4: CARBON CALCULATOR

This Technical Appendix provides a comparison of Carbon Calculator (v1.5.1) results between the consented Viking Wind Farm (per the Viking Wind Farm, S36C Application – EIA Report 2018¹) and the same scheme but with three larger construction compounds.

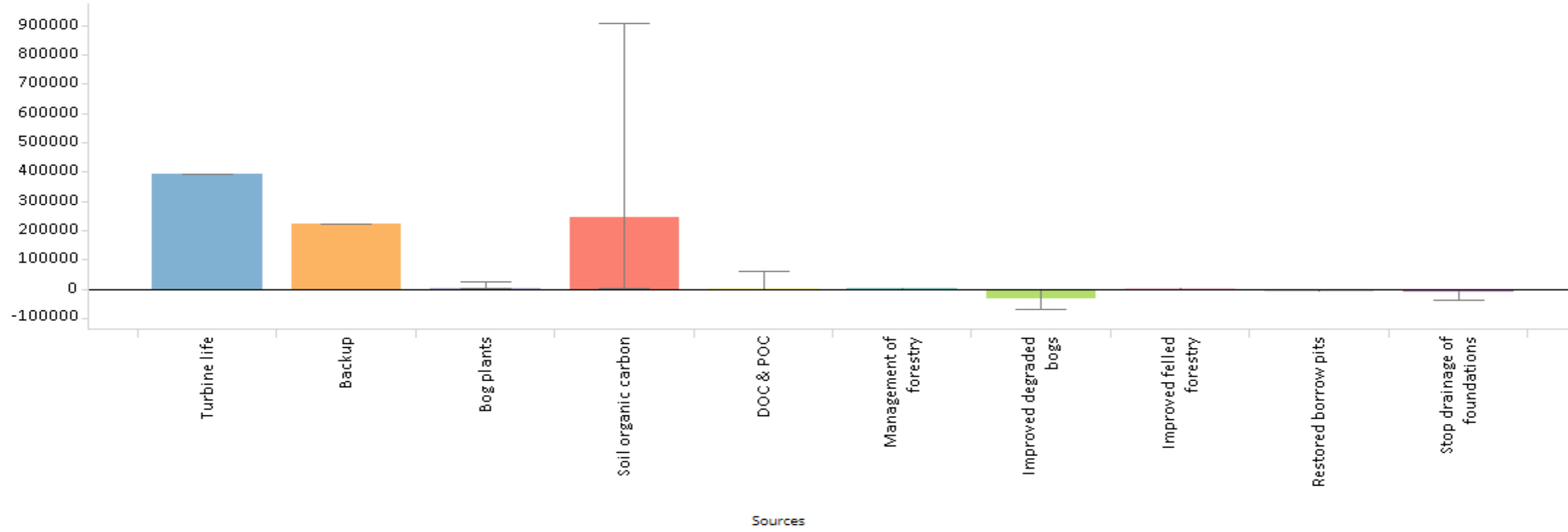
¹ Available at: <https://www.energyconsents.scot/ApplicationDetails.aspx>

2.4.1 Carbon Calculator - Output Data

	Viking Wind Farm, S36C Application - EIA Report 2018 (Ref: RRM0-8UB3-26BR v1)			Viking Wind Farm (Revised compounds) 20190617 (Ref: RRM0-8UB3-26BR v5)		
	Exp.	Min.	Max.	Exp.	Min.	Max.
1. Windfarm CO2 emission saving over...						
...coal-fired electricity generation (t CO2 / yr)	1,649,049	1,364,116	1,933,981	1,649,049	1,364,116	1,933,981
...grid-mix of electricity generation (t CO2 / yr)	504,559	417,378	591,739	504,559	417,378	591,739
...fossil fuel-mix of electricity generation (t CO2 / yr)	826,321	683,544	969,097	826,321	683,544	969,097
Energy output from windfarm over lifetime (MWh)	44,908,731	37,149,123	52,668,339	44,908,731	37,149,123	52,668,339
Total CO2 losses due to wind farm (tCO2 eq.)						
2. Losses due to turbine life (eg. manufacture, construction, decommissioning)	390,975	390,975	390,975	390,975	390,975	390,975
3. Losses due to backup	223,089	223,089	223,089	223,089	223,089	223,089
4. Losses due to reduced carbon fixing potential	5,256	1,577	23,319	5,396	1,633	23,545
5. Losses from soil organic matter	242,969	3,974	907,377	240,654	1,871	904,869
6. Losses due to DOC & POC leaching	3,880	173	60,276	3,877	172	60,274
7. Losses due to felling forestry	0	0	0	0	0	0
Total losses of carbon dioxide	866,168	619,788	1,605,036	863,991	617,741	1,602,753
8. Total CO2 gains due to improvement of site (t CO2 eq.)						
8a. Change in emissions due to improvement of degraded bogs	-30,174	0	-68,494	-30,174	0	-68,494
8b. Change in emissions due to improvement of felled forestry	0	0	0	0	0	0
8c. Change in emissions due to restoration of peat from borrow pits	-1,671	0	-2,995	-1,671	0	-2,995
8d. Change in emissions due to removal of drainage from foundations & hardstanding	-2,468	0	-36,385	-2,468	0	-36,385
Total change in emissions due to improvements	-34,313	0	-107,874	-34,313	0	-107,874
RESULTS						
Net emissions of carbon dioxide (t CO2 eq.)	831,855	511,914	1,605,036	829,677	509,867	1,602,753
Carbon Payback Time						
...coal-fired electricity generation (years)	0.50	0.26	1.18	0.50	0.30	1.20
...grid-mix of electricity generation (years)	1.65	0.87	3.85	1.60	0.90	3.80
...fossil fuel-mix of electricity generation (years)	1.01	0.53	2.35	1.00	0.50	2.30
Ratio of soil carbon loss to gain by restoration (not used in Scottish applications)	7	0	No gains!	7	0	No gains!
Ratio of CO2 eq. emissions to power generation (g/kWh) (for info. only)	19	10	43	18	10	43
Homes powered equivalent...(based on household consumption at 3.781 MWh pa, July 2018 (renewable UK) (lifetime, based on 2018 consumption data) (pa)	11,877,475 475,099	9,825,211 393,008	13,929,738 557,190	11,877,474 475,099	9,825,211 393,008	13,929,738 557,190

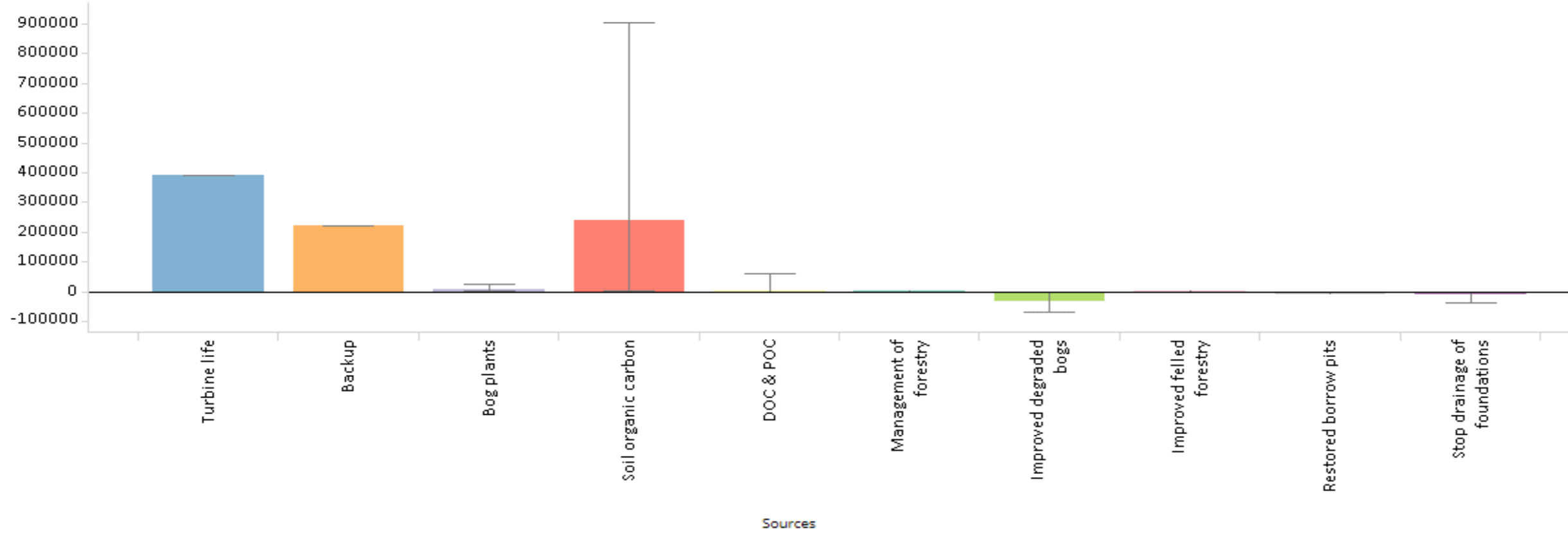
2.4.2 Viking Wind Farm, S36C Application - EIA Report 2018 - GHG emissions

Greenhouse gas emissions (t CO2 eq.)



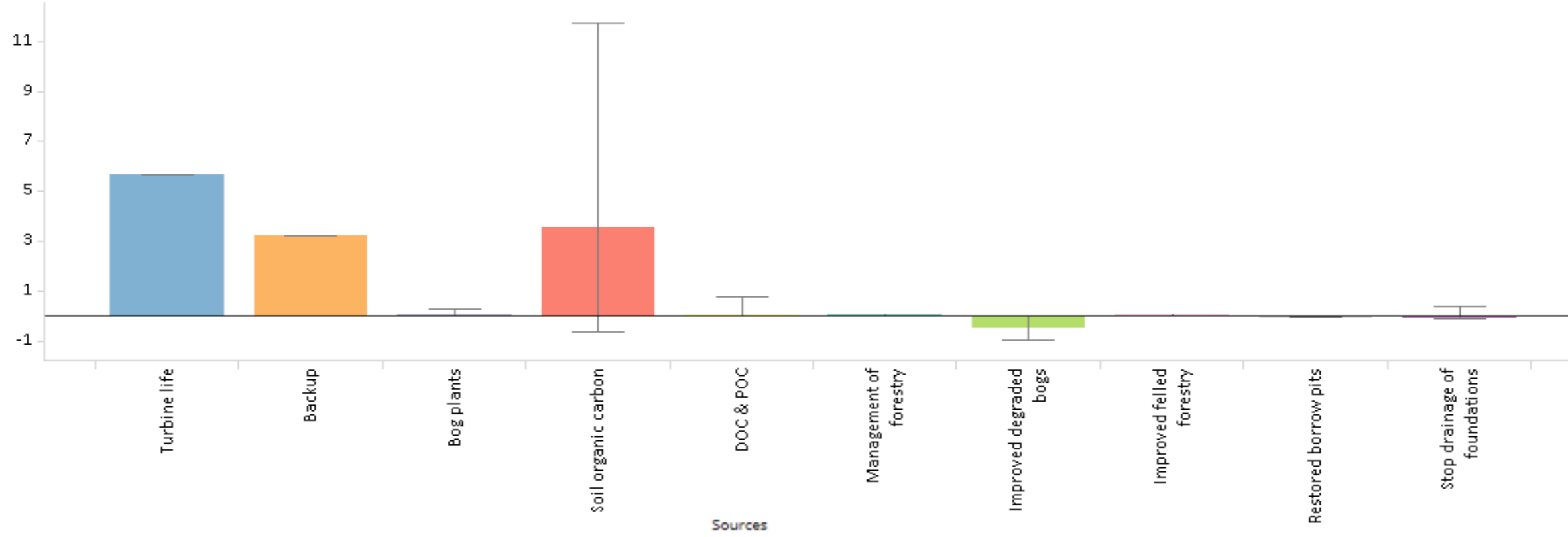
2.4.3 Viking Wind Farm (Revised compounds) 20190617 - GHG emissions

Greenhouse gas emissions (t CO2 eq.)



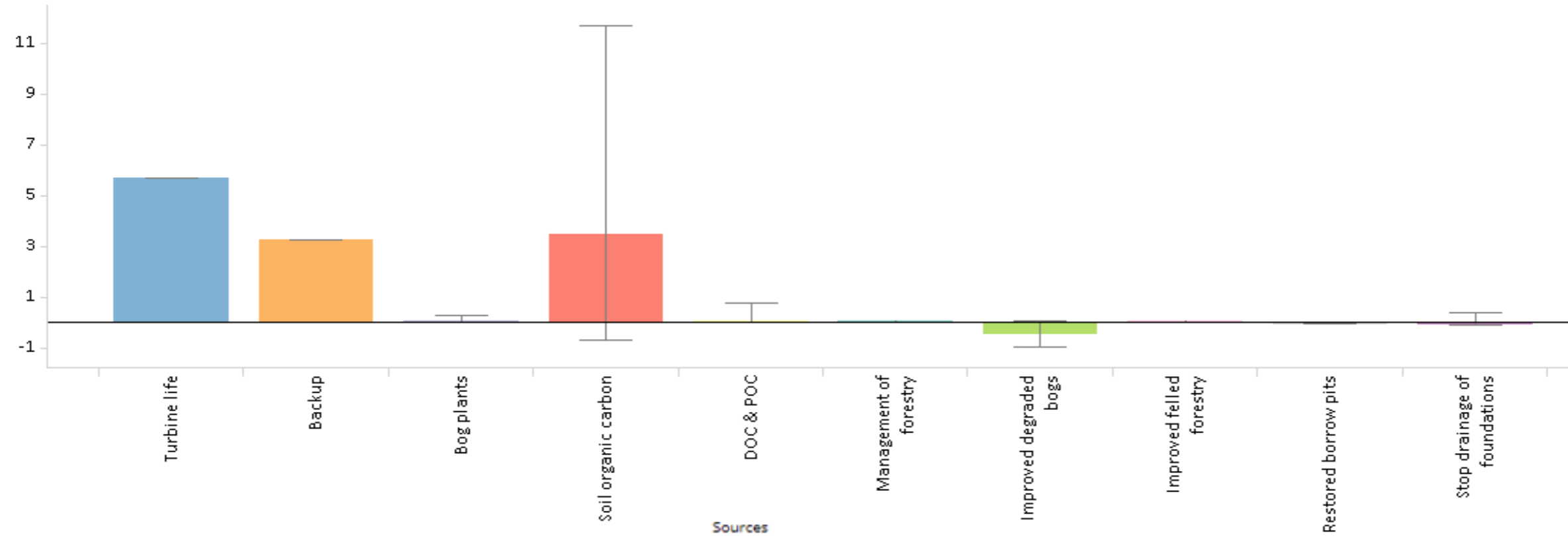
2.4.4 Viking Wind Farm, S36C Application - EIA Report 2018 - Carbon Payback time

Carbon payback time (months) using fossil-fuel mix as conterfactual



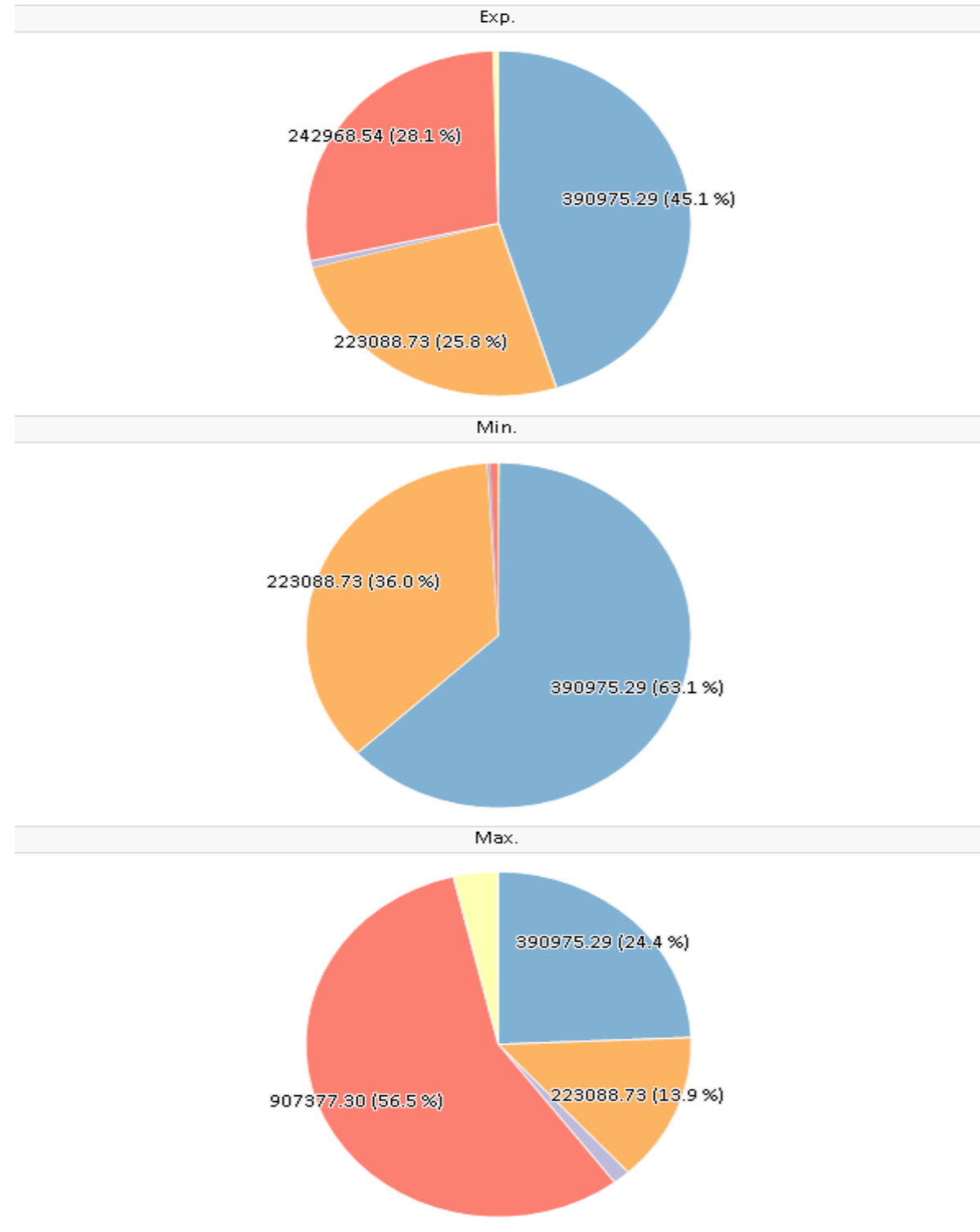
2.4.5 Viking Wind Farm (Revised compounds) 20190617 - Carbon Payback time

Carbon payback time (months) using fossil-fuel mix as conterfactual



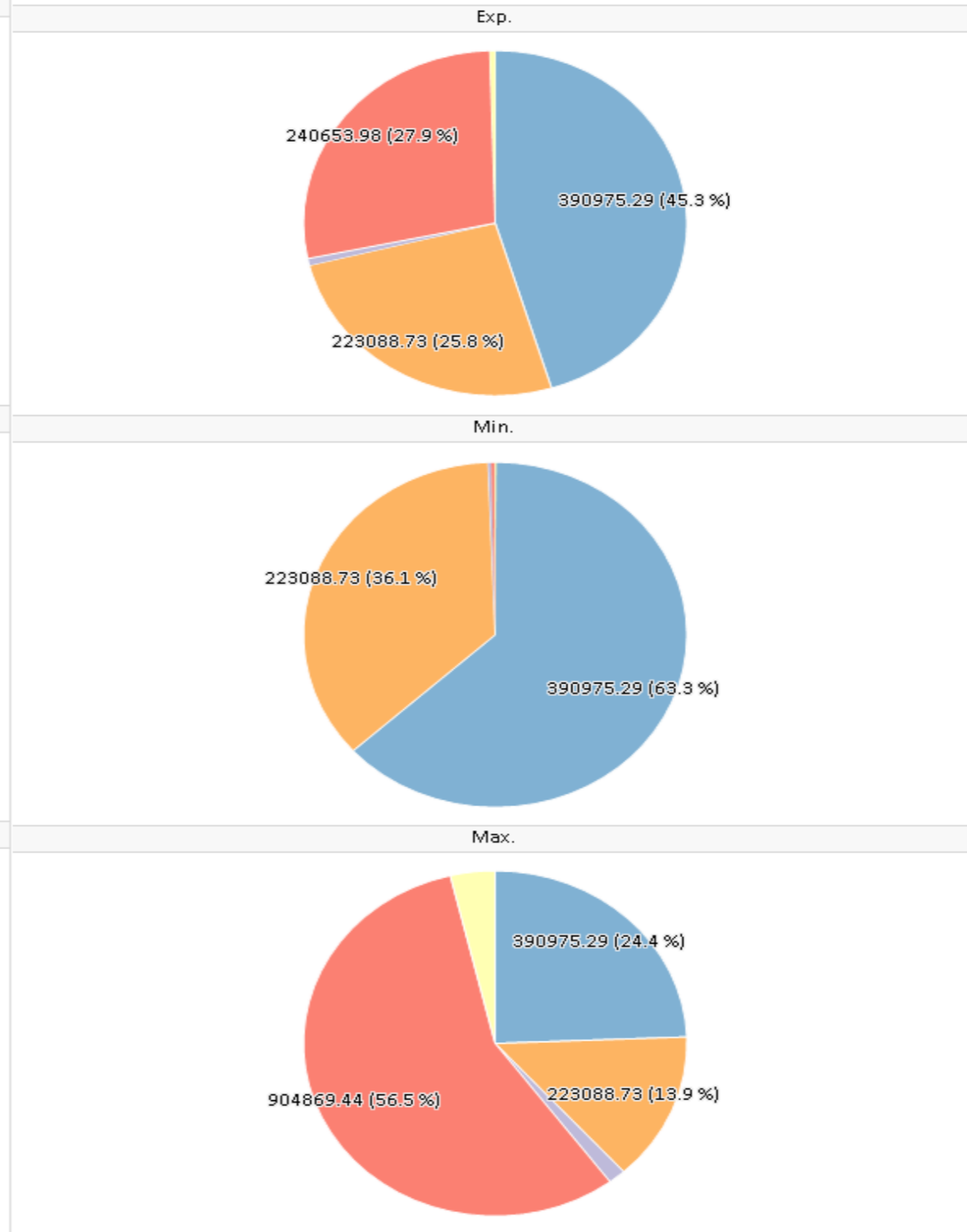
2.4.6 Viking Wind Farm, S36C Application - EIA Report 2018 - sources of GHG

Proportions of greenhouse gas emissions from different sources



2.4.7 Viking Wind Farm (Revised compounds) 20190617 - sources of GHG

Proportions of greenhouse gas emissions from different sources



Sources

- Turbine life
- Backup
- Bog plants
- Soil organic carbon
- DOC & POC
- Management of forestry
- Improved degraded bogs
- Improved felled forestry
- Restored borrow pits
- Stop drainage of foundations

APPENDIX 3.1: INFORMAL SCOPING OPINION / MINUTES OF MEETING

INFORMAL SCOPING OPINION / MINUTES OF MEETING

Project name **Viking Wind Farm Construction Compounds (Main Camp, West Camp and North Camp)**
 Subject **Informal meeting to discuss the Scoping Technical Note**
 Meeting date **12/04/2019**
 Location **Conference Call**
 Meeting no. **1**

Participants **Shetland Islands Council**
Richard MacNeill (RM)
John Holden (JH)
Janet Barclay Smith (JBS)
Austin Taylor (AT)

SEPA

Judith Montford (JM) – also provided follow up input via email.

SNH

Juan Brown (JB)

Viking Energy Wind Farm LLP ('the Applicant')

Jamie Watt (JW)
Andrew Smith (AS)

Ramboll

Peter Bruce (PB)
Fred Brown (FB)

Absent **SEPA**
Zoe Griffin – Judith Montford attended the meeting on Zoe's behalf

HES

Urszula Szpyszynska – provided input via email.

Date 23/04/2019

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Agenda

- 1 Introductions**
- 2 Overview of the purpose of the call**
- 3 Summary of Development Need**
- 4 Summary of Environmental Aspects to be scoped in / out**
- 5 Inviting comments on proposed Environmental aspects**
- 6 Summary of Actions**
- 7 AOB**

1 Introductions and call overview

PB facilitated introductions. PB provided some background and reasoning for the call (to reach agreement on the scope of the EIA), as well as outlined the agenda.

2 Summary of Development Need

JW provided a summary of the development. JW outlined the development need, in that early discussions with construction contractors has raised the issue that the current construction compound allocation (included within the wind farm consent) is too small.

3 Summary of Environmental Aspects to be scoped in / out

PB proposed to discuss each Environmental Aspect mentioned in Table 1 of the Scoping Technical Note in turn, inviting comment from the consultees on the applicant's decision to scope in / out.

Table 1 from the Scoping Technical Note is shown below with an additional row added below each Technical Area showing responses received by consultees from the call (as well as additional information provided via email). Any changes to the elements to be scoped in / out have been coloured red (deletion) and green (addition):

Table 1: Summary of Environmental Aspects to be Scoped in and Scoped out (Modified for Informal Scoping Opinion)		
Technical Area	Elements to be Scoped in to the EIA Report	Elements to be Scoped Out of the EIA Report
Peat Stability and Peat Management	<ul style="list-style-type: none"> Peat Management Plan (PMP). Peat Landslide Hazard Risk Assessment. 	<ul style="list-style-type: none"> None
<p>Consultee comments:</p> <p>JM - We approve that a Peat Management Plan is acknowledged as being a key document in this process. We would recommend that sufficient new peat probing is evidenced for the planned new location of the construction compound. This should be in the form of a 25m probing grid as a minimum but preferably a 10m probing grid. We recommend further probing is carried out in the surrounding area to confirm that, if deep peat is found, there might be a better location in the vicinity. All probing should be accompanied by some coring information with interpretation such as the von Post scale.</p> <p>We would encourage the applicant to provide restoration/re-use options for excavated peat <u>at this stage</u> and not to put this off until post-consent. We remind the applicant that re-use of peat must have ecological purpose and benefit.</p> <p>Where possible we request the applicant consider construction methods that reduce peat excavation (such as piling) in any deep peat area before other methods.</p> <p><u>Waste Management Licence</u></p> <p>It should be noted that peat storage on site for reuse is likely to require a waste management licence or exemption under The Waste Management Licensing (Scotland) Regulations 2011 and it can be stored for up to 3 years.</p> <p><u>Schedule of mitigation</u></p> <p>Request a schedule of mitigation is provided.</p> <p><u>Outline CEMP</u></p> <p>An outline CEMP should be provided.</p> <p>PB – detail beyond the outline for the CEMP will be provided by the construction contractor to discharge any conditions relating to this.</p>		
Ornithology	<ul style="list-style-type: none"> Habitat loss; 	<ul style="list-style-type: none"> Collision risk.

Table 1: Summary of Environmental Aspects to be Scoped in and Scoped out (Modified for Informal Scoping Opinion)		
Technical Area	Elements to be Scoped in to the EIA Report	Elements to be Scoped Out of the EIA Report
	<ul style="list-style-type: none"> • Disturbance/reinstatement; • Disturbance/displacement effects. 	
Consultee comments: No Comments.		
Ecology and Aquatic Ecology	<ul style="list-style-type: none"> • Mammal species surveys; • Vegetation surveys and peatland condition; and • Amphibian and reptile monitoring. 	<ul style="list-style-type: none"> • Aquatic ecology.
Consultee comments: <i>JB – need to make clear in the Environmental Impact Assessment Report (EIA Report) that there will be no (significant) impact on Sandwater.</i>		
Cultural Heritage and Archaeology	<ul style="list-style-type: none"> • Direct effects on cultural heritage and archaeological assets. 	<ul style="list-style-type: none"> • Indirect effects on cultural heritage and archaeological assets.
Consultee comments: <i>US – HES agrees with the proposed decision to scope in direct effects and scope out indirect effects.</i> <i>RM – regional archaeologist will want to make comment on the proposed development.</i>		
Hydrology	<ul style="list-style-type: none"> • Watercourse crossing; • Groundwater Dependent Terrestrial Ecosystems (GWDTE); and 	<ul style="list-style-type: none"> • Private water supplies (PWS).
<p>Consultee comments:</p> <p>JM - GWDTE</p> <p><i>In reference to point 5.3.1 of the Scoping Technical Note submitted, we recommend that an NVC survey is carried out in addition to the Phase 1 habitat surveys as any potential wetland will need to be assessed at the NVC level of habitat classification. We would also remind the applicant that where excavation work will go below 1m that the surveys must be carried out to 250m.</i></p> <p><u>Private water supplies</u></p> <p><i>It is stated in the Scoping Technical Note that the "The closest PWS location is located over 5 km away from the nearest proposed construction compound site boundary, as such no impacts are expected and thus a PWS assessment can be scoped out". We require a plan showing this is the case to be put in the EIA report.</i></p> <p><u>Foul drainage from Site welfare facilities</u></p> <p><i>As stated at the meeting we require details of how foul drainage will be discharged as options for discharge at this site will be limited.</i></p> <p><u>Water Course Crossings</u></p> <p><i>Water course crossings must be designed to withstand a 1 in 200 year flooding event.</i></p> <p><u>Sandwater</u></p> <p><i>To ensure that any potential impacts to Sandwater are considered.</i></p>		

Table 1: Summary of Environmental Aspects to be Scoped in and Scoped out (Modified for Informal Scoping Opinion)		
Technical Area	Elements to be Scoped in to the EIA Report	Elements to be Scoped Out of the EIA Report
Noise	<ul style="list-style-type: none"> • Construction Noise. 	<ul style="list-style-type: none"> • Operational noise; • Vibration; • Low Frequency noise; and • Amplitude Modulation.
<p>Consultee comments:</p> <p>JM:</p> <ul style="list-style-type: none"> - potential impacts to receptor Halfway House need to be considered. - Maintenance of plant and machinery to be considered. <p>PB – the applicant would anticipate a condition to cover construction phase noise to construction noise conditions attached to the Viking Wind Farm consent.</p>		
Landscape and Visual	<ul style="list-style-type: none"> • Landscape Character • Visual Amenity; and • Night-Time Visual Assessment. 	
<p>Consultee comments:</p> <p>AT:</p> <ul style="list-style-type: none"> - What LVIA assessment was included for the consented compounds? - Suggested review of previous assessment against Gillespie standards then again against the restoration of the site; and - Visual amenity to be considered for receptor Halfway House. <p>JH – Suggested Night Time Lighting Assessment, as Shetland only gets 6 hour of light per day during winter.</p> <p>JB – the Weisdale site is near the SLA.</p> <p>PB – the Applicant will include reasoning for scoping out aspects of the LVIA in the EIA Report.</p>		
Human Health, Air Quality and Population	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Air Quality; • Population; • Traffic and Transportation; • Noise; • Residential Amenity; • Health and Safety at Work; and including best practice.
<p>Consultee comments:</p> <p>RM – potential impact to receptor Halfway House to be considered.</p> <p>JW – the Applicant to consider having a section solely to focus on potential impacts to halfway house.</p> <p>PB – we note the comments on the consideration of residential amenity and note that this issue will be considered in terms of noise and visual amenity in the respective chapters.</p>		
Access, Traffic and Transport	<ul style="list-style-type: none"> • Outline Construction Traffic Management Plan. 	<ul style="list-style-type: none"> • Operational Traffic.

Table 1: Summary of Environmental Aspects to be Scoped in and Scoped out (Modified for Informal Scoping Opinion)		
Technical Area	Elements to be Scoped in to the EIA Report	Elements to be Scoped Out of the EIA Report
Consultee comments: No comments.		
Climate Change Impact Assessment	<ul style="list-style-type: none"> Carbon Calculator 	<ul style="list-style-type: none"> All other aspects of Climate Change Impact Assessment.
Consultee comments: AT – changes in the construction compound size could alter the validity of the carbon calculator. PB – the Applicant will include an updated Carbon Calculator.		
Recreation and Tourism	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> All aspects of Recreation and Tourism.
Consultee comments: PB – the LVIA assessment as part of the construction compounds EIA Report will cover potential recreation / visual amenity impacts.		
Socio-economics	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> All aspects of Socio-economics.
Consultee comments: No Comments.		
Aviation and Telecommunications	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> All aspects of Aviation and telecommunications.
Consultee comments: No Comments.		

PB requests any further comments:

- JB** – site reinstatement to be covered in the description of development section of the EIA Report?
 - PB** – The applicant will include details of the proposed restoration profile of the site.
- JB** – How Temporary are the compounds?
 - JW** – they will be there for the **construction phase** of Viking Wind Farm and decommissioned/reinstated following the completion of the construction phase.
- JM** – how will peat be stored?
 - PB** – it is anticipated that peat will be stored in appropriately designed and managed bunds around the sites (visual screening). This will be confirmed in the application and peat management plan.
- JM** – what will the construction compounds be used for?
 - PB** – mainly car parks, office space, general material laydown, equipment storage, waste management and fuel storage. Full details will be provided in the application.

4 Summary of Actions

- Ramboll to prepare PWS map (as per SEPA's request) for inclusion in the EIA Report;
- Ramboll to engage with regional archaeologist;
- EIA Report to provide restoration/re-use options for excavated peat.
- EIA Report to show sufficient peat probing is evidenced for the planned new location, new peat probing may be required;
- EIA Report to include Outline CEMP;
- EIA Report to demonstrate the potential hydrology impacts raised by consultees have been considered, i.e. foul drainage discharge, 1 in 200 year flooding event, GWDTE, impacts on Sandwater;
- EIA Report to address impacts on halfway house associated with a number of Technical Areas (e.g. Noise, LVIA, Human Health and Air Quality). Potentially in a standalone section;
- LVIA assessment to consider visual amenity, NSA, night-time lighting, landscape character and relevant guidelines;
- Climate Change Assessment – update carbon calculator for additional landtake;
- Main camp impacts to Sandwater to be considered in EIA Report; and
- EIA Report to include Schedule of Mitigation section.

5 AOB

None.

APPENDIX 4.1: ANNOTATED PHOTOGRAPHS

Proposed compound almost entirely screened. Only
Perimeter Fence Visible



Viewpoint 1: Southbound view from A970, North of B9075 Junction



Batter southern end of proposed compound visible

Viewpoint 2: View from land west of the A970