FEHILY TIMONEY
30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 6.1

Carbon Calculations

Carbon Calculator Inputs	Figure
Windfarm characteristics:	
No. of Turbines	7
Duration of consent	35
Power rating of 1 turbine (MW)	5.5
Capacity factor	35%
Backup - fraction of output to back up (%)	1.93
Backup - Additional emissions due to reduced thermal efficiency of the reserve generation (%)	10 (fixed)
CO2 emissions from turbine life (tCO2/MW)	Calculate wrt installed capacity
Characteristics of peatland before windfarm de	
Type of peatland	Acid Bog
average annual air temp	11
average depth of peat at site (m)	0.2
C Content of dry peat (% by weight)	19%
Average extent of drainage around drainage features at site (m)	0.50
average water table depth at site (m)	1
Dry soil bulk density (g cm-3)	0.3 g cm-3
Characteristics of bog plants:	
Time required for regeneration of bog plants after restoration (years)	30
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha-1 yr-1)	0.25
Forestry Plantation Characteristics:	
area of forestry to be felled (ha)	24.4
Average rate of carbon sequestration in timber (tC ha-1 yr-1)	3.6
Counterfactual emission factors:	
Fossil fuel-mix emission factor (t CO2 MWh-1)	0.45 (fixed)
Borrow pits (if any):	
no. of borrow pits	1
average length of borrow pits (m)	22m
average width of borrow pits (m)	22m
average depth of peat removed from pit (m)	0.2
Foundations and hard-standing area associated with each turbine:	
Method used to calculate CO2 loss from foundations and hard-standing	Rectangular with vertical walls
Turbine foundations	
Average length of turbine foundations (m)	5

Average width of turbine foundations (m)	4.4
average depth of peat excavaated when constructing foundations (m)	0.122m
Approximate geometric shape	Circular
Average length of hard-standing (m)	40
Average width of hard-standing (m)	75
Average depth of peat excavated when consrtructing hardstandings (m)	0.122m
Volume of concrete used in construction of the EN	
Volume of concrete used (m3)	6500
Access tracks:	
Existing track length (m)	0
length of access track that is floating road (m)	0
Floating road width (m)	0
floating road depth (m)	0
Length of floating road that is drained (m)	0
Average depth of drains associated with floating roads (m)	0
Length of access track that is excavated road (m)	3900
Excavated road width (m)	5
Average depth of peat excavated for road (m)	0.2
Length of access track that is rock filled road (m)	5300
Rock filled road width (m)	5.5
Rock filled road depth (m)	0.5
Length of rock filled road that is drained (m)	5300
Average depth of drains associated with rock filled roads (m)	0.4
total length of access track (m)	9200
Cable Trenches:	
Length of any cable trench on peat that does not follow access tracks and is lined awith a permeable medium eg. sand (m)	9200
Average depth of peat cut for cable trenches (m)	0.2
Additional peat excavated (not already accoun	
Volume of additional peat excavated (m3)	2749.6
Area of additional peat excavated (m2)	13748
Peat landslide Hazard	negligible
Improvement of C sequestration at site by blocking drains, r	
Area of degraded bog to be improved (ha)	0
Water table depth in degraded bog before improvement (m)	0
Water table depth in degraded bog after improvement (m)	0

Explanation

Output is 38.5MW; 5% is 1.93
Provided by model
velopment:
Whie the site does not contain peatland it does contain peat. Acid bog is chosen over Fen as fens are ground fed and the hydrology of the site does not reflect this.
Taken from Air and Climate chapter
Depth varies 0.1-0.3m, average used
19% is at the low range will go. Overall the C content will not be as high as a peat bog.
Don't have info. Worst case taken
Calculator values range between 0 and 1; water table a lot deeper than 1m
Shallow peat on mineral soil so figure is likely to be high, however, the calculator only goes as high as 0.3
Life time of restoration - 30 is as high as the calculator goes.
0.25 tC ha-1 yr-1 is the value given by SNH guidance (not a sensitive input).
This is dependent on the yield class of the forestry. Carbon sequestered for yield class 16 m3 ha-1 y-1 = 3.6 tC ha-1 yr-1
The assumption to use this emission factor was made based on the reality that additional wind generation will displace fossil fuel generation and a mix of fossil fuels are used
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Depth varies 0.1-0.3m, average used
22 diameter (5 x 4.4)

Average under total turbines
Average under total turbines
TIRE windfarm
There are 5300 existing access track. However all is to be upgraded so included in Excavated road
None
Existing to be upgraded - 5.3km New access track - 3.9
4.5 - 5m. Calculator doesn't go below 5m.
Depth varies 0.1-0.3m, average used
Varies from 0.3-0.5, average used
Same as total access track length
Depth varies 0.1-0.3m, average used
ted above):
Below total area (13748) x average depth of peat (0.2) = 2749.6
Temp comp, onsite substation (50m x 50m = 2500m2), control building (13m x 9m= 117m2), Mast (30m (2827m2) and 50m (7854)radius and 3.5m x 10m = 350m2 access track, 10m x 10m= 100m2 crane pad). Total area = 13748m2
estoration of habitat, etc.
None
N/A
N/A