

## Addendum of Supplementary Environmental Information

### Technical Appendix 1: Refined Design Envelope Parameters

Project design element		Parameter	5 MW	6 MW	6.15 MW (126m Rotor Diameter)	6.15 MW (152m Rotor Diameter)
Parameter	Item No.	Turbines				
<b>Turbines</b>	<b>T1.1</b>	Number at 450 MW capacity	90	75	73	73
	<b>T1.2</b>	Maximum rotor tip height (m) (LAT)	197			
	<b>T1.3</b>	Rotor diameter (m)	135	154	126	152
	<b>T1.4</b>	Minimum hub height (m) (LAT)	93.5			
	<b>T1.5</b>	Maximum hub height (m) (LAT)	107.5			
	<b>T1.6</b>	Air gap (m) clearance to blade tip (minimum of) from LAT	30.5 <sup>1</sup>			
	<b>T1.7</b>	Rev. per min. (rpm)	6.9-13.5	5-11	7.7-12.1	6.4-10.1
	<b>T1.8</b>	Speed at blade tip (m/s)	46.6-95.4	80 (nominal)	80 (maximum)	80 (maximum)
	<b>T1.9</b>	Height of platform (m) LAT	18			
	<b>T1.10</b>	Max turbine spacing (m) (approximately)	1805			
	<b>T1.11</b>	Min turbine spacing (m) (approximately)	450			
	<b>T1.12</b>	Position of turbines	Refer to Indicative Layout C			

<sup>1</sup> Note this is equivalent to 27.5m Mean Sea Level (MSL)

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	<b>T1.13</b>	Colour scheme	Light Grey RAL 7035			
	<b>T1.14</b>	No. of concurrent turbine installations	Maximum 2 at a time			
<b>Other Infrastructure</b>						
<b>Offshore Substation</b>	<b>OS1.1</b>	Number of offshore substations	1 or 2 No. of substation locations reduced from 4 (original submission) to 3			
	<b>OS1.2</b>	Position of offshore substations	Refer to Indicative Layout C			
	<b>OS1.3</b>	Height of Platform (m) LAT	18			
	<b>OS1.4</b>	Height of Highest Structure (m) LAT	60			
	<b>OS1.5</b>	Foundation of substation- No. & Diameter of Piles	4-8 piles per jacket at up to 3.5 m diameter (each).			
	<b>OS1.6</b>	Foundation of substation- Piling Method	Pre-install piles in template and fit jacket onto piles / or post pile through jacket sleeves after placing jacket.			
	<b>OS1.7</b>	Foundation of substation- Pile Penetration Depth	If piles in valley piles will be embedded up to 60 m below seabed, if in bedrock up to 20 m embedment below rockhead level.			
	<b>OS1.8</b>	Foundation of substation- Pile Anchorage Type	Bedrock - drilled piles.			
	<b>OS1.9</b>	Chemicals and oils	Sulphur hexafluoride usually inside gas insulated switchgear. Oil as cooling medium for transformers, back-up generator - with diesel tanks.			

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	<b>OS1.10</b>	Size of structures (m)	Deck area approximately 30 x 30. Jacket leg spacing at seabed up to 60 x 60.			
	<b>OS1.11</b>	Design details	Substation likely to include transformer rooms (and coolers), switchgear rooms (220 kV and 33 kV), stores, working areas, WC and shower, emergency accommodation, control and protection room and space for cable marshalling and transformer oil sump. Potential to have offshore mother ship or daily transits from local ports.			
	<b>OS1.12</b>	Colour scheme / lighting	Yellow (RAL 1023) up to underside of platform then grey (RAL 7035).			
<b>Jacket Foundations</b>						
<b>Turbine Foundations</b>	<b>TFJ1.1</b>	Jacket leg spacing at seabed level (m x m)	20 x 20 - 35 x 35			
	<b>TFJ1.2</b>	Details of seabed preparation	A seabed template with up to 4 legs (max leg spacing 40 m x 40 m) will sit temporarily on the seabed during pile installation.			
	<b>TFJ1.3</b>	Foundation diameter (m) (piles)	2.5-3.5			
	<b>TFJ1.4</b>	Number of piles per foundation	3 or 4			
	<b>TFJ1.5</b>	Foundation material	Steel			
	<b>TFJ1.6</b>	Foundation bed penetration depth (m) (piling)	20-50			
	<b>TFJ1.7</b>	Foundation installation method	Approximately 3% of piles will be driven only, 7% of piles will be drilled only. 90% of piles will be driven-drilled. Of these an average of 30% of the pile will be driven and 70% drilled.			

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	<b>TFJ1.8</b>	Foundation installation duration (per foundation) (Hours)	Piling (62-180 hours for 4 piles), Jacket installation (12-24 hours). This includes time for setting up and changing equipment between piling locations.			
	<b>TFJ1.9</b>	Foundation installation frequency (no. of days per foundation) if using one vessel	5-12			
	<b>TFJ1.10</b>	Jack-up number of moves per foundation installation	1-3			
	<b>TFJ1.11</b>	Footprint from jack-up (leg spacing) (m)	50x50 – 100x100			
	<b>TFJ1.12</b>	Number of spud cans	3-6			
	<b>TFJ1.13</b>	Spud can footing area (m <sup>2</sup> ) (per spud can )	1 m <sup>2</sup> (leg area without spud can) to 106 m <sup>2</sup>			
	<b>TFJ1.14</b>	Turbine foundation scour protection and footprint size (m <sup>2</sup> )	100 – 250 m <sup>2</sup>			
	<b>TFJ1.15</b>	Offshore substation foundation	Likely to be jacket on piles			
<b>Gravity Base Foundations</b>						
<b>Turbine Foundations</b>	<b>TFG1.1</b>	Area of foundation footprint (m <sup>2</sup> )	650-1400			
	<b>TFG1.2</b>	Foundation footprint diameter (m)	29-42			
	<b>TFG1.3</b>	Foundation footprint cross dimensions (cruciform option) (m)	30 – 40m by 5 - 7 m			

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	<b>TFG1.4</b>	Seabed preparation	Dredging in areas where loose sand or soft clay present at seabed plus gravel placement in area of dredging to provide a stable platform for foundation.			
	<b>TFG1.5</b>	Quantity of material dredged (m <sup>3</sup> ) (Maximum Case)	Total: 365,000m <sup>3</sup> Approximately 4,000m <sup>3</sup> average per foundation			
	<b>TFG1.6</b>	Disposal of dredged material	Dredged material will be disposed of at a licensed disposal area.			
	<b>TFG1.7</b>	Minimum gravel bed volume (m <sup>3</sup> )	530			
	<b>TFG1.8</b>	Maximum gravel bed volume (m <sup>3</sup> )	1850			
	<b>TFG1.9</b>	Depth of gravel bed	The gravel beds will be an average of 1.5 m deep.			
	<b>TFG1.10</b>	Extension of gravel bed beyond foundation perimeter	2 – 4 m			
	<b>TFG1.11</b>	Foundation material	The gravity base structure will be reinforced concrete. This will be filled with a ballast of sand which has been dredged from the turbine location in seabed preparation (if suitable) and sand/gravel which has been sourced from a licensed dredging area.			
	<b>TFG1.12</b>	Foundation installation duration (dredging) days	3-6			

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	<b>TFG1.13</b>	Foundation installation duration (placement and filling) days			4-6	
	<b>TFG1.14</b>	Foundation installation duration (scour protection) days			4-8	
	<b>TFG1.15</b>	Scour protection and footprint size (m)			Scour protection extends 5 - 8 m outside foundation perimeter.	
<b>Cables</b>						
<b>Inter-array cables</b>	<b>IAC1.1</b>	Length of cables (km)			75-120	
	<b>IAC1.2</b>	Design of array			Up to 15 circuits	
	<b>IAC1.3</b>	Cable specification- material			Cross Linked Polyethylene (XLPE) or Ethylene Propylene Rubber (EPR)	
	<b>IAC1.4</b>	Cable specification- AC or DC			AC Cable	
	<b>IAC1.5</b>	Cable specification- rated voltage			Up to 70 kV	
	<b>IAC1.6</b>	Cable specification- cross-sectional area (mm <sup>2</sup> )			120-630	
	<b>IAC1.7</b>	Burial method / scour protection			Currently unconfirmed, but likely plough/cutting/jetting or rock cover.	
	<b>IAC1.8</b>	Width of seabed affected (per cable)			2 m direct impact width, up to 8 m width of zone of minor disturbance (10 m in total).	
	<b>IAC1.9</b>	Burial depth (m)			Up to 3m	
	<b>IAC1.10</b>	Width of cable corridor			30 to 100 m	
<b>Export cables</b>	<b>EXC1.1</b>	Number of cables (No.)			2	
	<b>EXC1.2</b>	Cable route length (km)			33	

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	<b>EXC1.3</b>	Specification of cables	220 kV (Um 245 kV) 3-phase AC XLPE insulated			
	<b>EXC1.4</b>	Spacing between cables (m)	Minimum 70 m/ max 300 m. 3x water depth but no less than 70 m.			
	<b>EXC1.5</b>	Width of cable corridor (m)	300 m (150 m on either side of cable route centre line)			
	<b>EXC1.6</b>	Burial depth (m)	Up to 3m			
	<b>EXC1.7</b>	Burial method / scour protection	Currently unconfirmed, but likely plough/cutting/jetting or rock cover.			
	<b>EXC1.8</b>	Landing point	Thorntonloch			

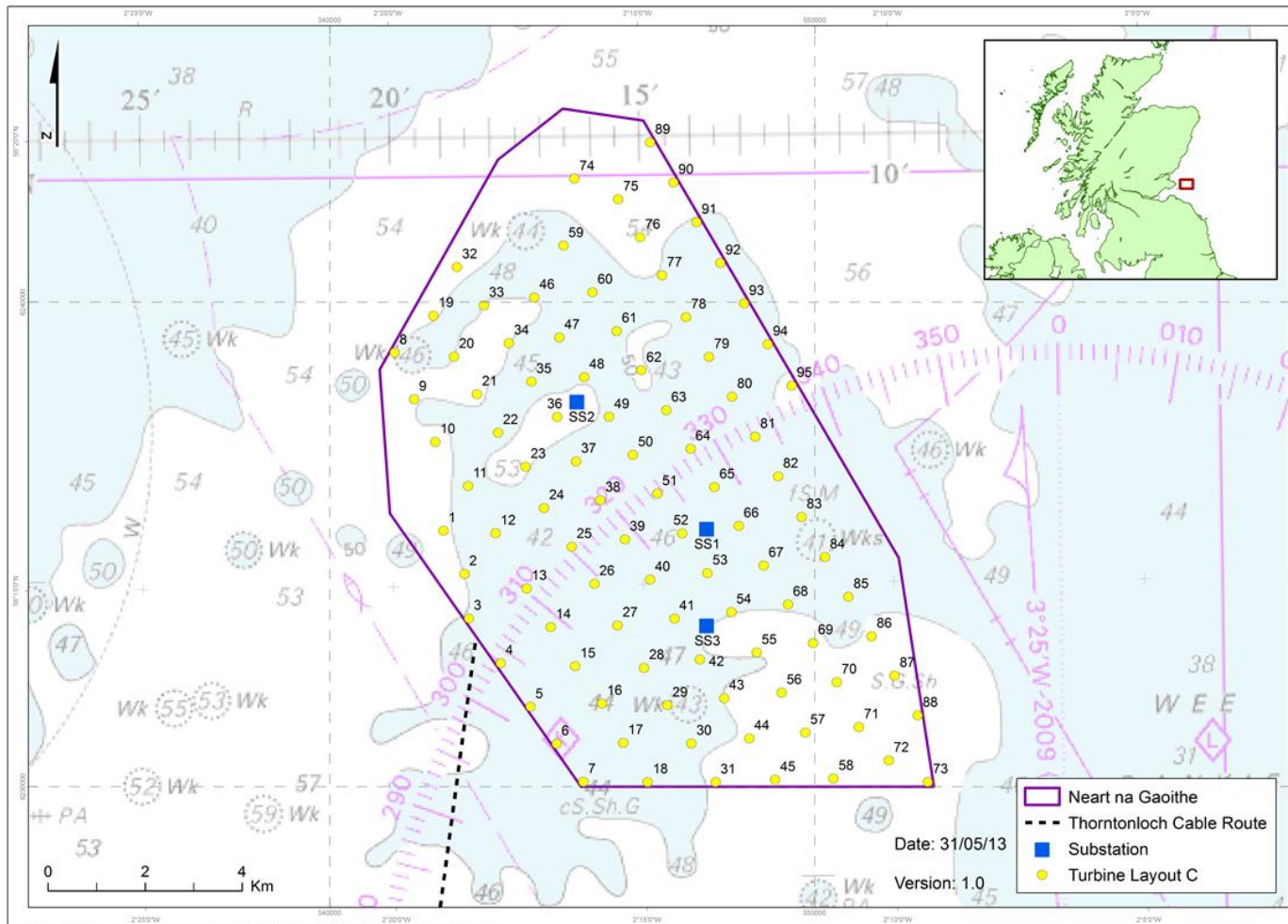


Figure 1: Indicative layout C, including indicative substation locations (maximum of 2 will be used).