

**Sunrise Wind - Appendix C: Project Design Envelope and
Maximum – Case Scenario**

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APPENDIX C: PROJECT DESIGN ENVELOPE AND MAXIMUM-CASE SCENARIO

C.1. Project Design Envelope

Sunrise Wind submitted a COP using the Project Designs Envelope (PDE) concept—which provides sufficiently detailed information within a reasonable range of parameters to analyze a “maximum-case scenario” (described below) within those parameters for each affected environmental resource. BOEM identified and verified that the maximum-case scenario based on the PDE provided by Sunrise Wind and analyzed in this final EIS could reasonably occur if approved. This approach is intended to provide flexibility for lessees and allow BOEM to analyze environmental impacts in a manner that minimizes the need for subsequent environmental and technical reviews as design changes occur.

This final EIS assesses the impacts of the reasonable range of Project designs described in the Sunrise Wind COP by using the maximum-case scenario process. The maximum-case scenario analyzes the aspects of each design parameter that would result in the greatest impact for each physical, biological, and socioeconomic resource. This final EIS considers the interrelationship among aspects of the PDE rather than simply viewing each design parameter independently. This final EIS also analyzes the planned action impacts of the maximum-case scenario alongside other reasonably foreseeable past, present, and future actions.

A summary of Sunrise Wind Project components is provided in Table C-1. Table C-2 details the full range of maximum-case design parameters for the proposed Project and which parameters are relevant to the analysis for each EIS section in Chapter 3, *Affected Environment and Environmental Consequences*.

Table C-1. Summary of Sunrise Wind Project Components

Sunrise Wind Farm (SRWF)	Foundations
	<ul style="list-style-type: none"> • Monopile foundations for the WTGs and a piled jacket foundation for the OCS–DC • Up to 95 foundations for WTGs and OCS–DC • Maximum embedment depth of up to 164 ft (50 meters [m]) for WTG monopile foundations, and 295 ft (90 m) for OCS–DC piled jacket foundations • Maximum area of seafloor footprint per foundation, inclusive of scour protection and CPS stabilization: 1.06 ac (4,290 m²) for WTG monopile foundations and 1.39 ac (5,625 m²) for the OCS–DC foundation structure.
	Wind Turbine Generators (WTGs)
	<ul style="list-style-type: none"> • Up to 94 WTGs within 102 potential positions • Nameplate capacity of 11 MW • Rotor diameter of 656 ft (200 m) • Hub height of 459 ft (140 m) above mean sea level (AMSL) • Upper blade tip height of 787 ft (240 m) AMSL

	Inter-array Cables (IAC)
	<ul style="list-style-type: none"> Maximum 161 kilovolt AC cables buried up to a target depth of 4 to 6 ft (1.2 to 1.8 m) Maximum total length of up to 180 mi (290 km) Maximum cable diameter of 8 inches (in; 200 millimeters [mm]) Maximum disturbance corridor width of 98 ft (30 m) per circuit
	Offshore Converter Station (OCS-DC)
	<ul style="list-style-type: none"> One OCS-DC Up to 361 ft (110.0 m) total structure height from lowest astronomical tide (LAT) (including lightning protection and ancillary structures)
SRWEC-OCS (Outer Continental Shelf waters) and SRWEC-NYS (New York State waters)	Sunrise Wind Export Cable (SRWEC)
	<ul style="list-style-type: none"> One 320-kV DC export cable bundle buried to a target depth of 4 to 6 ft (1.2 to 1.8 m); buried to a target depth of 6 ft (1.8 m) in NYS waters Maximum total corridor length of up to 104.6 mi (168.4 km) Maximum individual cable diameter of 7.8 in (200 mm) and maximum bundled diameter of 15.6 in (400 mm) Maximum bundled cable diameter of 15.8 (400mm) Maximum disturbance corridor width of 98 ft (30 m) Maximum seafloor disturbance for horizontal directional drilling (HDD) at exit pits of 61.8 ac (25 ha) Maximum disturbance for Landfall Work Area (onshore) of up to 6.5 ac (2.6 ha)
Onshore Facilities	Onshore Transmission Cable and Onshore Interconnection Cable
	<ul style="list-style-type: none"> Onshore Transmission Cable, including associated TJB and fiber optic cable, up to 17.5 mi (28.2 km) long, with a temporary disturbance corridor of 30 ft (9.1 m) and maximum duct bank target burial depth of 6 ft (1.8 m) Maximum cable diameter of 6 in (152 mm) Onshore Interconnection Cable to connect to Holbrook Substation
	Onshore Converter Station (OnCS-DC)
	<ul style="list-style-type: none"> An OnCS-DC with operational footprint of up to 6 ac (2.4 ha)

Source: Sunrise Wind 2023

in = inches, ft = feet, m = meters, ac = acres, m² = square meters, ha = hectares, mm = millimeters, mi = miles, km = kilometers, MW = Megawatts, kV = kilovolts, AMSL = above mean sea level, AC = alternating current, DC = direct current, SRWEC = Sunrise Wind Export Cable, SRWEC-OCS = Sunrise Wind Export Cable located in waters on the Outer Continental Shelf, SRWEC-NYS = Sunrise Wind Export Cable located in New York State waters, WTGs = wind turbine generators, OCS-DC = offshore converter station- direct current, OnCS-DC = onshore converter station- direct current

C.2. Maximum-Case Scenario

Table C-2. Maximum-Case Scenario of the Sunrise Wind Project Proposed Action

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
WIND FARM																				
Wind farm capacity (MW)	1,034	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WIND TURBINES																				
Parameters per Turbine																				
Minimum lower blade tip height (feet) (relative to AMSL)	131.2		X		X		X	X				X		X	X	X		X		
Maximum upper blade tip height (feet) (relative to AMSL)	787		X		X		X	X				X		X	X	X		X		
Maximum rotor diameter (feet)	656		X		X			X				X		X	X	X		X		
Parameters per Turbine Foundation (Monopiles)																				
Outer diameter at seabed of main tubular structure (feet)	39			X			X	X			X		X	X			X		X	
Sea surface diameter (feet)	23						X	X			X		X	X			X	X		
Scour protection (if required) diameter (feet) ¹	98			X	X		X				X		X	X			X		X	

¹ Monopile radius: 6 m (19.5 ft)

Scour Radius = 5x monopile radius = 30 m (98 ft)

Total footprint (monopile + scour) radius: 36 m (118 ft)

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Scour protection (if required) layer thickness (feet)	6.5			X	X		X				X		X	X			X		X	
Seabed structure area per monopile (acres)	0.03			X	X		X	X			X		X	X			X		X	
Seabed scour protection (if required) area per monopile (acres)	1.03			X	X		X	X			X		X	X			X		X	
Seabed permanent area affected per monopile (acres)	1.06			X	X		X	X			X		X	X			X		X	
Drill spoil volume per monopile (cubic yards)	N/A			X			X				X		X	X			X		X	
Scour protection (if required) volume per monopile (cubic yards)	9,240			X	X		X				X		X	X			X		X	
Pile structure grout volume per monopile (cubic yards)	N/A			X							X		X	X			X		X	
Seabed penetration (feet)	164			X			X	X			X		X	X			X		X	
Maximum hammer energy (kilojoules)	4,000		X	X	X		X				X		X	X			X		X	
Indicative continuous piling duration per turbine (hours)	Up to 12 (1-4 anticipated)		X	X	X		X				X		X	X			X		X	
Maximum Total Impacts for Wind Turbine Foundations																				
Maximum number of turbines	94 at 102 positions	X	X	X	X		X	X			X	X	X	X	X	X	X	X	X	X

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Total seabed structure area (acres)	108.12			X			X	X			X	X	X	X			X	X	X	
Total scour (if required) protection area (acres)	105.06			X	X		X				X		X	X			X		X	
Total permanent affected area (acres)	1.06			X	X		X	X			X		X	X			X	X	X	
Total drill spoil volume (cubic yards)	N/A			X			X				X		X	X			X		X	
Total scour (if required) protection volume (cubic yards) ²	942,480			X	X		X				X		X	X			X		X	
Total pile structure grout volume (cubic yards)	N/A			X							X		X	X			X		X	
OFFSHORE CONVERTER STATION																				
Topside Offshore Converter Station																				
Number of converter stations	1	X	X	X	X		X	X			X	X	X	X	X	X	X	X	X	
Length of topside main structure (feet)	253		X	X	X		X	X			X	X	X	X			X	X		
Width of topside main structure (feet)	171		X	X	X		X	X			X	X	X	X			X	X		
Length of topside main structure inclusive of ancillary structures (feet)	253		X		X		X	X			X	X	X	X			X	X		
Width of topside main structure inclusive of ancillary structures (feet)	171		X		X		X	X			X	X	X	X			X	X		

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Total structure height: including ancillary structures (feet) (relative to LAT)	295		X		X		X	X				X		X	X			X		
Bridge links link length (feet)	N/A											X		X				X		
Offshore Converter Station Foundations																				
Maximum number of structures	1	X	X	X	X		X	X			X	X	X	X	X	X	X	X	X	
Maximum scour protection (if required) dimension (yards) ²	1.06			X	X		X				X		X	X			X		X	
Maximum structure dimension at seabed (yards)	167 x 167			X	X		X	X			X		X	X			X		X	
Maximum structure dimension at sea surface (yards)	118 x 125						X	X			X		X	X			X		X	
Number of piles	8		X	X	X		X	X			X	X	X	X			X		X	
Seabed preparation area (acres) ³	37.6			X			X	X			X		X	X			X		X	
Seabed gravel bed area (acres)	1.4			X	X		X	X			X		X	X			X		X	
Seabed structure area (acres)	0.64			X			X	X			X		X	X			X		X	

² 1.06 acres (0.89 ac plus 0.17 ac) beyond footprint of OCS-DC: Scour protection at the OCS-DC foundation would extend beyond the foundation footprint by up to 20 m in each direction (0.89 acres), additional CPS stabilization at the OCS-DC for up to 15 IACs and the SRWEC where each is pulled into the foundation would extend out to 5 m beyond the scour protection and would be 12 m wide and an additional 0.17 acres.

³ Includes temporary seafloor preparation area plus permanent foundation footprint. The 220-m radius equates to 37.6 acres per foundation; the area of seafloor preparation only that surrounds the maximum permanent footprint of the foundation, scour protection, and CPS stabilization is approximately 36.5 acres per WTG foundation (37.6- 1.06 acres)

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Seabed scour protection (if required) area (acres)	0.61			X	X		X				X		X	X			X		X	
Seabed total permanent area (acres)	1.39			X	X		X	X			X		X	X			X		X	
Drill spoil volume (average; assumes 10% drilling) (cubic yards)	TBD			X			X				X		X	X			X		X	
Scour protection (if required) volume (cubic yards)	5,131			X	X		X				X		X	X			X		X	
Pile-structure grout volume (cubic yards) ⁹	TBD			X							X		X	X			X		X	
Piled Jacket Foundations for Offshore Converter Station																				
Number of legs per foundation	4		X	X	X		X	X			X		X	X			X		X	
Number of piles per foundation (4 piles per corner)	8		X	X	X		X	X			X		X	X			X		X	
Separation of adjacent legs at seabed (feet)	167 x 167			X			X				X		X	X			X			
Separation of adjacent legs at sea surface(feet)	118 x 125						X						X	X			X			
Height of platform above MHHW (feet)	88							X						X				X		
Jacket leg diameter (feet)	8			X			X	X			X		X	X			X		X	
Pin pile outer diameter at seabed (feet)	8			X			X	X			X		X	X			X		X	
Mud-mat area (square feet)	39 x 39			X			X	X			X		X	X			X		X	

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Embedment depth (below seabed) (feet)	295			X			X	X			X		X	X			X			
Maximum hammer energy (kilojoule)	4,000		X	X	X		X				X		X	X			X		X	
Maximum piling duration per foundation (days) ¹⁰	3		X	X	X		X				X		X	X			X		X	
Indicative continuous piling duration per pile (hours) ¹⁰	6		X	X	X		X				X		X	X			X		X	
ARRAY CABLES																				
Cable diameter (inches)	8			X				X			X	X	X	X	X		X		X	
Estimated total length of cable (miles)	180	X		X			X	X			X	X	X	X	X		X		X	
Typical voltage (kV)	66			X			X				X	X	X	X			X			
Maximum voltage (kV)	161			X			X				X	X	X	X			X			
Target burial depth (feet) (final burial depth based on CBRA)	4 to 6			X			X	X			X	X	X	X	X		X		X	
Cable separation: typical (feet)	328			X			X				X	X	X	X			X			
Offshore Cable disturbance corridor width (feet)	98			X			X	X			X	X	X	X	X		X		X	
Maximum Total Impacts for Array Cables																				
Full corridor width seabed disturbance (acres)	2,150			X			X	X			X		X	X			X		X	
Boulder clearance: seabed disturbance (acres)	215			X			X	X			X		X	X			X		X	

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Sand wave clearance: seabed disturbance (acres)	107.5			X			X	X			X		X	X			X		X	
Sand wave clearance: material volume (cubic yards) ¹¹	TBD			X			X	X			X		X	X			X		X	
Burial spoil: jetting/plowing/control flow excavation material volume (cubic yards) ⁹	TBD			X			X				X		X	X			X		X	
Percent of cable requiring protection	15%			X			X				X		X	X			X		X	
Cable protection area (acres)	129			X			X	X			X		X	X			X		X	
Cable protection volume (cubic yards) ¹²	208,120			X			X				X		X	X			X		X	
Cable/pipe crossings: pre- and post-lay rock berm area (acres)	10.36			X			X				X		X	X			X		X	
Cable/pipe crossings: pre- and post-lay rock berm volume (cubic yards) ¹²	16,714			X			X				X		X	X			X		X	
OFFSHORE EXPORT CABLE																				
Offshore export cable diameter (inches)	7.8 in for individual cables and 15.6 in for bundled cable			X				X			X		X	X			X		X	

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Typical export cable voltage (kV)	±320 DC "voltage per circuit"			X			X				X		X	X			X			
Cable seabed disturbance width per cable (feet)	98			X			X	X			X		X	X			X		X	
Target burial depth (feet)	4 to 6			X			X	X			X		X	X			X		X	
Maximum Total Impacts for Offshore Export Cables																				
Number of cable sections per cable	up to 5			X							X		X	X			X			
Number of cable joints	up to 4 per cable			X							X		X	X			X			
Offshore cables	2 cables bundled together with a fiber optic cable			X			X	X			X		X	X			X		X	
Length of offshore export cable route (miles) ¹³	104.6	X		X			X	X			X		X	X	X	X	X		X	
Length of offshore export cable (miles) (2 cables within corridor)	211	X		X			X	X			X		X	X	X	X	X		X	
Full corridor width seabed disturbance (acres)	1,242			X			X	X			X		X	X			X		X	
Boulder clearance: seabed disturbance (acres)	81.5			X			X	X			X		X	X			X		X	
Sand wave clearance: seabed disturbance (acres)	118.5			X			X	X			X		X	X			X		X	

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Sand wave clearance: material volume (cubic yards) ¹⁴	71,521			X			X	X			X		X	X			X		X	
Burial spoil: vertical injection material volume (cubic yards) ⁹	TBD			X			X				X		X	X			X		X	
Burial spoil: plowing/control flow excavation material volume (cubic yards) ⁹	TBD			X			X				X		X	X			X		X	
Cable protection area (acres) ¹⁵	25.2			X	X		X	X			X		X	X			X		X	
Cable protection volume (cubic yards)	40,656			X	X		X	X			X		X	X			X		X	
Percent of cable requiring protection	5%			X	X		X				X		X	X			X		X	
Cable/pipe crossings: pre- and post-lay rock berm area (acres)	13.3			X			X				X		X	X			X		X	
Cable/pipe crossings: pre- and post-lay rock berm volume (cubic yards) ¹²	21,457			X			X				X		X	X			X		X	
WIND TURBINE VESSEL TRIPS																				
Wind Turbine Foundation Installation – Maximum Number of Simultaneous Vessels																				
Scour Protection Vessel	1	X	X	X	X		X				X		X	X	X		X		X	
Installation Vessel	2	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels ¹⁶	6	X	X	X	X		X				X		X	X	X		X		X	
Transport / Feeder Vessels (including tugs)	4	X	X	X	X		X				X		X	X	X		X		X	

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- of which are anchored	0	X	X	X	X		X				X		X	X	X		X		X	
Wind Turbine Foundation Installation – Maximum Number of Trips per Vessel Type																				
Scour Protection Vessel	4	X	X	X	X		X				X		X	X	X		X		X	
Installation Vessel	5	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels	15	X	X	X	X		X				X		X	X	X	X	X		X	
Transport / Feeder Vessels (including tugs)	102	X	X	X	X		X				X		X	X	X	X	X		X	
- of which are anchored	0	X	X	X	X		X				X		X	X	X		X		X	
Structure Installation – Maximum Number of Simultaneous Vessels																				
Installation Vessels	1	X	X	X	X		X				X		X	X	X		X		X	
Transport Vessels	3	X	X	X	X		X				X		X	X	X		X		X	
Other Support Vessels	2	X	X	X	X		X				X		X	X	X		X		X	
Structure Installation – Maximum Number of Trips per Vessel Type																				
Installation Vessels	26	X	X	X	X		X				X		X	X	X		X		X	
Transport Vessels	420	X	X	X	X		X				X		X	X	X		X		X	
Other Support Vessels	9	X	X	X	X		X				X		X	X	X	X	X		X	
VESSLS REQUIRED FOR OFFSHORE CONVERTER STATION INSTALLATION																				
Maximum Design Parameters																				
Primary Installation Vessels	2	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels	11	X	X	X	X		X				X		X	X	X		X		X	
Transport Vessels	2	X	X	X	X		X				X		X	X	X		X		X	

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Maximum Duration (days)	48	X	X	X	X		X				X		X	X	X		X		X	
Maximum Return Trips per Vessel Type																				
Primary Installation Vessels	0	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels	5	X	X	X	X		X				X		X	X	X		X		X	
Transport Vessels	0	X	X	X	X		X				X		X	X	X		X		X	
VESSELS REQUIRED FOR ARRAY CABLE INSTALLATION																				
Maximum Number of Simultaneous Vessels																				
Main Laying Vessels	3	X	X	X	X		X				X		X	X	X		X		X	
Main Burial Vessels	2	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels	27	X	X	X	X		X				X		X	X	X		X		X	
Maximum Number of Return Trips per Vessel Type																				
Main Laying Vessels	3	X	X	X	X		X				X		X	X	X		X		X	
Main Burial Vessels	3	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels	5	X	X	X	X		X				X		X	X	X		X		X	
Duration per cable section (days)	TBD	X	X	X	X		X				X		X	X	X		X		X	
Total Duration (months)	TBD	X	X	X	X		X				X		X	X	X		X		X	
VESSELS REQUIRED FOR OFFSHORE EXPORT CABLE INSTALLATION																				
Maximum Design Parameters																				
Main Cable Laying Vessels	3	X	X	X	X		X				X		X	X	X		X		X	
Main Cable Jointing Vessels	2	X	X	X	X		X				X		X	X	X		X		X	
Main Cable Burial Vessels	2	X	X	X	X		X				X		X	X	X		X		X	

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Support Vessels	31	X	X	X	X		X				X		X	X	X		X		X	
Maximum Number of Return Trips per Vessel Type																				
Main Cable Laying Vessels	2	X	X	X	X		X				X		X	X	X		X		X	
Main Cable Jointing Vessels	1	X	X	X	X		X				X		X	X	X		X		X	
Main Cable Burial Vessels	2	X	X	X	X		X				X		X	X	X		X		X	
Support Vessels	5	X	X	X	X		X				X		X	X	X		X		X	
Duration per cable section (days)	TBD	X	X	X	X		X				X		X	X	X		X		X	
Typical Duration (months)	TBD	X	X	X	X		X				X		X	X	X		X		X	
REQUIRED FOR ALL CONSTRUCTION ACTIVITIES																				
Maximum Design Parameters																				
Helicopter	2	X	X		X								X	X	X		X			
Maximum Number of Return Trips per Vessel Type																				
Helicopter	350	X	X		X								X	X	X		X			

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
TOTAL PROJECT OFFSHORE SURVEYS OF FOUNDATIONS, BATHYMETRY, SCOUR PROTECTION AND CABLE BURIAL																				
All Offshore Facilities: Seabed Surveys: for Bathymetry, Cable Burial Depth, Scour during Project lifetime (events) ¹⁷	4 DOB campaigns / lifetime; 13 bathymetric campaigns / lifetime; 4 add-hoc surveys after extraordinary events estimated (after repairs or weather events)		X	X	X		X				X		X	X			X		X	
OFFSHORE FOUNDATION OPERATION AND MAINTENANCE ACTIVITIES																				
Wind Turbine Foundations																				
Repainting (events)	5 per foundation			X			X						X	X			X		X	
Cleaning (guano removal) (events) ¹⁸	1 per year			X			X						X	X			X		X	
Access Ladder Replacement (events)	N/A			X			X						X	X			X			
Anode Replacement (events)	1 per foundation			X			X				X		X	X			X			
J-tube Replacement (events)	0			X			X				X		X	X			X			

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Concrete Crack Repairs (events)	1.5 per foundation			X			X						X	X			X		X	
Offshore Converter Station																				
Repainting (events)	4 major per foundation; 2 minor per foundation			X			X				X		X	X			X		X	
Cleaning (guano removal) (events) ¹⁸	1 per year			X			X				X		X	X			X		X	
Access Ladder Replacement (events)	N/A			X			X				X		X	X			X			
Anode Replacement (events)	0.01 per foundation			X			X				X		X	X			X			
J-tube Replacement (events)	1 per foundation			X			X				X		X	X			X			
TOTAL WTG OPERATION AND MAINTENANCE ACTIVITIES																				
WTGs: Major Component Replacement (events)	5.5 per WTG (no heavy lift vessel); 0.6 per WTG (with heavy lift vessel)			X			X				X		X	X			X		X	
TOTAL PROJECT OCS OPERATION AND MAINTENANCE ACTIVITIES																				
OSS: Major Faults/Component Replacements (events) ¹⁹	14			X			X				X		X	X			X		X	

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
TOTAL PROJECT OFFSHORE CABLE OPERATION AND MAINTENANCE ACTIVITIES																				
Array Cable																				
Remedial Burial for the life of the Project (miles)	4 to 8			X			X	X			X		X	X			X		X	
Jetting Remedial Burial: Length per event (miles)	1.5 to 2.5			X			X	X			X		X	X			X		X	
Jetting Remedial Burial: Width per event (feet)	36			X			X	X			X		X	X			X		X	
Jetting Remedial Burial: Seabed disturbance area (acres per event)	10			X			X	X			X		X	X			X		X	
Cable Faults (number of events)	6 to 8			X			X				X		X	X			X		X	
Cable Faults: Seabed disturbance area per event (acres)	4 to 6			X			X	X			X		X	X			X		X	
Cable Faults: Rock berm area per event (acres)	0.015			X			X				X		X	X			X		X	
Cable Faults: Rock berm volume per event (cubic yards)	80			X			X				X		X	X			X		X	
Offshore Export Cables																				
Jetting Remedial Burial: Length per event (miles)	1.5			X			X	X			X		X	X			X		X	
Jetting Remedial Burial: Width per event (feet)	36			X			X	X			X		X	X			X		X	

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Jetting Remedial Burial: Seabed disturbance area (acres per event)	6			X			X	X			X		X	X			X		X	
Cable Faults: Seabed disturbance area per event (acres)	2.5			X			X	X			X		X	X			X		X	
Cable Faults: Rock berm area per event (acres)	0.03			X			X				X		X	X			X		X	
Cable Faults: Rock berm volume per event (cubic yards)	160			X			X				X		X	X			X		X	
OFFSHORE OPERATION AND MAINTENANCE VESSEL SUMMARY OF MAXIMUM ANNUAL VISITS																				
Helicopter, crew transfer vessels (CTV), or service operation vessels (SOV)	1 SOV with Daughter craft; 1 offshore based CTV	X	X	X	X		X				X		X	X	X	X	X		X	
Jack-Up Vessels ²⁰	0	X	X	X	X		X				X		X	X	X	X	X		X	
Crew Vessels	N/A	X	X	X	X		X				X		X	X	X	X	X		X	
Supply Vessels	N/A	X	X	X	X		X				X		X	X	X	X	X		X	
OPERATIONS JACK-UP AND ANCHORED VESSEL PARAMETERS																				
Number of jack-up vessel legs ²¹	4 or 6			X			X				X		X	X			X		X	

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Area of each leg base at the seabed (square feet) ²²	4-legs: 1,850 sq ft per spudcan 6-legs: 1,027 sq ft per spudcan			X			X				X		X	X			X		X	
Anchored vessel: anchor dimensions (feet)	9 x 9			X			X				X		X	X			X		X	
Anchored vessel: number of anchors per vessel	2 to 7			X			X				X		X	X			X		X	
ONSHORE EXPORT CABLE PARAMETERS²³																				
Type of cable	Single conductor HVDC											X								
Diameter of cable (inches)	6					X		X				X								
Diameter of cable ducts (inches)	8					X		X				X								
Maximum voltage (kV)	±320					X						X								
Minimum depth of cover (feet)	3-5					X		X				X								
Onshore Construction Areas and Volumes																				
Length of onshore transmission cable route (miles)	17.5	X	X		X	X		X	X	X		X			X	X			X	X
Cable trenches	1					X		X	X	X		X			X	X		X	X	X

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Total transmission onshore cables	1 duct bank system consisting of 2 HVDC cables and 2 fiber optic cables		X		X	X		X				X						X	X	X
Corridor width: permanent (feet)	5 to 20		X		X	X		X				X						X	X	X
Corridor width: temporary and permanent used for construction (feet)	30		X		X	X		X	X	X		X			X	X		X	X	X
Corridor area: permanent (acres) ²⁶	TBD		X		X	X		X				X							X	X
Corridor area: temporary and permanent used for construction (acres) ²⁷	TBD	X	X		X	X		X	X	X		X			X	X			X	X
Number of joint bays and splice vaults/grounding link boxes	Approximately 35 splice vaults which would include joint bays and grounding link boxes					X						X						X	X	X
Joint bays total area (acres)	0.35		X		X	X		X				X							X	X
Joint bays spoil volume per pit (cubic yards)	200					X						X							X	X

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
Joint bays spoil total volume (cubic yards)	7,000					X						X							X	X
ONSHORE CONVERTER STATION PARAMETERS²³																				
Onshore Converter Station																				
Permanent site area (acres)	6	X	X		X	X		X	X	X		X			X	X			X	X
Temporary construction workspace (acres) ²⁵	7	X	X		X	X		X	X	X		X			X	X			X	X
Main building length (feet)	250		X		X	X		X				X						X		
Main building width (feet)	165		X		X	X		X				X						X		
Main building area (acres)	0.85		X		X	X		X				X						X	X	
Main building height (feet)	65		X		X			X				X						X		
Maximum secondary building(s) length (feet)	212		X		X	X		X				X						X		
Maximum secondary building(s) width (feet)	50		X		X	X		X				X						X		
Secondary building(s) height (feet)	20		X		X			X				X						X		
Fire-wall height (feet) ⁹	25		X		X			X				X								
Number of lightning masts	22		X		X	X		X				X						X		
Lightning protection height (feet)	100		X		X			X				X						X		
Power mast infrastructure height (feet)	N/A		X		X			X				X						X		
Transformer height (feet)	24		X		X			X				X						X		

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
High-voltage reactor height (feet)	31		X		X			X				X						X		
SVC/Statcom height (feet)	N/A		X		X			X				X						X		
Harmonic filter height (feet) ⁹	8		X		X			X				X						X		
Bus duct height (feet) ⁹	42		X		X			X				X						X		
Other auxiliary equipment height (feet)	N/A		X		X			X				X						X		
ONSHORE INTERCONNECTION LINE PARAMETERS																				
Maximum Length of onshore interconnection cable route (miles)	1	X	X		X	X		X	X	X		X			X	X			X	X
Number of poles	N/A		X		X	X		X				X						X	X	X
Maximum pole height (feet)	N/A		X		X			X				X				X		X		
LANDFALL PARAMETERS																				
Landfall type	HDD			X		X			X	X		X			X	X		X	X	X
HDD noise (decibels)	100		X		X	X			X	X		X				X				
Number of personnel	<30		X		X	X			X	X		X							X	
Daily vehicle movements (non-HGV)	10	X	X		X	X						X								
Daily vehicle movements (HGV)	5	X	X		X	X						X								
Inadvertent return contingency vehicles	3		X		X	X						X								
HDD exit pit depth (feet)	16					X		X				X								

Design Parameter	Maximum Design Parameters	Air Quality	Bats	Benthic Resources	Birds	Coastal Habitat and Fauna	Commercial Fisheries and For-Hire Recreational Fishing	Cultural Resources	Demographics, Employment, and Economics	Environmental Justice	Finfish, Invertebrates, and Essential Fish Habitat	Land Use and Coastal Infrastructure	Marine Mammals	Navigation and Vessel Traffic	Other Uses (Marine Minerals, Military Use, Aviation)	Recreation and Tourism	Sea Turtles	Scenic and Visual Resources	Water Quality	Wetlands
HDD exit pit (acres)	0.18					X		X				X							X	X
HDD onshore workspace (acres)	6.5		X		X	X		X				X							X	X
TJB depth (feet)	10					X		X				X						X		
TJB area (acres)	0.03					X		X				X							X	X
TJB workspace (acres)	<1		X		X	X		X				X							X	X
Number of TJBs	1					X	X	X				X						X	X	X

Notes:

N/A = not applicable; TBD = to be determined

- ¹ With the selection of the 11 MW turbine and additional confirmation of the export capacity of the DC transmission system and the interconnection capacity limits at the Holbrook substation, Sunrise Wind has determined that up to 94 WTGs would be sufficient to meet the Project purpose. 102 WTG turbine locations are proposed to be permitted to allow for spare positions (in the event of environmental or engineering challenges), but only up to 94 WTGs are expected to be installed. The up to 94 WTGs within 102 potential WTG positions are a reduction in the initially evaluated PDE for the Project.
- ² Assumes 5 times radius of monopile and 1 m height average.
- ³ Inclusive of ancillary structures.
- ⁴ Indicates total structure height from lowest astronomical tide and includes lighting and ancillary structures.
- ⁵ One foundation with 4 legs.
- ⁶ Assumes scour protection at the OCS-DC foundation would extend beyond the foundation footprint by up to 20 m in each direction (0.89 acres); additional cable protection system (CPS) stabilization at the OCS-DC for up to 15 IACs and the SRWEC where each is pulled into the foundation would extend out to 5 m beyond the scour protection and would be 12 m wide and an additional 0.17 acres.
- ⁷ Includes temporary seafloor preparation area plus permanent foundation footprint. The 220-m radius equates to 37.6 acres per foundation; the area of seafloor preparation only that surrounds the maximum permanent footprint of the foundation, scour protection, and CPS stabilization is approximately 36.5 acres per WTG foundation (37.6 - 1.06 acres).

- ⁸ Drilling is not anticipated but is a contingency option. Drill spoil volume unknown.
- ⁹ Design is not mature enough at this stage to provide an estimate.
- ¹⁰ Data from Petition for Incidental Take Regulations for the Construction and Operation of the Sunrise Wind Offshore Wind Farm (April 2022).
- ¹¹ No sandwave leveling is currently anticipated along the IACs. The 5% indicated in the COP was included as a conservative estimate.
- ¹² Assumes 1-ft thickness; not inclusive of CPS stabilization associated with foundations, nor the cable crossing protection for crossing existing cables.
- ¹³ Includes federal (99.4 mi) and state waters (5.4 mi).
- ¹⁴ Anticipated to occur within select portions of up to 4.9 mi of the SRWEC-NYS (clearing 56,684 cy) and within four distinct segments (comprising 12.3 mi) of the SRWEC-OCS (clearing 14,837 cy).
- ¹⁵ Assume cable protection will be required for 5% of length (secondary cable protection of 1.5 ac for SRWEC-NYS and 23.7 ac for SRWEC-OCS); includes cable protection needed for jointing, and areas where additional cable protection may be required post-installation.
- ¹⁶ Assumes 1 completion vessel, 1 noise mitigation vessel, 4 protected species observer (PSO) vessels.
- ¹⁷ Anticipated based on permitting requirements.
- ¹⁸ No distinct campaigns planned but would be included with annual service of foundations.
- ¹⁹ All expected to be handled with standard logistics, no heavy lift vessel required.
- ²⁰ Individual jack-up vessel would be chartered for individual events or annual campaigns.
- ²¹ Depends on market availability.
- ²² Values based on 4-legs for Charybdis and 6-legs for Wind Osprey and Wind Orca.
- ²³ All values, dimensions, and totals are approximate and subject to change pending final engineering design of the Project.
- ²⁴ The onshore interconnection cable would be installed underground.
- ²⁵ Total area disturbed during construction would be 7 acres, with the operations site area within 6 of those acres.
- ²⁶ The total acres associated with the permanent operation ROW will be available if needed following execution of all landowner easement agreements.
- ²⁷ The acres associated with the total construction workspace will be available if needed following final site design and development of a limit of disturbance.