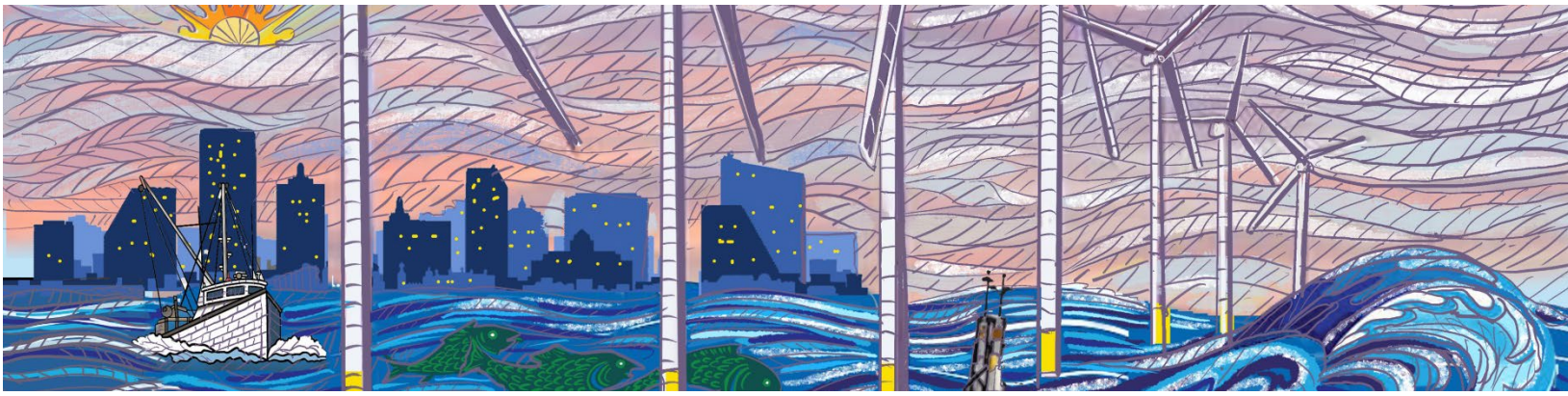

Appendix I-G

Submarine Export and Onshore Interconnection Cable Routes Determination

May 2024

EDR

Memorandum

To:	Kyle Hilberg, Atlantic Shores Permitting Lead – South
From:	Scott McBurney, Senior Project Manager, Wetlands Service Leader
Date:	July 29, 2022 Revised, September 13, 2022 Revised, March 7, 2023
Reference:	Submarine Export and Onshore Interconnection Cable Routes Determination Summary for Lease Area OCS-A 0499 (South)

On behalf of Atlantic Shores Offshore Wind, LLC (Atlantic Shores), EDR has developed this memorandum to document the evolution of the proposed submarine export and onshore interconnection cable routes for Lease Area OCS-A 0499. Information and results from the preliminary routing analysis, windshield surveys, and constructability reports were used to develop this summary of the alternatives that were considered in determining the currently proposed landfall locations, onshore interconnection cable route options, and submarine export cable route options.

This memorandum was originally developed in July 2022 and submitted to the Bureau of Ocean Energy Management (BOEM), revised in September 2022 to address BOEM and USACE comments, and revised in March 2023.

The following sections summarize the development process of the landfall locations, onshore interconnection cable routes, and submarine export cable routes within New Jersey and New York.

Landfall Locations and Onshore Interconnection Cable Routes

As an initial step to determine potential locations for the landfall sites and onshore interconnection cable routes, Atlantic Shores conducted a preliminary routing analysis.

Preliminary Routing Analysis

The analysis for landfall locations and onshore interconnection routes identified and analyzed development constraints and opportunities within the study area to determine potential landfall location and onshore interconnection cable route options to various points of interconnection (POI) along the coastline of New Jersey and New York. The POIs included in this analysis included the following:

- BL England – Cape May County, New Jersey
- Cardiff – Atlantic County, New Jersey
- Lewis – Atlantic County, New Jersey
- Oyster Creek – Ocean County, New Jersey
- Larrabee – Monmouth County, New Jersey
- Fresh Kills – Staten Island, New York
- Gowanus – Brooklyn, New York.

A desktop evaluation of the study area was conducted using aerial photography, publicly available Geographic Information Systems environmental data, and staff knowledge to identify potential landfall locations and onshore interconnection cable route options to the POIs. The following opportunities and constraints were evaluated:

- Threatened, endangered or otherwise protected species and habitat
- Wetlands, waterbodies, and floodways
- Historic and archaeological features
- Land use (residential, commercial, agricultural, etc.)
- Parks and recreation areas
- Federal and state lands
- Railroads and highways
- Communication infrastructure
- Existing transmission line and pipeline corridors
- Soils
- Length of transmission line
- Width of potential transmission line corridor
- Number of major-minor angles

The following potential landfall locations were also evaluated based specific engineering criteria for feasibility:

- **Location**. Areas within approximately [redacted] meters (m) ([redacted] feet [ft]) of the coastline (maximum distance for horizontal directional drilling to be able to reach beyond the toe-of-slope of the beach).
- **Size**. Cable landfall area (transition between submarine cable and onshore cable) of [redacted] m by [redacted] m ([redacted] by [redacted] ft) in size.
- **Infrastructure**. Areas that were either undeveloped or surface development (i.e., parking lots).

The initial screening for potential landfall locations resulted in the identification of 15 sites. Table 1 summarizes each landfall, the intended POI, and size of each property. Landfall locations from the preliminary routing analysis are illustrated on Figure 1.

Table 1. Potential Landfall Locations

Landfall ID	Likely Interconnection	Public/Private	Approximate Parcel Size (acres)
[redacted]	Gowanus, Narrows	Public	179
[redacted]	Gowanus, Narrows	Public	9
[redacted]	Gowanus	Private	3.5
[redacted]	Narrows	Private	7
[redacted]	Fresh Kills	Public	131
[redacted]	Larrabee, Fresh Kills	Private	<1
[redacted]	Larrabee, Oyster Creek	Public	164

Landfall ID	Likely Interconnection	Public/Private	Approximate Parcel Size (acres)
[redacted]	Larrabee, Oyster Creek	Public	2,200
[redacted]	Larrabee, Oyster Creek	Private	2
[redacted]	Larrabee, Oyster Creek	Private	<1
[redacted]	Larrabee, Oyster Creek	Private	3
[redacted]	Cardiff, Lewis	Private	<1
[redacted]	Cardiff, Lewis	Public	143
[redacted]	Cardiff, Lewis	Private	2
[redacted]	BL England	Public	42

A total of 22 onshore interconnection cable route options were identified (see Figure 1) extending from the landfall sites to the POIs under consideration. Table 2 provides a summary of the analysis criteria used to evaluate the 22 onshore interconnection cable routes identified in the original analysis.

Table 2. Summary of Preliminary Onshore Routes

POI	Length (mi)	No. Hard Angle	Ecological Constraints	Land Use (Approximate Linear Distance) (mi)					Rationale for Elimination
				Residential	Commercial	Roadway	Utility ROW	Railroad	
Gowanus	14	2	Tidelands, wetlands	-	2	12	-	-	Length of cable crossing commercial land, length of route in limited access highways
Narrows	13	5	Tidelands, wetlands	-	1	12	-	-	Length of cable crossing commercial land, length of route in limited access highways
Gowanus	6	2	Tidelands	-	2	4	-	-	Length of cable crossing commercial land, limited access highways
Narrows	5	3	Tidelands	-	1	4	-	-	Length of cable crossing commercial land, limited access highways
Fresh Kills	8	8	T&E species presence, tidelands, wetlands	2	-	6	-	-	**Route selected for Windshield Study**
Fresh Kills	48	22	T&E species presence, wetlands	1.5	-	-	46.5	-	Overall length of route, number of hard angles
Larrabee	15	4	T&E species presence, tidelands, wetlands	3.25	-	12	0.25	-	Overall length of route, Length of route in roadways and residential land
Larrabee	12	13	T&E species presence, tidelands, wetlands	1	-	6.25	4.75	-	**Route selected for Windshield Study**
Larrabee	23.5	11	T&E species presence, tidelands, wetlands	3	-	7	13.5	-	Overall length of route, length of route in residential land
Oyster Creek	23	9	T&E species presence, tidelands, wetlands, SAV	3	-	7.25	12.75	-	Elimination of the POI from consideration (to be used by other developer), overall length of route, length of route crossing residential land uses, presence of SAV
Oyster Creek	24	4	T&E species presence, tidelands, wetlands, SAV	9	-	15	-	-	Elimination of the POI from consideration (to be used by other developer), overall length of route, length of route crossing

POI	Length (mi)	No. Hard Angle	Ecological Constraints	Land Use (Approximate Linear Distance) (mi)					Rationale for Elimination
				Residential	Commercial	Roadway	Utility ROW	Railroad	
									residential land uses, presence of SAV
Oyster Creek	28	26	T&E species presence, tidelands, wetlands, SAV	9.5	-	6.25	12.25	-	Elimination of the POI from consideration (to be used by other developer), overall length of route, length of route crossing residential land uses, number of hard angles, presence of SAV
Oyster Creek	28.5	26	T&E species presence, tidelands, wetlands, SAV	10	-	6.25	12.25	-	Elimination of the POI from consideration (to be used by other developer), overall length of route, length of route crossing residential land, number of hard angles, presence of SAV
Lewis	8	3	T&E species presence, tidelands, wetlands	3	-	3	2	-	Limited available capacity at POI, length of route in residential land
Lewis	7	1	T&E species presence, tidelands, wetlands	-	-	7	-	-	Limited available capacity at POI, infeasible to use AC Expressway
Cardiff	13	6	T&E species presence, tidelands, wetlands	3	-	3	7	-	Length of route in residential land
Cardiff	12	3	T&E species presence, tidelands, wetlands	-	-	7	5	-	**Route selected for Windshield Study**
Cardiff	13	1	T&E species presence, tidelands, wetlands	0.5	-	11.5	1	-	Length of route in roadways, required use of existing Atlantic City Electric transmission corridor
BL England	7	5	T&E species presence, tidelands, wetlands	5	-	2	-	-	Elimination of the POI from consideration (to be used by other developer), length of route crossing residential land
BL England	8	5	T&E species presence, tidelands, wetlands	3	-	2.5	-	2.5	Elimination of the POI from consideration (to be used by other developer), length of route crossing residential land

POI	Length (mi)	No. Hard Angle	Ecological Constraints	Land Use (Approximate Linear Distance) (mi)					Rationale for Elimination
				Residential	Commercial	Roadway	Utility ROW	Railroad	
BL England	11	5	T&E species presence, tidelands, wetlands	1	-	3	3	4	Elimination of the POI from consideration (to be used by other developer)
BL England	9.5	8	T&E species presence, tidelands, wetlands	-	-	1.5	-	8	Elimination of the POI from consideration (to be used by other developer)

Criteria that were weighted heavily in the identification of onshore interconnection cable route options included the length of the transmission line, number of hard route angles, and use of established rights-of-way (ROWs). Shorter routes had a lower number of hard route angles. Used existing transportation, railroad, or transmission line corridors with minimal siting within residential areas were preferable over routes that were longer, generally had more hard route angles, and were sited with longer distances within residential areas.

Of the routes listed in Table 2, six were identified as "preferred" based on the desktop evaluation. However, three of the six routes were eliminated for additional reasons beyond physical siting constraints. Routes leading to the Oyster Creek and BL England POIs were eliminated from consideration based on competition among other developers. Additionally, the Lewis POI was eliminated from consideration due to its inability to accommodate the amount of energy input that would result from the Atlantic Shores Offshore Wind Project and cost for upgrades. As a result of the analysis, three potentially feasible onshore interconnection cable route options were identified, each one leading to a different POI (Fresh Kills, Larrabee, and Cardiff).

Windshield Surveys

Once the three potentially feasible routes were identified, windshield surveys were conducted by Atlantic Shores in December 2019 and April 2020 in order to ground-truth the desktop work from the Preliminary Routing Assessment and identify additional routing constraints. A summary of the number of routes, POI substations, and landfall locations evaluated in the windshield survey are provided in Table 3.

Table 3. Windshield Survey POI Routes and Landfall Locations

Number of Routes Evaluated	POI	Landfall ID
1	Fresh Kills Substation	[redacted]
1	Larrabee Substation	7- Army National Guard Facility
2[a]	Cardiff Substation	[redacted]

a) A windshield survey was conducted for an alternative route to the Cardiff POI due to its proximity to the preferred route.

The windshield surveys for a given cable route started at the potential landfall location, then followed the preliminary onshore interconnection cable route from public roadways to the extent practicable, then concluded in the vicinity of the POI substation. When the route could not be viewed from public roadways, brief stops were made at publicly accessible vantage points that intersected the route to evaluate the route option and photo document as necessary. Constraints were identified along all four routes surveyed during the windshield surveys. The most common constraints identified included narrow roads (and high traffic areas), high population densities, unsuitable terrain, and existing utility corridors. Based on the windshield surveys, the onshore interconnection cable route options to Cardiff and Larrabee POIs were moved forward for further analysis. These routes are identified as the selected onshore routes in Figure 1. Onshore interconnection route options to the Fresh Kills POI were ultimately dropped from consideration for servicing the OCS-A 0499 Lease Area.

Constructability Review

Atlantic Shores continued the analysis and refinement of the Cardiff and Larrabee onshore interconnection cable route options by conducting a constructability review for routes to each POI. The purpose of this analysis was to identify design and constructability concerns related to the construction and operation of the onshore interconnection cable route options. Constraints identified between the two analyses were similar and included the following:

- Need for rock removal along routes
- Limiting access for equipment along bike paths
- Presence of utilities which may require relocation, deeper burial depths, or additional ROW/property acquisition
- Insufficient space for jack and bore activities in existing ROWs associated with utilities or roadways
- Crossing of streams.

Based on these analyses, each of the onshore interconnection cable routes were micro-sited to address the engineering-related and environmental concerns. This was a step-wise process that continually refined each of the route options during the analysis. This review process is ongoing and, as design progresses and easements are established, these routes could be further refined.

Submarine Export Cable Routes

In addition to onshore components, the preliminary routing analysis also examined potential submarine export cable routes. The criteria used in determining the preliminary submarine export cable routes involved publicly available information from the National Oceanic and Atmospheric Administration (NOAA), BOEM and other sources. Based on this information, the determination of preliminary submarine routes involved the avoidance of areas such as unexploded ordinance, shipwrecks, artificial reefs, sand borrow areas, and other potentially mapped areas by NOAA. Other information such as locations of existing utility lines, pipelines, shipping lanes and sediment/substrate classification was used.

Atlantic Shores identified a total of 15 preliminary submarine cable routes from the Lease Area OCS-A 0499 to the New Jersey and New York coastline (see Figure 1). Table 4 provides the list of the 15 preliminary submarine cable routes as well as approximated constraints for each route including length of cable, proximity to obstructions, sand resource areas, dredge channels, anchorage areas, and utility crossings (pipeline, electric, telecommunication, etc.). The longest submarine cable routes were those serving the Gowanus, Narrows and Fresh Kills POIs (67 to 92 miles) and the shortest submarine cables were those serving the south and central New Jersey POIs (11 to 40 miles). While each of the submarine export cable routes were evaluated independently, ultimately each of these routes were evaluated as a complete route from the Lease Area to the POI substation, inclusive of the export cable route, landfall location, and onshore interconnection cable route.

Table 4. Summary of Preliminary Submarine Cable Routes

Landfall Location	Lengths (mi)				No. Utility Crossings	No. Obstruct. Within 500 ft[3]	No. Sand Resource Areas Within 1,000 ft	No. Unexploded Ordinance within 1,000 ft	Rationale for Elimination
	Tot. Length	Length in Nav. Channel	Length in Anch. Areas	Length Parallel other utilities[2]					
[redacted]	67	0.5	0	6	17	0	0	0	Length of route, crossing of navigation channels and utility crossings, length of onshore route that would utilize roadways
[redacted]	81	4	0	0	15	2	0	0	Length of route, length of cable crossing navigation channels and utility crossings, obstructions within 500 ft
[redacted]	87	5	0	0	15	4	0	0	Length of route, length of cable crossing navigation channels and utility crossings, obstructions within 500 ft
[redacted]	85	5	0	0	15	3	0	0	Length of route, length of cable crossing navigation channels and utility crossings, obstructions within 500 ft
[redacted]	82	5	0	0	15	1	0	0	Length of route, length of cable crossing navigation channels and utility crossings, obstructions within 500 ft
[redacted]	92	12	0	0	15	24	0	0	Length of route, length of cable crossing navigation channels number of utility crossings, obstructions within 500 ft
[redacted]	40	0	0	3	12	0	0	0	Length of route, number of utility crossings
Army National Guard	33	0	0	3	6	0	0	0	**Selected Route**
[redacted]	17	0	0	0	2	0	0	0	Eliminated due to elimination of the POI from consideration (to be used by other developer), impacts to state park land and open space

Landfall Location	Lengths (mi)				No. Utility Crossings	No. Obstruct. Within 500 ft[3]	No. Sand Resource Areas Within 1,000 ft	No. Unexploded Ordinance within 1,000 ft	Rationale for Elimination
	Tot. Length	Length in Nav. Channel	Length in Anch. Areas	Length Parallel other utilities[2]					
									associated with the landfall location and interconnection route
[redacted]	17	0	0	6	0	1	0	0	Eliminated due to elimination of the POI from consideration (to be used by other developer), number of obstructions within 500 ft
[redacted]	17	0	0	4	0	1	0	0	Eliminated due to elimination of the POI from consideration (to be used by other developer) number of obstructions within 500 ft
[redacted]	17	0	0	4	0	1	0	0	Eliminated due to elimination of the POI from consideration (to be used by other developer) number of obstructions within 500 ft
[redacted]	11	0	0	0	0	0	0	0	Associated landfall location and onshore interconnection route determined to be infeasible
[redacted]	13	0	0	0	0	0	2	0	**Selected Route**
[redacted]	22	0	0	0	0	0	0	0	Eliminated due to elimination of the POI from consideration (to be used by other developer)

1. Routes in proximity to one another were grouped together due to characteristic similarity
2. Utilities include pipelines, electric transmission cables, telecommunications, etc.
3. Obstructions include shipwrecks, artificial reefs, and other mapped underwater

From the results summarized in Table 4, and consideration of onshore interconnection cable routes and landfall locations, two submarine export cable corridors were selected for the Project—one route to [redacted] in Atlantic City, New Jersey, and one route to the Army National Guard Property in Sea Girt, New Jersey. These selected routes are shown on Figure 1 and were selected due to the length of route, avoidance of underwater obstructions, avoidance of underwater utilities, and avoidance or minimization of conflicts with navigation channels and anchorage areas. Onshore considerations such as feasibility of the landfall site and utilization of the various POIs were also considered when selecting the submarine export cable routes. Once the two routes were selected, additional analysis was conducted which included incorporating non-public mapping, corridor surveys, and constructability to revise and fine tune the export cable corridors to the preferred landfall sites and avoid shipwrecks, artificial reefs, and other mapped underwater obstructions.

Conclusion

Atlantic Shores performed an initial preliminary routing analysis that identified 15 potential landfall locations, 22 potential onshore interconnection cable route options, and 15 potential offshore export cables route options in both New Jersey and New York. Based on the constraint and opportunity analyses related to routing/siting design, environmental conditions (i.e., natural and built environment), and constructability, Atlantic Shores ultimately identified two onshore interconnection cable route options, one each leading to Larrabee and Cardiff Substations, and two submarine export cable route options and landfall locations.

Of the potential 22 onshore cable routes initially identified, three were selected as the most viable options based on short route length, minimal number of hard angles, lack of submerged aquatic vegetation (SAV), and limited disturbance to existing land uses (e.g., residential, commercial, roadway corridors). Once those three onshore routes were identified, a windshield study was conducted. Results of the survey concluded that due to narrow roadways, high traffic, high population density, unsuitable terrain, and existing utility corridors, the onshore route to Fresh Kills was eliminated from consideration. Therefore, two routes, one leading from the Army National Guard landfall site to the Larrabee POI and the other leading from the [redacted] site to the Cardiff POI, were established as the proposed routes. These routes have been revised and micro-sited based on the constructability reviews that have occurred. These routes could be further refined based on ROW easements approvals, securing the necessary real estate, and coordination with, and approvals from, federal, state and/or local agencies.

Of the 15 potential submarine cable routes and landfalls, the two selected and ultimately advanced routes were based on the overall length and the feasibility of the landfall site and onshore interconnection cable route since many of the identified offshore constraints could be avoided. Additional analysis and site surveys were performed to microsite the offshore export cable corridor.

[redacted]