



Appendix II-J1

Essential Fish Habitat (EFH) Technical Report

March 2024

Note: Atlantic Shores has updated the Project Design Envelope to include the following landfall sites: Monmouth Landfall Site, Asbury Landfall Site, Kingsley Landfall Site, Lemon Creek Landfall Site, Wolfe's Pond Landfall Site, and Fort Hamilton Landfall Site. The information included in this report demonstrates the completeness of Atlantic Shores' multi-year development efforts and should be considered representative for the Project. For additional information regarding the layout of the Project, please refer to COP Volume I Project Information, Sections 1.0 Introduction and 4.7 Landfall Sites, as well as Figure 1.1-2 Project Overview.

Essential Fish Habitat Technical Report

Atlantic Shores Offshore Wind North

Prepared for:



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Prepared by:



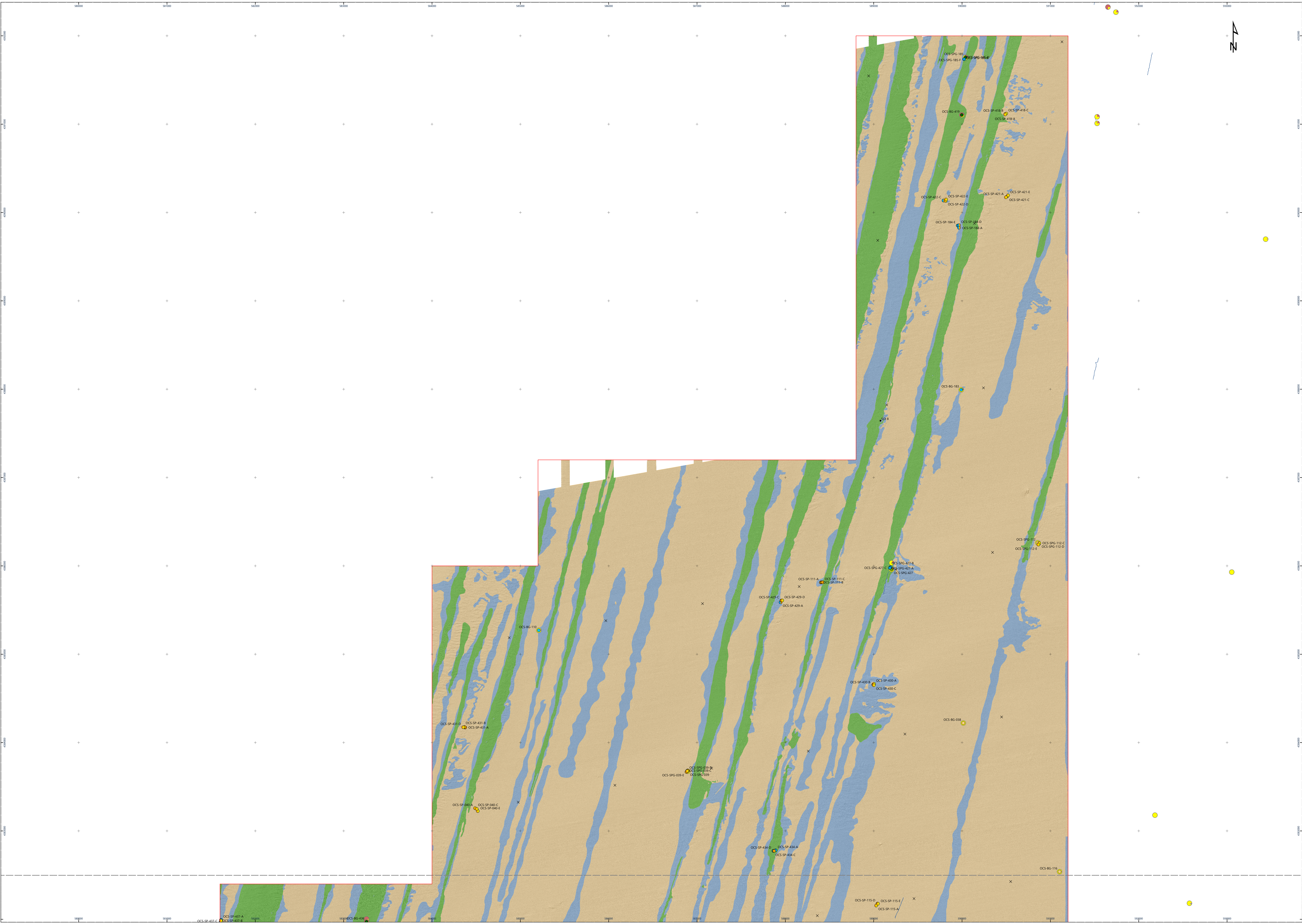
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March 2024

Attachment 3

Benthic Habitat Maps – 1:10,000 Scale

Lease Area



ATLANTIC SHORES
offshore wind
ATLANTIC SHORES OFFSHORE WIND, LLC
INTEGRATED GEOPHYSICAL & GEOTECHNICAL
MARINE SITE INVESTIGATION REPORT VOLUME 1
OFFSHORE NEW JERSEY

LEASE OCS-A0549: CMECS SUBSTRATES
Appendix F: Benthic Technical MemoChart No. F1A

FUGRO USA MARINE, INC.
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NEW JERSEY

ATLANTIC OCEAN

LEGEND

Wind Turbine Area Study Extent

Proposed Wind Turbine Generator

DATA EXTENTS

Wind Turbine Area

MBES Interpretive Data Extent

BENTHIC SAMPLING LOCATIONS

This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2021 by various contractors.

Towed Video Transects (RPS, 2021)

SP-PPV SAMPLE LOCATIONS (Fugro, 2020, 2022)

CMECS Substrate Group and Substrate Subgroup

Environmental Sample In

Gravel Mixes, Sandy Gravel

Gravelly, Pebble/Granule

Gravelly, Pebble/Granule

Gravelly, Gravelly Sand

Sand, Gravelly Sand

Sand, Very Coarse/Coarse Sand

Sand, Medium Sand

GRAB SAMPLE LOCATIONS (Terracon, 2019, Fugro, 2020, 2022)

Hybrid CMECS Substrate and Simplified-Folk Sediment Classification (Fugro, 2020)

Gravel / Gravel Mixes

Gravelly Mud, Gravelly Muddy Sand

Gravelly Sand

Sand

Mud, Sandy Mud, Muddy Sand

Wentworth Grain Size Composition (Center symbol represents CMECS substrate classification)

Gravel (%)

Sand (%)

Mud (%)

Benthic Grab Samples (Terracon, 2019)

Sampled predated Hybrid CMECS/Simplified Folk Classification approach)

CMECS SUBSTRATES

Substrate interpretation overlaid by shaded relief sun illumination model (azimuth 315 degrees, z factor 1, and 70% transparency).

Gravel / Gravel Mixes

Gravelly / Gravelly Mud, Gravelly Muddy Sand

Gravelly Sand

Sand

Hybrid CMECS Substrate and Simplified-Folk Sediment Classification Diagram

Gravel

Gravelly

Sand

Mud

Mud: Sand Ratio 9:1

NOTES

1) Survey data were acquired in geographic coordinate relative to the World Geodetic System 1984 (WGS84) datum. Data were then converted to North American Datum 1983 (NAD83) and projected to the General Transverse Mercator Zone 18 North (SPZ Zone 18N) projection.

2) Fugro collected (non-continuous) geophysical and geotechnical data in the WTA from April 2020 to August 2021.

3) Repetitive name block information is based on Fugro's GIS database.

4) Obstructions and depths were obtained from the Automated Vessels and Obstructions Information System (AVOIS) and Electronic Navigational Charts (ENCs, NOAA 2021).

5) Maritime Boundaries are provided by NOAA Nautical Charts (2019), Federal State Boundaries are provided by BODEN Digital Offshore Center (DOCS) Electronic Navigational Charts (ENCs, NOAA 2021).

6) Interpretation is based on collected seafloor geophysical data (SBS, MBES bathymetry and backscatter) and ground truth sampling results, CMECS substrate, EPY, and benthic habitat interpretation reported to MBES bathymetry (2021) data extent.

7) Benthic classification (MBES/Seafloor CMECS) of grab samples (Terracon, 2019 and Fugro, 2020, 2022) (see Grab video (Fugro, 2020) A 2022), and towed video transects (RPS, 2021) are reported in the COP Volume 11 - Affected Environment. SP-PPV basic classification is reported in COP MBES Volume.

EQUIPMENT

Vessels

Fugro Enterprise, Fugro Brink, R/V Shearwater

Navigation System: GPS Primary

Display: Electronic Chart Display/Information System (ECDIS)

Fugro Brink: Kongsberg Sineq 360 Global Navigation Satellite System

Hydrographic System

Kongsberg EM2040 MBES for all vessels

Sea State Sensor

Edgetech E55 (300KHz) kHz frequencies for all vessels

USBL System

Kongsberg HYPERBOL USBL system for all vessels

SP-PPV (2020, 2022)

Chart system system from Ocean Imaging System (OIS) with Nikon D7100 24-megapixel high-resolution digital camera for sediment profile imagery (SPY) and an OIS Model OSC 24000 24-megapixel underwater camera for plan view (PV) imagery

Crane/Crane (2020, 2022)

Tek Young Modified Van Veen Grab dual 0.04 m2 bucket sampler equipped with Fugro's maxine GrabCare video system

Sediment Grab (SPY)

Sediment Grab Standard 50-20 sampler 0.15 m2

Towed Video (2021)

R/V Shearwater: Camera sled equipped with submersible, GoPro Hero 5, and 4K camera

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GEOTECHNICAL PARAMETERS

GEOTECHNICAL DATUM

North American Datum 1983

ELLIPSOID

GRS 1980

Semi-Major Axis

6,378,137.000 m

Flattening

298.257222101

PROJECTION

UNIVERSAL TRANSVERSE MERCATOR / Zone 18N (EPSG 26918)

Central Meridian (CM)

75°00'00" W

Latitude of Origin

0°00'00" N

False Easting

500,000 mE

False Northing

0 mN

Scale Factor at CM

0.9996

VERTICAL DATUM

MEAN LOWER LOW WATER (MLLW)

Horizontal and vertical units are in meters

Scale 1: 10,000 at 42" x 67" page size

0 100 200 300 400 500 600 700 800 900 1,000 Meters

0 600 1,200 1,800 2,400 3,000 3,600 Feet

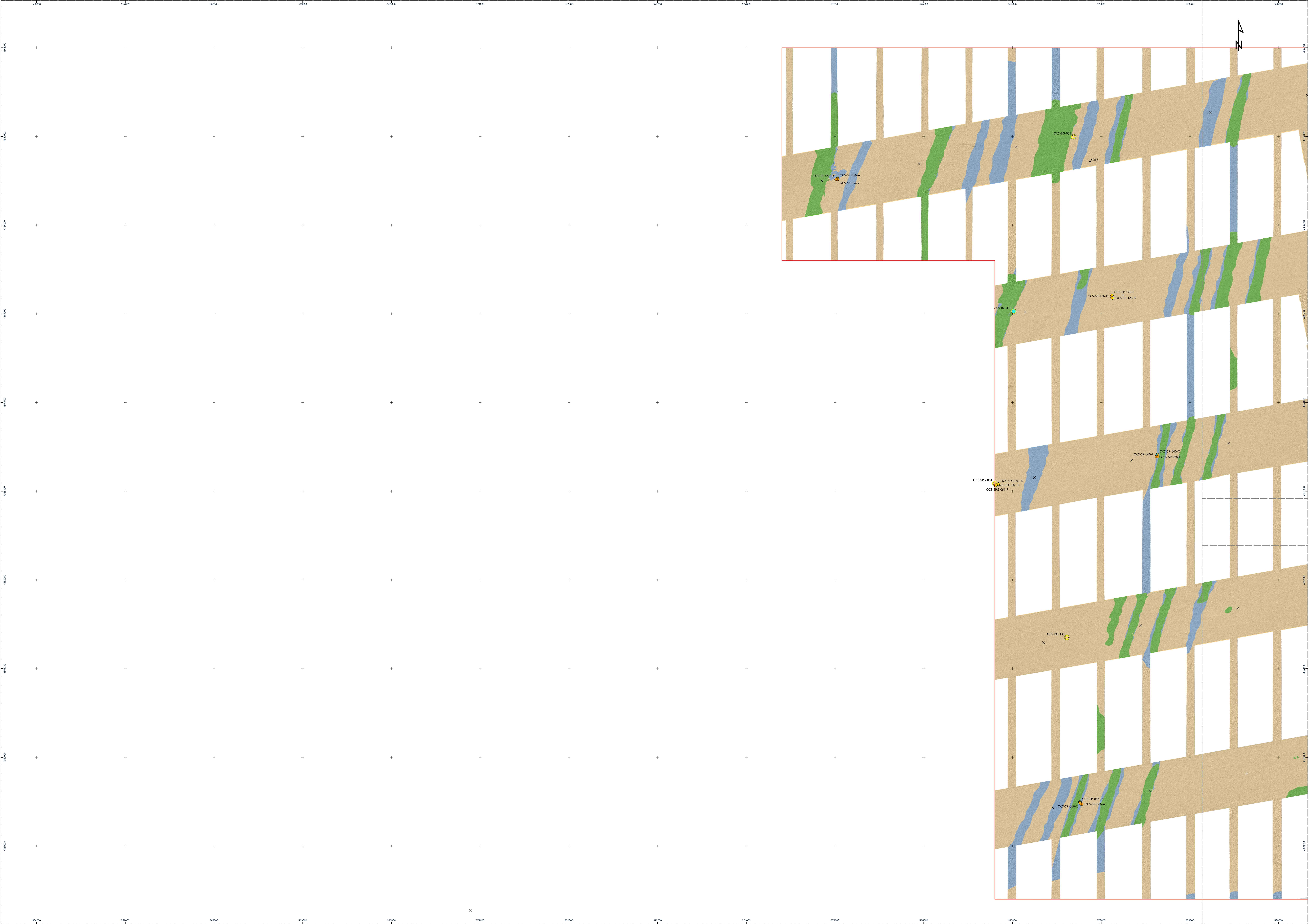
Issue No: Date: Description: Drawn: Checked: Approved:

01 09/16/2022 DRAFT - For Review KR DD DD

02 10/18/2022 FINAL KR DD DD

Project No: Chart Name: Chart No:

02 2206006 21030011_Swell_LA0549_CMECS_Substrate F1A



ATLANTIC SHORES
offshore wind
ATLANTIC SHORES OFFSHORE WIND, LLC
INTEGRATED GEOPHYSICAL & GEOTECHNICAL
MARINE SITE INVESTIGATION REPORT VOLUME 1
OFFSHORE NEW JERSEY

LEASE OCS-A0549: CMECS SUBSTRATES

2022Appendix F: Benthic Technical MemoChart No. F.1D

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LEGEND

Wind Turbine Area Study Extent

XProposed Wind Turbine Generator

DATA EXTENTS

Wind Turbine Area

MBES Interpretive Data Extent

BENTHIC SAMPLING LOCATIONS

This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2021 by various contractors.

Towed Video Transects (RPS, 2021)

SPH-PV SAMPLE LOCATIONS (Fugro, 2020, 2022)

CMECS Substrate Group and Substrate Subgroup

Environmental_Sample_In

Gravel Mixes, Sandy Gravel

Gravelly, Pebble/Granule

Gravelly, Pebble/Granule

Gravelly, Gravelly Sand

Sand, Gravelly Sand

Sand, Very Coarse/Coarse Sand

Sand, Medium Sand

GRAB SAMPLE LOCATIONS (Terracon, 2019, Fugro, 2020, 2022)

Hybrid CMECS Substrate and Simplified-Folk Sediment Classification (Fugro, 2020)

Gravel / Gravel Mixes

Gravelly Mud, Gravelly Muddy Sand

Gravelly Sand

Sand

Mud, Sandy Mud, Muddy Sand

Wentworth Grain Size Composition (Center symbol represents CMECS substrate classification)

Gravel (%)

Sand (%)

Mud (%)

Benthic Grab Samples (Terracon, 2019)

Sampled predated Hybrid CMECS/Simplified Folk Classification approach)

CMECS SUBSTRATES

Substrate interpretation overlaid by shaded relief sun illumination model (azimuth 315 degrees, z factor 1, and 70% transparency).

Gravel / Gravel Mixes

Gravelly / Gravelly Mud, Gravelly Muddy Sand

Gravelly Sand

Sand

Hybrid CMECS Substrate and Simplified-Folk Sediment Classification Diagram

NOTES

1) Survey data were acquired in geographic coordinate relative to the World Geodetic System 1984 (WGS84) datum. Data were then converted to North American Datum 1983 (NAD83) and projected to the General Transverse Mercator Zone 18 North (SPZ Zone 18N) projection.

2) Fugro collected (non-continuous) geophysical and geotechnical data in the WTA from April 2020 to August 2021.

3) Reported water block information is based on Fugro's GIS database.

4) Observations and all species were obtained from the Automated Visuals and Observations Information System (AVOIS) and Electronic Navigation Charts (ENCs, NOAA 2021).

5) Maritime Boundaries are provided by NOAA Nautical Charts (2016). Federal/State Boundaries are provided by BODEN Digital Offshore Center (DOCS) Atlantic, Submerged Lands Act (SLA) Database.

6) Interpretation is based on collected seafloor geophysical data (SBES, MBES bathymetry and backscatter) and ground truth sampling results, CMECS substrate, EPI, and benthic habitat interpretation reported to MBES bathymetry (2021) data vessel.

7) Benthic observations (MBES/Seafloor CMECS) of grab samples (Terracon, 2019 and Fugro, 2020, 2022) (see Grab video (Fugro, 2020) A 2022), and benthic video (RPS, 2021) are reported in the COF Volume 11 - Affected Environment. SPH-PV benthic classification is reported in COF Volume 11.

EQUIPMENT

Vessels

Fugro Enterprise, Fugro Brink, R/V Shearwater

Navigation System: GPS Primary

Display: Electronic Chart Display/Plotting System (ECDP) Navigation Satellite System

Fugro Brink: Kongsberg Sinec 360 Global Navigation Satellite System

Hydrographic System

Kongsberg EM6040 MBES for all Vessels

Non-Ship-Side

EdgeTech 425S SSS (300KHz) kHz frequencies for all Vessels

USBL System

Kongsberg HYDAP 502 USBL system for all Vessels

SPH-PV (2020, 2022)

Chart system system from Ocean Imaging System (OIS) with Nikon DP100 24-megapixel high-resolution digital camera for sediment profile imagery (SPI) and an OIS Model OSC 24000 24-megapixel underwater camera for close-view (PV) imagery

Grabber (2020, 2022)

The Young-McLellan Van Veen Grab dual 0.04 m3 bucket sampler equipped with Fugro's maxine GrabCare video system

Sediment Core (2019)

Sediment Grab Standard SS-20 sampler 0.12 m2

Towed Video (2021)

R/V Shearwater: Camera used equipped with altimeter, GoPro Hero 5, and all cameras

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GEODETIC PARAMETERS

GEODETIC DATUM

North American Datum 1983

ELLIPSOID

GRS 1980

Semi-Major Axis

6,378,137.000 m

Flattening

298.257222101

PROJECTION

UNIVERSAL TRANSVERSE MERCATOR / Zone 18N (EPSG 26918)

Central Meridian (CM)

75°00'00" W

Latitude of Origin

0°00'00" N

False Easting

500,000 mE

False Northing

0 mN

Scale Factor at CM

0.9996

VERTICAL DATUM

MEAN LOWER LOW WATER (MLLW)

Horizontal and vertical units are in meters

Scale 1:10,000 at 42" x 67" page size

0 100 200 300 400 500 600 700 800 900 1,000 Meters

0 600 1,200 1,800 2,400 3,000 3,600 Feet

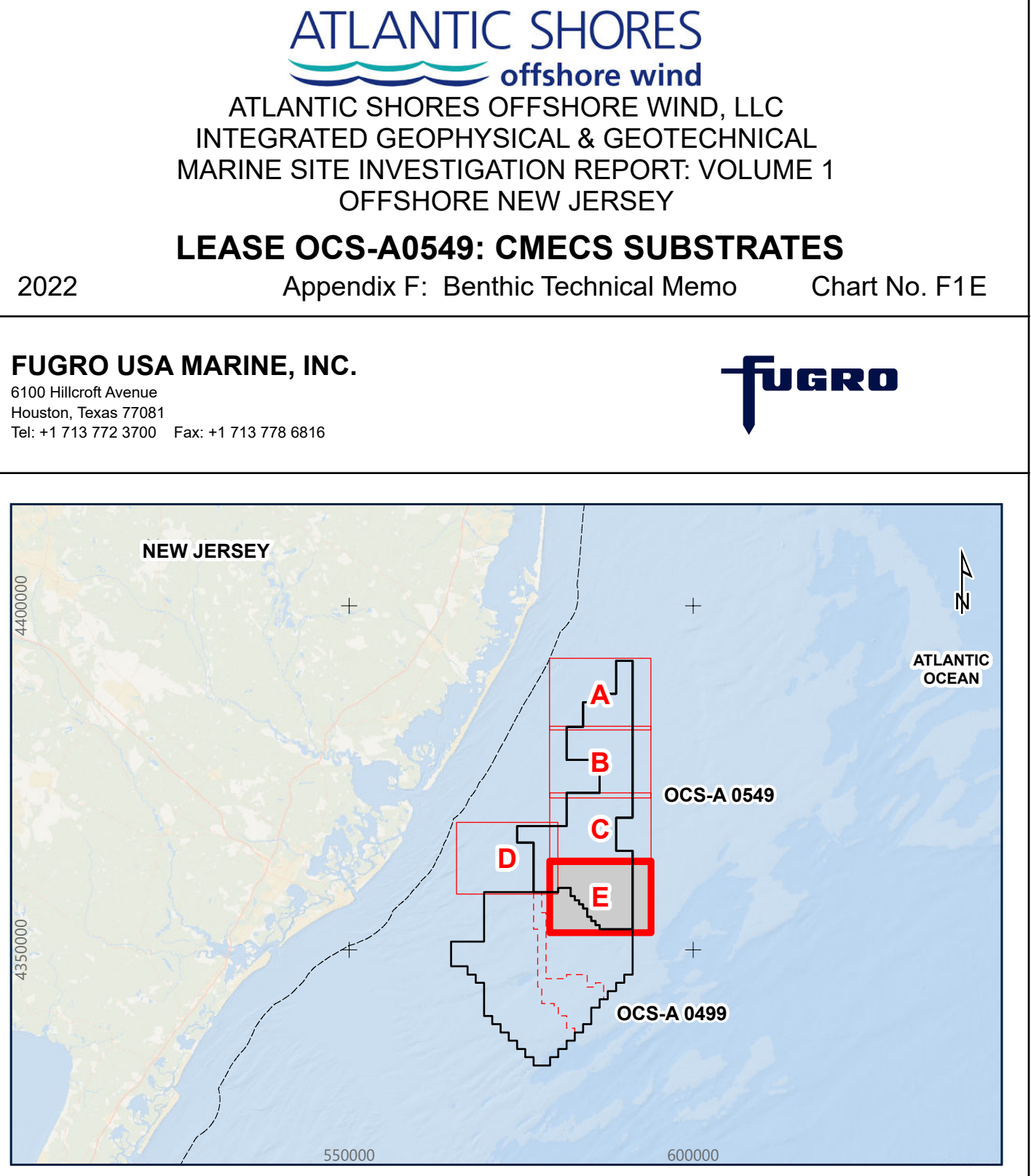
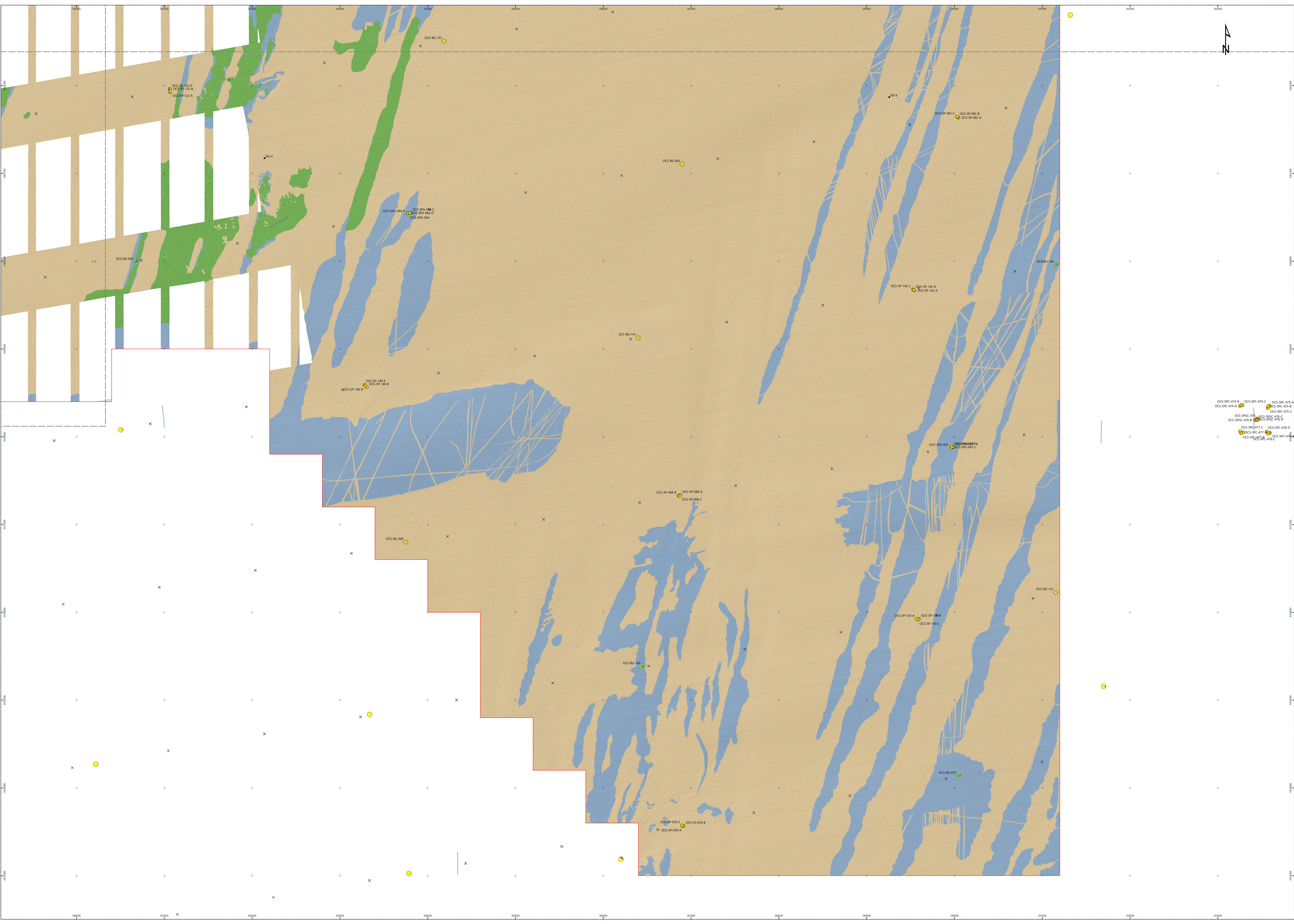
Issue No. Date Description Drawn Checked Approved

01 09/16/2022 DRAFT - For Review KR DD DD

02 10/18/2022 FINAL KR DD DD

Project No. Chart Name Chart No.

02 22060006 21030011_Swell_LA0549_CMECS_Substrate F.1D



ATLANTIC SHORES offshore wind

ATLANTIC SHORES OFFSHORE WIND, LLC

INTEGRATED GEOPHYSICAL & GEOTECHNICAL

MARINE SITE INVESTIGATION REPORT VOLUME 1

OFFSHORE NEW JERSEY

2022

Appendix F: Benthic Technical Memo

Chart No. F.1E

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NEW JERSEY

OCS-A 0549

OCS-A 0459

LEGEND

Wind Turbine Area Study Extent

Proposed Wind Turbine Generator

DATA EXTENTS

Wind Turbine Area

MBES Interpretive Data Extent

BENTHIC SAMPLING LOCATIONS

This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2021 by various contractors.

Towed Video Transects (RPS, 2021)

SP-PV SAMPLE LOCATIONS (Fugro, 2020, 2022)

CMECS Substrate Group and Substrate Subgroup

Environmental Sample In

Gravel Mixes, Sandy Gravel

Gravelly, Pebble/Granule

Gravelly, Pebble/Granule

Gravelly, Gravelly Sand

Sand, Gravelly Sand

Sand, Very Coarse/Coarse Sand

Sand, Medium Sand

GRAB SAMPLE LOCATIONS (Terracon, 2019; Fugro, 2020, 2022)

Hybrid CMECS Substrate and Simplified-Folk Sediment Classification (Fugro, 2020)

Gravel / Gravel Mixes

Gravelly Mud, Gravelly Muddy Sand

Gravelly Sand

Sand

Mud, Sandy Mud, Muddy Sand

Wentworth Grain Size Composition (Center symbol represents CMECS substrate classification)

Gravel (%)

Sand (%)

Mud (%)

Benthic Grab Samples (Terracon, 2019)

Sampled predicted Hybrid CMECS/Simplified Folk Classification approach)

CMECS SUBSTRATES

Substrate interpretation overlaid by shaded relief sun illumination model (azimuth 315 degrees, z factor 1, and 70% transparency)

Gravel / Gravel Mixes

Gravelly / Gravelly Mud, Gravelly Muddy Sand

Gravelly Sand

Sand

Hybrid CMECS Substrate and Simplified-Folk Sediment Classification Diagram

Gravel

Gravelly

Mud

Mud: Sand Ratio 9:1

Sand

NOTES

1) Survey data were acquired in geographic coordinate relative to the World Geodetic System 1984 (WGS84) datum. Data were then transformed to North American Datum 1983 (NAD83) and projected to the General Transverse Mercator Zone 18 North (SPV Zone 18N) projection.

2) Fugro collected towed-channel bathymetry and geophysical data in the WTA from April 2020 to August 2021.

3) Repetitive name block information is based on Fugro's GIS database.

4) Obstruction and all species were obtained from the Automated Vessels and Obstructions Information System (AVOIS) and Electronic Navigational Chart (ENC) data, Nautical Chart No. 11000 (2017).

5) Maritime Boundaries are provided by NOAA Nautical Charts (2016), Federal State Boundaries are provided by BODEN Digital Offshore Center (DOCO) (2016), Nautical Chart No. 11000 (2017).

6) Interpretation is based on collected seafloor geophysical data (SBS, MBES bathymetry and backscatter) and ground truth sampling results, CMECS substrates, EPB, and benthic features interpretation reported to MBES bathymetry (2021) data set.

7) Benthic classification (MBES) results (CMECS) of grab samples (Terracon, 2019 and Fugro, 2020, 2022) (see Grab video (Fugro, 2020) A, 2022) and benthic video (Terracon, 2019, 2021) are reported in the COOP Volume 1 - Affected Environment, SPV-PV basic classification is reported in COOP-0500 Volume 1.

EQUIPMENT

Vessels

Fugro Enterprise, Fugro Brink, R/V Shearwater

Navigation System: GPS Primary

Display: Electronic Chart Display/Plotting System (ECDP)

Fugro Brink's: Kongsberg Sigsbee 360 Degree Navigation Satellite System

Marine System

Kongsberg EM2040 MBES for all Vessels

Sea State Sensor

Edgetech 425S 858 (300KHz) kHz frequencies for all Vessels

USBL System

Kongsberg HYDAP 500 USBL system for all Vessels

SPV-PV (2020, 2022)

Chart system system from Ocean Imaging System (OIS) with Nikon D7100 24-megapixel high-resolution digital camera for sediment profile imagery (SPV) and an OIS Model DSC 2400 24-megapixel underwater camera for plan view (PV) imagery

Crane/Crane (2020, 2022)

Tek Young-Medical Van Veen Grab dual 0.04 m3 bucket sampler equipped with Fugro's maxine GrabCare video system

Sediment Core (2019)

Sediment Grab Standard 50-20 sampler 0.10 m2

Towed Video (2021)

R/V Shearwater: Camera and equipped with laboratory, GoPro Hero 5, and all cameras

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GEODETIC PARAMETERS

GEODETIC DATUM

North American Datum 1983

ELLIPSOID

GRS 1980

Semi-Major Axis

6,378,137.000 m

Flattening

298.257222101

PROJECTION

UNIVERSAL TRANSVERSE MERCATOR / Zone 18N (EPSG 26918)

Central Meridian (CM)

75°00'00" W

Latitude of Origin

0°00'00" N

False Easting

500,000 mE

False Northing

0 mN

Scale Factor at CM

0.9996

VERTICAL DATUM

MEAN LOWER LOW WATER (MLLW)

Horizontal and vertical units are in meters

Scale 1: 10,000 at 42" x 67" page size

0 100 200 300 400 500 600 700 800 900 1,000 Meters

0 600 1,200 1,800 2,400 3,000 3,600 Feet

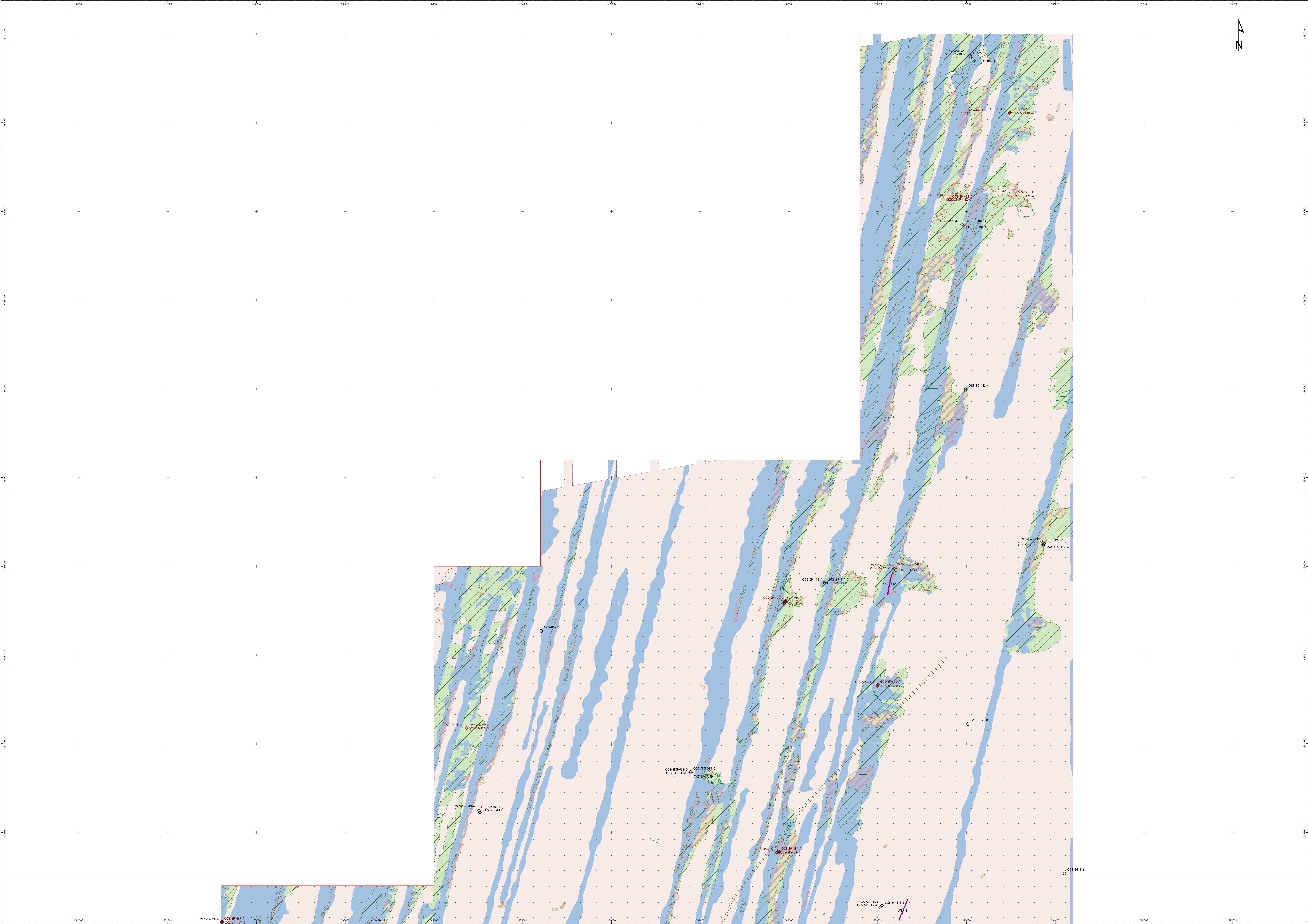
Issue No: Date: Description: Drawn: Checked: Approved:

01 09/16/2022 DRAFT - For Review KR DD DD

02 10/18/2022 FINAL KR DD DD

Project No: Chart Name: Chart No:

02 22060006 21030011_Swell_LA0549_CMECS Substrate F.1E



ATLANTIC SHORES
offshore wind
ATLANTIC SHORES OFFSHORE WIND
INTEGRATED GEOPHYSICAL & GEOTECHNICAL
MARINE SITE INVESTIGATION REPORT VOLUME 1
OFFSHORE NEW JERSEY

LEASE OCS-A0549: BENTHIC HABITAT
Appendix F: Benthic Technical MemoChart No. F2A

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NEW JERSEY

ATLANTIC OCEAN

OCS-A 0549

OCS-A 0489

LEGEND

Wind Turbine Area Study Extent

DATA EXTENTS

Wind Turbine Area

MBES Interpretive Data Extent

BENTHIC SAMPLING LOCATIONS

This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2022 by various contractors.

○

Grab Sample (Fugro, 2022)

○

Grab Sample (Fugro, 2020)

●

Grab Sample (Tem506), 2019)

◆

SPH-PV Sample (Fugro, 2022)

◆

SPH-PV Sample (Fugro, 2020)

—

Towed Video Transect (RPS, 2021)

NMFS ESSENTIAL FISH HABITAT (EFH)

Composite benthic features layers indicate that more than one benthic feature is present in the same geographic area.

BENTHIC FEATURES

—

Seabed Scars

|||||

Sand Ridge Crests

///

Irregular Seafloor Areas

■

Localized Relief Features

~~~~~

Sand Waves

— · — · —

Megaripples

· · ·

Ripples

ESSENTIAL FISH HABITAT CLASSIFICATION

■

Complex

■

Heterogeneous Complex

■

Soft

NOTES

1) The coordinate grid is in NAD 1983 UTM Zone 18N, meters.

2) Fugro collected (non-continuous) geophysical and geotechnical data in the WTA from April, 2020 to August, 2021.

3) Reported lease block information is based on Fugro's GIS database.

4) Obstructions and shipwrecks were obtained from the Automated Wrecks and Obstructions Information System (AWOIS) and Electronic Navigational Charts (ENCs, NOAA-2021).

5) Maximize Boundaries are provided by NOAA National Charts (2019). Federal/State Boundaries are provided by BOEM Digital Offshore Canyons (2022, December). Submerged Lands Act (SLA) Boundary.

6) EFH habitat delineations and characterization of benthic features created here are in reference to NMFS later to BOEM dated March 20, 2021 regarding "Special Recommendations for Mapping Fish Habitat".

7) Mobile sediment areas are mapped within the Cable Burial Risk Assessment (CBRA), Wind Turbine Area, (Fugro, 2021).

8) No large grained complex habitats were delineated within the survey area.

9) Neither regulated habitat nor submerged aquatic vegetation (SAV) has been charted in the survey area.

10) Bathymetry (MBES) Marine CHARTS) of data samples (Fugro, 2019 and Fugro, 2020, 2022). Grab-Cam video (Fugro, 2020, 2022), and lower video transects (RPS, 2021) are reported in the COP Volume 1: Affected Environment, SPH-PV beds identification is reported in COP Volume 2.

11) The hard edges are due to survey boundary limitations and seasonal changes in sediment, sediments transport, and movement of megaripple features.

12) Seabed scars caused by fishing activities is assessed and annually changing, and may not be present in all interpreted datasets due to time of year that the data were collected.

EQUIPMENT

Vessel:  
Fugro Enterprise, Fugro-Brooks, R/V Shearwater

Navigation System: GPS, Trimble  
(Fugro Enterprise) Fugro StarPack Global Navigation Satellite System  
(Fugro-Brooks) Furuno StarPack Global Navigation Satellite System

Marine System:  
Holographic MBES for all vessels

Side Scan Sonar:  
Edgetech 300i SSS (300kHz) (40° frequency) for all vessels

USBL System:  
Holographic HRP-500 USBL system for all vessels

SPH-PV (Fugro, 2020, 2022):  
Dual camera system from Ocean Imaging Systems (OIS) with Nikon D7100 24-megapixel high resolution digital camera for sediment profile imagery (RPS) and an OIS Model DCS-2000 24-megapixel underwater camera for day-view (PV) imagery

Grab-Cam (Fugro, 2020, 2022):  
Sea Tronix Model Two Two Grab-Cam Dual 1/4" HD bucket sampler equipped with Fugro's real-time GrabCam video system

Sediment Grab (2019):  
Sediment Grab (Sediment Grab) sample 0.15 m2

Towed Video (2021):  
(R/V Shearwater) Camera sled equipped with altimeter, GoPro Hero 5, and 4K camera

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GEODETIC PARAMETERS

Horizontal Datum: 1983

ELLIPSOID  
GRS 1980  
Semi-Major Axis  
6,378,137.000 m  
Inverse Flattening  
298.257222101

PROJECTION  
UNIVERSAL TRANSVERSE MERCATOR / Zone 18N (EPSG 26918)  
Central Meridian (CM)  
75°00'00" W  
Latitude of Origin  
30°00'00" N  
False Easting  
500,000 m  
False Northing  
0 m  
Scale Factor at CM  
0.9996

VERTICAL DATUM  
MEAN LOWER LOW WATER (MLLW)

Horizontal and vertical units are in meters

Scale 1: 10,000 at 42" x 67" page size

0 100 200 300 400 500 600 700 800 900 1,000 Meters

0 600 1,200 1,800 2,400 3,000 3,600 Feet

Issue No. Date Description Drawn Checked Approved

01 08/10/2022 DRAFT - For Review KR DD DD

02 10/18/2022 FINAL KR DD DD

Project No. Chart Name

02-2105006 21050011\_Swell\_LA0549\_EFH\_Classification

Chart No. F2



ATLANTIC SHORES  
offshore wind  
ATLANTIC SHORES OFFSHORE WIND, LLC  
INTEGRATED GEOPHYSICAL & GEOTECHNICAL  
MARINE SITE INVESTIGATION REPORT VOLUME 1  
OFFSHORE NEW JERSEY

LEASE OCS-A0549: BENTHIC HABITAT  
Appendix F: Benthic Technical MemoChart No. F2B

2022

FUGRO USA MARINE, INC.  
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Houston, Texas 77061  
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LEGEND

Wind Turbine Area Study Extent

DATA EXTENTS

Wind Turbine Area  
MBES Interpretive Data Extent

BENTHIC SAMPLING LOCATIONS

This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2022 by various contractors.

Grab Sample (Fugro, 2022)  
Grab Sample (Fugro, 2020)  
Grab Sample (TetraSonar, 2019)  
SPH-PV Sample (Fugro, 2022)  
SPH-PV Sample (Fugro, 2020)  
Towed Video Transect (RPS, 2021)

NMFS ESSENTIAL FISH HABITAT (EFH)

Composite benthic features layers indicate that more than one benthic feature is present in the same geographic area.

BENTHIC FEATURES

Seabed Scars  
Sand Ridge Crests  
Irregular Seafloor Areas  
Localized Relief Features  
Sand Waves  
Megaripples  
Ripples

ESSENTIAL FISH HABITAT CLASSIFICATION

Complex  
Heterogeneous Complex  
Soft

NOTES

1) The coordinate grid is in NAD 1983 UTM Zone 18N, meters.  
2) Fugro collected two conventional, preprocessed and georeferenced data in the WTA from April, 2020 to August, 2021.  
3) Reported lease block information is based on Fugro's GIS database.  
4) Obstructions and obstructions were obtained from the Automated Wrecks and Obstructions Information System (AWOIS) and Electronic Navigational Charts (ENCs, NOAA-2021).  
5) Maximize Boundaries are provided by NOAA National Charts (2019). Federal/State Boundaries are provided by BODEN Digital Marine Chart (2021) and NOAA National Charts (2021).  
6) EFH habitat delineations and characterization of benthic features charted here are in reference to NMFS' later to BODEN dated March 2021 regarding "Special Recommendations for Deepwater Fish Habitat".  
7) Mobile sediment areas are mapped within the Cable Burial Risk Assessment (CBRA), Wind Turbine Area, (Fugro, 2021).  
8) No large grained complex habitats were delineated within the survey area.  
9) Neither regulated habitat nor submerged aquatic vegetation (SAV) has been charted in the survey area.  
10) Bathymetric data (MBES) was collected in 2019 and 2020. Dual camera video (Fugro, 2020, 2021) and towed video transects (RPS, 2021) are reported in the COP Volume 1: Atlantic Offshore Wind Turbine Area. Bathymetric data (MBES) was collected in 2019 and 2020. Dual camera video (Fugro, 2020, 2021) and towed video transects (RPS, 2021) are reported in the COP Volume 1: Atlantic Offshore Wind Turbine Area. Bathymetric data (MBES) was collected in 2019 and 2020. Dual camera video (Fugro, 2020, 2021) and towed video transects (RPS, 2021) are reported in the COP Volume 1: Atlantic Offshore Wind Turbine Area.  
11) The hard edges are due to survey boundary limitations and seasonal changes in sediment, sediment transport, and movement of megaripples/features.  
12) Seabed scars caused by fishing activities is assessed and annually changing, and may not be present in all interpreted datasets due to time of year that the data were collected.

EQUIPMENT

Vessel:  
Fugro Enterprise, Fugro-Boatlift, R/V Shearwater  
Navigation System: GPS, Trimble  
Fugro Enterprise: Fugro StarTrack Global Navigation Satellite System  
Fugro-Boatlift: Fugro StarTrack Global Navigation Satellite System  
Multibeam System:  
Hologram H1000 MBES for all vessels  
Side Scan Sonar:  
Edgetech EOS SSS (300/600) kHz frequencies for all vessels  
USBL System:  
Hologram H1000 USBL system for all vessels  
SPH-PV (Fugro, 2020, 2021):  
Dual camera system from Ocean Imaging Systems (OIS) with Nikon D7100 24-megapixel high resolution digital camera for sediment profile imagery (SPH) and an OIS Model OCS-2000 2-megapixel underwater camera for day-view (PV) imagery  
GeoCam (Fugro, 2020, 2021):  
GeoCam (Fugro, 2020, 2021) dual camera system with Fugro's real-time GeoCam video system  
Sediment Grab (2019):  
Sediment Grab (2019) 0.10 m2  
Towed Video (2021):  
Towed Video (2021) (R/V Shearwater) Camera sled equipped with altimeter, GoPro Hero 5, and 4K camera

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GEODETIC PARAMETERS

North American Datum 1983  
ELLIPSOID  
GRS 1980  
Semi-Major Axis  
6,378,137.000 m  
Inverse Flattening  
298.257222101  
PROJECTION  
UNIVERSAL TRANSVERSE MERCATOR / Zone 18N (EPSG 26918)  
Central Meridian (CM)  
75°00'00" W  
Latitude of Origin  
30°00'00" N  
False Easting  
500,000 mE  
False Northing  
0 mN  
Scale Factor at CM  
0.9996  
VERTICAL DATUM  
MEAN LOWER LOW WATER (MLLW)  
Horizontal and vertical units are in meters

Scale 1:10,000 at 42" x 67" page size  
0 100 200 300 400 500 600 700 800 900 1,000 Meters  
0 600 1,200 1,800 2,400 3,000 3,600 Feet

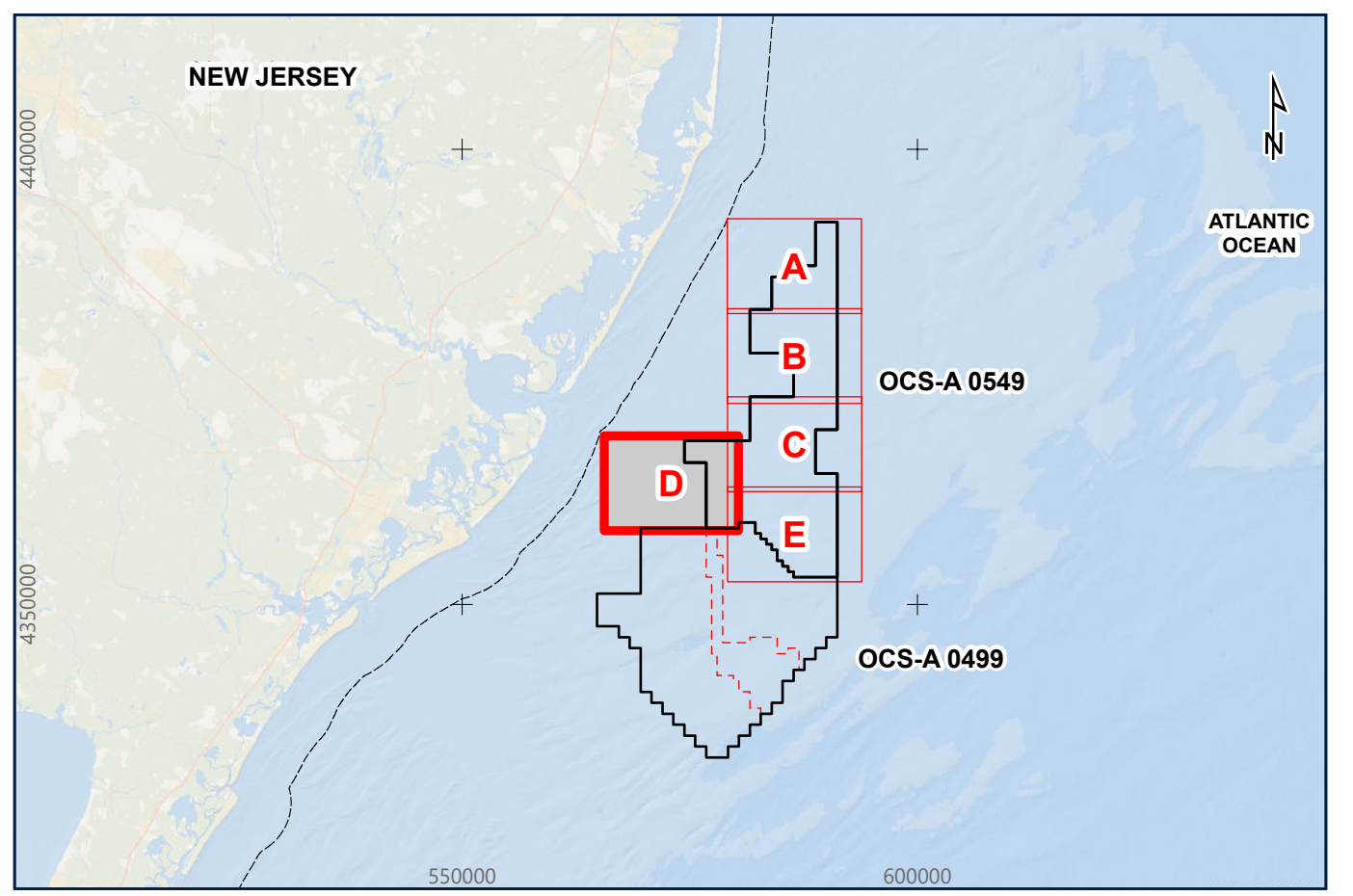
Issue No: Date: Description: Drawn: Checked: Approved:  
01 08/10/2022 DRAFT - For Review KR DD DD  
02 10/18/2022 FINAL KR DD DD

Project No: 62-2105006 Chart Name: 2105001T\_Swell\_LA0549\_EFH\_Classification Chart No: F2









### LEGEND









## DATA EXTENTS

 Wind Turbine Area  
 MBES Interpretive Data Extent

## BENTHIC SAMPLING LOCATIONS








This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2022 by various contractors.

-  Grab Sample (Fugro, 2022)
-  Grab Sample (Fugro, 2020)
-  Grab Sample (TerraSond, 2019)
-  SPI-PV Sample (Fugro, 2022)
-  SPI-PV Sample (Fugro, 2020)
-  Towed Video Transect (RPS, 2021)

## NMFS ESSENTIAL FISH HABITAT (EFH)

Composite benthic features layers indicate that more than one benthic feature is present in the same geographic area

#### BENTHIC FEATURES

-  Seabed Scars
-  Sand Ridge Crests
-  Irregular Seafloor Areas
-  Localized Relief Features
-  Sand Waves
-  Megaripples
-  Ripples

## ESSENTIAL FISH HABITAT CLASSIFICATION

- Complex
- Heterogeneous Complex
- Soft

NOTES

- Fig. 1. Collection of non-vascular (myxophagous) and vascular plant data in the WTA from April 2021 to April 2023. a) Reported lake water information is based on Figure 5 of GSWG datasets. b) Observations and inferences were obtained from the Australian Freshwater and Oribatid Invertebrate System (AFOWIS) and Australian Non-Vascular Plants (ANVP) datasets. c) Marine benthic invertebrates were obtained from the Australian Marine Biodiversity Data Centre (AMBD). d) Marine benthic invertebrates are provided by NOAA National Oceanic and Atmospheric Administration (NOAA) Digital Data Library (DDP). e) Marine benthic invertebrates are provided by NOAA National Oceanic and Atmospheric Administration (NOAA) Digital Data Library (DDP). f) EIT habitat descriptions and characteristics of benthic invertebrates (benthic) are in reference to the Benthic Data Manual 2021 regarding "Recommendations for Mapping Fish Habitat". g) Marine benthic invertebrates are provided by NOAA National Oceanic and Atmospheric Administration (NOAA) Digital Data Library (DDP). h) Marine benthic invertebrates are provided by NOAA National Oceanic and Atmospheric Administration (NOAA) Digital Data Library (DDP). i) No large gamed grassland habitats were subdivided into vegetation (SVG) has been changed in the survey area. j) Neither vegetated habitats nor submerged aquatic vegetation (SAV) has been changed in the survey area. k) Benthic invertebrates (BIV) Modified COMBIS of grass species (Thornhill 2001, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 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2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 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## EQUIPMENT

- [illegible]

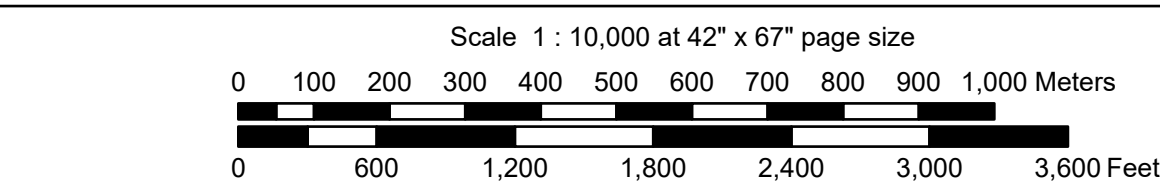
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## GEODETIC PARAMETERS

|                |                           |
|----------------|---------------------------|
| GEODETIC DATUM | North American Datum 1983 |
|----------------|---------------------------|

|                       |                                                                      |
|-----------------------|----------------------------------------------------------------------|
| Semi-Major Axis       | 6,378,137.000 m                                                      |
| Inverse Flattening    | 298.257222101                                                        |
| PROJECTION            |                                                                      |
| Central Meridian (CM) | UNIVERSAL TRANSVERSE MERCATOR / Zone 18N (EPSG 26918)<br>75°00'00" W |
| Latitude of Origin    | 00°00'00" N                                                          |
| Fake Easting          | 500,000 mE                                                           |
| Fake Northing         | 0 mN                                                                 |
| Scale Factor at CM    | 0.9996                                                               |
| VERTICAL DATUM        |                                                                      |
|                       | MEAN LOWER LOW WATER (MLLW)                                          |

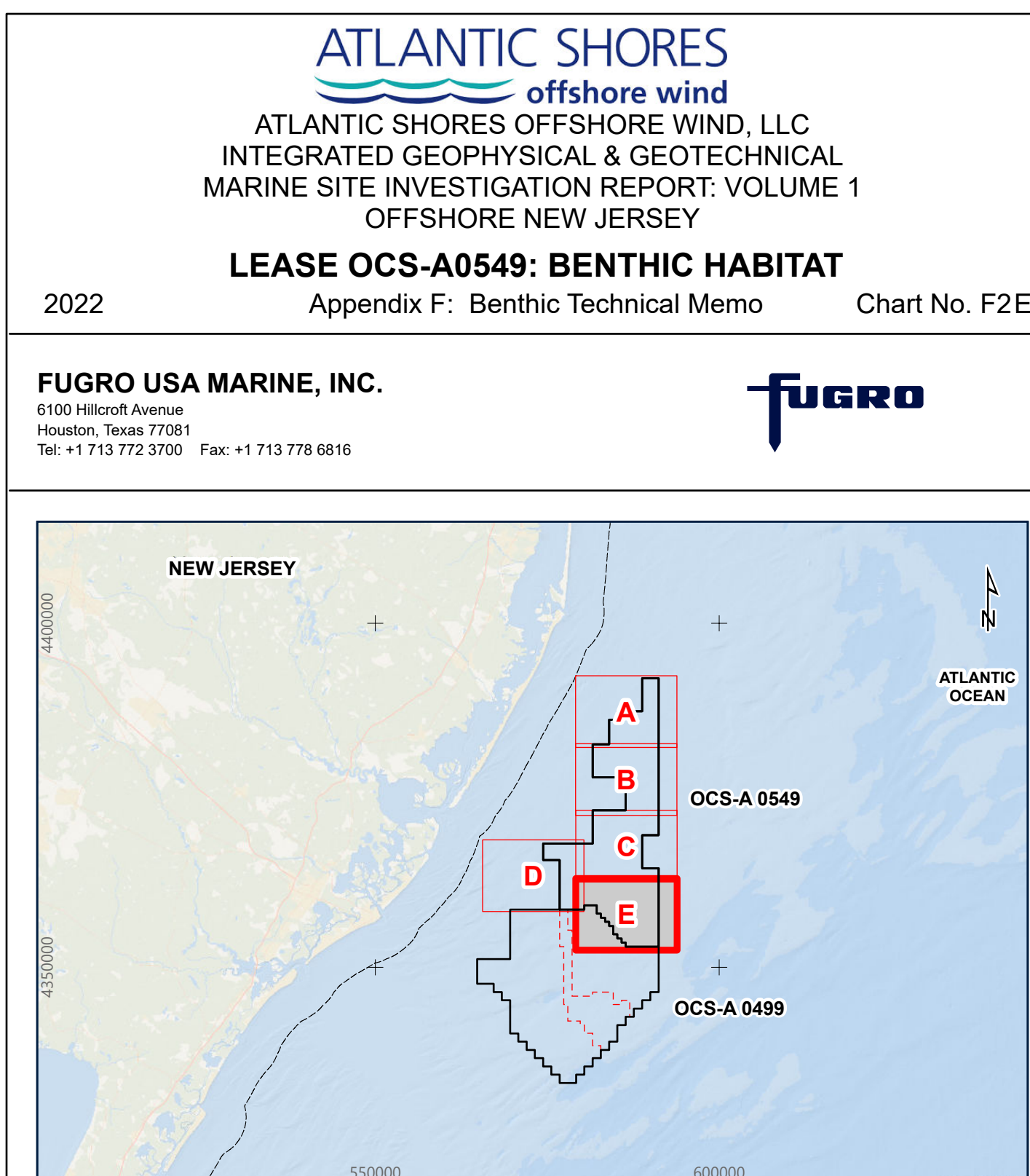
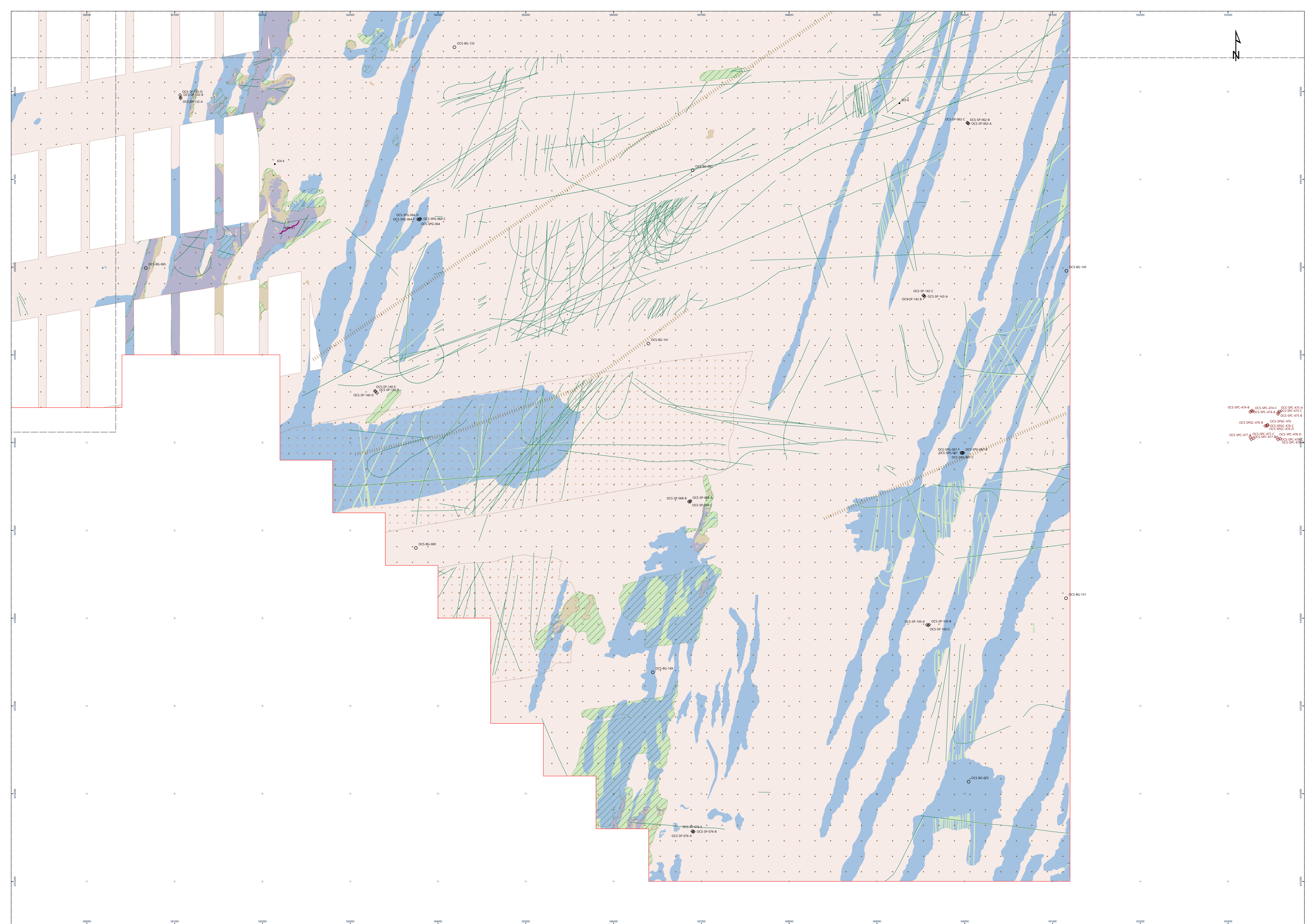
Horizontal and vertical units are in meters



| Issue No: | Date:      | Description:       | Drawn: | Checked: | Approved: |
|-----------|------------|--------------------|--------|----------|-----------|
| 01        | 08/10/2022 | DRAFT - For Review | KR     | DD       | DD        |
| 02        | 10/18/2022 | FINAL              | KR     | DD       | DD        |

|                    |                                          |              |
|--------------------|------------------------------------------|--------------|
| <b>Project No:</b> | <b>Chart Name:</b>                       | <b>Chart</b> |
| 22.21030006        | 21030011_Shell_LA0549_EFH_Classification | F2           |





**LEGEND**

Wind Turbine Area Study Extent

**DATA EXTENTS**

|                                                                                     |                               |
|-------------------------------------------------------------------------------------|-------------------------------|
|  | Wind Turbine Area             |
|  | MBES Interpretive Data Extent |

**BENTHIC SAMPLING LOCATIONS**

This chart symbolizes benthic samples taken from several surveys conducted in 2019 thru 2022 by various contractors.

- Grab Sample (Fugro, 2022)
- Grab Sample (Fugro, 2020)
- Grab Sample (TerraSond, 2019)
- ◆ SPI-PV Sample (Fugro, 2022)
- ◆ SPI-PV Sample (Fugro, 2020)
- Towed Video Transect (RPS, 2021)

**NMFS ESSENTIAL FISH HABITAT (EFH)**  
Composite benthic features layers indicate that more than one benthic feature is present in the same geographic area

BENTHIC FEATURES

Seabed Scars

- 
- Figure 1 is a legend for the seabed map. It contains six entries, each with a colored box and a label:
- Irregular Seafloor Areas:** Represented by a green box with diagonal lines.
  - Localized Relief Features:** Represented by a pink box.
  - Sand Waves:** Represented by a yellow box with dashed lines.
  - Megaripples:** Represented by a white box with red dots.
  - Ripples:** Represented by a white box with black dots.

ESSENTIAL FISH HABITAT CLASSIFICATION

- Complex
- Heterogeneous Complex
- Soft

NOTES

- 2) Pungent odors (non-invertivally) geophagical and geotaxical data in the WSA from April 2021 to August 2021.
- 3) Reproductive behavior (oviposition) was based on Figure 5 (S2020).
- 4) Observations and experimental data were taken from the Automated Wildlife and Distribution Information System (AWDIS) and Electronic Navigation Chart (ENC, NOAA 2021).
- 5) Marine Benthic Invertebrates (MIBI) (2019) – Federal Database System for Biological Assessment (FBIAS) (2020, 2020b). Submerged Land Use Data (SLUD) (2020).
- 6) EPA Habitat Modification, Survey, and Conservation of North's bivalves carried out are in reference to NMFS's report to BOEM dated March 2020 (2020) and the Department of the Interior's report to NMFS dated March 2020 (2020).
- 7) Mobile sediment areas are mapped within the California Benthic Observation (CBPA), World Wildlife Area, (Figure 2020).
- 8) No large gravel/cobble habitats were delineated within the survey area.
- 9) Marine invertebrate habitat (no armored agglutinate vegetation) (S2020) has been checked in the survey area.
- 10) Benthic macrofauna (S2020) and CTDs of gray scale (Tremont, 2019) have been checked in the survey area.
- 11) Benthic macrofauna (S2020) and CTDs of gray scale (Tremont, 2019) have been checked in the survey area.
- 12) The data edges are used in 2020 CBPA Inventory.
- 13) The data edges are used in 2020 CBPA Inventory and measure change in bottom, sediment transport, and movement of invertebrates.
- 14) Seasonal counts based on fishing activities in seasonal and annual changing, and may not be present in all interpreted datasets on the day of year that the data was collected.

**EQUIPMENT**  
Vessel(s)  
Furn Furnace Furnace Brazing RTV Rheometer

Navigation System: GPS Primary.  
(Tugo Enterprise) Tugo StarPack Global Navigation Satellite Systems  
(Tugo Brasil) Kongsberg Seapath 380 Global Navigation Satellite System.

Kongsberg EUS40 MIES for all Vessels

GrabCam (Fugro, 2020, 2022)

Towed Video (2021)  
(R/V Shearwater) Camera sled equipped with altimeter, GoPro Hero 9, and 4K camera

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|                             |                           |
|-----------------------------|---------------------------|
| <b>GEODETTIC PARAMETERS</b> |                           |
| GEODETTIC DATUM             | North American Datum 1983 |

|                 |                 |
|-----------------|-----------------|
| ELLIPSOID       | GRS 1980        |
| Semi-Major Axis | 6 378.137 000 m |

|                    |                                                         |
|--------------------|---------------------------------------------------------|
| Inverse Flattening | 298.267222101                                           |
| REDUCTION          | UNIVERSAL TO NEWERRE MEDIATOR (7-arg, 45N, 45DC, 26048) |

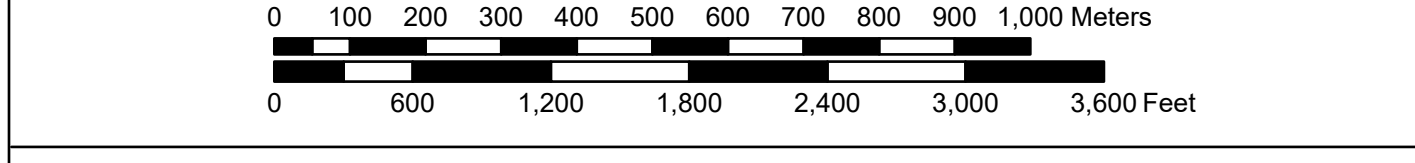
|                       |                                                       |
|-----------------------|-------------------------------------------------------|
| PROJECTION            | UNIVERSAL TRANSVERSE MERCATOR / 2011 18N (EPSG:26918) |
| Central Meridian (CM) | 75°00'00" W                                           |
| Latitude of Origin    | 00°00'00" N                                           |

|                     |            |
|---------------------|------------|
| False Easting       | 500,000 mE |
| False Northing      | 0 mN       |
| Scale Factor at GDM | 0.9996     |

|                |                             |
|----------------|-----------------------------|
| VERTICAL DATUM | MEAN LOWER LOW WATER (MLLW) |
|----------------|-----------------------------|

Horizontal and vertical units are in meters

Scale 1 : 10,000 at 42" x 67" page size



| Issue No: | Date:      | Description:       | Drawn: | Checked: | Approved: |
|-----------|------------|--------------------|--------|----------|-----------|
| 01        | 08/10/2022 | DRAFT - For Review | KR     | DD       | DD        |
| 02        | 10/18/2022 | FINAL              | KR     | DD       | DD        |

|             |                                               |           |
|-------------|-----------------------------------------------|-----------|
| Project No: | Chart Name:                                   | Chart No: |
| 00-01000000 | 01000044 - Shell, L-10010, ECU, Glass/Flexion | 50        |