W00659

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service

DESCRIPTIVE REPORT

Type of Survey: Basic Hydrographic Survey

Registry Number: W00659

LOCALITY

State(s):   Virginia

General Locality: Approaches to Chesapeake Bay

Sub-locality: Offshore Virginia Beach

2021

CHIEF OF PARTY
Jerry R. Barnes

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Date:

| U.S. DEPARTMENT OF COMMERCE | REGISTRY NUMBER: |
| NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | |

HYDROGRAPHIC TITLE SHEET

W00659

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s): **Virginia**

General Locality: **Approaches to Chesapeake Bay**

Sub-Locality: **Offshore Virginia Beach**

Scale: **25000**

Dates of Survey: **04/01/2021 to 08/09/2021**

Instructions Dated: **N/A**

Project Number: **ESD-AHB-22**

Field Unit: **Dominion Energy**

Chief of Party: **Jerry R. Barnes**

Soundings by: **Teledyne RESON SeaBat T50-P** (MBES)
R2Sonic 2024 (MBES)

Imagery by: **N/A**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83 UTM 18N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

DESCRIPTIVE REPORT MEMO

September 16, 2022

MEMORANDUM FOR: Pacific Hydrographic Branch

FROM: Report prepared by PHB on behalf of field unit
Jerry R. Barnes
Permitting Manager, Dominion Energy

SUBJECT: Submission of Survey W00659

Data were originally collected for Dominion Energy as a geophysical and geotechnical survey to acquire bathymetry, side scan sonar, gradiometer, sub bottom profiler, and single channel seismic data. Only bathymetric data was provided to NOAA by Dominion Energy for charting purposes. The field units collected data in three locations. This report is compiled from the metadata provided for these three locations where were named, "Lease", "ECRC", and "Shallow". The following information are relevant excerpts from the provided metadata.

An Average 50cm XYZ surface was exported directly from Qimera 2.2.1 in NAD83 (2011) UTM18N after completion of the processing details found in the summary. This XYZ was gridded in Global Mapper at the appropriate resolution and exported as final tiled surfaces in XYZ format. The tile scheme used was created at a 2km x 2km scale, with tile names relevant to the lower left corner position

All soundings were reduced to Mean Lower Low Water using VDatum. The horizontal datum for this project is North American Datum of 1983 (NAD 83). The projection used for this project is Universal Transverse Mercator (UTM) Zone 18.

Lease:

Wind Farm Identifier: CVOW-C, Ellipsoid: GRS 1980, Projection: Transverse Mercator, NAD83(2011)/UTM Zone 18N (ESPG:6347), Transformation: Time-dependent Helmert Transformation of ITRF08 to NAD83(2011), Collection Date: April 2020 to June 2021, Vertical Datum: Mean Lower Low Water (MLLW)

Survey Details: Dominion Energy geophysical and geotechnical survey off the coast of Virginia and North Carolina. Four vessels were used for this survey in 2020: M/V Sarah Bordelon, M/V Marcelle Bordelon, R/V Kommandor Iona, and R/V Northstar Challenger. Three vessels were used for this survey in 2021: R/V Kommandor Stuart, M/V GO Discovery, and R/V Minerva Uno (Operated by

Alpine Ocean). As part of the development of the Coastal Virginia Offshore Windfarm (CVOW-C), a high-resolution geophysical survey was conducted along the planned wind turbine generator (WTG) positions in CVOW-C.

Calibration Procedures: MBES Patch Test performed prior to data acquisition.

Navigation Processing Summary and Software: GPS data were processed with a PP-RTX solution using Applanix POSPac MMS 8.4/8.5 to a Smoothed Best Estimate Trajectory (SBET) files for pairing with MBES data in Qimera, Application of SVP data from AML MVP30 using Nearest in Distance within Time: 2 hours", as well application of TU Delft sound speed algorithm (where applicable); application of PP-RTX SBET solution; application of NOAA V-Datum Separation model to reduce heights from native ellipsoid to MLLW; data cleaning using IHO Special Order filters, outer beam filtering, manual cleaning in swath and slice editors; QC using 1m TPU, Density, and Standard Deviation surfaces, Software used for Deliverables: QPS Qimera 2.2.1, ESRI ArcGIS and Global Mapper 19.

Process for Export: Ungridded ASCII files were exported directly from Qimera 2.2.1 once all processing steps mentioned in the summary above were completed. This is done using the Qimera export tool that allows export of ungridded line by line files. Gridded XYZ surfaces for each surface type were exported directly from Qimera 2.2.1. This included 50cm resolution Average and Minimum surfaces as well as 1m resolution Standard Deviation, Density, THU, and TVU surfaces. These XYZs were gridded in Global Mapper at the appropriate resolution and exported as final tiled surfaces in XYZ (all surface types), TIF (Average and Minimum), and FLT (Average and Minimum) file types. The tile scheme used was created at a 2km x 2km scale, with tile names relevant to the lower left corner position.

Positional Uncertainty: All MBES data meet IHO Special Order for THU and TVU. THU for Special Order is 2m; TVU is depth dependent, with a maximum TVU at 18m depth of 28cm and at 42m depth of 40cm, Density Specification: Minimum 5 pings per square meter.

ECRC:

Wind Farm Identifier: CVOW-C ECR Survey Details: Data from across ECR area was acquired by Alpine Ocean Seismic Survey, Inc. Survey Acquisition Dates: 2020-05-23 to 2020-11-20.

Data Acquisition: Projection: Horizontal datum: NAD83 (2011) Ellipsoid name: GRS 1980 Coordinate system: UTM 18 N Vertical Datum: MLLW. Two vessels were used for this survey, RV Shearwater and the RV Minerva Uno.

Equipment Type: R2Sonic 2024 dual head Multibeam Echo Sounder 200-400kHz frequency range. Data processing has been carried out using CARIS version is 11.3.8. Swath Angle surfaces were used to generate all XYZ's. Bathymetry data was sound velocity corrected using SVP profiles collected regularly during survey operations using an AML MVP 30/350 based on the nearest in time. Tidal elevations and positioning are derived by post-processing GNSS and motion data logged throughout the survey period to produce a highly accurate vessel position and to recover the full

spectrum of motion – heave, squat, settlement and tide. The raw GNSS/IMU data is post-processed using POSPac to achieve a tightly-coupled PPK/INS solution. The Smoothed Best Estimate of Trajectory (SBET) output from POSPac contains the position and motion data. The processed GNSS heights and positions are reported in NAD83 (2011) reference frame. The SBET file is applied to data in Caris on a line-by-line basis to derive a GNSS tide. This element of the processing essentially removes the measured heave from the bathymetry and substitutes the processed SBET GNSS altitude. The SBET file is output relative to the VRP, all lever arms and offsets are applied in CARIS 11.3.8.

Data were converted from raw format using Caris 11.3.8. Once converted navigation and attitude data were checked for any spikes or erroneous data points. A swath model was used. An ellipsoid separation model was used to compute depths relative to Mean Lower Low Water in Caris, with values from NOAA VDATUM. The acquisition software was QPS QINSy v9.2. Processing software used was CARIS HIPS & SIPS v11.1.7 All data were loaded into Global Mapper v22, and exported from there with respect to the tilemap. Multibeam Echosounder ungridded processed point cloud data. XYZ Data exported line by line, after data was cleaned, vertically corrected to MLLW, SVP application and motion corrected.

Dataset Title: Multibeam Echosounder 0.5m Average Grid File Type: XYZ, tile size 2x2 km, tiled according to UTM 18 NAD83 2011, Tile named according to lower left corner.

Shallow:

Wind Farm Identifier: CVOW-C ECRC Survey Details: Data from across ECRC area was acquired by Alpine Ocean Seismic Survey, Inc. Survey Acquisition Dates: 21-Jun-2021 to 09-Aug-2021.

Data Acquisition: Projection: Horizontal datum: NAD83 (2011) Ellipsoid name: GRS 1980 Coordinate system: UTM 18 N Vertical Datum: MLLW. One vessel was used, RV Henry Hudson.

Equipment Type: R2Sonic 2024 Multibeam Echo Sounder 200-400kHz frequency range. Data processing has been carried out using CARIS version is 11.3.8. Cube surfaces were used to generate all XYZ's, whereas standard deviation and Density were created using swath angle grids. THU and TVU grids were created using Shoalest Depth true Position grids. Bathymetry data was sound velocity corrected using SVP profiles collected regularly during survey operations using an SonTek Castaway CTD. The casts were applied based on the nearest in distance within three hours the cast.

Tidal elevations and positioning are derived by post-processing GNSS and motion data logged throughout the survey period to produce a highly accurate vessel position and to recover the full spectrum of motion – heave, squat, settlement and tide. The raw GNSS/IMU data is post-processed using POSPac to achieve a tightly-coupled PPK/INS solution using Applanix's Post Processed Centerpoint RTX corrections. The Smoothed Best Estimate of Trajectory (SBET) output from POSPac contains the position and motion data. The processed GNSS heights and positions are reported in NAD83 (2011) reference frame. The SBET file is applied to data in Caris on a line-by-line basis to derive a GNSS tide. This element of the processing essentially removes the measured heave from the bathymetry and substitutes the processed SBET GNSS altitude. The SBET file

is output relative to the VRP, all lever arms and offsets are applied in CARIS 11.3.8. Data were converted from raw format using Caris 11.3.8.Once converted navigation and attitude data were checked for any spikes or erroneous data points. A swath model was used. An ellipsoid separation model was used to compute depths relative to Mean Lower Low Water in Caris, with values from NOAA VDATUM. The acquisition software was QPS QINSy v9.2. Processing software used was CARIS HIPS & SIPS v11.3.8 All data were loaded into Global Mapper v22 and exported from there with respect to the tilemap.

Multibeam Echosounder 0.5m Average Grid File Type: XYZ, color shaded GeoTIFF, FLT 0.5 m grid, tile size 2x2 km, tiled according to UTM 18 NAD83 2011, Tile named according to lower left corner.

Office Processing:

Data was imported into point clouds per region using CARIS Base Editor 5.5. These point clouds were used to create one surface for the whole survey at a 50cm resolution. Uncertainty was calculated using the following formula: 0.5m + (1% * Depth).

All data were reviewed for DTONs and none were identified in this survey.

Dominon Energy acquired the data outlined in this report. Additional documentation from the data provider may be attached to this report.

A junction comparison was performed during office review. Survey W00659 junctions with 11 surveys that were collected from 2005-2021. In an effort to maximize efficiency, the junction surveys were combined in to one surface for the junction analysis. The surface from W00659 was differenced with the combined junction grid in BDB 5.5 and then "Compute Statistics" were done on the resulting surface. As a result it was found that W00659 shows very good agreement with its junction surveys. Large differences are due to fliers in the junction grids (H11568) and along the slopes of wrecks. Results of the junction comparison can be found in the figure below.
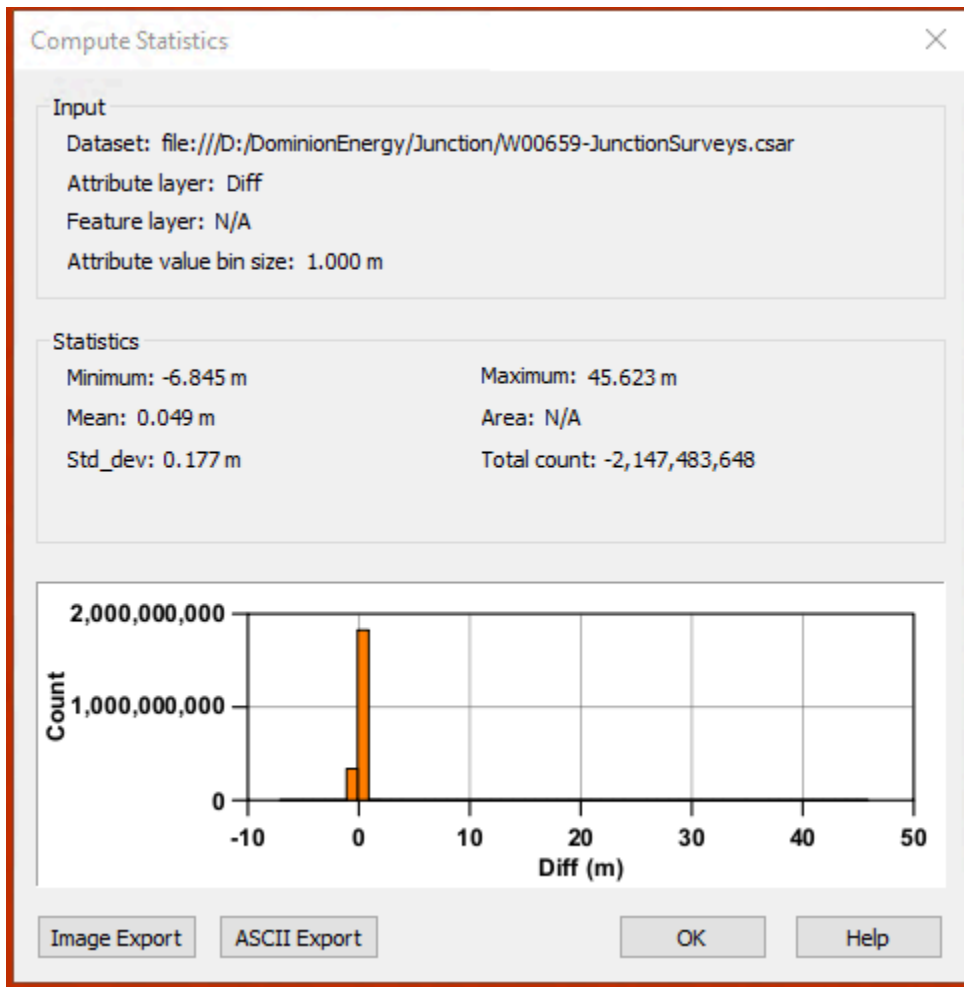
Junction statistics between W00659 and a combined
surface consisting of of the 11 junction surveys in the area.

This survey does meet charting specifications and is adequate to supersede prior data.