OCTOBER 29 | 2021



Appendix E: Essential Fish Habitat Assessment

Coastal Virginia Offshore Wind Commercial Project

Dominion Energy®

Submitted by:
Dominion Energy Services, Inc.
707 E. Main Street,
Richmond, VA 23219

Prepared by:
Tetra Tech, Inc.
4101 Cox Road, Suite 120
Glen Allen, VA 23060

Submitted to:
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, VA 20166

TABLE OF CONTENTS

E.1 Introduction E-1

E.2 Managed Species and Habitats in the Offshore Project Area E-3

E.2.1 Previous EFHA Consultations for U.S. Atlantic Offshore Wind Projects E-6
E.2.2 Review of EFH in the Project Area E-6
E.2.3 Categories of EFH: Habitat Types E-8
E.2.3.1 Pelagic Habitat: Water Column EFH E-8
E.2.3.2 Benthic Habitat – Softbottom EFH E-13
E.2.3.3 Benthic Habitat: Hardbottom EFH E-24
E.2.3.4 Benthic-Pelagic Coupling E-26
E.2.4 Other NOAA Trust Resources E-26

E.3 Description of the Proposed Action E-30

E.4 Effects of the Project on EFH E-32

E.4.1 Species Least Likely to be Affected by the Project E-33
E.4.2 Species and Life Stages Most Likely to be Affected by the Project E-34
E.4.3 Analysis of Potential Construction Impacts E-35
E.4.3.1 Disturbance, Injury, or Mortality of Managed Species E-35
E.4.3.2 Burial of Organisms by Sediment Deposition E-37
E.4.3.3 Entrainment of Plankton and Ichthyoplankton E-37
E.4.3.4 Disturbance from Pile-driving Noise and Vibration E-38
E.4.4 Analysis of Potential Operations and Maintenance Impacts E-40
E.4.4.1 Loss of softbottom habitat E-40
E.4.4.2 Long-term conversion of softbottom to artificial hardbottom habitat and introduction of vertical infrastructure to the water column E-41

E.5 Summary of Effects to EFH E-45

E.5.1 Summary of Effects on Water Column, Plankton, and Ichthyoplankton E-45
E.5.2 Summary of Effects on Softbottom Substrate E-46
E.5.3 Summary of Effects on Hardbottom Substrate E-46
E.5.4 Avoidance, Minimization, and Mitigation Measures E-47

E.6 References E-48

TABLES

Table E-1. Species in the Offshore Project Area Managed by Federal, Regional, and State Agencies E-4
Table E-2. Designated EFH by Species and Life Stage in the Offshore Project Area E-6
Table E-3. Categories of Essential Fish Habitat in Offshore Project Area E-8
Table E-4. Depth Profiles in the Offshore Project Area E-12
Table E-5. Sediment Types in the Offshore Project Area, Interpreted from MBES, SSS, and Backscatter Data Processed at 0.1 to 0.5 m^2 resolution. E-14
Table E-6. Summary of Maximum Design Scenarios for Essential Fish Habitat as Outlined in Project Design Envelope E-30
Table E-7. Managed Species and Life Stages Least Likely to be Affected by the Project E-34
Table E-8. Managed Species and Life Stages Most Likely to be Adversely Affected by Construction and O&M E-34
Table E-9. Managed Species and Life Stages Attracted to Artificial Structures E-35
Table E-10. Acoustic Threshold Levels for Fishes in Response to Impulsive Noise E-39
Table E-11. Project Impact-Producing Factors and Proposed Avoidance, Minimization, and Mitigation Measures E-47

FIGURES

Figure E-1. CVOW Commercial Offshore Project Area Overview E-2
Figure E-2. Bathymetry Overview in the Lease Area (TerraSond 2021) E-10
Figure E-3. Bathymetry Overview in the Offshore Export Cable Route Corridor (Alpine 2021) E-11
Figure E-4. Grain size and backscatter correlation based on samples classification E-17
Figure E-5. Seabed Morphology Overview in the Lease Area (TerraSond 2021), See Attachment E-3 for full-scale maps E-18
Figure E-6. Seabed Habitat Interpretation Overview as CMECS in the Lease Area (TerraSond 2021), See Attachment E-3 for full-scale maps E-19
Figure E-7. Seabed Morphology Overview in the Offshore Export Cable Route Corridor (Alpine 2021), See Attachment E-3 for full-scale maps E-20
Figure E-8. Seabed Habitat Interpretation Overview as CMECS in the Offshore Export Cable Route Corridor (Alpine 2021), See Attachment E-3 for full-scale maps E-21
Figure E-9. Representative Plan View Bottom Images in the Offshore Project Area Collected during Summer 2020 Surveys E-23
Figure E-10. Publicly Documented Shipwrecks and Artificial Reefs in the Offshore Project Area and Vicinity E-25

ATTACHMENTS

Attachment E-1: Profiles of Managed Species

Attachment E-2: Oversized Tables

Attachment E-3: Oversized Maps

ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
°F	degree Fahrenheit
µm	micrometer
ac	acre
ASMFC	Atlantic States Marine Fisheries Commission
BOEM	Bureau of Ocean Energy Management
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operations Plan
CVOW	Coastal Virginia Offshore Wind
Dominion Energy	Dominion Energy Virginia
EA	Environmental Assessment
EFH	Essential Fish Habitat
EFHA	Essential Fish Habitat Assessment
EMF	electric and magnetic fields
FMC	Fishery Management Council
FMP	Fishery Management Plan
GARFO	Greater Atlantic Regional Fisheries Office
gpm	gallons per minute
ft	foot
ha	hectare
HAPC	Habitat Area of Particular Concern
HRG	High-Resolution Geophysical
km	kilometer
Lease Area	Outer Continental Shelf Offshore Virginia (Lease No. OCS-A-0483)
m	meter
MAFMC	Mid-Atlantic Fishery Management Council
MAG/TVG	Magnetometer/Transverse Gradiometer
MBES	Multibeam echo sounder
MCS	Multi-Channel Seismic
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSIR	Marine Site Investigation Report
NEFMC	New England Fishery Management Council
nm	nautical mile
NOAA	National Oceanographic and Atmospheric Administration
NOAA Fisheries	NOAA National Marine Fisheries Service
O&M	Operations and Maintenance
OCS	Outer Continental Shelf
Offshore Project Area	Project Components in Lease Area and Offshore Export Cable Route Corridor
PDE	Project Design Envelope
ppt	parts per thousand
Project	Coastal Virginia Offshore Wind Commercial Project
SBP	Sub-Bottom Profiler
SCS	Single-Channel Seismic

SSS	Side scan sonar
UHRS	Ultra-High Resolution Seismic
U.S.	United States
VMRC	Virginia Marine Resources Commission
WEA	Wind Energy Area
WTG	Wind Turbine Generator

E.1 INTRODUCTION

The Virginia Electric and Power Company, doing business as Dominion Energy Virginia (Dominion Energy), is proposing to construct, own, and operate the Coastal Virginia Offshore Wind (CVOW) Commercial Project (the Project). The Project will be located in the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS) Offshore Virginia (Lease No. OCS-A-0483) (Lease Area), which was awarded to Dominion Energy through the Bureau of Ocean Energy Management (BOEM) competitive renewable energy lease auction of the Wind Energy Area (WEA) offshore of Virginia in 2013. The Lease Area covers approximately 112,799 acres (ac; 45,658 hectares [ha]) and is approximately 27 statute miles (23.8 nautical miles [nm], 44 kilometers [km]) off the Virginia Beach coastline.

Federal jurisdiction of fisheries of the United States (U.S.) applies to marine waters between the state boundary (3 nm [5.6 km]) and the U.S. Exclusive Economic Zone (200 nm [370 km]). The Commonwealth of Virginia has jurisdiction in marine and tidal waters between the shoreline and the state boundary. The Virginia Marine Resources Commission (VMRC) manages fisheries in the state portion of the Offshore Project Area and shares responsibility for some managed species with NOAA Fisheries and/or the Atlantic States Marine Fisheries Commission (ASMFC).

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) and Fishery Management Councils (FMCs) created under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) jointly manage fishery resources in the federal portion of the Offshore Project Area. The Mid-Atlantic Fishery Management Council (MAFMC) and the New England Fishery Management Council (NEFMC) regulate commercially and recreationally valuable species and stocks through fishery management plans (FMPs) and designate Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC). EFH is designated as the seafloor, water column, and sediment-water interfaces necessary for spawning, breeding, growth, and maturity (16 U.S.C. § 1802[10]). Jurisdiction is determined by species rather than location, as species ranges often cross administrative boundaries.

Under the MSA, federal agencies must consult with NOAA Fisheries regarding any actions authorized, funded, undertaken, or proposed to be authorized, funded, or undertaken under their jurisdiction. For any proposed offshore wind projects located in the northwestern Atlantic Ocean, BOEM must consult with the NOAA Fisheries' Greater Atlantic Regional Fisheries Office (GARFO). The present EFH Assessment (EFHA) was prepared in accordance with 50 Code of Federal Regulations (CFR) § 600.920(e)(1) to support BOEM during consultation with GARFO under the MSA. Potential impacts of construction, operations and maintenance (O&M), and decommissioning of the Project on species with designated EFH for one or more life stages in the Offshore Project Area are discussed. Habitat maps within the Offshore Project Area have been prepared according to GARFO's Recommendations for Mapping Fish Habitat to ensure the benthic habitat information presented in this EFHA is sufficient for BOEM to meet consultation requirements (NMFS-GARFO 2021). For the purposes of this Assessment, the Offshore Project Area includes the portions of the Project Components located in the Lease Area and Offshore Export Cable Route Corridor (Figure E-1).

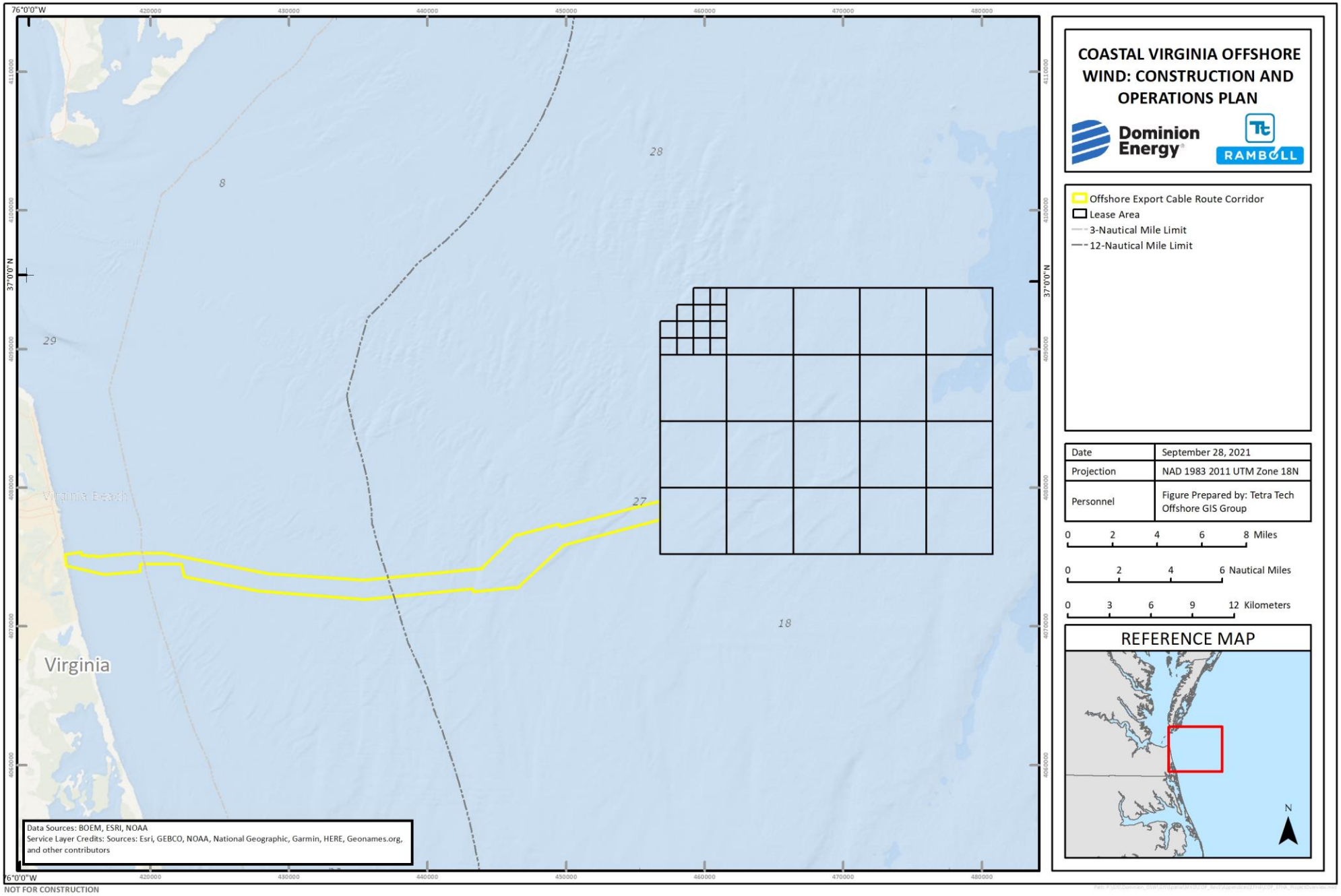


Figure E-1. CVOW Commercial Offshore Project Area Overview

This EFHA is an Appendix to the Construction and Operations Plan (COP), which presents a comprehensive description of the Project, affected environments, and potential impacts to numerous resources. A description of the affected physical and biological environments and potential impacts to benthic and pelagic habitats is presented in COP Section 4.1.1, Physical and Oceanographic Conditions; COP Section 4.1.2, Water Quality; and COP Section 4.2.4, Benthic Resources, Fishes, Invertebrates, and Essential Fish Habitat. This Assessment cross-references the COP sections and related appendices, including Appendix D, Benthic Resource Characterization Report; Appendix J, Sediment Transport Analysis; and Appendix Z, Underwater Acoustic Environment.

The required components of the EFHA are presented as follows:

- Summary of EFH for all life stages of managed species that may be exposed to stressors associated with the Project (Section E.2, Managed Species and Habitats in the Offshore Project Area);
- Description of the Project, including definitions of terms and descriptions of construction, operations and maintenance, and decommissioning activities; as well as avoidance, minimization, and mitigation measures incorporated into the Project (Section E.3, Description of the Proposed Action);
- Potential effects to designated EFH for all life stages of managed species (Section E.4, Effects of the Project on EFH);
- Summaries and determination of effects (Section E.5, Summary of Effects on EFH); and
- Literature cited (Section E.6, References).

Life history profiles of managed species with designated EFH for one or more life stages in the Offshore Project Area (including EFH maps) are presented in Attachment E-1, Profiles of Managed Species in the Offshore Project Area. Each species description includes a table and map of EFH acreages intersecting the Offshore Project Area for all relevant life stages. Attachment E-2, Oversized Tables presents the potential impacts of the Project on each managed species and life stage for which EFH intersects the Offshore Project Area. Attachment E-3, Oversized Maps presents the maps/charts generated from the HRG (High-Resolution Geophysical) survey data and geotechnical survey data, including seabed characterization in accordance with Coastal and Marine Ecological Classification Standard (CMECS) and NMFS-GARFO habitat mapping recommendations (NMFS-GARFO 2021). A detailed analysis of the seabed, resulting from the HRG surveys is included in Appendix C, Marine Site Investigation Report (MSIR).

E.2 MANAGED SPECIES AND HABITATS IN THE OFFSHORE PROJECT AREA

Approximately 600 fish species are resident or transient through the benthic and pelagic habitats of Virginia's coastal waters (BOEM 2014a). Benthic or pelagic EFH has been designated in the Offshore Project Area for one or more life stages of 33 species.

Species with EFH in the Offshore Project Area were identified using the NOAA Fisheries EFH Mapper (2021), NEFMC Omnibus Amendment 2 (2017), MAFMC FMPs, NOAA Fisheries Highly Migratory Species Amendment 10 (2017), and NOAA Fisheries EFH source documents. Dominion Energy further refined this list of species and life stages by conducting extensive surveys of the Lease Area and Offshore

Export Cable Route Corridor using multibeam echo sounder (MBES), side scan sonar (SSS), digital imagery, and sediment grab samples. The results of these surveys are described in detail in the Benthic Resource Characterization Report (Appendix D).

In the Offshore Project Area, the MAFMC and NEFMC share authority with NOAA Fisheries to manage and conserve fisheries stocks in federal waters. NOAA Fisheries' Highly Migratory Species Division is responsible for tunas and sharks in the Offshore Project Area. In addition, the ASMFC manages more than two dozen fish and invertebrate species in cooperation with the states and NOAA Fisheries; many of these species are also identified as NOAA Trust Resources.

State regulatory bodies manage and conserve fisheries stocks in state waters. The VMRC Fisheries Management Division develops and implements policies affecting saltwater recreational and commercial fisheries in the Commonwealth's tidal waters. The Division's Fisheries Plans and Statistics Department monitors the Commonwealth's finfish and shellfish fisheries and develops management plans with assistance from Fisheries Management Advisory Committees composed of representatives of fisheries interest groups. Together, the Department and Committees have developed FMPs for black drum, blue crab, bluefish, shad and river herring, spotted seatrout, striped bass, weakfish, and others (VMRC 2021a). Please note that scientific names of managed fish and invertebrate species are in Table E-1.

Table E-1 summarizes managed species that may occur seasonally or year-round in the Offshore Project Area; detailed life history profiles and EFH designations for these species are provided in Attachment E-1. EFH for temperate and subtropical–tropical managed species is organized into five life stages: egg, larva, juvenile, adult, and spawning adult. NOAA Fisheries' Highly Migratory Species Division has simplified these life stages to egg, larva, and spawning adult. Sharks are managed as neonates (newborns and pups aged less than 1 year), juveniles, and adults.

FMCs, councils, and divisions may also designate HAPCs, which are areas of EFH critical to the survival of given species. The nearest HAPC to the Offshore Project Area is Norfolk Canyon, located 21 nm (40 km) from the northeast corner of the Lease Area. There is no designated HAPC in the Offshore Project Area (NOAA Fisheries 2021).

Table E-1. Species in the Offshore Project Area Managed by Federal, Regional, and State Agencies

Common Name	Scientific Name	Essential Fish Habitat (EFH) Life Stages Designated within the Offshore Project Area
New England Fishery Management Council		
Atlantic cod	*Gadus morhua*	Egg, Larva
Atlantic herring a/	*Clupea harengus*	Juvenile, Adult
Atlantic sea scallop	*Placopecten magellanicus*	ALL
clearnose skate	*Raja eglanteria*	Juvenile, Adult
monkfish b/	*Lophius americanus*	ALL
pollock	*Pollachius virens*	Larva
red hake	*Urophycis chuss*	Adult
windowpane flounder	*Scophthalmus aquosus*	ALL
winter skate	*Leucoraja ocellata*	Juvenile
witch flounder	*Pseudopleuronectes americanus*	Egg, Larva
yellowtail flounder	*Limanda ferruginea*	Larva
Mid-Atlantic Fishery Management Council		
Atlantic butterfish	*Peprilus triacanthus*	ALL
Atlantic mackerel	*Scomber scombrus*	Egg, Juvenile, Adult

Common Name	Scientific Name	Essential Fish Habitat (EFH) Life Stages Designated within the Offshore Project Area
Atlantic surfclam	*Spisula solidissima*	Juvenile, Adult
black sea bass a/	*Centropristis striata*	Larva, Juvenile, Adult
bluefish a/	*Pomatomus saltatrix*	ALL
longfin inshore squid	*Doryteuthis pealeii*	Egg, Juvenile, Adult
scup a/	*Stenotomus chrysops*	Juvenile, Adult
spiny dogfish a/ b/	*Squalus acanthias*	Sub-adult Female, Adult Female, Adult Male
summer flounder a/	*Paralichthys dentatus*	ALL
NOAA Fisheries—Highly Migratory Species		
albacore tuna	*Thunnus alalunga*	Juvenile
Atlantic angel shark	*Squatina dumeril*	ALL
Atlantic bluefin tuna	*Thunnus thynnus*	Juvenile, Adult
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	Juvenile, Adult
skipjack tuna	*Katsuwonus pelamis*	Juvenile, Adult
yellowfin tuna	*Thunnus albacares*	Juvenile, Adult
blacktip shark	*Carcharhinus limbatus*	Juvenile, Adult
common thresher shark	*Alopias vulpinus*	ALL
dusky shark	*Carcharhinus obscurus*	ALL
sand tiger shark	*Carcharias taurus*	ALL
sandbar shark	*Carcharhinus plumbeus*	ALL
Smooth hound shark complex (smooth dogfish)	*Mustelus canis*	ALL
tiger shark	*Galeocerdo cuvier*	Juvenile, Adult
Atlantic States Marine Fisheries Commission and Virginia Marine Resources Commission		
amberjack c/	*Seriola dumerili*	N/A—EFH is only designated for federally managed species
American eel	*Anguilla rostrata*	
American lobster	*Homarus americanus*	
American shad	*Alosa sapidissima*	
Atlantic croaker	*Micropogonias undulatus*	
Atlantic menhaden	*Brevoortia tyrannus*	
Atlantic sturgeon	*Acipenser oxyrinchus*	
billfish c/	Istiophoriformes	
black drum	*Pogonias cromis*	
blue crab c/	*Callinectes sapidus*	
channeled whelk c/	*Busycotypus canaliculatus*	
cobia	*Rachycentron canadum*	
groupers c/	Epinephelidae	
horseshoe crab	*Limulus polyphemus*	
jonah crab	*Cancer borealis*	
red drum	*Sciaenops ocellatus*	
river herring	*Clupeidae*	
sheepshead c/	*Archosargus probatocephalus*	
spadefish c/	*Chaetodipterus faber*	
spot	*Leiostomus xanthurus*	
spotted seatrout	*Cynoscion nebulosus*	
striped bass	*Morone saxatilis*	
tautog	*Tautoga onitis*	
tilefish c/	Malacanthidae	
weakfish	*Cynoscion regalis*	

Notes:
a/ joint management with ASMFC
b/ joint management by NEFMC and MAFMC
c/ VMRC only

E.2.1 Previous EFHA Consultations for U.S. Atlantic Offshore Wind Projects

The MSA requires all federal agencies to consult with NOAA Fisheries on any actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely affect EFHs. BOEM has consulted with NOAA Fisheries on pre-COP activities such as leasing and developing Site Assessment Plans (SAPs) for several Lease Areas in the U.S. Atlantic OCS, including New Jersey, Delaware, Maryland, and Virginia (BOEM 2012); Rhode Island and Massachusetts (BOEM 2013); Massachusetts (BOEM 2014b); North Carolina (BOEM 2015a) and New York (BOEM 2016). Additionally, BOEM is conducting ongoing project-specific EFH consultations to evaluate construction and O&M impacts to EFH in the U.S. Atlantic OCS. These include the Block Island Wind Farm (USACE 2014), CVOW Pilot Project (BOEM 2015b), Cape Wind Energy Project (BOEM 2019), South Fork Wind Farm (BOEM 2021b), Ocean Wind Offshore Wind Farm (Federal Register 2021a), Revolution Wind Offshore Wind Farm (Federal Register 2021b), and Atlantic Shores (Federal Register 2021c). Essential Fish Habitat Assessments prepared to support these consultations have determined that construction, installation, and conceptual decommissioning of these projects would have minor adverse effects on EFHs resulting from noise, seabed disturbance, water quality impacts from sediment suspension and deposition, vessel activity, lighting, and introduction of novel structures into the water column. Analyses and determinations resulting from project-specific EFH consultations on the Atlantic OCS similar to the CVOW Commercial Project are incorporated into the present EFHA to the extent practicable.

E.2.2 Review of EFH in the Project Area

EFH for temperate and subtropical-tropical managed species is designated for five life stages: egg, larval, juvenile, adult, and spawning adult. Highly Migratory Species are managed as eggs, larvae, and spawning adults. Sharks are managed as neonates (newborns and pups less than 1 year), juveniles, and adults. For most species, EFH for each of life stage is designated in 10 by 10-minute squares based on habitat features, literature reviews, fishery-independent data, and best professional judgement of fisheries managers.

Managed species with EFH in the Offshore Project Area were identified using the NOAA Fisheries EFH Mapper (2021), NEFMC Omnibus Amendment 2 (2017), MAFMC FMPs, NOAA Fisheries Highly Migratory Species Amendment 10 (2017), and NOAA Fisheries EFH source documents. Dominion Energy conducted extensive surveys of the Lease Area and Offshore Export Cable Route Corridor using MBES, SSS, digital imagery, and sediment grab samples to characterize EFH. The results of these surveys are described in detail in the Benthic Resource Characterization Report (Appendix D). Designated EFH by species and life stage is presented in Table E-2.

Table E-2. Designated EFH by Species and Life Stage in the Offshore Project Area

Managed Species	Lease Area				Offshore Export Cable Route Corridor							
					Federal Waters				State Waters			
	Life Stage											
	E	L	J	A	E	L	J	A	E	L	J	A
Atlantic cod (*Gadus morhua*)	-	X	-	-	X	X	-	-	X	-	-	-

Managed Species	Lease Area				Offshore Export Cable Route Corridor							
					Federal Waters				State Waters			
	Life Stage											
	E	L	J	A	E	L	J	A	E	L	J	A
Atlantic herring (*Clupea harengus*)	-	-	X	X	-	-	X	X	-	-	-	X
Atlantic sea scallop (*Placopecten magellanicus*)	X	X	X	X	-	-	-	-	-	-	-	-
clearnose skate (*Raja eglanteria*)	-	n/a	X	X	-	n/a	X	X	-	n/a	X	X
monkfish (*Lophius americanus*)	X	X	X	-	X	X	-	X	X	X	-	X
pollock (*Pollachius virens*)	-	X	-	-	-	X	-	-	-	-	-	-
red hake (*Urophycis chuss*)	-	-	-	X	-	-	-	-	-	-	-	-
windowpane flounder (*Scophthalmus aquosus*)	X	X	X	X	X	X	X	X	X	-	X	-
winter skate (*Leucoraja ocellate*)	-	n/a	X	-	-	n/a	X	-	-	n/a	-	-
witch flounder (*Pseudopleuronectes americanus*)	X	X	-	-	X	X	-	-	X	-	-	-
yellowtail flounder (*Limanda ferruginea*)	-	X	-	-	-	X	-	-	-	-	-	-
Atlantic butterfish (*Peprilus triacanthus*)	-	X	X	X	X	-	X	X	-	-	X	X
Atlantic mackerel (*Scomber scombrus*)	X	-	X	X	X	-	X	X	-	-	-	X
Atlantic surfclam (*Spisula solidissima*)	-	-	X	X	-	-	X	X	-	-	-	-
black sea bass (*Centropristis striata*)	-	X	X	X	-	X	X	X	-	-	X	X
bluefish (*Pomatomus saltatrix*)	X	X	X	-	X	X	X	X	-	-	X	X
longfin inshore squid (*Doryteuthis [Amerigo] pealeii*)	-	-	X	X	X	-	X	X	X	-	-	-
scup (*Stenotomus chrysops*)	-	-	X	X	-	-	X	X	-	-	X	X
spiny dogfish (*Squalus acanthias*)	n/a	-	-	X	n/a	-	-	X	n/a	-	-	X
summer flounder (*Paralichthys dentatus*)	X	X	X	X	X	X	X	X	-	-	X	X
albacore tuna (*Thunnus alalonga*)	-	-	X	-	-	-	X	-	-	-	X	-
Atlantic angel shark (*Squatina dumeril*)	n/a	X	X	X	n/a	-	-	-	n/a	-	-	-
Atlantic bluefin tuna (*Thunnus thynnus*)	-	-	X	X	-	-	X	X	-	-	X	X
Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)	n/a	-	-	X	n/a	-	X	X	n/a	-	X	X
Atlantic skipjack tuna (*Katsuwonus pelamis*)	-	-	X	X	-	-	X	X	-	-	-	X
Atlantic yellowfin tuna (*Thunnus albacares*)	-	-	X	X	-	-	X	-	-	-	X	-
blacktip shark (*Carcharhinus limbatus*)	n/a	-	X	X	n/a	-	X	X	n/a	-	X	X
common thresher shark (*Alopias vulpinus*)	n/a	X	X	X	n/a	X	X	X	n/a	X	X	X

Managed Species	Lease Area				Offshore Export Cable Route Corridor							
					Federal Waters				State Waters			
	Life Stage											
	E	L	J	A	E	L	J	A	E	L	J	A
dusky shark (*Carcharhinus obscurus*)	n/a	X	X	X	n/a	X	X	X	n/a	X	-	-
sand tiger shark (*Carcharias taurus*)	n/a	X	X	X	n/a	X	X	X	n/a	X	X	X
sandbar shark (*Carcharhinus plumbeus*)	n/a	X	X	X	n/a	X	X	X	n/a	X	X	X
smooth hound shark complex / smooth dogfish (*Mustelus canis*)	n/a	X	X	X	n/a	X	X	X	n/a	X	X	X
tiger shark (*Galeocerdo cuvier*)	n/a	-	X	X	n/a	-	X	X	n/a	-	X	X

Notes:
X EFH for this life stage is designated in the given portion of the Offshore Project Area
- No EFH for this life stage is designated in the given portion of the Offshore Project Area
n/a No EFH is designated for this life stage
A Adult (including Sub-Adult)
E Egg
L Larva (or neonate if shark species)
J Juvenile

E.2.3 Categories of EFH: Habitat Types

The Offshore Project Area contains three broad categories of EFH that support managed species: water column (pelagic habitat), softbottom (benthic habitat), and hardbottom (benthic habitat; Table E-3).

Table E-3. Categories of Essential Fish Habitat in Offshore Project Area

EFH Category	Representative Habitats in CVOW Offshore Project Area
Pelagic Habitat: Water Column	All waters and associated currents from the seafloor to the sea surface, including bays and estuaries
Benthic Habitat: Softbottom	Seafloor substrate characterized by soft, unconsolidated sediments, including silt, mud, clay, sand, gravel, pebbles, cobbles, and shell fragments
Benthic Habitat: Hardbottom	Seafloor substrate characterized by complex, three-dimensional artificial reef habitat, including ships, tires, cable spools, and other intentionally deployed materials (e.g., Fish Haven)

E.2.3.1 Pelagic Habitat: Water Column EFH

Pelagic habitats are the open waters from the seafloor to the sea surface. They are characterized by physical parameters such as depth, distance from shore, light penetration, temperature, and turbidity. For example, the photic zone falls within the top 650 feet (ft; 198 meters [m]) of ocean where sunlight penetrates the water column. This zone strongly influences pelagic habitats by supporting photosynthetic phytoplankton and dispersing planktonic egg and larval stages (NOAA Fisheries 2017). Physiochemical conditions including dissolved oxygen, currents, pH, and temperature further influence the occurrence and abundance of these managed species (Pineda et al. 2007). Such conditions in the Offshore Project Area are described in greater detail in the COP (see Section 4.1.1, Section 4.1.2, and Appendix X, Metocean Assessment) and summarized here.

Current patterns, local weather, broad climactic events, and anthropogenic activities can influence dynamic water quality parameters such as conductivity, dissolved oxygen, and pH. Light penetration and temperature

generally covary with depth, although these relationships may not be linear. Inner shelf waters (60–100 ft [18–30 m]) are influenced by nearshore conditions such as winds and tidal action; intermediate shelf waters (100–160 ft [30–50 m]) are mostly wind driven; and shelf edges (160–330 ft [50–100 m]) are influenced primarily by the southbound Labrador Current and northwest Gulf Stream (Lee et al. 1981; Atkinson and Targett 1983).

A persistent cross-shelf salinity gradient exists in the Mid-Atlantic Bight because of freshwater runoff from the Hudson-Raritan Estuary System, Delaware Bay, and Chesapeake Bay (Castelao et al. 2010). Following periods of high runoff, a strong vertical salinity gradient has been observed across portions of the continental shelf (Wilkin and Hunter 2013). Historical annual mean salinities for the entire Mid-Atlantic Bight range from 32.7 to 34.5 parts per thousand (ppt) (NOAA 2003). NEFSC seasonal trawl CTD data (conductivity, temperature, and depth data gathered by a sonde instrument) collected from 2003 to 2016 generated water column salinity profiles consistent with these historical values (Guida et al. 2017). Salinity was recorded within the euhaline range (29.8-34.0 ppt), indicating relative stability of this pelagic habitat feature (Guida et al. 2017).

The National Coastal Condition Report IV (EPA 2012) rated the condition of Virginia Beach shoreline waters near the Cable Landfall Location as "poor to fair" and the waters of the Offshore Project Area as "fair to good." Wastewater treatment equipment, stormwater runoff, agricultural runoff, and other anthropogenic factors may indirectly influence dissolved oxygen by yielding occasional algal blooms and subsequent hypoxic events in the nearshore regions of the Offshore Project Area (VDEQ 2020). Concentrations of dissolved oxygen in offshore waters are expected to consistently exceed safe thresholds for marine organisms (i.e., more than 5 milligrams per liter) (BOEM 2015).

Water depth influences surface and bottom temperatures, light penetration, sediment movement, and other physiochemical parameters that define EFH. In the Offshore Project Area, charted water depths range from 0 to 62 ft (0 to 19 m) in the Offshore Export Cable Route Corridor and 62 to 134 ft (19 to 41 m) in the Lease Area (NOAA 2021). Depths increase seaward along roughly a southwest to northeast gradient, with the shallowest areas in the northwest and southwest corners and deepest areas in the northeast corner (Figure E-2).

During 2020 and 2021, Dominion Energy completed full-coverage HRG and geotechnical surveys in the Lease Area and Offshore Export Cable Route Corridor (TerraSond 2021; Alpine 2021). Relevant findings from those surveys are based on the interpretations of Sub-bottom Profiler (SBP), Ultra High-Resolution Seismic (UHRS), SSS, MBES, and Magnetometer/Transverse Gradiometer (MAG/TVG) equipment. MBES data were used to correlate SSS contact positions and prominent features of the seafloor during interpretation. Backscatter data were utilized to generate seafloor interpretations along with the MBES and SSS data, as summarized in Section E.2.3.2.2, Habitat Mapping. These surveys included a total of five vessels and approximately 20,000 km of survey lines in the Lease Area, and three vessels and approximately 3,300 km of survey lines in the Offshore Export Cable Route Corridor. The bathymetry of the entire Offshore Project Area (TerraSond 2021; Alpine 2021), is shown with bathymetric contours as an overview in Figure E-2 and Figure E-3, with additional detailed panels in Attachment E-3. Depth profiles and acreages are shown in Table E-4. Additionally, the full-coverage Offshore Project Area bathymetry based on geophysical survey data are available as a webmap tool, located at: https://cvowc.tetratech.com.

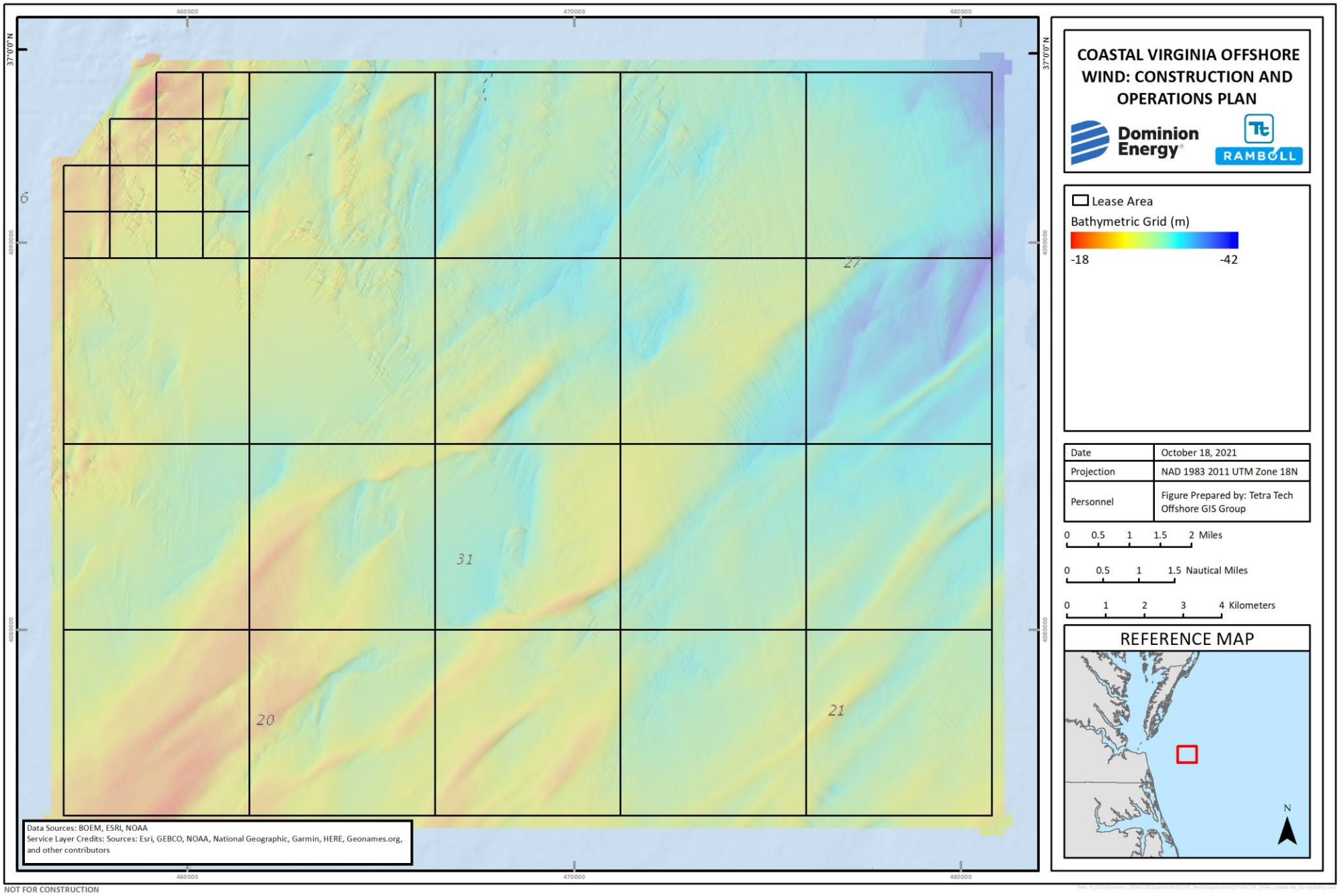


Figure E-2. Bathymetry Overview in the Lease Area (TerraSond 2021)

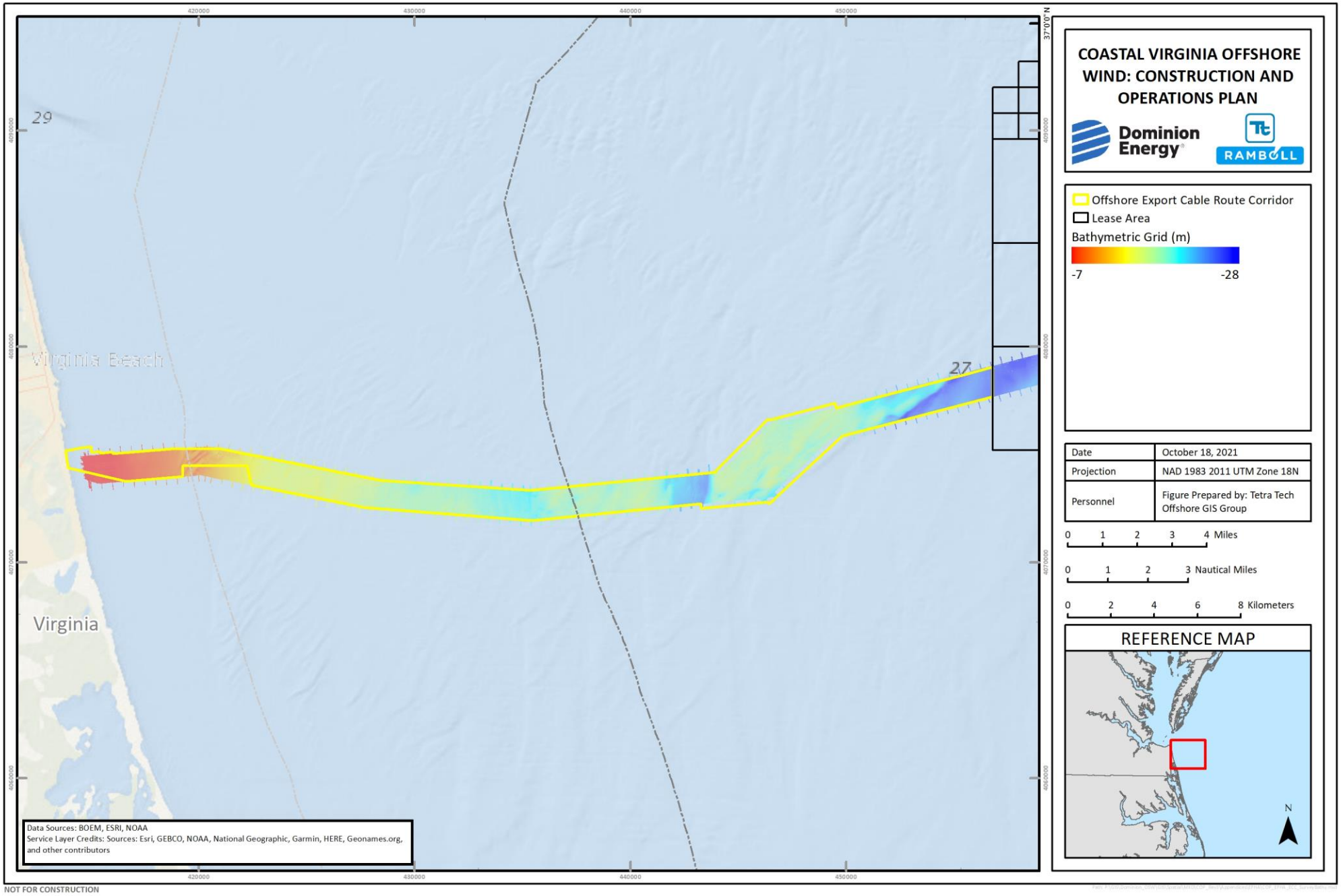


Figure E-3. Bathymetry Overview in the Offshore Export Cable Route Corridor (Alpine 2021)

Table E-4. Depth Profiles in the Offshore Project Area

Offshore Project Area	Depth Range (m)	Acres (Hectares) at Depth Range	% of Total Acreage
Offshore Export Cable Route Corridor: State Waters	0 to 5	86 (34.8)	4.7
	5 to 10	1,234 (499.4)	67.4
	10 to 15	449 (181.7)	24.5
Offshore Export Cable Route Corridor: Federal Waters	10 to 15	810 (327.8)	5.9
	15 to 20	8,957 (3,624.8)	64.9
	20 to 25	3,107 (1,257.4)	22.5
	25 to 30	720 (291.4)	5.2
Lease Area	15 to 20	120 (48.6)	0.1
	20 to 25	13,386 (5,417.1)	11.9
	25 to 30	65,048 (26,324)	57.7
	30 to 35	31,391 (12,703.5)	27.8
	35 to 40	2,777 (1,123.8)	2.5

Water temperatures in the Offshore Project Area vary greatly with depth and season. Seasonal variations include a range of 27 degrees Fahrenheit (˚F, 15 degrees Celsius [˚C]) at the seafloor and a range of 36˚F (20˚C) at the surface (Guida et al. 2017). April marks the initiation of thermal stratification, as ambient temperatures begin to raise surface water temperatures above those of bottom temperatures. Maximum surface-to-bottom thermal gradients include a range of 27˚F (15˚C) in August, followed by vertical turnover in September and October. Temperatures may drop 22˚F (12˚C) throughout the water column by the following January. These seasonal variations can trigger physiological and behavioral responses (e.g., gonadal development, seasonal migration) in managed species. Warm temperate species arrive from the south as Virginia's coastal waters warm in the summer; these species are replaced by cold temperate species from the north as water temperatures cool in the winter (BOEM 2014a). The thermal cycle redistributes highly mobile managed species and influences settlement timelines for planktonic stages of less mobile demersal species

The assemblage of pelagic species in the Offshore Project Area varies by season and with distance from shore. Bays and estuaries provide spawning, nursery, and foraging purposes habitats (MAFMC 2017; NEFMC 2017). Pelagic species tolerant of low salinities occur seasonally in bays and estuaries (e.g., Atlantic herring [*Clupea harengus*], Atlantic butterfish [*Peprilus triacanthus*], Atlantic mackerel [*Scomber scombrus*], bluefish [*Pomatomus saltatrix*], scup [*Stenotomus chrysops*]). Inshore habitat uses may be further divided by life stage. For example, Atlantic herring larvae occur in salinities as low as 2.5 ppt; juveniles also tolerate low salinities but exhibit increasing preference for higher salinities (>28 ppt) as they age (Reid et al. 1999; Stevenson and Scott 2005; NEFMC 2017).

In offshore waters over the continental shelf, the photic zone supports phytoplankton (e.g., diatoms and dinoflagellates), particularly in areas with high nutrient content, such as coastal zones enriched by runoff or shelf-break zones enriched by upwelling. Current dynamics provide a dispersal mechanism for planktonic eggs and larvae of managed species. The continental shelf of the Mid-Atlantic Bight receives Labrador Current cold-water influxes from the north and Gulf Stream warm-water influxes from the south. To the south of the Offshore Project Area, Cape Hatteras demarcates a dynamic ichthyoplankton faunal transition zone between two broad eco-regions: the Mid-Atlantic Bight, which extends from Delaware Bay to Cape Hatteras, and the South Atlantic Bight, which extends from Cape Hatteras to Cape Canaveral

(Grothues and Cowen 1999; Hare et al. 2001; Hare et al 2002). Ichthyoplankton from this transition zone are carried to the Offshore Project Area by prevailing currents.

As a result, larvae of species distributed throughout the U.S. Atlantic Coast occur in the Offshore Project Area (BOEM 2014a). Buoyant eggs and larvae are widely dispersed by currents during the weeks or months they remain in the plankton (Hare et al. 2001; Hare et al. 2002; Walsh et al. 2015). For example, the four- to eight-month planktonic larval stage of the Atlantic herring allows ample time for individuals to be distributed across the U.S. Atlantic Coast (NEFMC 2017). Such widespread phytoplankton and ichthyoplankton assemblages support some short-lived, highly fecund managed species (e.g., Atlantic mackerel) that serve as a forage base for longer-lived, highly migratory managed species (e.g., tunas and pelagic sharks) (see Attachment E-1; NEFMC 2017; NOAA Fisheries 2017).

E.2.3.2 Benthic Habitat – Softbottom EFH

E.2.3.2.1 Seabed Characterization

A detailed analysis of the seabed, resulting from the HRG surveys is included in Appendix C, MSIR, summarized in this section. Softbottom habitats are characterized by soft, unconsolidated sediments, including silt, mud, clay, sand, gravel, pebbles, cobbles, and shell fragments. The softbottom sediments offshore of Virginia are typical of the rest of the Mid-Atlantic Bight and are characterized by fine sand and punctuated by gravel and silt/sand mixes (Milliman 1972; Steimle and Zetlin 2000). Offshore Project Area substrates are consistent with this regional pattern and include unconsolidated sediments comprised of gravel (larger than 2000 micrometers [µm]), sand (62.5 to 2000 µm), silt (4 to 62.5 µm), clay (smaller than 4 µm), and shell debris (Williams et al. 2006).

Extensive HRG surveys have been performed in the Offshore Project Area (including the Lease Area) as part of BOEM's site Environmental Assessment (EA) (Fugro 2013) and leading up to the CVOW Pilot Project (Tetra Tech 2013; Tetra Tech 2014). These data are included in publicly available databases, technical literature, and site-specific reports that provide useful data collected in the Offshore Project Area. Numerous sources concur with Dominion Energy's 2020 findings that the Offshore Survey Area is dominated by fine, medium, and coarse-grain sand (Cutter and Diaz 1998; Diaz et al. 2004; Diaz et al. 2006; USACE 2009; Greene et al. 2010; Fugro 2013; Guida et al. 2017; MARCO 2021). Bottom topography in the Offshore Survey Area is characterized by a sedimentary fan, shelf valley tributaries to the north and east, and a series of sand ridges trending northeast to southwest (Guida et al. 2017). The slopes in the Offshore Survey Area generally fall within 1.2 degrees and there is virtually zero rugosity throughout the area (Guida et al. 2017). U.S. Fish and Wildlife Service (USFWS) benthic sampling programs determined that the most abundant taxa in Virginia nearshore habitats (in descending order) were polychaetes, bivalves, and amphipods (USACE 2009). Cutter and Diaz (1998) noted these taxa as well as decapods, sand dollars, and lancelets. Infaunal assemblages in grab samples collected in the Lease Area were characterized as highly diverse (Guida et al. 2017).

During 2020 and 2021, Dominion Energy completed full-coverage geophysical and geotechnical surveys in the Lease Area and Offshore Export Cable Route Corridor, which characterized the entire Offshore Project Area as softbottom habitat (TerraSond 2021; Alpine 2021). Seabed characterization and morphology features (e.g., sediment type, sandwaves, ridges, depressions, etc.) were also interpreted from

the SBP, UHRS, SSS, MBES, MAG/TVG, and backscatter data. Sediment type and seabed morphology are features that define EFH for some species. CMECS softbottom habitat types interpreted from the HRG data account for the entirety of the Offshore Project Area and range from muddy sand to coarse sand in the Offshore Export Cable Route Corridor and fine sand to coarse sand in the Lease Area (TerraSond 2021; Alpine 2021). Grain size roughly increases along a west to east gradient along the Offshore Export Cable Route Corridor. Fine sand was identified as the dominant sediment type in the northwest portion of the Lease Area and coarse sand in the southeast portion of the Lease Area, varying with seabed morphology within the Lease Area. CMECS sediment types in the Offshore Project Area were interpreted from MBES, SSS, and backscatter data processed at 0.1 to 0.5 m^2 resolution, as listed in Table E-5.

Table E-5. Sediment Types in the Offshore Project Area, Interpreted from MBES, SSS, and Backscatter Data Processed at 0.1 to 0.5 m^2 resolution.

Offshore Project Area	Sediment Type (CMECS)	Acres	% of Total Acreage
Offshore Export Cable Route Corridor–Federal Waters	Construction Hash	76.89	0.5
	Gravel mixes	2.80	0.02
	Gravelly	1,691.22	10.6
	Mud	11.52	0.1
	Muddy sand	1,324.40	8.3
	Sand	10,598.67	66.7
	Unsurveyed	530.51	3.3
Offshore Export Cable Route Corridor–State Waters	Muddy sand	1,381.22	8.7
	Sand	45.96	0.3
	Unsurveyed	225.32	1.4
Lease Area	Coarse Sand/Very Coarse Sand	62,180.10	55.1
	Fine Sand/Very Fine Sand	22,725.62	20.1
	Medium Sand	27,893.18	24.7

E.2.3.2.2 Habitat Mapping

NMFS-GARFO has developed habitat mapping recommendations in coordination with BOEM to ensure that adequate data and information are included as part of EFHAs associated with offshore wind projects (NMFS-GARFO 2021 [March]). The primary goal of interpreting and mapping seabed features is to quantify and differentiate between complex (hard bottom, gravel mixes, shell, and vegetation) and non-complex sand/silt/mud habitats (grain sizes less than 2 mm) in accordance with the CMECS modifiers provided by NMFS-GARFO (2021). CMECS sediment types in the Offshore Project Area were interpreted from MBES, SSS, and backscatter data processed at 0.1 to 0.5 m^2 resolution, and displayed on maps at a scale of 1:10,000 throughout the Project Area, as shown in Attachment E-3 and the webmap tool, located at: https://cvowc.tetratech.com. Benthic features defined as sand waves, megaripples, ripples, and biogenic habitats are also important to delineate to characterize and quantify EFH types present in the Project Area (NMFS-GARFO 2021).

All acquisition, processing, and interpretation of data was consistent with the BOEM Guidelines and NMFS-GARFO recommendations (BOEM 2020; NMFS-GARFO 2021). In addition to providing data to support the overall Project design, the HRG surveys provide ultra-high-resolution data on the seafloor to support accurate interpretation of habitat features in the Offshore Project Area. To that end, the following data were collected within the survey area:

- MBES Bathymetry and Backscatter: Gridded at 0.5 m resolution;

- SSS Imagery: Collected at 200% coverage submitted at 0.25 m resolution;
- Multi-Channel Seismic (MCS): 150 m depth BSB, 1 m resolution;
- Single-Channel Seismic (SCS): 25 m depth BSB, 0.4 m resolution;
- Sub-Bottom Profiler (SBP): 12 m depth BSB, 0.2 m resolution;
- TVG: Gridded at 1 m resolution;
- Geotechnical and benthic samples (grab samples and imagery).

Benthic sampling (grab samples, still images, video images) was conducted during summer 2020 (Tetra Tech 2021) and Fall 2020 (Schnabel 2021) to provide information on benthic habitats and organisms. Specifically, a portion of the Schnabel Engineering LLC (Schnabel) survey was to "ground-truth" the seabed interpretations from the HRG survey data. A total of 120 grab samples were collected within the Lease Area by TerraSond subcontractor Schnabel. Eighty of the 120 sites were positioned based on a regular pattern (60% of the 80 placed on even corridors, 40% of the 80 on odd), and 40 sites were selected as areas of interest. The first 80 sites were selected by referencing the turbine layout. The remaining 40 sites were selected by reviewing the SSS and backscatter data and selecting areas where the acoustic signature suggested a more variable surficial sediment or appeared to have significant intensity difference from areas already sampled. The sampling locations are fully represented on the maps included in Attachment E-3 and the webmap tool, located at: https://cvowc.tetratech.com. In addition to Schnabel's grab sampling, benthic sampling results from previous work conducted by Tetra Tech was provided and used during subsequent interpretation to supplement the available data.

Habitat mapping recommendations were incorporated into the processes and methods used to interpret seabed habitats from the HRG survey data, as detailed in Appendix C, MSIR, and the HRG survey reports (TerraSond 2021; Alpine 2021). Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of grain sizes in each grab sample with the backscatter amplitude was used to generate contours consistent with backscatter intensity. The generated contours were then adjusted on the basis of the bathymetry and SSS data. The resulting interpreted boundaries were classified using the CMECS Substrate Component (SC) and ASTM D2488 to describe the surficial sediments. The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1. Metadata were generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

Methods used to interpret seabed habitats are summarized from TerraSond (2021) and Alpine (2021) below:

- Grain size sample location point coordinates were imported on the MBES backscatter mosaic in GIS software and the amplitude of the backscatter at each sampling location was measured.
- A plot of sediment size correlated to the backscatter was made to visualize and analyze their relationship and sampling results were ordered by increasing value of grain size (mm) and correlated with the backscatter intensity at the sampling location.
- The moving average with a window of 10 samples and a linear interpolation resulted in a general increase of the backscatter reflectivity with the increase of the grain size.
- Laboratory grain size data from the 202 grab samples resulted in CMECS classifications of 97 percent very coarse sand or finer, and 3 percent granule/pebble, with each of the granule/pebble samples located within the CMECS coarse sand mapped areas.

  - Muddy Sand (1 sample)
  - Fine/Very Fine Sand (41 samples)
  - Medium Sand (62 samples)
  - Coarse Sand (91 samples)
  - Very Coarse Sand (2 samples)
  - Granule (1 sample)
  - Pebble (4 samples)

- The samples were then ordered using CMECS classification, showing the backscatter amplitude for coarse sand, fine/very fine sand and medium sand. The average backscatter amplitude was calculated for all the classes and the midpoint between the average values of the various classes was used as backscatter amplitude threshold between the classes: Fine: -70.000 to -28.456 Medium: -28.456 to -24.611 Coarse: -24.611 to 0.000; see Figure E-4.
- These limits between classes were used in GIS software to generate contours of the backscatter values, and the resulting areas represent a first approximation of the distribution of seabed sediments grainsize on CVOWC Lease Area and Export Cable Corridor, using the CMECS classification.
- A certain amount of variation is observed in the backscatter amplitude for each grain size class. This observed variation is due to the accuracy of the sample positioning coordinates and to the variability in the backscatter ranges across the CVOWC Lease Area and Export Cable Corridor. This difference in backscatter is expected in large surveys when thousands of survey lines from different vessels are merged for the creation of a single mosaic covering the whole study area.
- Additional corrections in the backscatter class limits were performed in a few portions of the area, showing a general positive or negative variation in the backscatter amplitude. The values were selected to obtain the maximum possible continuity of the sediment class areas previously generated using the average values.
- Additional manual editing of the mapped areas was performed on the basis of the sample grain sizes, the low frequency SSS mosaic and the geomorphology observed in bathymetric data. This manual editing was done to remove spikes and artifacts, as well as to improve the general interpretation of the class areas.

Resulting seabed morphology and sediment types are shown as overview maps (for informational purposes only) in Figure E-5 through Figure E-8, with additional detailed panels shown at a 1:10,000 scale in Attachment E-3. Additionally, the full-coverage and full-resolution Offshore Project Area seabed CMECS habitat interpretations based on geophysical survey data are available to BOEM and NMFS as a webmap tool, located at: https://cvowc.tetratech.com. This tool can be used to generate custom-view data-based habitat maps that display the characterized delineations and complex/non-complex or heterogeneous complex benthic features, provided at user-defined scales appropriate to habitat features, consistent with the NMFS-GARFO habitat mapping and minimum mapping unit recommendations (NMFS-GARFO 2021).

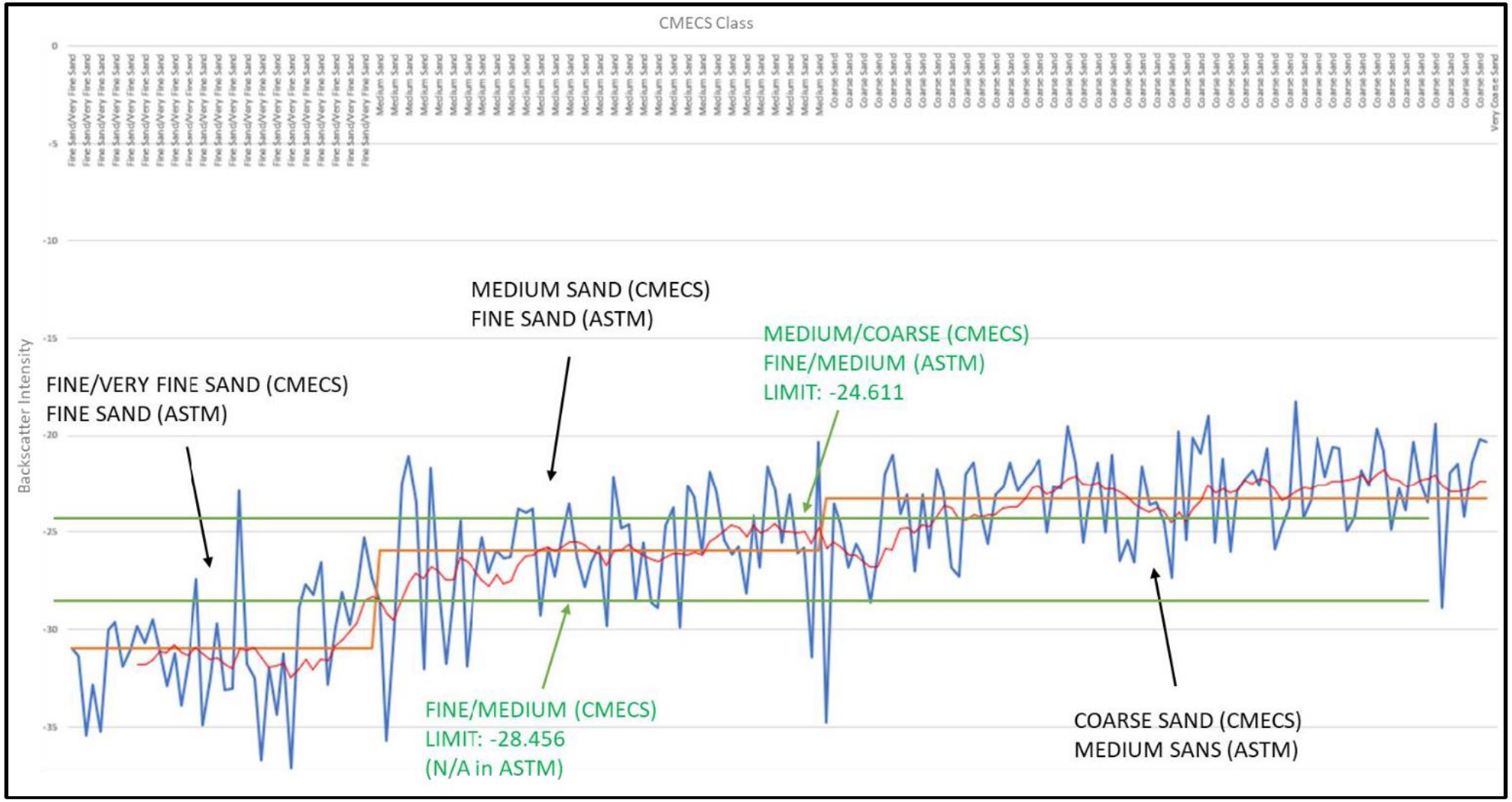


Figure E-4. Grain size and backscatter correlation based on samples classification

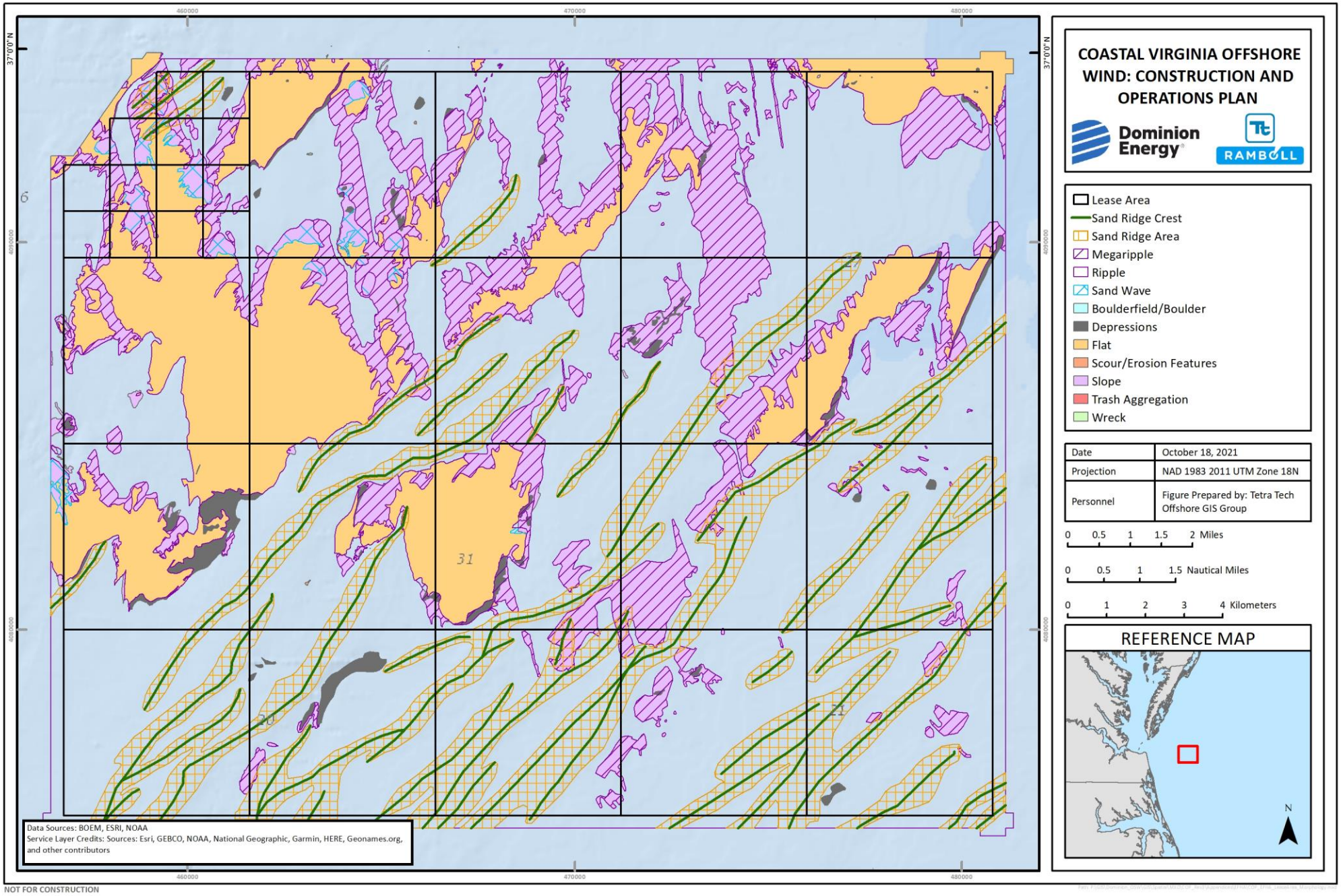


Figure E-5. Seabed Morphology Overview in the Lease Area (TerraSond 2021), See Attachment E-3 for full-scale maps

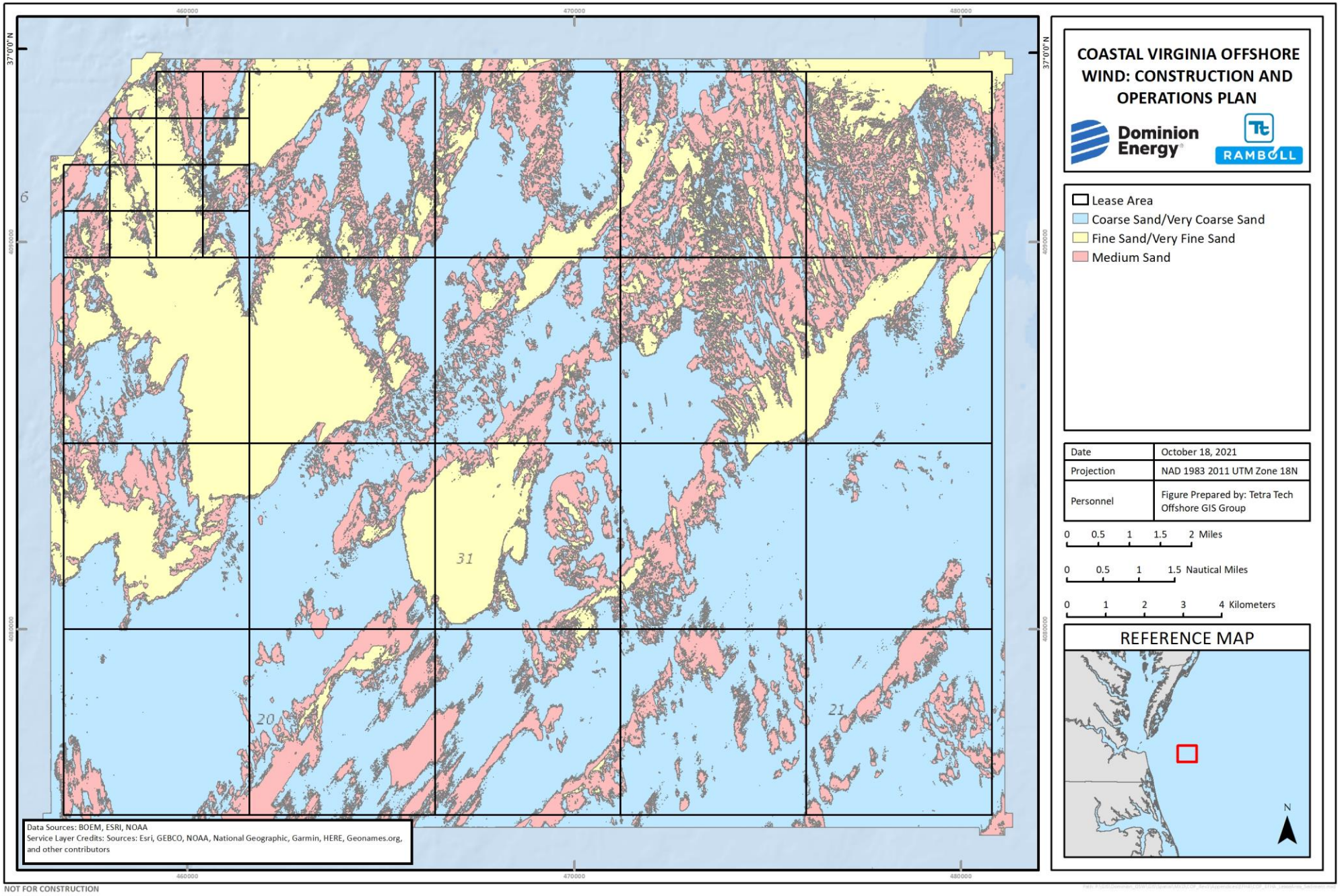


Figure E-6. Seabed Habitat Interpretation Overview as CMECS in the Lease Area (TerraSond 2021), See Attachment E-3 for full-scale maps

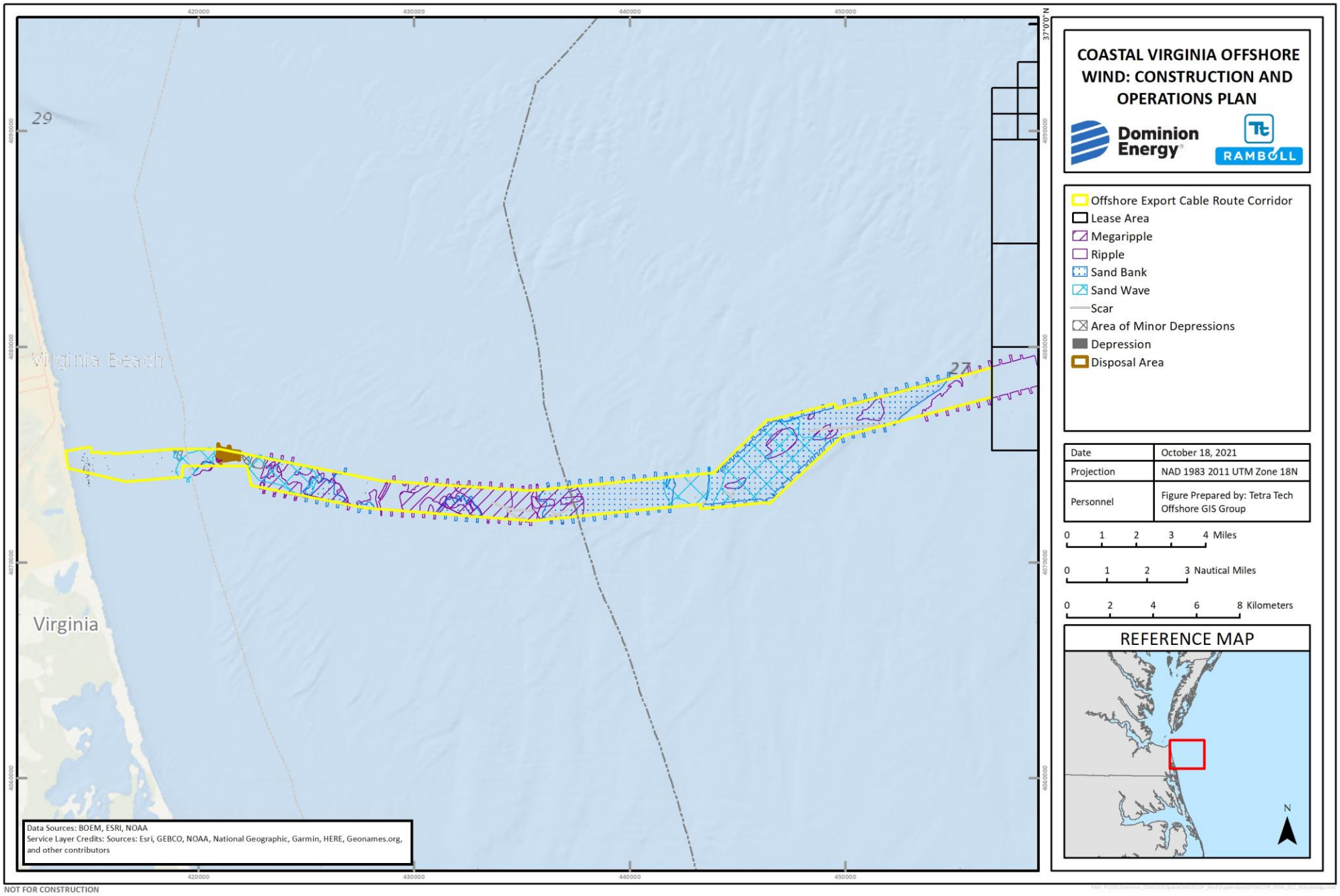


Figure E-7. Seabed Morphology Overview in the Offshore Export Cable Route Corridor (Alpine 2021), See Attachment E-3 for full-scale maps

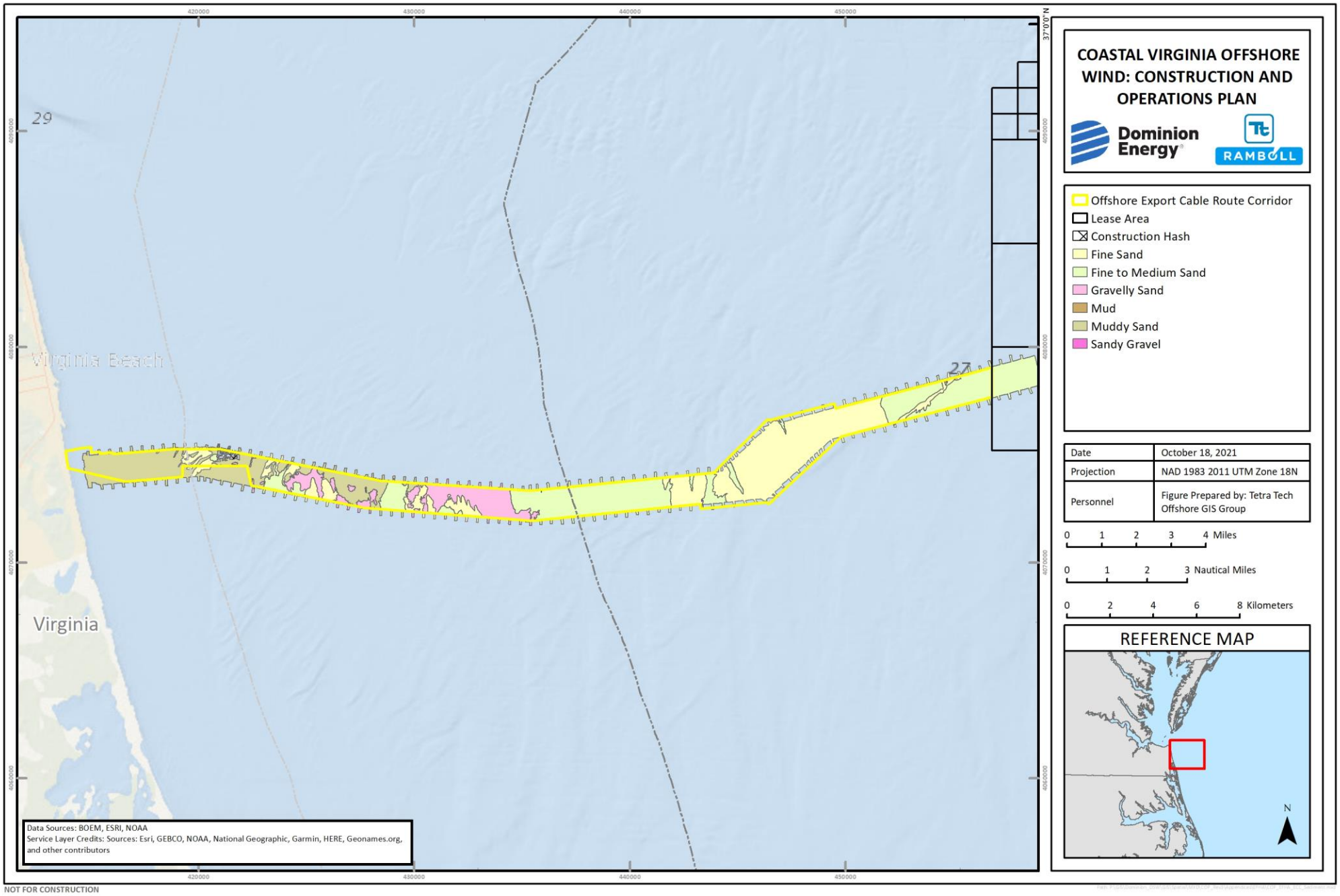


Figure E-8. Seabed Habitat Interpretation Overview as CMECS in the Offshore Export Cable Route Corridor (Alpine 2021), See Attachment E-3 for full-scale maps

Benthic resources were further characterized in summer 2020 (Tetra Tech 2021) and fall 2020 (TerraSond 2021; Alpine 2021) with benthic characterization surveys completed in the Offshore Project Area using digital imagery, sediment grab, and water quality samples. Grab samples from all surveys (total of 202 grab samples) were analyzed for particle size distribution, total organic carbon, and benthic infauna to ground-truth the sediment types observed in digital imagery. Mean sediment composition for the 202 grab samples collected during summer and fall 2020 was approximately 97 percent coarse sand or finer, with only 3 percent consisting of granule or pebble (TerraSond 2021). Mean total organic content (TOC) for the summer 2020 grab samples was 0.3 percent (range 0.1 to 1.2 percent).

Survey results corroborated the habitats generated by the EFH Data Inventory for the EFH Mapper desktop analysis (Table E-2), depicting habitat suitable for temperate, softbottom-associated species and life stages. Habitat observed in the Offshore Project Area was generally homogenous, with summer bottom temperatures spanning 54.7 to 66.6°F (12.6 to 19.2°C), salinities within 31.9 to 32.8 Practical Salinity Units, and unconsolidated sediment grain sizes ranging from fine sand with silt and clay to medium/coarse sand and gravel with shell hash. Depths gradually increase in the surveyed portion of the Offshore Export Cable Route Corridor from 43 to 98 ft (13 to 30 m) and 98 to 131 ft (30 to 40 m) in the surveyed portion of the Lease Area.

Observed biogenic habitat during the benthic survey was limited to a single mussel bed (*Mytilus edulis*) within the Offshore Export Cable Route Corridor. Sessile and slow moving epifauna observed along transects throughout the Offshore Project Area were characteristic of the Mid-Atlantic softbottom habitat and included sand dollars (*Echinarachnius parma*), sea stars (*Asteroides* spp.), sea urchins (*Echinoida* spp.), moon snails (*Neverita lewisii*), whelks (*Busycon carica*), and various portunid and hermit crabs. No managed species were observed in the Offshore Export Cable Route Corridor. Of the managed species with designated EFH in the Lease Area, black sea bass (*Centropristis striata*), butterfish (*Peprilus triacanthus*), clearnose skate (*Raja eglanteria*), and scup (*Stenotomus chrysops*) were observed in digital imagery (Figure E-9) in areas of fine to medium sand punctuated by shell hash, sand dollars, and egg masses (e.g., Loliginid, Naticid, Rajid eggs). Results are described in detail in Appendix D, Benthic Resource Characterization, a supplemental filing to the COP. These uniform, sandy habitats and associated infaunal assemblages support an array of both managed and unmanaged demersal species. Softbottom sediments are dynamic and prone to transport by physical processes and restructuring by biological processes, such as feeding and burrowing. Managed species using these softbottom habitats for spawning, development, and foraging include Atlantic cod (*Gadus morhua*), pollock (*Pollachius virens*), flounder species, skate species, red hake (*Urophycis chuss*), monkfish (*Lophius americanus*), several migratory sharks, and others (see Attachment E-1; NEFMC 2017; MAFMC 2017; NOAA Fisheries 2017).

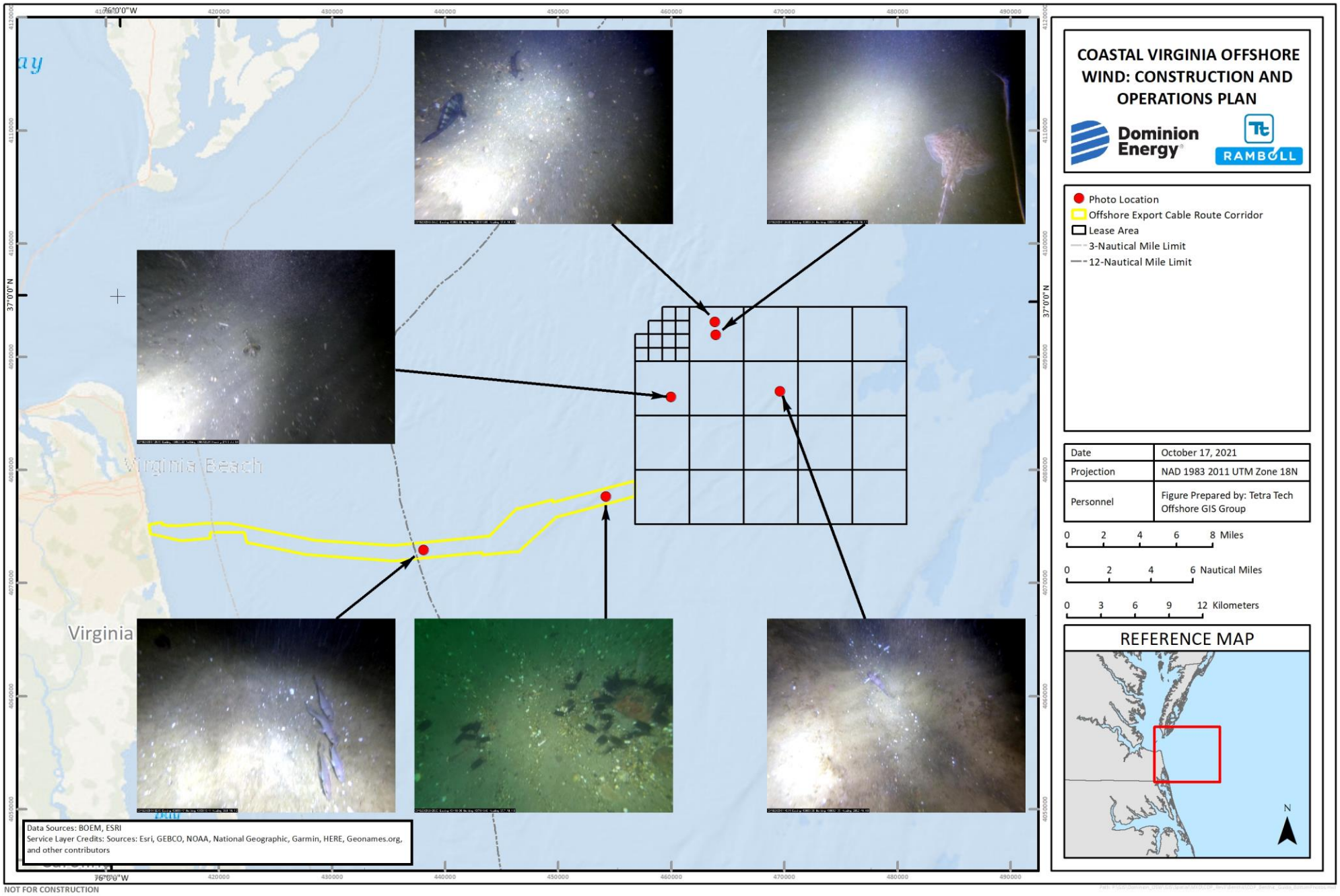


Figure E-9. Representative Plan View Bottom Images in the Offshore Project Area Collected during Summer 2020 Surveys

The assemblage of species using softbottom habitats varies with season and distance from the shoreline, just as pelagic assemblages do. Such species inhabit a spectrum of inshore-offshore habitats according to preferred thermal and depth gradients. For example, blacktip shark (*Carcharhinus limbatus*) neonates and young-of-year prefer shallow coastal waters from the shoreline to depths of 66 ft (20 m) in temperatures of 70 to 90°F (21 to 32°C); juveniles and adults prefer even shallower waters (NOAA Fisheries 2017). Witch flounder (*Glyptocephalus cynoglossus*) juveniles and adults, in contrast, exhibit preferences for depths of 66 to 5,135 ft (20 to 1,565 m) in temperatures of 32 to 59°F (0 to 15°C) (NEFMC 2017). Some demersal species make inshore-offshore seasonal migrations. For example, resident red hake juveniles and adults exhibit limited seasonal migrations, preferring inshore waters in spring and fall and offshore waters in summer and winter (Steimle et al. 1999).

E.2.3.3 Benthic Habitat: Hardbottom EFH

Naturally occurring hardbottom habitats and structured reefs are rare in the Mid-Atlantic Bight; no hardbottom was detected in the 2020-2021 HRG or benthic surveys in the Offshore Project Area (TerraSond 2021; Alpine 2021; Attachment E-3), which is consistent with previous hydrographic surveys in this region (Cutter and Diaz 1998; Diaz et al. 2004; Poppe et al. 2005; Diaz et al. 2006; USACE 2009; Greene et al. 2010; Fugro 2013; Guida et al. 2017; MARCO 2021). An artificial reef habitat was created in the northern portion of the Lease Area known as the Fish Haven (Figure E-10), where several large World War II-era tankers and transport ships, tires, and other structures were placed beginning in the 1970s (Lucy 1983). The VRMC continues to facilitate artificial reef development by adding scuttled cables, tires, and other materials to the Fish Haven (VMRC 2021b).

Artificial reefs provide hard vertical relief and structural complexity in the form of crevices and interstitial spaces; such complexity offers refuge from predation and energy-depleting currents, as well as a forage base resulting from increased biomass of prey. During Dominion Energy's 2020 surveys, several cables and other anthropogenic debris associated with Triangle Reef were observed along transects located within Fish Haven. Notably, managed species with EFH designated in the Offshore Project Area, including black sea bass, butterfish, and clearnose skate, were observed aggregating either directly on these cables or within the same transect in the vicinity of the artificial habitat.

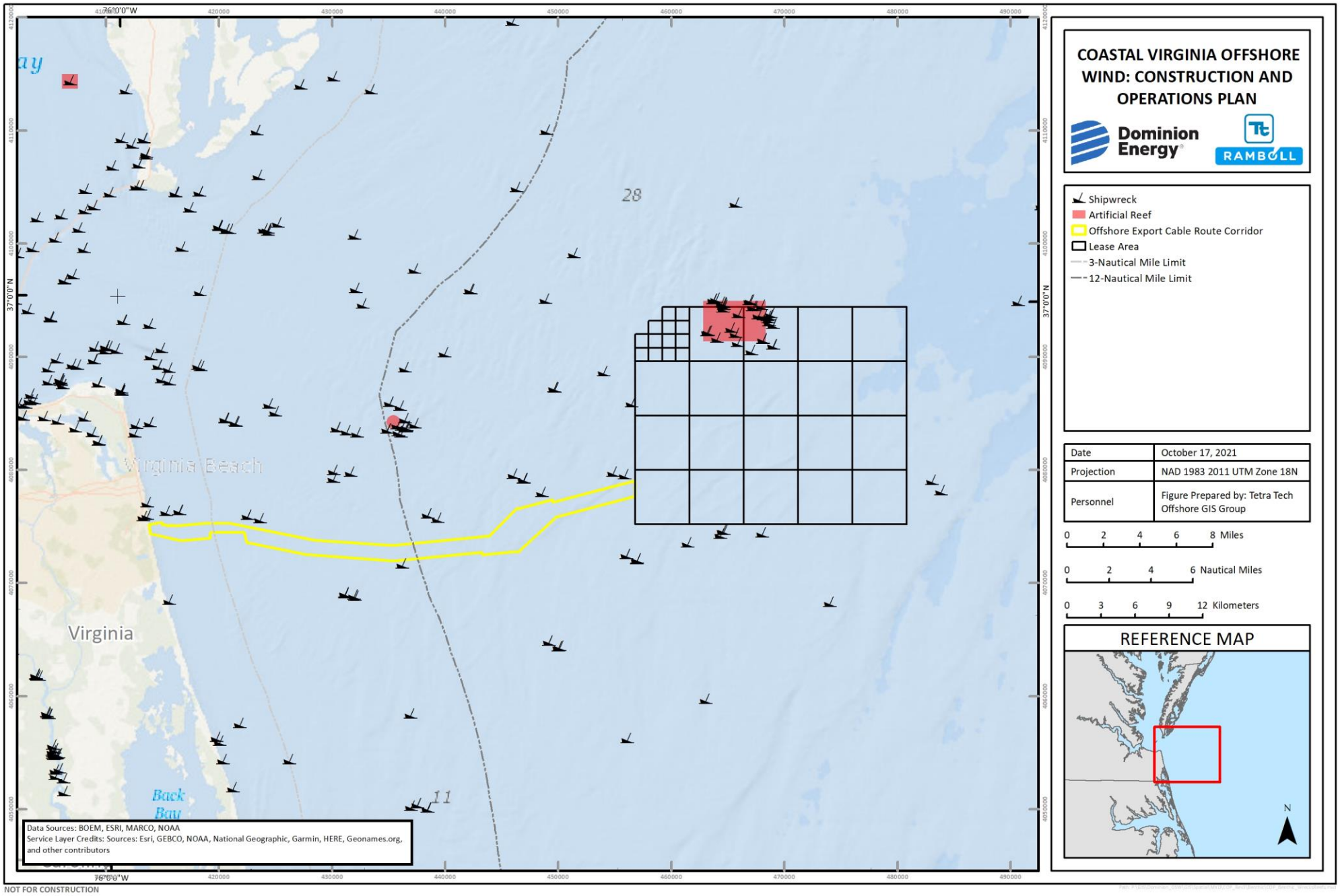


Figure E-10. Publicly Documented Shipwrecks and Artificial Reefs in the Offshore Project Area and Vicinity

E.2.3.4 Benthic-Pelagic Coupling

The energy transfer that occurs between the seafloor and water column as organisms eat, excrete waste, and decompose is termed benthic-pelagic coupling. Most marine organisms are neither wholly benthic nor wholly pelagic, but rather rely on the habitat continuum to support their various life stages. The Atlantic sea scallop (*Placopecten magellanicus*), for example, has benthic egg and planktonic larval stages. After hatching, scallop larvae mature in the plankton for 5 to 6 weeks before transforming into juveniles and settling on benthic substrates. Adults spend the rest of their lives filter-feeding on plankton in the water column of the pelagic habitat, enriching the sediment with their wastes, and releasing new generations to repeat the cycle (Munroe et al. 2018). Longfin inshore squid (*Doryteuthis [Amerigo] pealeii*), by contrast, have pelagic larval, juvenile, and adult stages; however, adults anchor egg masses, or "mops," to hard substrates in benthic habitats (Cargnelli et al. 1999a; Jacobson 2005). Bivalve mollusks such as the Atlantic surfclam (*Spisula solidissima*) use softbottom sediments and extend their siphons into the water column to feed on plankton and nutrient-rich detritus (Cargnelli et al. 1999b).

Per NOAA Fisheries, EFH includes the waters and substrates necessary for species' growth to maturity (including spawning, breeding, and feeding) [16 U.S.C. § 1801(10)], where "necessary" indicates a level required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. The joint contribution of benthic and pelagic habitat components to EFH is evident in the seafloor substrates, water column depths, and the intersection of the two at the sediment-water interface.

E.2.4 Other NOAA Trust Resources

The ASMFC, in cooperation with the states and NOAA Fisheries, manages more than two dozen fish and invertebrate species separately from the MSA; many of these species are also identified as NOAA Trust Resources. Of these species, the Project may potentially affect the American eel (*Anguilla rostrate*), American shad (*Alosa sapidissima*), Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic striped bass (*Morone saxatilis*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), black drum (*Pogonias cromis*), cobia (*Rachycentron canadum*), horseshoe crab (*Limulus polyphemus*), Jonah crab (*Cancer borealis*), red drum (*Sciaenops ocellatus*), river herring (*Alosa* spp.), spot (*Leiostomus xanthurus*), spotted seatrout (*Cynoscion nebulosus*), tautog (*Tautoga onitis*), and weakfish (*Cynoscion regalis*).

American eel. The American eel occurs along the entire U.S. Atlantic Coast from Maine to Florida and historically comprised more than 25 percent of the total fish biomass of East Coast streams (ASMFC 2018a). The species inhabits fresh, brackish, and coastal waters; eggs are spawned and hatch in the Sargasso Sea and leptocephali larvae are transported by ocean currents to the coasts of North and South America. Eels transit through coastal waters on their way to and from freshwater rivers. The 2012 Benchmark American Eel Stock Assessment found that the American eel population has been depleted by a combination of historical overfishing, habitat loss and alteration, productivity and food web alterations, predation, changing climactic and oceanic conditions, toxins and contaminants, and disease (ASMFC 2014). Though Virginia recorded average counts in 2012, stock assessment updates in 2017 identified downward trends in eel recovery and the stock remains depleted (ASMFC 2014, 2018).

American shad. The anadromous American shad spends most of its life in coastal waters along the North American Atlantic Coast and migrates seasonally to freshwater to spawn. Because the species exhibits high fidelity to its natal streams, each major tributary along the Atlantic Coast has its own discrete spawning stock. In Virginia, shad populations are monitored within the James, Potomac, Rappahannock, and York Rivers. Historically, the state has not had a significant commercial shad fishery, though limited recreational fisheries occur in several Virginia rivers. The 2020 benchmark stock assessment indicates that American shad stocks have continued their decline since the previous two benchmark stock assessments (1998 and 2007) and are currently at all-time lows (ASMFC 2020a). In Virginia, the James River stock status is unknown, the Rappahannock and York River stocks are experiencing sustainable mortalities, and the Potomac River stock is depleted and experiencing unsustainable mortality (ASMFC 2020a).

Atlantic croaker. The Atlantic croaker is a sciaenid species that inhabits demersal estuarine and nearshore waters along the North American Atlantic Coast from the Gulf of Maine to Argentina. The species spawns in pelagic waters in fall and winter months and larvae and juveniles settle in estuaries to mature. The Chesapeake Bay is an important spawning and nursery habitat for croaker. The 2017 Benchmark Stock Assessment was not recommended for management use; however, the report indicated that the Atlantic croaker spawning biomass is increasing and that the species is experiencing sustainable mortality (ASMFC 2017a). The current fishery includes both commercial and recreational fisheries that experience cyclical declines and recoveries

Atlantic menhaden. The Atlantic menhaden is a euryhaline species that inhabits nearshore and inland tidal waters along the North American Atlantic Coast from Nova Scotia to Florida. The species spawns at sea and larvae are carried to estuaries where they mature to juveniles; during winter months, the majority of the adult population migrates to Virginia and North Carolina capes. According to the 2017 Atlantic Menhaden Stock Assessment Update, the species is not overfished based on fishing mortality and fecundity data (ASMFC 2017b). The current commercial fishery is divided into the reduction fishery, which processes Atlantic menhaden to obtain fish oil and fish meal, and the bait fishery, which supplies bait to other fisheries (e.g., blue crab, lobster). Landings for the bait fishery have increased in recent years. However, the reduction fishery, which is the larger component of the commercial fishery, has seen substantial declines and there is currently only one reduction plant along the U.S. Atlantic Coast located in Reedville, VA (ASMFC 2017b).

Striped bass. The anadromous striped bass spends most of its life in coastal estuaries and marine waters but migrates seasonally to freshwater to spawn. The 2018 benchmark stock assessment indicates the Atlantic striped bass stock is overfished and overfishing continues to occur (ASMFC 2019a). The current fishery is predominantly recreational (88 percent of total removals in 2018), and most commercial and recreational landings are sourced from Chesapeake Bay (ASMFC 2019a).

Atlantic sturgeon. The anadromous Atlantic sturgeon spends most its adult life in estuarine and marine waters (Stein et al. 2004; Laney et al. 2007). Five distinct population segments (DPSs, or geographic portions of a species' or subspecies' population) of the Atlantic sturgeon are listed under the ESA and in Virginia, as described in Section 4.2.4 of the COP. In the Mid-Atlantic, mature females generally spawn every 1 to 5 years by migrating upriver from April to May and deposit more than 400,000 eggs on gravel or other hard substrates (USACE 2015). The nearest Atlantic sturgeon spawning areas to the Offshore Project Area are the James and York Rivers, which provide important habitat for the Chesapeake Bay DPS

(VIMS 2021). The 2017 Atlantic sturgeon stock assessment reported that all DPSs remain depleted relative to historic distributions (ASMFC 2017c). Indices from the New York Bight and Carolina DPSs indicated a greater than 50 percent chance of population increase since 1998, although the index from the Chesapeake Bay DPS only had a 36 percent chance of population increase during the same time (ASMFC 2017c). The Navy, in partnership with BOEM, is conducting ongoing research to determine seasonal presence/absence of Atlantic sturgeon in and around the Virginia WEA and to characterize the habitat use and feeding grounds of observed individuals. To date, several sturgeon have been identified and coordinated through data-sharing networks such as the Atlantic Cooperative Telemetry network. Results will help identify the causal mechanisms for Atlantic sturgeon habitat selection in the offshore environment (Watterson 2020 unpublished).

Black drum. The black drum is a demersal species that inhabits nearshore waters along the North American Atlantic Coast from the Gulf of Maine to Argentina. The species spawns in winter and early spring; recruitment is sporadic, with infrequent but large events. The first Benchmark Stock Assessment for black drum concluded that the species is not overfished or experiencing overfishing (ASMFC 2015). The black drum fishery is growing; Virginia and North Carolina comprise the majority of the commercial fishery.

Cobia. The cobia is a highly migratory pelagic species that occurs in tropical and warm-temperate waters. The species occurs along the North American Atlantic Coast from Nova Scotia to Argentina. The species aggregates inshore to spawn during warm months and overwinters south and offshore. The 2020 Benchmark Stock Assessment determined that the Atlantic stock of cobia is not overfished or subject to overfishing (ASMFC 2020b). While the commercial fishery is small, the Atlantic cobia supports an expanding recreational fishery from the Mid-Atlantic to South Atlantic region.

Horseshoe crab. The horseshoe crab resides in estuaries and on the continental shelf along the North American Atlantic Coast from Maine to the Gulf of Mexico. Spawning coincides with the high tide during the full and new moon, and the Delaware Bay supports the largest spawning population in the world. The 2019 Benchmark Stock Assessment concluded that the Delaware Bay and southeast stocks are in good condition and that the horseshoe crab is not overfished or subject to overfishing (ASMFC 2019). The species is harvested as bait for American eel and conch fisheries; the species also provides blood to the biomedical industry to produce Limulus Amoebocyte Lysate.

Jonah crab. The Jonah crab occurs along the North American Atlantic Coast from Canada to Florida. It has a poorly understood life history, but females are believed to migrate nearshore in spring and summer and overwinter offshore. The status of the fishery remains unknown, as there is no stock assessment for the Jonah crab. Though once considered bycatch, Jonah crab currently support a growing commercial fishery.

Red drum. The red drum resides in estuaries and offshore waters along the North American Atlantic Coast from Massachusetts to Florida. Juveniles and sub-adults reside in nursery estuaries and begin to conduct seasonal inshore-offshore migrations as adults. The 2017 Benchmark Stock Assessment was not recommended for management use but indicates that overfishing may be occurring (ASMFC 2017d). The southern stock is the target of a robust recreational fishery and the northern stock is the target of a smaller commercial fishery centered in North Carolina.

River herring. The term river herring collectively refers to alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), which are anadromous species that spend most of their lives in coastal waters but

migrate seasonally to spawn in freshwater rivers. Historically, river herring have spawned in virtually every river and tributary along the North American Atlantic Coast; the alewife spawns in lakes and ponds, while the blueback herring spawns in swift-moving rivers. Currently, the alewife is most abundant in the mid-Atlantic and northeastern states, while blueback herring is most abundant from the Chesapeake Bay south; both species currently occur in all of Virginia's major rivers (ASMFC 2017e). The most recent comprehensive assessment of river herring stocks concluded that both species exhibit signs of overexploitation, including reductions in average age, decreases in percent of repeat spawning, declines in recruitment, and decreases in adult abundance. The Virginia commercial herring fishery collapsed in the 1970s and in 2012 the VMRC implemented a moratorium on river herring in state waters that is currently upheld (ASMFC 2017e).

Spot. The spot is a sciaenid species that resides in estuarine and coastal waters along the North American Atlantic Coast from the Gulf of Maine to Florida. The species migrates to inshore bays and estuaries in the spring and offshore to spawn in late summer and fall. The first Benchmark Stock Assessment was not recommended for management use but indicated that both Mid-Atlantic and South Atlantic stocks are experiencing significant declines (ASMFC 2017f). The species supports a robust fishery in the South Atlantic, though the fishery experiences annual fluctuations in landings.

Spotted seatrout. The spotted seatrout occurs along the U.S. Atlantic Coast from the Florida Keys, Florida, to Cape Cod, Massachusetts, primarily in estuaries and in nearshore ocean waters during cold periods. It is most abundant from Chesapeake Bay southward and exhibits strong site fidelity to natal estuaries. A 2014 stock assessment specific to North Carolina and Virginia indicated that the age structure of the stock had expanded since 2004, but that there was a sharp decline in spawning stock biomass after 2007 and in recruitment after 2010 (ASMFC 2018b). Despite these declines, fishing mortality is below the threshold and the stock is not currently deemed overfished (ASMFC 2018b).

Tautog. The tautog occurs in coastal and estuarine waters along the North American Atlantic Coast from Nova Scotia to Georgia, though it is most abundant from Cape Cod, Massachusetts, to Cape Hatteras, North Carolina. Stocks north of Cape Cod prefer nearshore coastal waters less than 60 ft (18 m) deep, while stocks south of Cape Cod have been found up to 40 mi (64 km) offshore at depths up to 120 ft (37 m) (ASMFC 2017g). The 2016 stock assessment indicates the Delaware-Maryland-Virginia stock remains overfished but that overfishing is not currently occurring. Historically, most commercial fishing for tautog in Delaware-Maryland-Virginia has been based in Virginia, though landings have declined in the last decade (ASMFC 2017g).

Weakfish. The weakfish occurs along the North American Atlantic Coast from Novia Scotia to southeastern Florida, though it is most common from New York to North Carolina. The species spends most of its life in coastal waters but completes a seasonal inshore and northerly migration to spawn in nearshore sounds, bays, and estuaries. Most commercial landings occur in North Carolina and Virginia, while recreational catches are more common in North Carolina and New Jersey (ASMFC 2019c). Commercial landings have declined dramatically since the early 1980s and recreational catches have declined since 1987; the 2017 stock assessment indicates that the stock has been depleted since 2003 (ASMFC 2019c).

Species profiles for managed species with EFH are included in Attachment E-1.

E.3 DESCRIPTION OF THE PROPOSED ACTION

Dominion Energy is proposing to construct, own, and operate the Project to generate energy using renewable wind resources. The purpose of this Project is multifaceted and includes the following: to provide between 2,500 and 3,000 megawatts of clean, reliable offshore wind energy and to increase the amount and availability of that renewable energy to Virginia consumers; to displace electricity generated by fossil fuel-powered plants; and to offer substantial economic and environmental benefits to the Commonwealth of Virginia. Greater detail regarding the purpose and need for the Project is provided in the COP (Section 1, Introduction).

Dominion Energy has adopted a PDE approach to describe Project facilities and activities. A PDE represents "a reasonable range of project designs" associated with various components of the project, including Foundation and WTG options (BOEM 2018). The PDE is used to assess the potential effects on key environmental and human-use resources by focusing on the design parameter (within the defined range) that represents the greatest potential impact (i.e., the "maximum design scenario") for each resource (Rowe et al. 2017). The primary goal of applying a design envelope is to allow for meaningful assessments by the jurisdictional agencies of the proposed project elements and activities. This conservative approach likely overstates the actual effects on resources from the as-built Project, which will include design refinement and implementation of avoidance, minimization, and mitigation measures. Detailed information on the Project Description and PDE is included in Section 3 of the COP.

For the purposes of this EFHA, the design that permanently converts the largest area of benthic substrate to artificial substrate, including WTG and Offshore Substation Foundations, scour protection, and cable armoring, is considered the maximum PDE for benthic habitat and managed demersal fish species. The design that permanently introduces the greatest surface area of hard structure into the water column is considered the maximum design scenario for managed pelagic fish species. The design with the longest duration of pile driving is considered the maximum design scenario for acoustic impacts to all managed species. The parameters provided in Table E-6 represent that maximum potential effect of full build-out of the Project.

Table E-6. Summary of Maximum Design Scenarios for Essential Fish Habitat as Outlined in Project Design Envelope

Parameter	Realistic Maximum Design Scenario	Rationale
Construction		
Wind Turbine Generators (WTGs)	14 megawatts (MW)	Representative of the smallest-sized WTG and therefore the maximum number of structures in the Offshore Project Area: 205 WTGs and 3 Offshore Substations.
WTG Monopile Foundation	*Maximum monopile diameter*: 36 ft (11 m) *Maximum monopile area*: 1,017.9 square feet (ft^2; 94.6 square meters [m^2]) *Maximum base diameter including scour protection*: 230 ft (70 m) *Maximum base area including scour protection*: 41,547.6 ft^2 (3,859.9 m^2)	Representative of the maximum area of softbottom benthic habitat loss due to foundation and scour protection installation that would result in the greatest surface area of hardbottom introduced to the Offshore Project Area for a single WTG monopile foundation.

Parameter	Realistic Maximum Design Scenario	Rationale
Softbottom habitat loss: WTG Foundations and scour protection	Based on 14 MW WTGs with maximum scour protection (230 ft base diameter) corresponding to the maximum overall footprint in the Offshore Project Area: 205 WTGs x 41,547.6 ft^2 (3,859.9 m^2). *Maximum base area including scour protection:* 8,517,258 ft^2 (791,279.5 m^2)	Representative of the maximum area of softbottom benthic habitat loss due to foundation and scour protection installation, which would result in the greatest total surface area of hardbottom introduced to the Offshore Project Area.
Offshore Substation Piled Jacket Foundations	*Maximum number of piles per jacket foundation*: 8 *Maximum pile diameter*: 11.5 ft (3.5 m) *Base dimensions*: 306.8 ft x 283.8 ft (93.5 m x 86.5 m) *Scour protection diameter per pile*: 115 ft (35 m) *Seafloor footprint without scour protection*: 55,412 ft^2 (5,148 m^2) *Seafloor footprint with scour protection*: 122,849 ft^2 (11,413 m^2)	Representative of the maximum area of softbottom benthic habitat loss due to foundation and scour protection installation, which would result in the greatest surface area of hardbottom introduced to the Offshore Project Area for a single Offshore Substation.
Softbottom habitat loss: Offshore Substation Foundations and scour protection	Based on maximum seafloor footprint with scour protection for 3 Offshore Substations corresponding to the maximum overall footprint in the Offshore Project Area: 3 x 122,849 ft^2 (11,413 m^2). *Maximum base area including scour protection*: 368,547 ft^2 (34,239 m^2)	Representative of the maximum area of softbottom benthic habitat loss due to foundation and scour protection installation, which would result in the greatest total surface area of hardbottom introduced to the Offshore Project Area.
Inter-Array Cables	*Maximum total length per cable:* 29,961 ft (9,132.1 m) *Maximum burial depth*: 9.8 ft (3 m) *Maximum temporary trench width*: 49 ft (15 m) *Maximum temporary seafloor footprint*: 9.5 acres (ac; 3.8 hectares [ha])	Representative of the maximum installation length per cable, burial depth, temporary trench width, and maximum temporary seafloor footprint.
Offshore Export Cables	*Maximum burial depth*: 16.4 ft (5 m) *Maximum temporary trench width:* 3,840 ft (1,170 m) *Maximum Offshore Export Cable Route Corridor (width of construction corridor from Offshore Work Area to Offshore Substations)*: 2,892.4 ac (1,170.4 ha). *Maximum temporary area impacted by cable installation*: 4,338.9 ac (1,755.9 ha)	Representative of the maximum burial depth, Offshore Export Cable Route Corridor area, and maximum temporary seafloor footprint.
Underwater noise: Foundation installation method	Pile driving *Maximum projected blow energy:* 4,000 kJ *Maximum duration:* 45 blows per minute for 87 minutes per monopile	Representative of the installation method that would introduce the loudest underwater noise for the longest installation duration.
Underwater noise: Pile driving	*Method*: 100% pile driving monopile *Pile diameter*: 36 ft (11 m) *Maximum penetration*: 197 ft (60 m) *Maximum hammer energy*: 4,000 kilojoules (kJ) *Maximum number of hammer blows at maximum energy*: 3,915 *Soft-start hammer energy:* 800-3,200 kJ *Maximum number of hammer blows at soft-start energy*: 540 *Total pile driving time including soft-start procedures*: 1.65 hours	Representative of the maximum design scenario per monopile and therefore the largest impact footprint and potential acoustic stress to benthic and pelagic resources. 3,915 is considered the maximum number of hammer blows per monopile at maximum hammer energy, plus an additional 540 hammer blows at soft-start hammer energy.
Underwater noise: Project-related vessels	Based on 14 MW WTGs corresponding to the maximum number of structures in the Offshore Project Area (205 WTGs, 3 Offshore Substations, 230 Inter-array Cables, and 9 Offshore Export Cables) and maximum number of associated construction vessels.	Representative of the maximum predicted Project-related construction vessels for underwater vessel noise.

Parameter	Realistic Maximum Design Scenario	Rationale
Operations		
Underwater noise: Project-related vessels	Based on 14 MW WTGs corresponding to the maximum number of structures in the Offshore Project Area (205 WTGs, 3 Offshore Substations, 230 Inter-array Cables, and 9 Offshore Export Cables) and maximum number of associated operations and maintenance vessels.	Representative of the maximum predicted Project-related construction vessels.
Electric and magnetic fields (EMF): Inter-Array Cables	Based on 14 MW WTGs for the maximum number of offshore structures (205 WTGs and 3 Offshore Substations) to be connected. *Maximum number of cables*: 230 *Maximum operating voltage*: 66 kV *Maximum cable diameter*: 7.9 inches (200 millimeters) *Maximum length per cable*: 31,804 ft (9,694 m) *Maximum total length of cables*: 265.3 miles (427 km)	Representative of the maximum number, voltage, diameter, and length of Inter-array Cables, which would result in the maximum exposure of marine life to EMF within the Offshore Project Area.
EMF: Offshore Export Cables	*Number of cables*: 9 *Maximum operating voltage*: 230 kV *Maximum cable diameter*: 11.4 inches (290 millimeters) *Maximum total length of* cables: 42.6 nautical miles (79 km)	Representative of the maximum number, voltage, diameter, and length of Offshore Export Cables, which would result in the maximum exposure of marine life to EMF within the Offshore Project Area.

Advances in decommissioning methods and technologies are expected to occur throughout the ~20-year life of the Project. Dominion Energy would submit a full decommissioning plan to BOEM for approval prior to any decommissioning activities, and potential impacts would be evaluated at that time. BOEM currently requires that infrastructure be fully removed or severed 15 ft (4.6 m) below the sediment surface. Predictive ecosystem modeling indicates that the site-specific benthic-pelagic coupling relationships established during the O&M stage of the Project would be decoupled and regional connectivity would return to pre-construction conditions (van der Molen et al. 2018).

E.4 EFFECTS OF THE PROJECT ON EFH

The MSA requires federal agencies to consult with NOAA Fisheries on proposed activities that may adversely affect EFH, where an adverse effect is defined as "any impact which reduces the quality and/or quantity of essential fish habitat" (NOAA Fisheries 2004). Direct and indirect physical, chemical, and biological alterations of EFH and subsequent injury to or mortality of managed species and their forage base may constitute adverse effects. These are not restricted to site-specific stressors and may extend beyond the designated EFH in the Offshore Project Area.

Stressors potentially resulting from Project construction and O&M were identified based on a review of the following literature:

- EFHAs for similar projects by other proponents;
- EFH consultations and biological opinions prepared by NOAA Fisheries for similar projects;
- EFH source documents, FMPs, and stock assessments prepared by NOAA Fisheries and FMCs; and

- Peer-reviewed articles examining site-specific and cumulative effects on benthic and pelagic habitats and species in the U.S. and worldwide.

Most FMPs identify and describe potential fishing and non-fishing activities that may impact EFH. Commercial fishing pressures may impact managed species through gear interactions with EFH (e.g., hydraulic clam dredging, bottom trawling) and intense fishing pressures on unmanaged forage species, which could alter habitat ranges and feeding habits of managed species (MAFMC 2017; NEFMC 2017; NOAA Fisheries 2017). Non-fishing impacts to EFH include both climactic and anthropogenic stressors. Largescale regional changes to physiochemical oceanic conditions (e.g., increased sea surface and bottom temperatures, changes in pH, variations in current dynamics) have been connected to shifts in community assemblages along the U.S. Atlantic Coast, including the Mid-Atlantic Bight. These stressors are described in further detail in the COP (see Section 4.2.4, Benthic Resources, Fishes, Invertebrates, and Essential Fish Habitat). Anthropogenic impacts to EFH that may compound climactic stressors include seismic surveys, dredging and dredged material disposal, mining, ocean dumping, cooling water intake and discharge, impounding and diverting of coastal hydrology, and point and non-point source pollution and sedimentation from coastal infrastructure and agriculture (NOAA Fisheries 2008; MAFMC 2017; NEFMC 2017; NOAA Fisheries 2017).

Offshore renewable energy developments were included in the list of non-fishing anthropogenic activities that may impact EFH. These alternative energy efforts include wind, wave, solar, underwater current, and hydrogen. Construction, O&M, and decommissioning of these activities have been determined to potentially impact managed species and EFH by disturbing benthic and pelagic habitat quality and introducing sound and vibrations into the environment (MAFMC 2017; NOAA Fisheries 2017). This EFHA has been conducted in the context of these identified impacts.

The potential effects of the Project on EFH would vary by species, life stage, and habitat type. Dominion Energy assessed potential effects of construction and O&M of the Project on water column, softbottom, and hardbottom habitats designated as EFH. The text below discusses groups of managed species based on their relative probability of exposure to Project impacts (e.g., least likely to be affected [Section E.4.1], most likely to be a affected by Construction or O&M [Section E.4.2]).

E.4.1 Species Least Likely to be Affected by the Project

Project construction and O&M activities would be least likely to affect water column EFH and pelagic life stages of managed species. Most Project-related stressors are oriented toward benthic habitats; exposure of pelagic organisms to benthic disturbance would be limited to physical interactions with construction vessels and equipment; localized temporary turbidity; and sediment deposition. Mobile pelagic organisms are expected to avoid exposure to excessive sound by temporarily vacating the ensonified area. Construction and O&M are not expected to cause substantial changes to pelagic or benthic prey. Encrusting algal and invertebrate species would likely increase in the area as WTG Foundations are colonized, but such changes would be localized.

The life stages of managed species listed in Table E-7 are least likely to experience impacts from the Project. Potential effects to these life stages would be temporary and reversible following construction activities.

Table E-7. Managed Species and Life Stages Least Likely to be Affected by the Project

Species	Life Stages with Water Column EFH in the Offshore Project Area
Atlantic cod	E, L
Atlantic herring	J, A
Atlantic sea scallop	L
monkfish	E, L
pollock	L
windowpane flounder	E, L
witch flounder	E, L
yellowtail flounder	L
Atlantic butterfish	E, L, J, A
Atlantic mackerel	E, J, A
black sea bass	L
bluefish	E, L, J, A
longfin inshore squid	J, A
summer flounder	E, L

Notes:
A Adult (including Sub-Adult)
E Egg
L Larva
J Juvenile

E.4.2 Species and Life Stages Most Likely to be Affected by the Project

Benthic organisms and EFH are most likely to experience short-term direct effects of physical interactions with construction equipment (including entrainment), burial by sediments, and pile driving noise and vibration. The sessile, demersal, or benthic-dependent life stages of managed species in Table E-8 are expected to experience short-term impacts during construction or O&M (see Attachment E-2 for expanded descriptions).

Table E-8. Managed Species and Life Stages Most Likely to be Adversely Affected by Construction and O&M

Species	Benthic Life Stages Likely Affected in the Offshore Project Area		
	Construction	O&M	Require Softbottom
Atlantic sea scallop	E, J, A	E, J, A	✓
clearnose skate	J, A	J, A	✓
monkfish	J, A	-	-
red hake	A	-	-
windowpane flounder	J, A	J, A	✓
winter skate	J	J	✓
Atlantic surfclam	J, A	J, A	✓
black sea bass	J, A	-	-
longfin inshore squid	E	-	-
scup	J, A	-	-
summer flounder	J, A	J, A	✓

Notes:
A Adult
E Egg
J Juvenile
- Does not apply

Some managed species/life stages with EFH in the Offshore Project Area use hardbottom substrate and artificial structures for settlement, protection from predators and energy-draining currents, and foraging

opportunities (see Attachment E-1). The species in Table E-9 are expected to aggregate, or become concentrated, around complex structure and hardbottom provided by foundations and scour protection.

Table E-9. Managed Species and Life Stages Attracted to Artificial Structures

Species	Life Stages with EFH in the Offshore Project Area	
	Attaches to Hard Substrate	Associates with Hardbottom/Structure
Atlantic sea scallop	L	-
monkfish	-	J, A
red hake	-	A
black sea bass	-	J, A
longfin inshore squid	E	-
scup	-	J, A
spiny dogfish	-	A
All HMS	-	ALL (in water column)

Notes:
A Adult (including Sub-Adult)
E Egg
HMS Highly Migratory Species
L Larva (or neonate if shark species)
J Juvenile
- Does not apply

Project-related stressors and potential short- and long-term effects of construction and O&M are discussed in the following sections, with an emphasis on the species most likely to be affected.

E.4.3 Analysis of Potential Construction Impacts

Construction activities (e.g., pre-lay grapnel runs, cable installation and armoring, pile driving, and scour protection placement) would temporarily disturb benthic EFH such as bedforms, sand waves, megaripples, and ripples in the Offshore Project Area. These bedforms are dynamic by nature and would naturally reform within days to weeks under the influence of the same physical conditions that formed them initially. Construction activities would alter pelagic EFH by creating a sediment plume, increasing turbidity, and potentially introducing chemical contamination into the water column.

These potential stressors were analyzed in the COP (see Section 4.2.4) and determined unlikely to occur at a magnitude that would adversely affect managed species or EFH in the Offshore Project Area. The COP findings are considered applicable to this EFHA and are not considered further in this section. The most substantial construction-related impacts would be those that cause direct injury to/mortality of managed organisms or their softbottom prey. The impacts described in this section have been determined to cause minimal, moderate, or less than substantial adverse effects on managed species or EFH.

E.4.3.1 Disturbance, Injury, or Mortality of Managed Species

Construction activities disrupting softbottom habitat may injure or kill sessile or slow-moving organisms (listed in Table E-8). Direct seafloor disturbance would crush or bury Atlantic sea scallop eggs and juveniles, Atlantic surfclam juveniles and adults, and longfin inshore squid egg mops located directly in the footprint of pile driving or scour protection placement.

Prior to installation of Offshore Export and Inter-Array Cables, pre-lay grapnel runs would clear debris from the cable corridors; physical effects on benthic habitats would be similar to bottom dredges and trawls, minus the collection of organisms (Hiddink et al. 2017). Construction vessel anchors and spud cans may

similarly cause injury or mortality to sessile organisms. However, Dominion Energy would require any necessary anchors and spud cans to be placed within previously cleared and disturbed areas to the extent possible to reduce the spatial extent of direct effect. NOAA Fisheries (2015) analyzed benthic impacts of the Block Island Wind Farm and estimated that each vessel anchor temporarily disturbed an area of 0.12 ac (0.05 ha).

Jet plowing, jet trenching, chain cutting, trench forming, hydroplowing, mechanical plowing, pre-trenching, and mechanical trenching methods are all considered in the PDE for Inter-Array and Offshore Export Cable burial following pre-lay clearing and grapnel runs. Each of these methods would involve the creation of a temporary trench into which the cable would be fed as the equipment is towed along the seabed. Cable installation equipment is slow-moving and would allow time for most mobile organisms to escape injury or mortality (Table E-8); such equipment would continuously move through installation corridors and would therefore represent a minor, short-term impact on managed species and EFH at any given point. Any displacement of demersal organisms would be temporary.

Sessile organisms in or immediately adjacent to the temporary trenches would likely be buried, injured, or killed by these activities. Atlantic surfclams that burrowed deeper into sediments in response to pre-lay activities would be displaced by the cable-laying equipment. Surfclam mortality associated with clam dredging ranges from 1 to 12 percent, largely due to the impacts of dredge teeth (Sabatini 2007; Kuykendall et al. 2019). Of the equipment under consideration for cable-laying activities, only chain cutting involves the use of metal teeth; other equipment types would avoid the same level of mortality. Surfclams would subsequently reposition themselves at suitable depths in the sediment following completion of Inter-Array and Offshore Export Cable installation.

Studies have demonstrated that cables typically result in minimal damage to resident biota. Andrulewicz et al. (2003) found no difference in benthic diversity, abundance, or biomass on a cable route buried in soft-bottom substrate in the Baltic Sea one year after installation. Kogan et al. (2003, 2006) found no difference in abundance and distribution of 17 benthic taxa within 100 m of a surface-laid coaxial cable and no difference in infaunal communities in 138 sediment cores of varying distances from the cable. Due to the localized nature of cable activity, the overall biological impact is likely to be negligible, particularly if the habitat distribution throughout the wider area is homogenous (Vize et al. 2008). Sessile species inhabiting sand and gravel substrates are typically adapted to frequent natural disturbances and are expected to recover quickly.

Monopiles have been selected as the WTG Foundations for this Project (see Section E.3, Table E-6). The maximum design scenario assumes rock or other hard material would be placed within a 230 ft (70 m) diameter surrounding each foundation, corresponding to a maximum footprint of 41,547.6 ft^2 (3,859.9 m^2) to prevent bottom scour. Additional protective rock or other hard material would be placed atop approximately 0.1 percent of the Offshore Export Cable for added protection where cable burial is insufficient (Dominion Energy does not currently anticipate the need for additional cable protection on Inter-Array Cables). Armoring material would be lowered or released to the seafloor by a construction vessel stabilized by dynamic positioning, spuds, or anchors. Mobile life stages of managed species would be expected to vacate the area to avoid physical disturbance, but organisms that consume demersal prey (e.g., flounders, monkfish, red hake, skates) would likely return to scavenge sessile or infaunal organisms

injured by the construction activity (Table E-8; Vallejo et al. 2017; ICF 2020). Any displacement of demersal organisms would be temporary.

E.4.3.2 Burial of Organisms by Sediment Deposition

To predict the duration of sediment suspension and area of likely deposition associated with construction activities, Dominion Energy modeled sediment transport in the Offshore Project Area (see COP Appendix J, Sediment Transport Analysis).

Sediments would be suspended in the water column within the Offshore Project Area during seafloor clearing and preparation, pile-driving, foundation placement, Inter-Array Cable and Offshore Export Cable installation, scour protection and cable armor placement. Most sediment deposition following cable burial activities has been shown to occur within tens of meters of the disturbed bottom (Vize et al. 2008; NIRAS 2015). Coarser sediments (e.g., sand, gravel) settle relatively quickly and close to the origin of disturbance, while finer sediments (e.g., clay, silt) may remain suspended for longer times and thus travel farther from their place of origin. The sandy sediments of the Offshore Project Area would settle to the seafloor near the point of disturbance. The height of sediment deposits above the bottom would be influenced by bottom currents and particle size (see COP Appendix J). Modeled deposition thicknesses were less than 0.27 inch (0.69 centimeter) within 82 ft (25 m) of the cable trench centerline during flood tides and less than 0.09 inch (0.25 centimeter) within that distance during ebb tides.

Sediment deposition may bury some Atlantic sea scallop eggs and juveniles and Atlantic surfclam juveniles and adults; While this may cause mortality in younger life stages, adults would likely move vertically to accommodate the presence of additional sediment. For example, surfclams are capable of very rapid recovery following sedimentation, reburying to desired depths within minutes of disturbance by experimental trawls (Sabatini 2007). Squid egg mops may be dusted with a fine layer of sediment but are not likely to be completely buried except within the narrow footprint of placed structures. Mobile organisms are expected to vacate the area to avoid burial. Following deposition, mobile demersal consumers (e.g., flounders, monkfish, red hake, skates) would likely return to scavenge benthic prey displaced or injured by sediment disturbance (Table E-8; Kaiser and Hiddink 2007; Vallejo et al. 2017; ICF 2020).

E.4.3.3 Entrainment of Plankton and Ichthyoplankton

Planktonic organisms may be entrained by the intake pumps of cable installation equipment. Pelagic eggs and larvae of the following species are expected to occur in the Offshore Export Cable Route Corridor: Atlantic cod, monkfish, pollock, windowpane flounder (*Scophthalmus aquosus*), yellowtail flounder (*Limanda ferruginea*), Atlantic butterfish, Atlantic mackerel, black sea bass, bluefish, and summer flounder (*Paralichthys dentatus*) (see Attachment E-1; NOAA Fisheries 2021). Risks to these organisms from entrainment include injury from movement through the pump and high-pressure discharge into the seafloor. As no data are available on the probability of survival of entrained organisms in cable installation equipment, mortality of all entrained individuals is assumed. This represents an overestimate of entrainment-induced mortality on managed species in the Offshore Project Area.

Water jetting installation equipment would operate within a narrow centerline of each of the nine Offshore Export Cables, disturbing a negligible fraction of sediment and water column. Individuals immediately surrounding the intake pumps as the equipment moved continuously along the corridor would be at risk of

entrainment. The volume of water withdrawn by the pump is expected to be approximately 7,925 gallons per minute (approximately 30 m^3 per minute) depending on the type of cable burial tool used (NYSERDA 2021). The targeted nature of such cable burial tools would result in water being pumped from a small zone surrounding the pump intake and would only temporarily affect plankton in a given area, since the cable burial tool is continuously moving while in use. Ichthyoplankton of EFH species in the immediate vicinity of the jet plow water intake may be subject to entrainment during cable installation activities. Some unknown portion of the organisms entrained through the jet plow pumps would likely result in mortality.

Mortality resulting from entrainment would represent a negligible loss against the naturally high mortality of planktonic organisms and would not be detectable within the background of existing sources of entrainment in the Offshore Project Area (e.g., commercial vessels, military vessels, hydraulic clam dredges). The water intake rate of the jet plow (approximately 7,925 gallons per minute [30 m^3 per minute]) is equivalent to the lower range of a single transit of commercial/military vessels that routinely transit the Offshore Project Area. For comparison, the cooling water intakes of such vessels are approximately; 6,840 gpm (gallons per minute, 26 m^3 per minute) for an in-transit oceanographic research vessel, 38,889 gpm (147 m^3 per minute) for a liquefied natural gas carrier vessel, and 170,000 gpm (644 m^3 per minute) for an in-transit aircraft carrier (EPA 1999). The cooling water intake rate of an onshore power plant that utilizes once-through cooling typically ranges from 86,000 to 690,000 gpm (325 to 2,612 m^3 per minute). Furthermore, while cable installation is a one-time activity, repeated tows of hydraulic clam dredges across the same seafloor area are common and compound the effect of ichthyoplankton entrainment in such areas (Stevenson et al. 2004).

E.4.3.4 Disturbance from Pile-driving Noise and Vibration

The type and size of piling and the method of driving determine the level of underwater noise and seafloor vibrations generated. Dominion Energy modeled monopile installation with a maximum impact hammer energy of 4,000 kilojoules (see COP Appendix Z) as the worst-case scenario of acoustic stressors in the PDE. The modeling parameters were set to overestimate noise and vibration by assuming the maximum rated hammer energy; during actual construction, some energy would be lost to heat and friction.

The biological effects of underwater noise on fishes and invertebrates are influenced by the magnitude of the sound, distance of the organism from the sound origin, and the physiology of the organism. Many fishes are sensitive to sound pressure and particle motion, or the sound-induced oscillation of water molecules; fishes with swim bladders connected to the ear are most sensitive to these pressures (Popper et al. 2014; Popper and Hawkins 2019; ICF 2020). To better understand acoustic sensitivity in the marine environment, NOAA Fisheries initiated a Working Group on Effects of Sound on Fish and Turtles, which established interim threshold criteria finalized under the ANSI report (Popper et al. 2014). The Working Group developed general guidelines for predicting acoustic impacts according to basic morphological traits of marine organisms and established quantitative thresholds for temporary threshold shifts, recoverable injury, and mortality (Table E-10). Categories of sensitive fish included species lacking swim bladders (e.g., flounders, monkfish, skates), species with swim bladders involved in hearing, and species with swim bladders not involved in hearing. Injury thresholds for young life stages, including eggs and larvae, were based on thresholds for fishes with swim bladders not connected to the ear (Popper et al. 2014). See also, COP Appendix Z for additional discussion of Project-specific modeling approaches used for this analysis.

Table E-10. Acoustic Threshold Levels for Fishes in Response to Impulsive Noise

Hearing Group	Impulsive Sounds		
	Mortality and Potential Mortal Injury	Recoverable Injury	Temporary Threshold Shift
Fish without swim bladders	> 213 dB (L_{PK}) > 219 dB SEL_{cum}	> 213 dB (L_{PK}) > 216 dB SEL_{cum}	>> 186 dB SEL_{cum}
Fish with swim bladder not involved in hearing	207 dB (L_{PK}) 210 dB SEL_{cum}	207 dB (L_{PK}) 203 dB SEL_{cum}	186 dB SEL_{cum}
Fish with swim bladder involved in hearing	207 dB (L_{PK}) 207 dB SEL_{cum}	207 dB (L_{PK}) 203 dB SEL_{cum}	186 dB SEL_{cum}
Eggs and larvae	207 dB (L_{PK}) 210 dB SEL_{cum}	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low

Source: Popper et al. (2014)
Notes:
dB: decibel; L_{PK}: peak sound pressure (dB re 1 µPa); F: far (1,000s of meters); I: intermediate (100s of meters); µPa: micropascal; N: near (10s of meters); N/A: not applicable; PTS: permanent threshold shift; SEL_{cum}: sound exposure level (dB re 1 $\mu Pa^2 \cdot s$); SPL RMS: root mean square sound pressure (dB re 1 µPa)

In reality, mobile organisms vulnerable to impact pile driving would likely reduce their exposure to injurious noise by moving away from the pile driving. Acoustic stress of pile driving at the Block Island Wind Farm was determined to be unlikely to adversely affect the Atlantic sturgeon or its prey (NOAA Fisheries 2015). Underwater acoustic measurement results obtained during the CVOW Pilot Project pile installation activities were also incorporated into the underwater acoustic impact assessment. The bubble curtain technology used for the CVOW Pilot Project will also be incorporated for this Project, accounting for feedback received during consultation with NOAA Fisheries and BOEM (see Appendix Z, Underwater Acoustic Assessment). The highly mobile Atlantic sturgeon would be injured by noise only if it remained for some time in the vicinity of the pile during installation. These findings can reasonably be extrapolated to mobile life stages of other managed species that are not endangered.

Pile-driving in the Lease Area would expose benthic invertebrates to sound pressure, particle motion, and substrate vibrations. The interim criteria developed by the Working Group did not include consideration of particle motion and sediment vibration impacts on invertebrates, in part because conditions determining the probability of detection and response to particle motion in the field cannot be replicated in a laboratory setting (Roberts et al. 2016; Hawkins and Popper 2017). Although few studies have examined the effect of sound-generated vibrations of sediment on marine invertebrates (Andersson et al. 2017; Popper and Hawkins 2019), and some evidence of behavioral effects has been reported. The Atlantic sea scallop, Atlantic surfclam, and longfin inshore squid could be vulnerable to such effects. Juvenile and adult scallops and surfclams would likely respond to the impact hammer sounds and vibrations by "flinching," or closing their valves, which prevents feeding (Day et al. 2017). They would likely resume feeding immediately after the disturbance; the short-term interruption of foraging would not affect the health of individuals or decrease abundance of the local populations of bivalves.

In most species of squid, statocysts and lateral lines aid in the detection of particle motion (Mooney et al. 2010; Solé et al. 2013). However, squid behavioral responses to construction-related noise may vary by species, life stage, and even by individual. A variety of body pattern changes, inking, jetting, and startle responses have been observed in the longfin inshore squid in response to pile-driving, making it difficult to predict potential impacts to the species in advance of construction (Jones et al. 2020). Ichthyoplankton

cannot avoid auditory stressors by fleeing the area, because of their limited directional-swimming abilities (Pineda et al. 2007). Recovery capabilities of damaged squid sensory cells remain unknown, although the damaged sensory hair cells of some larval fishes can regenerate within a few weeks (Solé et al. 2013). Survival and abundance of monkfish and cod eggs were unaffected by seismic sounds similar to those that affected squid hatchlings (Carroll et al. 2017).

Dominion Energy's underwater acoustic modeling of maximum project design elements is presented in COP Appendix Z. No population-level effect on fishes, squid, or other invertebrates is expected to occur given the limited temporal and spatial extent of pile driving, relative to available habitat for these species. Most mobile species would move outside the ensonified construction areas for a short time. A small fraction of the overall range of managed species in the Lease Area would be affected by pile-driving noise; therefore, impacts would be temporary and localized. These conclusions are consistent with modeling and field measurements for other Greater Atlantic offshore wind projects that reported only short-term adverse effects on fishes, invertebrates, and EFH exposed to pile-driving (BOEM 2020b). Dominion Energy would commit to using soft-start procedures and noise mitigation systems to avoid or minimize impacts to managed species.

E.4.4 Analysis of Potential Operations and Maintenance Impacts

O&M-related activities would alter EFH in the Offshore Project Area by introducing EMF in the vicinity of Inter-Array and Offshore Export Cables; potentially facilitating spread of non-indigenous species; increasing artificial lights, underwater noise, and vibrations; and degrading water quality via incidental fuel and chemical spills. These potential stressors were analyzed and determined unlikely to adversely affect managed species or EFH in the Offshore Project Area (see COP Section 4.2.4). The COP findings are considered applicable to this EFHA.

Although the installation of hard structures occurs during the construction phase, the development of artificial reefs in areas that were previously softbottom is a result of long-term presence of the Project (i.e., occurs during the O&M phase). The conversion of softbottom to hardbottom habitat represents the most notable effect of the Project in the Offshore Project Area. During the life of the Project, the loss of softbottom habitat and development of artificial reefs on foundations, scour protection, and cable mattresses is likely to have minimal, moderate, or less than substantial adverse effects on managed species and EFH.

E.4.4.1 Loss of softbottom habitat

Installation and O&M of Offshore Project Components would cause long-term disturbance, displacement, and/or modification of softbottom EFH. Foundation types and associated scour protection vary in the extent to which they modify benthic substrate. The 36 ft (11 m) diameter monopile WTG foundations and Offshore Substation piled jacket foundations and associated scour protection would convert the largest area of softbottom habitat to artificial hardbottom within the Offshore Project Area (Section E.3, Table E-6). Under this maximum design scenario, approximately 204 ac (83 ha) of softbottom in the Offshore Project Area would be permanently converted to hardbottom by foundations, scour protection, and Offshore Export Cable armoring. Of the demersal species with EFH intersecting the Offshore Project Area, EFH source documents indicate that the Atlantic sea scallop, Atlantic surfclam, clearnose and winter skates, and summer and windowpane flounders rely on softbottom habitats (Attachment E-1). Sea scallops aggregate in beds

on sand and gravel substrates, while surfclams bury in unconsolidated substrates to depths of up to 3 ft (1 m) below the water/sediment interface (Cargnelli et al. 1999b; Packer et al. 1999a). Flounder and skate species rely on softbottom prey assemblages that include infaunal and epifaunal invertebrates, such as polychaetes, amphipods, decapods, gastropods, and bivalves (Chang et al. 1999; Packer et al. 1999b; Packer et al. 2003a; Packer et al. 2003b). These species would be displaced laterally following loss of softbottom habitats and prey sources.

However, the area of softbottom habitat replaced by hardbottom represents the less than 0.1 percent of total softbottom EFH in the Offshore Project Area. The managed species that would be laterally displaced during O&M would have access to ample, comparable EFH within and around the Offshore Project Area. Monitoring of the Block Island Wind Farm indicates that softbottom macrofaunal communities directly adjacent to WTGs have not exhibited declines in quality during O&M; polychaetes remain the dominant taxa in softbottom sediments within 98 to 295 ft (30 to 90 m) distance bands surrounding the monitored WTGs (Hutchison et al. 2020). Because changes to softbottom habitat are expected to be restricted to areas directly covered by Offshore Project Components, which represent a small fraction of the total softbottom EFH in the Offshore Project Area, effects of O&M on managed species are expected to be minor.

E.4.4.2 Long-term conversion of softbottom to artificial hardbottom habitat and introduction of vertical infrastructure to the water column

Under the maximum design scenario (Section E.3, Table E-6), approximately 204 ac (83 ha) of softbottom in the Offshore Project Area would be converted to hardbottom by foundations, scour protection, and Offshore Export Cable armoring. This area would provide new hardbottom habitat for a variety of structure-associated species.

Biogenic reefs would rapidly develop on underwater surfaces of WTG and Offshore Substation Foundations and scour protection as encrusting and attaching organisms emigrated from adjacent habitats or recruited from the plankton (Degraer et al. 2018) (e.g., algae, amphipods, anemones, anthozoans, barnacles, bryozoans, hydroids, mussels, sponges, tubeworms, tunicates [Steimle and Zetlin 2000; Steimle et al. 2002; Langhamer et al. 2009; Langhamer 2012; Causon and Gill 2018; ICF 2020]). These pioneer organisms would create secondary habitat for mobile fishes and invertebrates by increasing foraging and refuge opportunities (Causon and Gill 2018; ICF 2020).

Foundation types vary in their potential to support habitat for benthic and demersal species. Monopile foundations provide smooth and mostly vertical walls for attachment. In contrast, the varied orientations of components of piled jacket foundations provide more complex habitat, including shaded undersides of horizontal elements, narrow crevices, and other sheltering opportunities (ICF 2020). Foundation types also vary in the extent to which they modify light levels, water motion, and sedimentation rates; variability in these features can increase the abundance and diversity of marine community assemblages (Bué et al. 2020). In the North Sea, physical complexity of jacket foundations supported more species and greater abundances than relatively simple monopile foundations (Causon and Gill 2018). Jacket foundation types are therefore expected to create a stronger artificial reef effect and support more diverse assemblages of fishes and invertebrates than monopiles. A 12-year study of colonization of an offshore renewable energy project reported additional habitat value of complex infrastructure features such as holes and ridges, especially for benthic crabs (Bender et al. 2020).

Studies of epifaunal communities on operational WTGs provide evidence of the potential reef effect of the Project. Monopile foundations in the North Sea accumulated 23 species within the first few months and 55 species within four years; associated scour protection accumulated 35 species within the same timeframe (Bouma and Lengkeek 2012). Monopiles of the Baltic Sea were colonized by red and green algae, hydroids, and sessile bivalves; after seven years of succession, assemblages on the foundations were similar to those on a nearby lighthouse (Andersson and Öhman 2010). Within four years, epifaunal communities on jacket foundation types in the North Sea included red and green algae, anemones, barnacles, mussels, sea stars, and urchins (Causon and Gill 2018). These findings are consistent with the observed epifaunal communities that have already been established on the CVOW Pilot Project foundations installed in 2020.

The timing of installation can influence the type of species that initially colonize new substrates because colonizers are recruited from whatever suitable species are in the plankton at the time. The Labrador Current carries ichthyoplankton from the north and the Gulf Stream carries different species from the south to create a dynamic planktonic larval assemblage in the Offshore Project Area. Furthermore, the quasi-decadal shift in the latitude of the Gulf Stream is reported to cause a corresponding northward shift of warm temperate species that follow bottom temperature isotherms (Davis et al. 2017). Because planktonic larval assemblages vary seasonally in the Offshore Project Area, initial colonization patterns of individual foundations and armoring material would reflect the season during which each foundation was installed (Krone et al. 2013, 2017). Over time, assemblages on all foundations would reach similar mature successional stages that reflect ambient conditions (e.g., water depth, temperature, currents).

The presence of Project infrastructure would not interfere with the dispersion of ichthyoplankton in the region. Monopiles would represent a relatively narrow physical intrusion into the benthic and pelagic habitats of the Lease Area. For ichthyoplankton, presence of hard substrate is one of several environmental indicators responsible for the initiation or delay of settlement; other signals include stage of larval development, temperature, prey availability, and chemical signature of conspecifics (Pineda et al. 2007; McManus et al. 2016). Operational WTGs in the North Sea have not exhibited the expected recruitment levels, perhaps due to one or more of these environmental indicators (Degraer et al. 2016). The introduction of foundations and scour protection in the Offshore Project Area would not negatively affect the regional abundances of any species with planktonic life forms.

Colonization of foundations may exhibit vertical zonation. In addition to generating novel hardbottom habitat, installation of WTGs introduces novel intertidal habitat at the sea surface. In the North Sea, the highest number of nonindigenous species (e.g., Pacific oyster [*Crassostrea gigas*], marine splash midge [*Telmatogeton japonicus*], barnacle [*Balanus perforates*] were found in this novel intertidal and splash zone (Glasby et al. 2007; De Mesel et al. 2015; Degraer et al. 2020). In some studies, monopile foundations have been colonized more heavily at the seafloor than at the sea surface, possibly because reef-building species rely on sediments suspended just above the seafloor to construct tubes (Kerckhof et al. 2010; Bouma and Lengkeek 2012). On all foundation types studied, red and green algae and barnacles were more common near the intertidal sea surface while sessile reef-forming blue mussels dominated the base (Andersson and Öhman 2010; Causon and Gill 2018). The solid bases of monopile foundations attract mobile fishes and invertebrates near the seafloor, perhaps because these structures provide some shelter from bottom currents and easy access to adjacent soft-bottom forage areas (Bouma and Lengkeek 2012; Krone et al. 2013; Causon and Gill 2018). In contrast, jacket foundations tend to attract mobile fishes and invertebrates throughout the

water column, with less evidence of vertical zonation (ICF 2020). For example, steel jackets in the German Bight were dominated by adult crabs (*Cancer* spp.) at their base and larval edible crabs at upper levels (Krone et al. 2013, 2017). Vertical epifaunal zonation has not been observed on Block Island Wind Farm WTGs in the four years since its construction, suggesting that intermediary succession may persist for several years (Hutchison et al. 2020).

Enriched organic matter (i.e., littoral fall) and empty invertebrate shells accumulate beneath and immediately adjacent to all foundation types as the associated organisms grow, feed, and ultimately die (Goddard and Love 2010; Coates et al. 2014; Causon and Gill 2018; ICF 2020). The enriched area is typically favored by small mobile organisms seeking shelter in the discarded mollusk shells (e.g., juvenile black sea bass, red hake, scup, skate species) and organisms that can derive nutrients from the rain of detritus (e.g., larval fishes, burrowing amphipods, polychaetes, other forage infauna) (ICF 2020). The enriched area around offshore structures generally supports more species per unit area than flat softbottom habitat without structures (Coen and Grizzle 2007). In areas with limited bottom currents, decomposing organic matter can increase biological oxygen demand, resulting in anoxic areas at foundation bases (ICF 2020). Bottom currents in the Offshore Project Area are expected to maintain adequate oxygen to support marine life (see Section 4.1.2, Water Quality).

Benthic enrichment associated with littoral fall around operational oil and gas platforms in the Baltic Sea and North Sea was spatially limited, extending only 3 to 16 ft (1 to 5 m) from foundation bases (Wilhelmsson et al. 2006; Bergstrom et al. 2014). The spatial effects are especially notable at monopile foundations, where organic carbon enrichment decreased measurably with distance from the foundations, while grain size increased (Andersson and Öhman 2010; Bouma and Lengkeek 2012; Coates et al. 2014). The spatial patterns may be generated by accelerated water movement around the structures (i.e., wake effect), which causes turbulence and reduces current strength (ICF 2020). As current strength is reduced, pockets of substrate with smaller organically enriched sediment particles and greater abundance of larval recruits can form immediately down-current from the foundation bases; such enriched areas may subsequently attract mobile predators (Bouma and Lengkeek 2012; Coates et al. 2014; ICF 2020). Conversely, jacket foundations do not cause bottom currents to slow. Because water moves through rather than around the open structure, no low-flow pockets form, and spatial gradients are less apparent (Coates et al. 2014; Degraer et al. 2016).

Increased productivity around WTG foundations may alter local distributional patterns of managed species (Rein et al. 2013; Degraer et al. 2016). Stomach contents of demersal fishes collected near operational wind farms in softbottom habitats in the Baltic and North Seas were characterized by hardbottom prey associated with the foundations (Andersson and Öhman 2010; Degraer et al. 2016). With the exception of the Fish Haven, and the existing CVOW Pilot Project monopile foundations, the Offshore Project Area presently offers little habitat for structure-associated species. Of the demersal species with EFH intersecting the Offshore Project Area, EFH source documents indicate that black sea bass, monkfish, red hake, scup, and spiny dogfish would benefit from the complex habitat offered by structured hardbottom. These species are known to associate with artificial structures (Table E-9; Appendix E-1).

The black sea bass exhibits particularly strong site fidelity to specific reefs and is known to aggregate around artificial reefs along the eastern seaboard from Massachusetts (Rousseau 2008; Barber et al. 2009; Harrison and Rousseau 2020) to Florida (Powers et al. 2003). Structure-associated managed species have

been observed aggregating around artificial reefs in New York (NYSDEC 2020), New Jersey (Figley et al. 2000), Delaware (Steimle et al. 2002), Maryland (Loftus and Stone 2007; Cullen and Stevens 2017), North Carolina (Bangley and Rulifson 2014; Lemoine et al. 2019), South Carolina (Kolmos 2007), and elsewhere throughout the Mid-Atlantic Bight (Steimle and Zetlin 2000; Ross and Rhode 2016). These artificial reefs have also been frequented by Atlantic cod, bluefish, pollock, and other softbottom-dependent species (e.g., summer and winter flounder). Benefits of complex habitat provided by introduced WTGs may not extend to meso- and epipelagic species. While increased vertical mixing and subsequent transport of nutrients to the sea surface have been observed at WTGs in the North Sea, changes to primary production did not yield notable changes to the distribution of resident pelagic fishes (Floeter et al. 2017).

The positive effects of European wind farms on distributions of demersal fishes and invertebrates are well known, and limited observations of U.S. wind farms supports this finding. In a Biological Opinion for the Block Island Wind Farm, NOAA Fisheries concluded that increased prey associated with WTG structures would benefit Atlantic sturgeon transiting through the area (NOAA Fisheries 2015). Recent observations of the Block Island Wind Farm have noted aggregations of more than 100 black sea bass individuals per WTG, with additional sightings of scup, monkfish, bluefish, and smooth dogfish (Hutchison et al. 2020). In the North Sea, the secondary habitat created by colonizing species on foundations and scour protection provide additional foraging opportunities for fishes and nurseries for crabs (Stenberg et al. 2015; Krone et al. 2017). In Belgium's offshore waters, increased foraging opportunities near foundations have been linked to increases in Atlantic cod and pout abundance and productivity (Reubens et al. 2014). In the Netherlands, abundances of sand eel were higher near foundations and scour protection than on surrounding softbottom sediments (Wilhelmsson et al. 2006; Bergstrom et al. 2013, 2014).

According to a recent meta-analysis of data from offshore wind farms in Europe, fishes occur at greater abundances within operational wind farm areas than at nearby reference locations (Methratta and Dardick 2019). It remains unclear whether artificial structures increase regional biomass, redistribute existing biomass, or have some effect on both processes (Powers et al. 2003; Brickhill et al. 2005; Rein et al. 2013, Smith et al. 2015). The incidence of fishing pressure also must be accounted for, as many European wind farms are closed to fishing vessels (Coates et al. 2016). At some wind farms in the North and Baltic Seas, no measurable differences in community abundances within and outside of wind farms were observed (Degraer et al. 2016; Langhamer et al. 2018). Conversely, a dual analysis of gut content and stable isotopes in benthopelagic and benthic fishes showed extensive foraging on organisms unique to offshore artificial infrastructure (Mavraki et al. 2021). In the U.S., neither the distribution, abundance, nor condition of individual fishes was reported to be altered by installation of WTGs at Block Island Wind Farm, despite predicted impacts to demersal fishes and American lobster communities (Wilber et al. 2018).

Offshore structures of all types (e.g., fixed, floating) attract many highly migratory fishes, including tunas (e.g., albacore, Atlantic bluefin, Atlantic skipjack, and Atlantic yellowfin tunas) and sharks (e.g., Atlantic angel, Atlantic sharpnose, blacktip, common thresher, dusky, sand tiger, sandbar, smoothhound, and tiger sharks) (see Attachment E-1). These highly migratory species also may use offshore structures as navigational landmarks (Taormina et al. 2018).

While foundations would introduce some habitat variability to the relatively uniform sandy substrate in the Lease Area, only a small fraction of the Offshore Project Area would be subject to a reef effect. The 205 monopile WTG foundations (with maximum 230 ft [70 m] diameter scour protection) and three piled jacket

Offshore Substation foundations (with maximum 115 ft [35 m] diameter scour protection) would convert a maximum of 204 ac (83 ha) of softbottom to hardbottom under the maximum design scenario (see Table E-6). Foundations offering greater structural complexity (e.g., piled jackets) would support more complex attached species assemblages than smooth vertical foundation types (e.g., monopiles) (Wilhelmsson and Langhamer 2014; Bué et al. 2020).

Ultimately, effects of foundations on managed species and EFH in the Offshore Project Area may be adverse, beneficial, or mixed, depending on the species (NOAA Fisheries 2015; van der Stap et al. 2016). Effects on most managed benthic and pelagic organisms would be neutral or beneficial (Hooper et al. 2017). The conversion of softbottom to hardbottom around each foundation would reduce the amount of softbottom habitat in the Offshore Project Area for softbottom-reliant species (e.g., Atlantic sea scallop, Atlantic surfclam, clearnose skate [*Raja eglanteria*] and winter skate [*Leucoraja ocellata*], summer and windowpane flounders); however, softbottom habitat is not a limiting resource in the Mid-Atlantic Bight or in coastal Virginia. Structure-associated species (e.g., monkfish, red hake, black sea bass, scup, spiny dogfish [*Squalus acanthias*], tunas and sharks) may benefit from the Project. Influences of the Project on local distributions of fishes and invertebrates would be limited to the Offshore Project Area and no population-level impacts are expected.

E.5 SUMMARY OF EFFECTS TO EFH

The analyses presented in this EFHA and in the COP support Dominion Energy's determination of effects for managed species and EFH. Expected impacts for managed species with EFH intersecting the Offshore Project Area are detailed in Attachment E-2 and summarized briefly in this section. Effects on other NOAA Trust Resources (see Section E.2.4) would parallel those for managed species with similar habitat and prey requirements.

E.5.1 Summary of Effects on Water Column, Plankton, and Ichthyoplankton

Some EFH designated in the water column of the Offshore Project Area would temporarily be affected during construction and decommissioning of the Project. Potential stressors from these stages would include localized increases in turbidity from sediment plumes, inadvertent fuel releases from Project vessels and equipment, ichthyoplankton entrainment by cable installation equipment, and introduction of noise and vibration from impact pile driving. Water column EFH would not be subject to measurable O&M-related stressors.

During cable installation, equipment would move continuously through the installation corridor and pose a temporary entrainment threat to ichthyoplankton in any one location. Water would be drawn from the water column into the intake pumps of jetting tools, thus avoiding demersal eggs and larvae. The volume of water withdrawn by the pumps would be a small fraction of available pelagic habitat; mortality from entrainment would not be detectable relative to naturally high mortality of plankton. Therefore, the potential loss of ichthyoplankton to entrainment during construction would be temporary and localized in the Offshore Project Area.

During pile driving, noise and vibration introduced into the Offshore Project Area could result in behavioral changes, temporary or permanent threshold shifts, injury, or limited instances of mortality in managed species. Vulnerability to these impacts increases in species with swim bladders, particularly when the swim bladder is involved in hearing. However, mobile life stages of managed species vulnerable to impact pile driving are expected to reduce exposure to injurious noise by temporarily avoiding the area of impact. Given the limited spatial and temporal extent of Project-related pile driving, no population-level effect on managed fishes, squid, or bivalves is expected to occur.

E.5.2 Summary of Effects on Softbottom Substrate

A maximum of 204 ac (83 ha) of softbottom benthic habitat in the Offshore Project Area would be converted to hardbottom (WTG Foundations, Offshore Substation Foundations, scour protection) for the life of the Project (Table E-6). Short-term stressors to softbottom benthic EFH related to construction and decommissioning would include direct disturbance by construction equipment and potential burial, injury, or mortality of managed species. Bedforms such as sand waves, megaripples, and ripples would be temporarily disturbed and would reform within days to weeks under the influence of the same physical conditions that formed them initially. Long-term stressors to softbottom benthic EFH related to O&M would include the introduction of EMF in the benthic environment and the conversion of softbottom to hardbottom habitat.

Pre-lay grapnel runs and trench forming for Inter-Array and Offshore Export Cable installation would affect sessile life stages of managed species located directly in the path of construction. Mobile life stages of managed species would be expected to temporarily vacate the impacted area to avoid injurious interactions with construction equipment. Species that consume infaunal and epibenthic forage species would likely return rapidly after construction to scavenge organisms injured by the activity. Direct impacts to managed benthic and demersal species would be temporary and localized.

Long-term loss of softbottom habitat during O&M would be most likely to adversely affect managed species reliant on softbottom habitat for refuge and forage opportunities. These species would be directly impacted by the introduction of hardbottom substrate by being laterally displaced; they would also be indirectly impacted by the displacement of their preferred prey species. However, the area of softbottom habitat replaced by Offshore Project Components comprises less than 0.1 percent of total softbottom EFH in the Offshore Project Area. Monitoring of the Block Island Wind Farm indicates that softbottom macrofaunal communities directly adjacent to WTGs have not exhibited strong changes during O&M, implying that long-term changes to softbottom EFH would be restricted to areas directly covered by the Project (Hutchison et al. 2020).

E.5.3 Summary of Effects on Hardbottom Substrate

Hardbottom substrate (WTG Foundations, Offshore Substation Foundations, scour protection) would be introduced in up to 204 ac (83 ha) of the Offshore Project Area for the life of the Project (Table E-6). Novel underwater surfaces would rapidly be colonized by encrusting and attaching organisms, which would create biogenic habitat for structure-associated species. Benthic areas surrounding WTG foundations would be enriched by littoral fall from these communities; discarded shells would serve as another form of hard substrate offering refuge for small mobile organisms. Certain managed species with EFH in the Offshore

Project Area may benefit from the introduction of complex habitat and associated increased productivity, including both resident species and highly migratory sharks and tunas. While foundations would introduce some habitat variability to the relatively uniform softbottom substrates of the Lease Area, only a small fraction of the Offshore Project Area would be subject to reef effect. Influences of novel structure on local distributions of managed organisms would be limited to the Offshore Project Area and no population-level impacts are expected.

E.5.4 Avoidance, Minimization, and Mitigation Measures

Dominion Energy proposes to implement the following measures to avoid, minimize, and mitigate the potential impact-producing factors to managed species and EFH (Table E-11).

Table E-11. Project Impact-Producing Factors and Proposed Avoidance, Minimization, and Mitigation Measures

Project Stage	Location	Impact	Avoidance, Minimization, and Mitigation
Construction; Decommissioning	Offshore Project Area	Disturbance of softbottom EFH habitat	• Dominion would establish a horizontal buffer of at least 164 ft (50 m) around identified artificial reefs, shipwrecks, and other mapped hardbottom habitat in the Fish Haven area. No other hardbottom or sensitive habitat is known or expected to occur in the Offshore Project Area. Dominion Energy would further micro-site within the Offshore Export Cable Route Corridor to avoid softbottom EFH habitats where feasible to minimize the probability of adverse interactions with sensitive benthic resources; • The release of non-toxic drilling muds during horizontal directional drilling (HDD) activities is possible but unlikely. Dominion Energy would develop and implement an HDD Inadvertent Release Plan that would include pollution prevention measures and spill response procedures covered by the Stormwater Pollution Prevention Plan; and • Dominion Energy would commit to using a soft-start procedure and noise mitigation systems such as bubble curtain technologies to avoid or minimize impacts to managed species.
		Disturbance, injury, or mortality of benthic and pelagic organisms	
		Change in water quality, including turbidity, sediment deposition, and chemical contamination	
		Entrainment of plankton and ichthyoplankton	
		Increase in underwater noise and vibration	
Operations and Maintenance	Offshore Project Area	Long-term conversion of softbottom to artificial hardbottom habitat and introduction of vertical infrastructure to the water column	• As required for navigational safety, Dominion Energy would install artificial lights on all Project structures. These lights would be directed parallel to the sea surface to increase the visibility of structures to mariners; they would not be directed into the water; • Dominion Energy would develop and implement an Oil Spill Response Plan describing measures to avoid accidental spills and protocols to be implemented should a spill occur. Dominion Energy also would require all Project-related vessels to operate in accordance with laws regulating at-sea discharges of vessel-generated waste to minimize impacts to managed species; and • Dominion Energy would commit to burying Project-related cables wherever feasible to minimize EMF detectable by managed species.
		Habitat creation for nonindigenous species	
		Increase in shading and artificial lights	
		Change in water quality, including fuel and chemical spills	
		Introduction of Project-related electric and magnetic fields (EMF)	

Dominion Energy will continue discussion and engagement with the appropriate regulatory agencies and environmental non-governmental organizations throughout the life of the Project to develop an adaptive mitigation approach that provides flexible and protective mitigation measures. In addition to these specific measures, Dominion Energy and all Project-related vessels would abide by applicable laws and regulations, including but not limited to reducing marine debris, managing ballast water, preventing spills of fuels and other hazardous materials, and complying with vessel speed restrictions.

E.6 REFERENCES

Alpine (Alpine Ocean Seismic Survey, Inc.). 2021. *CVOW-C Export Cable Route Corridor Geophysical Survey Interpretation Report*. Rev 04. 771 pp.

Andersson, M. and M. Öhman. 2010. "Fish and sessile assemblages associated with wind turbine constructions in the Baltic Sea." *Marine and Freshwater Research*, 61:642-650. Available online at: https://www.researchgate.net/publication/236605205_Fish_and_sessile_assemblages_associated_with_wind_turbine_constructions_in_the_Baltic_Sea.

Andersson, M., S. Andersson, J. Ahlsén, B. Anderssson, J. Hammar, L. Persson, J. Pihl, P. Sigray, and A. Wikström. 2017. *A Framework for Regulating Underwater Noise During Pile Driving*. A technical Vindval Report ISBN 978-91-620-6775-5, Swedish Environmental Protection Agency, Stockholm, Sweden. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Andersson-et-al-2017-Report6775.pdf.

Andrulewicz, E., D. Napierska, and Z. Otremba. 2003. *The environmental effects of the installation and functioning of the submarine SwePol Link HVDC transmission line: A case study of the Polish Marine Area of the Baltic Sea*. Journal of Sea Research 49:337-345. Available online at: https://doi.org/10.1016/S1385-1101(03)00020-0.

ASMFC (Atlantic States Marine Fisheries Commission). 2014. *Addendum IV to the Interstate Fishery Management Plan for American Eel*. Available online at: http://www.asmfc.org/uploads/file/57336cfcAmericanEel_AddendumIV_Oct2014.pdf.

ASMFC (Atlantic States Marine Fisheries Commission). 2015. *Black Drum Stock Assessment and Peer Review Reports.* Prepared by the ASMFC Black Drum Stock Assessment Review Panel. Available online at: http://www.asmfc.org/uploads/file//54ecf837BlackDrumStockAssmt_PeerReviewReports_Feb2015.pdf.

ASMFC. 2017a. *2017 Atlantic Croaker Stock Assessment Peer Review.* Prepared by the ASMFC Atlantic Croaker and Spot Stock Assessment Review Panel pursuant to NOAA Award No. NA15NMF4740069. Available online at: http://www.asmfc.org/uploads/file/59c2ba88AtlCroakerAssessmentPeerReviewReport_May2017.pdf.

ASMFC. 2017b. *Amendment 3 to the Interstate Fishery Management Plan for Atlantic Menhaden*. Prepared by the Atlantic Menhaden Plan Development Team pursuant to NOAA Award no. NA15NMF4740069. Available online at: http://www.asmfc.org/uploads/file//5a4c02e1AtlanticMenhadenAmendment3_Nov2017.pdf.

ASMFC. 2017c. *Stock Assessment Overview: Atlantic Sturgeon*. Available online at: https://www.asmfc.org/uploads/file/59f8b1fdAtlanticSturgeonStockAssmtOverview_Oct2017.pdf.

ASMFC. 2017e. *Red Drum Benchmark Stock Assessment & Peer Review Report.* Prepared by the Red Drum Stock Assessment Desk Review Panel pursuant to NOAA Award No. NA15NMF4740069. Available online at: http://www.asmfc.org/uploads/file/589a2059RedDrumStockAssessment_PeerReviewReport_2017.pdf.

ASMFC. 2017e. *River Herring Stock Assessment Update Volume II: State-Specfic Reports.* Available online at: http://www.asmfc.org/uploads/file/59c2ac1fRiverHerringStockAssessmentUpdateVolumeII_State-Specific_Aug2017.pdf. ASMFC. 2017f. *2017 Spot Stock Assessment Peer Review.* Prepared by the Atlantic Croaker and Spot Stock Assessment Review Panel pursuant to NOAA Award No. NA15NMF4740069. Available online at: http://www.asmfc.org/uploads/file/59c2b9edSpotAssessmentPeerReviewReport_May2017.pdf.

ASMFC. 2017g. *Amendment 1 to the Interstate Fishery Management Plan for Tautog*. Prepared by the Tautog Plan Development Team pursuant to NOAA Award No. NA15NMF4740069. Available online at: https://www.asmfc.org/uploads/file/5a0477c3TautogAmendment1_Oct2017.pdf.

ASMFC. 2018a. *Addendum V to thee Interstate Fishery Management Plan for American Eel*. Available online at: http://www.asmfc.org/uploads/file/5e1636f1AmEelAddendumV_Aug2018_updated.pdf.

ASMFC. 2018b. *Review of the Fishery Management Plan for Spotted Seatrout (*Cynoscion nebulosus*)*. Prepared by the Spotted Seatrout Plan Review Team. Available online at: http://www.asmfc.org/uploads/file/5c01af46spottedseatroutFMPReview2018.pdf.

ASMFC. 2019a. *Addendum VI to Amendment 6 to the Atlantic Striped Bass Interstate Fishery Management Plan*. Available online at: http://www.asmfc.org/uploads/file/5dd447baStripedBassAddendumVI_Amend6_Oct2019.pdf.

ASMFC. 2019b. *2019 Horseshoe Crab Benchmark Stock Assessment and Peer Review Report*. Prepared by the Horseshoe Crab Stock Assessment Subcommittee pursuant to NOAA Award No. NA15NMF4740069. Available online at: http://www.asmfc.org/uploads/file/5cd5d6f1HSCAssessment_PeerReviewReport_May2019.pdf.

ASMFC. 2019c. *Weakfish Stock Assessment Overview*. Available online at: http://www.asmfc.org/uploads/file/5df29fd92019WeakfishAssessmentOverview_Nov2019.pdf.

ASMFC. 2020a. *2020 American Shad Benchmark Stock Assessment.* Prepared by the American Shad Stock Assessment Subcommittee. Available online at: http://www.asmfc.org/uploads/file/5f999ba1AmShadBenchmarkStockAssessment_PeerReviewReport_2020_web.pdf.

ASMFC. 2020b. *SEDAR 58 Atlantic Cobia Stock Assessment Report.* Available online at: http://www.asmfc.org/uploads/file/5f6276faSEDAR58_AtlCobiaAssessment_PeerReviewReport.pdf.

Atkinson, L. and T. Targett. 1983. "Upwelling along the 60-m isobath from Cape Canaveral to Cape Hatteras and its relationship to fish distribution." *Deep Sea Research Part A, Oceanographic Research Papers,* 30(2):221-226. Available online at: https://doi.org/10.1016/0198-0149(83)90070-5.

Bangley, C., and R. Rulifson. 2014. "Feeding habits, daily ration, and potential predatory impact of mature female spiny dogfish in North Carolina coastal waters." *North American Journal of Fisheries Management* 34(3):668-677. Available online at: https://doi.org/10.1080/02755947.2014.902410.

Barber, J., K. Whitmore, M. Rousseau, D. Chosid, and R. Glenn. 2009. *Boston Harbor Artificial Reef Site Selection & Monitoring Program.* Massachusetts Division of Marine Fisheries Technical Report TR-35. Available online at: https://www.researchgate.net/publication/303960175.

Bender, A., Langhamer, O., & Sundberg, J. (2020). "Colonisation of wave power foundations by mobile mega- and macrofauna - a 12 year study". *Marine Environmental Research, 161*, 28. doi:10.1016/j.marenvres.2020.105053.

Bergstrom, L., F. Sundqvist, and U. Bergstrom. 2013. "Effects of an offshore wind farm on temporal and spatial patterns in the demersal fish community." *Marine Ecology Press Series* 485:199-210. Available online at: https://doi.org/10.3354/meps10344.

Bergstrom, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, M. Capetillo, and D. Wilhelmsson. 2014. "Effects of offshore wind farms on marine wildlife—a generalized impact assessment." *Environmental Research Letters* 9:034012. Available online at: http://dx.doi.org/10.1088/1748-9326/9/3/034012.

BOEM (Bureau of Ocean Energy Management). 2012. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia: Final Environmental Assessment*. OCS EIS/EA BOEM 2012-003. Available online at: https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/Smart_from_the_Start/Mid-Atlantic_Final_EA_012012.pdf.

BOEM. 2013. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts: Revised Environmental Assessment.* OCS EIS/EA BOEM 2013-1131. Available online at: https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/State_Activities/BOEM%20RI_MA_Revised%20EA_22May2013.pdf.

BOEM. 2014a. *Atlantic OCS: Proposed Geological and Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas: Final Programmatic Environmental Impact Statement*. OCS EIS/EA BOEM 2014-01. Available online at: https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/GOMR/BOEM-2014-001-v1.pdf.

BOEM. 2014b. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Massachusetts: Revised Environmental Assessment.* OCS EIS/EA BOEM 2014-603. Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Revised-MA-EA-2014.pdf.

BOEM. 2015a. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore North Carolina: Revised Environmental Assessment.* OCS EIA/EA BOEM 2015-038. Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NC/NC-EA-Camera-FONSI.pdf.

BOEM. 2015b. *Virginia Offshore Wind Technology Advancement Project on the Atlantic Outer Continental Shelf Offshore Virginia: Revised Environmental Assessment.* OCS EIS/EA BOEM 2015-031. Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/VA/VOWTAP-EA.pdf.

BOEM. 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York: Revised Environmental Assessment.* OCS EIA/EA BOEM 2016-070. Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NY/NY_Revised_EA_FONSI.pdf. BOEM. 2018. *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan.* Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/Draft-Design-Envelope-Guidance.pdf

BOEM. 2019. *Vineyard Wind Offshore Wind Energy Project: Essential Fish Habitat Assessment.* Available online at: https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Vineyard-Wind/Vineyard_EFH_2019_04_19_Final_posted.pdf.

BOEM. 2021a. South Fork Wind Farm and South Fork Export Cable Project: Biological Assessment. Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/SFWF-BA-NMFS.pdf.

BOEM. 2021b. South Fork Wind Farm and South Fork Export Cable: Essential Fish Habitat Assessment with NOAA Trust Resources. Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/SFWF-EFH-AssessmentNMFS.pdf.

Bouma, S. and W. Lengkeek. 2012. *Benthic communities on hard substrates of the offshore wind farm Egmond aan Zee (OWEZ). Including results of samples collected in scour holes*. Report No. OWEZ-R-266-T1-20120206 prepared by Bureau Waardenburg for Noordzeewind. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Boumaetal2012.pdf.

Brickhill, M., S. Lee, and R. Connolly. 2005. "Fishes associated with artificial reefs: attributing changes to attraction or production using novel approaches." *Journal of Fish Biology*, 67: 53–71. Available online at: https://doi.org/10.1111/j.0022-1112.2005.00915.x.

Bué, M., D. Smale, G. Natanni, H. Marshall, and P. Moore. 2019. "Multiple-scale interactions structure macroinvertebrate assemblages associated with kelp understory algae." *Diversity and Distributions,* 26:1551-1565. Available online at: https://doi.org/10.1111/ddi.13140.

Cargnelli, L., S. Griesbach, C. McBride, C. Zetlin, and W. Morse. 1999a. *Essential Fish Habitat Source Document: Longfin Inshore Squid,* Loligo pealeii, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-146. Available online at: https://repository.library.noaa.gov/view/noaa/3151.

Cargnelli, L., S. Griesbach, D. Packer, and E. Weissberger. 1999b. *Essential Fish Habitat Source Document: Atlantic Surfclam,* Spisula solidissima, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-142. Available online at: https://repository.library.noaa.gov/view/noaa/3144.

Carroll, A., R. Przeslawski, A. Duncan, M. Gunning, and B. Bruce. 2017. "A critical review of the potential impacts of marine seismic surveys on fish & invertebrates." *Marine Pollution Bulletin*, 114:9-24. Available online at: http://dx.doi.org/10.1016/j.marpolbul.2016.11.038.

Castelao, R., S. Glenn, and O. Schofield. 2010. "Temperature, salinity, and density variability in the central Middle Atlantic Bight." *Journal of Geophysical Research*, 115:C10005. Available online at: https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2009JC006082.

Causon, P. and A. Gill. 2018. "Linking ecosystem services with epibenthic biodiversity change following installation of offshore wind farms." *Environmental Science and Policy* 89:340-347. Available online at: https://doi.org/10.1016/j.envsci.2018.08.013.

Chang, S., P. Berrien, D. Johnson, and W. Morse. 1999. *Essential Fish Habitat Source Document: Windowpane,* Scophthalmus aquosus, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-137. Available online at: https://repository.library.noaa.gov/view/noaa/3127.

Coates, D., A., Deschutter, Y. Vincx, M., and J. Vanaverbeke. 2014. "Enrichment and shifts in macrobenthic assemblages in an offshore wind farm area in the Belgian part of the North Sea." *Marine Environmental Research*, 95(Supplement C), 1-12. Available online at: https://doi.org/10.1016/j.marenvres.2013.12.008.

Coen, L. and R. Grizzle. 2007. *The Importance of habitat created by molluscan shellfish to managed species along the Atlantic Coast of the United States*. ASMFC Habitat Management Series #8. Available online at: https://www.researchgate.net/publication/285046037_The_importance_of_habitat_created_by_molluscan_shellfish_to_managed_species_along_the_Atlantic_Coast_of_the_United_States.

Cullen, D., and B. Stevens. 2016. "Use of an underwater video system to record observations of black sea bass (*Centropristis striata*) in waters off the coast of Maryland." *Fishery Bulletin* 115:408-418. Available online at: https://doi.org/10.7755/FB.115.3.10.

Cutter, G. and R. Diaz. 1998. "Part I: Benthic habitats and biological resources off the Virginia Coast 1996 and 1997." In: *Environmental studies relative to potential sand mining in the vicinity of the City of Virginia Beach, Virginia*. Virginia Institute of Marine Science, College of William and Mary. Available online at: http://dx.doi.org/doi:10.21220/m2-mx15-9c77.

Davis, X., T. Joyce, and Y. Kwon. 2017. "Prediction of silver hake distribution on the Northeast U.S. shelf based on the Gulf Stream path index." *Continental Shelf Research*, 138:51-64. Available online at: http://dx.doi.org/10.1016/j.csr.2017.03.003.

Day, R., R. McCauley, Q. Fitzgibbon, K. Hartmaan, and J. Semmens. 2017. "Exposure to seismic air gun signals causes physiological harm and alters behavior in the scallop *Pecten fumatus*." *Proceedings of the National Academy of Sciences*, 11(40):e8537-e8546. Available online at: https://doi.org/10.1073/pnas.1700564114.De Mesel, I., F. Kerckhof, A. Norro, B. Rumes, and S.

Degraer. 2015. "Succession and seasonal dynamics of the epifauna community on offshore wind farm foundations and their role as stepping stones for non-indigenous species." *Hydrobiologia* 756(37):37–50. Available online at: https://doi.org/10.1007/s10750-014-2157-1.

Degraer, S., R. Brabant, B. Rumes, and L. Vigin. 2016. *Environmental impacts of offshore wind farms in the Belgian part of the North Sea: Environmental impact monitoring reloaded*. Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management Section: Brussels. Available online at: http://www.vliz.be/en/catalogue?module=ref&refid=282994&printversion=1&dropIMIStitle=1.

Degraer, S., R. Brabant, B. Rumes, and L. Vigin. 2018. *Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea: Assessing and Managing Effect Spheres of Influence*. Brussels: Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management. Available online at: https://www.researchgate.net/publication/328095905_Environmental_Impacts_of_Offshore_Wind_Farms_in_the_Belgian_Part_of_the_North_Sea_Assessing_and_Managing_Effect_Spheres_of_Influence.

Degraer, S., D. Carey, J. Coolen, Z. Hutchison, F. Kerckhof, B. Rumes, and J. Vanaverbeke. 2020. "Offshore wind farm artificial reefs affect ecosystem structure and functioning: A synthesis." *Oceanography* 33(4):48-57. Available online at: https://tos.org/oceanography/assets/docs/33-4_degraer.pdf.

Diaz, R., G. Cutter, and C. Hobbs. 2004. "Potential impacts of sand mining offshore of Maryland and Delaware: Part 2 - Biological considerations." *Journal of Coastal Research*, 20:61-69. Available online at: https://doi.org/10.2112/1551-5036(2004)20[61:PIOSMO]2.0.CO;2.

Diaz, R., C. Tallent, and J. Nestlerode. 2006. "Benthic resources and habitats at the Sandbridge Borrow Area: A test of monitoring protocols." In: *Field testing of a physical/biological monitoring methodology for offshore dredging and mining operations*. Prepared by Virginia Institute of Marine Science under MMS Cooperative Agreement 1435-01-02-CA85050. Available online at: http://dx.doi.org/doi:10.21220/m2-8bmz-5b52. EPA (Environmental Protection Agency). 2012. *National Coastal Condition Report IV: September 2012, Office of Research and Development/Office of Water*. Available online at: https://www.epa.gov/sites/production/files/2014-10/documents/0_nccr_4_report_508_bookmarks.pdf.

Federal Register. 2017. *Endangered and threatened species; Designation of Critical Habitat for the endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments of Atlantic sturgeon and the threatened Gulf of Mexico Distinct Population Segment of Atlantic sturgeon*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Available online at: https://www.govinfo.gov/content/pkg/FR-2017-08-17/pdf/2017-17207.pdf.

Federal Register. 2021a. Notice of Intent to Prepare an Environmental Impact Assessment for Ocean Wind, LLC's Proposed Wind Energy Facility Offshore New Jersey. Federal Register, 86(59), 16630-16633. Available online at: https://www.boem.gov/sites/default/files/documents/about-boem/regulations-guidance/86-FR-16630.pdf.

Federal Register. 2021b. Notice of Intent to Prepare an Environmental Impact Statement for Revolution Wind LLC's Proposed Wind Energy Facility Offshore Rhode Island. Federal Register, 86(82), 22972-22975. Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/86-FR-22972.pdf.

Federal Register. 2021c. Notice of Intent to Prepare an Environmental Impact Statement for the Atlantic Shores Offshore Wind Projects Offshore New Jersey. Federal Register, 86(187), 54231-54235. Available online at: https://www.govinfo.gov/content/pkg/FR-2021-09-30/pdf/2021-21300.pdf.

Figley, B., J. Carlson, B. Preim, J. Daetsch, T. Colman, C. Giordano, and T. Moore. 2001. *Survey of New Jersey's Recreational Wreck/Artificial Reef Fisheries, 2000*. Wallop-Breaux Federal Aid to Fisheries Project F-15-R-41. Available online at: httsp://www.njscuba.net/z-reefs/fishing_2000.pdf.

Floeter, J., J. van Beusekom, D. Auch, U. Callies, J. Carpenter, T. Dudeck, S. Eberle, A. Eckhardt, D. Gloe, K. Hanselmann, M. Hufnagl, S. Janssen, H. Lenhart, K. Moeller, R. North, T. Pohlmann, R. Riethmueller, S. Schulz, S. Spreizenbarth, A. Temming, B. Walter, O. Zielinksi, and C. Moellmann. 2017. "Pelagic effects of offshore wind farm foundations in the stratified North Sea." *Progress in Oceanography* 156:154-173. Available online at: https://doi.org/10.1016/j.pocean.2017.07.003.

Fugro (Fugro Consultants, Inc.). 2013. *Regional geophysical survey and interpretive report: Virginia Wind Energy Area offshore southeastern Virginia*. Prepared for the U.S. Dept. of Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2013-220. Available online at: https://www.dmme.virginia.gov/DE/LinkDocuments/OffshoreWind/VA_WEA_Phase-2_Geophysical_Report%20(small).pdf.

Glasby, T.M., S.D. Connell, M.G. Holloway, and C.L. Hewitt. 2007. "Nonindigenous biota on artificial structures: Could habitat creation facilitate biological invasions?" *Marine Biology* 151:887–895. Available online at: https://doi.org/10.1007/s00227-006-0552-5.

Goddard, J. and M. Love. 2010. "Megabenthic invertebrates on shell mounds associated with oil and gas platforms off California." *Bulletin of Marine Science*, 86(3):533-554. Available online at: https://www.researchgate.net/publication/233584425_Megabenthic_invertebrates_on_shell_mounds_associated_with_oil_and_gas_platforms_off_California.

Greene, J., M. Anderson, J. Odell, and N. Steinberg. 2010. *The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One*. The Nature Conservancy, Eastern U.S. Division, Boston, MA. Available online at: https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/namera-phase1-fulreport.pdf.

Grothues, T. and R. Cowen. 1999. "Larval fish assemblages and water mass history in a major faunal transition zone." *Continental Shelf Research*, 19:1171-1198. Available online at: https://doi.org/10.1016/S0278-4343(99)00010-2.

Guida, V., A. Drohan, H. Welch, J. McHenry, D. Johnson, V. Kentner, J. Brink, D. Timmons, and E. Estlea-Gomez. 2017. *Habitat Mapping and Assessment of Northeast Wind Energy Areas*. OCS Study BOEM 2017-088. Available online at: https://espis.boem.gov/final%20reports/5647.pdf.

Hare, J., M. Fahay, and Robert Cowen. 2001. "Springtime ichthyoplankton of the slope region off the north-eastern United States of America: larval assemblages, relation to hydrography and implications for larval transport." *Fisheries Oceanography*, 10(2):164-192. Available online at: https://doi.org/10.1046/j.1365-2419.2001.00168.x.

Hare, J., J. Churchill, R. Cowen, T. Berger, P. Cornillon, P. Dragos, S. Glenn, J. Govoni, and T. Lee. 2002. "Routes and rates of larval fish transport from the southeast to the northeast United States continental shelf." *Limnology and Oceanography*, 47(6):1774-1789. Available online at: https://doi.org/10.4319/lo.2002.47.6.1774.

Harrison, S., and M. Rousseau. 2020. "Comparison of artificial and natural reef productivity in Nantucket Sound, MA, USA." *Estuaries and Coasts* 43:2092-2105. Available online at: https://doi.org/10.1007/s12237-020-00749-6.

Hawkins, A. and A. Popper. 2017. "A sound approach to assessing the impact of underwater noise on marine fishes and invertebrates." *ICES Journal of Marine Science*, 74(3):635-651. Available online at: https://doi.org/10.1093/icesjms/fsw205.

Hiddink, J., S. Jennings, M. Sciberras, C. Szostek, K. Hughes, N. Ellis, A. Rijnsdorp, R. McConnaughey, T. Mazor, R. Hilborn, J. Collie, C. Pitcher, R. Amoroso, A. Parma, P. Suuronen, and M. Kaiser. 2017. "Global analysis of depletion and recovery of seabed biota after bottom trawling disturbance." *Proceedings of the National Academy of Sciences*, 114(31):8301-8306. Available online at: https://doi.org/10.1073/pnas.1618858114.

Hooper, T., N. Beaumont, and C. Hattam. 2017. "The implications of energy systems for ecosystem services: A detailed case study of offshore wind." *Renewable and Sustainable Energy Reviews*, 70:230-241. Available online at: http://dx.doi.org/10.1016/j.rser.2016.11.248.

Hutchison, Z. M. Bartley, S. Degraer, P. English, A. Khan, J. Livermore, B. Rumes, and J. King. 2020. "Offshore Wind Energy and Benthic Habitat Changes: Lessons from Block Island Wind Farm." *Oceanography* 33(4):58-69. Available online at: https://www.jstor.org/stable/10.2307/26965750.

ICF. 2020. "Comparison of Environmental Effects from Different Offshore Wind Turbine Foundations." U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Sterling, VA. OCS Study BOEM 2020-041. 42 pp. Available online at: https://www.boem.gov/sites/default/files/documents/environment/Wind-Turbine-Foundations-White%20Paper-Final-White-Paper.pdf.

INSPIRE Environmental. 2020. Essential Fish Habitat Assessment Technical Report: Revolution Wind Offshore Wind Farm. Prepared for Revolution Wind, LLC. Available online at: https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/App-L-FinfishEFH-Tech-Rpt.pdf.

Jacobson, L. 2005. *Essential Fish Habitat Source Document: Longfin Inshore Squid,* Loligo pealeii, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-193. Available online at: https://repository.library.noaa.gov/view/noaa/4035.

Jones, I., J. Stanley, and T. Mooney. 2020. "Impulsive pile driving noise elicits alarm responses in squid (*Doryteuthis pealeii*)." *Marine Pollution Bulletin*, 150:110792. Available online at: https://doi.org/10.1016/j.marpolbul.2019.110792.

Kaiser, M. and J. Hiddink. 2007. "Food subsidies from fisheries to continental shelf benthic scavengers." *Marine Ecology Progress Series,* 350:267-276. Available online at: https://doi.org/10.3354/meps07194.

Kerckhof, F., B. Rumes, T. Jacques, S. Degraer, and A. Norro. 2010. "Early development of the subtidal marine biofouling on a concrete offshore windmill foundation on the Thornton Bank (southern North Sea): first monitoring results." *International Journal of the Society for Underwater Technology*, 29(3):137-149. Available online at: https://doi.org/10.3723/ut.29.137.

Kogan, I., C. Paull, L. Kuhnz, E. Burton, S. von Thun, H. Greene, and J. Barry. 2003. *Environmental Impact of the ATOC/Pioneer Seamount Submarine Cable*. Prepared by MBARI/Monterey Bay National Marine Sanctuary. Available online at: https://nmsmontereybay.blob.core.windows.net/montereybay-prod/media/research/techreports/cablesurveynov2003.pdf.

Kogan, I., C. Paull, L. Kuhnz, E. Burton, S. von Thun, H. Greene, and J. Barry. 2006. *ATOC/Pioneer Seamount cable after 8 years on the seafloor: Observations, environmental impact*. Continental Shelf Research 26:771-787. Available online at: https://doi.org/10.1016/j.csr.2006.01.010.

Kolmos, K. 2007. *Succession and Biodiversity of an Artificial Reef Marine Protected Area: A Comparison of Fish Assemblages on Protected and Unprotected Habitats*. M.Sc. Thesis submitted to Graduate School of the College of Charleston. Available online at: http://cdn1.safmc.net/wp-content/uploads/2016/11/28100946/KolmosThesis2007.pdf.

Krone, R., L. Gutow, T. Brey, J. Dannheim, and A. Schröder. 2013. "Mobile demersal megafauna at artificial structures in the German Bight—Likely effects of offshore wind farm development." *Estuarine, Coastal and Shelf Science*, 125:1-9. Available online at: http://dx.doi.org/10.1016/j.ecss.2013.03.012.

Krone, R., G. Dederer, P. Kanstinger, P. Krämer, C. Schneider, and I. Schmalenbach. 2017. "Mobile demersal megafauna at common offshore wind turbine foundations in the German Bight (North Sea) two years after deployment—increased production rate of *Cancer pagurus*." *Marine Environmental Research*, 123:53-61. Available online at: http://dx.doi.org/10.1016/j.marenvres.2016.11.011.

Kuykendall, K., E. Powell, J. Klinck, P. Moreno, and R. Leaf. 2019. "The effect of abundance changes on a management strategy evaluation for the Atlantic surfclam (*Spisula solidissima*) using a spatially explicit, vessel-based fisheries model." *Ocean and Coastal Management*, 169:68-85. Available online at: https://doi.org/10.1016/j.ocecoaman.2018.11.008.

Laney, R.W., J. Hightower, B. Versak, M. Mangold, W. Cole, and S. Winslow. 2007. "Distribution, habitat use, and size of Atlantic sturgeon captured during cooperative winter tagging cruises, 1988-2006." *American Fisheries Society Symposium*, 56:167-182. Retrieved from: https://www.researchgate.net/publication/237724543_Distribution_Habitat_Use_and_Size_of_Atlantic_Sturgeon_Captured_during_Cooperative_Winter_Tagging_Cruises_1988-2006.

Langhamer, O., D. Wilhelmsson, and J. Engström. 2009. "Artificial reef effect and fouling impacts on offshore wave power foundations and buoys—a pilot study." *Estuarine, Coastal and Shelf Science* 82:426-432. Available online at: https://doi.org/10.1016/j.ecss.2009.02.009.

Langhamer, O. 2012. "Artificial reef effect in relation to offshore renewable energy conversion: State of the art." *The Scientific World Journal* 2012:1-8. Available online at: https://doi.org/10.1100/2012/386713.

Langhamer, O., T. Dahlgren, and G. Rosenqvist. 2018. "Effect of an offshore wind farm on the viviparous eelpout: Biometrics, brood development and population studies in Lillgrund, Sweden." *Ecological Indicators* 84:1-6. Available online at: http://dx.doi.org/10.1016/j.ecolind.2017.08.035.

Lee, T., L. Atkinson, and R. Legeckis. 1981. "Observations of a Gulf Stream frontal eddy on the Georgia continental shelf." *Deep See Research Part A*, 28:347-348. Available online at: https://doi.org/10.1016/0198-0149(81)90004-2.

Lemoine, H., A. Paxton, S. Anisfeld, R. Rosemond, and C. Peterson. 2019. "Selecting the optimal artificial reefs to achieve fish habitat enhancement goals." *Biological Conservation*, 238:108200. Available online at: https://doi.org/10.1016/j.biocon.2019.108200.

Loftus, A., and R. Stone. 2007. *Artificial Reef Management Plan for Maryland*. Maryland Environmental Service Contract 06-07-58. https://dnr.maryland.gov/fisheries/Pages/reefs/index.aspx.

Lucy, J. 1983. *Development of Virginia's Artificial Fishing Reefs: A Historical Outline (1959-1977)*. Sea Grant Marine Advisory Service, Virginia Institute of Marine Science Marine Resource Report No. 83-6. Available online at: https://www.vims.edu/GreyLit/VIMS/mrr83-6ocr.pdf.

MAFMC (Mid-Atlantic Fishery Management Council). 2017. *Unmanaged Forage Omnibus Amendment, Including an Environmental Assessment, Regulatory Impact Review, and Regulatory Flexibility Act Analysis*. Prepared by the Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service. Available online at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5a0b49b053450ab00cbe4e46/1510689203283/20170613_Final%2BForage%2BEA_FONSI%2BSigned.pdf.

MARCO (Mid-Atlantic Regional Council on the Ocean). 2021. "Mid-Atlantic Ocean Data Portal." Available online at: online at: http://portal.midatlanticocean.org/visualize/. Accessed October 5, 2021.

Mavraki, N., Degraer, S., & Vanaverbeke, J. 2021. "Offshore wind farms and the attraction-production hypothesis: insights from a combination of stomach content and stable isotope analyses". *Hydrobiologia*, *848*(7), 1639-1657. doi:10.1007/s10750-021-04553-6.

McManus, M., J. Hare, D. Richardson, and J. Collie. 2016. "Tracking shifts in Atlantic mackerel (*Scomber scombrus*) larval habitat suitability in the Northeast U.S. Continental Shelf." *Fisheries Oceanography*, 27:49-62. Available online at: https://doi.org/10.1111/fog.12233.

Methratta, E. and W. Dardick. 2019. "Meta-analysis of Finfish Abundance at Offshore Wind Farms." *Reviews in Fisheries Science & Aquaculture*, 27(2):242-260. Available online at: https://doi.org/10.1080/23308249.2019.1584601.

Milliman, J. 1972. *Atlantic continental shelf and slope of the United States: Petrology of the sand fraction of sediments, Northern New Jersey to Southern Florida*. U.S. Geological Survey Professional Paper 529-J. Available online at: https://pubs.usgs.gov/pp/0529j/report.pdf. Mooney, T., R. Hanlon, J. Christensen-Dalsgaard, P. Madsen, D. Ketten, and P. Nachtigall. 2010. "Sound detection by the longfin squid (*Loligo pealeii*) studied with auditory evoked potentials: sensitivity to low-frequency particle motion and not pressure." *The Journal of Experimental Biology*, 213:3748-3759. Available online at: https://doi.org/10.1242/jeb.048348.

Munroe, D., D. Haidvogel, J. Caracappa, J. Klinck, E. Powell, E. Hofmann, B. Shank and D. Hart. 2018. "Modeling larval dispersal and connectivity for Atlantic sea scallop (*Placopecten magellanicus*) in the Middle Atlantic Bight." *Fisheries Research*, 208:7-15. Available online at: https://doi.org/10.1016/j.fishres.2018.06.020.

NEFMC (New England Fishery Management Council). 2017. *Omnibus Essential Fish Habitat Amendment 2: Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts.* Prepared by the New England Fishery Management Council in cooperation with the National Marine Fisheries Service. Available online at: https://www.habitat.noaa.gov/protection/efh/efhmapper/oa2_efh_hapc.pdf.

NIRAS. 2015. *Subsea cable interactions with the Marine Environment: Expert review and Recommendations Report*. December 2015. Prepared by NIRAS Consulting Ltd. for Renewables Grid Initiative. NIRAS Consulting Ltd. Cambridge CB3 0AJ, UK. Available online at: https://renewables-grid.eu/fileadmin/user_upload/Files_RGI/RGI_Publications/RGI_Subsea_cables_report.pdf.

NMFS-GARFO (National Marine Fisheries Service's Greater Atlantic Fisheries Office). 2021. *Updated Recommendations for Mapping Fish Habitat*. Habitat Conservation and Ecosystem Services Division. March 2021. 22 pp. Available at: https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null.

NOAA (National Oceanic and Atmospheric Administration). 2003. *Variability of Temperature and Salinity in the Middle Atlantic Bight and Gulf of Maine Based on Data Collected as Part of the MARMAP Ships of Opportunity Program, 1978-2001*. NOAA Technical Memorandum NMFS-NE-172. Available online at: https://repository.library.noaa.gov/view/noaa/3359.

NOAA. 2021. "National Centers for Environmental Information: Bathymetric Data Viewer." Available online at: https://www.ncei.noaa.gov/maps/bathymetry/. Accessed October 5, 2021.

NOAA Fisheries (National Marine Fisheries Service). 2008. *Impacts to Marine Fisheries Habitat from Nonfishing Activities in the Northeastern United States.* NOAA Tech Memo NMFS-NE-209. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Johnson-et-al-2008.pdf.

NOAA Fisheries. 2015. *Endangered Species Section 7 Consultation: Biological Opinion: Deepwater Wind: Block Island Wind Farm and Transmission System.* NER-2015-12248: pp. 270.

NOAA Fisheries. 2017. *Final Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Essential Fish Habitat*. Prepared by the Office of Sustainable Fisheries Atlantic Highly Migratory Species Management Division. Available online at: https://www.habitat.noaa.gov/application/efhinventory/docs/a10_hms_efh.pdf.

NOAA Fisheries. 2021. "Essential Fish Habitat (EFH) Mapper." Available online at: https://www.habitat.noaa.gov/apps/efhmapper/. Accessed 04 Feb 2021.

NYSDEC (New York State Department of Environmental Conservation). 2020. *Final Supplementary Generic Environmental Impact Statement for New York State Department of Environmental Conservation Artificial Reef Program. New York State Marine and Coastal District and Surrounding Federal Waters.* Submitted Pursuant to 6 NYCRR Part 617.10. Available online at: https://www.dec.ny.gov/docs/fish_marine_pdf/dmrreeffsgeis.pdf.

NYSERDA (New York State Energy Research and Development Authority). 2021. *Offshore Wind Submarine Cabling Overview: Fisheries Technical Working Group Final Report*. NYSERDA Report 21-14. Available online at: https://www.nyserda.ny.gov/-/media/Files/Programs/offshore-wind/21-14-Offshore-Wind-Submarine-Cable-Report.pdf.

Packer, D., L. Cargnelli, S. Griesbach, and S. Shumway. 1999a. *Essential Fish Habitat Source Document: Sea Scallop,* Placopecten magellanicus, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-134. Available online at: https://repository.library.noaa.gov/view/noaa/3124.

Packer, D., S. Griesbach, P. Berrien, C. Zetlin, D. Johnson, and W. Morse. 1999b. *Essential Fish Habitat Source Document: Summer Flounder,* Paralichthys dentatus, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-151. Available online at: https://repository.library.noaa.gov/view/noaa/3149.

Packer, D., C. Zetlin, and J. Vitaliano. 2003a. *Essential Fish Habitat Source Document: Clearnose Skate,* Raja eglanteria, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-174. Available online at: https://repository.library.noaa.gov/view/noaa/3326.

Packer, D., C. Zetlin, and J. Vitaliano. 2003b. *Essential Fish Habitat Source Document: Winter Skate,* Leucoraja ocellata, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-179. Available online at: https://repository.library.noaa.gov/view/noaa/3337.

Pineda, J., J. Hare, and S. Sponaugle. 2007. "Larval transport and dispersal in the coastal ocean and consequences for population connectivity." *Oceanography,* 20(3):22-39. Available online at: https://doi.org/10.5670/oceanog.2007.27.

Poppe, L., S. Williams, and V. Paskevich. 2005. *U.S. Geological Survey east-coast sediment analysis: procedures, database, and GIS data*. Open-File Report 2005-1001. Available online at: https://pubs.er.usgs.gov/publication/ofr20051001.

Popper, A. and M. Hastings. 2009. "The effects of anthropogenic sources of sound on fishes." *Journal of Fish Biology*, 75(3):455-489. Available online at: https://doi.org/10.1111/j.1095-8649.2009.02319.x.

Popper, A., A. Hawkins, R. Fay, D. Mann, S. Bartol, T. Carlson, S. Coombs, W. Ellison, R. Gentry, M. Halvorsen, S. Lokkeborg, P. Rogers, B. Southall, D. Zeddies, and W. Tavolga. 2014. *Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI*.

Popper, A. and A. Hawkins. 2019. "An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes." *Journal of Fish Biology*, 94:692-713. Available online at: https://doi.org/10.1111/jfb.13948.

Powers, S., J. Grabowski, C. Peterson, and W. Lindberg. 2003. "Estimating enhancement of fish production by offshore artificial reefs: uncertainty exhibited by divergent scenarios." *Marine Ecology Progress Series*, 264: 265–277. Available online at: https://doi.org/10.3354/meps264265.

Reid, R., L. Cargnelli, S. Griesbach, D. Packer, D. Johnson, C. Zetlin, W. Morse, and P. Berrien. 1999. *Essential Fish Habitat Source Document: Atlantic Herring,* Clupea harengus*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-126. Available online at: https://repository.library.noaa.gov/view/noaa/3101/noaa_3101_DS1.pdf.

Rein, C.G., A. Lundin, S. Wilson, and E. Kimbrell. 2013. *Offshore Wind Energy Development Site Assessment and Characterization: Evaluation of the Current Status and European Experience*. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA. OCS Study BOEM 2013-0010. Prepared by ESS Group, Inc. pursuant to BOEM Contract No. M12PD00018. Available online at: https://espis.boem.gov/final%20reports/5305.pdf.

Reubens, J., S. Degraer, and M. Vincx. 2014. "The ecology of benthopelagic fishes at offshore wind farms: a synthesis of 4 years of research." *Hydrobiologia*, 727:121-136. Available online at: https://doi.org/10.1007/s10750-013-1793-1.

Roberts, L., H. Harding, I. Voellmy, R. Bruintjes, S. Simpson, A. Radford, T. Breithaupt, and M. Elliot. 2016. "Exposure of benthic invertebrates to sediment vibration: From laboratory experiments to outdoor simulated pile-driving." *Proceedings of Meetings on Acoustics: Fourth International Conference on the Effects of Noise on Aquatic Life*, 27:1-10. Available online at: https://doi.org/10.1121/2.0000324.

Ross, S., and M. Rhode. 2016. "Fish species associated with shipwreck and natural hard-bottom habitats from the middle to outer continental shelf of the Middle Atlantic Bight near Norfolk Canyon." *Fishery Bulletin* 114:45-57. Available online at: http://dx.doi.org/10.7755/FB.114.1.4.

Rousseau, M. 2008. *Massachusetts Marine Artificial Reef Plan*. Massachusetts Division of Marine Fisheries Policy Report FP-3. Available online at: https://risaa.org/reefs/MA_plan.pdf.

Rowe, J., A. Payne, A. Williams, D. O'Sullivan, and A. Morandi. 2017. *Phased Approaches to Offshore Wind Developments and Use of Project Design Envelope*. OCS Study BOEM 2017-057. Available online at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/Phased-Approaches-to-Offshore-Wind-Developments-and-Use-of-Project-Design-Envelope.pdf.

Sabatini, M. 2007. *A surf clam (Spisula solida*). In Tyler-Walters H. and K. Hiscock (eds). "Marine Life Information Network: Biology and Sensitivity Key Information Reviews (online)". Plymouth: Marine Biological Association of the United Kingdom. Available online at: http://www.marlin.ac.uk/species/detail/2030.

Schnabel (Schnabel Engineering). 2021. *Surficial sediment sample collection and analysis: Coastal Virginia Offshore Wind (CVOW) Lease Area.* Rev 1.4. 928 pp.

Smith, J., M. Lowry, and I. Suthers. 2015. "Fish attraction to artificial reefs not always harmful: a simulation study." *Ecology and Evolution*, 5 (20): 4590–4602. Available online at: https://doi.org/10.1002/ece3.1730.

Solé, M., M. Lenoir, M. Durfort, M. Lopez-Bejar, A. Lombarte, and M. André. 2013. "Ultrastructural damage of *Loligo vulgaris* and *Illex coindetii* statocysts after Low Frequency Sound Exposure." *PLoS ONE*, 8(10):e78825. Available online at: https://doi.org/10.1371/journal.pone.0078825.

Steimle, F., W. Morse, P. Berrien, and D. Johnson. 1999. *Essential Fish Habitat Source Document: Red Hake,* Urophycis chuss*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-133. Available online at: https://repository.library.noaa.gov/view/noaa/3119.

Steimle, F. and C. Zetlin. 2000. "Reef habitats in the Middle Atlantic Bight: Abundance, distribution, associated biological communities, and fishery resource use." *Marine Fisheries Review* 62(2):24-42. Retrieved from: https://spo.nmfs.noaa.gov/sites/default/files/pdf-content/MFR/mfr622/mfr6222.pdf.

Steimle, F., K. Foster, R. Kropp, and B. Conlin. 2002. "Benthic macrofauna productivity enhancement by an artificial reef in Delaware Bay, USA." *ICES Journal of Marine Science* 59:S100-S105. Available online at: https://doi.org/10.1006/jmsc.2002.1268.

Stein, A., K. Friedland, and M. Sutherland. 2004. "Atlantic sturgeon marine bycatch mortality on the continental shelf of the northeastern United States*." North American Journal Fisheries Management 24(1):171-183*. Available online at: https://doi.org/10.1577/M02-123.

Stenberg, C., J. Støttrup, M. Van Deurs, C. Berg, G. Dinesen, H. Mosegaard, T. Grome, and S. Leonhard. 2015. "Long-term effects of an offshore wind farm in the North Sea on fish communities." *Marine Ecology Progress Series*, 528:257-265. Available online at: https://doi.org/10.3354/meps11261.

Stevenson, D., L. Chiarella, D. Stephan, R. Reid, K. Wilhelm, J. McCarthy, and M. Pentony. 2004. *Characterization of the Fishing Practices and Marine Benthic Ecosystems of the Northeast U.S. Shelf, and an Evaluation of the Potential Effects of Fishing on Essential Fish Habitat*. NOAA Tech Memo NMFS-NE-181. Available online at: https://repository.library.noaa.gov/view/noaa/3481.

Stevenson, D. and M. Scott. 2005. *Essential Fish Habitat Source Document: Atlantic herring*, Clupea harengus*, Life History and Habitat Characteristics. 2nd ed*. NOAA Tech Memo NMFS-NE-192. Available online at: https://repository.library.noaa.gov/view/noaa/4034.

TerraSond. 2021. *Geophysical Survey Report*. Dominion Coastal Virginia Offshore Wind – Commercial (CVOW-C Lease Area). Rev 01. 465 pp.

Tetra Tech (Tetra Tech, Inc.). 2013. *Draft Marine Site Characterization Survey Report*. Virginia Offshore Wind Technology Advancement Project (VOWTAP). Prepared for Dominion Resources, Inc. 51 pp.

Tetra Tech. 2014. *Benthic Survey Report, Virginia Offshore Wind Technology Advancement Project (VOWTAP).* Prepared for Dominion Energy. Submitted December 2013, Revised February 2014. 154 pp.

Taormina, B., J. Bald, A. Want, G. Thouzeau, M. Lejart, N. Desroy, and A. Carlier. 2018. "A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations and future directions." *Renewable and Sustainable Energy Reviews* 96:380-391. Available online at: https://doi.org/10.1016/j.rser.2018.07.026.

USACE (U.S. Army Corps of Engineers). 2009. *Sandbridge Beach Erosion Control and Hurricane Protection Project, Environmental Assessment, Virginia Beach, Virginia*. USACE Norfolk District. 218 pp.

USACE. 2014. *Finding of No Significant Impact: Block Island Wind Farm and Block Island Transmission System*. 106 pp.

USACE. 2015. *Environmental Assessment for the Town of Kitty Hawk Shore Protection Project*. Report SAW-2014-02204-EA prepared by Coastal Planning & Engineering of North Carolina, Inc. Available online at: https://www.saw.usace.army.mil/Portals/59/docs/regulatory/publicnotices/2015/SAW-2014-02204-EA.pdf?ver=2015-04-08-115006-730.

Vallejo, G., K. Grellier, E. Nelson, R. McGregor, S. Canning, F. Caryl, and N. McLean. 2017. "Responses of two marine top predators to an offshore wind farm." *Ecology and Evolution*, 7:8698-8708. Available online at: https://doi.org/10.1002/ece3.3389.

van der Molen, J., L. Garcia-Garcia, P. Whomersley, A. Callaway, P. Posen and K. Hyder. 2018. "Connectivity of larval stages of sedentary marine communities between hard substrates and offshore structures in the North Sea." *Scientific Reports*, 8: 14772. Available online at: https://doi.org/10.1038/s41598-018-32912-2.

van der Stap, T., J. Coolen, and H. Lindeboom. 2016. "Marine Fouling Assemblages on Offshore Gas Platforms in the Southern North Sea: Effects of Depth and Distance from Shore on Biodiversity." *PLoS ONE*, 11(1):e0146324. Available online at: https://doi.org/10.1371/journal.pone.0146324.

VDEQ (Virginia Department of Environmental Quality). 2020. *Draft 2020 305(b)/303(d) Water Quality Assessment Integrated Report: Executive Summary*.

VIMS (Virginia Institute of Marine Science). 2021. "Atlantic Sturgeon." Center for Coastal Resources Management. Available online at: https://www.vims.edu/ccrm/research/ecology/fauna/sturgeon/index.php. Accessed October 5, 2021.

Vize, S., C. Adnitt, R. Stanisland, et al. 2008. *Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry*. Department for Business Enterprise & Regulatory Reform [BERR] Technical Report. January 2008. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Cabling_Techniques_and_Environmental_Effects.pdf.

VMRC (Virginia Marine Resources Commission). 2021a. "Marine Resources Commission Regulation Index." Available online at: https://mrc.virginia.gov/Regulations/regindex.shtm. Accessed October 5, 2021.

VMRC. 2021b. "Artificial Reefs Map." Available online at: https://webapps.mrc.virginia.gov/public/maps/artificial_reefs.php. Accessed October 5, 2021.

Walsh, H., D. Richardson, K. Marancik and J. Hare 2015. "Long-Term Changes in the Distributions of Larval and Adult Fish in the Northeast U.S. Shelf Ecosystem." *PLoS ONE*, 10(9): e0137382. Available online at: https://doi.org/10.1371/journal.pone.0137382.

Watterson, C. 2020 unpublished. *Endangered Atlantic Sturgeon Habitat Use in Mid-Atlantic Wind Energy Area (NSL #AT 15-01)*. Environmental Studies Programs: Ongoing Study. U.S. Department of the Navy on behalf of the Office of Renewable Energy Programs. Available online at: https://www.boem.gov/sites/default/files/documents/about-boem/Endangered%20Atlantic%20Sturgeon%20Habitat%20Use%20in%20Mid-Atlantic%20Wind%20Energy%20Area.pdf. Accessed December 9, 2020.

Wilber, D., D. Carey, and M. Griffin. 2018. "Flatfish habitat use near North America's first offshore wind farm." *Journal of Sea Research*, 139:24-32. Available online at: https://doi.org/10.1016/j.seares.2018.06.004.

Wilhelmsson, D., T. Malm, and M. Öhman. 2006. "The influence of offshore wind power on demersal fish." *ICES Journal of Marine Science*, 63(5):775-784. Available online at: https://doi.org/10.1016/j.icesjms.2006.02.001.

Wilhelmsson, D. and O. Langhamer. 2014. *The Influence of Fisheries Exclusion and Addition of Hard Substrata on Fish and Crustaceans*. In M. A. Shields & A. I. L. Payne (Eds.), Marine Renewable Energy Technology and Environmental Interactions (pp. 49-60). Dordrecht: Springer.

Wilkin, J. and E. Hunter. 2013. "An assessment of the skill of real-time models of Mid-Atlantic Bight continental shelf circulation." *Journal of Geophysical Research: Oceans*, 118: 2919–2933. Available online at: https://doi.org/10.1002/jgrc.20223

Williams, S., M. Arsenault, B. Buczowski, J. Reid, J. Flocks, M. Kulp, S. Penland, and C. Jenkins. 2006. *Surficial sediment character of the Louisiana offshore continental shelf region: a GIS compilation*. U.S. Geological Survey Open-File Report 2006-1195. Available online at: https://pubs.er.usgs.gov/publication/ofr20061195.

ATTACHMENT E-1: PROFILES OF MANAGED SPECIES

TABLE OF CONTENTS

E-1.1 Managed Species in the Offshore Project Area E-1-7

E-1.2 Presence of EFH in the Project Area by Species and Life Stage E-1-10

E-1.2.1 Atlantic Cod (*Gadus morhua*) E-1-10
E-1.2.2 Atlantic Herring (*Clupea harengus*) E-1-12
E-1.2.3 Atlantic Sea Scallop (*Placopecten magellanicus*) E-1-14
E-1.2.4 Clearnose Skate (*Raja eglanteria*) E-1-16
E-1.2.5 Monkfish (*Lophius americanus*) E-1-18
E-1.2.6 Pollock (*Pollachius virens*) E-1-20
E-1.2.7 Red Hake (*Urophycis chuss*) E-1-22
E-1.2.8 Windowpane Flounder (*Scophthalmus aquosus*) E-1-24
E-1.2.9 Winter Skate (*Leucoraja ocellata*) E-1-26
E-1.2.10 Witch Flounder (*Glyptocephalus cynoglossus*) E-1-28
E-1.2.11 Yellowtail Flounder (*Limanda ferruginea*) E-1-30
E-1.2.12 Atlantic Butterfish (*Peprilus triacanthus*) E-1-32
E-1.2.13 Atlantic Mackerel (*Scomber scombrus*) E-1-34
E-1.2.14 Atlantic Surfclam (*Spisula solidissima*) E-1-36
E-1.2.15 Black Sea Bass (*Centropristis striata*) E-1-39
E-1.2.16 Bluefish (*Pomatomus saltatrix*) E-1-41
E-1.2.17 Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*) E-1-44
E-1.2.18 Scup (*Stenotomus chrysops*) E-1-46
E-1.2.19 Spiny Dogfish (*Squalus acanthias*) E-1-48
E-1.2.20 Summer Flounder (*Paralichthys dentatus*) E-1-50
E-1.2.21 Albacore Tuna (*Thunnus alalonga*) E-1-53
E-1.2.22 Atlantic Angel Shark (*Squatina dumeril*) E-1-55
E-1.2.23 Atlantic Bluefin Tuna (*Thunnus thynnus*) E-1-57
E-1.2.24 Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*) E-1-59
E-1.2.25 Atlantic Skipjack Tuna (*Katsuwonus pelamis*) E-1-61
E-1.2.26 Atlantic Yellowfin Tuna (*Thunnus albacares*) E-1-63
E-1.2.27 Blacktip Shark (*Carcharhinus limbatus*) E-1-65
E-1.2.28 Common Thresher Shark (*Alopias vulpinus*) E-1-67
E-1.2.29 Dusky Shark (*Carcharhinus obscurus*) E-1-69
E-1.2.30 Sand Tiger Shark (*Carcharhinus taurus*) E-1-71
E-1.2.31 Sandbar Shark (*Carcharhinus plumbeus*) E-1-73
E-1.2.32 Smoothhound Shark / Smooth Dogfish (*Mustelus canis*) E-1-75
E-1.2.33 Tiger Shark (*Galeocerdo cuvier*) E-1-77

E-1.3 References E-1-79

TABLES

Table E-1-1. Managed Species with Designated EFH in the Offshore Project Area E-1-7

Table E-1-2. Atlantic Cod (*Gadus morhua*) Designated EFH in the Offshore Project Area E-1-10
Table E-1-3. Atlantic Herring (*Clupea harengus*) Designated EFH in the Offshore Project Area E-1-12
Table E-1-4. Atlantic Sea Scallop (*Placopecten magellanicus*) Designated EFH in the Offshore Project Area E-1-14
Table E-1-5. Clearnose Skate (*Raja eglanteria*) Designated EFH in the Offshore Project Area E-1-16
Table E-1-6. Monkfish (*Lophius americanus*) Designated EFH in the Offshore Project Area E-1-18
Table E-1-7. Pollock (*Pollachius virens*) Designated EFH in the Offshore Project Area E-1-20
Table E-1-8. Red Hake (*Urophycis chuss*) Designated EFH in the Offshore Project Area E-1-22
Table E-1-9. Windowpane flounder (*Scophthalmus aquosus*) Designated EFH in the Offshore Project Area . E-1-24
Table E-1-10. Winter Skate (*Leucoraja ocellata*) Designated EFH in the Offshore Project Area E-1-26
Table E-1-11. Witch Flounder (*Glyptocephalus cynoglossus*) Designated EFH in the Offshore Project Area E-1-28
Table E-1-12. Yellowtail Flounder (*Limanda ferruginea*) Designated EFH in the Offshore Project Area E-1-30
Table E-1-13. Atlantic Butterfish (*Peprilus triacanthus*) Designated EFH in the Offshore Project Area E-1-32
Table E-1-14. Atlantic Mackerel (*Scomber scombrus*) Designated EFH in the Offshore Project Area E-1-34
Table E-1-15. Atlantic Surfclam (*Spisula solidissima*) Designated EFH in the Offshore Project Area E-1-36
Table E-1-16. Black Sea Bass (*Centropristis striata*) Designated EFH in the Offshore Project Area E-1-39
Table E-1-17. Bluefish (*Pomatomus saltatrix*) Designated EFH in the Offshore Project Area E-1-41
Table E-1-18. Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*) Designated EFH in the Offshore Project Area E-1-44
Table E-1-19. Scup (*Stenotomus chrysops*) Designated EFH in the Offshore Project Area E-1-46
Table E-1-20. Spiny Dogfish (*Squalus acanthias*) Designated EFH in the Offshore Project Area E-1-48
Table E-1-22. Albacore Tuna (*Thunnus alalonga*) Designated EFH in the Offshore Project Area E-1-53
Table E-1-23. Atlantic Angel Shark (*Squatina dumeril*) Designated EFH in the Offshore Project Area E-1-55
Table E-1-24. Atlantic Bluefin Tuna (*Thunnus thynnus*) Designated EFH in the Offshore Project Area E-1-57
Table E-1-25. Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*) Designated EFH in the Offshore Project Area E-1-59
Table E-1-26. Atlantic Skipjack Tuna (*Katsuwonus pelamis*) Designated EFH in the Offshore Project Area E-1-61
Table E-1-27. Atlantic Yellowfin Tuna (*Thunnus albacares*) Designated EFH in the Offshore Project Area E-1-63
Table E-1-28. Blacktip Shark (*Carcharhinus limbatus*) Designated EFH in the Offshore Project Area E-1-65
Table E-1-29. Common Thresher Shark (*Alopias vulpinus*) Designated EFH in the Offshore Project Area E-1-67
Table E-1-30. Dusky Shark (*Carcharhinus obscurus*) Designated EFH in the Offshore Project Area E-1-69
Table E-1-31. Sand Tiger Shark (*Carcharhinus taurus*) Designated EFH in the Offshore Project Area E-1-71
Table E-1-32. Sandbar Shark (*Carcharhinus plumbeus*) Designated EFH in the Offshore Project Area E-1-73
Table E-1-33. Smoothhound Shark / Smooth Dogfish (*Mustelus canis*) Designated EFH in the Offshore Project Area E-1-75
Table E-1-34. Tiger Shark (*Galeocerdo cuvier*) Designated EFH in the Offshore Project Area E-1-77

FIGURES

Figure E-1-1. CVOW Commercial Offshore Project Area Overview E-1-9
Figure E-1-2. Atlantic Cod (*Gadus morhua*) Designated EFH in the Offshore Project Area E-1-11
Figure E-1-3. Atlantic Herring (*Clupea harengus*) Designated EFH in the Offshore Project Area E-1-13
Figure E-1-4. Atlantic Sea Scallop (*Placopecten magellanicus*) Designated EFH in the Offshore Project Area E-1-15
Figure E-1-5. Clearnose Skate (*Raja eglanteria*) Designated EFH in the Offshore Project Area E-1-17
Figure E-1-6. Monkfish (*Lophius americanus*) Designated EFH in the Offshore Project Area E-1-19
Figure E-1-7. Pollock (*Pollachius virens*) Designated EFH in the Offshore Project Area E-1-21
Figure E-1-8. Red Hake (*Urophycis chuss*) Designated EFH in the Offshore Project Area E-1-23
Figure E-1-9. Windowpane flounder (*Scophthalmus aquosus*) Designated EFH in the Offshore Project Area . E-1-25
Figure E-1-10. Winter Skate (*Leucoraja ocellata*) Designated EFH in the Offshore Project Area E-1-27
Figure E-1-11. Witch Flounder (*Glyptocephalus cynoglossus*) Designated EFH in the Offshore Project Area E-1-29
Figure E-1-12. Yellowtail Flounder (*Limanda ferruginea*) Designated EFH in the Offshore Project Area E-1-31
Figure E-1-13. Atlantic Butterfish (*Peprilus triacanthus*) Designated EFH in the Offshore Project Area E-1-33
Figure E-1-14. Atlantic Mackerel (*Scomber scombrus*) Designated EFH in the Offshore Project Area E-1-35
Figure E-1-15. Atlantic Surfclam (*Spisula solidissima*) Designated EFH in the Offshore Project Area E-1-38
Figure E-1-16. Black Sea Bass (*Centropristis striata*) Designated EFH in the Offshore Project Area E-1-40
Figure E-1-17. Bluefish (*Pomatomus saltatrix*) Designated EFH in the Offshore Project Area E-1-43
Figure E-1-18. Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*) Designated EFH in the Offshore Project Area E-1-45
Figure E-1-19. Scup (*Stenotomus chrysops*) Designated EFH in the Offshore Project Area E-1-47
Figure E-1-20. Spiny Dogfish (*Squalus acanthias*) Designated EFH in the Offshore Project Area E-1-49
Figure E-1-21. Summer Flounder (*Paralichthys dentatus*) Designated EFH in the Offshore Project Area E-1-51
Figure E-1-22. Albacore Tuna (*Thunnus alalonga*) Designated EFH in the Offshore Project Area E-1-54
Figure E-1-23. Atlantic Angel Shark (*Squatina dumeril*) Designated EFH in the Offshore Project Area E-1-56
Figure E-1-24. Atlantic Bluefin Tuna (*Thunnus thynnus*) Designated EFH in the Offshore Project Area E-1-58
Figure E-1-25. Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*) Designated EFH in the Offshore Project Area E-1-60
Figure E-1-26. Atlantic Skipjack Tuna (*Katsuwonus pelamis*) Designated EFH in the Offshore Project Area E-1-62
Figure E-1-27. Atlantic Yellowfin Tuna (*Thunnus albacares*) Designated EFH in the Offshore Project Area E-1-64
Figure E-1-28. Blacktip Shark (*Carcharhinus limbatus*) Designated EFH in the Offshore Project Area E-1-66
Figure E-1-29. Common Thresher Shark (*Alopias vulpinus*) Designated EFH in the Offshore Project Area E-1-68
Figure E-1-30. Dusky Shark (*Carcharhinus obscurus*) Designated EFH in the Offshore Project Area E-1-70
Figure E-1-31. Sand Tiger Shark (*Carcharhinus taurus*) Designated EFH in the Offshore Project Area E-1-72
Figure E-1-32. Sandbar Shark (*Carcharhinus plumbeus*) Designated EFH in the Offshore Project Area E-1-74

Figure E-1-33. Smoothhound Shark / Smooth Dogfish (*Mustelus canis*) Designated EFH in the Offshore Project Area E-1-76
Figure E-1-34. Tiger Shark (*Galeocerdo cuvier*) Designated EFH in the Offshore Project Area E-1-78

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
EFH	Essential Fish Habitat
FMP	Fisheries Management Plan
ft	feet
HMS	Highly Migratory Species
Lease Area	Renewable Energy Lease Area OCS-A 0483
m	meters
MAFMC	Mid-Atlantic Fishery Management Council
NEFMC	New England Fishery Management Council
NOAA Fisheries	National Oceanographic and Atmospheric Administration National Marine Fisheries Service
Offshore Project Area	Project Components in Lease Area and Offshore Export Cable Route Corridor
ppt	parts per thousand
Project	Coastal Virginia Offshore Wind Commercial Project
U.S.	United States
YOY	young-of-year

E-1.1 MANAGED SPECIES IN THE OFFSHORE PROJECT AREA

The present Essential Fish Habitat (EFH) Assessment (EFHA) analyzes the potential effects of construction, operations and maintenance, and decommissioning of the Coastal Virginia Offshore Wind Commercial Project (Project) on managed fishery resources. Species with EFH in the Offshore Project Area were identified using the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) EFH Mapper (2021), New England Fishery Management Council (NEFMC) Omnibus Amendment 2 (2017), Mid-Atlantic Fishery Management Council (MAFMC) Fisheries Management Plans, NOAA Fisheries Highly Migratory Species (HMS) Amendment 10 (2017), and NOAA Fisheries EFH source documents. Managed species with designated EFH intersecting the Offshore Project Area are listed in Table E-1-1.

Table E-1-1. Managed Species with Designated EFH in the Offshore Project Area

Common Name	Scientific Name	Essential Fish Habitat (EFH) Life Stages Designated within the Offshore Project Area
New England Fishery Management Council (NEFMC)		
Atlantic cod	Gadus morhua	Egg, Larva
Atlantic herring a/	Clupea harengus	Juvenile, Adult
Atlantic sea scallop	Placopecten magellanicus	ALL
clearnose skate	Raja eglanteria	Juvenile, Adult
monkfish b/	Lophius americanus	ALL
pollock	Pollachius virens	Larva
red hake	Urophycis chuss	Adult
windowpane flounder	Scophthalmus aquosus	ALL
winter skate	Leucoraja ocellata	Juvenile
witch flounder	Pseudopleuronectes americanus	Egg, Larva
yellowtail flounder	Limanda ferruginea	Larva
Mid-Atlantic Fishery Management Council (MAFMC)		
Atlantic butterfish	Peprilus triacanthus	ALL
Atlantic mackerel	Scomber scombrus	Egg, Juvenile, Adult
Atlantic surfclam	Spisula solidissima	Juvenile, Adult
black sea bass a/	Centropristis striata	Larva, Juvenile, Adult
bluefish a/	Pomatomus saltatrix	ALL
longfin inshore squid	Doryteuthis [Amerigo] pealeii	Egg, Juvenile, Adult
scup a/	Stenotomus chrysops	Juvenile, Adult
spiny dogfish a/ b/	Squalus acanthias	Sub-adult Female, Adult Female, Adult Male
summer flounder a/	Paralichthys dentatus	ALL
NOAA Fisheries—Highly Migratory Species (HMS)		
albacore tuna	Thunnus alalunga	Juvenile
Atlantic angel shark	Squatina dumeril	ALL
Atlantic bluefin tuna	Thunnus thynnus	Juvenile, Adult
Atlantic sharpnose shark	Rhizoprionodon terraenovae	Juvenile, Adult
Atlantic Skipjack tuna	Katsuwonus pelamis	Juvenile, Adult
Atlantic Yellowfin tuna	Thunnus albacares	Juvenile, Adult
blacktip shark	Carcharhinus limbatus	Juvenile, Adult
common thresher shark	Alopias vulpinus	ALL
dusky shark	Carcharhinus obscurus	ALL
sand tiger shark	Carcharias taurus	ALL
sandbar shark	Carcharhinus plumbeus	ALL
smoothhound shark complex (smooth dogfish)	Mustelus canis	ALL

Common Name	Scientific Name	Essential Fish Habitat (EFH) Life Stages Designated within the Offshore Project Area
tiger shark	Galeocerdo cuvier	Juvenile, Adult

Notes:
a/ Joint management with Atlantic States Marine Fisheries Commission
b/ Joint management by NEFMC and MAFMC

EFH is described in Section E-1.2, Managed Species in the Offshore Project Area for the 33 species with designated EFH for one or more life stages in the Offshore Project Area. For the purpose of this assessment, the Offshore Project Area includes the portions of the Project Components located in the designated Renewable Energy Lease Area OCS-A 0483 (Lease Area) and Offshore Export Cable Route Corridor (Figure E-1-1). The species-specific acreages of EFH within the Offshore Project Area were calculated using geographic information system tools that measure the intersection of EFH and Offshore Project Area shapefiles.

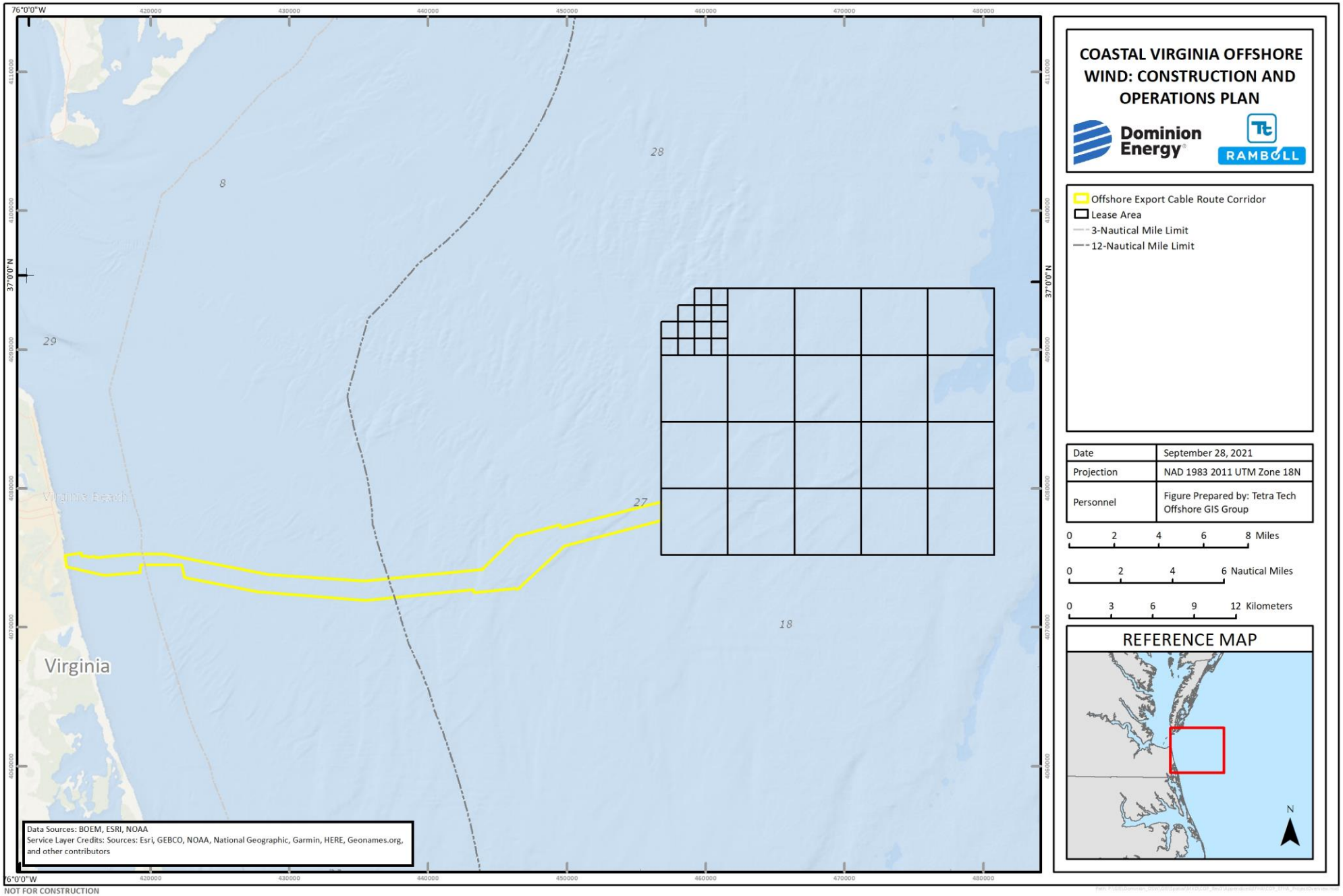


Figure E-1-1. CVOW Commercial Offshore Project Area Overview

E-1.2 PRESENCE OF EFH IN THE PROJECT AREA BY SPECIES AND LIFE STAGE

Managed species with EFH in the Offshore Project Area are described in the following sections. Species-specific EFH acreages are presented in tables and visualized in shapefiles intersecting the Offshore Project Area. All EFH portrayed in EFH Mapper shapefile downloads (NOAA Fisheries 2021) was assumed present, regardless of the geographic boundaries described in EFH source documents; therefore, the acreages presented in the following sections represent a conservative overestimate of functional EFH in the Offshore Project Area.

E-1.2.1 Atlantic Cod (*Gadus morhua*)

Atlantic cod egg EFH is designated in both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-2; Figure E-1-2). In the Mid-Atlantic Bight, Atlantic cod eggs are found in pelagic marine habitats and in the high salinity zones of regional bays and estuaries (NEFMC 2017). They typically occur in the upper 33 feet (ft; 10 meters [m]) of the water column, but spring rainfalls can locally reduce salinities and allow eggs to sink to lower depths (Fahay et al. 1999a; Lough 2004). Designated EFH for Atlantic cod eggs spans the fall to spring spawning season in the upper 230 feet (ft) (70 meters [m]) of the water column, where temperatures do not exceed 54 degrees Fahrenheit (°F; 12 degrees Celsius [°C]) and salinities are within 32 to 33 parts per thousand (ppt) (Fahay et al. 1999a; Lough 2004).

Table E-1-2. Atlantic Cod (*Gadus morhua*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	0	1,659	1,652
Larva	50,842	5,021	0
Percent of Project Area Covered by EFH by Life Stage			
Egg	0.0%	11.7%	100.0%
Larva	45.1%	35.3%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.000%	0.007%	0.007%
Larva	0.182%	0.018%	0.000%

Sources: Fahay et al. 1999a; Lough 2004; NEFMC 2017

Atlantic cod larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-2; Figure E-1-2). Atlantic cod larvae are found in pelagic marine habitats and in the high salinity zones of regional bays and estuaries (NEFMC 2017). Young larvae typically occur in the upper 246 ft (75 m) of the water column and descend as they age to depths of 689 ft (210 m); they migrate vertically in reaction to light (Fahay et al. 1999a; Lough 2004). Designated EFH for Atlantic cod larvae is in temperatures of 39 to 46°F (4 to 8°C) in winter and spring and 45 to 54°F (7 to 12°C) in summer and fall, where salinities are within 32 to 33 ppt (Fahay et al. 1999a; Lough 2004).

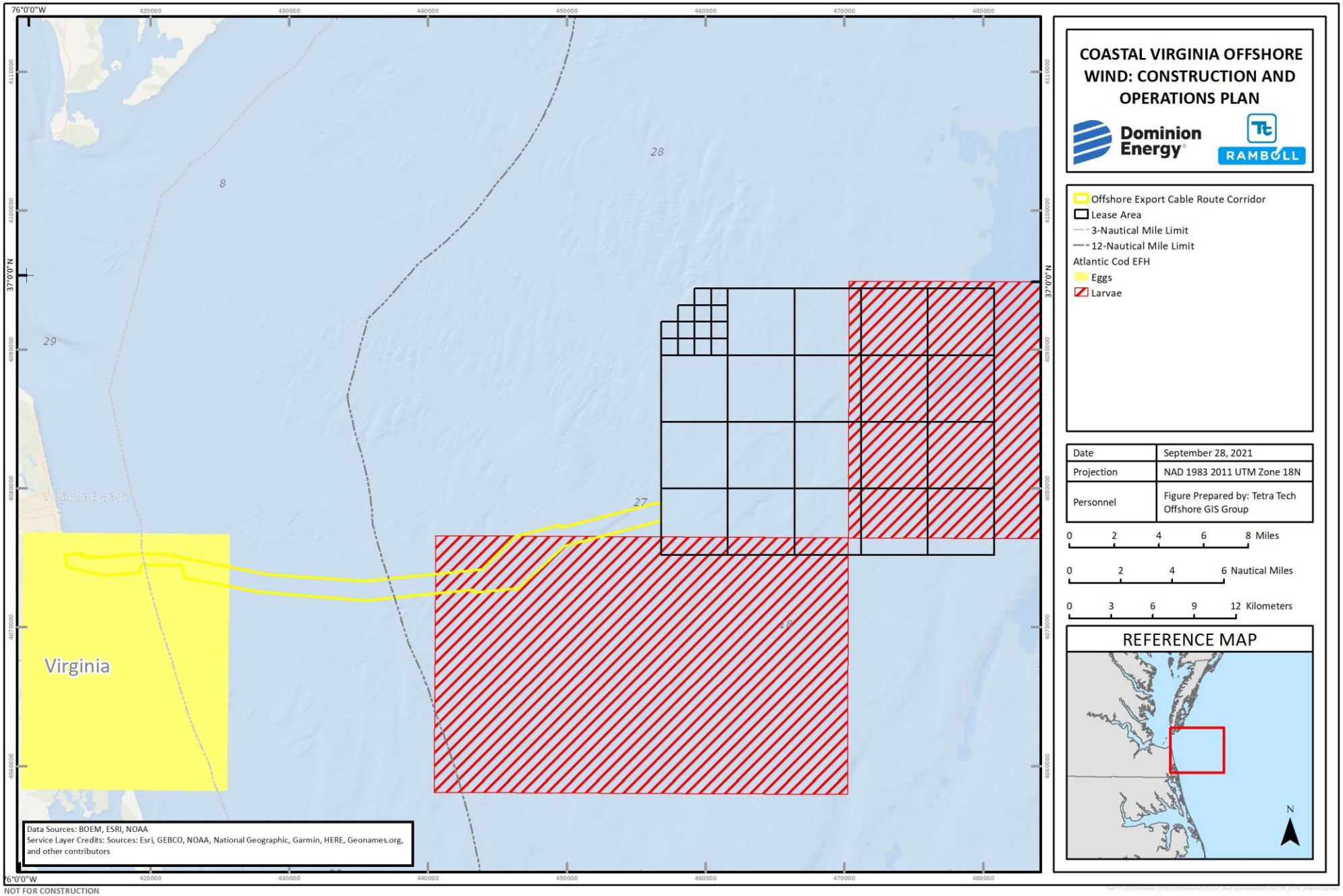


Figure E-1-2. Atlantic Cod (*Gadus morhua*) Designated EFH in the Offshore Project Area

No Atlantic cod juvenile or adult EFH is designated in the Offshore Project Area.

The Atlantic cod is managed as two stocks under the NEFSC Northeast Multispecies Fisheries Management Plan (FMP): the Gulf of Maine stock and the Georges Bank stock. Both fishery stocks are currently overfished and subject to overfishing (NOAA Fisheries 2019).

E-1.2.2 Atlantic Herring (*Clupea harengus*)

No Atlantic herring egg or larva EFH is designated in the Offshore Project Area.

Atlantic herring juvenile EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-3; Figure E-1-3). In the Mid-Atlantic Bight, Atlantic herring juveniles are found in intertidal and subtidal pelagic marine habitats and in the high salinity zones of regional bays and estuaries (NEFMC 2017). Juveniles exhibit diel vertical migrations; one- and two-year-old individuals form large schools to complete limited seasonal inshore-offshore migrations. Young-of-year (YOY) can tolerate low salinities but exhibit increasing preference for high salinities as they age (NEFMC 2017). They feed on up to 15 groups of zooplankton, including copepods, decapod larvae, barnacle larvae, cladocerans, and molluscan larvae (Stevenson and Scott 2005). Designated EFH for Atlantic herring juveniles is in the upper 984 ft (300 m) of the water column, where temperatures span 37 to 72°F (3 to 22°C) and salinities are within 28 to 32 ppt (Reid et al. 1999; Stevenson and Scott 2005; NEFMC 2017).

Table E-1-3. Atlantic Herring (*Clupea harengus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	12,575	0
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	88.3%	0.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.189%	0.021%	0.000%
Adult	0.209%	0.026%	0.003%

Sources: Reid et al. 1999; Stevenson and Scott 2005; NEFMC 2017

Atlantic herring adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-3; Figure E-1-3). Atlantic herring adults are found in subtidal pelagic marine habitats and in the high salinity zones of regional bays and estuaries (NEFMC 2017). They exhibit diel vertical migrations and complete extensive seasonal migrations between northern spawning grounds in summer and fall and southern overwintering areas; though pelagic, they spawn on the seafloor on a variety of substrates in depths of 16 to 295 ft (5 to 90 m) (NEFMC 2017). Adults prefer well-mixed waters and transition zones between stratified and unstratified waters (Reid et al. 1999; Stevenson and Scott 2005). They feed primarily on euphausiids, chaetognaths, and copepods (Stevenson and Scott 2005). Designated EFH for Atlantic herring adults is in the upper 984 ft (300 m) of the water column, where temperatures span 39 to 45°F (4 to 7°C) in spring and 41 to 57°F (5 to 14°C) in summer and fall and salinities are within 27 to 35 ppt (Reid et al. 1999; Stevenson and Scott 2005).

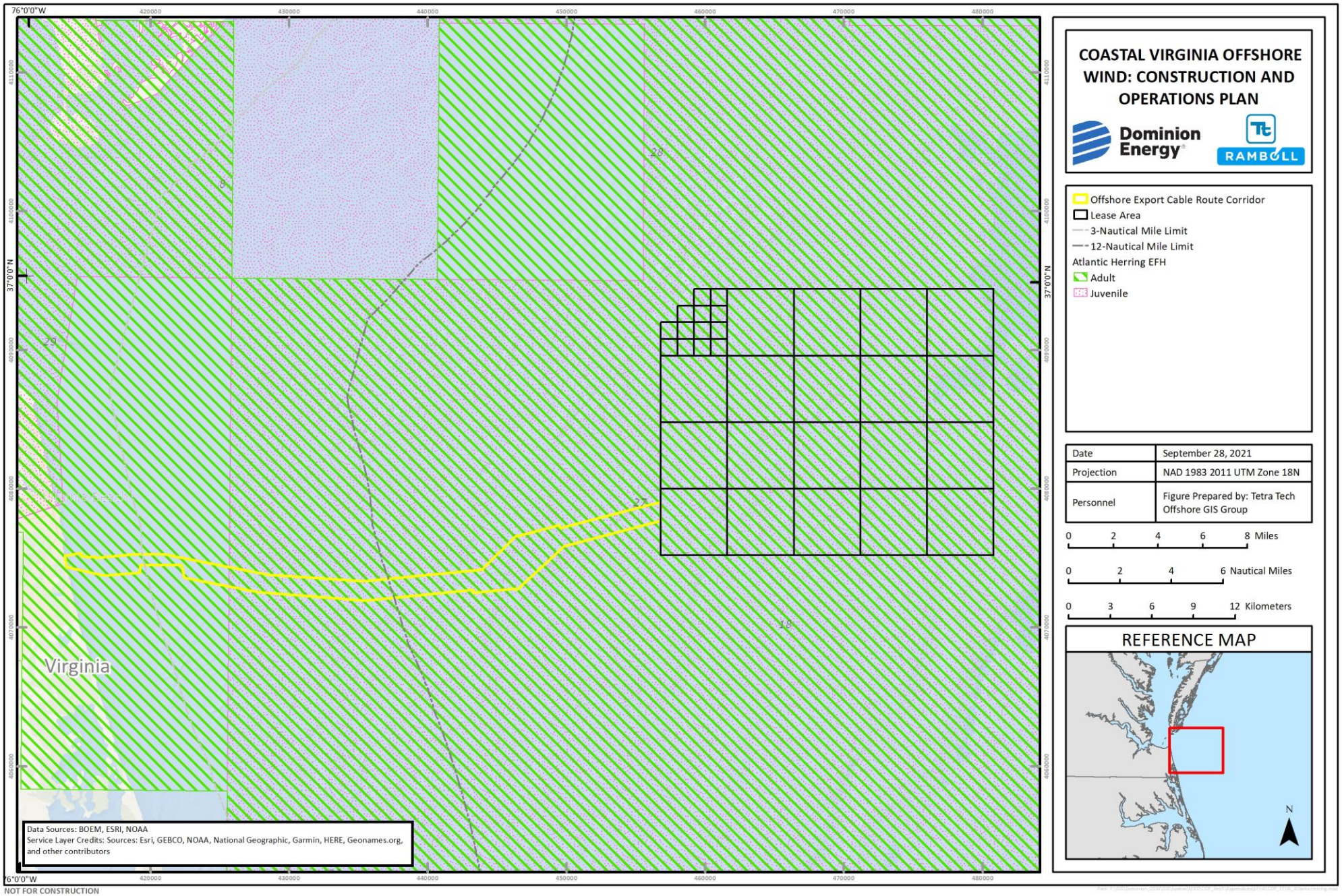


Figure E-1-3. Atlantic Herring (*Clupea harengus*) Designated EFH in the Offshore Project Area

The Atlantic herring is managed under the NEFMC Atlantic Herring FMP as a single stock: the Northwestern Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.3 Atlantic Sea Scallop (*Placopecten magellanicus*)

Atlantic sea scallop EFH for all life stages is designated in the Lease Area; there is no designated Atlantic sea scallop EFH in federal or state waters of the Offshore Export Cable Route Corridor (Table E-1-4; Figure E-1-4). They are suspension or filter feeders that feed primarily on phytoplankton, diatoms, microscopic animals, and detritus (Packer et al. 1999a). Feeding habits do not change markedly across life stages.

Table E-1-4. Atlantic Sea Scallop (*Placopecten magellanicus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
ALL	46,601	0	0
Percent of Project Area Covered by EFH by Life Stage			
ALL	41.3%	0.0%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
ALL	0.140%	0.000%	0.000%

Sources: Packer et al. 1999a; NEFMC 2017

In the Mid-Atlantic Bight, Atlantic sea scallop eggs are found in inshore benthic marine habitats and on the continental shelf in the vicinity of adult scallops (NEFMC 2017). Eggs remain on the seafloor for four to five weeks prior to developing into the first free-swimming larval stage. Designated EFH for Atlantic sea scallop eggs is on the seafloor in temperatures spanning 55 to 63°F (13 to 17°C) (Packer et al. 1999a).

Atlantic sea scallop larvae are found in pelagic marine habitats in inshore and offshore areas during their two planktonic stages (trochophore and veliger stages) (NEFMC 2017). Planktonic larvae exhibit diel vertical migrations and are carried by currents for more than a month before demersal spat settle on hard surfaces including gravel, pebbles, shells, macroalgae, and other organisms such as hydroids (NEFMC 2017). Spat attached to hardbottom have higher survival rates than spat settled on shifting sand. Designated EFH for Atlantic sea scallop larvae is in the upper 33 ft (10 m) of the water column during planktonic stages and on the seafloor as spat, where temperatures span 54 to 64°F (12 to 18°C) and salinities are within 16.9 to 30 ppt (Packer et al. 1999a).

Atlantic sea scallop juveniles are found in benthic marine habitats attached by byssal threads to gravel, pebble, cobble, and shells (NEFMC 2017). Older juveniles lose their byssal attachments and become active swimmers but remain demersal; they prefer habitats with low concentrations of suspended inorganic material for feeding purposes (Packer et al. 1999a; NEFMC 2017). Designated EFH for Atlantic sea scallop juveniles is in depths of 59 to 361 ft (18 to 110 m), where temperatures span 34 to 59°F (1.2 to 15°C) and salinities exceed 25 ppt (Packer et al. 1999a; NEFMC 2017).

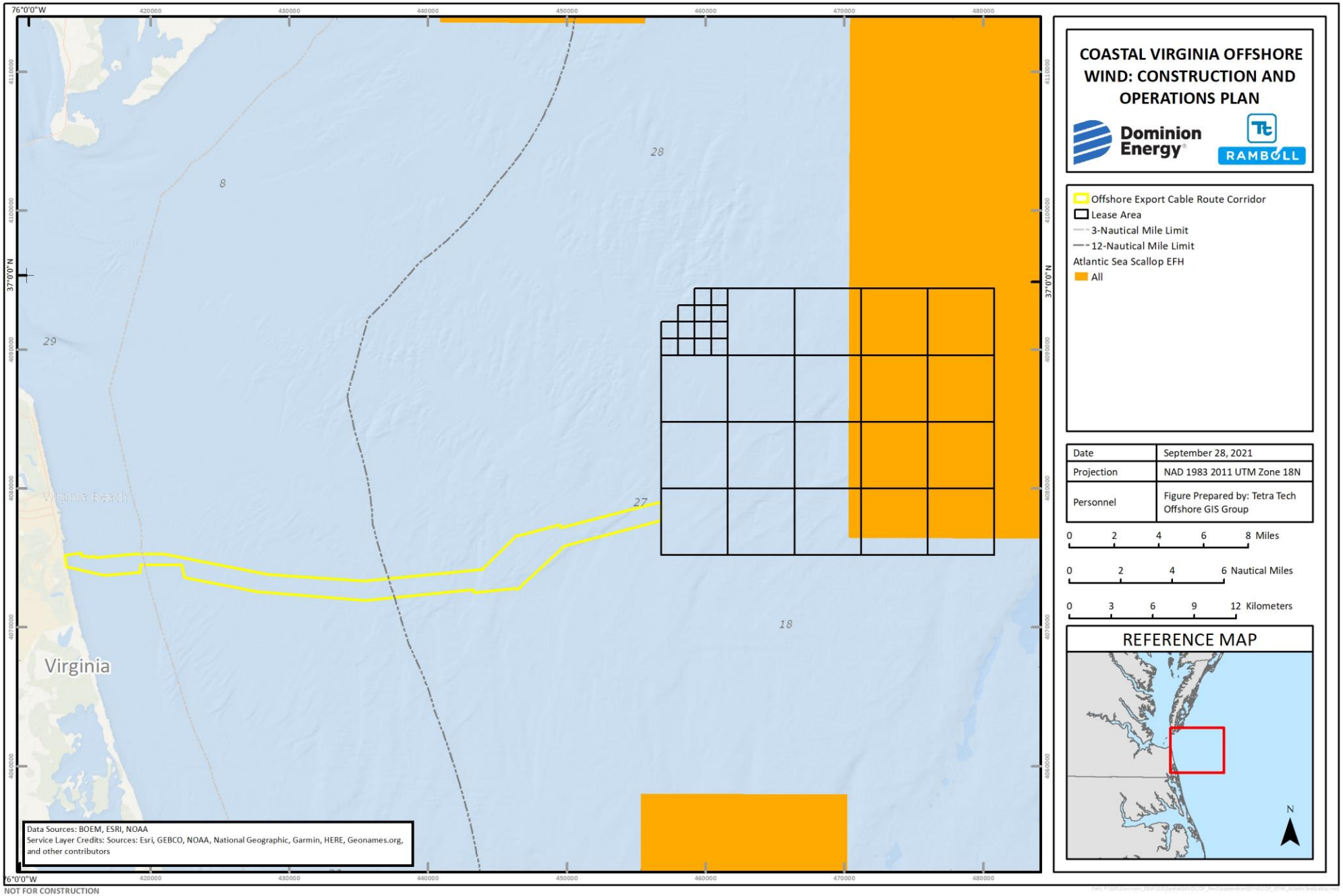


Figure E-1-4. Atlantic Sea Scallop (*Placopecten magellanicus*) Designated EFH in the Offshore Project Area

Atlantic sea scallop adults are found in benthic marine habitats on coarse sand and gravel substrates containing shell fragments, often aggregating in beds; oceanographic features may impact scallop bed duration by increasing larval retention or dispersion (NEFMC 2017). They prefer habitats with low concentrations of suspended inorganic material for feeding purposes (Packer et al. 1999a). Designated EFH for Atlantic sea scallop adults is in depths of 59 to 361 ft (18 to 110 m), where temperatures span 50 to 59°F (10 to 15°C) and salinities are within 32 to 33 ppt (Packer et al. 1999a; NEFMC 2017).

The Atlantic sea scallop is managed under the NEFMC Atlantic Sea Scallop FMP as a single stock: the Northwestern Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.4 Clearnose Skate (*Raja eglanteria*)

No clearnose skate egg EFH is designated in the Offshore Project Area; no larval stage exists for skates.

Clearnose skate juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-5; Figure E-1-5). In the Mid-Atlantic Bight, clearnose skate juveniles are found in subtidal benthic marine habitats in coastal and inner continental shelf waters and in the high salinity zones of regional bays and estuaries (NEFMC 2017). They prefer mud and sand but may also be found on gravel and hardbottom substrates (NEFMC 2017). Juveniles feed on polychaetes, amphipods, mantis and mysid shrimps, and a variety of small crabs, squids, and fishes (e.g., sole, weakfish, butterfish, scup) (Packer et al. 2003a). Designated EFH for clearnose skate juveniles is benthic habitats from the shoreline to depths of 984 ft (300 m) during spring and 262 ft (80 m) during fall, where temperatures span 39 to 70°F (4 to 21°C) in spring and 45 to 81°F (7 to 27°C) in fall and salinities are within 26 to 36 ppt (Packer et al. 2003a).

Table E-1-5. Clearnose Skate (*Raja eglanteria*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	109,609	14,234	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	97.2%	100.0%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.516%	0.067%	0.008%
Adult	0.682%	0.086%	0.010%

Sources: Packer et al. 2003a; NEFMC 2017

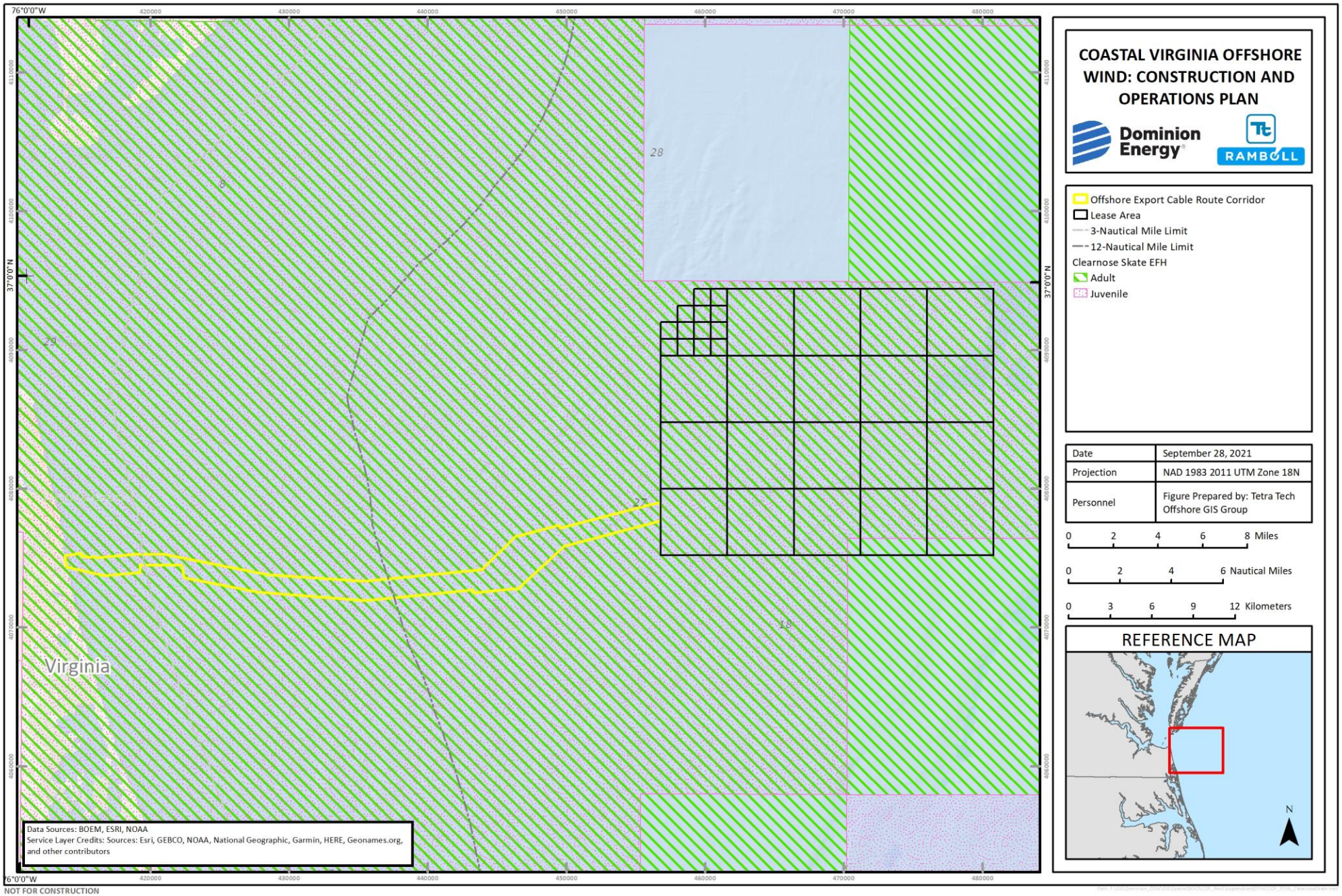


Figure E-1-5. Clearnose Skate (*Raja eglanteria*) Designated EFH in the Offshore Project Area

Clearnose skate adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-5; Figure E-1-5). Clearnose skate adults are found in subtidal benthic marine habitats in coastal and inner continental shelf waters and in the high salinity zones of regional bays and estuaries (NEFMC 2017). They prefer mud and sand but may also be found on gravel and hardbottom substrates (NEFMC 2017). Adults consume the same prey as juveniles. Designated EFH for clearnose skate adults is in benthic habitats from the shoreline to depths of 984 ft (300 m) during spring and 164 ft (50 m) during fall, where temperatures span 39 to 72°F (4 to 22°C) in spring and 50 to 77°F (10 to 25°C) in fall and salinities are within 26 to 36 ppt (Packer et al. 2003a).

The clearnose skate is managed under the NEFMC Northeast Skate Complex FMP as a single stock: the Southern New England/Mid-Atlantic stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.5 Monkfish (*Lophius americanus*)

Monkfish egg EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-6; Figure E-1-6). In the Mid-Atlantic Bight, monkfish eggs are shed in large, buoyant mucoidal egg veils that float on or near the surface in pelagic marine habitats of inshore areas and on the continental shelf and slope (NEFMC 2017). Designated EFH for monkfish eggs spans March to September from the surface to depths of 3,280 ft (1,000 m), where temperatures span 39 to 64°F (4 to 18°C) (Steimle et al. 1999a; MAFMC 2017; NEFMC 2017).

Table E-1-6. Monkfish (*Lophius americanus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg/Larva	54,001	13,770	1,652
Juvenile	50,823	0	0
Adult	0	1,656	1,652
Percent of Project Area Covered by EFH by Life Stage			
Egg/Larva	47.9%	96.7%	100.0%
Juvenile	45.1%	0.0%	0.0%
Adult	0.0%	11.7%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Egg/Larva	0.100%	0.026%	0.003%
Juvenile	0.164%	0.000%	0.000%
Adult	0.000%	0.005%	0.005%

Sources: Steimle et al. 1999a; MAFMC 2017; NEFMC 2017

Monkfish larva EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-6; Figure E-1-6). Monkfish larvae are found in pelagic marine habitats in inshore areas and on the continental shelf and slope (NEFMC 2017). As with eggs, larvae occur over a wide depth range up to a maximum depth of 4,921 ft (1,500 m) (NEFMC 2017). They feed on zooplankton, including copepods, crustacean larvae, and chaetognaths (Steimle et al. 1999a). Designated EFH for monkfish larvae spans March to September from the surface to depths of 3,280 ft (1,000 m), where temperatures span 43 to 68°F (6 to 20°C) (Steimle et al. 1999a; MAFMC 2017; NEFMC 2017).

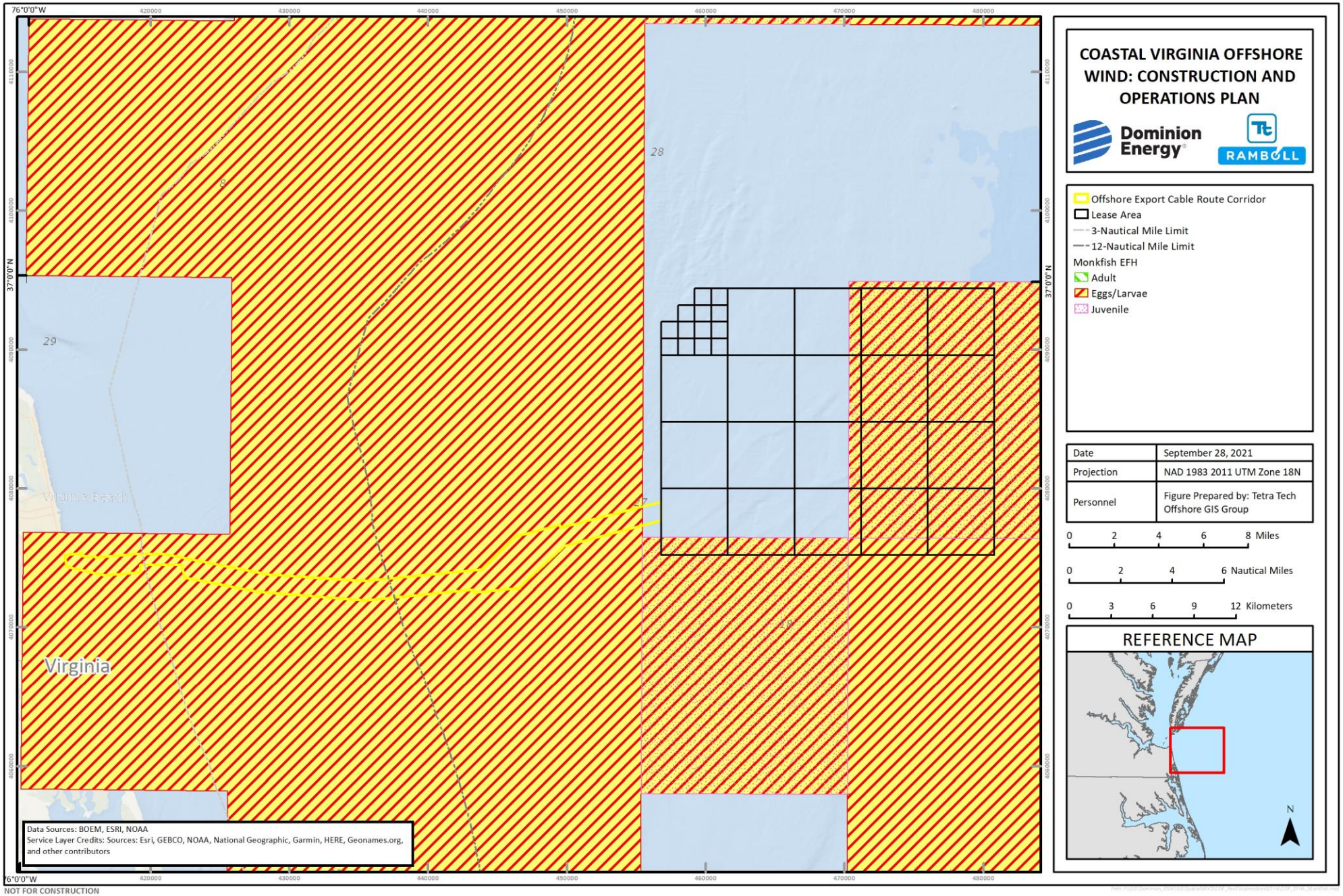


Figure E-1-6. Monkfish (*Lophius americanus*) Designated EFH in the Offshore Project Area

Monkfish juvenile EFH is designated in the Lease Area (Table E-1-6; Figure E-1-6). Monkfish juveniles are found in subtidal benthic marine habitats over a range of substrates, including soft mud, sand, gravel, pebbles, shell fragments, and structurally complex rock outcroppings with attached macroalgae (NEFMC 2017). They exhibit seasonal inshore-offshore migrations but most commonly occur on the outer shelf down to a maximum depth of 3,280 ft (1,000 m) (Steimle et al. 1999a; NEFMC 2017). Juveniles feed on small fishes (e.g., sand lance), red shrimp, and squid (Steimle et al. 1999a). Designated EFH for monkfish juveniles is in benthic habitats in depths of 66 to 1,312 ft (20 to 400 m), where temperatures span 36 to 75°F (2 to 24°C) and salinities are within 30 to 36 ppt (Steimle et al. 1999a).

Monkfish adult EFH is designated in both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-6; Figure E-1-6). Monkfish adults are found in subtidal benthic marine habitats over a range of substrates, including soft mud, sand, gravel, pebbles, and shell fragments (NEFMC 2017). They prefer soft sediments, forage at the edges of structurally complex rock outcroppings, and most commonly occur on the outer shelf down to a maximum depth of 3,280 ft (1,000 m) (NEFMC 2017). Adults are opportunistic feeders and consume a variety of benthic and pelagic crustaceans, squid, and fishes (Steimle et al. 1999a). Designated EFH for monkfish adults is in benthic habitats from the shoreline to depths of 2,625 ft (800 m), where temperatures span 32 to 75°F (0 to 24°C) and salinities are within 30 to 36 ppt (Steimle et al. 1999a).

The monkfish is co-managed by the NEFMC and MAFMC under the Monkfish FMP as two separate stocks: the Gulf of Maine/Northern Georges Bank stock and the Southern Georges Bank/Mid-Atlantic stock. Neither stock is currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.6 Pollock (*Pollachius virens*)

No pollock egg, juvenile, or adult EFH is designated in the Offshore Project Area.

Pollock larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-7; Figure E-1-7). In the Mid-Atlantic Bight, pollock larvae are found in pelagic inshore and offshore marine habitats and in the high salinity zones of regional bays and estuaries (NEFMC 2017). The planktonic larval stage lasts approximately three to four months, during which time they are dispersed from spawning grounds by currents; youngest larvae are found nearest the surface (Cargnelli et al. 1999a). Young larvae feed primarily on larval copepods and shift their diets to adult copepods as they increase in size (Cargnelli et al. 1999a). Large larvae metamorphose into harbor pollock and migrate inshore to rocky subtidal and intertidal zones (Cargnelli et al. 1999a). Designated EFH for pollock larvae is in depths of 33 to 4,101 ft (10 to 1,250 m), where temperatures span 36 to 63°F (2 to 17°C) (Cargnelli et al. 1999a).

Table E-1-7. Pollock (*Pollachius virens*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Larva	7,387	5,032	0
Percent of Project Area Covered by EFH by Life Stage			
Larva	6.5%	35.4%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Larva	0.038%	0.026%	0.000%

Sources: Cargnelli et al. 1999a; NEFMC 2017

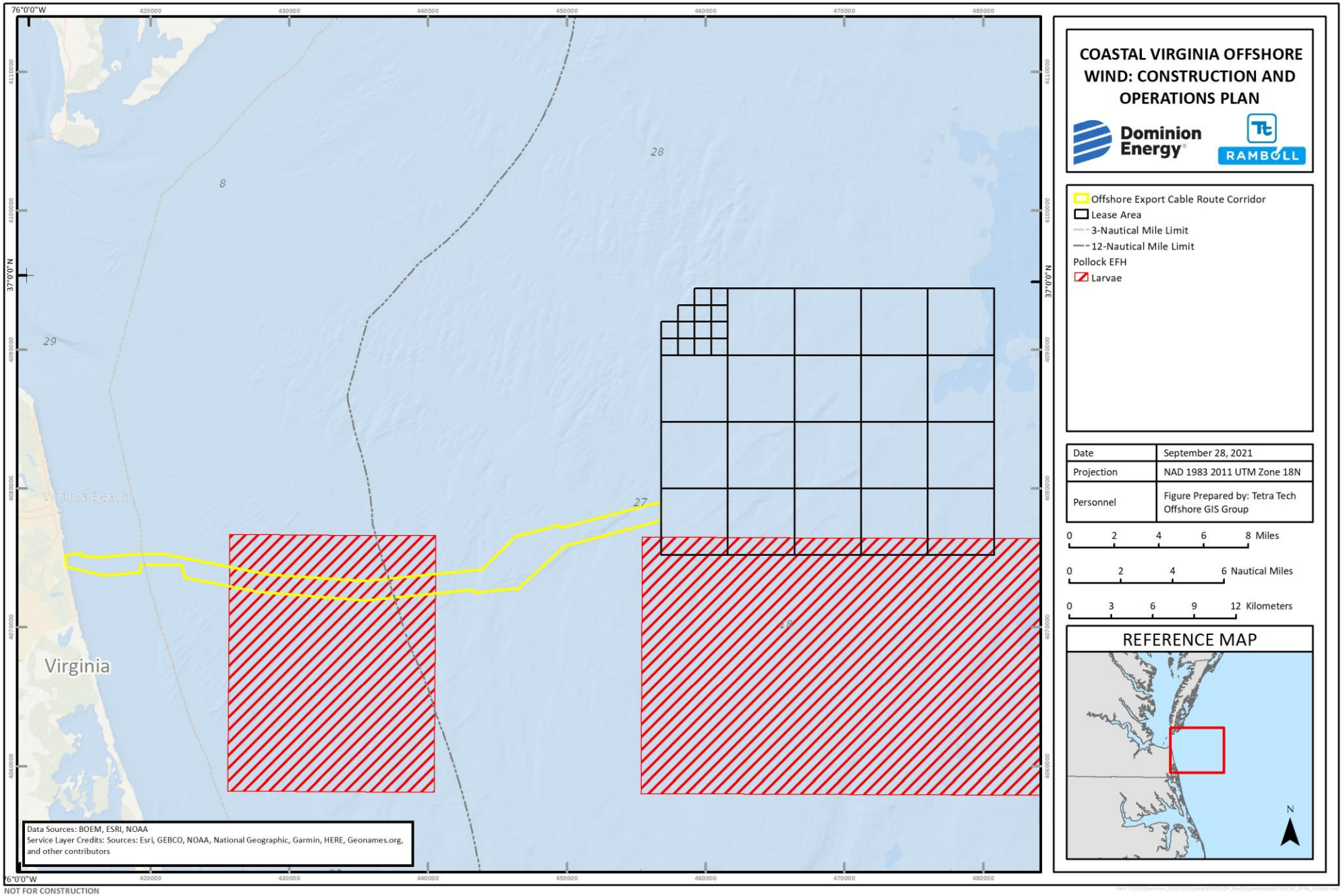


Figure E-1-7. Pollock (*Pollachius virens*) Designated EFH in the Offshore Project Area

The pollock is managed under the NEFMC Northeast Multispecies FMP as a single stock: the Gulf of Maine/Georges Bank stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.7 Red Hake (*Urophycis chuss*)

No red hake egg, larva, or juvenile EFH is designated in the Offshore Project Area.

Red hake adult EFH is designated in the Lease Area (Table E-1-8; Figure E-1-8). In the Mid-Atlantic Bight, red hake adults are found in benthic marine habitats on the outer continental shelf and slope and in high salinity zones of regional bays and estuaries (NEFMC 2017). Adults prefer depressions of soft mud and sand substrates, shell beds, and complex reef structure (NEFMC 2017). They exhibit seasonal migrations, preferring inshore waters in spring and fall and offshore waters in summer and winter. Adults feed on crustaceans and a variety of demersal and pelagic fishes and squids (Steimle et al. 1999b). Designated EFH for red hake adults is benthic habitat in depths of 16 to 2,461 ft (5 to 750 m), where temperatures span 36 to 72°F (2 to 22°C) and salinities exceed 20 ppt (Steimle et al. 1999b).

Table E-1-8. Red Hake (*Urophycis chuss*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Adult	7,504	0	0
Percent of Project Area Covered by EFH by Life Stage			
Adult	6.7%	0.0%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Adult	0.013%	0.000%	0.000%

Sources: Steimle et al. 1999b; NEFMC 2017

The red hake is managed under the NEFMC Northeast Multispecies FMP as a single stock: the Southern Georges Bank/Mid-Atlantic stock. The fishery stock is currently overfished and subject to overfishing (NOAA Fisheries 2019).

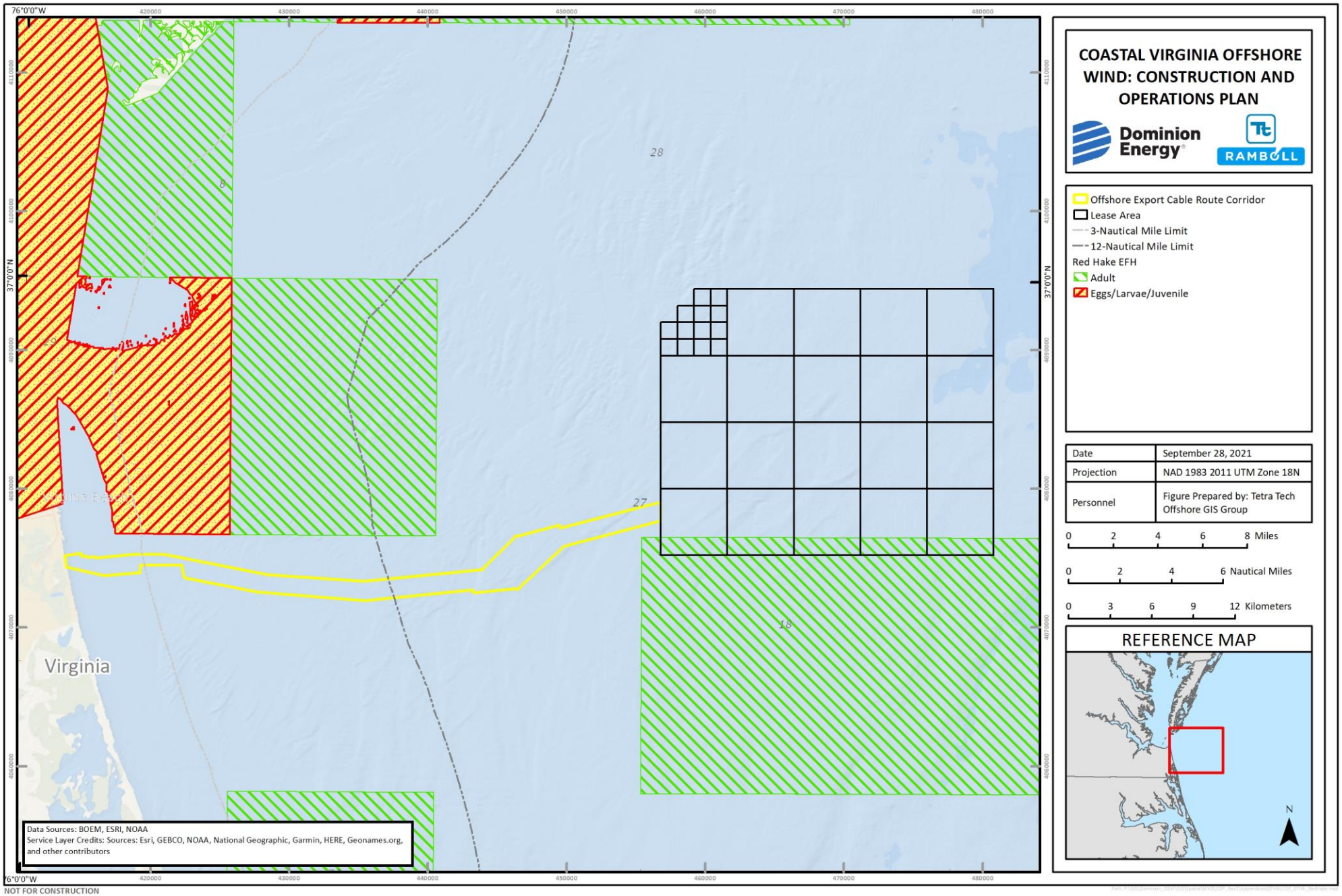


Figure E-1-8. Red Hake (*Urophycis chuss*) Designated EFH in the Offshore Project Area

E-1.2.8 Windowpane Flounder (*Scophthalmus aquosus*)

Windowpane flounder egg EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-9; Figure E-1-9). In the Mid-Atlantic Bight, windowpane flounder eggs are found in pelagic marine habitats and in mixed and high salinity zones of regional bays and estuaries (NEFMC 2017). Designated EFH for windowpane flounder eggs is pelagic habitat in the upper 230 ft (70 m) of the water column, where temperatures span 43 to 57°F (6 to 14°C) in spring, 50 to 61°F (10 to 16°C) in summer, and 57 to 68°F (14 to 20°C) in fall (Chang et al. 1999).

Table E-1-9. Windowpane flounder (*Scophthalmus aquosus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	50,823	13,770	1,652
Larva	109,623	7,565	0
Juvenile	108,587	14,234	1,652
Adult	111,403	12,575	0
Percent of Project Area Covered by EFH by Life Stage			
Egg	45.1%	97.7%	100.0%
Larva	97.2%	53.1%	0.0%
Juvenile	96.3%	100.0%	100.0%
Adult	98.8%	88.3%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.234%	0.063%	0.008%
Larva	0.473%	0.033%	0.000%
Juvenile	0.276%	0.036%	0.004%
Adult	0.297%	0.034%	0.000%

Sources: Chang et al. 1999; NEFMC 2017

Windowpane flounder larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-9; Figure E-1-9). Windowpane flounder larvae are found in pelagic marine habitats and in mixed and high salinity zones of regional bays and estuaries; they consume planktonic prey (NEFMC 2017). Larvae descend to the seafloor upon reaching 0.4 inches (10 millimeters) in length; spring-spawned larvae settle in estuaries and on the shelf, while autumn-spawned larvae primarily settle on the shelf (Chang et al. 1999). Designated EFH for windowpane flounder larvae is pelagic habitat in the upper 230 ft (70 m) of the water column, where temperatures span 37 to 57°F (3 to 14°C) in spring, 50 to 63°F (10 to 17°C) in summer, and 55 to 66°F (13 to 19°C) in fall (Chang et al. 1999).

Windowpane flounder juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-9; Figure E-1-9). Windowpane flounder juveniles are found in intertidal and subtidal benthic habitats in estuarine, coastal marine, and continental shelf waters, including mixed and high salinity zones in regional bays and estuaries (NEFMC 2017). YOY prefer sand substrates, while older juveniles occur on both mud and sand substrates (NEFMC 2017). They feed on small crustaceans (e.g., mysid and decapod shrimps) and fish larvae (e.g., hakes, cod, and other windowpane flounders) (Chang et al. 1999). Designated EFH for windowpane flounder juveniles is benthic habitat in nearshore bays and estuaries from the shoreline to depths of 246 ft (75 m), where temperatures span 32 to 75°F (0 to 24°C) and salinities are within 15 to 33 ppt (Chang et al. 1999).

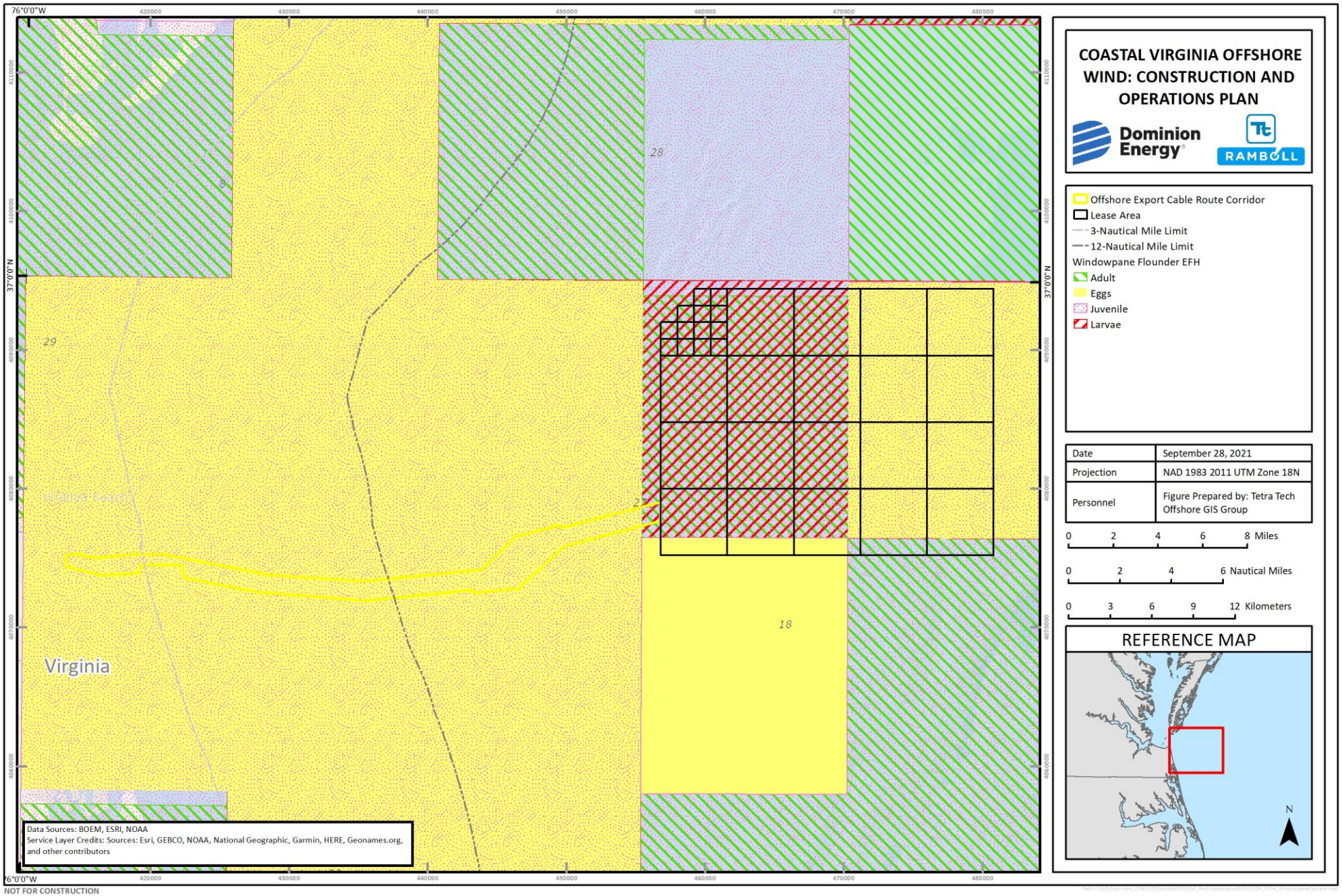


Figure E-1-9. Windowpane flounder (*Scophthalmus aquosus*) Designated EFH in the Offshore Project Area

Windowpane flounder adult EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-9; Figure E-1-9). Windowpane flounder adults are found in intertidal and subtidal benthic habitats in estuarine, coastal marine, and continental shelf waters, including mixed and high salinity zones in regional bays and estuaries (NEFMC 2017). Adults prefer mud and sand substrates (NEFMC 2017). They consume the same prey as juveniles. Designated EFH for windowpane flounder adults is benthic habitat in nearshore bays and estuaries from the shoreline to depths of 246 ft (75 m), where temperatures span 32 to 75°F (0 to 24°C) and salinities are within 15 to 33 ppt (Chang et al. 1999).

The windowpane flounder is managed under the NEFMC Northeast Multispecies FMP as two separate stocks: the Gulf of Maine/Georges Bank stock and the Southern New England/Mid-Atlantic stock. While the Southern New England/Mid-Atlantic stock is not overfished, the Gulf of Maine/Georges Bank stock is currently overfished; neither stock is subject to overfishing (NOAA Fisheries 2019).

E-1.2.9 Winter Skate (*Leucoraja ocellata*)

No winter skate egg or adult EFH is designated in the Offshore Project Area; there is no larval stage for skates.

Winter skate juvenile EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-10; Figure E-1-10). In the Mid-Atlantic Bight, winter skate juveniles are found in subtidal benthic marine habitats on the continental shelf and in the high salinity zones of regional bays and estuaries (NEFMC 2017). Juveniles reside in sediment depressions during the day (primarily on sand and gravel substrates, but occasionally on mud substrates) and are more active at night (Packer et al. 2003b; NEFMC 2017). They feed on polychaetes, amphipods, decapods, isopods, bivalves, and fishes (Packer et al. 2003b). Designated EFH for winter skate juveniles is benthic habitat from the shoreline to 1,217 ft (371 m), where temperatures span 30 to 66°F (-1.2 to 19°C) and salinities are within 28 to 35 ppt (Packer et al. 2003b).

Table E-1-10. Winter Skate (*Leucoraja ocellata*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	46,611	2,068	0
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	41.3%	14.5%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.140%	0.006%	0.000%

Sources: Packer et al. 2003b; NEFMC 2017

The winter skate is managed under the NEFMC Northeast Skate Complex as a single stock: the Georges Bank/Southern New England stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

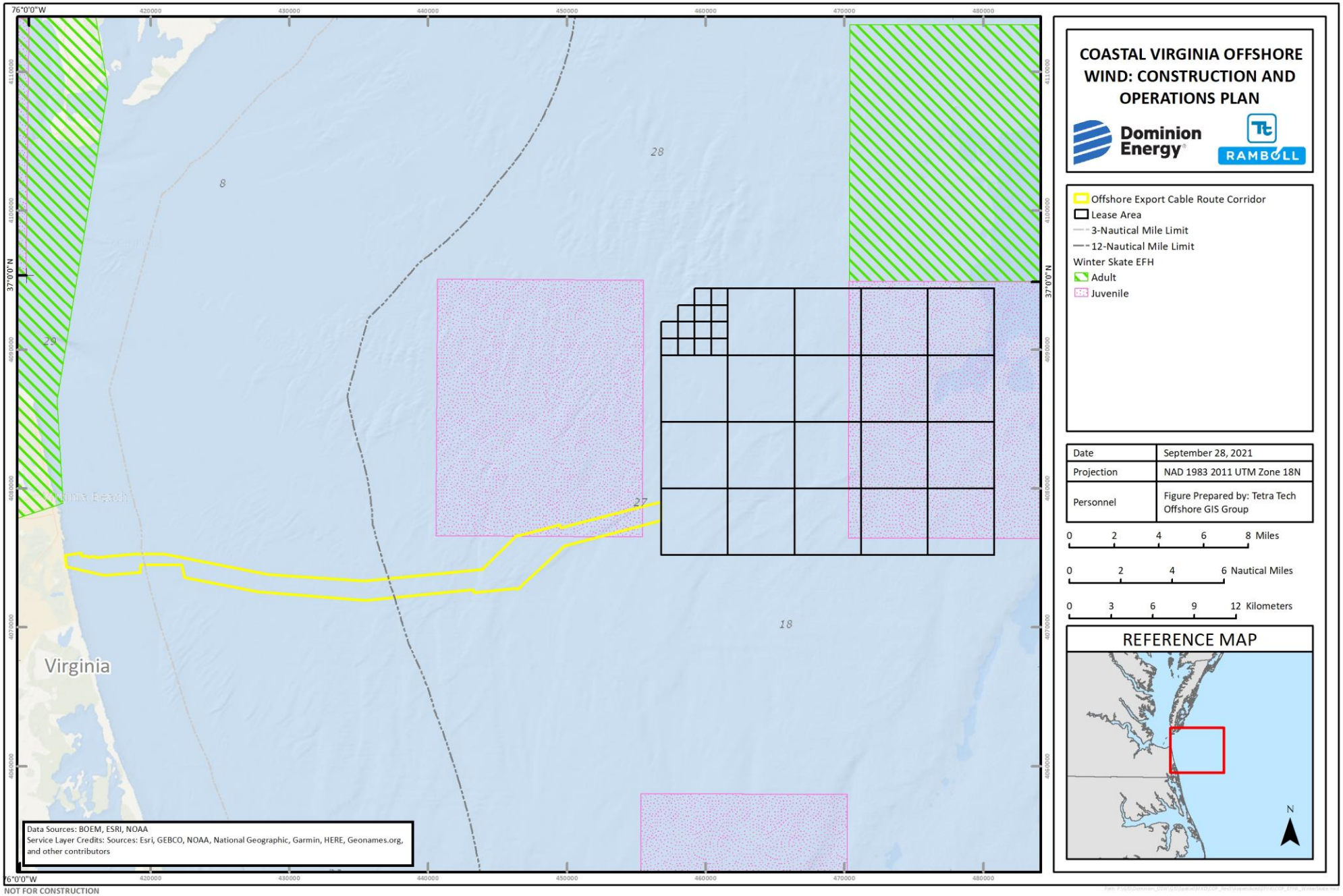


Figure E-1-10. Winter Skate (*Leucoraja ocellata*) Designated EFH in the Offshore Project Area

E-1.2.10 Witch Flounder (*Glyptocephalus cynoglossus*)

Witch flounder egg EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-11; Figure E-1-11). In the Mid-Atlantic Bight, witch flounder eggs are found in pelagic marine habitats on the continental shelf (NEFMC 2017). They are buoyant and often occur near the surface above deep waters but have been found at depths of 16,404 ft (5,000 m). Designated EFH for witch flounder eggs spans March to October in depths of 33 to 558 ft (10 to 170 m), where temperatures range from 39 to 63°F (4 to 17°C) and salinities are high (Cargnelli et al. 1999b).

Table E-1-11. Witch Flounder (*Glyptocephalus cynoglossus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	50,823	8,759	1,652
Larva	105,324	464	0
Percent of Project Area Covered by EFH by Life Stage			
Egg	45.1%	61.5%	100.0%
Larva	93.4%	3.3%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.369%	0.064%	0.012%
Larva	0.617%	0.003%	0.000%

Sources: Cargnelli et al. 1999b; NEFMC 2017

Witch flounder larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-11; Figure E-1-11). Witch flounder larvae are found in pelagic marine habitats on the continental shelf; they feed on planktonic prey (NEFMC 2017). Larvae undergo extended planktonic stages from four months to one year, during which time smaller larvae are found near the surface and sink to lower depths as they increase in size (Cargnelli et al. 1999b). Designated EFH for witch flounder larvae is in the upper 820 ft (250 m) of the water column, where temperatures span 39 to 61°F (4 to 16°C) and salinities are high (Cargnelli et al. 1999b).

No witch flounder juvenile or adult EFH is designated in the Offshore Project Area.

The witch flounder is managed by the NEFMC Northeast Multispecies FMP as a single stock: the Northwestern Atlantic Coast stock. The fishery stock is overfished but is not currently subject to overfishing (NOAA Fisheries 2019).

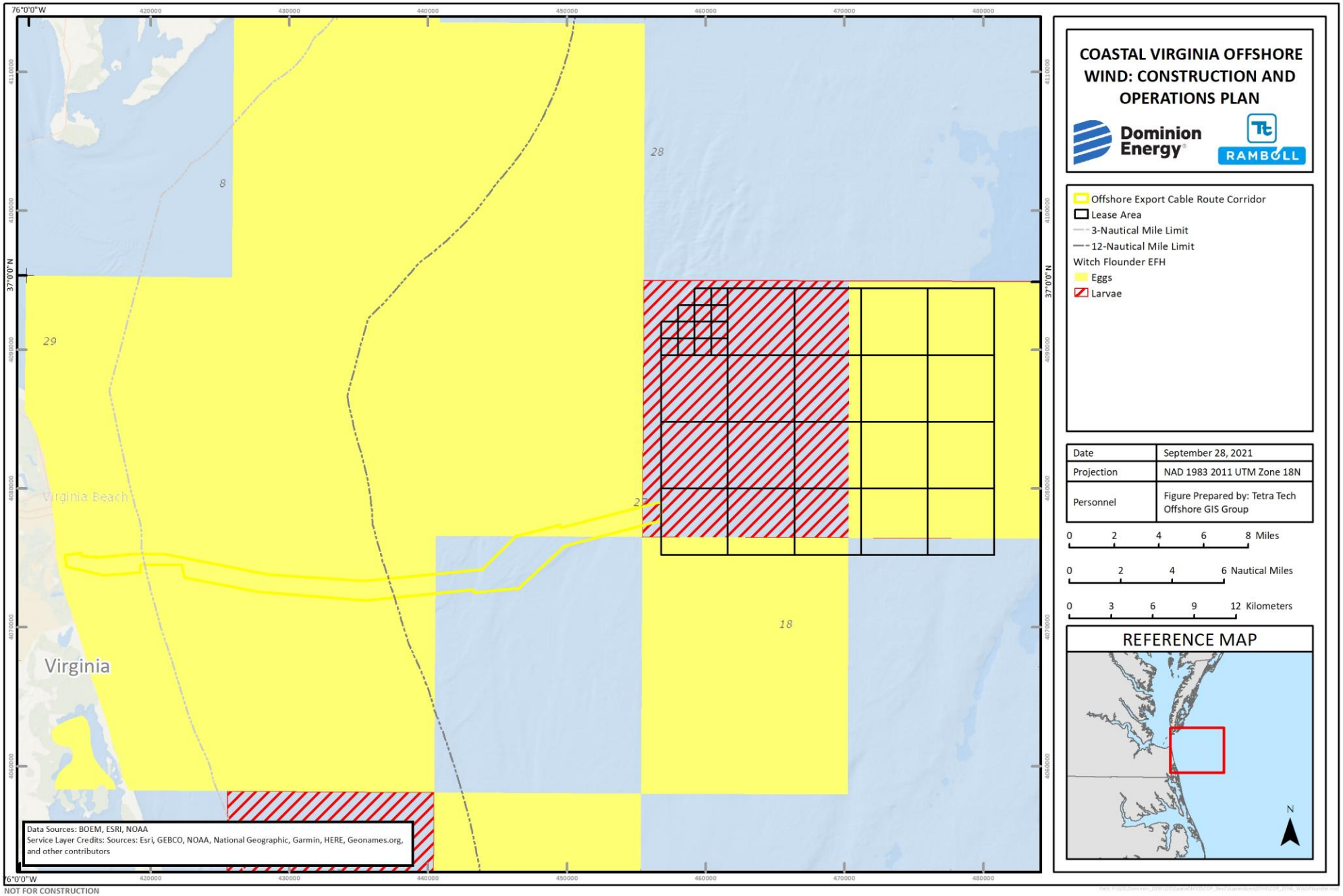


Figure E-1-11. Witch Flounder (*Glyptocephalus cynoglossus*) Designated EFH in the Offshore Project Area

E-1.2.11 Yellowtail Flounder (*Limanda ferruginea*)

No yellowtail flounder egg, juvenile, or adult EFH is designated in the Offshore Project Area.

Yellowtail flounder larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-12; Figure E-1-12). In the Mid-Atlantic Bight, yellowtail flounder larvae are found in coastal and continental shelf pelagic marine habitats and in the high salinity zones of regional bays and estuaries; they feed on planktonic prey (NEFMC 2017). Larvae complete diel migrations and exhibit a vertical abundance peak at 33 ft (10 m) at night and 66 ft (20 m) during daytime (Johnson et al. 1999). They are planktonic until they reach approximately 0.5 to 0.7 inches (12 to 16 millimeters) in length, at which point they descend to the seafloor and metamorphose into juveniles (Johnson et al. 1999). Designated EFH for yellowtail flounder larvae is in depths of 33 to 2,460 ft (10 to 1,250 m), where temperatures span 41 to 63°F (5 to 17°C) and salinities are within 32 to 34 ppt (Johnson et al. 1999).

Table E-1-12. Yellowtail Flounder (*Limanda ferruginea*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Larva	4,211	2,068	0
Percent of Project Area Covered by EFH by Life Stage			
Larva	3.7%	14.5%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Larva	0.022%	0.011%	0.000%

Sources: Johnson et al. 1999; NEFMC 2017

The yellowtail flounder is managed under the NEFMC Northeast Multispecies FMP as two separate stocks: the Cape Cod/Gulf of Maine stock and the Southern New England/Mid-Atlantic stock. The Southern New England/Mid-Atlantic stock is overfished, and the Cape Cod/Gulf of Maine stock is rebuilding; neither stock is currently subject to overfishing (NOAA Fisheries 2019).

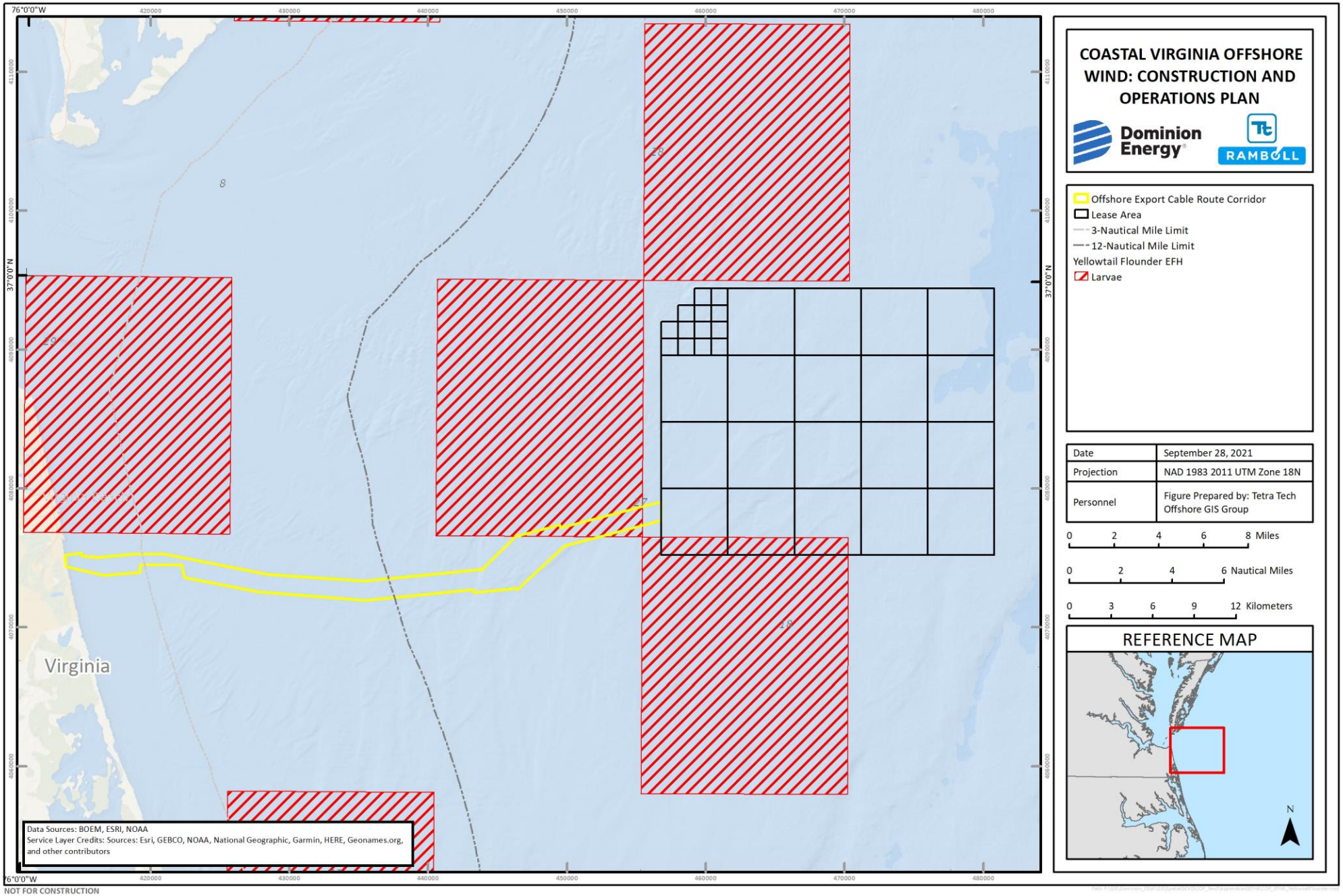


Figure E-1-12. Yellowtail Flounder (*Limanda ferruginea*) Designated EFH in the Offshore Project Area

E-1.2.12 Atlantic Butterfish (*Peprilus triacanthus*)

Atlantic butterfish egg EFH is designated in federal waters of the Offshore Export Cable Route Corridor (Table E-1-13; Figure E-1-13). In the Mid-Atlantic Bight, Atlantic butterfish eggs are found in pelagic marine habitats on the continental shelf and slope and in the high salinity zones of inshore estuaries and embayments (MAFMC 2011). Designated EFH for Atlantic butterfish eggs is in the upper 656 ft (200 m) of the water column over depths of 4,921 ft (1,500 m), where temperatures span 43 to 79°F (6 to 26°C) and salinities are within 25 to 33 ppt (Cross et al. 1999; MAFMC 2011).

Table E-1-13. Atlantic Butterfish (*Peprilus triacanthus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	0	2,066	0
Larva	49,785	0	0
Juvenile	109,618	14,234	1,646
Adult	4,216	6,691	1,646
Percent of Project Area Covered by EFH by Life Stage			
Egg	0.0%	14.5%	0.0%
Larva	44.1%	0.0%	0.0%
Juvenile	97.2%	100.0%	99.6%
Adult	3.7%	47.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.000%	0.011%	0.000%
Larva	0.213%	0.000%	0.000%
Juvenile	0.278%	0.036%	0.004%
Adult	0.010%	0.015%	0.004%

Sources: Cross et al. 1999; MAFMC 2011

Atlantic butterfish larva EFH is designated in the Lease Area (Table E-1-13; Figure E-1-13). Atlantic butterfish larvae are found in pelagic marine habitats on the continental shelf and in the high salinity zones of inshore estuaries and embayments; they feed on planktonic prey (MAFMC 2011). Larvae exhibit diel migrations, occurring in deeper waters during day and migrating to surface waters at night (Cross et al. 1999). Designated EFH for Atlantic butterfish larvae is in the upper 656 ft (200 m) of the water column over depths of 5,741 ft (1,750 m), where temperatures span 45 to 79°F (7 to 26°C) and salinities are within 6 to 38 ppt (Cross et al. 1999; MAFMC 2011).

Atlantic butterfish juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-13; Figure E-1-13). Atlantic butterfish juveniles are found in pelagic marine habitats in the inner and outer continental shelf and in the high salinity zones of inshore estuaries and embayments (MAFMC 2011). They are common in inshore areas, including the surf zone, and larger individuals are found over sandy and muddy substrates (Cross et al. 1999). Juveniles tolerate a wide range of temperatures and salinities. They feed primarily on pelagic prey including thaliaceans, mollusks, crustaceans, coelenterates, polychaetes, small fishes, and ctenophores (Cross et al. 1999). Designated EFH for Atlantic butterfish juveniles is in depths of 33 to 1,083 ft (10 to 330 m), where temperatures span 45 to 86°F (7 to 30°C) and salinities are within 3 to 37 ppt (Cross et al. 1999; MAFMC 2011).

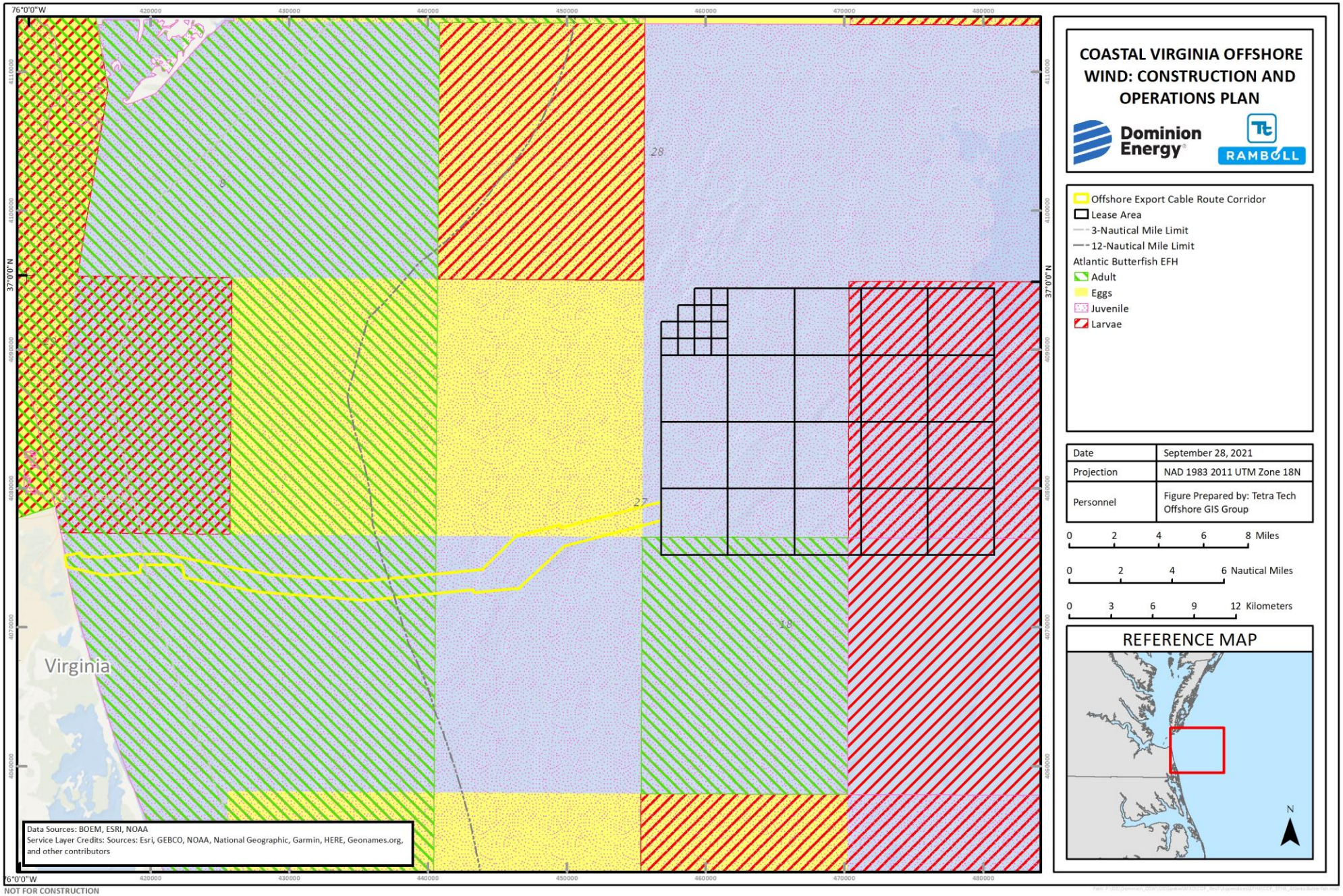


Figure E-1-13. Atlantic Butterfish (*Peprilus triacanthus*) Designated EFH in the Offshore Project Area

Atlantic butterfish adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-13; Figure E-1-13). Atlantic butterfish adults are found in pelagic marine habitats on the inner and outer continental shelf and in the high salinity zones of inshore estuaries and embayments (MAFMC 2011). As with juveniles, adults are eurythermal and euryhaline and primarily consume pelagic prey. Designated EFH for Atlantic butterfish adults is from surface waters to depths of 1,378 ft (420 m), where temperatures span 41 to 82°F (5 to 28°C) and salinities are within 4 to 33 ppt (Cross et al. 1999; MAFMC 2011).

The Atlantic butterfish is managed under the MAFMC Atlantic Mackerel, Squid, and Butterfish FMP as a single stock: the Gulf of Maine/Cape Hatteras stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.13 Atlantic Mackerel (*Scomber scombrus*)

Atlantic mackerel egg EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-14; Figure E-1-14). In the Mid-Atlantic Bight, Atlantic mackerel eggs are found in pelagic marine habitats on the continental shelf and in the high salinity zones of inshore estuaries and embayments (MAFMC 2011). Eggs exhibit seasonal variations in depth and generally occur in depths of 33 to 98 ft (10 to 30 m) in April, 98 to 164 ft (30 to 50 m) in May, and 98 to 230 ft (30 to 70 m) in June through August. Designated EFH for Atlantic mackerel eggs is in depths of 33 to 1,066 ft (10 to 325 m), where temperatures span 41 to 73°F (5 to 23°C) in salinities within 25 to 34 ppt (Studholme et al. 1999).

Table E-1-14. Atlantic Mackerel (*Scomber scombrus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	58,798	464	0
Juvenile	112,799	7,562	0
Adult	112,799	14,234	1,646
Percent of Project Area Covered by EFH by Life Stage			
Egg	52.1%	3.3%	0.0%
Juvenile	100.0%	53.1%	0.0%
Adult	100.0%	100.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.353%	0.003%	0.000%
Juvenile	0.356%	0.024%	0.000%
Adult	0.373%	0.047%	0.005%

Sources: Studholme et al. 1999; MAFMC 2011

No Atlantic mackerel larva EFH is designated in the Offshore Project Area.

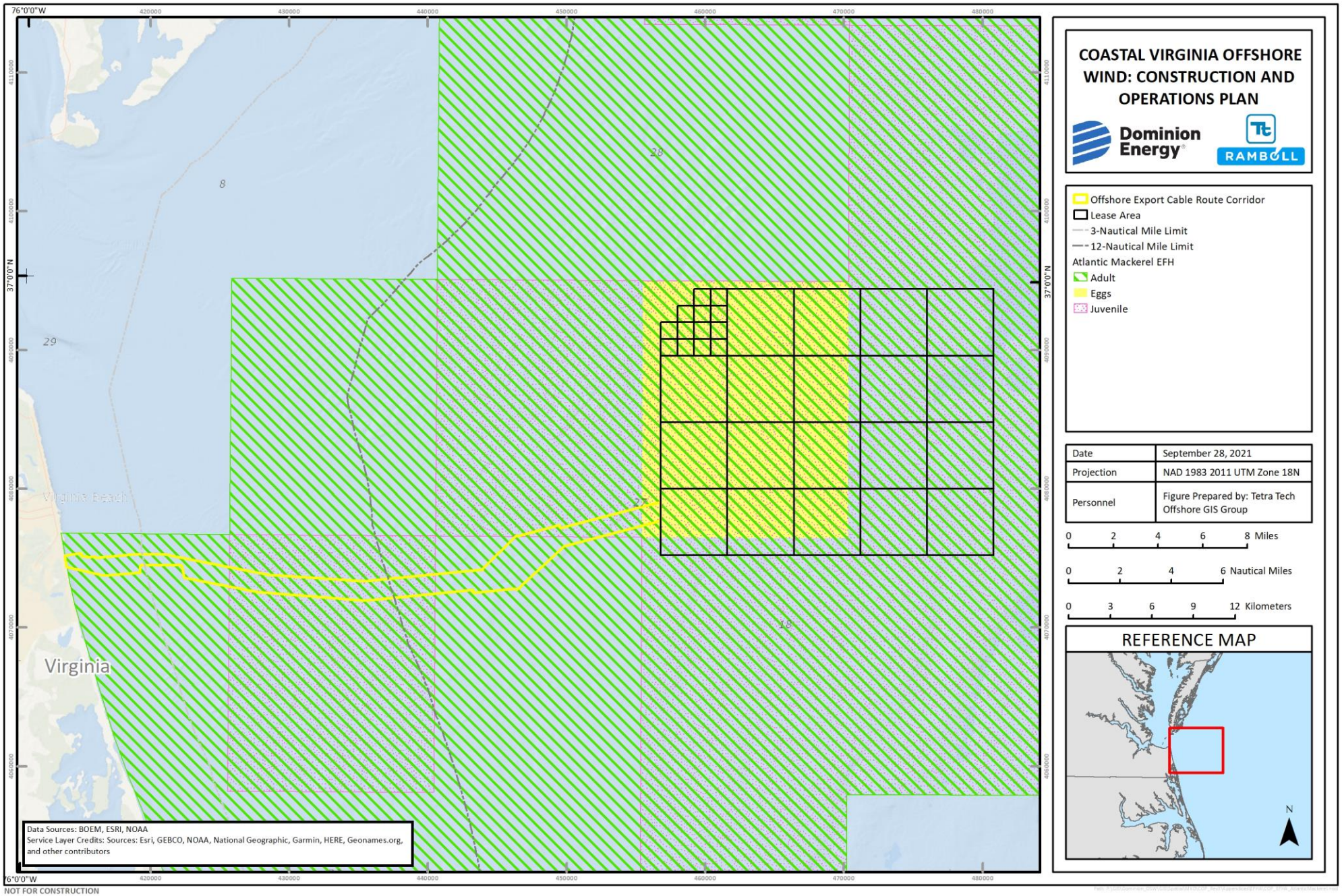


Figure E-1-14. Atlantic Mackerel (*Scomber scombrus*) Designated EFH in the Offshore Project Area

Atlantic mackerel juvenile EFH is designated in the Lease Area and federal of the Offshore Export Cable Route Corridor (Table E-1-14; Figure E-1-14). Atlantic mackerel juveniles are found in pelagic marine habitats on the continental shelf and in the high salinity zones of inshore estuaries and embayments (MAFMC 2011). Juveniles exhibit seasonal variations in depth and generally occur in depths of 66 to 131 ft (20 to 40 m) in fall, 164 to 230 ft (50 to 70 m) in winter, 98 to 295 ft (30 to 90 m) in spring, and 66 to 164 ft (20 to 50 m) in summer (Studholme et al. 1999). They are opportunistic feeders that primarily consume small crustaceans including copepods, amphipods, mysid shrimp, and decapod larvae (Studholme et al. 1999). Designated EFH for Atlantic mackerel juveniles is from surface waters to depths of 1,050 ft (320 m), where temperatures span 39 to 72°F (4 to 22°C) and salinities exceed 25 ppt (Studholme et al. 1999).

Atlantic mackerel adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-14; Figure E-1-14). Atlantic mackerel adults are found in pelagic marine habitats on the continental shelf and in the high salinity zones of inshore estuaries and embayments (MAFMC 2011). Adults exhibit seasonal variations in depth and generally occur in depths of 197 to 262 ft (60 to 80 m) in fall, 66 to 98 ft (20 to 30 m) in winter, 197 to 558 ft (60 to 170 m) in spring, and 164 to 230 ft (50 to 70 m) in winter (Studholme et al. 1999). Larger fish are often found at greater depths than smaller adults; distributions may be correlated with prey availability, downwelling events, and onshore advection of warm surface water (Studholme et al. 1999). Adults consume the same general prey as juveniles but consume a wider assortment of organisms and larger prey items (Studholme et al. 1999). Designated EFH for Atlantic mackerel adults in from surface waters to depths of 1,247 ft (380 m), where temperatures span 41 to 61°F (5 to 16°C) and salinities exceed 25 ppt (Studholme et al. 1999).

The Atlantic mackerel is managed under the MAFMC Atlantic Mackerel, Squid, and Butterfish FMP as a single stock: the Gulf of Maine/Cape Hatteras stock. The fishery stock is currently overfished and subject to overfishing (NOAA Fisheries 2019).

E-1.2.14 Atlantic Surfclam (*Spisula solidissima*)

No Atlantic surfclam egg or larva EFH is designated in the Offshore Project Area.

Atlantic surfclam juvenile EFH stages is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-15; Figure E-1-15). In the Mid-Atlantic Bight, Atlantic surfclam juveniles are found in benthic marine habitats throughout the substrate to a depth of 3 ft (1 m) below the water/sediment interface (MAFMC 2017). Planktonic larvae metamorphose to juveniles within 18 to 35 days. Juveniles are planktivorous siphon feeders that consume a variety of diatoms and ciliates (Cargnelli et al. 1999c). Designated EFH for Atlantic surfclam juveniles is benthic habitat in depths of 26 to 217 ft (8 to 66 m), where temperatures span 36 to 86°F (2 to 30°C) and salinities exceed 14 ppt (Cargnelli et al. 1999c).

Table E-1-15. Atlantic Surfclam (*Spisula solidissima*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	12,575	0

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
Adult	112,799	5,477	0
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	88.3%	0.0%
Adult	100.0%	38.5%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.684%	0.076%	0.000%
Adult	0.838%	0.041%	0.000%

Sources: Cargnelli et al. 1999c; MAFMC 2017

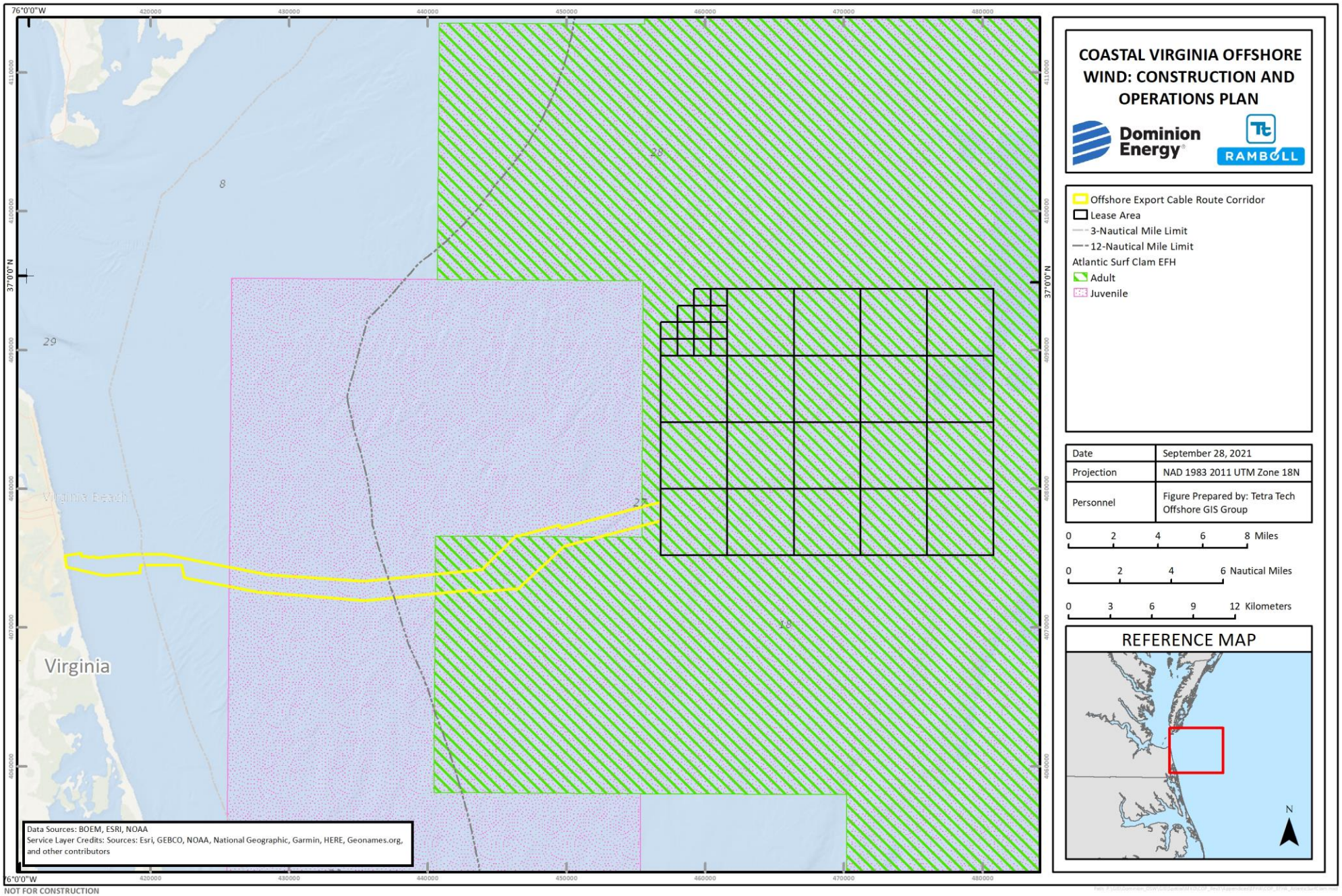


Figure E-1-15. Atlantic Surfclam (*Spisula solidissima*) Designated EFH in the Offshore Project Area

Atlantic surfclam adults are found in benthic marine habitats throughout the substrate to a depth of 3 ft (1 m) below the water/sediment interface (MAFMC 2017). They consume the same planktivorous prey as juveniles. Designated EFH for Atlantic surfclam juveniles is benthic habitat in depths of 26 to 217 ft (8 to 66 m), where temperatures span 36 to 86°F (2 to 30°C) and salinities exceed 14 ppt (Cargnelli et al. 1999c).

The Atlantic surfclam is managed under the MAFMC Atlantic Surfclam and Ocean Quahog FMP as a single stock: the Mid-Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.15 Black Sea Bass (*Centropristis striata*)

No black sea bass egg EFH is designated in the Offshore Project Area.

Black sea bass larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-16; Figure E-1-16). In the Mid-Atlantic Bight, black sea bass larvae are found in pelagic marine habitat over the continental shelf and in the mixed to high salinity zones of regional estuaries (MAFMC 1998a). They primarily feed on decapods (Drohan et al. 2007). Larvae typically transform into juveniles in nearshore habitats. Designated EFH for black sea bass larvae is in the upper 328 ft (100 m) of the water column over depths of 6,562 ft (2,000 m), where temperatures span 52 to 79°F (11 to 26°C) and salinities are within 30 to 35 ppt (Steimle et al. 1999c; Drohan et al. 2007; MAFMC 2017).

Table E-1-16. Black Sea Bass (*Centropristis striata*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Larva	54,001	7,098	0
Juvenile	112,799	14,234	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Larva	47.9%	49.9%	0.0%
Juvenile	100.0%	100.0%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Larva	0.679%	0.089%	0.000%
Juvenile	0.405%	0.051%	0.006%
Adult	0.428%	0.054%	0.006%

Sources: MAFMC 1998a; Steimle et al. 1999c; Drohan et al. 2007; MAFMC 2017

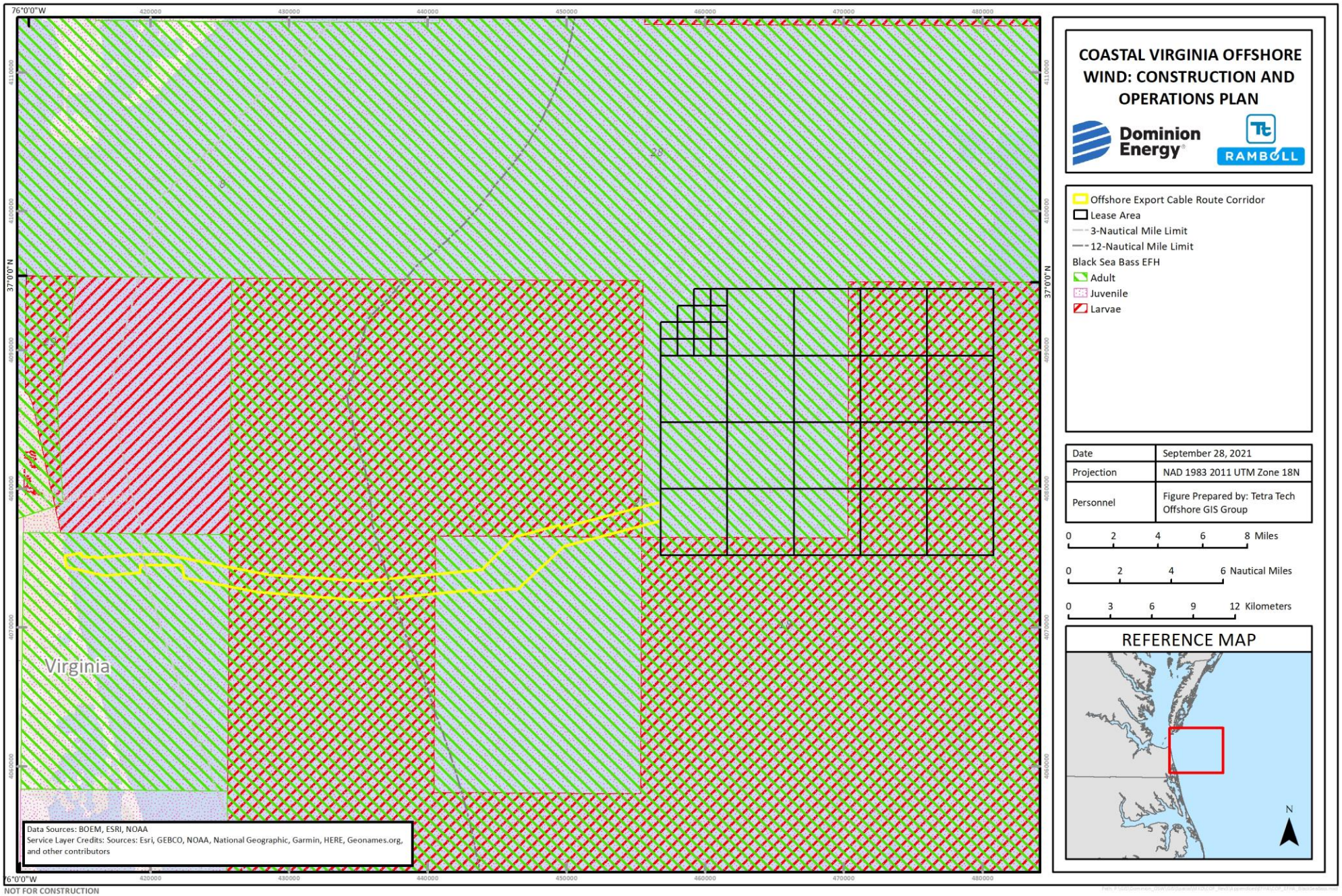


Figure E-1-16. Black Sea Bass (*Centropristis striata*) Designated EFH in the Offshore Project Area

Black sea bass adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-16; Figure E-1-16). Black sea bass adults are found in benthic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998a). Adults generally summer in estuaries and coastal waters in depths of 125 ft (38 m) and overwinter offshore in deeper waters (MAFMC 1998a). They are generalist carnivores that feed on a variety of infaunal and epibenthic invertebrates, especially crustaceans, small fishes, and squid (Drohan et al. 2007). They exhibit high site fidelity and preference for structurally complex substrates, sand with shell hash, and artificial reefs (MAFMC 2017). Designated EFH for black sea bass adults is 66 to 1,312 ft (20 to 400 m), where temperatures span 43 to 81°F (6 to 27°C) and salinities are within 30 to 36 ppt (MAFMC 1998a; Drohan et al. 2007; MAFMC 2017).

The black sea bass is managed under the MAFMC Summer Flounder, Scup, and Black Sea Bass FMP as a single stock: the Mid-Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.16 Bluefish (*Pomatomus saltatrix*)

Bluefish egg EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-17; Figure E-1-17). In the Mid-Atlantic Bight, bluefish eggs are found in pelagic marine habitats over the continental shelf (MAFMC 1998b). Surface currents transport eggs south and offshore (Shephard and Packer 2006). The prolonged bluefish spawning season is attributed to at least three separate cohorts of bluefish that spawn independently in spring, summer, and fall. Designated EFH for bluefish eggs is in depths of 98 to 230 ft (30 to 70 m), where temperatures span 64 to 72°F (18 to 22°C) and salinities exceed 26 ppt (Fahay et al. 1999b; Shepherd and Packer 2006).

Table E-1-17. Bluefish (*Pomatomus saltatrix*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	50,823	2,068	0
Larva	54,000	2,068	0
Juvenile	58,798	14,234	1,646
Adult	0	13,770	1,646
Percent of Project Area Covered by EFH by Life Stage			
Egg	45.1%	14.5%	0.0%
Larva	47.9%	14.5%	0.0%
Juvenile	52.1%	100.0%	99.6%
Adult	0.0%	96.7%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.170%	0.007%	0.000%
Larva	0.065%	0.002%	0.000%
Juvenile	0.059%	0.014%	0.002%
Adult	0.000%	0.010%	0.001%

Sources: MAFMC 1998b; Fahay et al. 1999b; Shepherd and Packer 2006; MAFMC 2017

Bluefish larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-17; Figure E-1-17). Bluefish larvae are found in pelagic marine habitats over the continental shelf (MAFMC 1998b). Individuals from the spring cohort associate strongly with surface

waters, while those from the summer cohort exhibit diel migrations from surface waters at night to below depths of 13 ft (4 m) during the day (Fahay et al. 1999b; Shepherd and Packer 2006). Young larvae primarily consume copepods and shift their diets to fish as they age (Shepherd and Packer 2006). Designated EFH for bluefish larvae spans May to September in depths of 98 to 230 ft (30 to 70 m), where temperatures span 64 to 79°F (18 to 26°C) and salinities are within 30 to 35 ppt (Fahay et al. 1999b; Shepherd and Packer 2006).

Bluefish juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-17; Figure E-1-17). Bluefish juveniles are found in pelagic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998b). They move shoreward with growth and enter estuarine nurseries (Fahay et al. 1999b; Shepherd and Packer 2006). Individuals from the summer cohort exhibit diel distributions from the shoreline during the day to open bay or channel waters at night (Fahay et al. 1999b; Shepherd and Packer 2006). Juveniles are opportunistic feeders that consume whatever taxa are locally abundant, including fish, crustaceans, and polychaetes (Shepherd and Packer 2006). Designated EFH for bluefish juveniles is in surface waters to mid-shelf depths, where temperatures span 59 to 86°F (15 to 30°C) and salinities are within 23 to 36 ppt (Fahay et al. 1999b; Shepherd and Packer 2006; MAFMC 2017).

Bluefish adult EFH is designated in both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-17; Figure E-1-17). Bluefish adults are found in pelagic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998b). They are highly migratory and their distribution varies seasonally and according to the size of the individuals comprising the schools (MAFMC 1998b). Like juveniles, adults are opportunistic feeders and consume a large variety of fishes, crustaceans, and polychaetes (Shepherd and Packer 2006). Designated EFH for bluefish adults is in surface waters to mid-shelf depths, where temperatures span 57 to 86°F (14 to 30°C) and salinities are within 32 to 33 ppt (Fahay et al. 1999b; Shepherd and Packer 2006; MAFMC 2017).

The bluefish is managed under the MAFMC Bluefish FMP as a single stock: the Atlantic Coast stock. The fishery stock is currently overfished but is not subject to overfishing (NOAA Fisheries 2019).

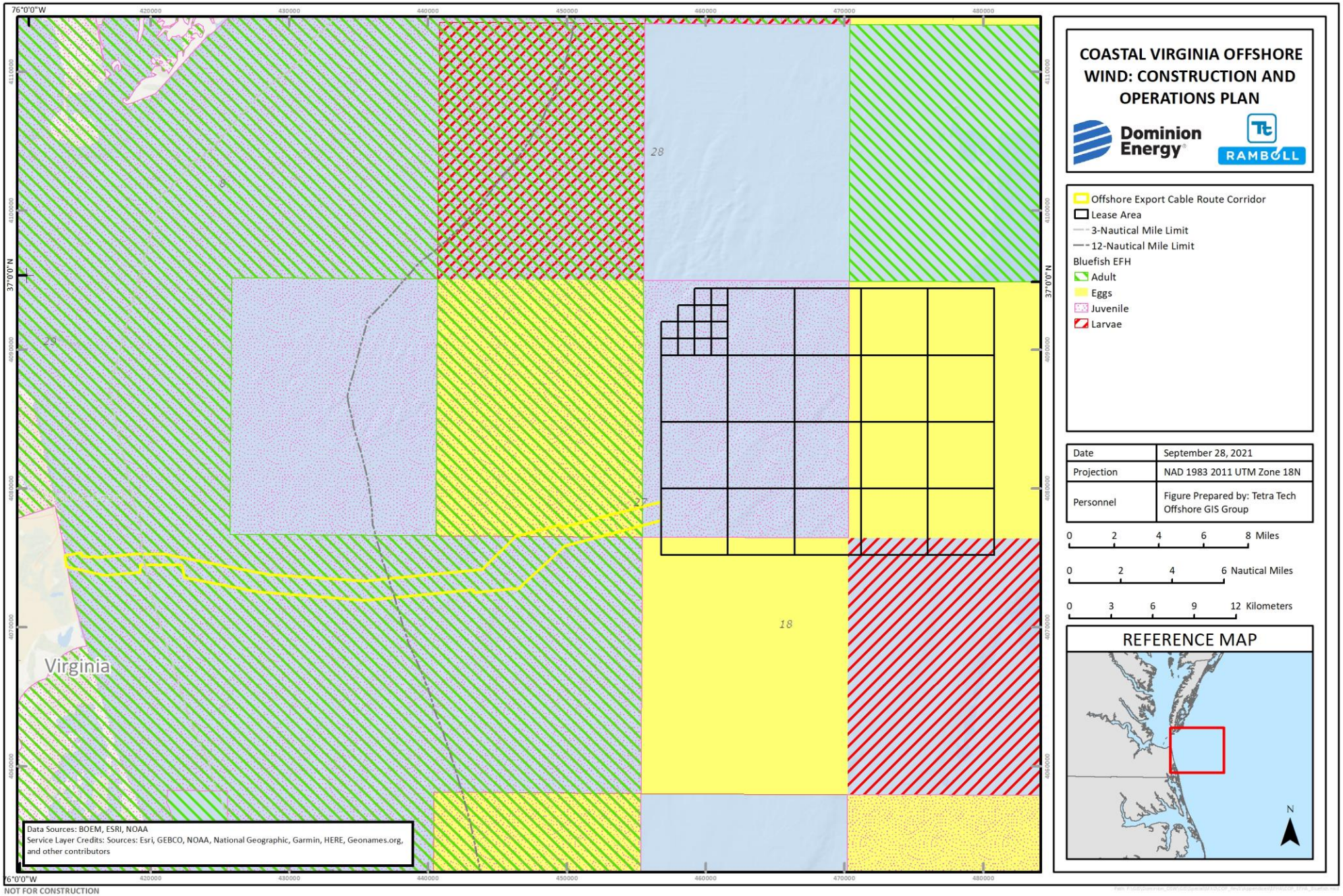


Figure E-1-17. Bluefish (*Pomatomus saltatrix*) Designated EFH in the Offshore Project Area

E-1.2.17 Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*)

Longfin inshore squid egg EFH is designated in both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-18; Figure E-1-18). In the Mid-Atlantic Bight, longfin inshore squid eggs are found in inshore and offshore benthic marine habitats (MAFMC 2011). Egg masses, or "mops," are anchored to hand substrates, including shells, rocks, boulders, submerged aquatic vegetation, sand, and mud (MAFMC 2011). Designated EFH for longfin inshore squid eggs is in benthic habitat from the shoreline to depths of 164 ft (50 m), where temperatures span 50 to 73°F (10 to 23°C) and salinities are within 30 to 32 ppt (Cargnelli et al. 1999d; Jacobson 2005).

No longfin inshore squid larva EFH is designated in the Offshore Project Area.

Longfin inshore squid juvenile EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-18; Figure E-1-18). Juveniles and subadults (pre-recruits) are found in pelagic marine habitats in coastal inshore waters in spring through fall and offshore continental shelf waters in winter (Cargnelli et al. 1999d; Jacobson 2005). Juveniles exhibit diel migrations from the surface at night to greater depths during the day (Cargnelli et al. 1999d; Jacobson 2005). Their prey varies with size; small juveniles consume euphausiids and arrow worms, while larger juveniles consume small crabs, polychaetes, and shrimp (Jacobson 2005). Designated EFH for longfin inshore squid juveniles and subadults is the upper 33 ft (10 m) of pelagic habitat over depths of 164 to 328 ft (50 to 100 m), where temperatures span 50 to 79°F (10 to 26°C) and salinities are within 28 to 37 ppt (Cargnelli et al. 1999d; Jacobson 2005; MAFMC 2011).

Table E-1-18. Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	0	6,691	1,646
Juvenile	109,616	5,478	0
Adult	109,616	5,478	0
Percent of Project Area Covered by EFH by Life Stage			
Egg	0%	47.0%	99.6%
Juvenile	97.2%	38.5%	0.0%
Adult	97.2%	38.5%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.000%	0.052%	0.013%
Juvenile	0.338%	0.019%	0.000%
Adult	0.339%	0.017%	0.000%

Sources: Cargnelli et al. 1999d; Jacobson 2005; MAFMC 2011

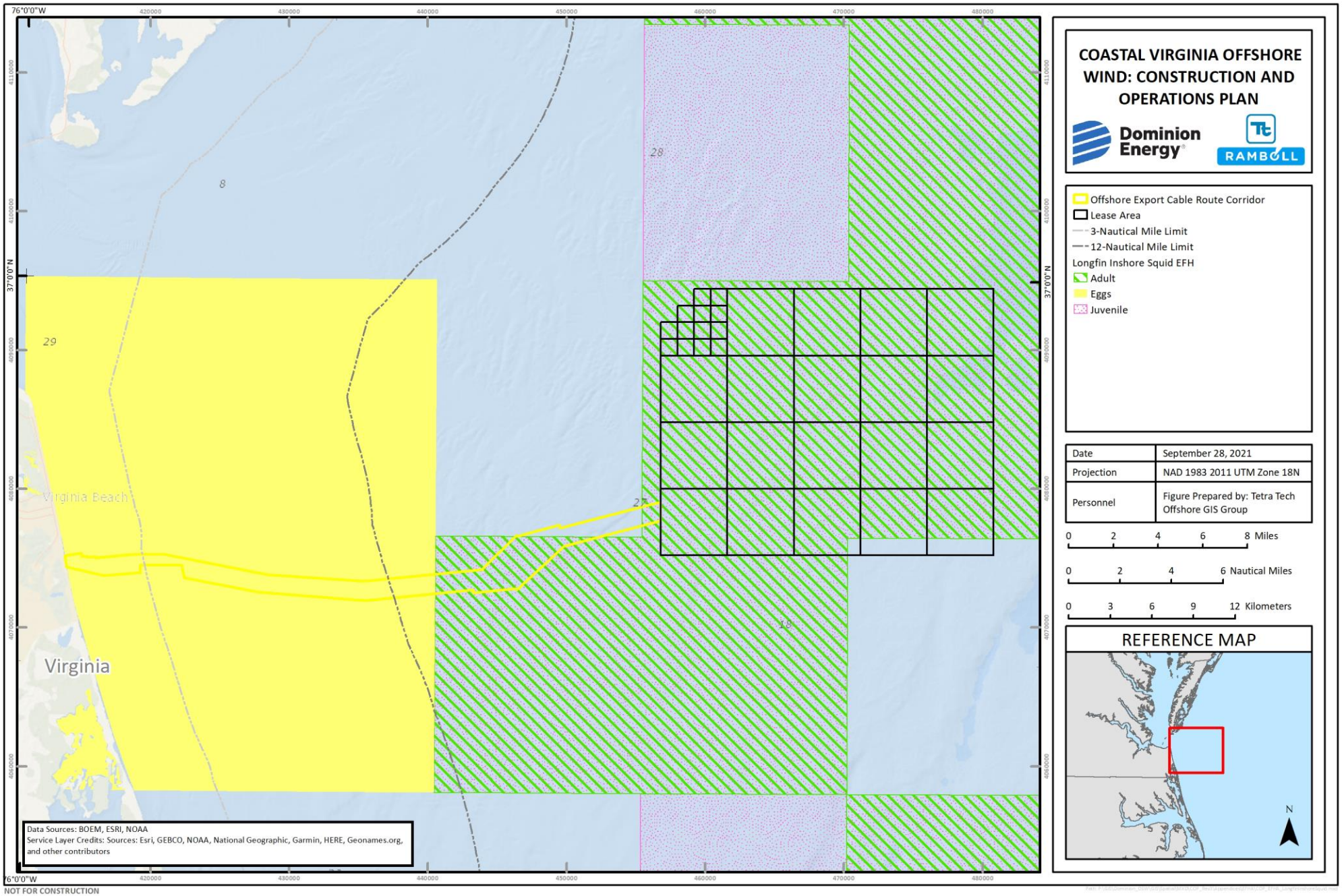


Figure E-1-18. Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*) Designated EFH in the Offshore Project Area

Longfin inshore squid adult EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-18; Figure E-1-18). Adults (recruits) are found in pelagic marine habitats in inshore and offshore continental shelf waters and in the high salinity zones of regional embayments (MAFMC 2011). They migrate offshore in the fall and overwinter in warmer waters along the edge of the shelf; they exhibit diel vertical migrations from the surface at night to greater depths during the day (MAFMC 2011). Prey varies with individual size; small adults consume larval and juvenile fish and squid, while larger adults consume adult fish (e.g., hakes, mackerel, herring, anchovies, menhaden, weakfish) and squid (Jacobson 2005). Designated EFH for longfin inshore squid adults is in surface waters to depths of 591 ft (180 m) during spring and summer and depths of 1,312 ft (400 m) during fall and winter, where temperatures span 46 to 61°F (8 to 16°C) and salinities are within 24 to 37 ppt (Cargnelli et al. 1999d; Jacobson 2005; MAFMC 2011).

The longfin inshore squid is managed under the MAFMC Atlantic Mackerel, Squid, and Butterfish FMP as a single stock: the Georges Bank/Cape Hatteras stock. The fishery stock is not currently subject to overfishing, but the stock status remains unknown (NOAA Fisheries 2019).

E-1.2.18 Scup (*Stenotomus chrysops*)

No scup egg or larva EFH is designated in the Offshore Project Area.

Scup juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-19; Figure E-1-19). In the Mid-Atlantic Bight, scup juveniles are found in intertidal and subtidal benthic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998a). Juveniles exhibit seasonal changes in distribution from inshore waters in summer and nearshore waters in fall to offshore waters in winter and spring (Steimle et al. 1999d). In inshore waters, juveniles associate with a variety of substrates, including mud, sand, mussel, and eelgrass beds; in offshore waters, juveniles are found over a variety of sand substrates (Steimle et al. 1999d). They feed on polychaetes, epibenthic amphipods and other small crustaceans, mollusks, and fish eggs and larvae (Steimle et al. 1999d). Designated EFH for scup juveniles is from the shoreline to depths of 125 ft (38 m), where temperatures span 45 to 81°F (7 to 27°C) and salinities exceed 15 ppt (MAFMC 1998a; Steimle et al. 1999d).

Table E-1-19. Scup (*Stenotomus chrysops*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	14,234	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	100.0%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.353%	0.045%	0.005%
Adult	0.328%	0.041%	0.005%

Sources: MAFMC 1998a; Steimle et al. 1999d

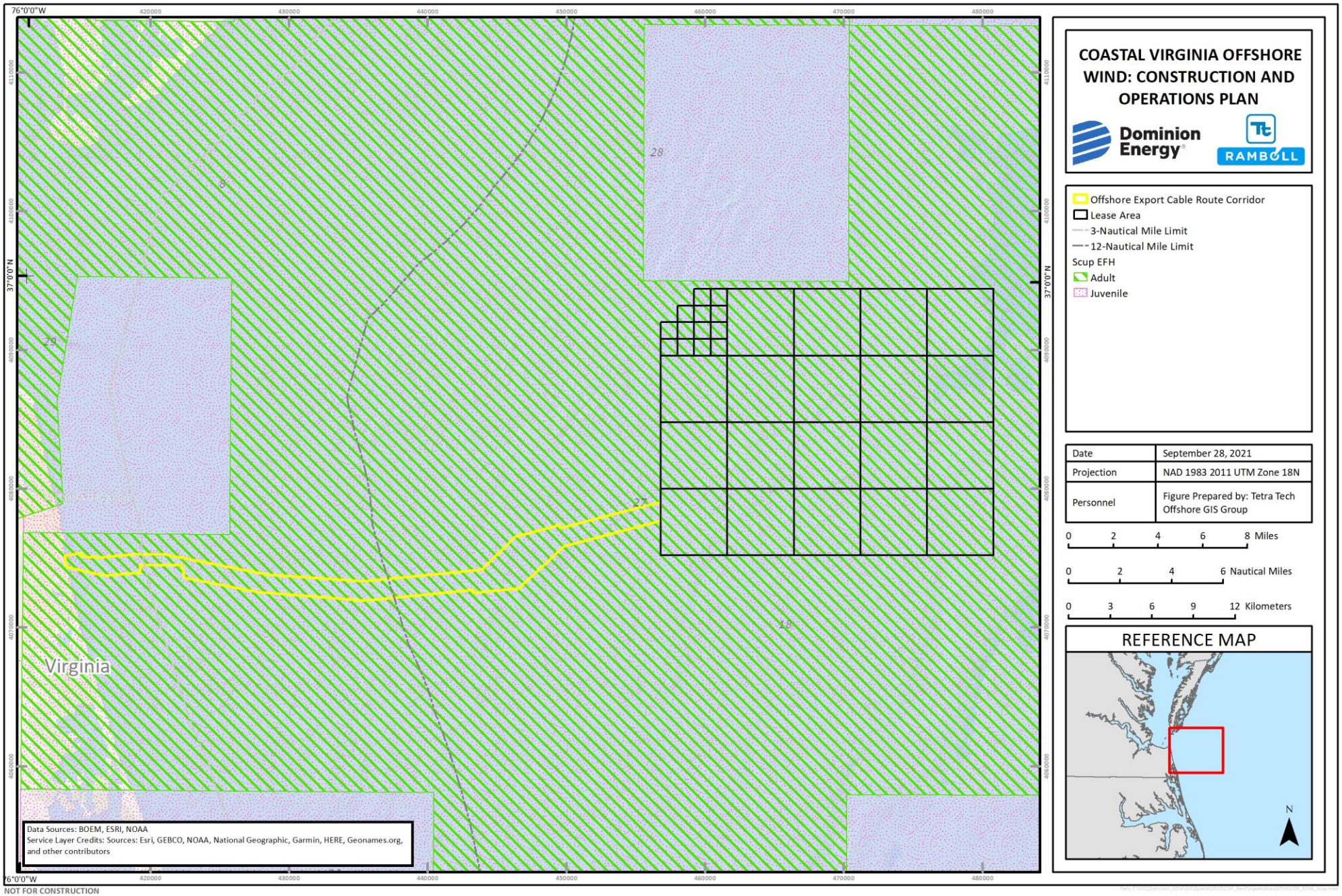


Figure E-1-19. Scup (*Stenotomus chrysops*) Designated EFH in the Offshore Project Area

Scup adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-19; Figure E-1-19).

Scup adults are found in intertidal and subtidal benthic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998a). Adults generally overwinter offshore and move inshore during summer, during which time they associate with a variety of substrates, including fine to silty sand, mud, mussel beds, rocks, and artificial reefs (Steimle et al. 1999d). They feed on polychaetes, mollusks, small squid, detritus, insect larvae, hydroids, sand dollars, and small fish (Steimle et al. 1999d). Designated EFH for scup adults is in depths of 7 to 125 ft (2 to 38 m) during summer and 125 to 607 ft (38 to 185 m) during winter, where temperatures span 45 to 77°F (7 to 25°C) and salinities are within 20 to 31 ppt (Steimle et al. 1999d).

The scup is managed under the MAFMC Summer Flounder, Scup, and Black Sea Bass FMP as a single stock: the Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.19 Spiny Dogfish (*Squalus acanthias*)

No spiny dogfish neonate, juvenile, or sub-adult male EFH is designated in the Offshore Project Area.

Spiny dogfish sub-adult female EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-20; Figure E-1-20). In the Mid-Atlantic Bight, sub-adult females are often more widely distributed than sub-adult males and are found in epibenthic and pelagic marine habitats, primarily on the outer continental shelf (MAFMC 2014). They feed on a variety of fish, squid, and ctenophores (Stehlik 2007). Designated EFH for spiny dogfish sub-adult females is over a wide depth range in temperatures spanning 45 to 59°F (7 to 15°C) and salinities within 32 to 35 ppt (MAFMC 2014).

Table E-1-20. Spiny Dogfish (*Squalus acanthias*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Sub-Adult Female	112,799	14,234	1,652
Adult Female	112,799	12,575	0
Adult Male	58,805	7,155	1,652
Percent of Project Area Covered by EFH by Life Stage			
Sub-Adult Female	100.0%	100.0%	100.0%
Adult Female	100.0%	88.3%	0.0%
Adult Male	52.1%	50.3%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Sub-Adult Female	0.271%	0.034%	0.004%
Adult Female	0.321%	0.036%	0.000%
Adult Male	0.161%	0.020%	0.005%

Sources: McMillan and Morse 1999; Stehlik 2007; MAFMC 2014

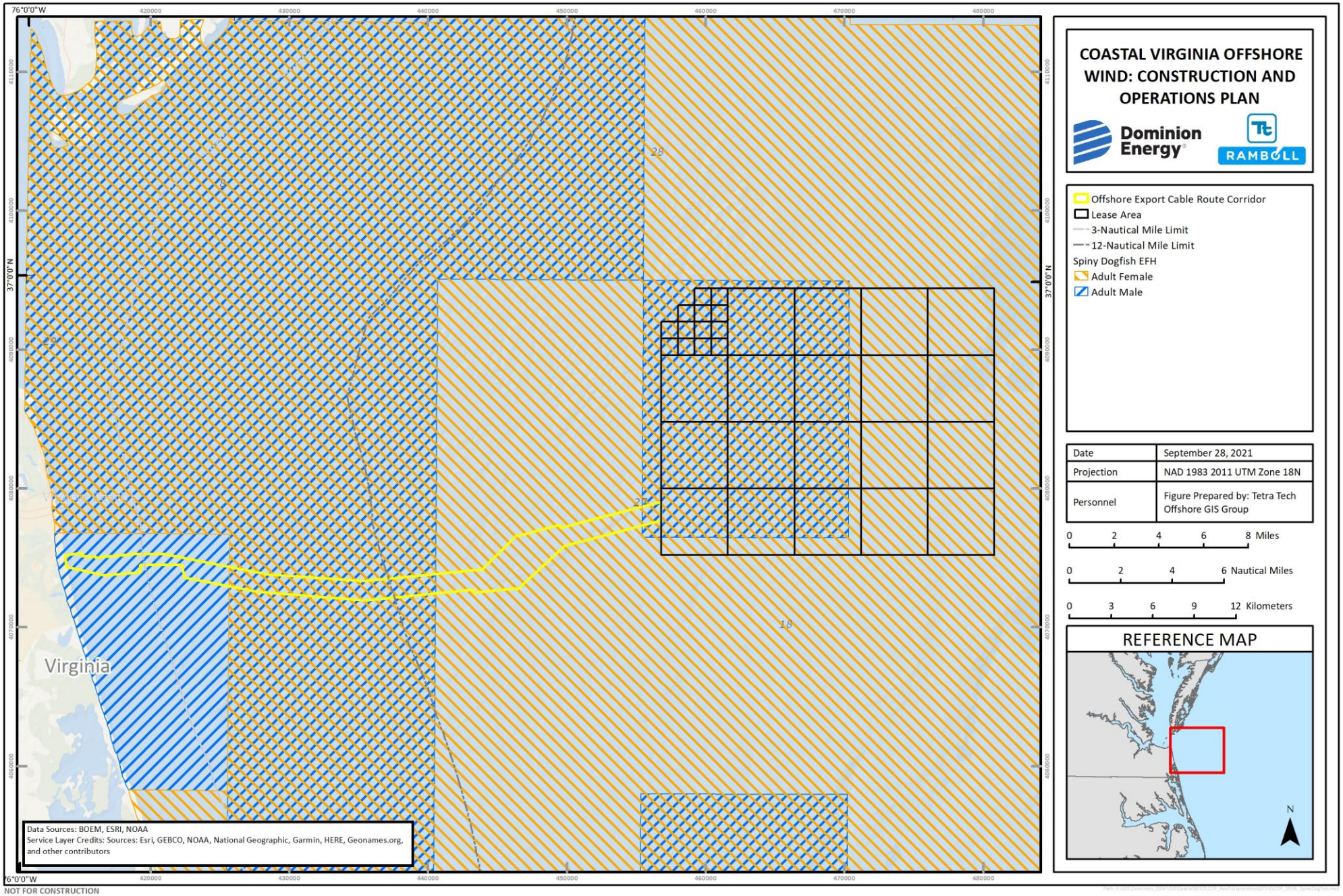


Figure E-1-20. Spiny Dogfish (*Squalus acanthias*) Designated EFH in the Offshore Project Area

Spiny dogfish adult male and female EFH is designated in the Lease Area and federal of the Offshore Export Cable Route Corridor; adult male EFH is also designated in state waters of the Offshore Export Cable Route Corridor (Table E-1-20; Figure E-1-20). Spiny dogfish adults are found in epibenthic and pelagic marine habitats (MAFMC 2014). They are widely distributed in winter and spring, but few remain in the Mid-Atlantic Bight in summer and fall when temperatures exceed 59°F (15°C) (MAFMC 2014). They consume the same prey as sub-adults, though the size of their prey increases as they age (Stehlik 2007). Designated EFH for spiny dogfish adults is in depths of 82 to 1,194 ft (25 to 364 m), where temperatures span 45 to 59°F (7 to 15°C) and salinities are within 30 to 35 ppt (McMillan and Morse 1999; Stehlik 2007; MAFMC 2014).

The spiny dogfish is co-managed by the NEFMC and MAFMC under the Spiny Dogfish FMP as a single stock: the Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.20 Summer Flounder (*Paralichthys dentatus*)

Summer flounder EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-21; Figure E-1-21). In the Mid-Atlantic Bight, summer flounder eggs are found in pelagic marine habitats over the continental shelf (MAFMC 1998a). Designated EFH for summer flounder eggs is in depths of 30 to 360 ft (9 to 110 m), where temperatures span 48 to 73°F (9 to 23°C) and salinities are within 22 to 33 ppt (Packer et al. 1999b).

Summer flounder larva EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-21; Figure E-1-21). Summer flounder larvae are found in pelagic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries; they primarily feed on copepods (MAFMC 1998a; Packer et al. 1999b). Larvae are most abundant nearshore and exhibit a seasonal shift from the northern Mid-Atlantic Bight from September through February to the southern Mid-Atlantic Bight from November to May (MAFMC 1998a). Designated EFH for summer flounder larvae is in depths of 30 to 230 ft (9 to 70 m), where temperatures span 32 to 73°F (0 to 23°C) and salinities are within 10 to 30 ppt (Packer et al. 1999b).

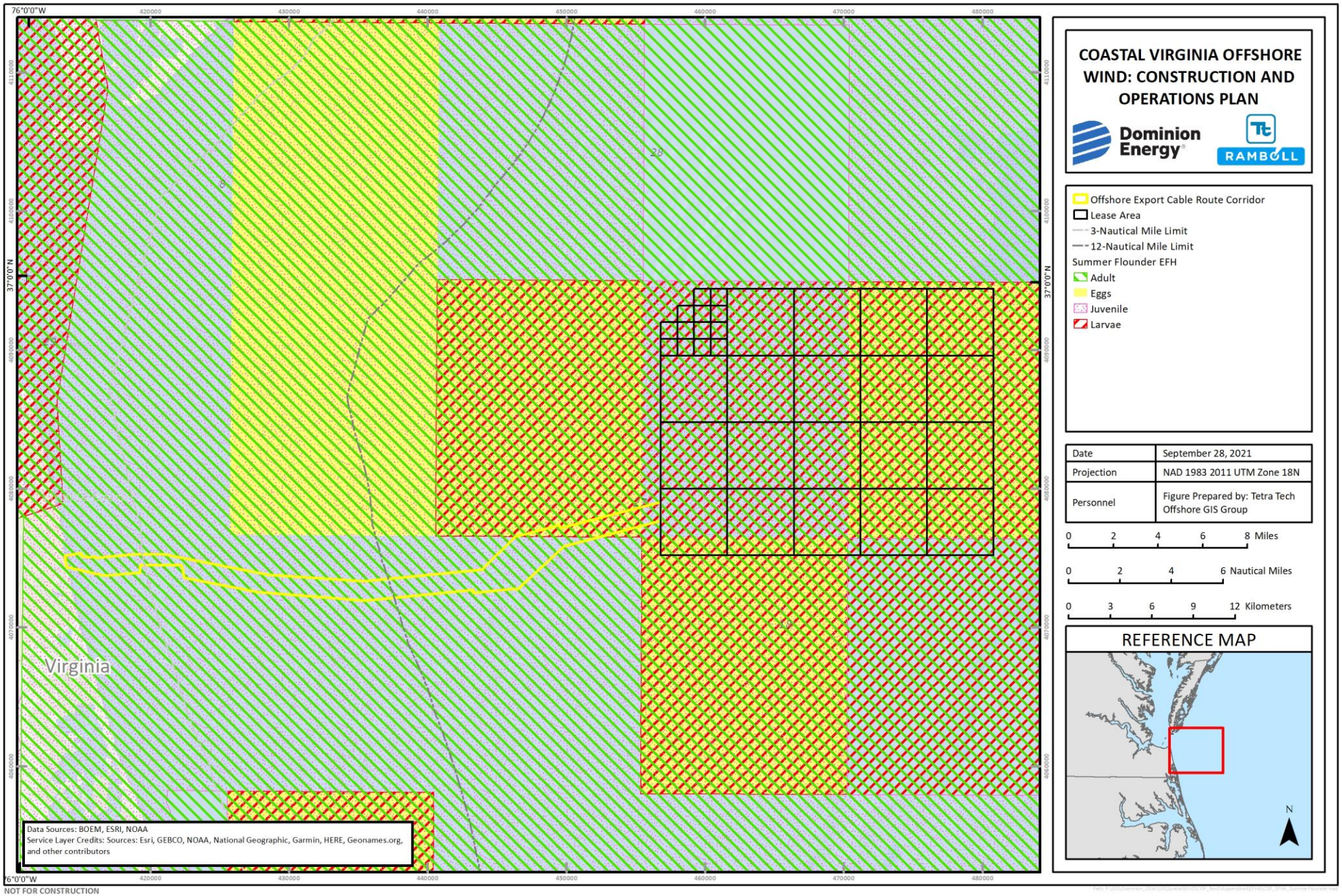


Figure E-1-21. Summer Flounder (*Paralichthys dentatus*) Designated EFH in the Offshore Project Area

Table E-1-21. Summer Flounder (*Paralichthys dentatus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Egg	50,823	2,068	0
Larva	112,799	2,530	0
Juvenile	109,621	14,234	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Egg	45.1%	14.5%	0.0%
Larva	100.0%	17.8%	0.0%
Juvenile	97.2%	100.0%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Egg	0.598%	0.024%	0.000%
Larva	0.244%	0.005%	0.000%
Juvenile	0.193%	0.025%	0.003%
Adult	0.156%	0.020%	0.002%

Sources: MAFMC 1998a; Packer et al. 1999b

Summer flounder juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-21; Figure E-1-21). Summer flounder juveniles are found in benthic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998a). Juveniles generally use estuaries as nursery habitat, including salt marsh creeks, seagrass beds, mudflats, and sands of open bay areas (MAFMC 1998a). They are opportunistic feeders that consume polychaetes, infaunal invertebrates, bivalve siphons, and small fish (Packer et al. 1999b). Designated EFH for summer flounder juveniles is benthic habitat from the shoreline to depths of 500 ft (152 m), where temperatures span 37 to 81°F (3 to 27°C) and salinities are within 18 to 35 ppt (Packer et al. 1999b).

Summer flounder adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-21; Figure E-1-21). Summer flounder adults are found in benthic marine habitats over the continental shelf and in the mixed and high salinity zones of regional estuaries (MAFMC 1998a). Adults generally inhabit shallow coastal and estuarine waters during warmer months and move offshore to outer continental shelf substrates in colder months (MAFMC 1998a). Like juveniles, they are opportunistic feeders that consume a variety of fish (e.g., flounders, anchovies, hakes, scup, bluefish, weakfish) and invertebrates (e.g., crabs, squids, shrimps, bivalves, gastropods, worms, sand dollars) (Packer et al. 1999b). Designated EFH for summer flounder adults is benthic habitat from the shoreline to 500 ft (152 m), where temperatures span 36 to 81°F (2 to 27°C) (Packer et al. 1999b).

The summer flounder is managed under the MAFMC Summer Flounder, Scup, and Black Sea Bass FMP as a single stock: the Mid-Atlantic Coast stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

E-1.2.21 Albacore Tuna (*Thunnus alalonga*)

No albacore tuna egg, larva, or adult EFH is designated in the Offshore Project Area. Albacore tuna juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-22; Figure E-1-22).

Table E-1-22. Albacore Tuna (*Thunnus alalonga*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.090%	0.011%	0.001%

Sources: NOAA Fisheries 2017

The albacore tuna is a highly migratory, temperate, epipelagic species with a poorly known life history. In the Atlantic Ocean, the species ranges from between 40°N to 40°S (NOAA Fisheries 2017). Individuals aggregate in schools (often containing multiple species of tuna) according to size; schools comprised of the largest individuals complete the longest journeys. The albacore tuna is generally found in surface waters in temperatures ranging from 61 to 66°F (16 to 19°C), but individuals may dive into waters as cold as 48°F (9°C) (NOAA Fisheries 2017). Juveniles (up to five years old) and adults conduct feeding migrations throughout the central Atlantic during winter and northeastern Atlantic during summer and fall (NOAA Fisheries 2017). They forage opportunistically in epipelagic to upper mesopelagic waters and consume medium-sized fish and cephalopods (NOAA Fisheries 2017). Designated EFH for albacore tuna juveniles and adults is offshore, pelagic habitats of the Atlantic Ocean from the outer edge of the United States (U.S.) Exclusive Economic Zone through Georges Bank and south to Cape Hatteras, North Carolina (NOAA Fisheries 2017).

The albacore tuna is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the North Atlantic stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

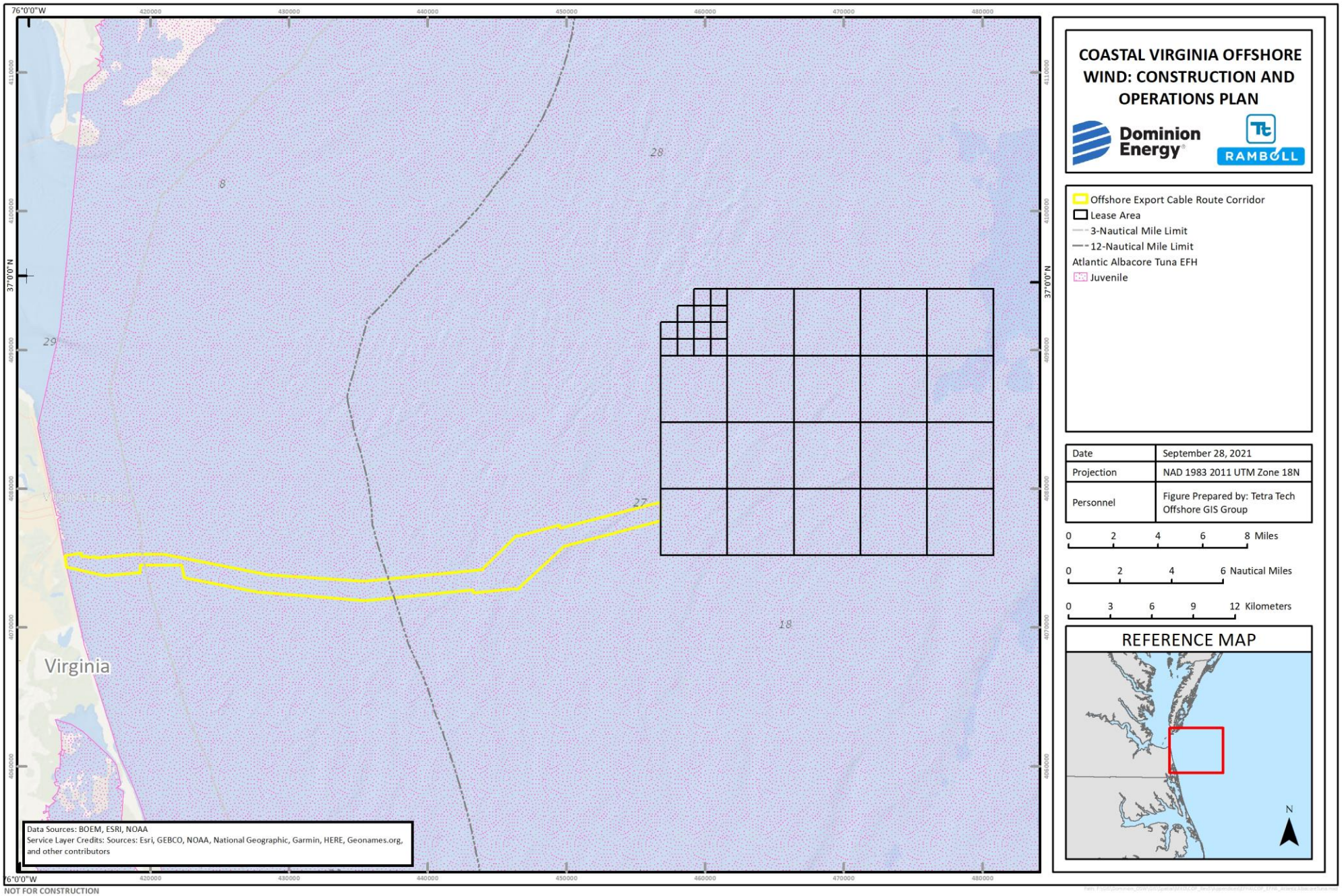


Figure E-1-22. Albacore Tuna (*Thunnus alalonga*) Designated EFH in the Offshore Project Area

E-1.2.22 Atlantic Angel Shark (*Squatina dumeril*)

Atlantic angel shark EFH for all life stages is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-23; Figure E-1-23).

Table E-1-23. Atlantic Angel Shark (*Squatina dumeril*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
ALL	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
ALL	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
ALL	0.239%	0.030%	0.004%

Sources: NOAA Fisheries 2017

The Atlantic angel shark is a highly migratory species found in benthic marine habitats in coastal waters of the U.S. from Massachusetts to the Florida Keys, Gulf of Mexico, and Caribbean (NOAA Fisheries 2017). They conduct seasonal migrations from shallow to deep waters and consume teleost fishes, cephalopods, crustaceans, and portunid crabs (NOAA Fisheries 2017). Designated EFH for all life stages of the Atlantic angel shark in the Atlantic Ocean includes benthic habitats on the continental shelf from Cape May, New Jersey to Cape Lookout, North Carolina (NOAA Fisheries 2017).

The Atlantic angel shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP. Fishing for the Atlantic angel shark is prohibited in U.S. waters (NOAA Fisheries 2017).

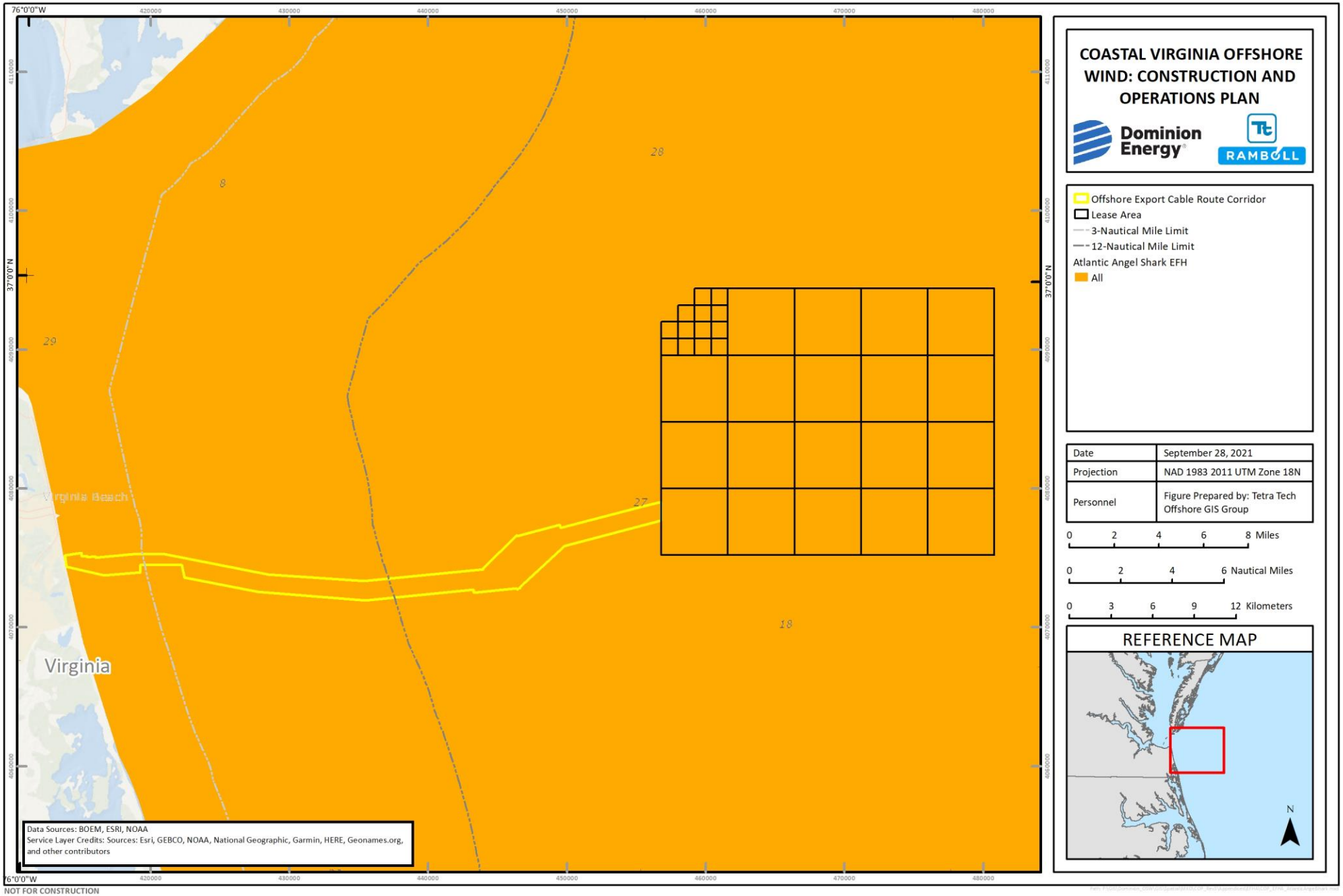


Figure E-1-23. Atlantic Angel Shark (*Squatina dumeril*) Designated EFH in the Offshore Project Area

E-1.2.23 Atlantic Bluefin Tuna (*Thunnus thynnus*)

No Atlantic bluefin tuna egg or larva EFH is designated in the Offshore Project Area. Atlantic bluefin tuna juvenile and adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-24; Figure E-1-24).

Table E-1-24. Atlantic Bluefin Tuna (*Thunnus thynnus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	14,234	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	100.0%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.318%	0.040%	0.005%
Adult	0.058%	0.007%	0.001%

Sources: NOAA Fisheries 2017

The Atlantic bluefin tuna is a highly migratory species that historically ranged from the equator to 45°N in the Western Atlantic Ocean; warming sea temperatures have allowed a range expansion as far north as 60°N (NOAA Fisheries 2017). The species spawns from April to June in the Gulf of Mexico, Bahamas, and Florida Straits; there is also evidence of spawning behavior and larval presence in the Slope Sea of the Mid-Atlantic Bight. Larvae are typically found at depths of 6,000 ft (1,829 m) and within narrow temperature and salinity ranges of approximately 79°F (26°C) and 36 ppt, respectively (NOAA Fisheries 2017). YOY begin migrations in June to juvenile habitats over the continental shelf near 34°N and 41°W and shift with age to nursery areas between Cape Hatteras, North Carolina, and Cape Cod, Massachusetts. Individuals conduct seasonal migrations in pursuit of forage species off the eastern U.S. and Canadian coasts from June through March (NOAA Fisheries 2017). Though the species is generally epipelagic in the open ocean, some individuals migrate inshore during the summer in pursuit of prey (e.g., herring, mackerel, and squid). Juveniles feed primarily on zooplanktivorous fishes and crustaceans, while adults opportunistically prey on schooling fish, cephalopods, and benthic invertebrates (NOAA Fisheries 2017). Designated EFH for juveniles is in coastal and pelagic habitats from shore to the continental shelf break, where depths span 66 to 328 ft (20 to 100 m) and temperatures range from 39 to 79°F (4 to 26°C). Designated EFH for adults in the Mid-Atlantic Bight is in coastal and offshore pelagic habitat from southern New England to Onslow Bay, North Carolina (NOAA Fisheries 2017).

The Atlantic bluefin tuna is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Western Atlantic stock. The fishery stock is not currently subject to overfishing, but the stock status remains unknown (NOAA Fisheries 2019).

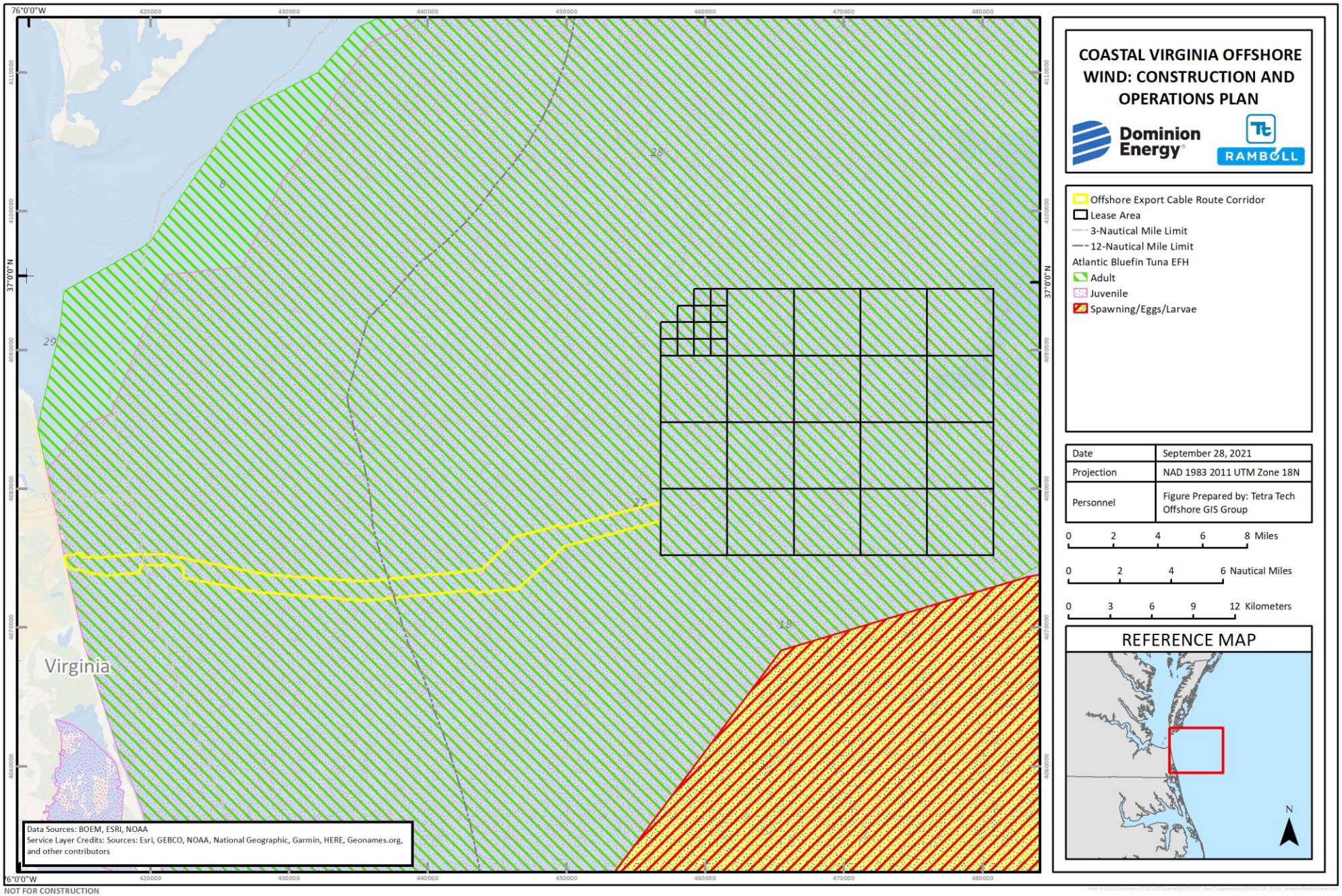


Figure E-1-24. Atlantic Bluefin Tuna (*Thunnus thynnus*) Designated EFH in the Offshore Project Area

E-1.2.24 Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*)

No Atlantic sharpnose shark neonate EFH is designated in the Offshore Project Area. Atlantic sharpnose shark juvenile and adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-25; Figure E-1-25).

Table E-1-25. Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	0	3,648	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	0.0%	25.6%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.000%	0.013%	0.006%
Adult	0.351%	0.044%	0.005%

Sources: NOAA Fisheries 2017

The Atlantic sharpnose shark is an abundant summer migrant off coastal Virginia and the Chesapeake Bay. Designated EFH for neonates and YOY is in estuarine, inshore, and nearshore nursery habitats from the shoreline to maximum depths of 43 ft (13 m), where temperatures span 64 to 89°F (18 to 31°C) and salinities are within 21 to 37 ppt (NOAA Fisheries 2017). Designated EFH for juveniles is in estuarine, inshore, and nearshore waters with an offshore depth extent of 591 ft (180 m), where temperatures span 63 to 91°F (17 to 33°C) and salinities are within 21 to 37 ppt. Juveniles and adults primarily feed on teleost fishes (NOAA Fisheries 2017). Designated EFH for adults is in inshore and nearshore waters with an offshore depth extent of 591 ft (180 m). Both juveniles and adults exhibit seasonal summer distributions in the northern portion of the species' Atlantic stock range (NOAA Fisheries 2017).

The Atlantic sharpnose shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as two separate stocks: the Atlantic stock and the Gulf of Mexico stock. Neither stock is currently overfished or subject to overfishing (NOAA Fisheries 2019).

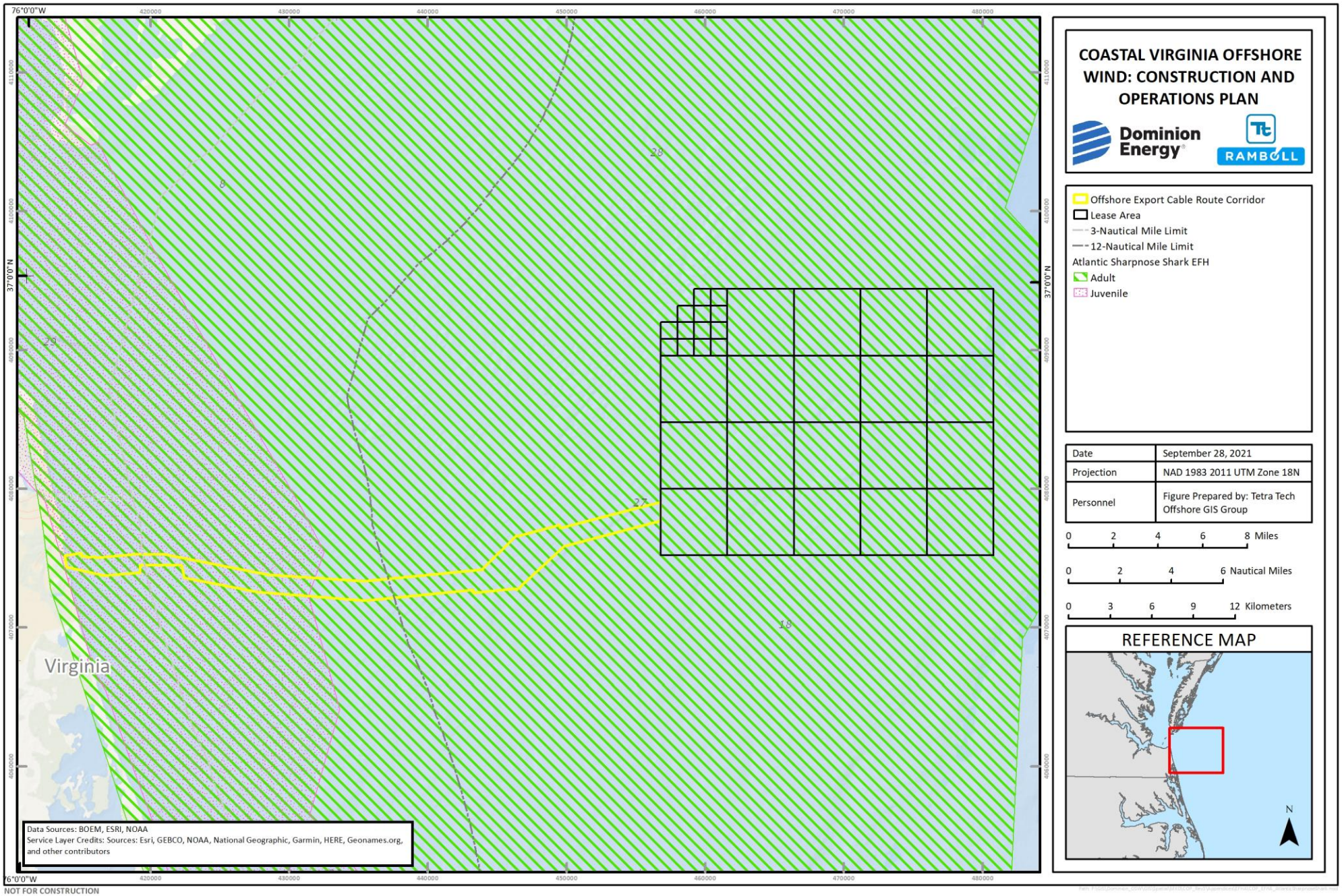


Figure E-1-25. Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*) Designated EFH in the Offshore Project Area

E-1.2.25 Atlantic Skipjack Tuna (*Katsuwonus pelamis*)

No Atlantic skipjack tuna egg or larva EFH is designated in the Offshore Project Area. Atlantic skipjack tuna juvenile EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-26; Figure E-1-26). Atlantic skipjack tuna adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-26; Figure E-1-26).

Table E-1-26. Atlantic Skipjack Tuna (*Katsuwonus pelamis*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	3,119	0
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	21,9%	0.0%
Adult	100.0%	100.0%	99.647%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.056%	0.002%	0.000%
Adult	0.071%	0.009%	0.001%

Sources: NOAA Fisheries 2017

The Atlantic skipjack tuna is a highly migratory, epipelagic species present in tropical and warm-temperate waters from Newfoundland to Brazil (NOAA Fisheries 2017). While the species resides in surface waters, individuals may dive to depths of 853 ft (260 m) during the day. Schools of Atlantic skipjack tuna are associated with convergences, hydrographic discontinuities, birds, drifting objects, whales, sharks, and other tuna species. Both juveniles and adults opportunistically feed on fishes, cephalopods, and crustaceans; their prey often include *Sargassum*-associated species (NOAA Fisheries 2017). Designated EFH for juveniles is in coastal pelagic habitats from Massachusetts to South Carolina and in offshore pelagic habitats seaward of the continental shelf break in depths greater than 66 ft (20 m). Designated EFH for adults is in coastal and offshore pelagic habitats from Massachusetts to Cape Lookout, North Carolina. The optimal temperature range for the species is 68 to 88°F (20 to 13°C) (NOAA Fisheries 2017).

The Atlantic skipjack tuna is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Western Atlantic stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

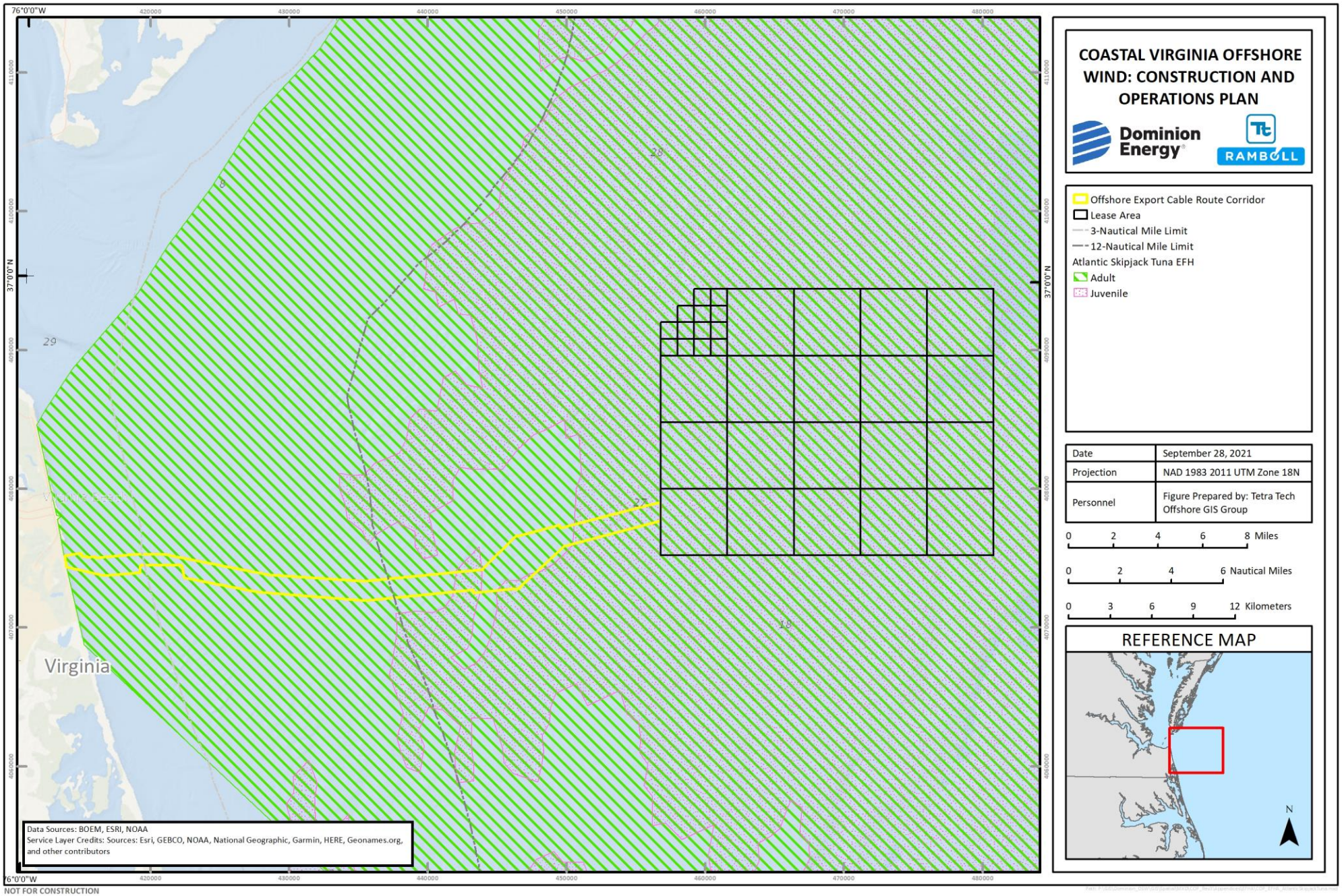


Figure E-1-26. Atlantic Skipjack Tuna (*Katsuwonus pelamis*) Designated EFH in the Offshore Project Area

E-1.2.26 Atlantic Yellowfin Tuna (*Thunnus albacares*)

No Atlantic yellowfin egg or larva EFH is designated in the Offshore Project Area. Atlantic yellowfin tuna juvenile EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-27; Figure E-1-27). Atlantic yellowfin tuna adult EFH is designated in the Lease Area (Table E-1-27; Figure E-1-27).

Table E-1-27. Atlantic Yellowfin Tuna (*Thunnus albacares*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile	112,799	14,234	1,652
Adult	19,690	0	0
Percent of Project Area Covered by EFH by Life Stage			
Juvenile	100.0%	100.0%	100.0%
Adult	17.5%	0.0%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile	0.062%	0.008%	0.001%
Adult	0.015%	0.000%	0.000%

Sources: NOAA Fisheries 2017

The Atlantic yellowfin tuna is a highly migratory, epipelagic species found in tropical and temperate waters between 45°N and 40°S (NOAA Fisheries 2017). Juveniles aggregate at the surface in mixed schools of skipjack and bigeye tuna, while larger adults extend their ranges into deeper waters and higher latitudes; vertical distribution has been associated with thermocline depth. Both juveniles and adults opportunistically feed on fishes, cephalopods, and crustaceans; their prey often include *Sargassum*-associated species (NOAA Fisheries 2017). Designated EFH for juveniles is in coastal and offshore pelagic habitats between Cape Cod, Massachusetts, and Florida and seaward of the continental shelf break. Designated EFH for adults is in coastal and offshore pelagic habitats from Cape Cod to North Carolina and seaward of the continental shelf break; adults are generally confined to the upper 328 ft (100 m) of the water column (NOAA Fisheries 2017).

The Atlantic yellowfin tuna is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Atlantic stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2019).

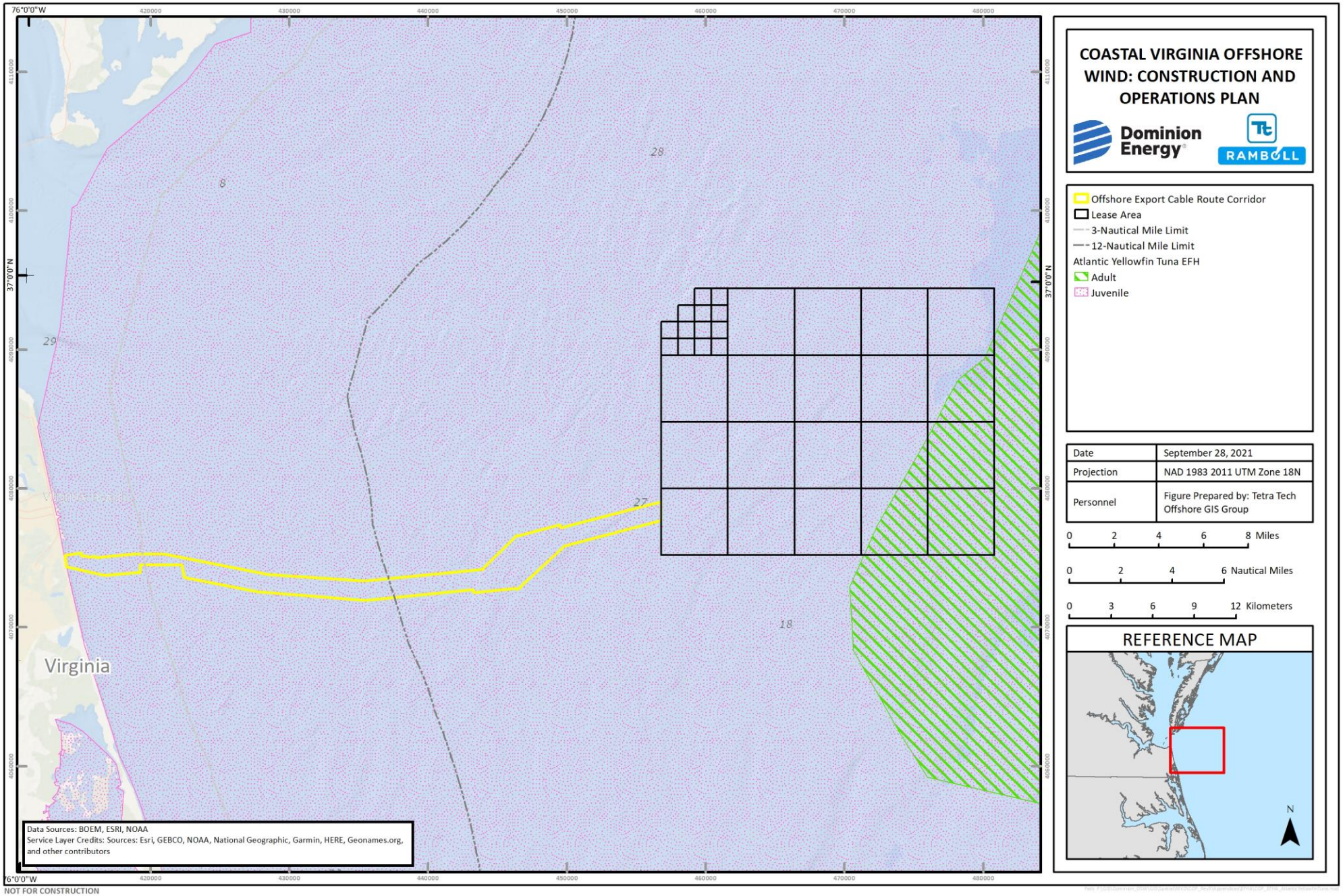


Figure E-1-27. Atlantic Yellowfin Tuna (*Thunnus albacares*) Designated EFH in the Offshore Project Area

E-1.2.27 Blacktip Shark (*Carcharhinus limbatus*)

No blacktip shark neonate EFH is designated in the Offshore Project Area. Blacktip shark juvenile and adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-28; Figure E-1-28).

Table E-1-28. Blacktip Shark (*Carcharhinus limbatus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**13,800**	**1,832**
EFH Acreage in Project Area by Life Stage			
Juvenile/Adult	83,974	14,234	1,647
Percent of Project Area Covered by EFH by Life Stage			
Juvenile/Adult	74.4%	100.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile/Adult	0.514%	0.087%	0.010%

Sources: NOAA Fisheries 2017

The blacktip shark is a highly migratory, circumtropical species present in shallow coastal waters and offshore surface waters of the continental shelf (NOAA Fisheries 2017). The species prefers warmer temperatures, mid to deep waters, and salinities exceeding 30 ppt over silt, sand, mud, and seagrass habitats; juveniles and adults are also found over shell, sand, and rocky habitats. They feed primarily on fishes, cephalopods, and crustaceans (NOAA Fisheries 2017). Designated EFH for juveniles and adults is in estuarine and coastal areas from Virginia to Florida in depths of 3 to 30 ft (1 to 9 m), where temperatures span 66 to 91°F (20 to 32°C) and salinities are within 22 to 35 ppt (though some juveniles have been found in salinities as low as 7 ppt) (NOAA Fisheries 2017).

The blacktip shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as two separate stocks: the Atlantic stock and the Gulf of Mexico stock. The Gulf of Mexico stock is not currently overfished or subject to overfishing; the status of the Atlantic stock remains unknown (NOAA Fisheries 2019).

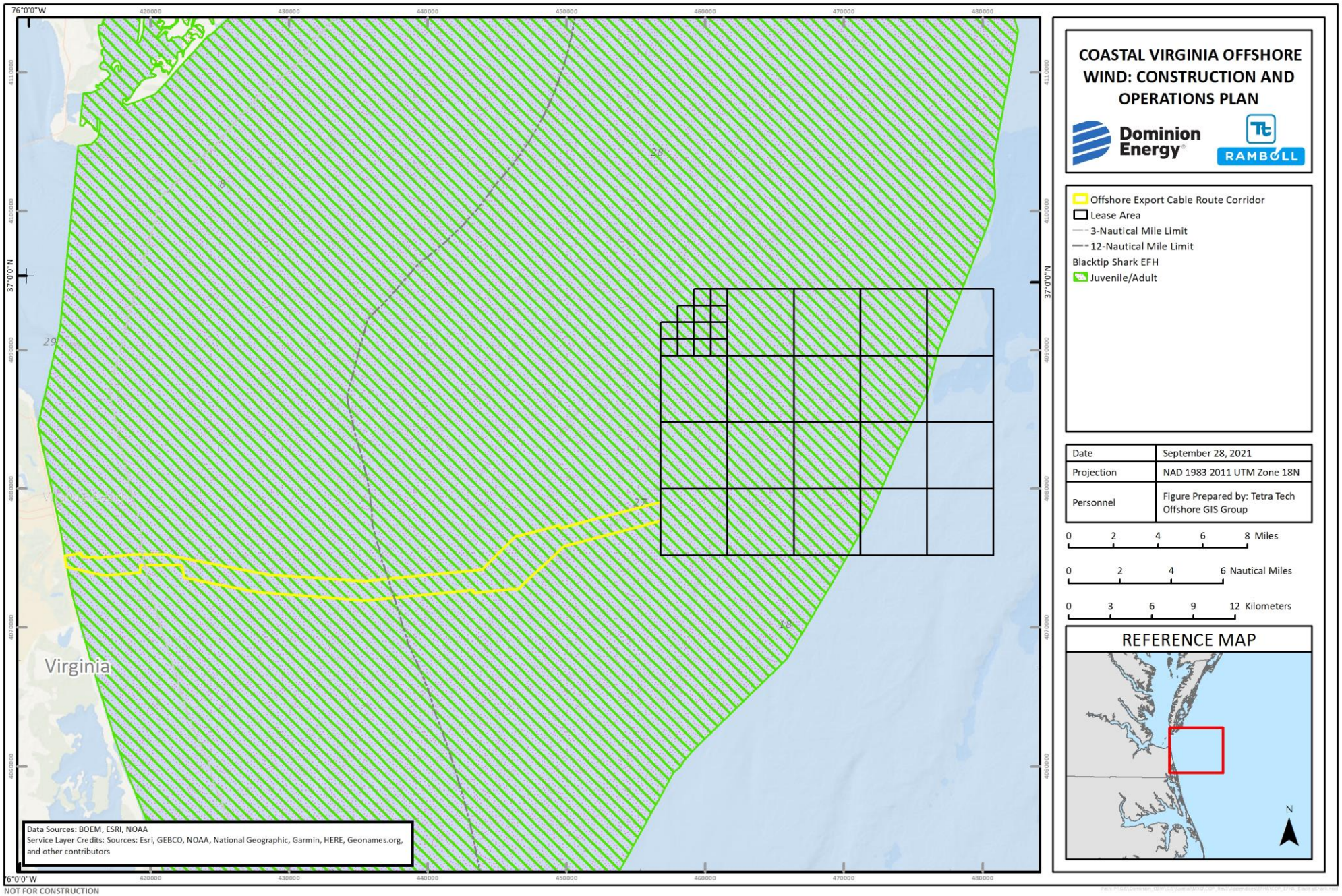


Figure E-1-28. Blacktip Shark (*Carcharhinus limbatus*) Designated EFH in the Offshore Project Area

E-1.2.28 Common Thresher Shark (*Alopias vulpinus*)

Common thresher shark EFH for all life stages is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-29; Figure E-1-29).

Table E-1-29. Common Thresher Shark (*Alopias vulpinus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
ALL	112,799	14,234	1,647
Percent of Project Area Covered by EFH by Life Stage			
ALL	100.0%	100.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
ALL	0.234%	0.030%	0.003%

Sources: NOAA Fisheries 2017

The common thresher shark is a highly migratory species common to warm and temperate coastal and oceanic waters (NOAA Fisheries 2017). It is more abundant in nearshore pelagic habitats and exhibits north-south seasonal migrations, particularly in offshore and cold inshore waters during summer months. The species feeds on invertebrates (e.g., squid and pelagic crabs) and small fishes (e.g., anchovies, sardines, hakes, mackerels) (NOAA Fisheries 2017). Designated EFH for all life stages of the common thresher shark is in the Atlantic Ocean from Georges Bank to Cape Lookout, North Carolina in depths of 16 to 43 ft (5 to 13 m), where temperatures span 64 to 70°F (18 to 21°C) (NOAA Fisheries 2017).

The common thresher shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock. The stock status remains unknown (NOAA Fisheries 2019).

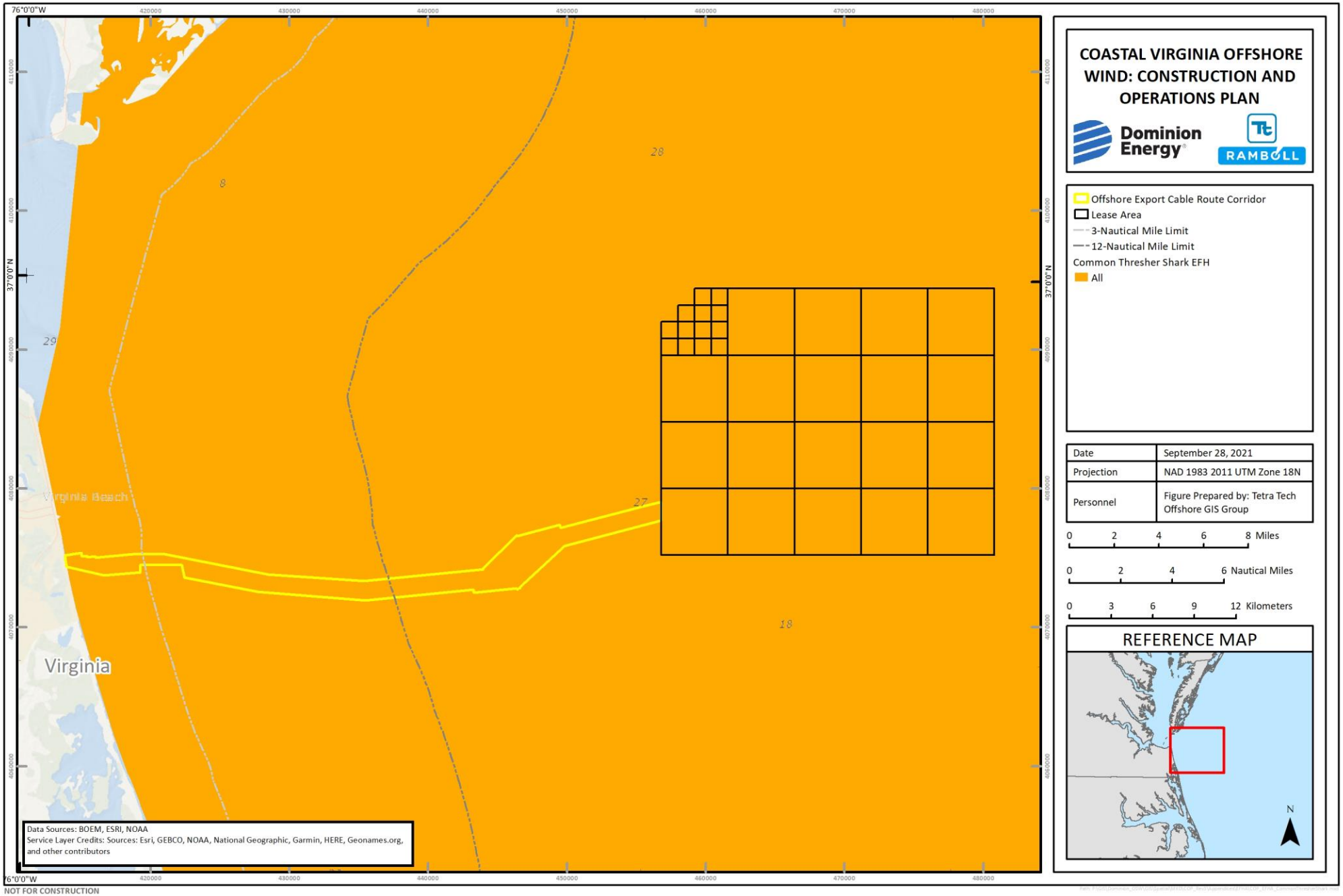


Figure E-1-29. Common Thresher Shark (*Alopias vulpinus*) Designated EFH in the Offshore Project Area

E-1.2.29 Dusky Shark (*Carcharhinus obscurus*)

Dusky shark neonate EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-30; Figure E-1-30). Dusky shark juvenile and adult EFH is designated in the Lease Area and federal waters of the Offshore Export Cable Route Corridor (Table E-1-30; Figure E-1-30).

Table E-1-30. Dusky Shark (*Carcharhinus obscurus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**13,800**	**1,832**
EFH Acreage in Project Area by Life Stage			
Neonate	112,799	14,234	1,644
Juvenile/Adult	112,799	3,119	0
Percent of Project Area Covered by EFH by Life Stage			
Neonate	100.0%	100.0%	99.5%
Juvenile/Adult	100.0%	21.9%	0.0%
Percent of Total Species EFH Area Covered by Project Area			
Neonate	0.604%	0.076%	0.009%
Juvenile/Adult	0.112%	0.003%	0.000%

Sources: NOAA Fisheries 2017

The dusky shark is a highly migratory species found in warm and temperate continental shelf waters from inshore habitats to the outer continental shelf; it makes seasonal north-south migrations (NOAA Fisheries 2017). They are generalist predators and feed on demersal fishes (e.g., flounders, skates), pelagic fishes (e.g., sardines, tunas), and cephalopods (NOAA Fisheries 2017). Designated EFH for dusky shark neonates and YOY is in offshore pelagic habitats of New England to Cape Lookout, North Carolina, in depths of 13 to 197 ft (4 to 60 m), where temperatures span 64 to 72°F (18 to 22°C) and salinities are within 25 to 35 ppt. Designated EFH for juveniles and adults is in coastal and pelagic habitats inshore of the continental shelf break in depths of 66 to 656 ft (20 to 200 m), where temperatures span 68 to 75°F (20 to 24°C). Adults are generally found deeper than juveniles in depths of 6,562 ft (2,000 m) (NOAA Fisheries 2017).

The dusky shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Atlantic and Gulf of Mexico stock. The fishery stock is currently overfished and subject to overfishing (NOAA Fisheries 2019).

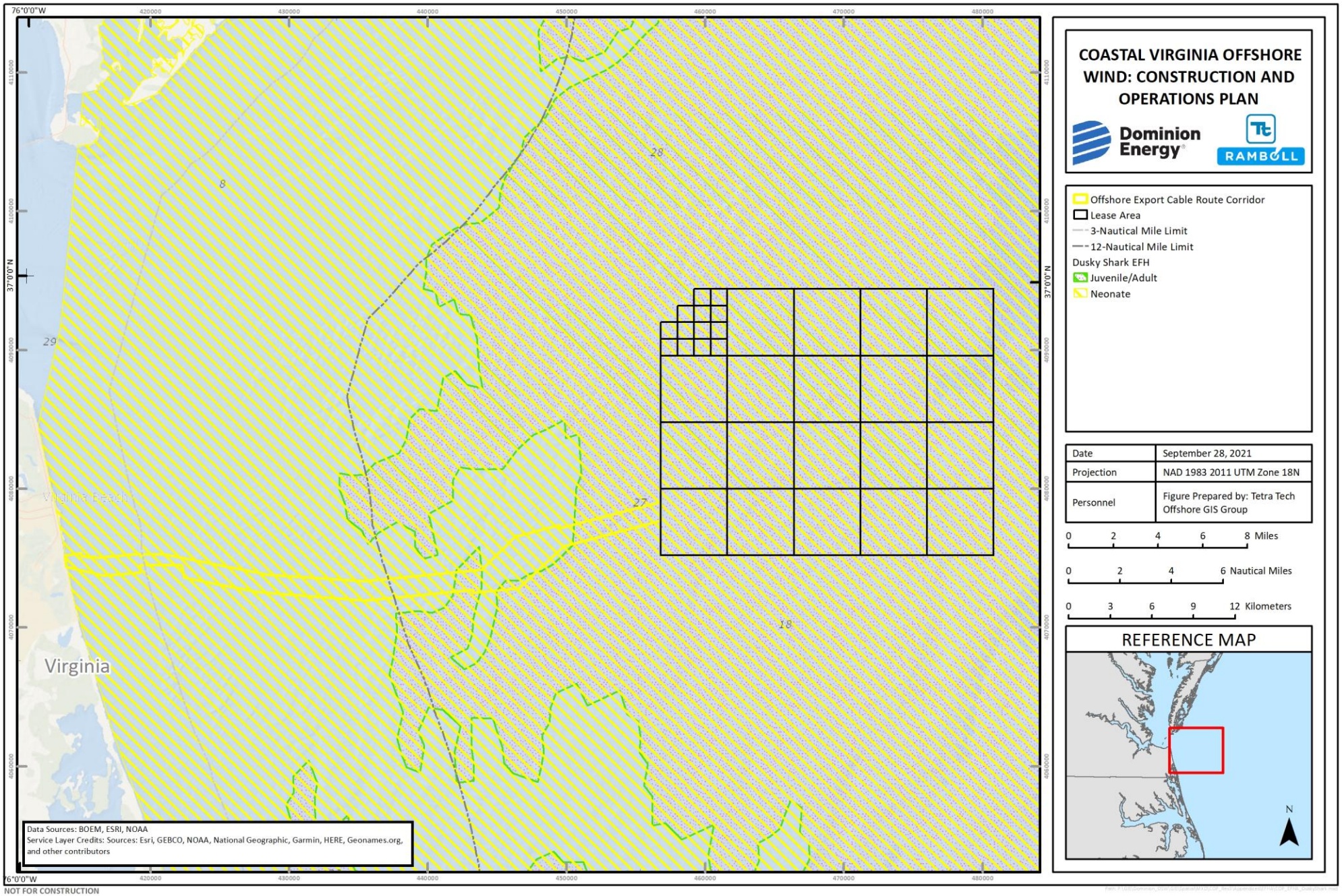


Figure E-1-30. Dusky Shark (*Carcharhinus obscurus*) Designated EFH in the Offshore Project Area

E-1.2.30 Sand Tiger Shark (*Carcharhinus taurus*)

Sand tiger shark EFH for all life stages is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-31; Figure E-1-31).

Table E-1-31. Sand Tiger Shark (*Carcharhinus taurus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Neonate/Juvenile	94,517	14,234	1,652
Adult	112,799	14,234	1,652
Percent of Project Area Covered by EFH by Life Stage			
Neonate/Juvenile	83.8%	100.0%	100.0%
Adult	100.0%	100.0%	100.0%
Percent of Total Species EFH Area Covered by Project Area			
Neonate/Juvenile	0.283%	0.043%	0.005%
Adult	0.395%	0.050%	0.006%

Sources: NOAA Fisheries 2017

The sand tiger shark is a highly migratory species found in tropical and warm temperate coastal waters (NOAA Fisheries 2017). The species exhibits seasonal migrations from northern summer habitats to southern overwintering habitats; individuals may segregate by sex, with males exhibiting stricter north-south migrations and females exhibiting greater inshore-offshore seasonal movements. In North America, adults give birth to two pups in March and April, likely in the southern part of their range. Neonates migrate northward to rear in estuaries and coastal sounds in the Mid-Atlantic Bight. They feed on a variety of fishes (e.g., hakes, herring), crabs, and cephalopods (NOAA Fisheries 2017). Designated EFH for sand tiger shark neonates, YOY, and juveniles extends from Massachusetts to Florida in nearshore habitats and coastal sounds; they exhibit habitat preferences for mud, rocky substrates, and complex natural or artificial reef structures in depths of 26 to 46 ft (8 to 14 m), where temperatures span 66 to 81°F (19 to 27°C) and salinities are within 30 to 31 ppt. Designated EFH for adults is in shallow coastal waters from Florida to Delaware Bay (typically in 13 ft [4 m]) in temperatures spanning 63 to 73°F (17 and 23°C) (NOAA Fisheries 2017).

The sand tiger shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP. Fishing for the sand tiger shark is prohibited in U.S. waters (NOAA Fisheries 2017).

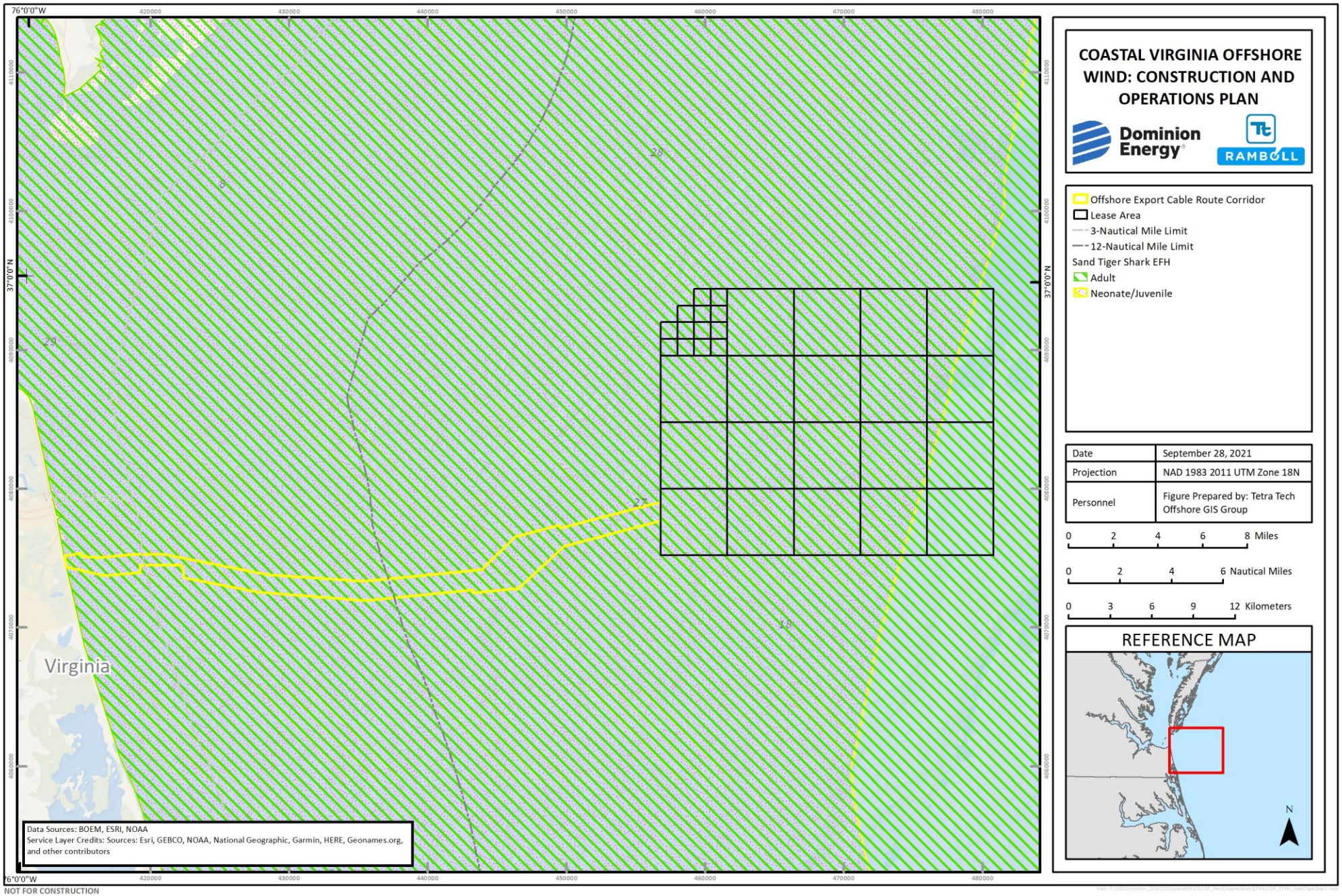


Figure E-1-31. Sand Tiger Shark (*Carcharhinus taurus*) Designated EFH in the Offshore Project Area

E-1.2.31 Sandbar Shark (*Carcharhinus plumbeus*)

Sandbar shark EFH for all life stages is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-32; Figure E-1-32).

Table E-1-32. Sandbar Shark (*Carcharhinus plumbeus*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Neonate	15,789	14,234	1,652
Juvenile	112,799	14,234	1,652
Adult	112,799	14,234	1,647
Percent of Project Area Covered by EFH by Life Stage			
Neonate	14.0%	100.0%	100.0%
Juvenile	100.0%	100.0%	100.0%
Adult	100.0%	100.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
Neonate	0.098%	0.088%	0.010%
Juvenile	0.297%	0.038%	0.004%
Adult	0.096%	0.012%	0.001%

Sources: NOAA Fisheries 2017

The sandbar shark is a highly migratory species common to subtropical and warm temperate benthic habitats (NOAA Fisheries 2017). It is common to coastal areas from Cape Cod to the Gulf of Mexico, migrates seasonally, and segregates itself by sex throughout much of the year. The species feeds opportunistically on a variety of fishes, smaller sharks, cephalopods, gastropods, crabs, and shrimp (NOAA Fisheries 2017). Designated EFH for sandbar shark neonates and YOY is in coastal benthic habitats from Long Island, New York to Cape Lookout, North Carolina, including estuarine nursery habitat in Chesapeake Bay; they exhibit habitat preferences for sand, mud, shell, and rocky substrates in depths of 3 to 75 ft (1 to 23 m), where temperatures span 59 to 86°F (15 to 30°C) and salinities are within 15 to 35 ppt. Designated EFH for juveniles is in coastal habitats from New England to Georgia, including estuarine habitat in Chesapeake Bay; they exhibit habitat preferences for sand, mud, shell, and rocky substrates in depths of 6 to 20 ft (2 to 236 m), where temperatures span 59 to 86°F (15 to 30°C) and salinities are within 15 to 35 ppt. Designated EFH for adults is in coastal habitats from New England to the Florida Keys, spanning estuarine habitats to the continental shelf break in depths of 66 to 656 ft (20 to 200 m) (NOAA Fisheries 2017).

The sandbar shark is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Atlantic and Gulf of Mexico stock. The fishery stock is currently overfished but is not subject to overfishing (NOAA Fisheries 2017).

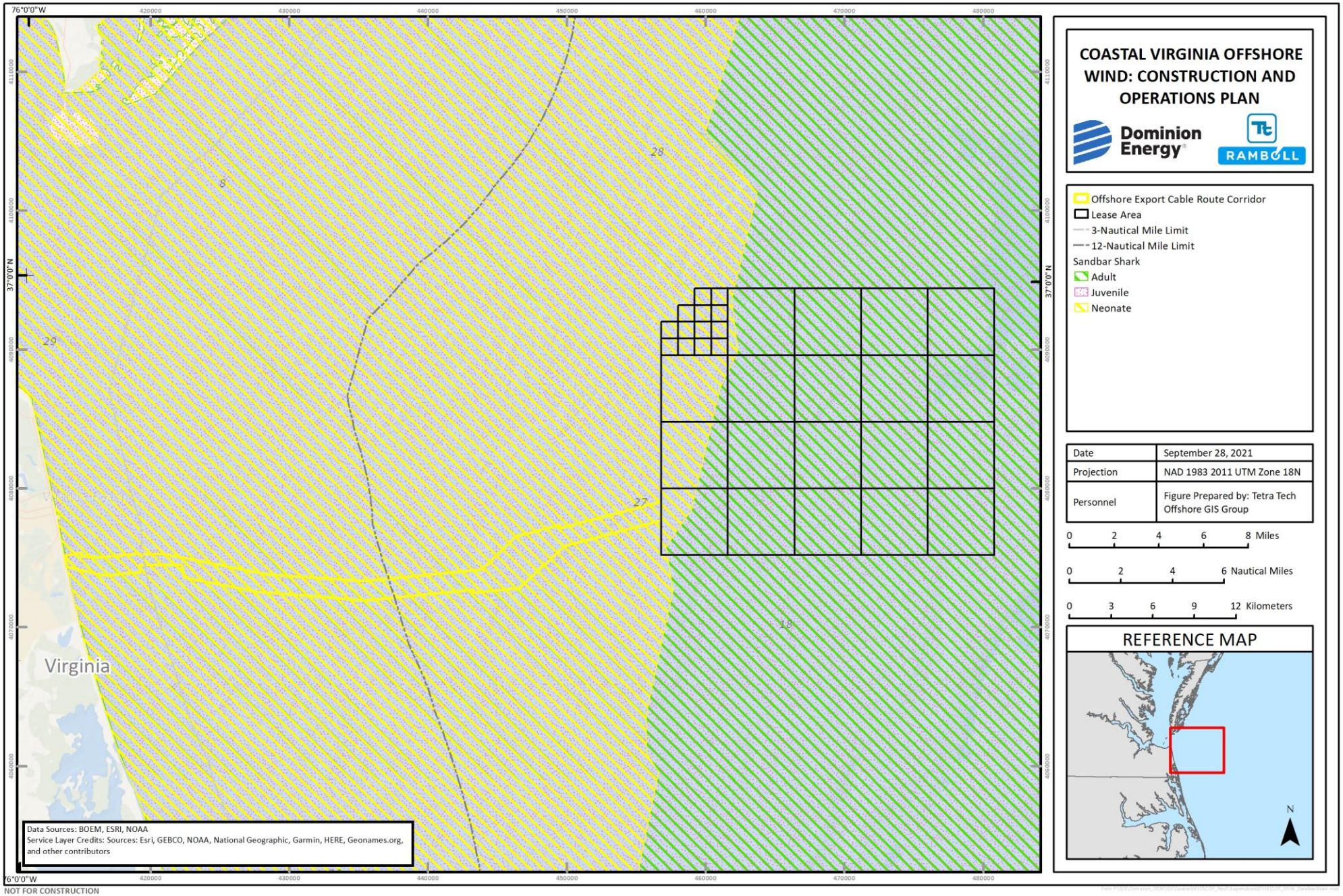


Figure E-1-32. Sandbar Shark (*Carcharhinus plumbeus*) Designated EFH in the Offshore Project Area

E-1.2.32 Smoothhound Shark / Smooth Dogfish (*Mustelus canis*)

Smoothhound shark/smooth dogfish EFH for all life stages is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-33; Figure E-1-33).

Table E-1-33. Smoothhound Shark / Smooth Dogfish (*Mustelus canis*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
ALL	112,799	14,234	1,647
Percent of Project Area Covered by EFH by Life Stage			
ALL	100.0%	100.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
ALL	0.403%	0.051%	0.006%

Sources: NOAA Fisheries 2017

The smooth dogfish is a common coastal shark species found in the Atlantic Ocean from Massachusetts to northern Argentina (NOAA Fisheries 2017). The species is found primarily in benthic habitats on the continental shelf; it aggregates between North Carolina and the Chesapeake Bay in offshore habitats in the winter and moves inshore to coastal habitats in the spring when bottom temperatures exceed 43°F (6°C). Mating occurs from May through September; neonates rear in estuaries and inshore marsh creeks during June and July and YOY migrate to open waters in October. The species primarily feeds on large crustaceans and small fishes (NOAA Fisheries 2017). Designated EFH for all life stages of the smoothhound shark complex/smooth dogfish is in coastal and continental shelf benthic marine habitats and inshore bays and estuaries from the shoreline to depths of 656 ft (200 m), where temperatures span 43 to 81°F (6 to 27°C) (NOAA Fisheries 2017).

The smooth dogfish is managed on the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Atlantic stock. The fishery stock is not currently overfished or subject to overfishing (NOAA Fisheries 2017).

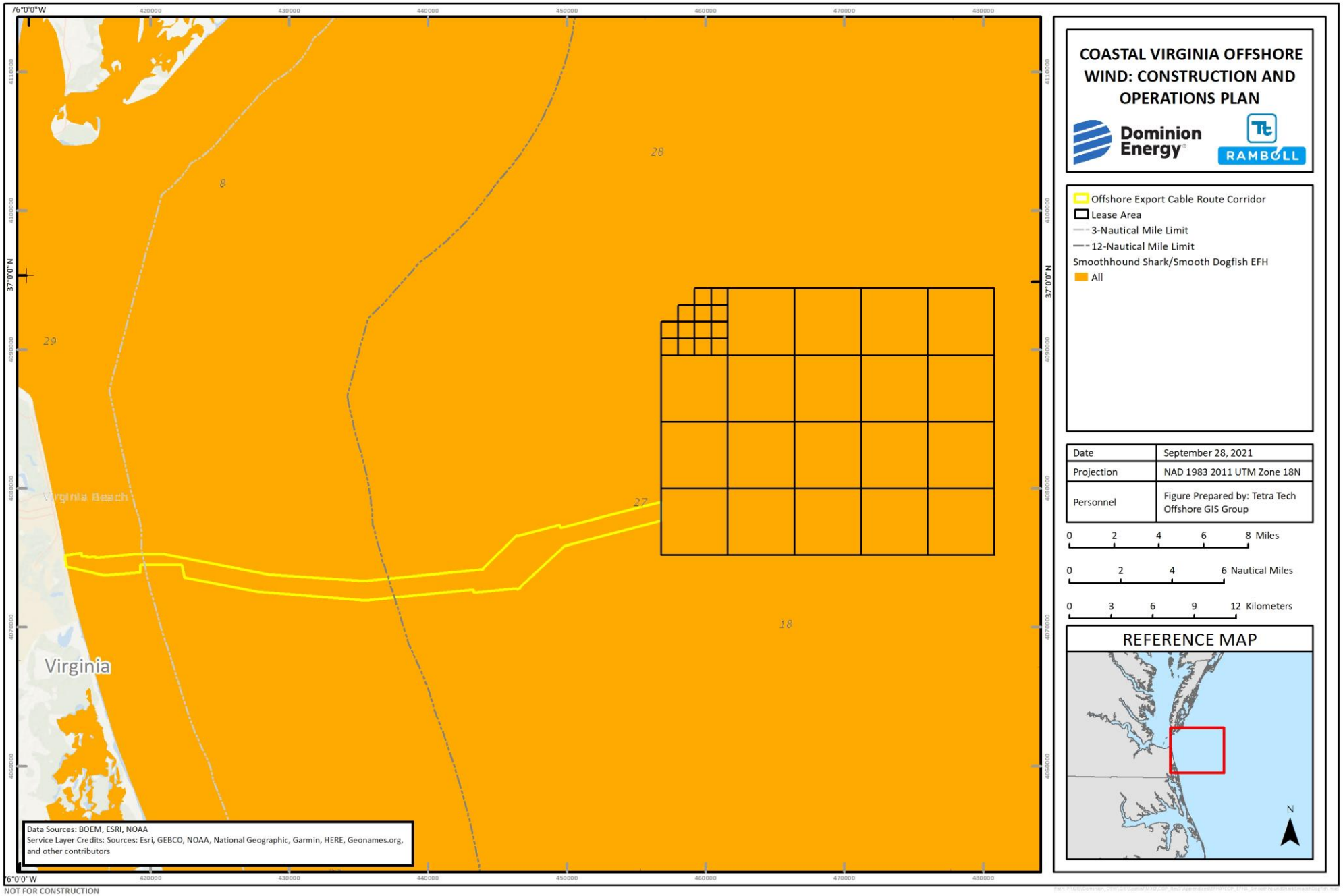


Figure E-1-33. Smoothhound Shark / Smooth Dogfish (*Mustelus canis*) Designated EFH in the Offshore Project Area

E-1.2.33 Tiger Shark (*Galeocerdo cuvier*)

No tiger shark neonate EFH is designated in the Offshore Project Area. Tiger shark juvenile and adult EFH is designated in the Lease Area and both federal and state waters of the Offshore Export Cable Route Corridor (Table E-1-34; Figure E-1-34).

Table E-1-34. Tiger Shark (*Galeocerdo cuvier*) Designated EFH in the Offshore Project Area

Action Area	Lease Area	Offshore Export Cable Route Corridor	
		Federal Waters	State Waters
Total Project Acreage	**112,799**	**14,234**	**1,652**
EFH Acreage in Project Area by Life Stage			
Juvenile/Adult	112,799	14,234	1,647
Percent of Project Area Covered by EFH by Life Stage			
Juvenile/Adult	100.0%	100.0%	99.6%
Percent of Total Species EFH Area Covered by Project Area			
Juvenile/Adult	0.403%	0.051%	0.006%

Sources: NOAA Fisheries 2017

The tiger shark is a highly migratory species that inhabits warm waters in shallow coastal and deep pelagic habitats (NOAA Fisheries 2017). In the western North Atlantic Ocean, it occurs in coastal and offshore waters from 40°N to the equator and is known to make long distance movements in pursuit of forage species. Juveniles and adults are generalists and consume a wide variety of fishes, other sharks, crustaceans, cephalopods, and marine mammals (NOAA Fisheries 2017). Designated EFH for juveniles and adults is in offshore pelagic habitats at the continental shelf break; individuals typically remain in the upper 164 ft (50 m) of the water column but are known to make dives to depths greater than 656 ft (200 m) (NOAA Fisheries 2017).

The tiger shark is managed in the Atlantic Coast of the U.S. by NOAA's HMS Management Division under the Consolidated HMS FMP as a single stock: the Atlantic and Gulf of Mexico stock. The stock status remains unknown (NOAA Fisheries 2017).

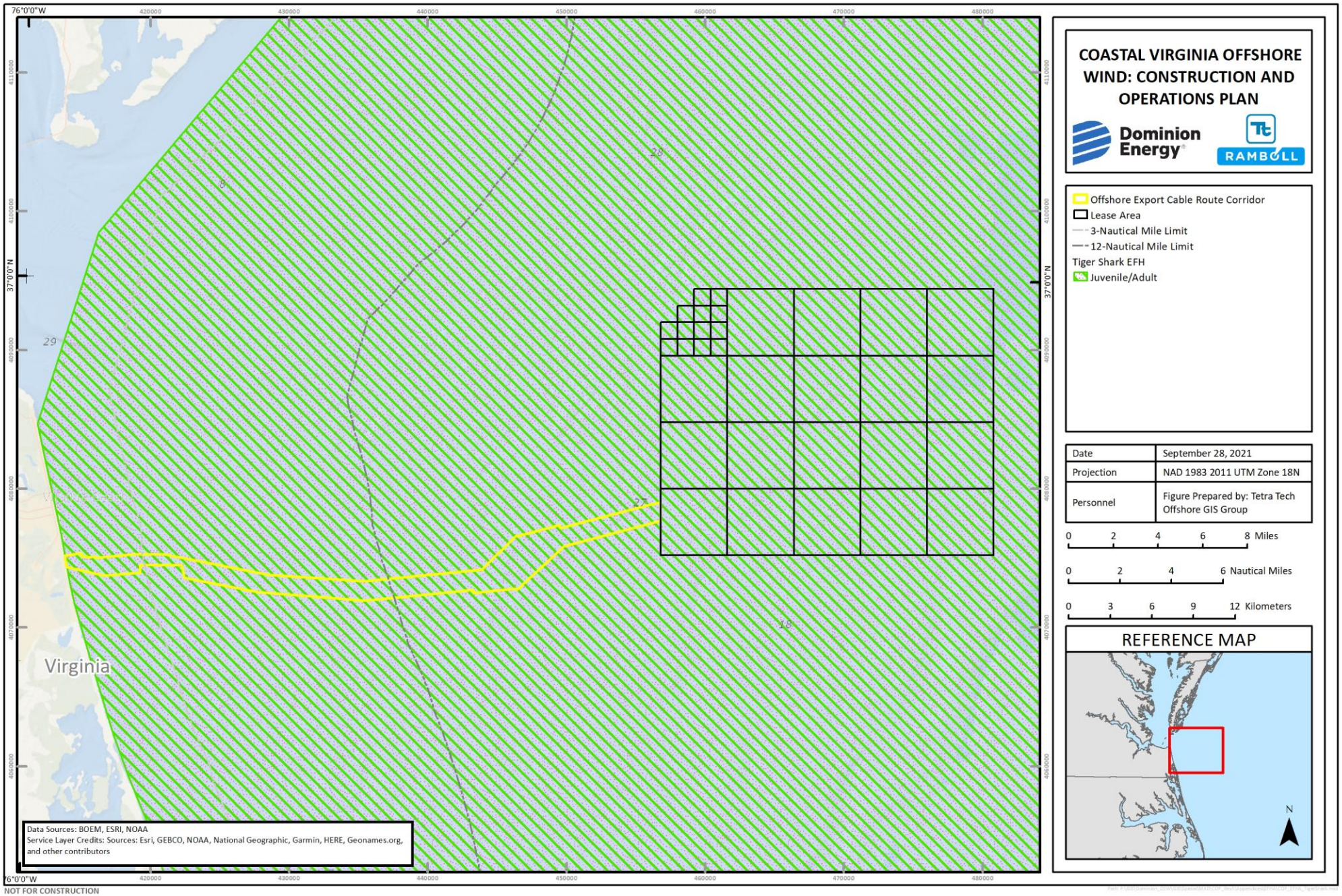


Figure E-1-34. Tiger Shark (*Galeocerdo cuvier*) Designated EFH in the Offshore Project Area

E-1.3 REFERENCES

Cargnelli, L., S. Griesbach, D. Packer, P. Berrien, D. Johnson, and W. Morse. 1999a. *Essential Fish Habitat Source Document: Pollock,* Pollachius virens, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-131. Available online at: https://repository.library.noaa.gov/view/noaa/3117.

Cargnelli, L., S. Griesbach, D. Packer, P. Berrien, W. Morse, and D. Johnson. 1999b. *Essential Fish Habitat Source Document: Witch Flounder,* Glyptocephalus cynoglossus, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-139. Available online at: https://repository.library.noaa.gov/view/noaa/3136.

Cargnelli, L., S. Griesbach, D. Packer, and E. Weissberger. 1999c. *Essential Fish Habitat Source Document: Atlantic Surfclam,* Spisula solidissima, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-142. Available online at: https://repository.library.noaa.gov/view/noaa/3144.

Cargnelli, L., S. Griesbach, C. McBride, C. Zetlin, and W. Morse. 1999d. *Essential Fish Habitat Source Document: Longfin Inshore Squid,* Loligo pealeii, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-146. Available online at: https://repository.library.noaa.gov/view/noaa/3151.

Chang, S., P. Berrien, D. Johnson, and W. Morse. 1999. *Essential Fish Habitat Source Document: Windowpane,* Scophthalmus aquosus, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-137. Available online at: https://repository.library.noaa.gov/view/noaa/3127.

Cross, J., C. Zetlin, P. Berrien, D. Johnson, and C. McBride. 1999. *Essential Fish Habitat Source Document: Butterfish,* Peprilus triacanthus, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-145. Available online at: https://repository.library.noaa.gov/view/noaa/3146.

Drohan, A., J. Manderson, and D. Packer. 2007. *Essential Fish Habitat Source Document: Black Sea Bass,* Centropristis striata, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-200. Available online at: https://repository.library.noaa.gov/view/noaa/4038.

Fahay, M., P. Berrien, D. Johnson, and W. Morse. 1999a. *Essential Fish Habitat Source Document: Atlantic cod,* Gadus morhua, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-124. Available online at: https://repository.library.noaa.gov/view/noaa/3099.

Fahay, M., P. Berrien, D. Johnson, and W. Wallace. 1999b. *Essential Fish Habitat Source Document: Bluefish,* Pomatomus saltatrix, *Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-144. Available online at: https://repository.library.noaa.gov/view/noaa/22659.

Jacobson, L. 2005. *Essential Fish Habitat Source Document: Longfin Inshore Squid,* Loligo pealeii, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-193. Available online at: https://repository.library.noaa.gov/view/noaa/4035.

Johnson, D., W. Morse, P. Berrien, and J. Viraliano. 1999. *Essential Fish Habitat Source Document: Yellowtail flounder,* Limanda ferruginea, *Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-140. Available online at: https://repository.library.noaa.gov/view/noaa/3137.

Lough, R. 2004. *Essential Fish Habitat Source Document: Atlantic cod,* Gadus morhua*, Life History and Habitat Characteristics. 2nd ed*. NOAA Tech Memo NMFS-NE-190. Available online at: https://repository.library.noaa.gov/view/noaa/4032.

MAFMC (Mid-Atlantic Fishery Management Council). 1998a. *Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plant.* Prepared by the Mid-Atlantic Fishery Management Council and the Atlantic States Marine Fisheries Commission in cooperation with the National Marine Fisheries Service, the New England Fishery Management Council, and the South Atlantic Fishery Management Council. Available online at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/53e3ac8ce4b0b6a302b8dea3/1407429772601/SFSCBSB_Amend_12.pdf.

MAFMC. 1998b. *Amendment 1 to the Bluefish Fishery Management Plan.* Prepared by the Mid-Atlantic Fishery Management Council and the Atlantic States Marine Fisheries Commission in cooperation with the National Marine Fisheries Service, the New England Fishery Management Council, and the South Atlantic Fishery Management Council. Available online at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/53e3adade4b0a6f03dc680eb/1407430061511/Bluefish_Amend_1_Vol_1.pdf.

MAFMC. 2011. *Amendment 11 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan*. Prepared by the Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service. Available online at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/518968c5e4b0884a65fe5067/1367959749407/Amendment+11+FEIS+-+FINAL_2011_05_12.pdf.

MAFMC. 2014. *Amendment 3 to the Spiny Dogfish Fishery Management Plan*. Prepared by the Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service. Available online at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/54e79dace4b021b682bc8984/1424465324916/Spiny+Dogfish+Amd+3.pdf.

MAFMC. 2017. *Unmanaged Forage Omnibus Amendment*. Prepared by the Mid-Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service. Available online at: https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5a0b49b053450ab00cbe4e46/1510689203283/20170613_Final%2BForage%2BEA_FONSI%2BSigned.pdf.

McMillan, D. and W. Morse. 1999. *Essential Fish Habitat Source Document: Spiny Dogfish,* Squalus acanthias*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-150. Available online at: https://repository.library.noaa.gov/view/noaa/3155.

NEFMC (New England Fishery Management Council). 2017. *Omnibus Essential Fish Habitat Amendment 2. Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts.* Prepared by the New England Fishery Management Council in cooperation with the National Marine Fisheries Service. Available online at: https://www.habitat.noaa.gov/protection/efh/efhmapper/oa2_efh_hapc.pdf.

NOAA (National Oceanographic and Atmospheric Administration) Fisheries. 2017. *Final Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Essential Fish Habitat and Environmental Assessment*. Prepared by the Office of Sustainable Fisheries Atlantic Highly Migratory Species Management Division. Available online at: https://www.habitat.noaa.gov/application/efhinventory/docs/a10_hms_efh.pdf.

NOAA Fisheries. 2019. *Status of Stocks 2019: Annual Report to Congress on the Status of U.S. Fisheries.* Stock Status Tables prepared by the National Marine Fisheries Service. Available online at: https://www.fisheries.noaa.gov/national/sustainable-fisheries/status-stocks-2019.

NOAA Fisheries. 2021. "Essential Fish Habitat Mapper." Available online at: https://www.habitat.noaa.gov/apps/efhmapper/. Accessed February 4, 2021.

Packer, D., L. Cargnelli, S. Griesbach, and S. Shumway. 1999a. *Essential Fish Habitat Source Document: Sea Scallop,* Placopecten magellanicus*, Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-134. Available online at: https://repository.library.noaa.gov/view/noaa/3124.

Packer, D., S. Griesbach, P. Berrien, C. Zetlin, D. Johnson, and W. Morse. 1999b. *Essential Fish Habitat Source Document: Summer Flounder,* Paralichthys dentatus*, Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-151. Available online at: https://repository.library.noaa.gov/view/noaa/3149.

Packer, D., C. Zetlin, and J. Vitaliano. 2003a. *Essential Fish Habitat Source Document: Clearnose Skate,* Raja eglanteria*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-174. Available online at: https://repository.library.noaa.gov/view/noaa/3326.

Packer, D., C. Zetlin, and J. Vitaliano. 2003b. *Essential Fish Habitat Source Document: Winter Skate,* Leucoraja ocellata*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-179. Available online at: https://repository.library.noaa.gov/view/noaa/3337.

Reid, R., L. Cargnelli, S. Griesbach, D. Packer, D. Johnson, C. Zetlin, W. Morse, and P. Berrien. 1999. *Essential Fish Habitat Source Document: Atlantic Herring,* Clupea harengus*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-126. Available online at: https://repository.library.noaa.gov/view/noaa/3101.

Shepherd, G. and D. Packer. 2006. *Essential Fish Habitat Source Document: Bluefish*, Pomatomus saltatrix*, Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-198. Available online at: https://repository.library.noaa.gov/view/noaa/4039.

Stehlik, L. 2007. *Essential Fish Habitat Source Document: Spiny Dogfish,* Squalus acanthias*, Life History and Habitat Characteristics. 2nd ed*. NOAA Tech Memo NMFS-NE-203. Available online at: https://repository.library.noaa.gov/view/noaa/3528.

Steimle, F., W. Morse, and D. Johnson. 1999a. *Essential Fish Habitat Source Document: Goosefish,* Lophius americanus*, Life History and Habitat Characteristics.* NOAA Tech Memo NMFS-NE-127. Available online at: https://repository.library.noaa.gov/view/noaa/3104.

Steimle, F., W. Morse, P. Berrien, and D. Johnson. 1999b. *Essential Fish Habitat Source Document: Red Hake,* Urophycis chuss*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-133. Available online at: https://repository.library.noaa.gov/view/noaa/3119.

Steimle, F., C. Zetlin, P. Berrien, and S. Chang. 1999c. *Essential Fish Habitat Source Document: Black Sea Bass,* Centropristis striata*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-143. Available online at: https://repository.library.noaa.gov/view/noaa/3145.

Steimle, F., C. Zetlin, P. Berrien, D. Johnson, and S. Chang 1999d. *Essential Fish Habitat Source Document: Scup,* Stenotomus chrysops*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-149. Available online at: https://repository.library.noaa.gov/view/noaa/3154.

Stevenson, D. and M. Scott. 2005. *Essential Fish Habitat Source Document: Atlantic herring*, Clupea harengus*, Life History and Habitat Characteristics. 2nd ed*. NOAA Tech Memo NMFS-NE-192. Available online at: https://repository.library.noaa.gov/view/noaa/4034.

Studholme, A., D. Packer, P. Berrien, D. Johnson, C. Aetlin, and W. Morse. 1999. *Essential Fish Habitat Source Document: Atlantic mackerel,* Scomber scombrus*, Life History and Habitat Characteristics*. NOAA Tech Memo NMFS-NE-141. Available online at: https://repository.library.noaa.gov/view/noaa/3138.

ATTACHMENT E-2: OVERSIZED TABLES

TABLES

Table E-2-1. Summary of Designated EFH for Managed Species and Life Stages in the Offshore Project Area E-2-3
Table E-2-2. Summary of Potential Impacts to Managed Species and Life Stages in the Offshore Project Area E-2-7

Table E-2-1. Summary of Designated EFH for Managed Species and Life Stages in the Offshore Project Area

Species	Stock Status a/	Life Stage	Depth (meters) b/	Habitat Type and Description b/	Typical Prey b/
Atlantic cod	1,2	Egg	0-70	Epipelagic; bays, estuaries, and upper 10 m of continental shelf water column	n/a
		Larva	0-75	Epipelagic; bays, estuaries, and upper 75 m of continental shelf water column	Plankton
Atlantic herring	1	Juveniles	0-300	Epipelagic; bays, estuaries, and intertidal and subtidal pelagic habitats	Zooplankton including copepods, decapod larvae, barnacle larvae, cladocerans, and mollusk larvae
		Adults			Euphausiids, chaetognaths, and copepods
Atlantic sea scallop	3	Eggs	18-110	Benthic; inshore and continental shelf habitats in the vicinity of adult scallops	n/a
		Larvae	Upper 10 m of water column	Pelagic; inshore and offshore habitat until settling as spat on gravel, pebbles, shells, macroalgae, and other seafloor surfaces	Phytoplankton and microzooplankton
		Juveniles	18-110	Benthic; attached to gravel, pebble, cobbles, and shells until losing their byssal threads and becoming active swimmers	
		Adults	18-110	Benthic; seafloor habitats with sand and gravel substrates	
Clearnose Skate	3	Juveniles	0-300	Benthic; bays, estuaries, and subtidal benthic habitats on coastal and inner continental shelf	Polychaetes, amphipods, mantis and mysid shrimps, crabs, squid, and fishes
		Adults			
Monkfish	3	Eggs	0-1,000	Pelagic in mucoidal egg veils	n/a
		Larvae	0-1,000	Pelagic; inshore areas and on continental shelf and slope	Zooplankton, including copepods, crustacean larvae, and chaetognaths
		Juveniles	20-400	Benthic; subtidal benthic habitats over soft mud, sand, gravel, pebbles, shell fragments, and rock outcroppings with attached algae	Small fishes, red shrimp, and squid
		Adults	0-800	Benthic; subtidal benthic habitats over soft mud, sand, gravel, pebbles, and shell fragments	Benthic and pelagic crustaceans, squid, and fishes
Pollock	3	Larva	30-1,250	Pelagic; bays, estuaries, inshore and offshore habitats	Copepods
Red hake	1,2	Adults	5-750	Benthic; bays, estuaries, outer continental shelf on depressions in soft mud and sand	Crustaceans, demersal and pelagic fish, squid
Windowpane flounder	3	Eggs	0-70	Pelagic; bays, estuaries, pelagic habitat	n/a
		Larvae			Plankton
		Juveniles	0-75	Benthic; intertidal and sub-tidal benthic habitats in estuaries, bays, and continental shelf over mud and sand substrates	Small crustaceans and fish larvae
		Adults			
Winter skate	3	Juveniles	0-371	Benthic; estuaries, bays, and subtidal benthic habitats on continental shelf	Polychaetes, amphipods, decapods, isopods, bivalves, and fishes

Species	Stock Status a/	Life Stage	Depth (meters) b/	Habitat Type and Description b/	Typical Prey b/
Witch flounder	1	Egg	10-170	Epipelagic; surface waters over continental shelf	n/a
		Larvae	0-250	Pelagic; continental shelf	Pelagic prey
Yellowtail flounder	3	Larvae	10-1,250	Pelagic; estuaries, bays, and upper 20 m of coastal and continental shelf habitats	Plankton
Atlantic butterfish	3	Eggs	0-1,500	Epipelagic; estuaries, bays, and upper 200 m of water column over continental shelf and slope	n/a
		Larvae	0-1,750		Plankton
		Juveniles	10-330	Pelagic; estuaries, bays, and inner and outer continental shelf	Thaliaceans, mollusks, crustaceans, coelenterates, polychaetes, small fishes, and ctenophores
		Adults	0-420		
Atlantic mackerel	1, 2	Eggs	10-325	Pelagic; estuaries, bays, and continental shelf	n/a
		Juveniles	0-320		Copepods, amphipods, mysid shrimp, decapods
		Adults	0-380		
Atlantic surfclam	3	Juveniles	8-66	Benthic; softbottom substrates to depths of 1m below sediment/water interface	Plankton
		Adults			
Black sea bass	3	Larvae	0-2,000	Epipelagic; estuaries and in the upper 100m of water column over continental shelf	Decapods
		Juveniles	0-400	Benthic; estuaries and continental shelf	Benthic and epibenthic crustaceans and small fishes
		Adults	20-400		Epibenthic invertebrates, small fishes, and squid
Bluefish	1	Eggs	30-70	Pelagic; continental shelf	n/a
		Larvae			Copepods
		Juveniles	5-20	Pelagic; estuaries and continental shelf	Fishes, crustaceans, and polychaetes
		Adults	Varies		
Longfin inshore squid	4	Eggs	0-50	Benthic; anchored to hardbottom on shells, rocks, boulders, vegetation, sand and mud	n/a
		Juveniles	50-100	Pelagic; coastal inshore waters and offshore continental shelf waters	Euphausiids, arrow worms, small crabs, polychaetes, and shrimp
		Adults	6-200	Pelagic; regional embayments, costal inshore and offshore continental shelf waters	Larval and juvenile fish and squid, adult fishes and squid
Scup	3	Juveniles	0-38	Benthic; estuaries, intertidal and subtidal habitats over continental shelf	Polychaetes, epibenthic amphipods, other crustaceans, mollusks, and fish eggs and larvae
		Adults	2-38	Benthic; estuaries, intertidal and subtidal habitats over continental shelf	Polychaetes, mollusks, small squid, detritus, insect larvae, hydroids, sand dollars, and small fishes
Spiny dogfish	3		25-364	Epibenthic and pelagic; outer continental shelf	Fishes, squid, and ctenophores

Species	Stock Status a/	Life Stage	Depth (meters) b/	Habitat Type and Description b/	Typical Prey b/
		Sub-adult females; Adult males and females			
Summer flounder	3	Eggs	9-110	Pelagic	n/a
		Larvae	9-70	Pelagic	Plankton, copepods
		Juveniles	0-152	Benthic; estuaries, salt marshes, seagrasses, mudflats, bays	Polychaetes, infaunal invertebrates, bivalve siphons, small fish
		Adults	0-152	Benthic; shallow coastal and estuarine waters to offshore outer continental shelf	Fishes and invertebrates
Atlantic albacore tuna	3	Juveniles	Varied	Epipelagic; offshore seaward of the continental shelf	Fishes and cephalopods
Atlantic angel shark	4	All	Varied	Benthic; continental shelf	Bony fishes, cephalopods, crustaceans, and portunid crabs
Atlantic bluefin tuna	4	Juveniles	20-100	Epipelagic; coastal and pelagic habitats to the continental shelf break	Zooplanktivorous fishes and crustaceans
		Adults			Fishes, cephalopods, benthic invertebrates
Atlantic sharpnose shark	3	Juveniles	0-180m	Estuarine, inshore, and nearshore waters	Bony fishes
		Adults			
Atlantic skipjack tuna	4	Juveniles	>20	Epipelagic; coastal and offshore habitats	Fishes, cephalopods, and crustaceans
		Adults			
Atlantic yellowfin tuna	3	Juveniles	Upper 100 m of water column	Epipelagic; coastal and offshore pelagic habitats seaward of the continental shelf break	Fishes, cephalopods, and crustaceans
		Adults			
Blacktip shark	3	Juvenile; Adult	1-9	Epipelagic; offshore surface waters and shallow coastal waters over silt, sand, mud, and seagrass habitats	Fishes, cephalopods, and crustaceans
Common thresher shark	4	All	5-13	Pelagic; nearshore	Invertebrates and small fishes
Dusky shark	1, 2	Neonate	4-60	Pelagic; offshore	Demersal and pelagic fishes and cephalopods
		Juvenile; Adult	20-200	Pelagic; coastal, inshore of the continental shelf break	
Sand tiger shark	4	Neonate; Juvenile	8-14	Bays and coastal sounds over mud, rocky substrates, and complex habitat	Fishes, crabs, and cephalopods
		Adult	1-4	Shallow coastal waters	
Sandbar shark	1	Neonate	1-23	Benthic; coastal and estuarine habitats over sand, mud, shell, and rocky substrates	Fishes, smaller sharks, cephalopods, gastropods, crabs, and shrimp

Species	Stock Status a/	Life Stage	Depth (meters) b/	Habitat Type and Description b/	Typical Prey b/
		Juvenile	1-236	Pelagic; coastal and estuarine habitats over sand, mud, shell, and rocky substrates	
		Adult	20-200	Benthic; coastal, estuarine, and shelf break habitats	
Smoothhound shark / smooth dogfish	3	All	0-200	Benthic; coastal and continental shelf, inshore bays and estuaries	Large crustaceans and small fishes
Tiger Shark	4	Juvenile	0-200	Epipelagic; shallow coastal and deep pelagic habitats at the continental shelf break	Fishes, other sharks, crustaceans, cephalopods, and marine mammals
		Adult			

Notes:
a/ NOAA Fisheries Stock Status Update as of 2nd Quarter, 2021; 1=overfished; 2=overfishing; 3=recovered; 4=not mentioned
b/ See EFH Source documents listed in Attachment E-1.

Table E-2-2. Summary of Potential Impacts to Managed Species and Life Stages in the Offshore Project Area

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Atlantic Cod (*Gadus morhua*)	--	X	--	--	X	X	--	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Eggs and larvae are pelagic and have a minimal chance of entrainment.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									Eggs and larvae are pelagic.
Atlantic Herring (*Clupea harengus*)	--	--	X	X	--	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									The Project would not affect pelagic prey or habitat.
Atlantic Sea Scallop (*Placopecten magellanicus*)	X	X	X	X	--	--	--	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration	✓	✓	✓	✓					Demersal eggs, settled spat, sessile juveniles, and adults with limited mobility could be disturbed, injured, or crushed by direct contact with construction equipment. Sessile life stages could also be buried by sediment deposition. All life stages could be adversely affected by impact pile driving.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat	✓	+	+	✓					Eggs settled on hard structure may be less viable than those settled on unconsolidated natural substrate, while spat and juveniles may benefit from increased hardbottom available for settlement. Adults would be displaced laterally to adjacent softbottom. No changes are expected to pelagic prey.
Clearnose Skate (*Raja eglanteria*)	--	n/a	X	X	--	n/a	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓	✓			✓	✓	Juveniles and adults could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because these life stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			✓	✓			✓	✓	Juveniles, adults, and demersal prey would be displaced by novel structure laterally to adjacent softbottom.
Monkfish (*Lophius americanus*)	**X**	**X**	**X**	**--**	**X**	**X**	**--**	**X**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓					✓	Eggs and larvae are pelagic and have a minimal chance of entrainment. Juveniles in the Lease Area and adults in the Offshore Export Cable Route Corridor could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because these life stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+					+	Juveniles and adults are known to forage on the edge of complex reef habitat and may benefit from the introduction of novel structure.
Pollock (*Pollachius virens*)	**--**	**X**	**--**	**--**	**--**	**X**	**--**	**--**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Larvae are pelagic and have a minimal chance of entrainment.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									Larvae are pelagic.
Red Hake (*Urophycis chuss*)	**--**	**--**	**--**	**X**	**--**	**--**	**--**	**--**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration				✓					Adults could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because adults are mobile and EFH for this life stage only intersects with the southern edge of the Lease Area.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat				+					Adults are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Windowpane Flounder (*Scophthalmus aquosus*)	X	X	X	X	X	X	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓	✓			✓	✓	Eggs and larvae are pelagic and have a minimal chance of entrainment. Juveniles and adults could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because these life stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			✓	✓			✓	✓	Juveniles, adults, and demersal prey would be displaced by novel structure laterally to adjacent softbottom.
Winter Skate (*Leucoraja ocellata*)	--	n/a	X	--	--	n/a	X	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓				✓		Juveniles could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because juveniles stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			✓				✓		Juveniles, and demersal prey would be displaced by novel structure laterally to adjacent softbottom.
Witch Flounder (*Glyptocephalus cynoglossus*)	X	X	--	--	X	X	--	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Eggs and larvae are pelagic and have a minimal chance of entrainment.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									Eggs and larvae are pelagic.
Yellowtail Flounder (*Limanda ferruginea*)	--	X	--	--	--	X	--	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Eggs and larvae are pelagic and have a minimal chance of entrainment.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									Eggs and larvae are pelagic.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Atlantic Butterfish (*Peprilus triacanthus*)	--	X	X	X	X	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Eggs and larvae are pelagic and have a minimal chance of entrainment. Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									The Project would not affect pelagic prey or habitat.
Atlantic Mackerel (*Scomber scombrus*)	X	--	X	X	X	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Eggs are pelagic and have minimal chance of entrainment. Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									The Project would not affect pelagic prey or habitat.
Atlantic Surfclam (*Spisula solidissima*)	--	--	X	X	--	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓	✓			✓	✓	Juveniles and adults buried in unconsolidated sediments could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			✓	✓			✓	✓	Juveniles and adults would be displaced by novel structure laterally to adjacent softbottom.
Black Sea Bass (*Centropristis striata*)	--	X	X	X	--	X	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment deposition; entrainment; noise and vibration			✓	✓			✓	✓	Larvae are pelagic and have minimal chance of entrainment. Juveniles and adults could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because these life stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	Juveniles and adults are heavily structure-associated and exhibit strong site fidelity. They may benefit from the introduction of novel structure.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Bluefish (*Pomatomus saltatrix*)	X	X	X	--	X	X	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Eggs and larvae are pelagic and have a minimal chance of entrainment. Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat									The Project would not affect pelagic prey or habitat.
Longfin Inshore Squid (*Doryteuthis [Amerigo] pealeii*)	--	--	X	X	X	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration					✓				Benthic eggs could be disturbed, injured, or crushed by direct contact with construction equipment. They could also be buried by sediment deposition. Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat					✓+				Eggs are attached to hard substrates and may benefit from increased hardbottom available for attachment.
Scup (*Stenotomus chrysops*)	--	--	X	X	--	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓	✓			✓	✓	Juveniles and adults could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because these life stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	Juveniles and adults are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.
Spiny Dogfish (*Squalus acanthias*)	n/a	--	--	X	n/a	--	--	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Sub-adult females and adult males and females are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	Sub-adult females and adult males and females are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Summer Flounder (*Paralichthys dentatus*)	X	X	X	X	X	X	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration			✓	✓			✓	✓	Eggs and larvae are pelagic and have a minimal chance of entrainment. Juveniles and adults could be disturbed, injured, or crushed by direct contact with construction equipment or indirect contact with noise and vibration. Impacts would be minimal because these life stages are mobile and can avoid injury. Demersal prey may also be injured or temporarily displaced.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			✓	✓			✓	✓	Juveniles, adults, and demersal prey would be displaced by novel structure laterally to adjacent softbottom.
Albacore Tuna (*Thunnus alalonga*)	--	--	X	--	--	--	X	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+				+		Juveniles are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Atlantic Angel Shark (*Squatina dumeril*)	n/a	X	X	X	n/a	X	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are highly mobile and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat		+	+	+		+	+	+	All life stages are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.
Atlantic Bluefin Tuna (*Thunnus thynnus*)	--	--	X	X	--	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	Juveniles and adults are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*)	n/a	--	--	X	n/a	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat				+			+	+	Juveniles and adults are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Atlantic Skipjack Tuna (*Katsuwonus pelamis*)	--	--	X	X	--	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	Juveniles and adults are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Atlantic Yellowfin Tuna (*Thunnus albacares*)	--	--	X	X	--	--	X	--	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+		Juveniles and adults are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Blacktip Shark (*Carcharhinus limbatus*)	n/a	--	--	X	n/a	--	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									Juveniles and adults are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	Juveniles and adults are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Common Thresher Shark (*Alopias vulpinus*)	n/a	X	X	X	n/a	X	X	X	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Operations: Loss of softbottom habitat; introduction of hardbottom habitat		+	+	+		+	+	+	All life stages are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Dusky Shark (*Carcharhinus obscurus*)	**n/a**	**X**	**X**	**X**	**n/a**	**X**	**X**	**X**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are pelagic, highly mobile, and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat		+	+	+		+	+	+	All life stages are known to aggregate around structure in the water column and may benefit from the introduction of novel structure.
Sand Tiger Shark (*Carcharhinus taurus*)	**n/a**	**X**	**X**	**X**	**n/a**	**X**	**X**	**X**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are highly mobile and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat		+	+	+		+	+	+	All life stages are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.
Sandbar Shark (*Carcharhinus plumbeus*)	**n/a**	**X**	**X**	**X**	**n/a**	**X**	**X**	**X**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are highly mobile and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat		+	+	+		+	+	+	All life stages are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.
Smooth Dogfish (*Mustelus canis*)	**n/a**	**X**	**X**	**X**	**n/a**	**X**	**X**	**X**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are highly mobile and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat		+	+	+		+	+	+	All life stages are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.

Managed Species	Lease Area				Offshore Export Cable Route Corridor				Supporting Information
	Life Stage								
	E	L	J	A	E	L	J	A	
Tiger shark (*Galeocerdo cuvier*)	**n/a**	**--**	**X**	**X**	**n/a**	**--**	**X**	**X**	
Construction: Direct disturbance, injury, or mortality of life stage; sediment suspension and deposition; entrainment; noise and vibration									All life stages are highly mobile and can avoid injury due to physical interactions or noise and vibration.
Operations: Loss of softbottom habitat; introduction of hardbottom habitat			+	+			+	+	All life stages are known to aggregate around complex reef habitat and may benefit from the introduction of novel structure.

Legend:
X: EFH for this life stage is designated in the portion of the Project Area indicated
--: No EFH for this life stage is designated in the portion of the Project Area indicated
n/a: Life stage does not exist
E: Egg
L: Larva (and neonate sharks)
J: Juvenile
A: Adults (and sub-adult female spiny dogfish)
✓: Likely adverse impact
+: Likely beneficial effect
Tan: Negligible or no adverse impact

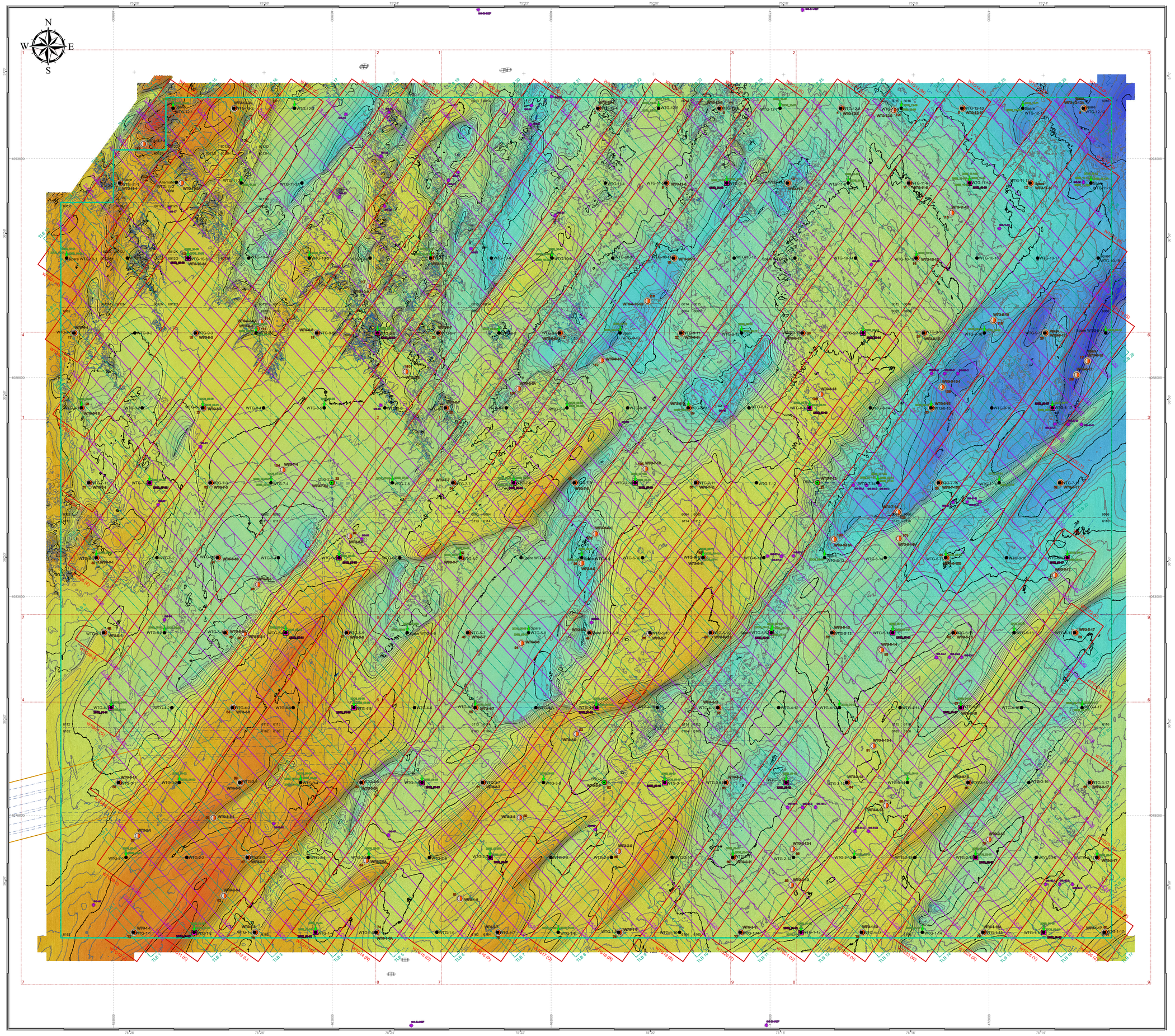
ATTACHMENT E-3: OVERSIZED MAPS

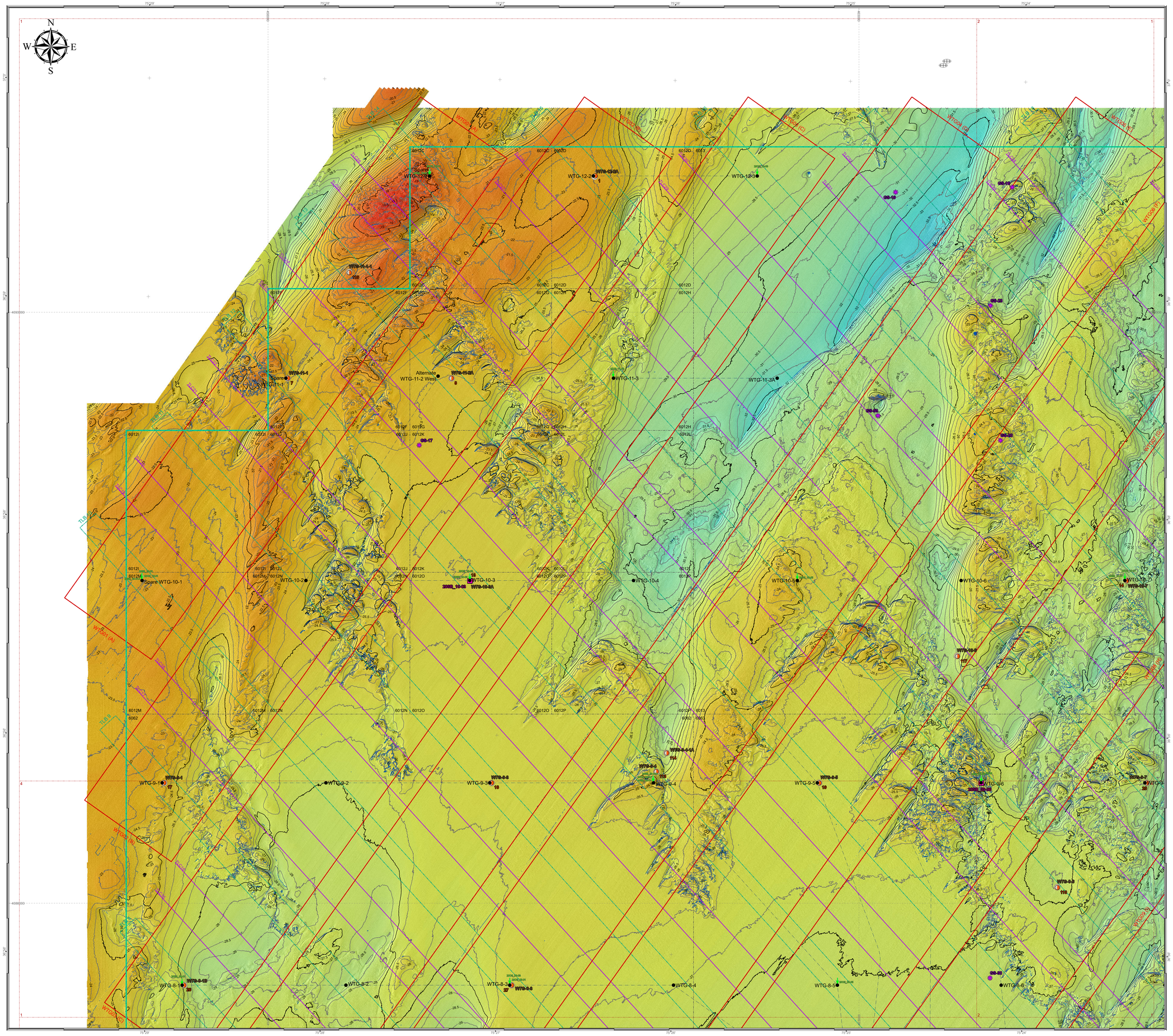
APPENDIX E ESSENTIAL FISH HABITAT ASSESSMENT ATTACHMENT E-3

FIGURES

Chart 2, Overview. Lease Area Bathymetry 1
Chart 2, Tile 1 of 9. Lease Area Bathymetry 2
Chart 2, Tile 2 of 9. Lease Area Bathymetry 3
Chart 2, Tile 3 of 9. Lease Area Bathymetry 4
Chart 2, Tile 4 of 9. Lease Area Bathymetry 5
Chart 2, Tile 5 of 9. Lease Area Bathymetry 6
Chart 2, Tile 6 of 9. Lease Area Bathymetry 7
Chart 2, Tile 7 of 9. Lease Area Bathymetry 8
Chart 2, Tile 8 of 9. Lease Area Bathymetry 9
Chart 2, Tile 9 of 9. Lease Area Bathymetry 10
Chart 3d, Overview. Lease Area Seabed Sediment Classification (CMECS) 11
Chart 3d, Tile 1 of 9. Lease Area Seabed Sediment Classification (CMECS) 12
Chart 3d, Tile 2 of 9. Lease Area Seabed Sediment Classification (CMECS) 13
Chart 3d, Tile 3 of 9. Lease Area Seabed Sediment Classification (CMECS) 14
Chart 3d, Tile 4 of 9. Lease Area Seabed Sediment Classification (CMECS) 15
Chart 3d, Tile 5 of 9. Lease Area Seabed Sediment Classification (CMECS) 16
Chart 3d, Tile 6 of 9. Lease Area Seabed Sediment Classification (CMECS) 17
Chart 3d, Tile 7 of 9. Lease Area Seabed Sediment Classification (CMECS) 18
Chart 3d, Tile 8 of 9. Lease Area Seabed Sediment Classification (CMECS) 19
Chart 3d, Tile 9 of 9. Lease Area Seabed Sediment Classification (CMECS) 20
Chart 3c, Overview. Lease Area Seabed Features and Morphology (CMECS) 21
Chart 3c, Tile 1 of 9. Lease Area Seabed Features and Morphology (CMECS) 22
Chart 3c, Tile 2 of 9. Lease Area Seabed Features and Morphology (CMECS) 23
Chart 3c, Tile 3 of 9. Lease Area Seabed Features and Morphology (CMECS) 24
Chart 3c, Tile 4 of 9. Lease Area Seabed Features and Morphology (CMECS) 25
Chart 3c, Tile 5 of 9. Lease Area Seabed Features and Morphology (CMECS) 26
Chart 3c, Tile 6 of 9. Lease Area Seabed Features and Morphology (CMECS) 27
Chart 3c, Tile 7 of 9. Lease Area Seabed Features and Morphology (CMECS) 28
Chart 3c, Tile 8 of 9. Lease Area Seabed Features and Morphology (CMECS) 29
Chart 3c, Tile 9 of 9. Lease Area Seabed Features and Morphology (CMECS) 30
Chart 4, Overview. Lease Area Side Scan Sonar Mosaic 31

Chart 4, Tile 1 of 9. Lease Area Side Scan Sonar Mosaic 32
Chart 4, Tile 2 of 9. Lease Area Side Scan Sonar Mosaic 33
Chart 4, Tile 3 of 9. Lease Area Side Scan Sonar Mosaic 34
Chart 4, Tile 4 of 9. Lease Area Side Scan Sonar Mosaic 35
Chart 4, Tile 5 of 9. Lease Area Side Scan Sonar Mosaic 36
Chart 4, Tile 6 of 9. Lease Area Side Scan Sonar Mosaic 37
Chart 4, Tile 7 of 9. Lease Area Side Scan Sonar Mosaic 38
Chart 4, Tile 8 of 9. Lease Area Side Scan Sonar Mosaic 39
Chart 4, Tile 9 of 9. Lease Area Side Scan Sonar Mosaic 40
Centerline Alignment Chart, Overview. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 41
Centerline Alignment Chart, Sheet 1 of 6. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 42
Centerline Alignment Chart, Sheet 2 of 6. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 43
Centerline Alignment Chart, Sheet 3 of 6. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 44
Centerline Alignment Chart, Sheet 4 of 6. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 45
Centerline Alignment Chart, Sheet 5 of 6. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 46
Centerline Alignment Chart, Sheet 6 of 6. Export Cable Route Corridor Bathymetry, Surface Features, Sediment (CMECS), and Side Scan Sonar Mosaic 47


N
W
E
S
Spare WTG-1-1
Spare WTG-1-2
Alternate WTG-1-2 West
Spare WTG-1-3
Spare WTG-1-4
Spare WTG-2-1
Spare WTG-2-2
Spare WTG-3-1
Spare WTG-3-2
Spare WTG-4-1
Spare WTG-4-2
Spare WTG-5-1
Spare WTG-5-2
Spare WTG-6-1
Spare WTG-6-2
Spare WTG-7-1
Spare WTG-7-2
Spare WTG-8-1
Spare WTG-8-2
Spare WTG-9-1
Spare WTG-9-2
Spare WTG-10-1
Spare WTG-10-2
Spare WTG-11-1
Spare WTG-11-2
Spare WTG-12-1
Spare WTG-12-2
OSS-1
OSS-2
OSS-3
OSS-4
WTG-1-1
WTG-1-2
WTG-1-3
WTG-1-4
WTG-1-5
WTG-1-6
WTG-1-7
WTG-1-8
WTG-1-9
WTG-1-10
WTG-1-11
WTG-1-12
WTG-1-13
WTG-1-14
WTG-1-15
WTG-1-16
WTG-1-17
WTG-1-18
WTG-2-1
WTG-2-2
WTG-2-3
WTG-2-4
WTG-2-5
WTG-2-6
WTG-2-7
WTG-2-8
WTG-2-9
WTG-2-10
WTG-2-11
WTG-2-12
WTG-2-13
WTG-2-14
WTG-2-15
WTG-2-16
WTG-2-17
WTG-2-18
WTG-3-1
WTG-3-2
WTG-3-3
WTG-3-4
WTG-3-5
WTG-3-6
WTG-3-7
WTG-3-8
WTG-3-9
WTG-3-10
WTG-3-11
WTG-3-12
WTG-3-13
WTG-3-14
WTG-3-15
WTG-3-16
WTG-3-17
WTG-3-18
WTG-4-1
WTG-4-2
WTG-4-3
WTG-4-4
WTG-4-5
WTG-4-6
WTG-4-7
WTG-4-8
WTG-4-9
WTG-4-10
WTG-4-11
WTG-4-12
WTG-4-13
WTG-4-14
WTG-4-15
WTG-4-16
WTG-4-17
WTG-4-18
WTG-5-1
WTG-5-2
WTG-5-3
WTG-5-4
WTG-5-5
WTG-5-6
WTG-5-7
WTG-5-8
WTG-5-9
WTG-5-10
WTG-5-11
WTG-5-12
WTG-5-13
WTG-5-14
WTG-5-15
WTG-5-16
WTG-5-17
WTG-5-18
WTG-6-1
WTG-6-2
WTG-6-3
WTG-6-4
WTG-6-5
WTG-6-6
WTG-6-7
WTG-6-8
WTG-6-9
WTG-6-10
WTG-6-11
WTG-6-12
WTG-6-13
WTG-6-14
WTG-6-15
WTG-6-16
WTG-6-17
WTG-6-18
WTG-7-1
WTG-7-2
WTG-7-3
WTG-7-4
WTG-7-5
WTG-7-6
WTG-7-7
WTG-7-8
WTG-7-9
WTG-7-10
WTG-7-11
WTG-7-12
WTG-7-13
WTG-7-14
WTG-7-15
WTG-7-16
WTG-7-17
WTG-7-18
WTG-8-1
WTG-8-2
WTG-8-3
WTG-8-4
WTG-8-5
WTG-8-6
WTG-8-7
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
WTG-8-12
WTG-8-13
WTG-8-14
WTG-8-15
WTG-8-16
WTG-8-17
WTG-8-18
WTG-9-1
WTG-9-2
WTG-9-3
WTG-9-4
WTG-9-5
WTG-9-6
WTG-9-7
WTG-9-8
WTG-9-9
WTG-9-10
WTG-9-11
WTG-9-12
WTG-9-13
WTG-9-14
WTG-9-15
WTG-9-16
WTG-9-17
WTG-9-18
WTG-10-1
WTG-10-2
WTG-10-3
WTG-10-4
WTG-10-5
WTG-10-6
WTG-10-7
WTG-10-8
WTG-10-9
WTG-10-10
WTG-10-11
WTG-10-12
WTG-10-13
WTG-10-14
WTG-10-15
WTG-10-16
WTG-10-17
WTG-10-18
WTG-11-1
WTG-11-2
WTG-11-3
WTG-11-4
WTG-11-5
WTG-11-6
WTG-11-7
WTG-11-8
WTG-11-9
WTG-11-10
WTG-11-11
WTG-11-12
WTG-11-13
WTG-11-14
WTG-11-15
WTG-11-16
WTG-11-17
WTG-11-18
WTG-12-1
WTG-12-2
WTG-12-3
WTG-12-4
WTG-12-5
WTG-12-6
WTG-12-7
WTG-12-8
WTG-12-9
WTG-12-10
WTG-12-11
WTG-12-12
WTG-12-13
WTG-12-14
WTG-12-15
WTG-12-16
WTG-12-17
WTG-12-18
75°28'
75°26'
75°24'
75°22'
75°20'
75°18'
75°16'
75°14'
36°32'
36°30'
36°28'
36°26'
4093000
4088000
4083000
4078000
430000
435000
440000
445000
450000
455000
460000
465000
470000
475000
480000
485000
490000
495000
500000
505000
510000
515000
520000
525000
530000
535000
540000
545000
550000
555000
560000
565000
570000
575000
580000
585000
590000
595000
600000
605000
610000
615000
620000
625000
630000
635000
640000
645000
650000
655000
660000
665000
670000
675000
680000
685000
690000
695000
700000
705000
710000
715000
720000
725000
730000
735000
740000
745000
750000
755000
760000
765000
770000
775000
780000
785000
790000
795000
800000
805000
810000
815000
820000
825000
830000
835000
840000
845000
850000
855000
860000
865000
870000
875000
880000
885000
890000
895000
900000
905000
910000
915000
920000
925000
930000
935000
940000
945000
950000
955000
960000
965000
970000
975000
980000
985000
990000
995000
1000000
1005000
1010000
1015000
1020000
1025000
1030000
1035000
1040000
1045000
1050000
1055000
1060000
1065000
1070000
1075000
1080000
1085000
1090000
1095000
1100000
1105000
1110000
1115000
1120000
1125000
1130000
1135000
1140000
1145000
1150000
1155000
1160000
1165000
1170000
1175000
1180000
1185000
1190000
1195000
1200000
1205000
1210000
1215000
1220000
1225000
1230000
1235000
1240000
1245000
1250000
1255000
1260000
1265000
1270000
1275000
1280000
1285000
1290000
1295000
1300000
1305000
1310000
1315000
1320000
1325000
1330000
1335000
1340000
1345000
1350000
1355000
1360000
1365000
1370000
1375000
1380000
1385000
1390000
1395000
1400000
1405000
1410000
1415000
1420000
1425000
1430000
1435000
1440000
1445000
1450000
1455000
1460000
1465000
1470000
1475000
1480000
1485000
1490000
1495000
1500000
1505000
1510000
1515000
1520000
1525000
1530000
1535000
1540000
1545000
1550000
1555000
1560000
1565000
1570000
1575000
1580000
1585000
1590000
1595000
1600000
1605000
1610000
1615000
1620000
1625000
1630000
1635000
1640000
1645000
1650000
1655000
1660000
1665000
1670000
1675000
1680000
1685000
1690000
1695000
1700000
1705000
1710000
1715000
1720000
1725000
1730000
1735000
1740000
1745000
1750000
1755000
1760000
1765000
1770000
1775000
1780000
1785000
1790000
1795000
1800000
1805000
1810000
1815000
1820000
1825000
1830000
1835000
1840000
1845000
1850000
1855000
1860000
1865000
1870000
1875000
1880000
1885000
1890000
1895000
1900000
1905000
1910000
1915000
1920000
1925000
1930000
1935000
1940000
1945000
1950000
1955000
1960000
1965000
1970000
1975000
1980000
1985000
1990000
1995000
2000000
2005000
2010000
2015000
2020000
2025000
2030000
2035000
2040000
2045000
2050000
2055000
2060000
2065000
2070000
2075000
2080000
2085000
2090000
2095000
2100000
2105000
2110000
2115000
2120000
2125000
2130000
2135000
2140000
2145000
2150000
2155000
2160000
2165000
2170000
2175000
2180000
2185000
2190000
2195000
2200000
2205000
2210000
2215000
2220000
2225000
2230000
2235000
2240000
2245000
2250000
2255000
2260000
2265000
2270000
2275000
2280000
2285000
2290000
2295000
2300000
2305000
2310000
2315000
2320000
2325000
2330000
2335000
2340000
2345000
2350000
2355000
2360000
2365000
2370000
2375000
2380000
2385000
2390000
2395000
2400000
2405000
2410000
2415000
2420000
2425000
2430000
2435000
2440000
2445000
2450000
2455000
2460000
2465000
2470000
2475000
2480000
2485000
2490000
2495000
2500000
2505000
2510000
2515000
2520000
2525000
2530000
2535000
2540000
2545000
2550000
2555000
2560000
2565000
2570000
2575000
2580000
2585000
2590000
2595000
2600000
2605000
2610000
2615000
2620000
2625000
2630000
2635000
2640000
2645000
2650000
2655000
2660000
2665000
2670000
2675000
2680000
2685000
2690000
2695000
2700000
2705000
2710000
2715000
2720000
2725000
2730000
2735000
2740000
2745000
2750000
2755000
2760000
2765000
2770000
2775000
2780000
2785000
2790000
2795000
2800000
2805000
2810000
2815000
2820000
2825000
2830000
2835000
2840000
2845000
2850000
2855000
2860000
2865000
2870000
2875000
2880000
2885000
2890000
2895000
2900000
2905000
2910000
2915000
2920000
2925000
2930000
2935000
2940000
2945000
2950000
2955000
2960000
2965000
2970000
2975000
2980000
2985000
2990000
2995000
3000000
3005000
3010000
3015000
3020000
3025000
3030000
3035000
3040000
3045000
3050000
3055000
3060000
3065000
3070000
3075000
3080000
3085000
3090000
3095000
3100000
3105000
3110000
3115000
3120000
3125000
3130000
3135000
3140000
3145000
3150000
3155000
3160000
3165000
3170000
3175000
3180000
3185000
3190000
3195000
3200000
3205000
3210000
3215000
3220000
3225000
3230000
3235000
3240000
3245000
3250000
3255000
3260000
3265000
3270000
3275000
3280000
3285000
3290000
3295000
3300000
3305000
3310000
3315000
3320000
3325000
3330000
3335000
3340000
3345000
3350000
3355000
3360000
3365000
3370000
3375000
3380000
3385000
3390000
3395000
3400000
3405000
3410000
3415000
3420000
3425000
3430000
3435000
3440000
3445000
3450000
3455000
3460000
3465000
3470000
3475000
3480000
3485000
3490000
3495000
3500000
3505000
3510000
3515000
3520000
3525000
3530000
3535000
3540000
3545000
3550000
3555000
3560000
3565000
3570000
3575000
3580000
3585000
3590000
3595000
3600000
3605000
3610000
3615000
3620000
3625000
3630000
3635000
3640000
3645000
3650000
3655000
3660000
3665000
3670000
3675000
3680000
3685000
3690000
3695000
3700000
3705000
3710000
3715000
3720000
3725000
3730000
3735000
3740000
3745000
3750000
3755000
3760000
3765000
3770000
3775000
3780000
3785000
3790000
3795000
3800000
3805000
3810000
3815000
3820000
3825000
3830000
3835000
3840000
3845000
3850000
3855000
3860000
3865000
3870000
3875000
3880000
3885000
3890000
3895000
3900000
3905000
3910000
3915000
3920000
3925000
3930000
3935000
3940000
3945000
3950000
3955000
3960000
3965000
3970000
3975000
3980000
3985000
3990000
3995000
4000000
4005000
4010000
4015000
4020000
4025000
4030000
4035000
4040000
4045000
4050000
4055000
4060000
4065000
4070000
4075000
4080000
4085000
4090000
4095000
4100000
4105000
4110000
4115000
4120000
4125000
4130000
4135000
4140000
4145000
4150000
4155000
4160000
4165000
4170000
4175000
4180000
4185000
4190000
4195000
4200000
4205000
4210000
4215000
4220000
4225000
4230000
4235000
4240000
4245000
4250000
4255000
4260000
4265000
4270000
4275000
4280000
4285000
4290000
4295000
4300000
4305000
4310000
4315000
4320000
4325000
4330000
4335000
4340000
4345000
4350000
4355000
4360000
4365000
4370000
4375000
4380000
4385000
4390000
4395000
4400000
4405000
4410000
4415000
4420000
4425000
4430000
4435000
4440000
4445000
4450000
4455000
4460000
4465000
4470000
4475000
4480000
4485000
4490000
4495000
4500000
4505000
4510000
4515000
4520000
4525000
4530000
4535000
4540000
4545000
4550000
4555000
4560000
4565000
4570000
4575000
4580000
4585000
4590000
4595000
4600000
4605000
4610000
4615000
4620000
4625000
4630000
4635000
4640000
4645000
4650000
4655000
4660000
4665000
4670000
4675000
4680000
4685000
4690000
4695000
4700000
4705000
4710000
4715000
4720000
4725000
4730000
4735000
4740000
4745000
4750000
4755000
4760000
4765000
4770000
4775000
4780000
4785000
4790000
4795000
4800000
4805000
4810000
4815000
4820000
4825000
4830000
4835000
4840000
4845000
4850000
4855000
4860000
4865000
4870000
4875000
4880000
4885000
4890000
4895000
4900000
4905000
4910000
4915000
4920000
4925000
4930000
4935000
4940000
4945000
4950000
4955000
4960000
4965000
4970000
4975000
4980000
4985000
4990000
4995000
5000000
5005000
5010000
5015000
5020000
5025000
5030000
5035000
5040000
5045000
5050000
5055000
5060000
5065000
5070000
5075000
5080000
5085000
5090000
5095000
5100000
5105000
5110000
5115000
5120000
5125000
5130000
5135000
5140000
5145000
5150000
5155000
5160000
5165000
5170000
5175000
5180000
5185000
5190000
5195000
5200000
5205000
5210000
5215000
5220000
5225000
5230000
5235000
5240000
5245000
5250000
5255000
5260000
5265000
5270000
5275000
5280000
5285000
5290000
5295000
5300000
5305000
5310000
5315000
5320000
5325000
5330000
5335000
5340000
5345000
5350000
5355000
5360000
5365000
5370000
5375000
5380000
5385000
5390000
5395000
5400000
5405000
5410000
5415000
5420000
5425000
5430000
5435000
5440000
5445000
5450000
5455000
5460000
5465000
5470000
5475000
5480000
5485000
5490000
5495000
5500000
5505000
5510000
5515000
5520000
5525000
5530000
5535000
5540000
5545000
5550000
5555000
5560000
5565000
5570000
5575000
5580000
5585000
5590000
5595000
5600000
5605000
5610000
5615000
5620000
5625000
5630000
5635000
5640000
5645000
5650000
5655000
5660000
5665000
5670000
5675000
5680000
5685000
5690000
5695000
5700000
5705000
5710000
5715000
5720000
5725000
5730000
5735000
5740000
5745000
5750000
5755000
5760000
5765000
5770000
5775000
5780000
5785000
5790000
5795000
5800000
5805000
5810000
5815000
5820000
5825000
5830000
5835000
5840000
5845000
5850000
5855000
5860000
5865000
5870000
5875000
5880000
5885000
5890000
5895000
5900000
5905000
5910000
5915000
5920000
5925000
5930000
5935000
5940000
5945000
5950000
5955000
5960000
5965000
5970000
5975000
5980000
5985000
5990000
5995000
6000000
6005000
6010000
6015000
6020000
6025000
6030000
6035000
6040000
6045000
6050000
6055000
6060000
6065000
6070000
6075000
6080000
6085000
6090000
6095000
6100000
6105000
6110000
6115000
6120000
6125000
6130000
6135000
6140000
6145000
6150000
6155000
6160000
6165000
6170000
6175000
6180000
6185000
6190000
6195000
6200000
6205000
6210000
6215000
6220000
6225000
6230000
6235000
6240000
6245000
6250000
6255000
6260000
6265000
6270000
6275000
6280000
6285000
6290000
6295000
6300000
6305000
6310000
6315000
6320000
6325000
6330000
6335000
6340000
6345000
6350000
6355000
6360000
6365000
6370000
6375000
6380000
6385000
6390000
6395000
6400000
6405000
6410000
6415000
6420000
6425000
6430000
6435000
6440000
6445000
6450000
6455000
6460000
6465000
6470000
6475000
6480000
6485000
6490000
6495000
6500000
6505000
6510000
6515000
6520000
6525000
6530000
6535000
6540000
6545000
6550000
6555000
6560000
6565000
6570000
6575000
6580000
6585000
6590000
6595000
6600000
6605000
6610000
6615000
6620000
6625000
6630000
6635000
6640000
6645000
6650000
6655000
6660000
6665000
6670000
6675000
6680000
6685000
6690000
6695000
6700000
6705000
6710000
6715000
6720000
6725000
6730000
6735000
6740000
6745000
6750000
6755000
6760000
6765000
6770000
6775000
6780000
6785000
6790000
6795000
6800000
6805000
6810000
6815000
6820000
6825000
6830000
6835000
6840000
6845000
6850000
6855000
6860000
6865000
6870000
6875000
6880000
6885000
6890000
6895000
6900000
6905000
6910000
6915000
6920000
6925000
6930000
6935000
6940000
6945000
6950000
6955000
6960000
6965000
6970000
6975000
6980000
6985000
6990000
6995000
7000000
7005000
7010000
7015000
7020000
7025000
7030000
7035000
7040000
7045000
7050000
7055000
7060000
7065000
7070000
7075000
7080000
7085000
7090000
7095000
7100000
7105000
7110000
7115000
7120000
7125000
7130000
7135000
7140000
7145000
7150000
7155000
7160000
7165000
7170000
7175000
7180000
7185000
7190000
7195000
7200000
7205000
7210000
7215000
7220000
7225000
7230000
7235000
7240000
7245000
7250000
7255000
7260000
7265000
7270000
7275000
7280000
7285000
7290000
7295000
7300000
7305000
7310000
7315000
7320000
7325000
7330000
7335000
7340000
7345000
7350000
7355000
7360000
7365000
7370000
7375000
7380000
7385000
7390000
7395000
7400000
7405000
7410000
7415000
7420000
7425000
7430000
7435000
7440000
7445000
7450000
7455000
7460000
7465000
7470000
7475000
7480000
7485000
7490000
7495000
7500000
7505000
7510000
7515000
7520000
7525000
7530000
7535000
7540000
7545000
7550000
7555000
7560000
7565000
7570000
7575000
7580000
7585000
7590000
7595000
7600000
7605000
7610000
7615000
7620000
7625000
7630000
7635000
7640000
7645000
7650000
7655000
7660000
7665000
7670000
7675000
7680000
7685000
7690000
7695000
7700000
7705000
7710000
7715000
7720000
7725000
7730000
7735000
7740000
7745000
7750000
7755000
7760000
7765000
7770000
7775000
7780000
7785000
7790000
7795000
7800000
7805000
7810000
7815000
7820000
7825000
7830000
7835000
7840000
7845000
7850000
7855000
7860000
7865000
7870000
7875000
7880000
7885000
7890000
7895000
7900000
7905000
7910000
7915000
7920000
7925000
7930000
7935000
7940000
7945000
7950000
7955000
7960000
7965000
7970000
7975000
7980000
7985000
7990000
7995000
8000000
8005000
8010000
8015000
8020000
8025000
8030000
8035000
8040000
8045000
8050000
8055000
8060000
8065000
8070000
8075000
8080000
8085000
8090000
8095000
8100000
8105000
8110000
8115000
8120000
8125000
8130000
8135000
8140000
8145000
8150000
8155000
8160000
8165000
8170000
8175000
8180000
8185000
8190000
8195000
8200000
8205000
8210000
8215000
8220000
8225000
8230000
8235000
8240000
8245000
8250000
8255000
8260000
8265000
8270000
8275000
8280000
8285000
8290000
8295000
8300000
8305000
8310000
8315000
8320000
8325000
8330000
8335000
8340000
8345000
8350000
8355000
8360000
8365000
8370000
8375000
8380000
8385000
8390000
8395000
8400000
8405000
8410000
8415000
8420000
8425000
8430000
8435000
8440000
8445000
8450000
8455000
8460000
8465000
8470000
8475000
8480000
8485000
8490000
8495000
8500000
8505000
8510000
8515000
8520000
8525000
8530000
8535000
8540000
8545000
8550000
8555000
8560000
8565000
8570000
8575000
8580000
8585000
8590000
8595000
8600000
8605000
8610000
8615000
8620000
8625000
8630000
8635000
8640000
8645000
8650000
8655000
8660000
8665000
8670000
8675000
8680000
8685000
8690000
8695000
8700000
8705000
8710000
8715000
8720000
8725000
8730000
8735000
8740000
8745000
8750000
8755000
8760000
8765000
8770000
8775000
8780000
8785000
8790000
8795000
8800000
8805000
8810000
8815000
8820000
8825000
8830000
8835000
8840000
8845000
8850000
8855000
8860000
8865000
8870000
8875000
8880000
8885000
8890000
8895000
8900000
8905000
8910000
8915000
8920000
8925000
8930000
8935000
8940000
8945000
8950000
8955000
8960000
8965000
8970000
8975000
8980000
8985000
8990000
8995000
9000000
9005000
9010000
9015000
9020000
9025000
9030000
9035000
9040000
9045000
9050000
9055000
9060000
9065000
9070000
9075000
9080000
9085000
9090000
9095000
9100000
9105000
9110000
9115000
9120000
9125000
9130000
9135000
9140000
9145000
9150000
9155000
9160000
9165000
9170000
9175000
9180000
9185000
9190000
9195000
9200000
9205000
9210000
9215000
9220000
9225000
9230000
9235000
9240000
9245000
9250000
9255000
9260000
9265000
9270000
9275000
9280000
9285000
9290000
9295000
9300000
9305000
9310000
9315000
9320000
9325000
9330000
9335000
9340000
9345000
9350000
9355000
9360000
9365000
9370000
9375000
9380000
9385000
9390000
9395000
9400000
9405000
9410000
9415000
9420000
9425000
9430000
9435000
9440000
9445000
9450000
9455000
9460000
9465000
9470000
9475000
9480000
9485000
9490000
9495000
9500000
9505000
9510000
9515000
9520000
9525000
9530000
9535000
9540000
9545000
9550000
9555000
9560000
9565000
9570000
9575000
9580000
9585000
9590000
9595000
9600000
9605000
9610000
9615000
9620000
9625000
9630000
9635000
9640000
9645000
9650000
9655000
9660000
9665000
9670000
9675000
9680000
9685000
9690000
9695000
9700000
9705000
9710000
9715000
9720000
9725000
9730000
9735000
9740000
9745000
9750000
9755000
9760000
9765000
9770000
9775000
9780000
9785000
9790000
9795000
9800000
9805000
9810000
9815000
9820000
9825000
9830000
9835000
9840000
9845000
9850000
9855000
9860000
9865000
9870000
9875000
9880000
9885000
9890000
9895000
9900000
9905000
9910000
9915000
9920000
9925000
9930000
9935000
9940000
9945000
9950000
9955000
9960000
9965000
9970000
9975000
9980000
9985000
9990000
9995000
10000000
10005000
10010000
10015000
10020000
10025000
10030000
10035000
10040000
10045000
10050000
10055000
10060000
10065000
10070000
10075000
10080000
10085000
10090000
10095000
10100000
10105000
10110000
10115000
10120000
10125000
10130000
10135000
10140000
10145000
10150000
10155000
10160000
10165000
10170000
10175000
10180000
10185000
10190000
10195000
10200000
10205000
10210000
10215000
10220000
10225000
10230000
10235000
10240000
10245000
10250000
10255000
10260000
10265000
10270000
10275000
10280000
10285000
10290000
10295000
10300000
10305000
10310000
10315000
10320000
10325000
10330000
10335000
10340000
10345000
10350000
10355000
10360000
10365000
10370000
10375000
10380000
10385000
10390000
10395000
10400000
10405000
10410000
10415000
10420000
10425000
10430000
10435000
10440000
10445000
10450000
10455000
10460000
10465000
10470000
10475000
10480000
10485000
10490000
10495000
10500000
10505000
10510000
10515000
10520000
10525000
10530000
10535000
10540000
10545000
10550000
10555000
10560000
10565000
10570000
10575000
10580000
10585000
10590000
10595000
10600000
10605000
10610000
10615000
10620000
10625000
10630000
10635000
10640000
10645000
10650000
10655000
10660000
10665000
10670000
10675000
10680000
10685000
10690000
10695000
10700000
10705000
10710000
10715000
10720000
10725000
10730000
10735000
10740000
10745000
10750000
10755000
10760000
10765000
10770000
10775000
10780000
10785000
10790000
10795000
10800000
10805000
10810000
10815000
10820000
10825000
10830000
10835000
10840000
10845000
10850000
10855000
10860000
10865000
10870000
10875000
10880000
10885000
10890000
10895000
10900000
10905000
10910000
10915000
10920000
10925000
10930000
10935000
10940000
10945000
10950000
10955000
10960000
10965000
10970000
10975000
10980000
10985000
10990000
10995000
11000000
11005000
11010000
11015000
11020000
11025000
11030000
11035000
11040000
11045000
11050000
11055000
11060000
11065000
11070000
11075000
11080000
11085000
11090000
11095000
11100000
11105000
11110000
11115000
11120000
11125000
11130000
11135000
11140000
11145000
11150000
11155000
11160000
11165000
11170000
11175000
11180000
11185000
11190000
11195000
11200000
11205000
11210000
11215000
11220000
11225000
11230000
11235000
11240000
11245000
11250000
11255000
11260000
11265000
11270000
11275000
11280000
11285000
11290000
11295000
11300000
11305000
11310000
11315000
11320000
11325000
11330000
11335000
11340000
11345000
11350000
11355000
11360000
11365000
11370000
11375000
11380000
11385000
11390000
11395000
11400000
11405000
11410000
11415000
11420000
11425000
11430000
11435000
11440000
11445000
11450000
11455000
11460000
11465000
11470000
11475000
11480000
11485000
11490000
11495000
11500000
11505000
11510000
11515000
11520000
11525000
11530000
11535000
11540000
11545000
11550000
11555000
11560000
11565000
11570000
11575000
11580000
11585000
11590000
11595000
11600000
11605000
11610000
11615000
11620000
11625000
11630000
11635000
11640000
11645000
11650000
11655000
11660000
11665000
11670000
11675000
11680000
11685000
11690000
11695000
11700000
11705000
11710000
11715000
11720000
11725000
11730000
11735000
11740000
11745000
11750000
11755000
11760000
11765000
11770000
11775000
11780000
11785000
11790000
11795000
11800000
11805000
11810000
11815000
11820000
11825000
11830000
11835000
11840000
11845000
11850000
11855000
11860000
11865000
11870000
11875000
11880000
11885000
11890000
11895000
11900000
11905000
11910000
11915000
11920000
11925000
11930000
11935000
11940000
11945000
11950000
11955000
11960000
11965000
11970000
11975000
11980000
11985000
11990000
11995000
12000000
12005000
12010000
12015000
12020000
12025000
12030000
12035000
12040000
12045000
12050000
12055000
12060000
12065000
12070000
12075000
12080000
12085000
12090000
12095000
12100000
12105000
12110000
12115000
12120000
12125000
12130000
12135000
12140000
12145000
12150000
12155000
12160000
12165000
12170000
12175000
12180000
12185000
12190000
12195000
12200000
12205000
12210000
12215000
12220000
12225000
12230000
12235000
12240000
12245000
12250000
12255000
12260000
12265000
12270000
12275000
12280000
12285000
12290000
12295000
12300000
12305000
12310000
12315000
12320000
12325000
12330000
12335000
12340000
12345000
12350000
12355000
12360000
12365000
12370000
12375000
12380000
12385000
12390000
12395000
12400000
12405000
12410000
12415000
12420000
12425000
12430000
12435000
12440000
12445000
12450000
12455000
12460000
12465000
12470000
12475000
12480000
12485000
12490000
12495000
12500000
12505000
12510000
12515000
12520000
12525000
12530000
12535000
12540000
12545000
12550000
12555000
12560000
12565000
12570000
12575000
12580000
12585000
12590000
12595000
12600000
12605000
12610000
12615000
12620000
12625000
12630000
12635000
12640000
12645000
12650000
12655000
12660000
12665000
12670000
12675000
12680000
12685000
12690000
12695000
12700000
12705000
12710000
12715000
12720000
12725000
12730000
12735000
12740000
12745000
12750000
12755000
12760000
12765000
12770000
12775000
12780000
12785000
12790000
12795000
12800000
12805000
12810000
12815000
12820000
12825000
12830000
12835000
12840000
12845000
12850000
12855000
12860000
12865000
12870000
12875000
12880000
12885000
12890000
12895000
12900000
12905000
12910000
12915000
12920000
12925000
12930000
12935000
12940000
12945000
12950000
12955000
12960000
12965000
12970000
12975000
12980000
12985000
12990000
12995000
13000000
13005000
13010000
13015000
13020000
13025000
13030000
13035000
13040000
13045000
13050000
13055000
13060000
13065000
13070000
13075000
13080000
13085000
13090000
13095000
13100000
13105000
13110000
13115000
13120000
13125000
13130000
13135000
13140000
13145000
13150000
13155000
13160000
13165000
13170000
13175000
13180000
13185000
13190000
13195000
13200000
13205000
13210000
13215000
13220000
13225000
13230000
13235000
13240000
13245000
13250000
13255000
13260000
13265000
13270000
13275000
13280000
13285000
13290000
13295000
13300000
13305000
13310000
13315000
13320000
13325000
13330000
13335000
13340000
13345000
13350000
13355000
13360000
13365000
13370000
13375000
13380000
13385000
13390000
13395000
13400000
13405000
13410000
13415000
13420000
13425000
13430000
13435000
13440000
13445000
13450000
13455000
13460000
13465000
13470000
13475000
13480000
13485000
13490000
13495000
13500000
13505000
13510000
13515000
13520000
13525000
13530000
13535000
13540000
13545000
13550000
13555000
13560000
13565000
13570000
13575000
13580000
13585000
13590000
13595000
13600000
13605000
13610000
13615000
13620000
13625000
13630000
13635000
13640000
13645000
13650000
13655000
13660000
13665000
13670000
13675000
13680000
13685000
13690000
13695000
13700000
13705000
13710000
13715000
13720000
13725000
13730000
13735000
13740000
13745000
13750000
13755000
13760000
13765000
13770000
13775000
13780000
13785000
13790000
13795000
13800000
13805000
13810000
13815000
13820000
13825000
13830000
13835000
13840000
13845000
13850000
13855000
13860000
13865000
13870000
13875000
13880000
13885000
13890000
13895000
13900000
13905000
13910000
13915000
13920000
13925000
13930000
13935000
13940000
13945000
13950000
13955000
13960000
13965000
13970000
13975000
13980000
13985000
13990000
13995000
14000000
14005000
14010000
14015000
14020000
14025000
14030000
14035000
14040000
14045000
14050000
14055000
14060000
14065000
14070000
14075000
14080000
14085000
14090000
14095000
14100000
14105000
14110000
14115000
14120000
14125000
14130000
14135000
14140000
14145000
14150000
14155000
14160000
14165000
14170000
14175000
14180000
14185000
14190000
14195000
14200000
14205000
14210000
14215000
14220000
14225000
14230000
14235000
14240000
14245000
14250000
14255000
14260000
14265000
14270000
14275000
14280000
14285000
14290000
14295000
14300000
14305000
14310000
14315000
14320000
14325000
14330000
14335000
14340000
14345000
14350000
14355000
14360000
14365000
14370000
14375000
14380000
14385000
14390000
14395000
14400000
14405000
14410000
14415000
14420000
14425000
14430000
14435000
14440000
14445000
14450000
14455000
14460000
14465000
14470000
14475000
14480000
14485000
14490000
14495000
14500000
14505000
14510000
14515000
14520000
14525000
14530000
14535000
14540000
14545000
14550000
14555000
14560000
14565000
14570000
14575000
14580000
14585000
14590000
14595000
14600000
14605000
14610000
14615000
14620000
14625000
14630000
14635000
14640000
14645000
14650000
14655000
14660000
14665000
14670000
14675000
14680000
14685000
14690000
14695000
14700000
14705000
14710000
14715000
14720000
14725000
14730000
14735000
14740000
14745000
14750000
14755000
14760000
14765000
14770000
14775000
14780000
14785000
14790000
14795000
14800000
14805000
14810000
14815000
14820000
14825000
14830000
14835000
14840000
14845000
14850000
14855000
14860000
14865000
14870000
14875000
14880000
14885000
14890000
14895000
14900000
14905000
14910000
14915000
14920000
14925000
14930000
14935000
14940000
14945000
14950000
14955000
14960000
14965000
14970000
14975000
14980000
14985000
14990000
14995000
15000000
15005000
15010000
15015000
15020000
15025000
15030000
15035000
15040000
15045000
15050000
15055000
15060000
15065000
15070000
15075000
15080000
15085000
15090000
15095000
15100000
15105000
15110000
15115000
15120000
15125000
15130000
15135000
15140000
15145000
15150000
15155000
15160000
15165000
15170000
15175000
15180000
15185000
15190000
15195000
15200000
15205000
15210000
15215000
15220000
15225000
15230000
15235000
15240000
15245000
15250000
15255000
15260000
15265000
15270000
15275000
15280000
15285000
15290000
15295000
15300000
15305000
15310000
15315000
15320000
15325000
15330000
15335000
15340000
15345000
15350000
15355000
15360000
15365000
15370000
15375000
15380000
15385000
15390000
15395000
15400000
15405000
15410000
15415000
15420000
15425000
15430000
15435000
15440000
15445000
15450000
15455000
15460000
15465000
15470000
15475000
15480000
15485000
15490000
15495000
15500000
15505000
15510000
15515000
15520000
15525000
15530000
15535000
15540000
15545000
15550000
15555000
15560000
15565000
15570000
15575000
15580000
15585000
15590000
15595000
15600000
15605000
15610000
15615000
15620000
15625000
15630000
15635000
15640000
15645000
15650000
15655000
15660000
15665000
15670000
15675000
15680000
15685000
15690000
15695000
15700000
15705000
15710000
15715000
15720000
15725000
15730000
15735000
15740000
15745000
15750000
15755000
15760000
15765000
15770000
15775000
15780000
15785000
15790000
15795000
15800000
15805000
15810000
15815000
15820000
15825000
15830000
15835000
15840000
15845000
15850000
15855000
15860000
15865000
15870000
15875000
15880000
15885000
15890000
15895000
15900000
15905000
15910000
15915000
15920000
15925000
15930000
15935000
15940000
15945000
15950000
15955000
15960000
15965000
15970000
15975000
15980000
15985000
15990000
15995000
16000000
16005000
16010000
16015000
16020000
16025000
16030000
16035000
16040000
16045000
16050000
16055000
16060000
16065000
16070000
16075000
16080000
16085000
16090000
16095000
16100000
16105000
16110000
16115000
16120000
16125000
16130000
16135000
16140000
16145000
16150000
16155000
16160000
16165000
16170000
16175000
16180000
16185000
16190000
16195000
16200000
16205000
16210000
16215000
16220000
16225000
16230000
16235000
16240000
16245000
16250000
16255000
16260000
16265000
16270000
16275000
16280000
16285000
16290000
16295000
16300000
16305000
16310000
16315000
16320000
16325000
16330000
16335000
16340000
16345000
16350000
16355000
16360000
16365000
16370000
16375000
16380000
16385000
16390000
16395000
16400000
16405000
16410000
16415000
16420000
16425000
16430000
16435000
16440000
16445000
16450000
16455000
16460000
16465000
16470000
16475000
16480000
16485000
16490000
16495000
16500000
16505000
16510000
16515000
16520000
16525000
16530000
16535000
16540000
16545000
16550000
16555000
16560000
16565000
16570000
16575000
16580000
16585000
16590000
16595000
16600000
16605000
16610000
16615000
16620000
16625000
16630000
16635000
16640000
16645000
16650000
16655000
16660000
16665000
16670000
16675000
16680000
16685000
16690000
16695000
16700000
16705000
16710000
16715000
16720000
16725000
16730000
16735000
16740000
16745000
16750000
16755000
16760000
16765000
16770000
16775000
16780000
16785000
16790000
16795000
16800000
16805000
16810000
16815000
16820000
16825000
16830000
16835000
16840000
16845000
16850000
16855000
16860000
16865000
16870000
16875000
16880000
16885000
16890000
16895000
16900000
16905000
16910000
16915000
16920000
16925000
16930000
16935000
16940000
16945000
16950000
16955000
16960000
16965000
16970000
16975000
16980000
16985000
16990000
16995000
17000000
17005000
17010000
17015000
17020000
17025000
17030000
17035000
17040000
17045000
17050000
17055000
17060000
17065000
17070000
17075000
17080000
17085000
17090000
17095000
17100000
17105000
17110000
17115000
17120000
17125000
17130000
17135000
17140000
17145000
17150000
17155000
17160000
17165000
17170000
17175000
17180000
17185000
17190000
17195000
17200000
17205000
17210000
17215000
17220000
17225000
17230000
17235000
17240000
17245000
17250000
17255000
17260000
17265000
17270000
17275000
17280000
17285000
17290000
17295000
17300000
17305000
17310000
17315000
17320000
17325000
17330000
17335000
17340000
17345000
17350000
17355000
17360000
17365000
17370000
17375000
17380000
17385000
17390000
17395000
17400000
17405000
17410000
17415000
17420000
17425000
17430000
17435000
17440000
17445000
17450000
17455000
17460000
17465000
17470000
17475000
17480000
17485000
17490000
17495000
17500000
17505000
17510000
17515000
17520000
17525000
17530000
17535000
17540000
17545000
17550000
17555000
17560000
17565000
17570000
17575000
17580000
17585000
17590000
17595000
17600000
17605000
17610000
17615000
17620000
17625000
17630000
17635000
17640000
17645000
17650000
17655000
17660000
17665000
17670000
17675000
17680000
17685000
17690000
17695000
17700000
17705000
17710000
17715000
17720000
17725000
17730000
17735000
17740000
17745000
17750000
17755000
17760000
17765000
17770000
17775000
17780000
17785000
17790000
17795000
17800000
17805000
17810000
17815000
17820000



General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities: Geographic Data: download from ESRI Stories; Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Bathymetry

- Major Contours (2.5 m interval)
- Minor Contours (0.50 m interval)
- Slope Gradient >= 10°

The elevation values for the current display:

Minimum: -34.26m

Maximum: -18.11m

Bathymetric Grid

-18 -21 -24 -27 -30 -33 -36 -39 -42

MBES surface was created at 50 cm resolution.
Bathymetric Grid: values are elevation, in meters

Multibeam Echosounder Processing Notes

Multibeam bathymetry data were processed in QPS Qimera 2.2.1.

Data Import and Navigation

Qinsy Database (DB) files were imported into Qimera 2.2.1, and an initial surface was made; post-processed POSPac PP-RTX results in the form of Smoothed Best Estimate Trajectories (SBETs) were imported. In Qimera, position and altitude data were analyzed for erroneous points; these data points were flagged and then removed.

Sound Velocity Correction

Sound velocity data were imported, evaluated for erroneous points, and applied to the MBES data. Unless sound velocity errors were noted, "Nearest in Distance Within Time – 360 minutes" was the method for pairing SV casts to the DB files.

Vertical Datum

The data were then converted to the working vertical datum, MLLW, by the application of NOAA V-Datum separation model; this separation model shifted the SBET from its native ellipsoidal elevation.The data were checked for tidal errors, refraction, and noise and adjusted where necessary.

Data Cleaning

Data were filtered using an TPU (Total Propagated Uncertainty) filter for IHO Special Order. Data were then manually edited and cleaned using the swath, slice, and 3D editor tools in Qimera. The Density Grid was analyzed prior to cutting any outer beams (if necessary) to ensure a minimum of 5 pings per square meter. The final surface was inspected using the Uncertainty Grid (95% confidence level) for any remaining outliers to be removed. Final QC was performed using the Density, Uncertainty (95%), Total Horizontal Uncertainty (THU), and Total Vertical Uncertainty (TVU) grids.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) / RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer
Sparker[1]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[1]
Acquisition Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

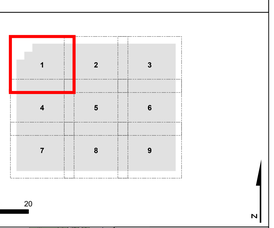
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

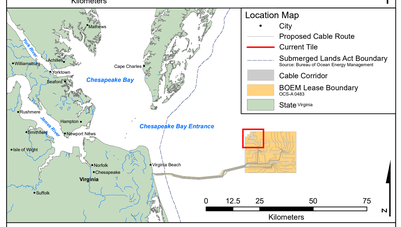
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title:

CVOW-C Geophysical Survey 2021

Chart Title:

CHART 2
BATHYMETRY
TILE 1 of 9

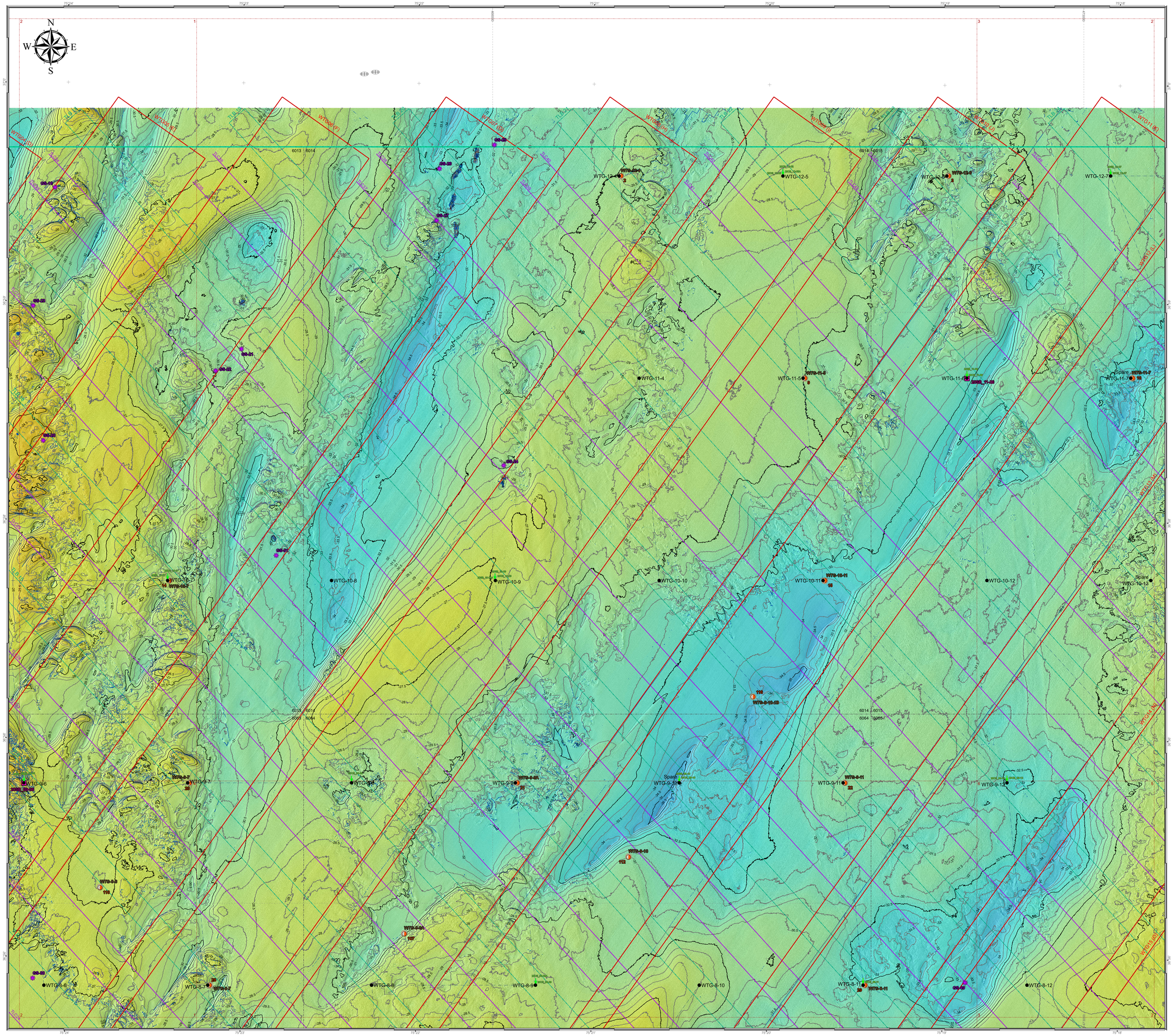
DATE	NOTE	AUTHOR	CHKD	APPD
06/04/21	DRAFT	CLS	KMM	KMM
06/14/21	Rev00	CLS	KDW	KMM
07/29/21	Rev01	CLS	KDW	KMM

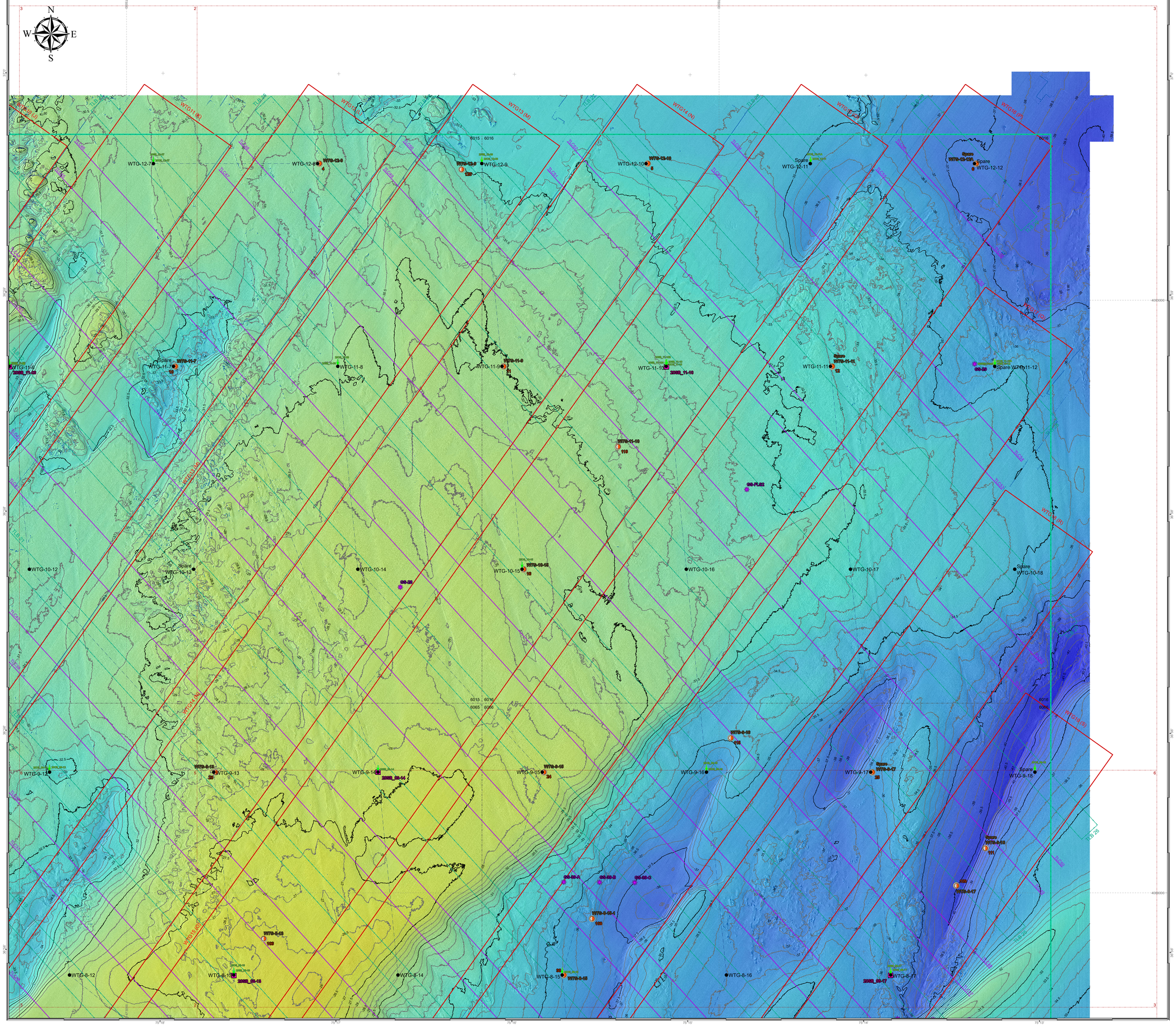
Rev01

Date: 7/29/2021

File Name: Dominion_Bathymetry_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


N
W
E
S
WTG-12-4
WTG-12-5
WTG-12-6
WTG-12-7
WTG-11-4
WTG-11-5
WTG-11-6
WTG-11-7
WTG-10-8
WTG-10-9
WTG-10-10
WTG-10-11
WTG-10-12
WTG-9-6
WTG-9-7
WTG-9-8
WTG-9-9
WTG-9-10
WTG-9-11
WTG-9-12
WTG-8-6
WTG-8-7
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
WTG-8-12
Spare
6013 6014
6014 6015
6015 6014
6015 6044
6014 6064 6065
TLB 01
TLB 02
TLB 03
TLB 04
TLB 05
TLB 06
TLB 07
TLB 08
TLB 09
TLB 10
TLB 11
TLB 12
WTG01(K)
WTG02(K)
WTG03(K)
WTG04(K)
WTG05(K)
WTG06(K)
WTG07(K)
WTG08(K)
WTG09(K)
WTG10(K)
WTG11(K)
WTG12(K)
WTG13(K)
WTG14(K)
WTG15(K)
WTG16(K)
WTG17(K)
WTG18(K)
WTG19(K)
WTG20(K)
WTG21(K)
WTG22(K)
WTG23(K)
WTG24(K)
WTG25(K)
WTG26(K)
WTG27(K)
WTG28(K)
WTG29(K)
WTG30(K)
WTG31(K)
WTG32(K)
WTG33(K)
WTG34(K)
WTG35(K)
WTG36(K)
WTG37(K)
WTG38(K)
WTG39(K)
WTG40(K)
WTG41(K)
WTG42(K)
WTG43(K)
WTG44(K)
WTG45(K)
WTG46(K)
WTG47(K)
WTG48(K)
WTG49(K)
WTG50(K)
WTG51(K)
WTG52(K)
WTG53(K)
WTG54(K)
WTG55(K)
WTG56(K)
WTG57(K)
WTG58(K)
WTG59(K)
WTG60(K)
WTG61(K)
WTG62(K)
WTG63(K)
WTG64(K)
WTG65(K)
WTG66(K)
WTG67(K)
WTG68(K)
WTG69(K)
WTG70(K)
WTG71(K)
WTG72(K)
WTG73(K)
WTG74(K)
WTG75(K)
WTG76(K)
WTG77(K)
WTG78(K)
WTG79(K)
WTG80(K)
WTG81(K)
WTG82(K)
WTG83(K)
WTG84(K)
WTG85(K)
WTG86(K)
WTG87(K)
WTG88(K)
WTG89(K)
WTG90(K)
WTG91(K)
WTG92(K)
WTG93(K)
WTG94(K)
WTG95(K)
WTG96(K)
WTG97(K)
WTG98(K)
WTG99(K)
WTG100(K)
WTG101(K)
WTG102(K)
WTG103(K)
WTG104(K)
WTG105(K)
WTG106(K)
WTG107(K)
WTG108(K)
WTG109(K)
WTG110(K)
WTG111(K)
WTG112(K)
WTG113(K)
WTG114(K)
WTG115(K)
WTG116(K)
WTG117(K)
WTG118(K)
WTG119(K)
WTG120(K)
WTG121(K)
WTG122(K)
WTG123(K)
WTG124(K)
WTG125(K)
WTG126(K)
WTG127(K)
WTG128(K)
WTG129(K)
WTG130(K)
WTG131(K)
WTG132(K)
WTG133(K)
WTG134(K)
WTG135(K)
WTG136(K)
WTG137(K)
WTG138(K)
WTG139(K)
WTG140(K)
WTG141(K)
WTG142(K)
WTG143(K)
WTG144(K)
WTG145(K)
WTG146(K)
WTG147(K)
WTG148(K)
WTG149(K)
WTG150(K)
WTG151(K)
WTG152(K)
WTG153(K)
WTG154(K)
WTG155(K)
WTG156(K)
WTG157(K)
WTG158(K)
WTG159(K)
WTG160(K)
WTG161(K)
WTG162(K)
WTG163(K)
WTG164(K)
WTG165(K)
WTG166(K)
WTG167(K)
WTG168(K)
WTG169(K)
WTG170(K)
WTG171(K)
WTG172(K)
WTG173(K)
WTG174(K)
WTG175(K)
WTG176(K)
WTG177(K)
WTG178(K)
WTG179(K)
WTG180(K)
WTG181(K)
WTG182(K)
WTG183(K)
WTG184(K)
WTG185(K)
WTG186(K)
WTG187(K)
WTG188(K)
WTG189(K)
WTG190(K)
WTG191(K)
WTG192(K)
WTG193(K)
WTG194(K)
WTG195(K)
WTG196(K)
WTG197(K)
WTG198(K)
WTG199(K)
WTG200(K)
WTG201(K)
WTG202(K)
WTG203(K)
WTG204(K)
WTG205(K)
WTG206(K)
WTG207(K)
WTG208(K)
WTG209(K)
WTG210(K)
WTG211(K)
WTG212(K)
WTG213(K)
WTG214(K)
WTG215(K)
WTG216(K)
WTG217(K)
WTG218(K)
WTG219(K)
WTG220(K)
WTG221(K)
WTG222(K)
WTG223(K)
WTG224(K)
WTG225(K)
WTG226(K)
WTG227(K)
WTG228(K)
WTG229(K)
WTG230(K)
WTG231(K)
WTG232(K)
WTG233(K)
WTG234(K)
WTG235(K)
WTG236(K)
WTG237(K)
WTG238(K)
WTG239(K)
WTG240(K)
WTG241(K)
WTG242(K)
WTG243(K)
WTG244(K)
WTG245(K)
WTG246(K)
WTG247(K)
WTG248(K)
WTG249(K)
WTG250(K)
WTG251(K)
WTG252(K)
WTG253(K)
WTG254(K)
WTG255(K)
WTG256(K)
WTG257(K)
WTG258(K)
WTG259(K)
WTG260(K)
WTG261(K)
WTG262(K)
WTG263(K)
WTG264(K)
WTG265(K)
WTG266(K)
WTG267(K)
WTG268(K)
WTG269(K)
WTG270(K)
WTG271(K)
WTG272(K)
WTG273(K)
WTG274(K)
WTG275(K)
WTG276(K)
WTG277(K)
WTG278(K)
WTG279(K)
WTG280(K)
WTG281(K)
WTG282(K)
WTG283(K)
WTG284(K)
WTG285(K)
WTG286(K)
WTG287(K)
WTG288(K)
WTG289(K)
WTG290(K)
WTG291(K)
WTG292(K)
WTG293(K)
WTG294(K)
WTG295(K)
WTG296(K)
WTG297(K)
WTG298(K)
WTG299(K)
WTG300(K)
WTG301(K)
WTG302(K)
WTG303(K)
WTG304(K)
WTG305(K)
WTG306(K)
WTG307(K)
WTG308(K)
WTG309(K)
WTG310(K)
WTG311(K)
WTG312(K)
WTG313(K)
WTG314(K)
WTG315(K)
WTG316(K)
WTG317(K)
WTG318(K)
WTG319(K)
WTG320(K)
WTG321(K)
WTG322(K)
WTG323(K)
WTG324(K)
WTG325(K)
WTG326(K)
WTG327(K)
WTG328(K)
WTG329(K)
WTG330(K)
WTG331(K)
WTG332(K)
WTG333(K)
WTG334(K)
WTG335(K)
WTG336(K)
WTG337(K)
WTG338(K)
WTG339(K)
WTG340(K)
WTG341(K)
WTG342(K)
WTG343(K)
WTG344(K)
WTG345(K)
WTG346(K)
WTG347(K)
WTG348(K)
WTG349(K)
WTG350(K)
WTG351(K)
WTG352(K)
WTG353(K)
WTG354(K)
WTG355(K)
WTG356(K)
WTG357(K)
WTG358(K)
WTG359(K)
WTG360(K)
WTG361(K)
WTG362(K)
WTG363(K)
WTG364(K)
WTG365(K)
WTG366(K)
WTG367(K)
WTG368(K)
WTG369(K)
WTG370(K)
WTG371(K)
WTG372(K)
WTG373(K)
WTG374(K)
WTG375(K)
WTG376(K)
WTG377(K)
WTG378(K)
WTG379(K)
WTG380(K)
WTG381(K)
WTG382(K)
WTG383(K)
WTG384(K)
WTG385(K)
WTG386(K)
WTG387(K)
WTG388(K)
WTG389(K)
WTG390(K)
WTG391(K)
WTG392(K)
WTG393(K)
WTG394(K)
WTG395(K)
WTG396(K)
WTG397(K)
WTG398(K)
WTG399(K)
WTG400(K)
WTG401(K)
WTG402(K)
WTG403(K)
WTG404(K)
WTG405(K)
WTG406(K)
WTG407(K)
WTG408(K)
WTG409(K)
WTG410(K)
WTG411(K)
WTG412(K)
WTG413(K)
WTG414(K)
WTG415(K)
WTG416(K)
WTG417(K)
WTG418(K)
WTG419(K)
WTG420(K)
WTG421(K)
WTG422(K)
WTG423(K)
WTG424(K)
WTG425(K)
WTG426(K)
WTG427(K)
WTG428(K)
WTG429(K)
WTG430(K)
WTG431(K)
WTG432(K)
WTG433(K)
WTG434(K)
WTG435(K)
WTG436(K)
WTG437(K)
WTG438(K)
WTG439(K)
WTG440(K)
WTG441(K)
WTG442(K)
WTG443(K)
WTG444(K)
WTG445(K)
WTG446(K)
WTG447(K)
WTG448(K)
WTG449(K)
WTG450(K)
WTG451(K)
WTG452(K)
WTG453(K)
WTG454(K)
WTG455(K)
WTG456(K)
WTG457(K)
WTG458(K)
WTG459(K)
WTG460(K)
WTG461(K)
WTG462(K)
WTG463(K)
WTG464(K)
WTG465(K)
WTG466(K)
WTG467(K)
WTG468(K)
WTG469(K)
WTG470(K)
WTG471(K)
WTG472(K)
WTG473(K)
WTG474(K)
WTG475(K)
WTG476(K)
WTG477(K)
WTG478(K)
WTG479(K)
WTG480(K)
WTG481(K)
WTG482(K)
WTG483(K)
WTG484(K)
WTG485(K)
WTG486(K)
WTG487(K)
WTG488(K)
WTG489(K)
WTG490(K)
WTG491(K)
WTG492(K)
WTG493(K)
WTG494(K)
WTG495(K)
WTG496(K)
WTG497(K)
WTG498(K)
WTG499(K)
WTG500(K)
WTG501(K)
WTG502(K)
WTG503(K)
WTG504(K)
WTG505(K)
WTG506(K)
WTG507(K)
WTG508(K)
WTG509(K)
WTG510(K)
WTG511(K)
WTG512(K)
WTG513(K)
WTG514(K)
WTG515(K)
WTG516(K)
WTG517(K)
WTG518(K)
WTG519(K)
WTG520(K)
WTG521(K)
WTG522(K)
WTG523(K)
WTG524(K)
WTG525(K)
WTG526(K)
WTG527(K)
WTG528(K)
WTG529(K)
WTG530(K)
WTG531(K)
WTG532(K)
WTG533(K)
WTG534(K)
WTG535(K)
WTG536(K)
WTG537(K)
WTG538(K)
WTG539(K)
WTG540(K)
WTG541(K)
WTG542(K)
WTG543(K)
WTG544(K)
WTG545(K)
WTG546(K)
WTG547(K)
WTG548(K)
WTG549(K)
WTG550(K)
WTG551(K)
WTG552(K)
WTG553(K)
WTG554(K)
WTG555(K)
WTG556(K)
WTG557(K)
WTG558(K)
WTG559(K)
WTG560(K)
WTG561(K)
WTG562(K)
WTG563(K)
WTG564(K)
WTG565(K)
WTG566(K)
WTG567(K)
WTG568(K)
WTG569(K)
WTG570(K)
WTG571(K)
WTG572(K)
WTG573(K)
WTG574(K)
WTG575(K)
WTG576(K)
WTG577(K)
WTG578(K)
WTG579(K)
WTG580(K)
WTG581(K)
WTG582(K)
WTG583(K)
WTG584(K)
WTG585(K)
WTG586(K)
WTG587(K)
WTG588(K)
WTG589(K)
WTG590(K)
WTG591(K)
WTG592(K)
WTG593(K)
WTG594(K)
WTG595(K)
WTG596(K)
WTG597(K)
WTG598(K)
WTG599(K)
WTG600(K)
WTG601(K)
WTG602(K)
WTG603(K)
WTG604(K)
WTG605(K)
WTG606(K)
WTG607(K)
WTG608(K)
WTG609(K)
WTG610(K)
WTG611(K)
WTG612(K)
WTG613(K)
WTG614(K)
WTG615(K)
WTG616(K)
WTG617(K)
WTG618(K)
WTG619(K)
WTG620(K)
WTG621(K)
WTG622(K)
WTG623(K)
WTG624(K)
WTG625(K)
WTG626(K)
WTG627(K)
WTG628(K)
WTG629(K)
WTG630(K)
WTG631(K)
WTG632(K)
WTG633(K)
WTG634(K)
WTG635(K)
WTG636(K)
WTG637(K)
WTG638(K)
WTG639(K)
WTG640(K)
WTG641(K)
WTG642(K)
WTG643(K)
WTG644(K)
WTG645(K)
WTG646(K)
WTG647(K)
WTG648(K)
WTG649(K)
WTG650(K)
WTG651(K)
WTG652(K)
WTG653(K)
WTG654(K)
WTG655(K)
WTG656(K)
WTG657(K)
WTG658(K)
WTG659(K)
WTG660(K)
WTG661(K)
WTG662(K)
WTG663(K)
WTG664(K)
WTG665(K)
WTG666(K)
WTG667(K)
WTG668(K)
WTG669(K)
WTG670(K)
WTG671(K)
WTG672(K)
WTG673(K)
WTG674(K)
WTG675(K)
WTG676(K)
WTG677(K)
WTG678(K)
WTG679(K)
WTG680(K)
WTG681(K)
WTG682(K)
WTG683(K)
WTG684(K)
WTG685(K)
WTG686(K)
WTG687(K)
WTG688(K)
WTG689(K)
WTG690(K)
WTG691(K)
WTG692(K)
WTG693(K)
WTG694(K)
WTG695(K)
WTG696(K)
WTG697(K)
WTG698(K)
WTG699(K)
WTG700(K)
WTG701(K)
WTG702(K)
WTG703(K)
WTG704(K)
WTG705(K)
WTG706(K)
WTG707(K)
WTG708(K)
WTG709(K)
WTG710(K)
WTG711(K)
WTG712(K)
WTG713(K)
WTG714(K)
WTG715(K)
WTG716(K)
WTG717(K)
WTG718(K)
WTG719(K)
WTG720(K)
WTG721(K)
WTG722(K)
WTG723(K)
WTG724(K)
WTG725(K)
WTG726(K)
WTG727(K)
WTG728(K)
WTG729(K)
WTG730(K)
WTG731(K)
WTG732(K)
WTG733(K)
WTG734(K)
WTG735(K)
WTG736(K)
WTG737(K)
WTG738(K)
WTG739(K)
WTG740(K)
WTG741(K)
WTG742(K)
WTG743(K)
WTG744(K)
WTG745(K)
WTG746(K)
WTG747(K)
WTG748(K)
WTG749(K)
WTG750(K)
WTG751(K)
WTG752(K)
WTG753(K)
WTG754(K)
WTG755(K)
WTG756(K)
WTG757(K)
WTG758(K)
WTG759(K)
WTG760(K)
WTG761(K)
WTG762(K)
WTG763(K)
WTG764(K)
WTG765(K)
WTG766(K)
WTG767(K)
WTG768(K)
WTG769(K)
WTG770(K)
WTG771(K)
WTG772(K)
WTG773(K)
WTG774(K)
WTG775(K)
WTG776(K)
WTG777(K)
WTG778(K)
WTG779(K)
WTG780(K)
WTG781(K)
WTG782(K)
WTG783(K)
WTG784(K)
WTG785(K)
WTG786(K)
WTG787(K)
WTG788(K)
WTG789(K)
WTG790(K)
WTG791(K)
WTG792(K)
WTG793(K)
WTG794(K)
WTG795(K)
WTG796(K)
WTG797(K)
WTG798(K)
WTG799(K)
WTG800(K)
WTG801(K)
WTG802(K)
WTG803(K)
WTG804(K)
WTG805(K)
WTG806(K)
WTG807(K)
WTG808(K)
WTG809(K)
WTG810(K)
WTG811(K)
WTG812(K)
WTG813(K)
WTG814(K)
WTG815(K)
WTG816(K)
WTG817(K)
WTG818(K)
WTG819(K)
WTG820(K)
WTG821(K)
WTG822(K)
WTG823(K)
WTG824(K)
WTG825(K)
WTG826(K)
WTG827(K)
WTG828(K)
WTG829(K)
WTG830(K)
WTG831(K)
WTG832(K)
WTG833(K)
WTG834(K)
WTG835(K)
WTG836(K)
WTG837(K)
WTG838(K)
WTG839(K)
WTG840(K)
WTG841(K)
WTG842(K)
WTG843(K)
WTG844(K)
WTG845(K)
WTG846(K)
WTG847(K)
WTG848(K)
WTG849(K)
WTG850(K)
WTG851(K)
WTG852(K)
WTG853(K)
WTG854(K)
WTG855(K)
WTG856(K)
WTG857(K)
WTG858(K)
WTG859(K)
WTG860(K)
WTG861(K)
WTG862(K)
WTG863(K)
WTG864(K)
WTG865(K)
WTG866(K)
WTG867(K)
WTG868(K)
WTG869(K)
WTG870(K)
WTG871(K)
WTG872(K)
WTG873(K)
WTG874(K)
WTG875(K)
WTG876(K)
WTG877(K)
WTG878(K)
WTG879(K)
WTG880(K)
WTG881(K)
WTG882(K)
WTG883(K)
WTG884(K)
WTG885(K)
WTG886(K)
WTG887(K)
WTG888(K)
WTG889(K)
WTG890(K)
WTG891(K)
WTG892(K)
WTG893(K)
WTG894(K)
WTG895(K)
WTG896(K)
WTG897(K)
WTG898(K)
WTG899(K)
WTG900(K)
WTG901(K)
WTG902(K)
WTG903(K)
WTG904(K)
WTG905(K)
WTG906(K)
WTG907(K)
WTG908(K)
WTG909(K)
WTG910(K)
WTG911(K)
WTG912(K)
WTG913(K)
WTG914(K)
WTG915(K)
WTG916(K)
WTG917(K)
WTG918(K)
WTG919(K)
WTG920(K)
WTG921(K)
WTG922(K)
WTG923(K)
WTG924(K)
WTG925(K)
WTG926(K)
WTG927(K)
WTG928(K)
WTG929(K)
WTG930(K)
WTG931(K)
WTG932(K)
WTG933(K)
WTG934(K)
WTG935(K)
WTG936(K)
WTG937(K)
WTG938(K)
WTG939(K)
WTG940(K)
WTG941(K)
WTG942(K)
WTG943(K)
WTG944(K)
WTG945(K)
WTG946(K)
WTG947(K)
WTG948(K)
WTG949(K)
WTG950(K)
WTG951(K)
WTG952(K)
WTG953(K)
WTG954(K)
WTG955(K)
WTG956(K)
WTG957(K)
WTG958(K)
WTG959(K)
WTG960(K)
WTG961(K)
WTG962(K)
WTG963(K)
WTG964(K)
WTG965(K)
WTG966(K)
WTG967(K)
WTG968(K)
WTG969(K)
WTG970(K)
WTG971(K)
WTG972(K)
WTG973(K)
WTG974(K)
WTG975(K)
WTG976(K)
WTG977(K)
WTG978(K)
WTG979(K)
WTG980(K)
WTG981(K)
WTG982(K)
WTG983(K)
WTG984(K)
WTG985(K)
WTG986(K)
WTG987(K)
WTG988(K)
WTG989(K)
WTG990(K)
WTG991(K)
WTG992(K)
WTG993(K)
WTG994(K)
WTG995(K)
WTG996(K)
WTG997(K)
WTG998(K)
WTG999(K)
WTG1000(K)
WTG1001(K)
WTG1002(K)
WTG1003(K)
WTG1004(K)
WTG1005(K)
WTG1006(K)
WTG1007(K)
WTG1008(K)
WTG1009(K)
WTG1010(K)
WTG1011(K)
WTG1012(K)
WTG1013(K)
WTG1014(K)
WTG1015(K)
WTG1016(K)
WTG1017(K)
WTG1018(K)
WTG1019(K)
WTG1020(K)
WTG1021(K)
WTG1022(K)
WTG1023(K)
WTG1024(K)
WTG1025(K)
WTG1026(K)
WTG1027(K)
WTG1028(K)
WTG1029(K)
WTG1030(K)
WTG1031(K)
WTG1032(K)
WTG1033(K)
WTG1034(K)
WTG1035(K)
WTG1036(K)
WTG1037(K)
WTG1038(K)
WTG1039(K)
WTG1040(K)
WTG1041(K)
WTG1042(K)
WTG1043(K)
WTG1044(K)
WTG1045(K)
WTG1046(K)
WTG1047(K)
WTG1048(K)
WTG1049(K)
WTG1050(K)
WTG1051(K)
WTG1052(K)
WTG1053(K)
WTG1054(K)
WTG1055(K)
WTG1056(K)
WTG1057(K)
WTG1058(K)
WTG1059(K)
WTG1060(K)
WTG1061(K)
WTG1062(K)
WTG1063(K)
WTG1064(K)
WTG1065(K)
WTG1066(K)
WTG1067(K)
WTG1068(K)
WTG1069(K)
WTG1070(K)
WTG1071(K)
WTG1072(K)
WTG1073(K)
WTG1074(K)
WTG1075(K)
WTG1076(K)
WTG1077(K)
WTG1078(K)
WTG1079(K)
WTG1080(K)
WTG1081(K)
WTG1082(K)
WTG1083(K)
WTG1084(K)
WTG1085(K)
WTG1086(K)
WTG1087(K)
WTG1088(K)
WTG1089(K)
WTG1090(K)
WTG1091(K)
WTG1092(K)
WTG1093(K)
WTG1094(K)
WTG1095(K)
WTG1096(K)
WTG1097(K)
WTG1098(K)
WTG1099(K)
WTG1100(K)
WTG1101(K)
WTG1102(K)
WTG1103(K)
WTG1104(K)
WTG1105(K)
WTG1106(K)
WTG1107(K)
WTG1108(K)
WTG1109(K)
WTG1110(K)
WTG1111(K)
WTG1112(K)
WTG1113(K)
WTG1114(K)
WTG1115(K)
WTG1116(K)
WTG1117(K)
WTG1118(K)
WTG1119(K)
WTG1120(K)
WTG1121(K)
WTG1122(K)
WTG1123(K)
WTG1124(K)
WTG1125(K)
WTG1126(K)
WTG1127(K)
WTG1128(K)
WTG1129(K)
WTG1130(K)
WTG1131(K)
WTG1132(K)
WTG1133(K)
WTG1134(K)
WTG1135(K)
WTG1136(K)
WTG1137(K)
WTG1138(K)
WTG1139(K)
WTG1140(K)
WTG1141(K)
WTG1142(K)
WTG1143(K)
WTG1144(K)
WTG1145(K)
WTG1146(K)
WTG1147(K)
WTG1148(K)
WTG1149(K)
WTG1150(K)
WTG1151(K)
WTG1152(K)
WTG1153(K)
WTG1154(K)
WTG1155(K)
WTG1156(K)
WTG1157(K)
WTG1158(K)
WTG1159(K)
WTG1160(K)
WTG1161(K)
WTG1162(K)
WTG1163(K)
WTG1164(K)
WTG1165(K)
WTG1166(K)
WTG1167(K)
WTG1168(K)
WTG1169(K)
WTG1170(K)
WTG1171(K)
WTG1172(K)
WTG1173(K)
WTG1174(K)
WTG1175(K)
WTG1176(K)
WTG1177(K)
WTG1178(K)
WTG1179(K)
WTG1180(K)
WTG1181(K)
WTG1182(K)
WTG1183(K)
WTG1184(K)
WTG1185(K)
WTG1186(K)
WTG1187(K)
WTG1188(K)
WTG1189(K)
WTG1190(K)
WTG1191(K)
WTG1192(K)
WTG1193(K)
WTG1194(K)
WTG1195(K)
WTG1196(K)
WTG1197(K)
WTG1198(K)
WTG1199(K)
WTG1200(K)
WTG1201(K)
WTG1202(K)
WTG1203(K)
WTG1204(K)
WTG1205(K)
WTG1206(K)
WTG1207(K)
WTG1208(K)
WTG1209(K)
WTG1210(K)
WTG1211(K)
WTG1212(K)
WTG1213(K)
WTG1214(K)
WTG1215(K)
WTG1216(K)
WTG1217(K)
WTG1218(K)
WTG1219(K)
WTG1220(K)
WTG1221(K)
WTG1222(K)
WTG1223(K)
WTG1224(K)
WTG1225(K)
WTG1226(K)
WTG1227(K)
WTG1228(K)
WTG1229(K)
WTG1230(K)
WTG1231(K)
WTG1232(K)
WTG1233(K)
WTG1234(K)
WTG1235(K)
WTG1236(K)
WTG1237(K)
WTG1238(K)
WTG1239(K)
WTG1240(K)
WTG1241(K)
WTG1242(K)
WTG1243(K)
WTG1244(K)
WTG1245(K)
WTG1246(K)
WTG1247(K)
WTG1248(K)
WTG1249(K)
WTG1250(K)
WTG1251(K)
WTG1252(K)
WTG1253(K)
WTG1254(K)
WTG1255(K)
WTG1256(K)
WTG1257(K)
WTG1258(K)
WTG1259(K)
WTG1260(K)
WTG1261(K)
WTG1262(K)
WTG1263(K)
WTG1264(K)
WTG1265(K)
WTG1266(K)
WTG1267(K)
WTG1268(K)
WTG1269(K)
WTG1270(K)
WTG1271(K)
WTG1272(K)
WTG1273(K)
WTG1274(K)
WTG1275(K)
WTG1276(K)
WTG1277(K)
WTG1278(K)
WTG1279(K)
WTG1280(K)
WTG1281(K)
WTG1282(K)
WTG1283(K)
WTG1284(K)
WTG1285(K)
WTG1286(K)
WTG1287(K)
WTG1288(K)
WTG1289(K)
WTG1290(K)
WTG1291(K)
WTG1292(K)
WTG1293(K)
WTG1294(K)
WTG1295(K)
WTG1296(K)
WTG1297(K)
WTG1298(K)
WTG1299(K)
WTG1300(K)
WTG1301(K)
WTG1302(K)
WTG1303(K)
WTG1304(K)
WTG1305(K)
WTG1306(K)
WTG1307(K)
WTG1308(K)
WTG1309(K)
WTG1310(K)
WTG1311(K)
WTG1312(K)
WTG1313(K)
WTG1314(K)
WTG1315(K)
WTG1316(K)
WTG1317(K)
WTG1318(K)
WTG1319(K)
WTG1320(K)
WTG1321(K)
WTG1322(K)
WTG1323(K)
WTG1324(K)
WTG1325(K)
WTG1326(K)
WTG1327(K)
WTG1328(K)
WTG1329(K)
WTG1330(K)
WTG1331(K)
WTG1332(K)
WTG1333(K)
WTG1334(K)
WTG1335(K)
WTG1336(K)
WTG1337(K)
WTG1338(K)
WTG1339(K)
WTG1340(K)
WTG1341(K)
WTG1342(K)
WTG1343(K)
WTG1344(K)
WTG1345(K)
WTG1346(K)
WTG1347(K)
WTG1348(K)
WTG1349(K)
WTG1350(K)
WTG1351(K)
WTG1352(K)
WTG1353(K)
WTG1354(K)
WTG1355(K)
WTG1356(K)
WTG1357(K)
WTG1358(K)
WTG1359(K)
WTG1360(K)
WTG1361(K)
WTG1362(K)
WTG1363(K)
WTG1364(K)
WTG1365(K)
WTG1366(K)
WTG1367(K)
WTG1368(K)
WTG1369(K)
WTG1370(K)
WTG1371(K)
WTG1372(K)
WTG1373(K)
WTG1374(K)
WTG1375(K)
WTG1376(K)
WTG1377(K)
WTG1378(K)
WTG1379(K)
WTG1380(K)
WTG1381(K)
WTG1382(K)
WTG1383(K)
WTG1384(K)
WTG1385(K)
WTG1386(K)
WTG1387(K)
WTG1388(K)
WTG1389(K)
WTG1390(K)
WTG1391(K)
WTG1392(K)
WTG1393(K)
WTG1394(K)
WTG1395(K)
WTG1396(K)
WTG1397(K)
WTG1398(K)
WTG1399(K)
WTG1400(K)
WTG1401(K)
WTG1402(K)
WTG1403(K)
WTG1404(K)
WTG1405(K)
WTG1406(K)
WTG1407(K)
WTG1408(K)
WTG1409(K)
WTG1410(K)
WTG1411(K)
WTG1412(K)
WTG1413(K)
WTG1414(K)
WTG1415(K)
WTG1416(K)
WTG1417(K)
WTG1418(K)
WTG1419(K)
WTG1420(K)
WTG1421(K)
WTG1422(K)
WTG1423(K)
WTG1424(K)
WTG1425(K)
WTG1426(K)
WTG1427(K)
WTG1428(K)
WTG1429(K)
WTG1430(K)
WTG1431(K)
WTG1432(K)
WTG1433(K)
WTG1434(K)
WTG1435(K)
WTG1436(K)
WTG1437(K)
WTG1438(K)
WTG1439(K)
WTG1440(K)
WTG1441(K)
WTG1442(K)
WTG1443(K)
WTG1444(K)
WTG1445(K)
WTG1446(K)
WTG1447(K)
WTG1448(K)
WTG1449(K)
WTG1450(K)
WTG1451(K)
WTG1452(K)
WTG1453(K)
WTG1454(K)
WTG1455(K)
WTG1456(K)
WTG1457(K)
WTG1458(K)
WTG1459(K)
WTG1460(K)
WTG1461(K)
WTG1462(K)
WTG1463(K)
WTG1464(K)
WTG1465(K)
WTG1466(K)
WTG1467(K)
WTG1468(K)
WTG1469(K)
WTG1470(K)
WTG1471(K)
WTG1472(K)
WTG1473(K)
WTG1474(K)
WTG1475(K)
WTG1476(K)
WTG1477(K)
WTG1478(K)
WTG1479(K)
WTG1480(K)
WTG1481(K)
WTG1482(K)
WTG1483(K)
WTG1484(K)
WTG1485(K)
WTG1486(K)
WTG1487(K)
WTG1488(K)
WTG1489(K)
WTG1490(K)
WTG1491(K)
WTG1492(K)
WTG1493(K)
WTG1494(K)
WTG1495(K)
WTG1496(K)
WTG1497(K)
WTG1498(K)
WTG1499(K)
WTG1500(K)
WTG1501(K)
WTG1502(K)
WTG1503(K)
WTG1504(K)
WTG1505(K)
WTG1506(K)
WTG1507(K)
WTG1508(K)
WTG1509(K)
WTG1510(K)
WTG1511(K)
WTG1512(K)
WTG1513(K)
WTG1514(K)
WTG1515(K)
WTG1516(K)
WTG1517(K)
WTG1518(K)
WTG1519(K)
WTG1520(K)
WTG1521(K)
WTG1522(K)
WTG1523(K)
WTG1524(K)
WTG1525(K)
WTG1526(K)
WTG1527(K)
WTG1528(K)
WTG1529(K)
WTG1530(K)
WTG1531(K)
WTG1532(K)
WTG1533(K)
WTG1534(K)
WTG1535(K)
WTG1536(K)
WTG1537(K)
WTG1538(K)
WTG1539(K)
WTG1540(K)
WTG1541(K)
WTG1542(K)
WTG1543(K)
WTG1544(K)
WTG1545(K)
WTG1546(K)
WTG1547(K)
WTG1548(K)
WTG1549(K)
WTG1550(K)
WTG1551(K)
WTG1552(K)
WTG1553(K)
WTG1554(K)
WTG1555(K)
WTG1556(K)
WTG1557(K)
WTG1558(K)
WTG1559(K)
WTG1560(K)
WTG1561(K)
WTG1562(K)
WTG1563(K)
WTG1564(K)
WTG1565(K)
WTG1566(K)
WTG1567(K)
WTG1568(K)
WTG1569(K)
WTG1570(K)
WTG1571(K)
WTG1572(K)
WTG1573(K)
WTG1574(K)
WTG1575(K)
WTG1576(K)
WTG1577(K)
WTG1578(K)
WTG1579(K)
WTG1580(K)
WTG1581(K)
WTG1582(K)
WTG1583(K)
WTG1584(K)
WTG1585(K)
WTG1586(K)
WTG1587(K)
WTG1588(K)
WTG1589(K)
WTG1590(K)
WTG1591(K)
WTG1592(K)
WTG1593(K)
WTG1594(K)
WTG1595(K)
WTG1596(K)
WTG1597(K)
WTG1598(K)
WTG1599(K)
WTG1600(K)
WTG1601(K)
WTG1602(K)
WTG1603(K)
WTG1604(K)
WTG1605(K)
WTG1606(K)
WTG1607(K)
WTG1608(K)
WTG1609(K)
WTG1610(K)
WTG1611(K)
WTG1612(K)
WTG1613(K)
WTG1614(K)
WTG1615(K)
WTG1616(K)
WTG1617(K)
WTG1618(K)
WTG1619(K)
WTG1620(K)
WTG1621(K)
WTG1622(K)
WTG1623(K)
WTG1624(K)
WTG1625(K)
WTG1626(K)
WTG1627(K)
WTG1628(K)
WTG1629(K)
WTG1630(K)
WTG1631(K)
WTG1632(K)
WTG1633(K)
WTG1634(K)
WTG1635(K)
WTG1636(K)
WTG1637(K)
WTG1638(K)
WTG1639(K)
WTG1640(K)
WTG1641(K)
WTG1642(K)
WTG1643(K)
WTG1644(K)
WTG1645(K)
WTG1646(K)
WTG1647(K)
WTG1648(K)
WTG1649(K)
WTG1650(K)
WTG1651(K)
WTG1652(K)
WTG1653(K)
WTG1654(K)
WTG1655(K)
WTG1656(K)
WTG1657(K)
WTG1658(K)
WTG1659(K)
WTG1660(K)
WTG1661(K)
WTG1662(K)
WTG1663(K)
WTG1664(K)
WTG1665(K)
WTG1666(K)
WTG1667(K)
WTG1668(K)
WTG1669(K)
WTG1670(K)
WTG1671(K)
WTG1672(K)
WTG1673(K)
WTG1674(K)
WTG1675(K)
WTG1676(K)
WTG1677(K)
WTG1678(K)
WTG1679(K)
WTG1680(K)
WTG1681(K)
WTG1682(K)
WTG1683(K)
WTG1684(K)
WTG1685(K)
WTG1686(K)
WTG1687(K)
WTG1688(K)
WTG1689(K)
WTG1690(K)
WTG1691(K)
WTG1692(K)
WTG1693(K)
WTG1694(K)
WTG1695(K)
WTG1696(K)
WTG1697(K)
WTG1698(K)
WTG1699(K)
WTG1700(K)
WTG1701(K)
WTG1702(K)
WTG1703(K)
WTG1704(K)
WTG1705(K)
WTG1706(K)
WTG1707(K)
WTG1708(K)
WTG1709(K)
WTG1710(K)
WTG1711(K)
WTG1712(K)
WTG1713(K)
WTG1714(K)
WTG1715(K)
WTG1716(K)
WTG1717(K)
WTG1718(K)
WTG1719(K)
WTG1720(K)
WTG1721(K)
WTG1722(K)
WTG1723(K)
WTG1724(K)
WTG1725(K)
WTG1726(K)
WTG1727(K)
WTG1728(K)
WTG1729(K)
WTG1730(K)
WTG1731(K)
WTG1732(K)
WTG1733(K)
WTG1734(K)
WTG1735(K)
WTG1736(K)
WTG1737(K)
WTG1738(K)
WTG1739(K)
WTG1740(K)
WTG1741(K)
WTG1742(K)
WTG1743(K)
WTG1744(K)
WTG1745(K)
WTG1746(K)
WTG1747(K)
WTG1748(K)
WTG1749(K)
WTG1750(K)
WTG1751(K)
WTG1752(K)
WTG1753(K)
WTG1754(K)
WTG1755(K)
WTG1756(K)
WTG1757(K)
WTG1758(K)
WTG1759(K)
WTG1760(K)
WTG1761(K)
WTG1762(K)
WTG1763(K)
WTG1764(K)
WTG1765(K)
WTG1766(K)
WTG1767(K)
WTG1768(K)
WTG1769(K)
WTG1770(K)
WTG1771(K)
WTG1772(K)
WTG1773(K)
WTG1774(K)
WTG1775(K)
WTG1776(K)
WTG1777(K)
WTG1778(K)
WTG1779(K)
WTG1780(K)
WTG1781(K)
WTG1782(K)
WTG1783(K)
WTG1784(K)
WTG1785(K)
WTG1786(K)
WTG1787(K)
WTG1788(K)
WTG1789(K)
WTG1790(K)
WTG1791(K)
WTG1792(K)
WTG1793(K)
WTG1794(K)
WTG1795(K)
WTG1796(K)
WTG1797(K)
WTG1798(K)
WTG1799(K)
WTG1800(K)
WTG1801(K)
WTG1802(K)
WTG1803(K)
WTG1804(K)
WTG1805(K)
WTG1806(K)
WTG1807(K)
WTG1808(K)
WTG1809(K)
WTG1810(K)
WTG1811(K)
WTG1812(K)
WTG1813(K)
WTG1814(K)
WTG1815(K)
WTG1816(K)
WTG1817(K)
WTG1818(K)
WTG1819(K)
WTG1820(K)
WTG1821(K)
WTG1822(K)
WTG1823(K)
WTG1824(K)
WTG1825(K)
WTG1826(K)
WTG1827(K)
WTG1828(K)
WTG1829(K)
WTG1830(K)
WTG1831(K)
WTG1832(K)
WTG1833(K)
WTG1834(K)
WTG1835(K)
WTG1836(K)
WTG1837(K)
WTG1838(K)
WTG1839(K)
WTG1840(K)
WTG1841(K)
WTG1842(K)
WTG1843(K)
WTG1844(K)
WTG1845(K



General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (OCS-A 0483) — Main Chart
- Tile Panel 1 - 9 — Main Chart
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities: Geographic Data: download from ESRI Stories; Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Bathymetry

- Major Contours (2.5 m interval)
- Minor Contours (0.50 m interval)
- Slope Gradient >= 10°

The elevation values for the current display:

Minimum: -41.74m

Maximum: -27.38m

Bathymetric Grid

-18 -21 -24 -27 -30 -33 -36 -39 -42

MBES surface was created at 50 cm resolution.
Bathymetric Grid: values are elevation, in meters

Multibeam Echosounder Processing Notes

Multibeam bathymetry data were processed in QPS Qimera 2.2.1.

Data Import and Navigation

Qinsy Database (DB) files were imported into Qimera 2.2.1, and an initial surface was made; post-processed POSPac PP-RTX results in the form of Smoothed Best Estimate Trajectories (SBETs) were imported. In Qimera, position and altitude data were analyzed for erroneous points; these data points were flagged and then removed.

Sound Velocity Correction

Sound velocity data were imported, evaluated for erroneous points, and applied to the MBES data. Unless sound velocity errors were noted, "Nearest in Distance Within Time – 360 minutes" was the method for pairing SV casts to the DB files.

Vertical Datum

The data were then converted to the working vertical datum, MLLW, by the application of NOAA V-Datum separation model; this separation model shifted the SBET from its native ellipsoidal elevation.The data were checked for tidal errors, refraction, and noise and adjusted where necessary.

Data Cleaning

Data were filtered using an TPU (Total Propagated Uncertainty) filter for IHO Special Order. Data were then manually edited and cleaned using the swath, slice, and 3D editor tools in Qimera. The Density Grid was analyzed prior to cutting any outer beams (if necessary) to ensure a minimum of 5 pings per square meter. The final surface was inspected using the Uncertainty Grid (95% confidence level) for any remaining outliers to be removed. Final QC was performed using the Density, Uncertainty (95%), Total Horizontal Uncertainty (THU), and Total Vertical Uncertainty (TVU) grids.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) : R2Sonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,5,6]	: AAS-Boom and SCS Streamer
Sparker[1]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[1]
Acquisition Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

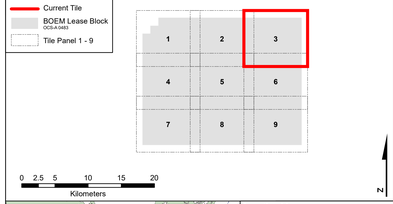
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

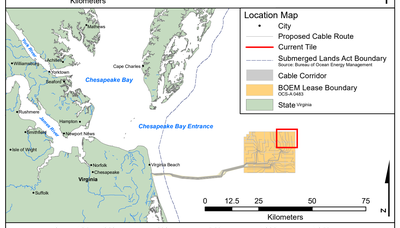
Vertical Coordinate Reference System

Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9





0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title:

CVOW-C Geophysical Survey 2021

Chart Title:

CHART 2
BATHYMETRY
TILE 3 of 9

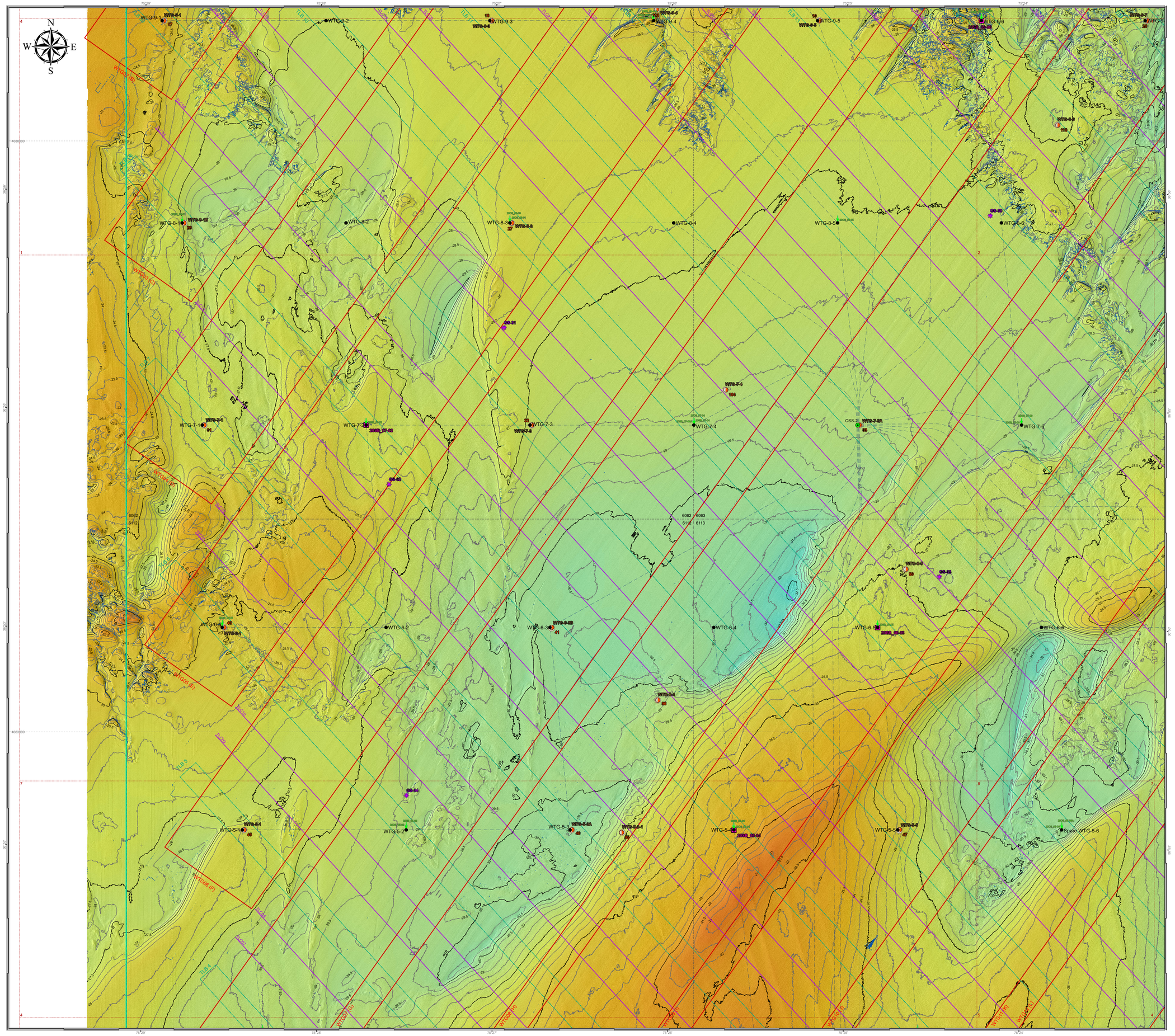
DATE	NOTE	AUTHOR	CHKD	APPD
06/04/21	DRAFT	CLS	KMM	KMM
06/14/21	Rev00	CLS	KDW	KMM
07/29/21	Rev01	CLS	KDW	KMM

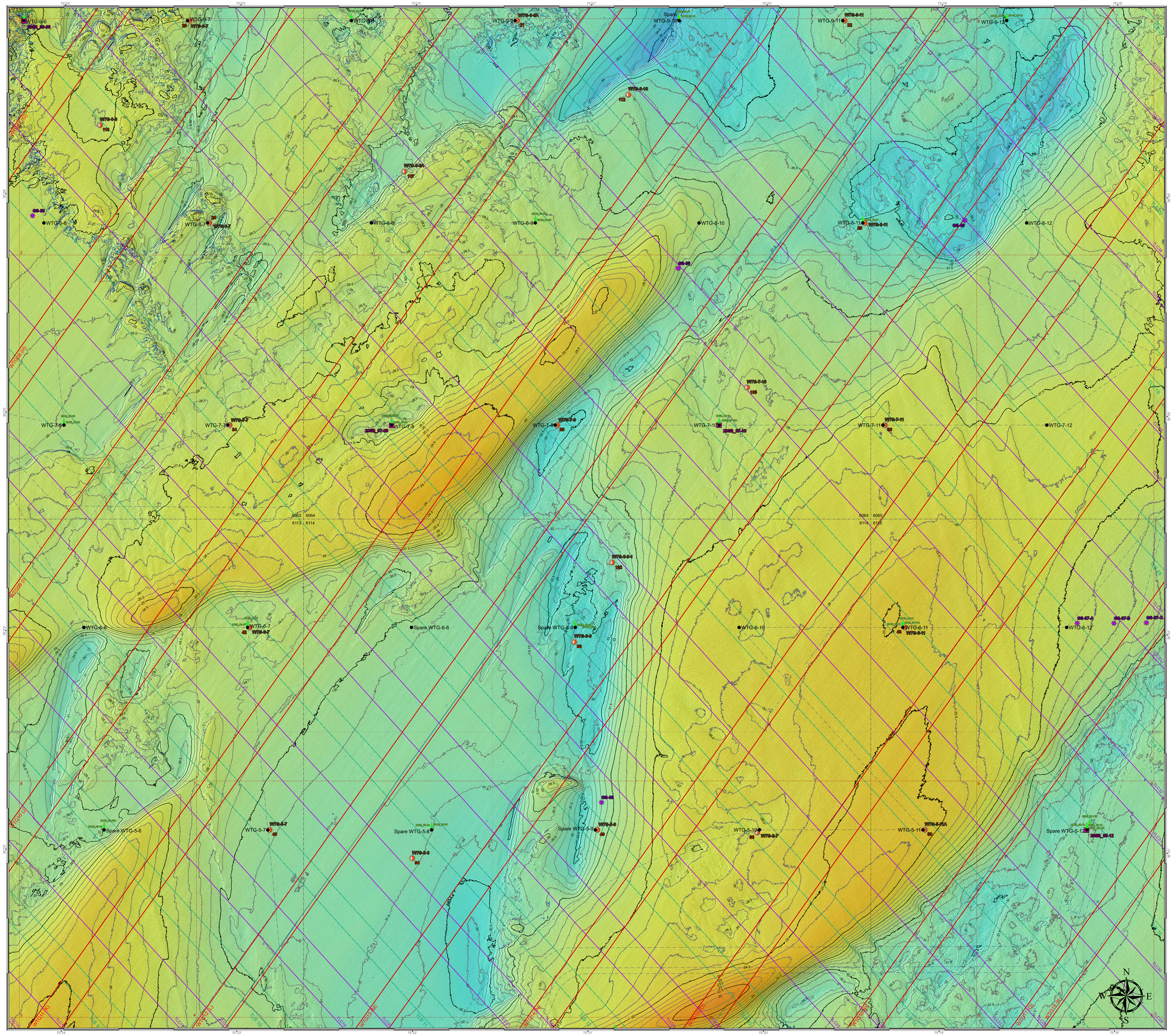
Rev01

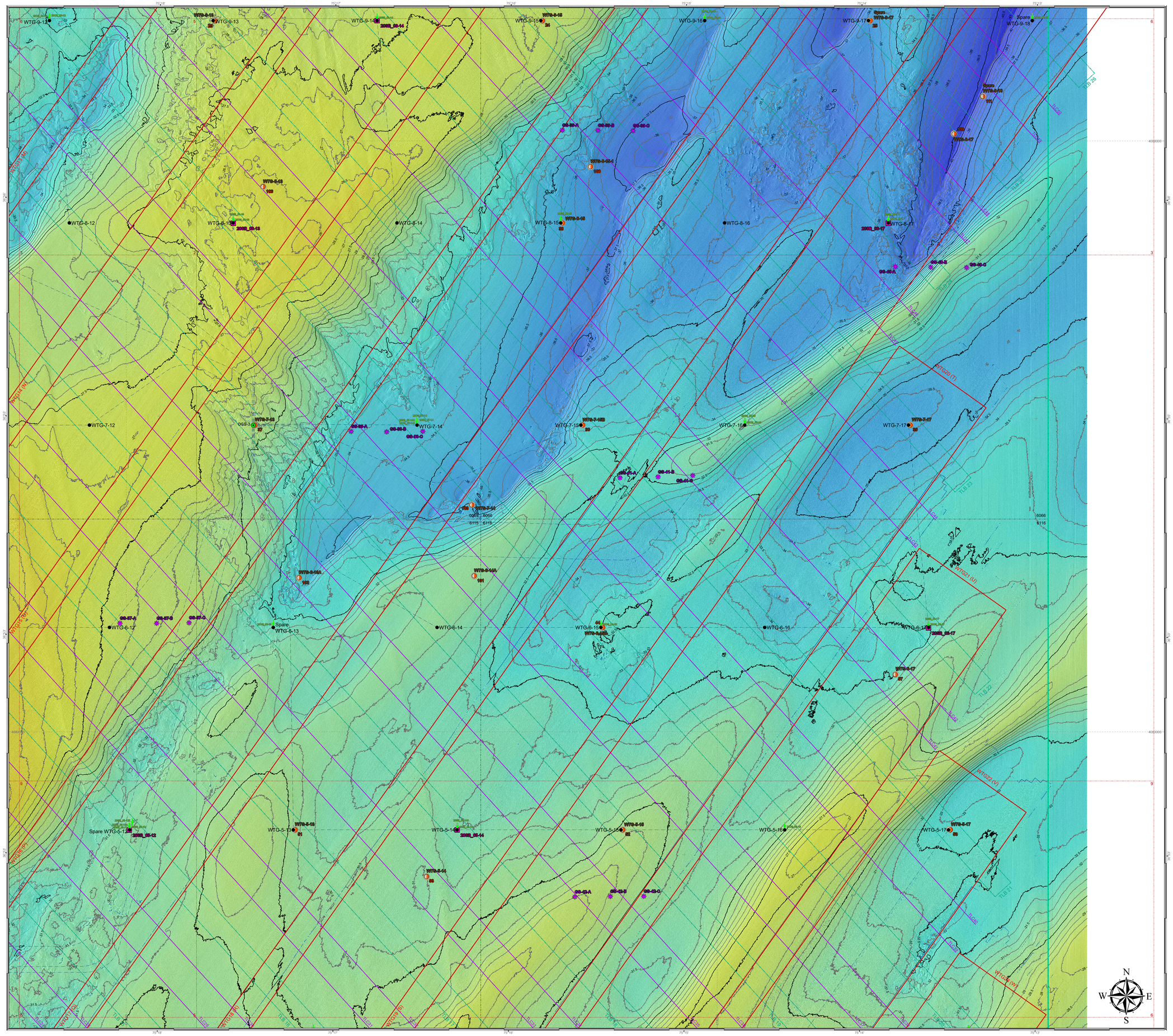
Date: 7/29/2021

File Name: Dominion_Bathymetry_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


WTG-9-1
WTG-9-2
WTG-9-3
WTG-9-4
WTG-9-5
WTG-9-6
WTG-9-7
WTG-8-1
WTG-8-2
WTG-8-3
WTG-8-4
WTG-8-5
WTG-8-6
WTG-7-1
WTG-7-2
WTG-7-3
WTG-7-4
WTG-7-5A
WTG-7-6
WTG-6-1
WTG-6-2
WTG-6-3
WTG-6-4
WTG-6-5
WTG-6-6
WTG-5-1
WTG-5-2
WTG-5-3
WTG-5-4
WTG-5-5
Spare WTG-5-6
OSS-1
OSS-2
WTG-8-3A
WTG-8-4A
WTG-7-4A
WTG-6-3A
WTG-5-3A
WTG-5-4A
WTG-6-4A
WTG-7-5A
WTG-8-4A
WTG-9-4A
WTG-9-5A
WTG-9-6A
WTG-9-7A
WTG-8-1A
WTG-8-2A
WTG-8-3A
WTG-8-4A
WTG-8-5A
WTG-8-6A
WTG-7-1A
WTG-7-2A
WTG-7-3A
WTG-7-4A
WTG-7-5A
WTG-7-6A
WTG-6-1A
WTG-6-2A
WTG-6-3A
WTG-6-4A
WTG-6-5A
WTG-6-6A
WTG-5-1A
WTG-5-2A
WTG-5-3A
WTG-5-4A
WTG-5-5A
WTG-5-6A
WTG-5-7A
WTG-5-8A
WTG-5-9A
WTG-5-10A
WTG-5-11A
WTG-5-12A
WTG-5-13A
WTG-5-14A
WTG-5-15A
WTG-5-16A
WTG-5-17A
WTG-5-18A
WTG-5-19A
WTG-5-20A
WTG-5-21A
WTG-5-22A
WTG-5-23A
WTG-5-24A
WTG-5-25A
WTG-5-26A
WTG-5-27A
WTG-5-28A
WTG-5-29A
WTG-5-30A
WTG-5-31A
WTG-5-32A
WTG-5-33A
WTG-5-34A
WTG-5-35A
WTG-5-36A
WTG-5-37A
WTG-5-38A
WTG-5-39A
WTG-5-40A
WTG-5-41A
WTG-5-42A
WTG-5-43A
WTG-5-44A
WTG-5-45A
WTG-5-46A
WTG-5-47A
WTG-5-48A
WTG-5-49A
WTG-5-50A
WTG-5-51A
WTG-5-52A
WTG-5-53A
WTG-5-54A
WTG-5-55A
WTG-5-56A
WTG-5-57A
WTG-5-58A
WTG-5-59A
WTG-5-60A
WTG-5-61A
WTG-5-62A
WTG-5-63A
WTG-5-64A
WTG-5-65A
WTG-5-66A
WTG-5-67A
WTG-5-68A
WTG-5-69A
WTG-5-70A
WTG-5-71A
WTG-5-72A
WTG-5-73A
WTG-5-74A
WTG-5-75A
WTG-5-76A
WTG-5-77A
WTG-5-78A
WTG-5-79A
WTG-5-80A
WTG-5-81A
WTG-5-82A
WTG-5-83A
WTG-5-84A
WTG-5-85A
WTG-5-86A
WTG-5-87A
WTG-5-88A
WTG-5-89A
WTG-5-90A
WTG-5-91A
WTG-5-92A
WTG-5-93A
WTG-5-94A
WTG-5-95A
WTG-5-96A
WTG-5-97A
WTG-5-98A
WTG-5-99A
WTG-5-100A
WTG-5-101A
WTG-5-102A
WTG-5-103A
WTG-5-104A
WTG-5-105A
WTG-5-106A
WTG-5-107A
WTG-5-108A
WTG-5-109A
WTG-5-110A
WTG-5-111A
WTG-5-112A
WTG-5-113A
WTG-5-114A
WTG-5-115A
WTG-5-116A
WTG-5-117A
WTG-5-118A
WTG-5-119A
WTG-5-120A
WTG-5-121A
WTG-5-122A
WTG-5-123A
WTG-5-124A
WTG-5-125A
WTG-5-126A
WTG-5-127A
WTG-5-128A
WTG-5-129A
WTG-5-130A
WTG-5-131A
WTG-5-132A
WTG-5-133A
WTG-5-134A
WTG-5-135A
WTG-5-136A
WTG-5-137A
WTG-5-138A
WTG-5-139A
WTG-5-140A
WTG-5-141A
WTG-5-142A
WTG-5-143A
WTG-5-144A
WTG-5-145A
WTG-5-146A
WTG-5-147A
WTG-5-148A
WTG-5-149A
WTG-5-150A
WTG-5-151A
WTG-5-152A
WTG-5-153A
WTG-5-154A
WTG-5-155A
WTG-5-156A
WTG-5-157A
WTG-5-158A
WTG-5-159A
WTG-5-160A
WTG-5-161A
WTG-5-162A
WTG-5-163A
WTG-5-164A
WTG-5-165A
WTG-5-166A
WTG-5-167A
WTG-5-168A
WTG-5-169A
WTG-5-170A
WTG-5-171A
WTG-5-172A
WTG-5-173A
WTG-5-174A
WTG-5-175A
WTG-5-176A
WTG-5-177A
WTG-5-178A
WTG-5-179A
WTG-5-180A
WTG-5-181A
WTG-5-182A
WTG-5-183A
WTG-5-184A
WTG-5-185A
WTG-5-186A
WTG-5-187A
WTG-5-188A
WTG-5-189A
WTG-5-190A
WTG-5-191A
WTG-5-192A
WTG-5-193A
WTG-5-194A
WTG-5-195A
WTG-5-196A
WTG-5-197A
WTG-5-198A
WTG-5-199A
WTG-5-200A
WTG-5-201A
WTG-5-202A
WTG-5-203A
WTG-5-204A
WTG-5-205A
WTG-5-206A
WTG-5-207A
WTG-5-208A
WTG-5-209A
WTG-5-210A
WTG-5-211A
WTG-5-212A
WTG-5-213A
WTG-5-214A
WTG-5-215A
WTG-5-216A
WTG-5-217A
WTG-5-218A
WTG-5-219A
WTG-5-220A
WTG-5-221A
WTG-5-222A
WTG-5-223A
WTG-5-224A
WTG-5-225A
WTG-5-226A
WTG-5-227A
WTG-5-228A
WTG-5-229A
WTG-5-230A
WTG-5-231A
WTG-5-232A
WTG-5-233A
WTG-5-234A
WTG-5-235A
WTG-5-236A
WTG-5-237A
WTG-5-238A
WTG-5-239A
WTG-5-240A
WTG-5-241A
WTG-5-242A
WTG-5-243A
WTG-5-244A
WTG-5-245A
WTG-5-246A
WTG-5-247A
WTG-5-248A
WTG-5-249A
WTG-5-250A
WTG-5-251A
WTG-5-252A
WTG-5-253A
WTG-5-254A
WTG-5-255A
WTG-5-256A
WTG-5-257A
WTG-5-258A
WTG-5-259A
WTG-5-260A
WTG-5-261A
WTG-5-262A
WTG-5-263A
WTG-5-264A
WTG-5-265A
WTG-5-266A
WTG-5-267A
WTG-5-268A
WTG-5-269A
WTG-5-270A
WTG-5-271A
WTG-5-272A
WTG-5-273A
WTG-5-274A
WTG-5-275A
WTG-5-276A
WTG-5-277A
WTG-5-278A
WTG-5-279A
WTG-5-280A
WTG-5-281A
WTG-5-282A
WTG-5-283A
WTG-5-284A
WTG-5-285A
WTG-5-286A
WTG-5-287A
WTG-5-288A
WTG-5-289A
WTG-5-290A
WTG-5-291A
WTG-5-292A
WTG-5-293A
WTG-5-294A
WTG-5-295A
WTG-5-296A
WTG-5-297A
WTG-5-298A
WTG-5-299A
WTG-5-300A
WTG-5-301A
WTG-5-302A
WTG-5-303A
WTG-5-304A
WTG-5-305A
WTG-5-306A
WTG-5-307A
WTG-5-308A
WTG-5-309A
WTG-5-310A
WTG-5-311A
WTG-5-312A
WTG-5-313A
WTG-5-314A
WTG-5-315A
WTG-5-316A
WTG-5-317A
WTG-5-318A
WTG-5-319A
WTG-5-320A
WTG-5-321A
WTG-5-322A
WTG-5-323A
WTG-5-324A
WTG-5-325A
WTG-5-326A
WTG-5-327A
WTG-5-328A
WTG-5-329A
WTG-5-330A
WTG-5-331A
WTG-5-332A
WTG-5-333A
WTG-5-334A
WTG-5-335A
WTG-5-336A
WTG-5-337A
WTG-5-338A
WTG-5-339A
WTG-5-340A
WTG-5-341A
WTG-5-342A
WTG-5-343A
WTG-5-344A
WTG-5-345A
WTG-5-346A
WTG-5-347A
WTG-5-348A
WTG-5-349A
WTG-5-350A
WTG-5-351A
WTG-5-352A
WTG-5-353A
WTG-5-354A
WTG-5-355A
WTG-5-356A
WTG-5-357A
WTG-5-358A
WTG-5-359A
WTG-5-360A
WTG-5-361A
WTG-5-362A
WTG-5-363A
WTG-5-364A
WTG-5-365A
WTG-5-366A
WTG-5-367A
WTG-5-368A
WTG-5-369A
WTG-5-370A
WTG-5-371A
WTG-5-372A
WTG-5-373A
WTG-5-374A
WTG-5-375A
WTG-5-376A
WTG-5-377A
WTG-5-378A
WTG-5-379A
WTG-5-380A
WTG-5-381A
WTG-5-382A
WTG-5-383A
WTG-5-384A
WTG-5-385A
WTG-5-386A
WTG-5-387A
WTG-5-388A
WTG-5-389A
WTG-5-390A
WTG-5-391A
WTG-5-392A
WTG-5-393A
WTG-5-394A
WTG-5-395A
WTG-5-396A
WTG-5-397A
WTG-5-398A
WTG-5-399A
WTG-5-400A
WTG-5-401A
WTG-5-402A
WTG-5-403A
WTG-5-404A
WTG-5-405A
WTG-5-406A
WTG-5-407A
WTG-5-408A
WTG-5-409A
WTG-5-410A
WTG-5-411A
WTG-5-412A
WTG-5-413A
WTG-5-414A
WTG-5-415A
WTG-5-416A
WTG-5-417A
WTG-5-418A
WTG-5-419A
WTG-5-420A
WTG-5-421A
WTG-5-422A
WTG-5-423A
WTG-5-424A
WTG-5-425A
WTG-5-426A
WTG-5-427A
WTG-5-428A
WTG-5-429A
WTG-5-430A
WTG-5-431A
WTG-5-432A
WTG-5-433A
WTG-5-434A
WTG-5-435A
WTG-5-436A
WTG-5-437A
WTG-5-438A
WTG-5-439A
WTG-5-440A
WTG-5-441A
WTG-5-442A
WTG-5-443A
WTG-5-444A
WTG-5-445A
WTG-5-446A
WTG-5-447A
WTG-5-448A
WTG-5-449A
WTG-5-450A
WTG-5-451A
WTG-5-452A
WTG-5-453A
WTG-5-454A
WTG-5-455A
WTG-5-456A
WTG-5-457A
WTG-5-458A
WTG-5-459A
WTG-5-460A
WTG-5-461A
WTG-5-462A
WTG-5-463A
WTG-5-464A
WTG-5-465A
WTG-5-466A
WTG-5-467A
WTG-5-468A
WTG-5-469A
WTG-5-470A
WTG-5-471A
WTG-5-472A
WTG-5-473A
WTG-5-474A
WTG-5-475A
WTG-5-476A
WTG-5-477A
WTG-5-478A
WTG-5-479A
WTG-5-480A
WTG-5-481A
WTG-5-482A
WTG-5-483A
WTG-5-484A
WTG-5-485A
WTG-5-486A
WTG-5-487A
WTG-5-488A
WTG-5-489A
WTG-5-490A
WTG-5-491A
WTG-5-492A
WTG-5-493A
WTG-5-494A
WTG-5-495A
WTG-5-496A
WTG-5-497A
WTG-5-498A
WTG-5-499A
WTG-5-500A
WTG-5-501A
WTG-5-502A
WTG-5-503A
WTG-5-504A
WTG-5-505A
WTG-5-506A
WTG-5-507A
WTG-5-508A
WTG-5-509A
WTG-5-510A
WTG-5-511A
WTG-5-512A
WTG-5-513A
WTG-5-514A
WTG-5-515A
WTG-5-516A
WTG-5-517A
WTG-5-518A
WTG-5-519A
WTG-5-520A
WTG-5-521A
WTG-5-522A
WTG-5-523A
WTG-5-524A
WTG-5-525A
WTG-5-526A
WTG-5-527A
WTG-5-528A
WTG-5-529A
WTG-5-530A
WTG-5-531A
WTG-5-532A
WTG-5-533A
WTG-5-534A
WTG-5-535A
WTG-5-536A
WTG-5-537A
WTG-5-538A
WTG-5-539A
WTG-5-540A
WTG-5-541A
WTG-5-542A
WTG-5-543A
WTG-5-544A
WTG-5-545A
WTG-5-546A
WTG-5-547A
WTG-5-548A
WTG-5-549A
WTG-5-550A
WTG-5-551A
WTG-5-552A
WTG-5-553A
WTG-5-554A
WTG-5-555A
WTG-5-556A
WTG-5-557A
WTG-5-558A
WTG-5-559A
WTG-5-560A
WTG-5-561A
WTG-5-562A
WTG-5-563A
WTG-5-564A
WTG-5-565A
WTG-5-566A
WTG-5-567A
WTG-5-568A
WTG-5-569A
WTG-5-570A
WTG-5-571A
WTG-5-572A
WTG-5-573A
WTG-5-574A
WTG-5-575A
WTG-5-576A
WTG-5-577A
WTG-5-578A
WTG-5-579A
WTG-5-580A
WTG-5-581A
WTG-5-582A
WTG-5-583A
WTG-5-584A
WTG-5-585A
WTG-5-586A
WTG-5-587A
WTG-5-588A
WTG-5-589A
WTG-5-590A
WTG-5-591A
WTG-5-592A
WTG-5-593A
WTG-5-594A
WTG-5-595A
WTG-5-596A
WTG-5-597A
WTG-5-598A
WTG-5-599A
WTG-5-600A
WTG-5-601A
WTG-5-602A
WTG-5-603A
WTG-5-604A
WTG-5-605A
WTG-5-606A
WTG-5-607A
WTG-5-608A
WTG-5-609A
WTG-5-610A
WTG-5-611A
WTG-5-612A
WTG-5-613A
WTG-5-614A
WTG-5-615A
WTG-5-616A
WTG-5-617A
WTG-5-618A
WTG-5-619A
WTG-5-620A
WTG-5-621A
WTG-5-622A
WTG-5-623A
WTG-5-624A
WTG-5-625A
WTG-5-626A
WTG-5-627A
WTG-5-628A
WTG-5-629A
WTG-5-630A
WTG-5-631A
WTG-5-632A
WTG-5-633A
WTG-5-634A
WTG-5-635A
WTG-5-636A
WTG-5-637A
WTG-5-638A
WTG-5-639A
WTG-5-640A
WTG-5-641A
WTG-5-642A
WTG-5-643A
WTG-5-644A
WTG-5-645A
WTG-5-646A
WTG-5-647A
WTG-5-648A
WTG-5-649A
WTG-5-650A
WTG-5-651A
WTG-5-652A
WTG-5-653A
WTG-5-654A
WTG-5-655A
WTG-5-656A
WTG-5-657A
WTG-5-658A
WTG-5-659A
WTG-5-660A
WTG-5-661A
WTG-5-662A
WTG-5-663A
WTG-5-664A
WTG-5-665A
WTG-5-666A
WTG-5-667A
WTG-5-668A
WTG-5-669A
WTG-5-670A
WTG-5-671A
WTG-5-672A
WTG-5-673A
WTG-5-674A
WTG-5-675A
WTG-5-676A
WTG-5-677A
WTG-5-678A
WTG-5-679A
WTG-5-680A
WTG-5-681A
WTG-5-682A
WTG-5-683A
WTG-5-684A
WTG-5-685A
WTG-5-686A
WTG-5-687A
WTG-5-688A
WTG-5-689A
WTG-5-690A
WTG-5-691A
WTG-5-692A
WTG-5-693A
WTG-5-694A
WTG-5-695A
WTG-5-696A
WTG-5-697A
WTG-5-698A
WTG-5-699A
WTG-5-700A
WTG-5-701A
WTG-5-702A
WTG-5-703A
WTG-5-704A
WTG-5-705A
WTG-5-706A
WTG-5-707A
WTG-5-708A
WTG-5-709A
WTG-5-710A
WTG-5-711A
WTG-5-712A
WTG-5-713A
WTG-5-714A
WTG-5-715A
WTG-5-716A
WTG-5-717A
WTG-5-718A
WTG-5-719A
WTG-5-720A
WTG-5-721A
WTG-5-722A
WTG-5-723A
WTG-5-724A
WTG-5-725A
WTG-5-726A
WTG-5-727A
WTG-5-728A
WTG-5-729A
WTG-5-730A
WTG-5-731A
WTG-5-732A
WTG-5-733A
WTG-5-734A
WTG-5-735A
WTG-5-736A
WTG-5-737A
WTG-5-738A
WTG-5-739A
WTG-5-740A
WTG-5-741A
WTG-5-742A
WTG-5-743A
WTG-5-744A
WTG-5-745A
WTG-5-746A
WTG-5-747A
WTG-5-748A
WTG-5-749A
WTG-5-750A
WTG-5-751A
WTG-5-752A
WTG-5-753A
WTG-5-754A
WTG-5-755A
WTG-5-756A
WTG-5-757A
WTG-5-758A
WTG-5-759A
WTG-5-760A
WTG-5-761A
WTG-5-762A
WTG-5-763A
WTG-5-764A
WTG-5-765A
WTG-5-766A
WTG-5-767A
WTG-5-768A
WTG-5-769A
WTG-5-770A
WTG-5-771A
WTG-5-772A
WTG-5-773A
WTG-5-774A
WTG-5-775A
WTG-5-776A
WTG-5-777A
WTG-5-778A
WTG-5-779A
WTG-5-780A
WTG-5-781A
WTG-5-782A
WTG-5-783A
WTG-5-784A
WTG-5-785A
WTG-5-786A
WTG-5-787A
WTG-5-788A
WTG-5-789A
WTG-5-790A
WTG-5-791A
WTG-5-792A
WTG-5-793A
WTG-5-794A
WTG-5-795A
WTG-5-796A
WTG-5-797A
WTG-5-798A
WTG-5-799A
WTG-5-800A
WTG-5-801A
WTG-5-802A
WTG-5-803A
WTG-5-804A
WTG-5-805A
WTG-5-806A
WTG-5-807A
WTG-5-808A
WTG-5-809A
WTG-5-810A
WTG-5-811A
WTG-5-812A
WTG-5-813A
WTG-5-814A
WTG-5-815A
WTG-5-816A
WTG-5-817A
WTG-5-818A
WTG-5-819A
WTG-5-820A
WTG-5-821A
WTG-5-822A
WTG-5-823A
WTG-5-824A
WTG-5-825A
WTG-5-826A
WTG-5-827A
WTG-5-828A
WTG-5-829A
WTG-5-830A
WTG-5-831A
WTG-5-832A
WTG-5-833A
WTG-5-834A
WTG-5-835A
WTG-5-836A
WTG-5-837A
WTG-5-838A
WTG-5-839A
WTG-5-840A
WTG-5-841A
WTG-5-842A
WTG-5-843A
WTG-5-844A
WTG-5-845A
WTG-5-846A
WTG-5-847A
WTG-5-848A
WTG-5-849A
WTG-5-850A
WTG-5-851A
WTG-5-852A
WTG-5-853A
WTG-5-854A
WTG-5-855A
WTG-5-856A
WTG-5-857A
WTG-5-858A
WTG-5-859A
WTG-5-860A
WTG-5-861A
WTG-5-862A
WTG-5-863A
WTG-5-864A
WTG-5-865A
WTG-5-866A
WTG-5-867A
WTG-5-868A
WTG-5-869A
WTG-5-870A
WTG-5-871A
WTG-5-872A
WTG-5-873A
WTG-5-874A
WTG-5-875A
WTG-5-876A
WTG-5-877A
WTG-5-878A
WTG-5-879A
WTG-5-880A
WTG-5-881A
WTG-5-882A
WTG-5-883A
WTG-5-884A
WTG-5-885A
WTG-5-886A
WTG-5-887A
WTG-5-888A
WTG-5-889A
WTG-5-890A
WTG-5-891A
WTG-5-892A
WTG-5-893A
WTG-5-894A
WTG-5-895A
WTG-5-896A
WTG-5-897A
WTG-5-898A
WTG-5-899A
WTG-5-900A
WTG-5-901A
WTG-5-902A
WTG-5-903A
WTG-5-904A
WTG-5-905A
WTG-5-906A
WTG-5-907A
WTG-5-908A
WTG-5-909A
WTG-5-910A
WTG-5-911A
WTG-5-912A
WTG-5-913A
WTG-5-914A
WTG-5-915A
WTG-5-916A
WTG-5-917A
WTG-5-918A
WTG-5-919A
WTG-5-920A
WTG-5-921A
WTG-5-922A
WTG-5-923A
WTG-5-924A
WTG-5-925A
WTG-5-926A
WTG-5-927A
WTG-5-928A
WTG-5-929A
WTG-5-930A
WTG-5-931A
WTG-5-932A
WTG-5-933A
WTG-5-934A
WTG-5-935A
WTG-5-936A
WTG-5-937A
WTG-5-938A
WTG-5-939A
WTG-5-940A
WTG-5-941A
WTG-5-942A
WTG-5-943A
WTG-5-944A
WTG-5-945A
WTG-5-946A
WTG-5-947A
WTG-5-948A
WTG-5-949A
WTG-5-950A
WTG-5-951A
WTG-5-952A
WTG-5-953A
WTG-5-954A
WTG-5-955A
WTG-5-956A
WTG-5-957A
WTG-5-958A
WTG-5-959A
WTG-5-960A
WTG-5-961A
WTG-5-962A
WTG-5-963A
WTG-5-964A
WTG-5-965A
WTG-5-966A
WTG-5-967A
WTG-5-968A
WTG-5-969A
WTG-5-970A
WTG-5-971A
WTG-5-972A
WTG-5-973A
WTG-5-974A
WTG-5-975A
WTG-5-976A
WTG-5-977A
WTG-5-978A
WTG-5-979A
WTG-5-980A
WTG-5-981A
WTG-5-982A
WTG-5-983A
WTG-5-984A
WTG-5-985A
WTG-5-986A
WTG-5-987A
WTG-5-988A
WTG-5-989A
WTG-5-990A
WTG-5-991A
WTG-5-992A
WTG-5-993A
WTG-5-994A
WTG-5-995A
WTG-5-996A
WTG-5-997A
WTG-5-998A
WTG-5-999A
WTG-5-1000A
WTG-5-1001A
WTG-5-1002A
WTG-5-1003A
WTG-5-1004A
WTG-5-1005A
WTG-5-1006A
WTG-5-1007A
WTG-5-1008A
WTG-5-1009A
WTG-5-1010A
WTG-5-1011A
WTG-5-1012A
WTG-5-1013A
WTG-5-1014A
WTG-5-1015A
WTG-5-1016A
WTG-5-1017A
WTG-5-1018A
WTG-5-1019A
WTG-5-1020A
WTG-5-1021A
WTG-5-1022A
WTG-5-1023A
WTG-5-1024A
WTG-5-1025A
WTG-5-1026A
WTG-5-1027A
WTG-5-1028A
WTG-5-1029A
WTG-5-1030A
WTG-5-1031A
WTG-5-1032A
WTG-5-1033A
WTG-5-1034A
WTG-5-1035A
WTG-5-1036A
WTG-5-1037A
WTG-5-1038A
WTG-5-1039A
WTG-5-1040A
WTG-5-1041A
WTG-5-1042A
WTG-5-1043A
WTG-5-1044A
WTG-5-1045A
WTG-5-1046A
WTG-5-1047A
WTG-5-1048A
WTG-5-1049A
WTG-5-1050A
WTG-5-1051A
WTG-5-1052A
WTG-5-1053A
WTG-5-1054A
WTG-5-1055A
WTG-5-1056A
WTG-5-1057A
WTG-5-1058A
WTG-5-1059A
WTG-5-1060A
WTG-5-1061A
WTG-5-1062A
WTG-5-1063A
WTG-5-1064A
WTG-5-1065A
WTG-5-1066A
WTG-5-1067A
WTG-5-1068A
WTG-5-1069A
WTG-5-1070A
WTG-5-1071A
WTG-5-1072A
WTG-5-1073A
WTG-5-1074A
WTG-5-1075A
WTG-5-1076A
WTG-5-1077A
WTG-5-1078A
WTG-5-1079A
WTG-5-1080A
WTG-5-1081A
WTG-5-1082A
WTG-5-1083A
WTG-5-1084A
WTG-5-1085A
WTG-5-1086A
WTG-5-1087A
WTG-5-1088A
WTG-5-1089A
WTG-5-1090A
WTG-5-1091A
WTG-5-1092A
WTG-5-1093A
WTG-5-1094A
WTG-5-1095A
WTG-5-1096A
WTG-5-1097A
WTG-5-1098A
WTG-5-1099A
WTG-5-1100A
WTG-5-1101A
WTG-5-1102A
WTG-5-1103A
WTG-5-1104A
WTG-5-1105A
WTG-5-1106A
WTG-5-1107A
WTG-5-1108A
WTG-5-1109A
WTG-5-1110A
WTG-5-1111A
WTG-5-1112A
WTG-5-1113A
WTG-5-1114A
WTG-5-1115A
WTG-5-1116A
WTG-5-1117A
WTG-5-1118A
WTG-5-1119A
WTG-5-1120A
WTG-5-1121A
WTG-5-1122A
WTG-5-1123A
WTG-5-1124A
WTG-5-1125A
WTG-5-1126A
WTG-5-1127A
WTG-5-1128A
WTG-5-1129A
WTG-5-1130A
WTG-5-1131A
WTG-5-1132A
WTG-5-1133A
WTG-5-1134A
WTG-5-1135A
WTG-5-1136A
WTG-5-1137A
WTG-5-1138A
WTG-5-1139A
WTG-5-1140A
WTG-5-1141A
WTG-5-1142A
WTG-5-1143A
WTG-5-1144A
WTG-5-1145A
WTG-5-1146A
WTG-5-1147A
WTG-5-1148A
WTG-5-1149A
WTG-5-1150A
WTG-5-1151A
WTG-5-1152A
WTG-5-1153A
WTG-5-1154A
WTG-5-1155A
WTG-5-1156A
WTG-5-1157A
WTG-5-1158A
WTG-5-1159A
WTG-5-1160A
WTG-5-1161A
WTG-5-1162A
WTG-5-1163A
WTG-5-1164A
WTG-5-1165A
WTG-5-1166A
WTG-5-1167A
WTG-5-1168A
WTG-5-1169A
WTG-5-1170A
WTG-5-1171A
WTG-5-1172A
WTG-5-1173A
WTG-5-1174A
WTG-5-1175A
WTG-5-1176A
WTG-5-1177A
WTG-5-1178A
WTG-5-1179A
WTG-5-1180A
WTG-5-1181A
WTG-5-1182A
WTG-5-1183A
WTG-5-1184A
WTG-5-1185A
WTG-5-1186A
WTG-5-1187A
WTG-5-1188A
WTG-5-1189A
WTG-5-1190A
WTG-5-1191A
WTG-5-1192A
WTG-5-1193A
WTG-5-1194A
WTG-5-1195A
WTG-5-1196A
WTG-5-1197A
WTG-5-1198A
WTG-5-1199A
WTG-5-1200A
WTG-5-1201A
WTG-5-1202A
WTG-5-1203A
WTG-5-1204A
WTG-5-1205A
WTG-5-1206A
WTG-5-1207A
WTG-5-1208A
WTG-5-1209A
WTG-5-1210A
WTG-5-1211A
WTG-5-1212A
WTG-5-1213A
WTG-5-1214A
WTG-5-1215A
WTG-5-1216A
WTG-5-1217A
WTG-5-1218A
WTG-5-1219A
WTG-5-1220A
WTG-5-1221A
WTG-5-1222A
WTG-5-1223A
WTG-5-1224A
WTG-5-1225A
WTG-5-1226A
WTG-5-1227A
WTG-5-1228A
WTG-5-1229A
WTG-5-1230A
WTG-5-1231A
WTG-5-1232A
WTG-5-1233A
WTG-5-1234A
WTG-5-1235A
WTG-5-1236A
WTG-5-1237A
WTG-5-1238A
WTG-5-1239A
WTG-5-1240A
WTG-5-1241A
WTG-5-1242A
WTG-5-1243A
WTG-5-1244A
WTG-5-1245A
WTG-5-1246A
WTG-5-1247A
WTG-5-1248A
WTG-5-1249A
WTG-5-1250A
WTG-5-1251A
WTG-5-1252A
WTG-5-1253A
WTG-5-1254A
WTG-5-1255A
WTG-5-1256A
WTG-5-1257A
WTG-5-1258A
WTG-5-1259A
WTG-5-1260A
WTG-5-1261A
WTG-5-1262A
WTG-5-1263A
WTG-5-1264A
WTG-5-1265A
WTG-5-1266A
WTG-5-1267A
WTG-5-1268A
WTG-5-1269A
WTG-5-1270A
WTG-5-1271A
WTG-5-1272A
WTG-5-1273A
WTG-5-1274A
WTG-5-1275A
WTG-5-1276A
WTG-5-1277A
WTG-5-1278A
WTG-5-1279A
WTG-5-1280A
WTG-5-1281A
WTG-5-1282A
WTG-5-1283A
WTG-5-1284A
WTG-5-1285A
WTG-5-1286A
WTG-5-1287A
WTG-5-1288A
WTG-5-1289A
WTG-5-1290A
WTG-5-1291A
WTG-5-1292A
WTG-5-1293A
WTG-5-1294A
WTG-5-1295A
WTG-5-1296A
WTG-5-1297A
WTG-5-1298A
WTG-5-1299A
WTG-5-1300A
WTG-5-1301A
WTG-5-1302A
WTG-5-1303A
WTG-5-1304A
WTG-5-1305A
WTG-5-1306A
WTG-5-1307A
WTG-5-1308A
WTG-5-1309A
WTG-5-1310A
WTG-5-1311A
WTG-5-1312A
WTG-5-1313A
WTG-5-1314A
WTG-5-1315A
WTG-5-1316A
WTG-5-1317A
WTG-5-1318A
WTG-5-1319A
WTG-5-1320A
WTG-5-1321A
WTG-5-1322A
WTG-5-1323A
WTG-5-1324A
WTG-5-1325A
WTG-5-1326A
WTG-5-1327A
WTG-5-1328A
WTG-5-1329A
WTG-5-1330A
WTG-5-1331A
WTG-5-1332A
WTG-5-1333A
WTG-5-1334A
WTG-5-1335A
WTG-5-1336A
WTG-5-1337A
WTG-5-1338A
WTG-5-1339A
WTG-5-1340A
WTG-5-1341A
WTG-5-1342A
WTG-5-1343A
WTG-5-1344A
WTG-5-1345A
WTG-5-1346A
WTG-5-1347A
WTG-5-1348A
WTG-5-1349A
WTG-5-1350A
WTG-5-1351A
WTG-5-1352A
WTG-5-1353A
WTG-5-1354A
WTG-5-1355A
WTG-5-1356A
WTG-5-1357A
WTG-5-1358A
WTG-5-1359A
WTG-5-1360A
WTG-5-1361A
WTG-5-1362A
WTG-5-1363A
WTG-5-1364A
WTG-5-1365A
WTG-5-1366A
WTG-5-1367A
WTG-5-1368A
WTG-5-1369A
WTG-5-1370A
WTG-5-1371A
WTG-5-1372A
WTG-5-1373A
WTG-5-1374A
WTG-5-1375A
WTG-5-1376A
WTG-5-1377A
WTG-5-1378A
WTG-5-1379A
WTG-5-1380A
WTG-5-1381A
WTG-5-1382A
WTG-5-1383A
WTG-5-1384A
WTG-5-1385A
WTG-5-1386A
WTG-5-1387A
WTG-5-1388A
WTG-5-1389A
WTG-5-1390A
WTG-5-1391A
WTG-5-1392A
WTG-5-1393A
WTG-5-1394A
WTG-5-1395A
WTG-5-1396A
WTG-5-1397A
WTG-5-1398A
WTG-5-1399A
WTG-5-1400A
WTG-5-1401A
WTG-5-1402A
WTG-5-1403A
WTG-5-1404A
WTG-5-1405A
WTG-5-1406A
WTG-5-1407A
WTG-5-1408A
WTG-5-1409A
WTG-5-1410A
WTG-5-1411A
WTG-5-1412A
WTG-5-1413A
WTG-5-1414A
WTG-5-1415A
WTG-5-1416A
WTG-5-1417A
WTG-5-1418A
WTG-5-1419A
WTG-5-1420A
WTG-5-1421A
WTG-5-1422A
WTG-5-1423A
WTG-5-1424A
WTG-5-1425A
WTG-5-1426A
WTG-5-1427A
WTG-5-1428A
WTG-5-1429A
WTG-5-1430A
WTG-5-1431A
WTG-5-1432A
WTG-5-1433A
WTG-5-1434A
WTG-5-1435A
WTG-5-1436A
WTG-5-1437A
WTG-5-1438A
WTG-5-1439A
WTG-5-1440A
WTG-5-1441A
WTG-5-1442A
WTG-5-1443A
WTG-5-1444A
WTG-5-1445A
WTG-5-1446A
WTG-5-1447A
WTG-5-1448A
WTG-5-1449A
WTG-5-1450A
WTG-5-1451A
WTG-5-1452A
WTG-5-1453A
WTG-5-1454A
WTG-5-1455A
WTG-5-1456A
WTG-5-1457A
WTG-5-1458A
WTG-5-1459A
WTG-5-1460A
WTG-5-1461A
WTG-5-1462A
WTG-5-1463A
WTG-5-1464A
WTG-5-1465A
WTG-5-1466A
WTG-5-1467A
WTG-5-1468A
WTG-5-1469A
WTG-5-1470A
WTG-5-1471A
WTG-5-1472A
WTG-5-1473A
WTG-5-1474A
WTG-5-1475A
WTG-5-1476A
WTG-5-1477A
WTG-5-1478A
WTG-5-1479A
WTG-5-1480A
WTG-5-1481A
WTG-5-1482A
WTG-5-1483A
WTG-5-1484A
WTG-5-1485A
WTG-5-1486A
WTG-5-1487A
WTG-5-1488A
WTG-5-1489A
WTG-5-1490A
WTG-5-1491A
WTG-5-1492A
WTG-5-1493A
WTG-5-1494A
WTG-5-1495A
WTG-5-1496A
WTG-5-1497A
WTG-5-1498A
WTG-5-1499A
WTG-5-1500A
WTG-5-1501A
WTG-5-1502A
WTG-5-1503A
WTG-5-1504A
WTG-5-1505A
WTG-5-1506A
WTG-5-1507A
WTG-5-1508A
WTG-5-1509A
WTG-5-1510A
WTG-5-1511A
WTG-5-1512A
WTG-5-1513A
WTG-5-1514A
WTG-5-1515A
WTG-5-1516A
WTG-5-1517A
WTG-5-1518A
WTG-5-1519A
WTG-5-1520A
WTG-5-1521A
WTG-5-1522A
WTG-5-1523A
WTG-5-1524A
WTG-5-1525A
WTG-5-1526A
WTG-5-1527A
WTG-5-1528A
WTG-5-1529A
WTG-5-1530A
WTG-5-1531A
WTG-5-1532A
WTG-5-1533A
WTG-5-1534A
WTG-5-1535A
WTG-5-1536A
WTG-5-1537A
WTG-5-1538A
WTG-5-1539A
WTG-5-1540A
WTG-5-1541A
WTG-5-1542A
WTG-5-1543A
WTG-5-1544A
WTG-5-1545A
WTG-5-1546A
WTG-5-1547A
WTG-5-1548A
WTG-5-1549A
WTG-5-1550A
WTG-5-1551A
WTG-5-1552A
WTG-5-1553A
WTG-5-1554A
WTG-5-1555A
WTG-5-1556A
WTG-5-1557A
WTG-5-1558A
WTG-5-1559A
WTG-5-1560A
WTG-5-1561A
WTG-5-1562A
WTG-5-1563A
WTG-5-1564A
WTG-5-1565A
WTG-5-1566A
WTG-5-1567A
WTG-5-1568A
WTG-5-1569A
WTG-5-1570A
WTG-5-1571A
WTG-5-1572A
WTG-5-1573A
WTG-5-1574A
WTG-5-1575A
WTG-5-1576A
WTG-5-1577A
WTG-5-1578A
WTG-5-1579A
WTG-5-1580A
WTG-5-1581A
WTG-5-1582A
WTG-5-1583A
WTG-5-1584A
WTG-5-1585A
WTG-5-1586A
WTG-5-1587A
WTG-5-1588A
WTG-5-1589A
WTG-5-1590A
WTG-5-1591A
WTG-5-1592A
WTG-5-1593A
WTG-5-1594A
WTG-5-1595A
WTG-5-1596A
WTG-5-1597A
WTG-5-1598A
WTG-5-1599A
WTG-5-1600A
WTG-5-1601A
WTG-5-1602A
WTG-5-1603A
WTG-5-1604A
WTG-5-1605A
WTG-5-1606A
WTG-5-1607A
WTG-5-1608A
WTG-5-1609A
WTG-5-1610A
WTG-5-1611A
WTG-5-1612A
WTG-5-1613A
WTG-5-1614A
WTG-5-1615A
WTG-5-1616A
WTG-5-1617A
WTG-5-1618A
WTG-5-1619A
WTG-5-1620A
WTG-5-1621A
WTG-5-1622A
WTG-5-1623A
WTG-5-1624A
WTG-5-1625A
WTG-5-1626A
WTG-5-1627A
WTG-5-1628A
WTG-5-1629A
WTG-5-1630A
WTG-5-1631A
WTG-5-1632A
WTG-5-1633A
WTG-5-1634A
WTG-5-1635A
WTG-5-1636A
WTG-5-1637A
WTG-5-1638A
WTG-5-1639A
WTG


WTG-9-6
WTG-9-7
WTG-9-8
WTG-9-9
WTG-9-10
WTG-9-11
WTG-9-12
WTG-8-6
WTG-8-7
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
WTG-8-12
WTG-7-6
WTG-7-7
WTG-7-8
WTG-7-9
WTG-7-10
WTG-7-11
WTG-7-12
WTG-6-6
WTG-6-7
Spare WTG-6-8
WTG-6-9
WTG-6-10
WTG-6-11
WTG-6-12
Spare WTG-5-6
WTG-5-7
Spare WTG-5-8
Spare WTG-5-9
WTG-5-10
WTG-5-11
Spare WTG-5-12
WTG-9-4
WTG-8-4
WTG-7-4
WTG-6-4
WTG-5-4
WTG-8-11A
WTG-7-11
WTG-6-11
WTG-5-11
WTG-7-8
WTG-6-8
WTG-5-8
WTG-5-10
WTG-6-7
WTG-5-7
WTG-8-7
WTG-7-7
WTG-9-7
WTG-9-8
WTG-8-8
WTG-7-8
WTG-6-9
WTG-5-9
WTG-8-9
WTG-7-9
WTG-6-10
WTG-5-10
WTG-9-9
WTG-8-10
WTG-7-10
WTG-6-11
WTG-5-11
WTG-9-10
WTG-8-11
WTG-7-11
WTG-6-12
WTG-5-12
WTG-9-11
WTG-8-12
WTG-7-12
WTG-9-12
WTG-6-9
WTG-5-9
WTG-8-9
WTG-7-9
WTG-6-10
WTG-5-10
WTG-9-9
WTG-8-10
WTG-7-10
WTG-6-11
WTG-5-11
WTG-9-10
WTG-8-11
WTG-7-11
WTG-6-12
WTG-5-12
WTG-9-11
WTG-8-12
WTG-7-12
WTG-9-12
WTG-6-6
WTG-5-6
WTG-9-6
WTG-8-6
WTG-7-6
WTG-6-7
WTG-5-7
WTG-9-7
WTG-8-7
WTG-7-7
WTG-6-8
WTG-5-8
WTG-9-8
WTG-8-8
WTG-7-8



General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block — Main Chart, OCS-A 0483
- Tile Panel 1 - 9 — Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA States and Cities: Geographic Data: download from ESRI Source: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Bathymetry

- Major Contours (2.5 m interval)
- Minor Contours (0.50 m interval)
- Slope Gradient >= 10°

The elevation values for the current display:

Minimum: -41.27m

Maximum: -25.72m

Bathymetric Grid

-18 -21 -24 -27 -30 -33 -36 -39 -42

MBES surface was created at 50 cm resolution.
Bathymetric Grid: values are elevation, in meters

Multibeam Echosounder Processing Notes

Multibeam bathymetry data were processed in QPS Qimera 2.2.1.

Data Import and Navigation

Qinsy Database (DB) files were imported into Qimera 2.2.1, and an initial surface was made; post-processed POSPac PP-RTX results in the form of Smoothed Best Estimate Trajectories (SBETs) were imported. In Qimera, position and altitude data were analyzed for erroneous points; these data points were flagged and then removed.

Sound Velocity Correction

Sound velocity data were imported, evaluated for erroneous points, and applied to the MBES data. Unless sound velocity errors were noted, "Nearest in Distance Within Time – 360 minutes" was the method for pairing SV casts to the DB files.

Vertical Datum

The data were then converted to the working vertical datum, MLLW, by the application of NOAA V-Datum separation model; this separation model shifted the SBET from its native ellipsoidal elevation.The data were checked for tidal errors, refraction, and noise and adjusted where necessary.

Data Cleaning

Data were filtered using an TPU (Total Propagated Uncertainty) filter for IHO Special Order. Data were then manually edited and cleaned using the swath, slice, and 3D editor tools in Qimera. The Density Grid was analyzed prior to cutting any outer beams (if necessary) to ensure a minimum of 5 pings per square meter. The final surface was inspected using the Uncertainty Grid (95% confidence level) for any remaining outliers to be removed. Final QC was performed using the Density, Uncertainty (95%), Total Horizontal Uncertainty (THU), and Total Vertical Uncertainty (TVU) grids.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) : RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer
Sparker[7]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[1]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Milston
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block — OCS-A 0483
- Tile Panel 1 - 9

1 2 3 4 5 6 7 8 9

0 2.5 5 10 15 20 Kilometers

N

Location Map

- City
- Proposed Cable Route
- Current Tile
- Submerged Lands Act Boundary — Source: Bureau of Ocean Energy Management
- Cable Corridor
- BOEM Lease Boundary — OCS-A 0483
- State — Virginia

Cape Charles, Chesapeake Bay, Chesapeake Bay Entrance, Williamsburg, Yorktown, Newport News, Hampton, Poquoson, Hudson, Seaford, Northampton, Accomack, Eastville, Smithfield, Isle of Wight, Norfolk, Chesapeake, Virginia Beach, Virginia, Suffolk

0 12.5 25 50 75 Kilometers

0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title:

CVOW-C Geophysical Survey 2021

Chart Title:

CHART 2
BATHYMETRY
TILE 6 of 9

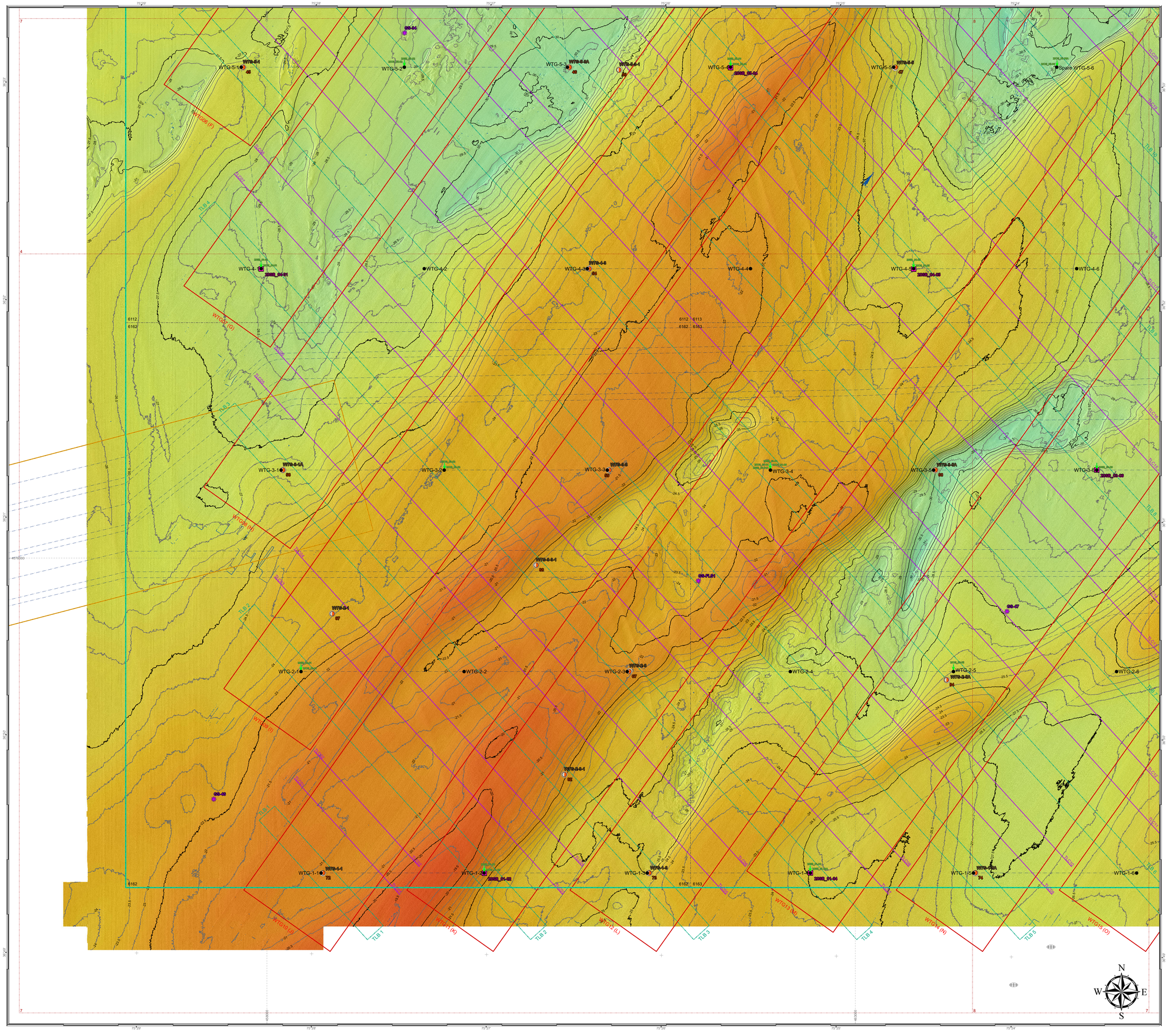
DATE	NOTE	AUTHOR	CHKD	APPD
06/04/21	DRAFT	CLS	KMM	KMM
06/14/21	Rev00	CLS	KDW	KMM
07/29/21	Rev01	CLS	KDW	KMM

Rev01

Date: 7/29/2021

File Name: Dominion_Bathymetry_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.



General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities: Geographic Data: download from ESRI Stories Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Bathymetry

- Major Contours (2.5 m interval)
- Minor Contours (0.50 m interval)
- Slope Gradient >= 10°

The elevation values for the current display:
Minimum: -31.77m
Maximum: -19.19m

Bathymetric Grid

-18 -21 -24 -27 -30 -33 -36 -39 -42

MBES surface was created at 50 cm resolution.
Bathymetric Grid: values are elevation, in meters

Multibeam Echosounder Processing Notes

Multibeam bathymetry data were processed in QPS Qimera 2.2.1.

Data Import and Navigation

Qinsy Database (DB) files were imported into Qimera 2.2.1, and an initial surface was made; post-processed POSPac PP-RTX results in the form of Smoothed Best Estimate Trajectories (SBETs) were imported. In Qimera, position and altitude data were analyzed for erroneous points; these data points were flagged and then removed.

Sound Velocity Correction

Sound velocity data were imported, evaluated for erroneous points, and applied to the MBES data. Unless sound velocity errors were noted, "Nearest in Distance Within Time – 360 minutes" was the method for pairing SV casts to the DB files.

Vertical Datum

The data were then converted to the working vertical datum, MLLW, by the application of NOAA V-Datum separation model; this separation model shifted the SBET from its native ellipsoidal elevation.The data were checked for tidal errors, refraction, and noise and adjusted where necessary.

Data Cleaning

Data were filtered using an TPU (Total Propagated Uncertainty) filter for IHO Special Order. Data were then manually edited and cleaned using the swath, slice, and 3D editor tools in Qimera. The Density Grid was analyzed prior to cutting any outer beams (if necessary) to ensure a minimum of 5 pings per square meter. The final surface was inspected using the Uncertainty Grid (95% confidence level) for any remaining outliers to be removed. Final QC was performed using the Density, Uncertainty (95%), Total Horizontal Uncertainty (THU), and Total Vertical Uncertainty (TVU) grids.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,5,6]	: AAS-Boom and SCS Streamer
Sparker[3]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June 13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

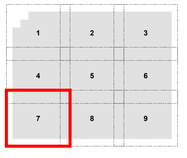
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

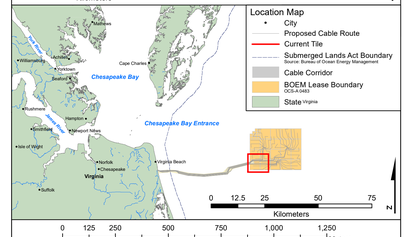
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

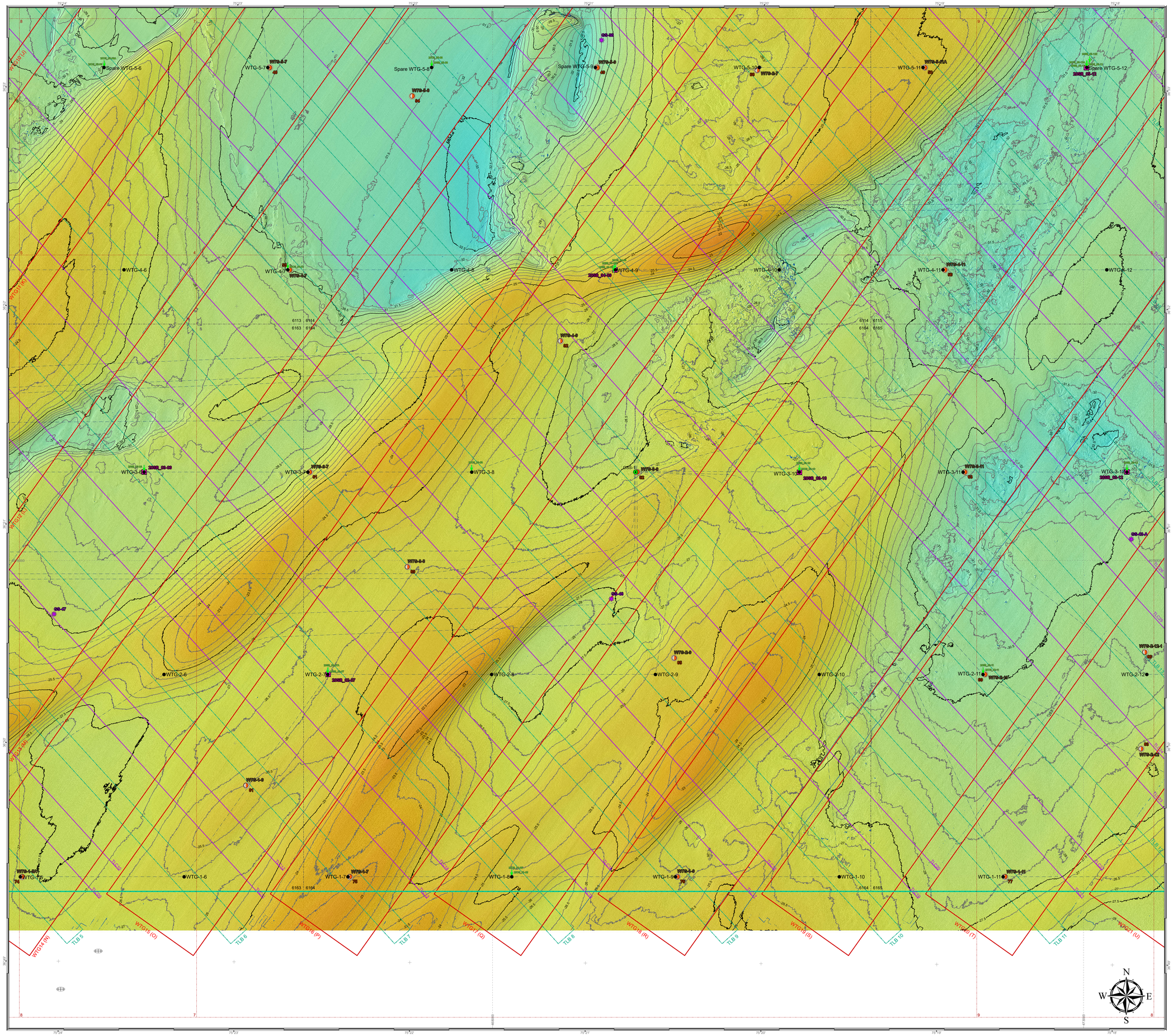
Chart Title: CHART 2 BATHYMETRY TILE 7 of 9

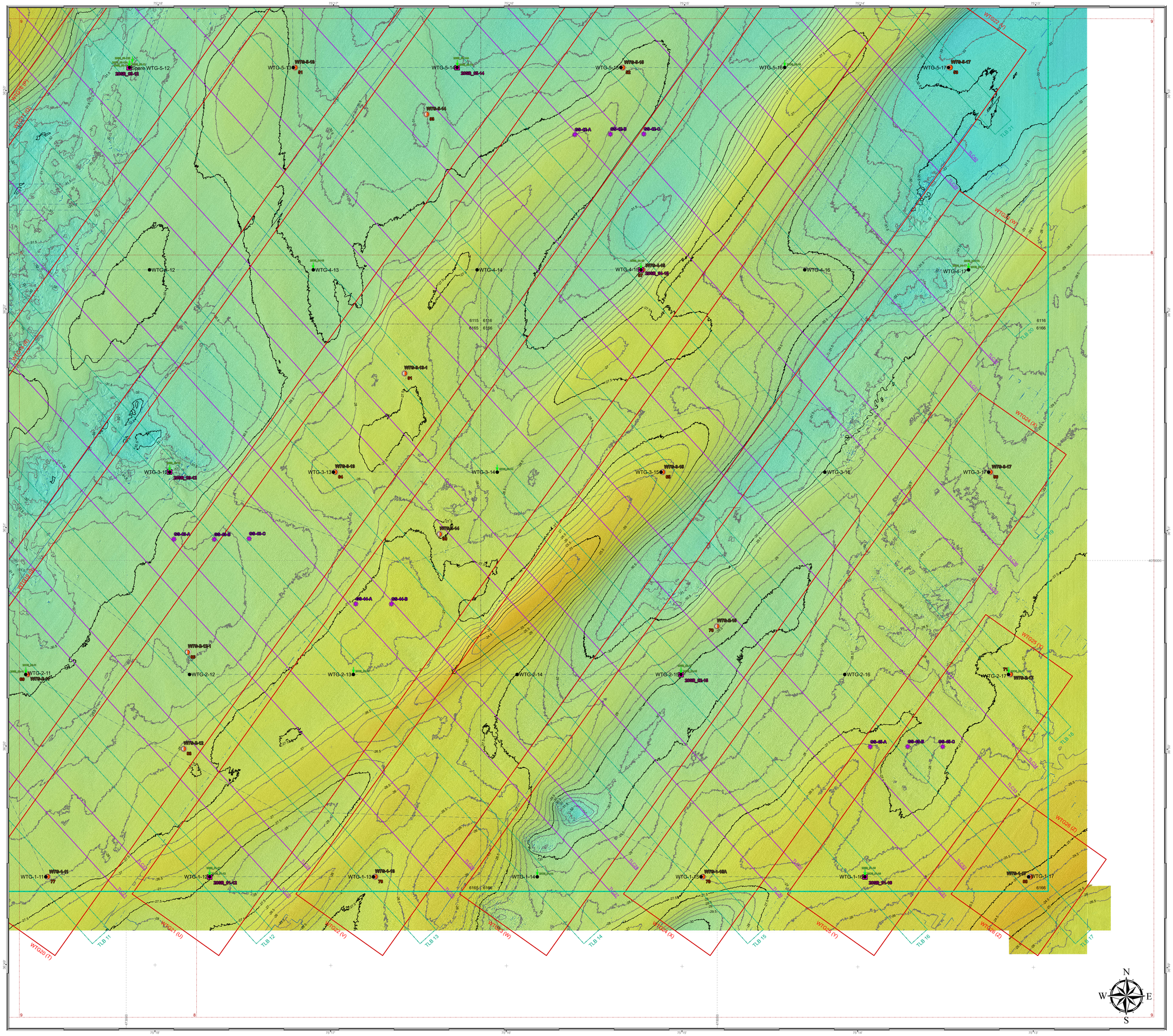
DATE	NOTE	AUTHOR	CHKD	APPD
06/04/21	DRAFT	CLS	KMM	KMM
06/14/21	Rev00	CLS	KDW	KMM
07/29/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/29/2021

File Name: Dominion_Bathymetry_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


WTG-5-6
WTG-5-7
WTG-5-8
WTG-5-9
WTG-5-10
WTG-5-11
WTG-5-12
WTG-4-6
WTG-4-7
WTG-4-8
WTG-4-9
WTG-4-10
WTG-4-11
WTG-4-12
WTG-3-6
WTG-3-7
WTG-3-8
WTG-3-10
WTG-3-11
WTG-3-12
WTG-2-6
WTG-2-7
WTG-2-8
WTG-2-9
WTG-2-10
WTG-2-11
WTG-2-12
WTG-1-6
WTG-1-7
WTG-1-8
WTG-1-9
WTG-1-10
WTG-1-11
WTG-1-12
WTG-1-13
WTG-1-14
WTG-1-15
WTG-1-16
WTG-1-17
WTG-1-18
WTG-1-19
WTG-1-20
WTG-1-21
WTG-1-22
WTG-1-23
WTG-1-24
WTG-1-25
WTG-1-26
WTG-1-27
WTG-1-28
WTG-1-29
WTG-1-30
WTG-1-31
WTG-1-32
WTG-1-33
WTG-1-34
WTG-1-35
WTG-1-36
WTG-1-37
WTG-1-38
WTG-1-39
WTG-1-40
WTG-1-41
WTG-1-42
WTG-1-43
WTG-1-44
WTG-1-45
WTG-1-46
WTG-1-47
WTG-1-48
WTG-1-49
WTG-1-50
WTG-1-51
WTG-1-52
WTG-1-53
WTG-1-54
WTG-1-55
WTG-1-56
WTG-1-57
WTG-1-58
WTG-1-59
WTG-1-60
WTG-1-61
WTG-1-62
WTG-1-63
WTG-1-64
WTG-1-65
WTG-1-66
WTG-1-67
WTG-1-68
WTG-1-69
WTG-1-70
WTG-1-71
WTG-1-72
WTG-1-73
WTG-1-74
WTG-1-75
WTG-1-76
WTG-1-77
WTG-1-78
WTG-1-79
WTG-1-80
WTG-1-81
WTG-1-82
WTG-1-83
WTG-1-84
WTG-1-85
WTG-1-86
WTG-1-87
WTG-1-88
WTG-1-89
WTG-1-90
WTG-1-91
WTG-1-92
WTG-1-93
WTG-1-94
WTG-1-95
WTG-1-96
WTG-1-97
WTG-1-98
WTG-1-99
WTG-1-100
WTG-1-101
WTG-1-102
WTG-1-103
WTG-1-104
WTG-1-105
WTG-1-106
WTG-1-107
WTG-1-108
WTG-1-109
WTG-1-110
WTG-1-111
WTG-1-112
WTG-1-113
WTG-1-114
WTG-1-115
WTG-1-116
WTG-1-117
WTG-1-118
WTG-1-119
WTG-1-120
WTG-1-121
WTG-1-122
WTG-1-123
WTG-1-124
WTG-1-125
WTG-1-126
WTG-1-127
WTG-1-128
WTG-1-129
WTG-1-130
WTG-1-131
WTG-1-132
WTG-1-133
WTG-1-134
WTG-1-135
WTG-1-136
WTG-1-137
WTG-1-138
WTG-1-139
WTG-1-140
WTG-1-141
WTG-1-142
WTG-1-143
WTG-1-144
WTG-1-145
WTG-1-146
WTG-1-147
WTG-1-148
WTG-1-149
WTG-1-150
WTG-1-151
WTG-1-152
WTG-1-153
WTG-1-154
WTG-1-155
WTG-1-156
WTG-1-157
WTG-1-158
WTG-1-159
WTG-1-160
WTG-1-161
WTG-1-162
WTG-1-163
WTG-1-164
WTG-1-165
WTG-1-166
WTG-1-167
WTG-1-168
WTG-1-169
WTG-1-170
WTG-1-171
WTG-1-172
WTG-1-173
WTG-1-174
WTG-1-175
WTG-1-176
WTG-1-177
WTG-1-178
WTG-1-179
WTG-1-180
WTG-1-181
WTG-1-182
WTG-1-183
WTG-1-184
WTG-1-185
WTG-1-186
WTG-1-187
WTG-1-188
WTG-1-189
WTG-1-190
WTG-1-191
WTG-1-192
WTG-1-193
WTG-1-194
WTG-1-195
WTG-1-196
WTG-1-197
WTG-1-198
WTG-1-199
WTG-1-200
WTG-1-201
WTG-1-202
WTG-1-203
WTG-1-204
WTG-1-205
WTG-1-206
WTG-1-207
WTG-1-208
WTG-1-209
WTG-1-210
WTG-1-211
WTG-1-212
WTG-1-213
WTG-1-214
WTG-1-215
WTG-1-216
WTG-1-217
WTG-1-218
WTG-1-219
WTG-1-220
WTG-1-221
WTG-1-222
WTG-1-223
WTG-1-224
WTG-1-225
WTG-1-226
WTG-1-227
WTG-1-228
WTG-1-229
WTG-1-230
WTG-1-231
WTG-1-232
WTG-1-233
WTG-1-234
WTG-1-235
WTG-1-236
WTG-1-237
WTG-1-238
WTG-1-239
WTG-1-240
WTG-1-241
WTG-1-242
WTG-1-243
WTG-1-244
WTG-1-245
WTG-1-246
WTG-1-247
WTG-1-248
WTG-1-249
WTG-1-250
WTG-1-251
WTG-1-252
WTG-1-253
WTG-1-254
WTG-1-255
WTG-1-256
WTG-1-257
WTG-1-258
WTG-1-259
WTG-1-260
WTG-1-261
WTG-1-262
WTG-1-263
WTG-1-264
WTG-1-265
WTG-1-266
WTG-1-267
WTG-1-268
WTG-1-269
WTG-1-270
WTG-1-271
WTG-1-272
WTG-1-273
WTG-1-274
WTG-1-275
WTG-1-276
WTG-1-277
WTG-1-278
WTG-1-279
WTG-1-280
WTG-1-281
WTG-1-282
WTG-1-283
WTG-1-284
WTG-1-285
WTG-1-286
WTG-1-287
WTG-1-288
WTG-1-289
WTG-1-290
WTG-1-291
WTG-1-292
WTG-1-293
WTG-1-294
WTG-1-295
WTG-1-296
WTG-1-297
WTG-1-298
WTG-1-299
WTG-1-300
WTG-1-301
WTG-1-302
WTG-1-303
WTG-1-304
WTG-1-305
WTG-1-306
WTG-1-307
WTG-1-308
WTG-1-309
WTG-1-310
WTG-1-311
WTG-1-312
WTG-1-313
WTG-1-314
WTG-1-315
WTG-1-316
WTG-1-317
WTG-1-318
WTG-1-319
WTG-1-320
WTG-1-321
WTG-1-322
WTG-1-323
WTG-1-324
WTG-1-325
WTG-1-326
WTG-1-327
WTG-1-328
WTG-1-329
WTG-1-330
WTG-1-331
WTG-1-332
WTG-1-333
WTG-1-334
WTG-1-335
WTG-1-336
WTG-1-337
WTG-1-338
WTG-1-339
WTG-1-340
WTG-1-341
WTG-1-342
WTG-1-343
WTG-1-344
WTG-1-345
WTG-1-346
WTG-1-347
WTG-1-348
WTG-1-349
WTG-1-350
WTG-1-351
WTG-1-352
WTG-1-353
WTG-1-354
WTG-1-355
WTG-1-356
WTG-1-357
WTG-1-358
WTG-1-359
WTG-1-360
WTG-1-361
WTG-1-362
WTG-1-363
WTG-1-364
WTG-1-365
WTG-1-366
WTG-1-367
WTG-1-368
WTG-1-369
WTG-1-370
WTG-1-371
WTG-1-372
WTG-1-373
WTG-1-374
WTG-1-375
WTG-1-376
WTG-1-377
WTG-1-378
WTG-1-379
WTG-1-380
WTG-1-381
WTG-1-382
WTG-1-383
WTG-1-384
WTG-1-385
WTG-1-386
WTG-1-387
WTG-1-388
WTG-1-389
WTG-1-390
WTG-1-391
WTG-1-392
WTG-1-393
WTG-1-394
WTG-1-395
WTG-1-396
WTG-1-397
WTG-1-398
WTG-1-399
WTG-1-400
WTG-1-401
WTG-1-402
WTG-1-403
WTG-1-404
WTG-1-405
WTG-1-406
WTG-1-407
WTG-1-408
WTG-1-409
WTG-1-410
WTG-1-411
WTG-1-412
WTG-1-413
WTG-1-414
WTG-1-415
WTG-1-416
WTG-1-417
WTG-1-418
WTG-1-419
WTG-1-420
WTG-1-421
WTG-1-422
WTG-1-423
WTG-1-424
WTG-1-425
WTG-1-426
WTG-1-427
WTG-1-428
WTG-1-429
WTG-1-430
WTG-1-431
WTG-1-432
WTG-1-433
WTG-1-434
WTG-1-435
WTG-1-436
WTG-1-437
WTG-1-438
WTG-1-439
WTG-1-440
WTG-1-441
WTG-1-442
WTG-1-443
WTG-1-444
WTG-1-445
WTG-1-446
WTG-1-447
WTG-1-448
WTG-1-449
WTG-1-450
WTG-1-451
WTG-1-452
WTG-1-453
WTG-1-454
WTG-1-455
WTG-1-456
WTG-1-457
WTG-1-458
WTG-1-459
WTG-1-460
WTG-1-461
WTG-1-462
WTG-1-463
WTG-1-464
WTG-1-465
WTG-1-466
WTG-1-467
WTG-1-468
WTG-1-469
WTG-1-470
WTG-1-471
WTG-1-472
WTG-1-473
WTG-1-474
WTG-1-475
WTG-1-476
WTG-1-477
WTG-1-478
WTG-1-479
WTG-1-480
WTG-1-481
WTG-1-482
WTG-1-483
WTG-1-484
WTG-1-485
WTG-1-486
WTG-1-487
WTG-1-488
WTG-1-489
WTG-1-490
WTG-1-491
WTG-1-492
WTG-1-493
WTG-1-494
WTG-1-495
WTG-1-496
WTG-1-497
WTG-1-498
WTG-1-499
WTG-1-500
WTG-1-501
WTG-1-502
WTG-1-503
WTG-1-504
WTG-1-505
WTG-1-506
WTG-1-507
WTG-1-508
WTG-1-509
WTG-1-510
WTG-1-511
WTG-1-512
WTG-1-513
WTG-1-514
WTG-1-515
WTG-1-516
WTG-1-517
WTG-1-518
WTG-1-519
WTG-1-520
WTG-1-521
WTG-1-522
WTG-1-523
WTG-1-524
WTG-1-525
WTG-1-526
WTG-1-527
WTG-1-528
WTG-1-529
WTG-1-530
WTG-1-531
WTG-1-532
WTG-1-533
WTG-1-534
WTG-1-535
WTG-1-536
WTG-1-537
WTG-1-538
WTG-1-539
WTG-1-540
WTG-1-541
WTG-1-542
WTG-1-543
WTG-1-544
WTG-1-545
WTG-1-546
WTG-1-547
WTG-1-548
WTG-1-549
WTG-1-550
WTG-1-551
WTG-1-552
WTG-1-553
WTG-1-554
WTG-1-555
WTG-1-556
WTG-1-557
WTG-1-558
WTG-1-559
WTG-1-560
WTG-1-561
WTG-1-562
WTG-1-563
WTG-1-564
WTG-1-565
WTG-1-566
WTG-1-567
WTG-1-568
WTG-1-569
WTG-1-570
WTG-1-571
WTG-1-572
WTG-1-573
WTG-1-574
WTG-1-575
WTG-1-576
WTG-1-577
WTG-1-578
WTG-1-579
WTG-1-580
WTG-1-581
WTG-1-582
WTG-1-583
WTG-1-584
WTG-1-585
WTG-1-586
WTG-1-587
WTG-1-588
WTG-1-589
WTG-1-590
WTG-1-591
WTG-1-592
WTG-1-593
WTG-1-594
WTG-1-595
WTG-1-596
WTG-1-597
WTG-1-598
WTG-1-599
WTG-1-600
WTG-1-601
WTG-1-602
WTG-1-603
WTG-1-604
WTG-1-605
WTG-1-606
WTG-1-607
WTG-1-608
WTG-1-609
WTG-1-610
WTG-1-611
WTG-1-612
WTG-1-613
WTG-1-614
WTG-1-615
WTG-1-616
WTG-1-617
WTG-1-618
WTG-1-619
WTG-1-620
WTG-1-621
WTG-1-622
WTG-1-623
WTG-1-624
WTG-1-625
WTG-1-626
WTG-1-627
WTG-1-628
WTG-1-629
WTG-1-630
WTG-1-631
WTG-1-632
WTG-1-633
WTG-1-634
WTG-1-635
WTG-1-636
WTG-1-637
WTG-1-638
WTG-1-639
WTG-1-640
WTG-1-641
WTG-1-642
WTG-1-643
WTG-1-644
WTG-1-645
WTG-1-646
WTG-1-647
WTG-1-648
WTG-1-649
WTG-1-650
WTG-1-651
WTG-1-652
WTG-1-653
WTG-1-654
WTG-1-655
WTG-1-656
WTG-1-657
WTG-1-658
WTG-1-659
WTG-1-660
WTG-1-661
WTG-1-662
WTG-1-663
WTG-1-664
WTG-1-665
WTG-1-666
WTG-1-667
WTG-1-668
WTG-1-669
WTG-1-670
WTG-1-671
WTG-1-672
WTG-1-673
WTG-1-674
WTG-1-675
WTG-1-676
WTG-1-677
WTG-1-678
WTG-1-679
WTG-1-680
WTG-1-681
WTG-1-682
WTG-1-683
WTG-1-684
WTG-1-685
WTG-1-686
WTG-1-687
WTG-1-688
WTG-1-689
WTG-1-690
WTG-1-691
WTG-1-692
WTG-1-693
WTG-1-694
WTG-1-695
WTG-1-696
WTG-1-697
WTG-1-698
WTG-1-699
WTG-1-700
WTG-1-701
WTG-1-702
WTG-1-703
WTG-1-704
WTG-1-705
WTG-1-706
WTG-1-707
WTG-1-708
WTG-1-709
WTG-1-710
WTG-1-711
WTG-1-712
WTG-1-713
WTG-1-714
WTG-1-715
WTG-1-716
WTG-1-717
WTG-1-718
WTG-1-719
WTG-1-720
WTG-1-721
WTG-1-722
WTG-1-723
WTG-1-724
WTG-1-725
WTG-1-726
WTG-1-727
WTG-1-728
WTG-1-729
WTG-1-730
WTG-1-731
WTG-1-732
WTG-1-733
WTG-1-734
WTG-1-735
WTG-1-736
WTG-1-737
WTG-1-738
WTG-1-739
WTG-1-740
WTG-1-741
WTG-1-742
WTG-1-743
WTG-1-744
WTG-1-745
WTG-1-746
WTG-1-747
WTG-1-748
WTG-1-749
WTG-1-750
WTG-1-751
WTG-1-752
WTG-1-753
WTG-1-754
WTG-1-755
WTG-1-756
WTG-1-757
WTG-1-758
WTG-1-759
WTG-1-760
WTG-1-761
WTG-1-762
WTG-1-763
WTG-1-764
WTG-1-765
WTG-1-766
WTG-1-767
WTG-1-768
WTG-1-769
WTG-1-770
WTG-1-771
WTG-1-772
WTG-1-773
WTG-1-774
WTG-1-775
WTG-1-776
WTG-1-777
WTG-1-778
WTG-1-779
WTG-1-780
WTG-1-781
WTG-1-782
WTG-1-783
WTG-1-784
WTG-1-785
WTG-1-786
WTG-1-787
WTG-1-788
WTG-1-789
WTG-1-790
WTG-1-791
WTG-1-792
WTG-1-793
WTG-1-794
WTG-1-795
WTG-1-796
WTG-1-797
WTG-1-798
WTG-1-799
WTG-1-800
WTG-1-801
WTG-1-802
WTG-1-803
WTG-1-804
WTG-1-805
WTG-1-806
WTG-1-807
WTG-1-808
WTG-1-809
WTG-1-810
WTG-1-811
WTG-1-812
WTG-1-813
WTG-1-814
WTG-1-815
WTG-1-816
WTG-1-817
WTG-1-818
WTG-1-819
WTG-1-820
WTG-1-821
WTG-1-822
WTG-1-823
WTG-1-824
WTG-1-825
WTG-1-826
WTG-1-827
WTG-1-828
WTG-1-829
WTG-1-830
WTG-1-831
WTG-1-832
WTG-1-833
WTG-1-834
WTG-1-835
WTG-1-836
WTG-1-837
WTG-1-838
WTG-1-839
WTG-1-840
WTG-1-841
WTG-1-842
WTG-1-843
WTG-1-844
WTG-1-845
WTG-1-846
WTG-1-847
WTG-1-848
WTG-1-849
WTG-1-850
WTG-1-851
WTG-1-852
WTG-1-853
WTG-1-854
WTG-1-855
WTG-1-856
WTG-1-857
WTG-1-858
WTG-1-859
WTG-1-860
WTG-1-861
WTG-1-862
WTG-1-863
WTG-1-864
WTG-1-865
WTG-1-866
WTG-1-867
WTG-1-868
WTG-1-869
WTG-1-870
WTG-1-871
WTG-1-872
WTG-1-873
WTG-1-874
WTG-1-875
WTG-1-876
WTG-1-877
WTG-1-878
WTG-1-879
WTG-1-880
WTG-1-881
WTG-1-882
WTG-1-883
WTG-1-884
WTG-1-885
WTG-1-886
WTG-1-887
WTG-1-888
WTG-1-889
WTG-1-890
WTG-1-891
WTG-1-892
WTG-1-893
WTG-1-894
WTG-1-895
WTG-1-896
WTG-1-897
WTG-1-898
WTG-1-899
WTG-1-900
WTG-1-901
WTG-1-902
WTG-1-903
WTG-1-904
WTG-1-905
WTG-1-906
WTG-1-907
WTG-1-908
WTG-1-909
WTG-1-910
WTG-1-911
WTG-1-912
WTG-1-913
WTG-1-914
WTG-1-915
WTG-1-916
WTG-1-917
WTG-1-918
WTG-1-919
WTG-1-920
WTG-1-921
WTG-1-922
WTG-1-923
WTG-1-924
WTG-1-925
WTG-1-926
WTG-1-927
WTG-1-928
WTG-1-929
WTG-1-930
WTG-1-931
WTG-1-932
WTG-1-933
WTG-1-934
WTG-1-935
WTG-1-936
WTG-1-937
WTG-1-938
WTG-1-939
WTG-1-940
WTG-1-941
WTG-1-942
WTG-1-943
WTG-1-944
WTG-1-945
WTG-1-946
WTG-1-947
WTG-1-948
WTG-1-949
WTG-1-950
WTG-1-951
WTG-1-952
WTG-1-953
WTG-1-954
WTG-1-955
WTG-1-956
WTG-1-957
WTG-1-958
WTG-1-959
WTG-1-960
WTG-1-961
WTG-1-962
WTG-1-963
WTG-1-964
WTG-1-965
WTG-1-966
WTG-1-967
WTG-1-968
WTG-1-969
WTG-1-970
WTG-1-971
WTG-1-972
WTG-1-973
WTG-1-974
WTG-1-975
WTG-1-976
WTG-1-977
WTG-1-978
WTG-1-979
WTG-1-980
WTG-1-981
WTG-1-982
WTG-1-983
WTG-1-984
WTG-1-985
WTG-1-986
WTG-1-987
WTG-1-988
WTG-1-989
WTG-1-990
WTG-1-991
WTG-1-992
WTG-1-993
WTG-1-994
WTG-1-995
WTG-1-996
WTG-1-997
WTG-1-998
WTG-1-999
WTG-1-1000
WTG-1-1001
WTG-1-1002
WTG-1-1003
WTG-1-1004
WTG-1-1005
WTG-1-1006
WTG-1-1007
WTG-1-1008
WTG-1-1009
WTG-1-1010
WTG-1-1011
WTG-1-1012
WTG-1-1013
WTG-1-1014
WTG-1-1015
WTG-1-1016
WTG-1-1017
WTG-1-1018
WTG-1-1019
WTG-1-1020
WTG-1-1021
WTG-1-1022
WTG-1-1023
WTG-1-1024
WTG-1-1025
WTG-1-1026
WTG-1-1027
WTG-1-1028
WTG-1-1029
WTG-1-1030
WTG-1-1031
WTG-1-1032
WTG-1-1033
WTG-1-1034
WTG-1-1035
WTG-1-1036
WTG-1-1037
WTG-1-1038
WTG-1-1039
WTG-1-1040
WTG-1-1041
WTG-1-1042
WTG-1-1043
WTG-1-1044
WTG-1-1045
WTG-1-1046
WTG-1-1047
WTG-1-1048
WTG-1-1049
WTG-1-1050
WTG-1-1051
WTG-1-1052
WTG-1-1053
WTG-1-1054
WTG-1-1055
WTG-1-1056
WTG-1-1057
WTG-1-1058
WTG-1-1059
WTG-1-1060
WTG-1-1061
WTG-1-1062
WTG-1-1063
WTG-1-1064
WTG-1-1065
WTG-1-1066
WTG-1-1067
WTG-1-1068
WTG-1-1069
WTG-1-1070
WTG-1-1071
WTG-1-1072
WTG-1-1073
WTG-1-1074
WTG-1-1075
WTG-1-1076
WTG-1-1077
WTG-1-1078
WTG-1-1079
WTG-1-1080
WTG-1-1081
WTG-1-1082
WTG-1-1083
WTG-1-1084
WTG-1-1085
WTG-1-1086
WTG-1-1087
WTG-1-1088
WTG-1-1089
WTG-1-1090
WTG-1-1091
WTG-1-1092
WTG-1-1093
WTG-1-1094
WTG-1-1095
WTG-1-1096
WTG-1-1097
WTG-1-1098
WTG-1-1099
WTG-1-1100
WTG-1-1101
WTG-1-1102
WTG-1-1103
WTG-1-1104
WTG-1-1105
WTG-1-1106
WTG-1-1107
WTG-1-1108
WTG-1-1109
WTG-1-1110
WTG-1-1111
WTG-1-1112
WTG-1-1113
WTG-1-1114
WTG-1-1115
WTG-1-1116
WTG-1-1117
WTG-1-1118
WTG-1-1119
WTG-1-1120
WTG-1-1121
WTG-1-1122
WTG-1-1123
WTG-1-1124
WTG-1-1125
WTG-1-1126
WTG-1-1127
WTG-1-1128
WTG-1-1129
WTG-1-1130
WTG-1-1131
WTG-1-1132
WTG-1-1133
WTG-1-1134
WTG-1-1135
WTG-1-1136
WTG-1-1137
WTG-1-1138
WTG-1-1139
WTG-1-1140
WTG-1-1141
WTG-1-1142
WTG-1-1143
WTG-1-1144
WTG-1-1145
WTG-1-1146
WTG-1-1147
WTG-1-1148
WTG-1-1149
WTG-1-1150
WTG-1-1151
WTG-1-1152
WTG-1-1153
WTG-1-1154
WTG-1-1155
WTG-1-1156
WTG-1-1157
WTG-1-1158
WTG-1-1159
WTG-1-1160
WTG-1-1161
WTG-1-1162
WTG-1-1163
WTG-1-1164
WTG-1-1165
WTG-1-1166
WTG-1-1167
WTG-1-1168
WTG-1-1169
WTG-1-1170
WTG-1-1171
WTG-1-1172
WTG-1-1173
WTG-1-1174
WTG-1-1175
WTG-1-1176
WTG-1-1177
WTG-1-1178
WTG-1-1179
WTG-1-1180
WTG-1-1181
WTG-1-1182
WTG-1-1183
WTG-1-1184
WTG-1-1185
WTG-1-1186
WTG-1-1187
WTG-1-1188
WTG-1-1189
WTG-1-1190
WTG-1-1191
WTG-1-1192
WTG-1-1193
WTG-1-1194
WTG-1-1195
WTG-1-1196
WTG-1-1197
WTG-1-1198
WTG-1-1199
WTG-1-1200
WTG-1-1201
WTG-1-1202
WTG-1-1203
WTG-1-1204
WTG-1-1205
WTG-1-1206
WTG-1-1207
WTG-1-1208
WTG-1-1209
WTG-1-1210
WTG-1-1211
WTG-1-1212
WTG-1-1213
WTG-1-1214
WTG-1-1215
WTG-1-1216
WTG-1-1217
WTG-1-1218
WTG-1-1219
WTG-1-1220
WTG-1-1221
WTG-1-1222
WTG-1-1223
WTG-1-1224
WTG-1-1225
WTG-1-1226
WTG-1-1227
WTG-1-1228
WTG-1-1229
WTG-1-1230
WTG-1-1231
WTG-1-1232
WTG-1-1233
WTG-1-1234
WTG-1-1235
WTG-1-1236
WTG-1-1237
WTG-1-1238
WTG-1-1239
WTG-1-1240
WTG-1-1241
WTG-1-1242
WTG-1-1243
WTG-1-1244
WTG-1-1245
WTG-1-1246
WTG-1-1247
WTG-1-1248
WTG-1-1249
WTG-1-1250
WTG-1-1251
WTG-1-1252
WTG-1-1253
WTG-1-1254
WTG-1-1255
WTG-1-1256
WTG-1-1257
WTG-1-1258
WTG-1-1259
WTG-1-1260
WTG-1-1261
WTG-1-1262
WTG-1-1263
WTG-1-1264
WTG-1-1265
WTG-1-1266
WTG-1-1267
WTG-1-1268
WTG-1-1269
WTG-1-1270
WTG-1-1271
WTG-1-1272
WTG-1-1273
WTG-1-1274
WTG-1-1275
WTG-1-1276
WTG-1-1277
WTG-1-1278
WTG-1-1279
WTG-1-1280
WTG-1-1281
WTG-1-1282
WTG-1-1283
WTG-1-1284
WTG-1-1285
WTG-1-1286
WTG-1-1287
WTG-1-1288
WTG-1-1289
WTG-1-1290
WTG-1-1291
WTG-1-1292
WTG-1-1293
WTG-1-1294
WTG-1-1295
WTG-1-1296
WTG-1-1297
WTG-1-1298
WTG-1-1299
WTG-1-1300
WTG-1-1301
WTG-1-1302
WTG-1-1303
WTG-1-1304
WTG-1-1305
WTG-1-1306
WTG-1-1307
WTG-1-1308
WTG-1-1309
WTG-1-1310
WTG-1-1311
WTG-1-1312
WTG-1-1313
WTG-1-1314
WTG-1-1315
WTG-1-1316
WTG-1-1317
WTG-1-1318
WTG-1-1319
WTG-1-1320
WTG-1-1321
WTG-1-1322
WTG-1-1323
WTG-1-1324
WTG-1-1325
WTG-1-1326
WTG-1-1327
WTG-1-1328
WTG-1-1329
WTG-1-1330
WTG-1-1331
WTG-1-1332
WTG-1-1333
WTG-1-1334
WTG-1-1335
WTG-1-1336
WTG-1-1337
WTG-1-1338
WTG-1-1339
WTG-1-1340
WTG-1-1341
WTG-1-1342
WTG-1-1343
WTG-1-1344
WTG-1-1345
WTG-1-1346
WTG-1-1347
WTG-1-1348
WTG-1-1349
WTG-1-1350
WTG-1-1351
WTG-1-1352
WTG-1-1353
WTG-1-1354
WTG-1-1355
WTG-1-1356
WTG-1-1357
WTG-1-1358
WTG-1-1359
WTG-1-1360
WTG-1-1361
WTG-1-1362
WTG-1-1363
WTG-1-1364
WTG-1-1365
WTG-1-1366
WTG-1-1367
WTG-1-1368
WTG-1-1369
WTG-1-1370
WTG-1-1371
WTG-1-1372
WTG-1-1373
WTG-1-1374
WTG-1-1375
WTG-1-1376
WTG-1-1377
WTG-1-1378
WTG-1-1379
WTG-1-1380
WTG-1-1381
WTG-1-1382
WTG-1-1383
WTG-1-1384
WTG-1-1385
WTG-1-1386
WTG-1-1387
WTG-1-1388
WTG-1-1389
WTG-1-1390
WTG-1-1391
WTG-1-1392
WTG-1-1393
WTG-1-1394
WTG-1-1395
WTG-1-1396
WTG-1-1397
WTG-1-1398
WTG-1-1399
WTG-1-1400
WTG-1-1401
WTG-1-1402
WTG-1-1403
WTG-1-1404
WTG-1-1405
WTG-1-1406
WTG-1-1407
WTG-1-1408
WTG-1-1409
WTG-1-1410
WTG-1-1411
WTG-1-1412
WTG-1-1413
WTG-1-1414
WTG-1-1415
WTG-1-1416
WTG-1-1417
WTG-1-1418
WTG-1-1419
WTG-1-1420
WTG-1-1421
WTG-1-1422
WTG-1-1423
WTG-1-1424
WTG-1-1425
WTG-1-1426
WTG-1-1427
WTG-1-1428
WTG-1-1429
WTG-1-1430
WTG-1-1431
WTG-1-1432
WTG-1-1433
WTG-1-1434
WTG-1-1435
WTG-1-1436
WTG-1-1437
WTG-1-1438
WTG-1-1439
WTG-1-1440
WTG-1-1441
WTG-1-1442
WTG-1-1443
WTG-1-1444
WTG-1-1445
WTG-1-1446
WTG-1-1447
WTG-1-1448
WTG-1-1449
WTG-1-1450
WTG-1-1451
WTG-1-1452
WTG-1-1453
WTG-1-1454
WTG-1-1455
WTG-1-1456
WTG-1-1457
WTG-1-1458
WTG-1-1459
WTG-1-1460
WTG-1-1461
WTG-1-1462
WTG-1-1463
WTG-1-1464
WTG-1-1465
WTG-1-1466
WTG-1-1467
WTG-1-1468
WTG-1-1469
WTG-1-1470
WTG-1-1471
WTG-1-1472
WTG-1-1473
WTG-1-1474
WTG-1-1475
WTG-1-1476
WTG-1-1477
WTG-1-1478
WTG-1-1479
WTG-1-1480
WTG-1-1481
WTG-1-1482
WTG-1-1483
WTG-1-1484
WTG-1-1485
WTG-1-1486
WTG-1-1487
WTG-1-1488
WTG-1-1489
WTG-1-1490
WTG-1-1491
WTG-1-1492
WTG-1-1493
WTG-1-1494
WTG-1-1495
WTG-1-1496
WTG-1-1497
WTG-1-1498
WTG-1-1499
WTG-1-1500
WTG-1-1501
WTG-1-1502
WTG-1-1503
WTG-1-1504
WTG-1-1505
WTG-1-1506
WTG-1-1507
WTG-1-1508
WTG-1-1509
WTG-1-1510
WTG-1-1511
WTG-1-1512
WTG-1-1513
WTG-1-1514
WTG-1-1515
WTG-1-1516
WTG-1-1517
WTG-1-1518
WTG-1-1519
WTG-1-1520
WTG-1-1521
WTG-1-1522
WTG-1-1523
WTG-1-1524
WTG-1-1525
WTG-1-1526
WTG-1-1527
WTG-1-1528
WTG-1-1529
WTG-1-1530
WTG-1-1531
WTG-1-1532
WTG-1-1533
WTG-1-1534
WTG-1-1535
WTG-1-1536
WTG-1-1537
WTG-1-1538
WTG-1-1539
WTG-1-1540
WTG-1-1541
WTG-1-1542
WTG-1-1543
WTG-1-1544
WTG-1-1545
WTG-1-1546
WTG-1-1547
WTG-1-1548
WTG-1-1549
WTG-1-1550
WTG-1-1551
WTG-1-1552
WTG-1-1553
WTG-1-1554
WTG-1-1555
WTG-1-1556
WTG-1-1557
WTG-1-1558
WTG-1-1559
WTG-1-1560
WTG-1-1561
WTG-1-1562
WTG-1-1563
WTG-1-1564
WTG-1-1565
WTG-1-1566
WTG-1-1567
WTG-1-1568
WTG-1-1569
WTG-1-1570
WTG-1-1571
WTG-1-1572
WTG-1-1573
WTG-1-1574
WTG-1-1575
WTG-1-1576
WTG-1-1577
WTG-1-1578
WTG-1-1579
WTG-1-1580
WTG-1-1581
WTG-1-1582
WTG-1-1583
WTG-1-1584
WTG-1-1585
WTG-1-1586
WTG-1-1587
WTG-1-1588
WTG-1-1589
WTG-1-1590
WTG-1-1591
WTG-1-1592
WTG-1-1593
WTG-1-1594
WTG-1-1595
WTG-1-1596
WTG-1-1597
WTG-1-1598
WTG-1-1599
WTG-1-1600
WTG-1-1601
WTG-1-1602
WTG-1-1603
WTG-1-1604
WTG-1-1605
WTG-1-1606
WTG-1-1607
WTG-1-1608
WTG-1-1609
WTG-1-1610
WTG-1-1611
WTG-1-1612
WTG-1-1613
WTG-1-1614
WTG-1-1615
WTG-1-1616
WTG-1-1617
WTG-1-1618
WTG-1-1619
WTG-1-1620
WTG-1-1621
WTG-1-1622
WTG-1-1623
WTG-1-1624
WTG-1-1625
WTG-1-1626
WTG-1-1627
WTG-1-1628
WTG-1-1629
WTG-1-1630
WTG-1-1631
WTG-1-1632
WTG-1-1633
WTG-1-1634
WTG-1-1635
WTG-1-1636
WTG-1-1637
WTG-1-1638
WTG-1-1639
WTG-1-1640
WTG-1-1641
WTG-1-1642
WTG-1-1643
WTG-1-1644
WTG-1-1645
WTG-1-1646
WTG-1-1647
WTG-1-1648
WTG-1-1649
WTG-1-1650
WTG-1-1651
WTG-1-1652
WTG-1-1653
WTG-1-1654
WTG-1-1655
WTG-1-1656
WTG-1-1657
WTG-1-1658
WTG-1-1659
WTG-1-1660
WTG-1-1661
WTG-1-1662
WTG-1-1663
WTG-1-1664
WTG-1-1665
WTG-1-1666
WTG-1-1667
WTG-1-1668
WTG-1-1669
WTG-1-1670
WTG-1-1671
WTG-1-1672
WTG-1-1673
WTG-1-1674
WTG-1-1675
WTG-1-1676
WTG-1-1677
WTG-1-1678
WTG-1-1679
WTG-1-1680
WTG-1-1681
WTG-1-1682
WTG-1-1683
WTG-1-1684
WTG-1-1685
WTG-1-1686
WTG-1-1687
WTG-1-1688
WTG-1-1689
WTG-1-1690
WTG-1-1691
WTG-1-1692
WTG-1-1693
WTG-1-1694
WTG-1-1695
WTG-1-1696
WTG-1-1697
WTG-1-1698
WTG-1-1699
WTG-1-1700
WTG-1-1701
WTG-1-1702
WTG-1-1703
WTG-1-1704
WTG-1-1705
WTG-1-1706
WTG-1-1707
WTG-1-1708
WTG-1-1709
WTG-1-1710
WTG-1-1711
WTG-1-1712
WTG-1-1713
WTG-1-1714
WTG-1-1715
WTG-1-1716
WTG-1-1717
WTG-1-1718
WTG-1-1719
WTG-1-1720
WTG-1-1721
WTG-1-1722
WTG-1-1723
WTG-1-1724
WTG-1-1725
WTG-1-1726
WTG-1-1727
WTG-1-1728
WTG-1-1729
WTG-1-1730
WTG-1-1731
WTG-1-1732
WTG-1-1733
WTG-1-1734
WTG-1-1735
WTG-1-1736
WTG-1-1737
WTG-1-1738
WTG-1-1739
WTG-1-1740
WTG-1-1741
WTG-1-1742
WTG-1-1743
WTG-1-1744
WTG-1-1745
WTG-1-1746
WTG-1-1747
WTG-1-1748
WTG-1-1749
WTG-1-1750
WTG-1-1751
WTG-1-1752
WTG-1-1753
WTG-1-1754
WTG-1-1755
WTG-1-1756
WTG-1-1757
WTG-1-1758
WTG-1-1759
WTG-1-1760
WTG-1-1761
WTG-1-1762
WTG-1-1763
WTG-1-1764
WTG-1-1765
WTG-1-1766
WTG-1-1767
WTG-1-1768
WTG-1-1769
WTG-1-1770
WTG-1-1771
WTG-1-1772
WTG-1-1773
WTG-1-1774
WTG-1-1775
WTG-1-1776
WTG-1-1777
WTG-1-1778
WTG-1-1779
WTG-1-1780
WTG-1-1781
WTG-1-1782
WTG-1-1783
WTG-1-1784
WTG-1-1785
WTG-1-1786
WTG-1-1787
WTG-1-1788
WTG-1-1789
WTG-1-1790
WTG-1-1791
WTG-1-1792
WTG-1-1793
WTG-1-1794
WTG-1-1795
WTG-1-1796
WTG-1-1797
WTG-1-1798
WTG-1-1799
WTG-1-1800
WTG-1-1801
WTG-1-1802
WTG-1-1803
WTG-1-1804
WTG-1-1805
WTG-1-1806
WTG-1-1807
WTG-1-1808
WTG-1-1809
WTG-1-1810
WTG-1-1811
WTG-1-1812
WTG-1-1813
WTG-1-1814
WTG-1-1815
WTG-1-1816
WTG-1-1817
WTG-1-1818
WTG-1-1819
WTG-1-1820
WTG-1-1821
WTG-1-1822
WTG-1-1823
WTG-1-1824
WTG-1-1825
WTG-1-1826
WTG-1-1827
WTG-1-1828
WTG-1-1829
WTG-1-1830
WTG-1-1831
WTG-1-1832
WTG-1-1833
WTG-1-1834
WTG-1-1835
WTG-1-1836
WTG-1-1837
WTG-1-1838
WTG-1-1839
WTG-1-1840
WTG-1-1841
WTG-1-1842
WTG-1-1843
WTG-1-1844
WTG-1-1845
WTG-1-1846
WTG-1-1847
WTG-1-1848
WTG-1-1849
WTG-1-1850
WTG-1-1851
WTG-1-1852
WTG-1-1853
WTG-1-1854
WTG-1-1855
WTG-1-1856
WTG-1-1857
WTG-1-1858
WTG-1-1859
WTG-1-1860
WTG-1-1861
WTG-1-1862
WT



General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart, OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities - Geographic Data downloaded from ESRI Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Bathymetry

- Major Contours (2.5 m interval)
- Minor Contours (0.50 m interval)
- Slope Gradient >= 10°

The elevation values for the current display:

Minimum: -33.51m

Maximum: -24.06m

Bathymetric Grid

-18 -21 -24 -27 -30 -33 -36 -39 -42

MBES surface was created at 50 cm resolution.
Bathymetric Grid: values are elevation, in meters

Multibeam Echosounder Processing Notes

Multibeam bathymetry data were processed in QPS Qimera 2.2.1.

Data Import and Navigation

Qinsy Database (DB) files were imported into Qimera 2.2.1, and an initial surface was made; post-processed POSPac PP-RTX results in the form of Smoothed Best Estimate Trajectories (SBETs) were imported. In Qimera, position and altitude data were analyzed for erroneous points; these data points were flagged and then removed.

Sound Velocity Correction

Sound velocity data were imported, evaluated for erroneous points, and applied to the MBES data. Unless sound velocity errors were noted, "Nearest in Distance Within Time – 360 minutes" was the method for pairing SV casts to the DB files.

Vertical Datum

The data were then converted to the working vertical datum, MLLW, by the application of NOAA V-Datum separation model; this separation model shifted the SBET from its native ellipsoidal elevation.The data were checked for tidal errors, refraction, and noise and adjusted where necessary.

Data Cleaning

Data were filtered using an TPU (Total Propagated Uncertainty) filter for IHO Special Order. Data were then manually edited and cleaned using the swath, slice, and 3D editor tools in Qimera. The Density Grid was analyzed prior to cutting any outer beams (if necessary) to ensure a minimum of 5 pings per square meter. The final surface was inspected using the Uncertainty Grid (95% confidence level) for any remaining outliers to be removed. Final QC was performed using the Density, Uncertainty (95%), Total Horizontal Uncertainty (THU), and Total Vertical Uncertainty (TVU) grids.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) / R2Sonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer
Sparker[1]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Milston
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

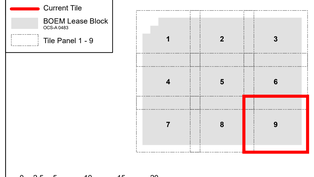
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

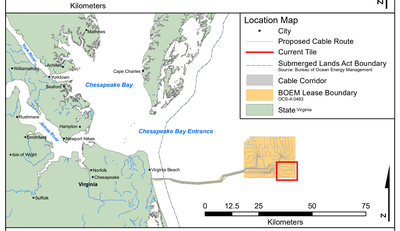
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9



Location Map



0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 2 BATHYMETRY TILE 9 of 9

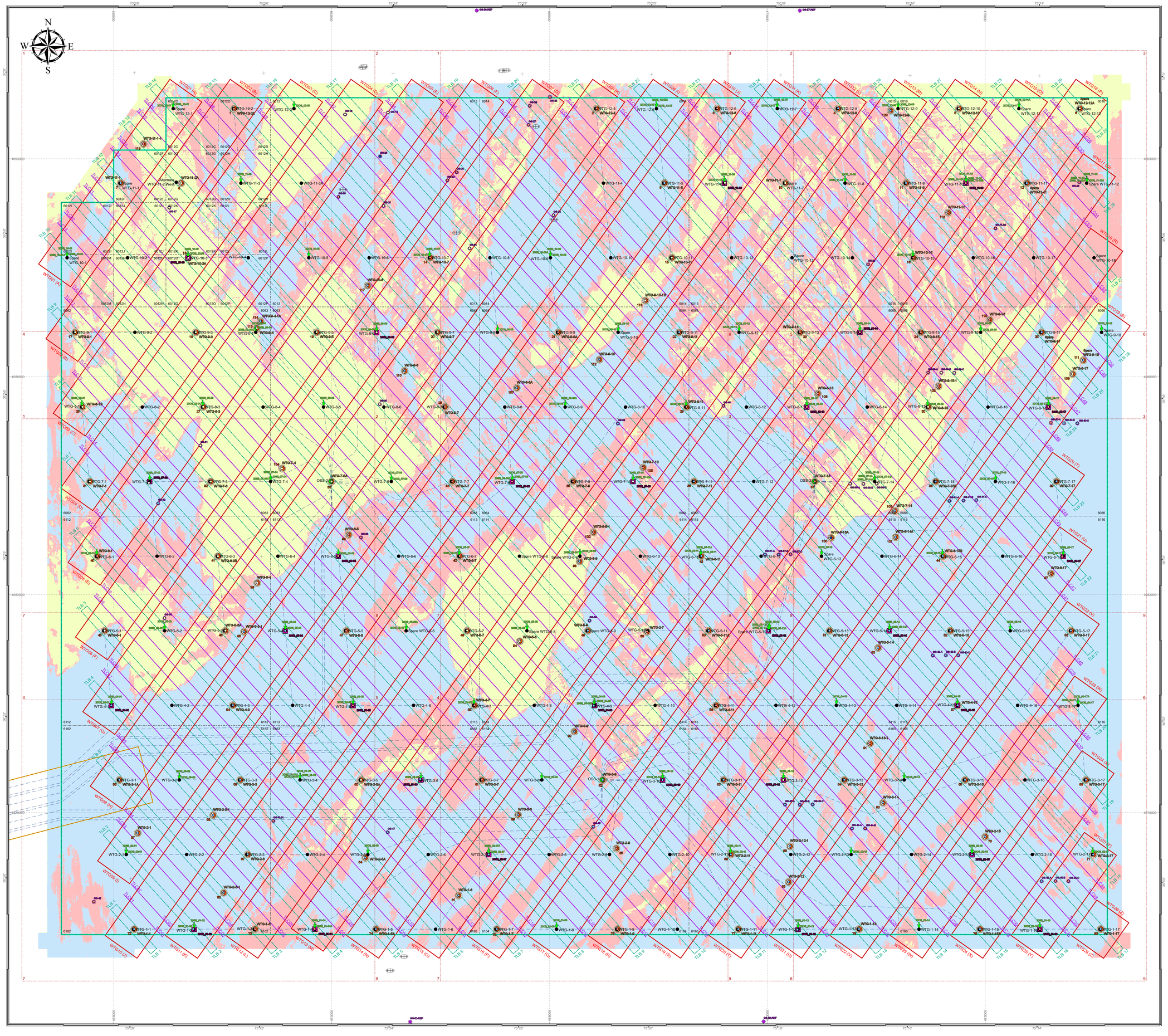
DATE	NOTE	AUTHOR	CHKD	APPD
06/04/21	DRAFT	CLS	KMM	KMM
06/14/21	Rev00	CLS	KDW	KMM
07/29/21	Rev01	CLS	KDW	KMM

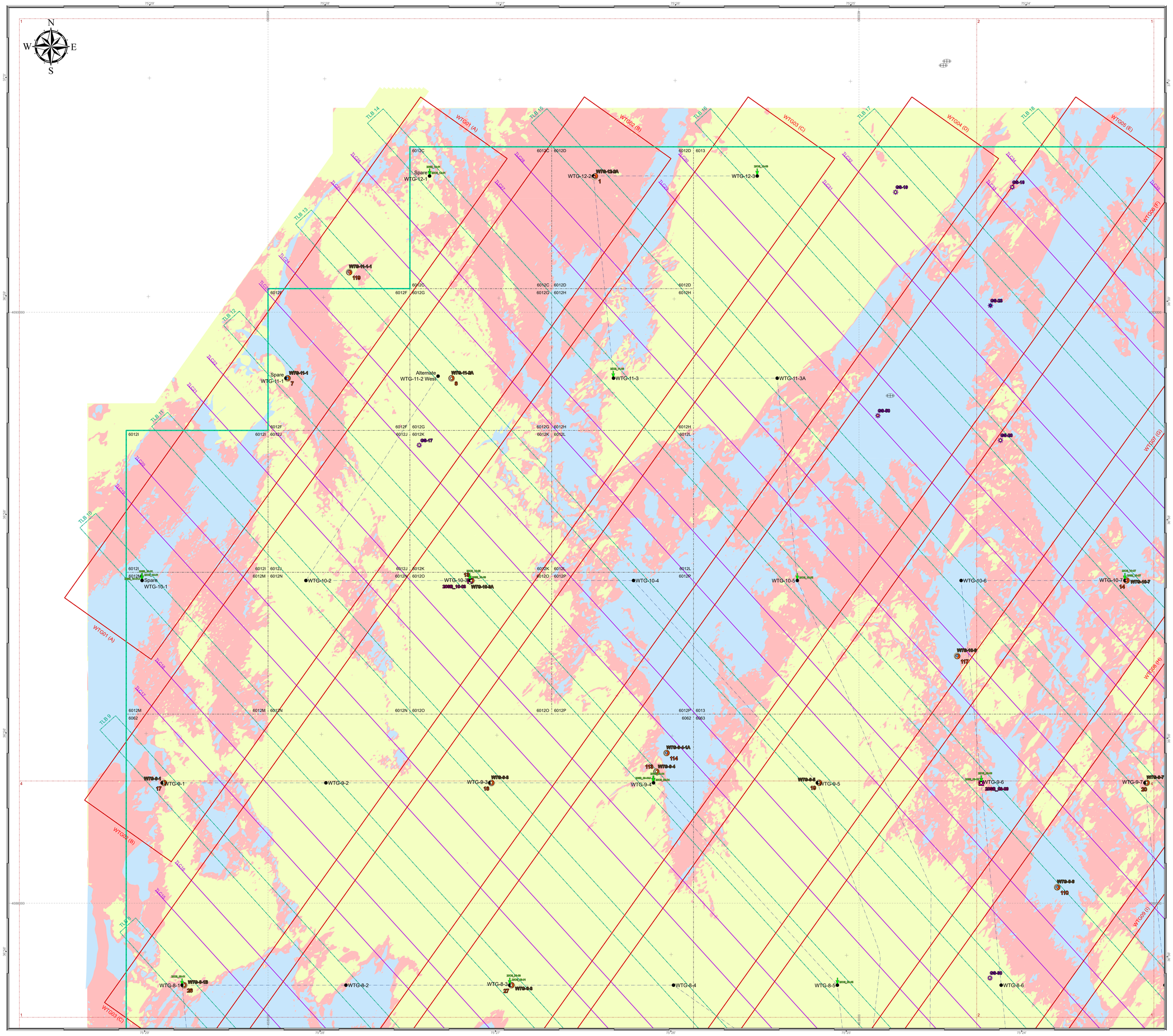
Rev01

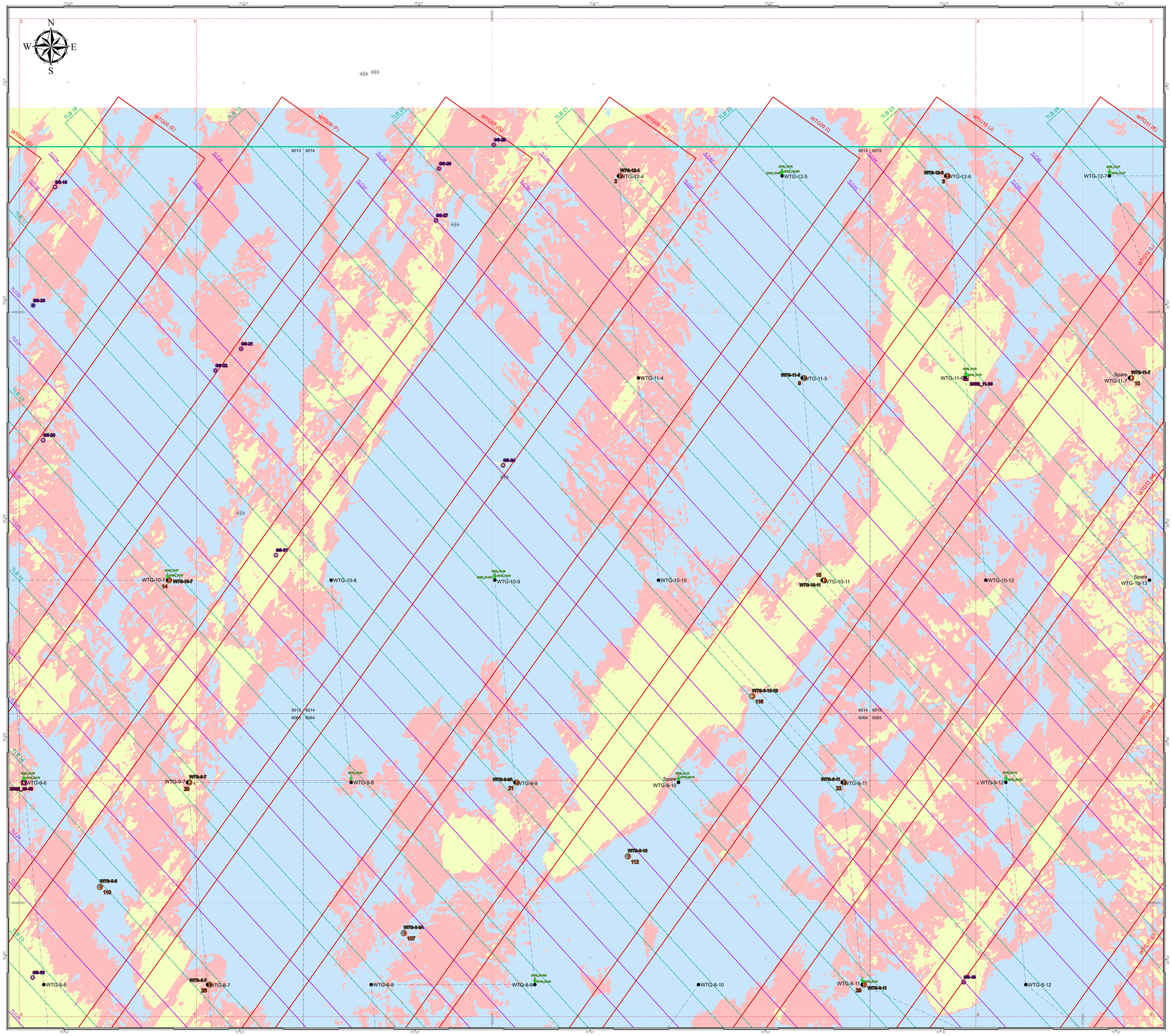
Date: 7/29/2021

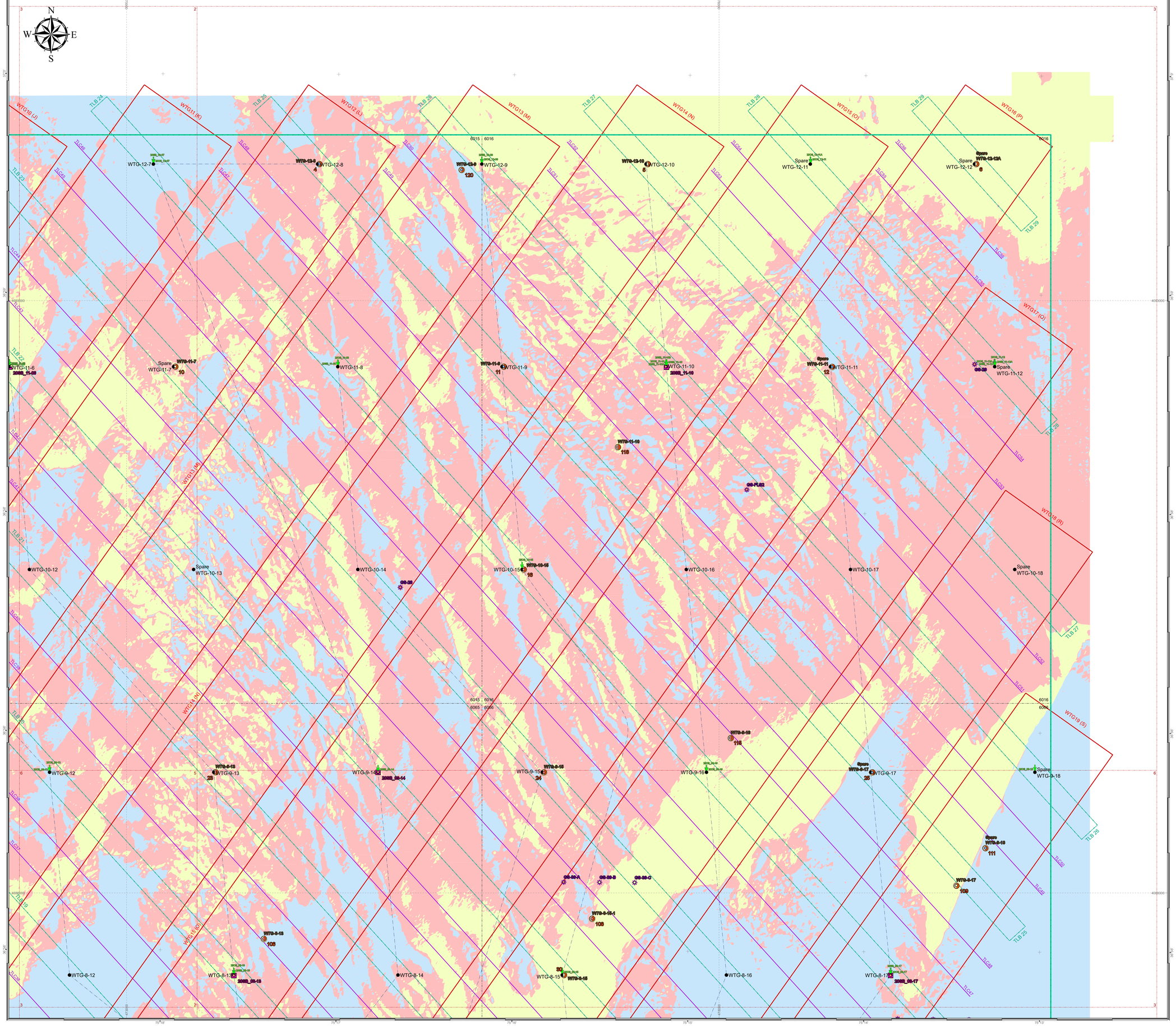
File Name: Dominion_Bathymetry_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


N
W
E
S
WTG01 (A)
WTG02 (B)
WTG03 (C)
WTG04 (D)
WTG05 (E)
WTG06 (F)
WTG07 (G)
WTG08 (H)
WTG09 (I)
WTG10 (J)
WTG11 (K)
WTG12 (L)
WTG13 (M)
WTG14 (N)
WTG15 (O)
WTG16 (P)
WTG17 (Q)
WTG18 (R)
WTG19 (S)
WTG20 (T)
WTG21 (U)
WTG22 (V)
WTG23 (W)
WTG24 (X)
WTG25 (Y)
WTG26 (Z)
WTG27 (AA)
WTG28 (AB)
WTG29 (AC)
WTG30 (AD)
WTG31 (AE)
WTG32 (AF)
WTG33 (AG)
WTG34 (AH)
WTG35 (AI)
WTG36 (AJ)
WTG37 (AK)
WTG38 (AL)
WTG39 (AM)
WTG40 (AN)
WTG41 (AO)
WTG42 (AP)
WTG43 (AQ)
WTG44 (AR)
WTG45 (AS)
WTG46 (AT)
WTG47 (AU)
WTG48 (AV)
WTG49 (AW)
WTG50 (AX)
WTG51 (AY)
WTG52 (AZ)
WTG53 (BA)
WTG54 (BB)
WTG55 (BC)
WTG56 (BD)
WTG57 (BE)
WTG58 (BF)
WTG59 (BG)
WTG60 (BH)
WTG61 (BI)
WTG62 (BJ)
WTG63 (BK)
WTG64 (BL)
WTG65 (BM)
WTG66 (BN)
WTG67 (BO)
WTG68 (BP)
WTG69 (BQ)
WTG70 (BR)
WTG71 (BS)
WTG72 (BT)
WTG73 (BU)
WTG74 (BV)
WTG75 (BW)
WTG76 (BX)
WTG77 (BY)
WTG78 (BZ)
WTG79 (CA)
WTG80 (CB)
WTG81 (CC)
WTG82 (CD)
WTG83 (CE)
WTG84 (CF)
WTG85 (CG)
WTG86 (CH)
WTG87 (CI)
WTG88 (CJ)
WTG89 (CK)
WTG90 (CL)
WTG91 (CM)
WTG92 (CN)
WTG93 (CO)
WTG94 (CP)
WTG95 (CQ)
WTG96 (CR)
WTG97 (CS)
WTG98 (CT)
WTG99 (CU)
WTG100 (CV)
WTG101 (CW)
WTG102 (CX)
WTG103 (CY)
WTG104 (CZ)
WTG105 (DA)
WTG106 (DB)
WTG107 (DC)
WTG108 (DD)
WTG109 (DE)
WTG110 (DF)
WTG111 (DG)
WTG112 (DH)
WTG113 (DI)
WTG114 (DJ)
WTG115 (DK)
WTG116 (DL)
WTG117 (DM)
WTG118 (DN)
WTG119 (DO)
WTG120 (DP)
WTG121 (DQ)
WTG122 (DR)
WTG123 (DS)
WTG124 (DT)
WTG125 (DU)
WTG126 (DV)
WTG127 (DW)
WTG128 (DX)
WTG129 (DY)
WTG130 (DZ)
WTG131 (EA)
WTG132 (EB)
WTG133 (EC)
WTG134 (ED)
WTG135 (EE)
WTG136 (EF)
WTG137 (EG)
WTG138 (EH)
WTG139 (EI)
WTG140 (EJ)
WTG141 (EK)
WTG142 (EL)
WTG143 (EM)
WTG144 (EN)
WTG145 (EO)
WTG146 (EP)
WTG147 (EQ)
WTG148 (ER)
WTG149 (ES)
WTG150 (ET)
WTG151 (EU)
WTG152 (EV)
WTG153 (EW)
WTG154 (EX)
WTG155 (EY)
WTG156 (EZ)
WTG157 (FA)
WTG158 (FB)
WTG159 (FC)
WTG160 (FD)
WTG161 (FE)
WTG162 (FF)
WTG163 (FG)
WTG164 (FH)
WTG165 (FI)
WTG166 (FJ)
WTG167 (FK)
WTG168 (FL)
WTG169 (FM)
WTG170 (FN)
WTG171 (FO)
WTG172 (FP)
WTG173 (FQ)
WTG174 (FR)
WTG175 (FS)
WTG176 (FT)
WTG177 (FU)
WTG178 (FV)
WTG179 (FW)
WTG180 (FX)
WTG181 (FY)
WTG182 (FZ)
WTG183 (GA)
WTG184 (GB)
WTG185 (GC)
WTG186 (GD)
WTG187 (GE)
WTG188 (GF)
WTG189 (GG)
WTG190 (GH)
WTG191 (GI)
WTG192 (GJ)
WTG193 (GK)
WTG194 (GL)
WTG195 (GM)
WTG196 (GN)
WTG197 (GO)
WTG198 (GP)
WTG199 (GQ)
WTG200 (GR)
WTG201 (GS)
WTG202 (GT)
WTG203 (GU)
WTG204 (GV)
WTG205 (GW)
WTG206 (GX)
WTG207 (GY)
WTG208 (GZ)
WTG209 (HA)
WTG210 (HB)
WTG211 (HC)
WTG212 (HD)
WTG213 (HE)
WTG214 (HF)
WTG215 (HG)
WTG216 (HH)
WTG217 (HI)
WTG218 (HJ)
WTG219 (HK)
WTG220 (HL)
WTG221 (HM)
WTG222 (HN)
WTG223 (HO)
WTG224 (HP)
WTG225 (HQ)
WTG226 (HR)
WTG227 (HS)
WTG228 (HT)
WTG229 (HU)
WTG230 (HV)
WTG231 (HW)
WTG232 (HX)
WTG233 (HY)
WTG234 (HZ)
WTG235 (IA)
WTG236 (IB)
WTG237 (IC)
WTG238 (ID)
WTG239 (IE)
WTG240 (IF)
WTG241 (IG)
WTG242 (IH)
WTG243 (II)
WTG244 (IJ)
WTG245 (IK)
WTG246 (IL)
WTG247 (IM)
WTG248 (IN)
WTG249 (IO)
WTG250 (IP)
WTG251 (IQ)
WTG252 (IR)
WTG253 (IS)
WTG254 (IT)
WTG255 (IU)
WTG256 (IV)
WTG257 (IW)
WTG258 (IX)
WTG259 (IY)
WTG260 (IZ)
WTG261 (JA)
WTG262 (JB)
WTG263 (JC)
WTG264 (JD)
WTG265 (JE)
WTG266 (JF)
WTG267 (JG)
WTG268 (JH)
WTG269 (JI)
WTG270 (JJ)
WTG271 (JK)
WTG272 (JL)
WTG273 (JM)
WTG274 (JN)
WTG275 (JO)
WTG276 (JP)
WTG277 (JQ)
WTG278 (JR)
WTG279 (JS)
WTG280 (JT)
WTG281 (JU)
WTG282 (JV)
WTG283 (JW)
WTG284 (JX)
WTG285 (JY)
WTG286 (JZ)
WTG287 (KA)
WTG288 (KB)
WTG289 (KC)
WTG290 (KD)
WTG291 (KE)
WTG292 (KF)
WTG293 (KG)
WTG294 (KH)
WTG295 (KI)
WTG296 (KJ)
WTG297 (KK)
WTG298 (KL)
WTG299 (KM)
WTG300 (KN)
WTG301 (KO)
WTG302 (KP)
WTG303 (KQ)
WTG304 (KR)
WTG305 (KS)
WTG306 (KT)
WTG307 (KU)
WTG308 (KV)
WTG309 (KW)
WTG310 (KX)
WTG311 (KY)
WTG312 (KZ)
WTG313 (LA)
WTG314 (LB)
WTG315 (LC)
WTG316 (LD)
WTG317 (LE)
WTG318 (LF)
WTG319 (LG)
WTG320 (LH)
WTG321 (LI)
WTG322 (LJ)
WTG323 (LK)
WTG324 (LL)
WTG325 (LM)
WTG326 (LN)
WTG327 (LO)
WTG328 (LP)
WTG329 (LQ)
WTG330 (LR)
WTG331 (LS)
WTG332 (LT)
WTG333 (LU)
WTG334 (LV)
WTG335 (LW)
WTG336 (LX)
WTG337 (LY)
WTG338 (LZ)
WTG339 (MA)
WTG340 (MB)
WTG341 (MC)
WTG342 (MD)
WTG343 (ME)
WTG344 (MF)
WTG345 (MG)
WTG346 (MH)
WTG347 (MI)
WTG348 (MJ)
WTG349 (MK)
WTG350 (ML)
WTG351 (MM)
WTG352 (MN)
WTG353 (MO)
WTG354 (MP)
WTG355 (MQ)
WTG356 (MR)
WTG357 (MS)
WTG358 (MT)
WTG359 (MU)
WTG360 (MV)
WTG361 (MW)
WTG362 (MX)
WTG363 (MY)
WTG364 (MZ)
WTG365 (NA)
WTG366 (NB)
WTG367 (NC)
WTG368 (ND)
WTG369 (NE)
WTG370 (NF)
WTG371 (NG)
WTG372 (NH)
WTG373 (NI)
WTG374 (NJ)
WTG375 (NK)
WTG376 (NL)
WTG377 (NM)
WTG378 (NN)
WTG379 (NO)
WTG380 (NP)
WTG381 (NQ)
WTG382 (NR)
WTG383 (NS)
WTG384 (NT)
WTG385 (NU)
WTG386 (NV)
WTG387 (NW)
WTG388 (NX)
WTG389 (NY)
WTG390 (NZ)
WTG391 (OA)
WTG392 (OB)
WTG393 (OC)
WTG394 (OD)
WTG395 (OE)
WTG396 (OF)
WTG397 (OG)
WTG398 (OH)
WTG399 (OI)
WTG400 (OJ)
WTG401 (OK)
WTG402 (OL)
WTG403 (OM)
WTG404 (ON)
WTG405 (OO)
WTG406 (OP)
WTG407 (OQ)
WTG408 (OR)
WTG409 (OS)
WTG410 (OT)
WTG411 (OU)
WTG412 (OV)
WTG413 (OW)
WTG414 (OX)
WTG415 (OY)
WTG416 (OZ)
WTG417 (PA)
WTG418 (PB)
WTG419 (PC)
WTG420 (PD)
WTG421 (PE)
WTG422 (PF)
WTG423 (PG)
WTG424 (PH)
WTG425 (PI)
WTG426 (PJ)
WTG427 (PK)
WTG428 (PL)
WTG429 (PM)
WTG430 (PN)
WTG431 (PO)
WTG432 (PP)
WTG433 (PQ)
WTG434 (PR)
WTG435 (PS)
WTG436 (PT)
WTG437 (PU)
WTG438 (PV)
WTG439 (PW)
WTG440 (PX)
WTG441 (PY)
WTG442 (PZ)
WTG443 (QA)
WTG444 (QB)
WTG445 (QC)
WTG446 (QD)
WTG447 (QE)
WTG448 (QF)
WTG449 (QG)
WTG450 (QH)
WTG451 (QI)
WTG452 (QJ)
WTG453 (QK)
WTG454 (QL)
WTG455 (QM)
WTG456 (QN)
WTG457 (QO)
WTG458 (QP)
WTG459 (QQ)
WTG460 (QR)
WTG461 (QS)
WTG462 (QT)
WTG463 (QU)
WTG464 (QV)
WTG465 (QW)
WTG466 (QX)
WTG467 (QY)
WTG468 (QZ)
WTG469 (RA)
WTG470 (RB)
WTG471 (RC)
WTG472 (RD)
WTG473 (RE)
WTG474 (RF)
WTG475 (RG)
WTG476 (RH)
WTG477 (RI)
WTG478 (RJ)
WTG479 (RK)
WTG480 (RL)
WTG481 (RM)
WTG482 (RN)
WTG483 (RO)
WTG484 (RP)
WTG485 (RQ)
WTG486 (RR)
WTG487 (RS)
WTG488 (RT)
WTG489 (RU)
WTG490 (RV)
WTG491 (RW)
WTG492 (RX)
WTG493 (RY)
WTG494 (RZ)
WTG495 (SA)
WTG496 (SB)
WTG497 (SC)
WTG498 (SD)
WTG499 (SE)
WTG500 (SF)
WTG501 (SG)
WTG502 (SH)
WTG503 (SI)
WTG504 (SJ)
WTG505 (SK)
WTG506 (SL)
WTG507 (SM)
WTG508 (SN)
WTG509 (SO)
WTG510 (SP)
WTG511 (SQ)
WTG512 (SR)
WTG513 (SS)
WTG514 (ST)
WTG515 (SU)
WTG516 (SV)
WTG517 (SW)
WTG518 (SX)
WTG519 (SY)
WTG520 (SZ)
WTG521 (TA)
WTG522 (TB)
WTG523 (TC)
WTG524 (TD)
WTG525 (TE)
WTG526 (TF)
WTG527 (TG)
WTG528 (TH)
WTG529 (TI)
WTG530 (TJ)
WTG531 (TK)
WTG532 (TL)
WTG533 (TM)
WTG534 (TN)
WTG535 (TO)
WTG536 (TP)
WTG537 (TQ)
WTG538 (TR)
WTG539 (TS)
WTG540 (TT)
WTG541 (TU)
WTG542 (TV)
WTG543 (TW)
WTG544 (TX)
WTG545 (TY)
WTG546 (TZ)
WTG547 (UA)
WTG548 (UB)
WTG549 (UC)
WTG550 (UD)
WTG551 (UE)
WTG552 (UF)
WTG553 (UG)
WTG554 (UH)
WTG555 (UI)
WTG556 (UJ)
WTG557 (UK)
WTG558 (UL)
WTG559 (UM)
WTG560 (UN)
WTG561 (UO)
WTG562 (UP)
WTG563 (UQ)
WTG564 (UR)
WTG565 (US)
WTG566 (UT)
WTG567 (UU)
WTG568 (UV)
WTG569 (UW)
WTG570 (UX)
WTG571 (UY)
WTG572 (UZ)
WTG573 (VA)
WTG574 (VB)
WTG575 (VC)
WTG576 (VD)
WTG577 (VE)
WTG578 (VF)
WTG579 (VG)
WTG580 (VH)
WTG581 (VI)
WTG582 (VJ)
WTG583 (VK)
WTG584 (VL)
WTG585 (VM)
WTG586 (VN)
WTG587 (VO)
WTG588 (VP)
WTG589 (VQ)
WTG590 (VR)
WTG591 (VS)
WTG592 (VT)
WTG593 (VU)
WTG594 (VV)
WTG595 (VW)
WTG596 (VX)
WTG597 (VY)
WTG598 (VZ)
WTG599 (WA)
WTG600 (WB)
WTG601 (WC)
WTG602 (WD)
WTG603 (WE)
WTG604 (WF)
WTG605 (WG)
WTG606 (WH)
WTG607 (WI)
WTG608 (WJ)
WTG609 (WK)
WTG610 (WL)
WTG611 (WM)
WTG612 (WN)
WTG613 (WO)
WTG614 (WP)
WTG615 (WQ)
WTG616 (WR)
WTG617 (WS)
WTG618 (WT)
WTG619 (WU)
WTG620 (WV)
WTG621 (WW)
WTG622 (WX)
WTG623 (WY)
WTG624 (WZ)
WTG625 (XA)
WTG626 (XB)
WTG627 (XC)
WTG628 (XD)
WTG629 (XE)
WTG630 (XF)
WTG631 (XG)
WTG632 (XH)
WTG633 (XI)
WTG634 (XJ)
WTG635 (XK)
WTG636 (XL)
WTG637 (XM)
WTG638 (XN)
WTG639 (XO)
WTG640 (XP)
WTG641 (XQ)
WTG642 (XR)
WTG643 (XS)
WTG644 (XT)
WTG645 (XU)
WTG646 (XV)
WTG647 (XW)
WTG648 (XX)
WTG649 (XY)
WTG650 (XZ)
WTG651 (YA)
WTG652 (YB)
WTG653 (YC)
WTG654 (YD)
WTG655 (YE)
WTG656 (YF)
WTG657 (YG)
WTG658 (YH)
WTG659 (YI)
WTG660 (YJ)
WTG661 (YK)
WTG662 (YL)
WTG663 (YM)
WTG664 (YN)
WTG665 (YO)
WTG666 (YP)
WTG667 (YQ)
WTG668 (YR)
WTG669 (YS)
WTG670 (YT)
WTG671 (YU)
WTG672 (YV)
WTG673 (YW)
WTG674 (YX)
WTG675 (YY)
WTG676 (YZ)
WTG677 (ZA)
WTG678 (ZB)
WTG679 (ZC)
WTG680 (ZD)
WTG681 (ZE)
WTG682 (ZF)
WTG683 (ZG)
WTG684 (ZH)
WTG685 (ZI)
WTG686 (ZJ)
WTG687 (ZK)
WTG688 (ZL)
WTG689 (ZM)
WTG690 (ZN)
WTG691 (ZO)
WTG692 (ZP)
WTG693 (ZQ)
WTG694 (ZR)
WTG695 (ZS)
WTG696 (ZT)
WTG697 (ZU)
WTG698 (ZV)
WTG699 (ZW)
WTG700 (ZX)
WTG701 (ZY)
WTG702 (ZZ)
WTG703 (AAA)
WTG704 (AAB)
WTG705 (AAC)
WTG706 (AAD)
WTG707 (AAE)
WTG708 (AAF)
WTG709 (AAG)
WTG710 (AAH)
WTG711 (AAI)
WTG712 (AAJ)
WTG713 (AAK)
WTG714 (AAL)
WTG715 (AAM)
WTG716 (AAN)
WTG717 (AAO)
WTG718 (AAP)
WTG719 (AAQ)
WTG720 (AAR)
WTG721 (AAS)
WTG722 (AAT)
WTG723 (AAU)
WTG724 (AAV)
WTG725 (AAW)
WTG726 (AAX)
WTG727 (AAY)
WTG728 (AAZ)
WTG729 (ABA)
WTG730 (ABB)
WTG731 (ABC)
WTG732 (ABD)
WTG733 (ABE)
WTG734 (ABF)
WTG735 (ABG)
WTG736 (ABH)
WTG737 (ABI)
WTG738 (ABJ)
WTG739 (ABK)
WTG740 (ABL)
WTG741 (ABM)
WTG742 (ABN)
WTG743 (ABO)
WTG744 (ABP)
WTG745 (ABQ)
WTG746 (ABR)
WTG747 (ABS)
WTG748 (ABT)
WTG749 (ABU)
WTG750 (ABV)
WTG751 (ABW)
WTG752 (ABX)
WTG753 (ABY)
WTG754 (ABZ)
WTG755 (ACA)
WTG756 (ACB)
WTG757 (ACC)
WTG758 (ACD)
WTG759 (ACE)
WTG760 (ACF)
WTG761 (ACG)
WTG762 (ACH)
WTG763 (ACI)
WTG764 (ACJ)
WTG765 (ACK)
WTG766 (ACL)
WTG767 (ACM)
WTG768 (ACN)
WTG769 (ACO)
WTG770 (ACP)
WTG771 (ACQ)
WTG772 (ACR)
WTG773 (ACS)
WTG774 (ACT)
WTG775 (ACU)
WTG776 (ACV)
WTG777 (ACW)
WTG778 (ACX)
WTG779 (ACY)
WTG780 (ACZ)
WTG781 (ADA)
WTG782 (ADB)
WTG783 (ADC)
WTG784 (ADD)
WTG785 (ADE)
WTG786 (ADF)
WTG787 (ADG)
WTG788 (ADH)
WTG789 (ADI)
WTG790 (ADJ)
WTG791 (ADK)
WTG792 (ADL)
WTG793 (ADM)
WTG794 (ADN)
WTG795 (ADO)
WTG796 (ADP)
WTG797 (ADQ)
WTG798 (ADR)
WTG799 (ADS)
WTG800 (ADT)
WTG801 (ADU)
WTG802 (ADV)
WTG803 (ADW)
WTG804 (ADX)
WTG805 (ADY)
WTG806 (ADZ)
WTG807 (AEA)
WTG808 (AEB)
WTG809 (AEC)
WTG810 (AED)
WTG811 (AEE)
WTG812 (AEF)
WTG813 (AEG)
WTG814 (AEH)
WTG815 (AEI)
WTG816 (AEJ)
WTG817 (AEK)
WTG818 (AEL)
WTG819 (AEM)
WTG820 (AEN)
WTG821 (AEO)
WTG822 (AEP)
WTG823 (AEQ)
WTG824 (AER)
WTG825 (AES)
WTG826 (AET)
WTG827 (AEU)
WTG828 (AEV)
WTG829 (AEW)
WTG830 (AEX)
WTG831 (AEY)
WTG832 (AEZ)
WTG833 (AFA)
WTG834 (AFB)
WTG835 (AFC)
WTG836 (AFD)
WTG837 (AFE)
WTG838 (AFF)
WTG839 (AFG)
WTG840 (AFH)
WTG841 (AFI)
WTG842 (AFJ)
WTG843 (AFK)
WTG844 (AFL)
WTG845 (AFM)
WTG846 (AFN)
WTG847 (AFO)
WTG848 (AFP)
WTG849 (AFQ)
WTG850 (AFR)
WTG851 (AFS)
WTG852 (AFT)
WTG853 (AFU)
WTG854 (AFV)
WTG855 (AFW)
WTG856 (AFX)
WTG857 (AFY)
WTG858 (AFZ)
WTG859 (AGA)
WTG860 (AGB)
WTG861 (AGC)
WTG862 (AGD)
WTG863 (AGE)
WTG864 (AGF)
WTG865 (AGG)
WTG866 (AGH)
WTG867 (AGI)
WTG868 (AGJ)
WTG869 (AGK)
WTG870 (AGL)
WTG871 (AGM)
WTG872 (AGN)
WTG873 (AGO)
WTG874 (AGP)
WTG875 (AGQ)
WTG876 (AGR)
WTG877 (AGS)
WTG878 (AGT)
WTG879 (AGU)
WTG880 (AGV)
WTG881 (AGW)
WTG882 (AGX)
WTG883 (AGY)
WTG884 (AGZ)
WTG885 (AHA)
WTG886 (AHB)
WTG887 (AHC)
WTG888 (AHD)
WTG889 (AHE)
WTG890 (AHF)
WTG891 (AHG)
WTG892 (AHH)
WTG893 (AHI)
WTG894 (AHJ)
WTG895 (AHK)
WTG896 (AHL)
WTG897 (AHM)
WTG898 (AHN)
WTG899 (AHO)
WTG900 (AHP)
WTG901 (AHQ)
WTG902 (AHR)
WTG903 (AHS)
WTG904 (AHT)
WTG905 (AHU)
WTG906 (AHV)
WTG907 (AHW)
WTG908 (AHX)
WTG909 (AHY)
WTG910 (AHZ)
WTG911 (AIA)
WTG912 (AIB)
WTG913 (AIC)
WTG914 (AID)
WTG915 (AIE)
WTG916 (AIF)
WTG917 (AIG)
WTG918 (AIH)
WTG919 (AII)
WTG920 (AIJ)
WTG921 (AIK)
WTG922 (AIL)
WTG923 (AIM)
WTG924 (AIN)
WTG925 (AIO)
WTG926 (AIP)
WTG927 (AIQ)
WTG928 (AIR)
WTG929 (AIS)
WTG930 (AIT)
WTG931 (AIU)
WTG932 (AIV)
WTG933 (AIW)
WTG934 (AIX)
WTG935 (AIY)
WTG936 (AIZ)
WTG937 (AJA)
WTG938 (AJB)
WTG939 (AJC)
WTG940 (AJD)
WTG941 (AJE)
WTG942 (AJF)
WTG943 (AJG)
WTG944 (AJH)
WTG945 (AJI)
WTG946 (AJJ)
WTG947 (AJK)
WTG948 (AJL)
WTG949 (AJM)
WTG950 (AJN)
WTG951 (AJO)
WTG952 (AJP)
WTG953 (AJQ)
WTG954 (AJR)
WTG955 (AJS)
WTG956 (AJT)
WTG957 (AJU)
WTG958 (AJV)
WTG959 (AJW)
WTG960 (AJX)
WTG961 (AJY)
WTG962 (AJZ)
WTG963 (AKA)
WTG964 (AKB)
WTG965 (AKC)
WTG966 (AKD)
WTG967 (AKE)
WTG968 (AKF)
WTG969 (AKG)
WTG970 (AKH)
WTG971 (AKI)
WTG972 (AKJ)
WTG973 (AKK)
WTG974 (AKL)
WTG975 (AKM)
WTG976 (AKN)
WTG977 (AKO)
WTG978 (AKP)
WTG979 (AKQ)
WTG980 (AKR)
WTG981 (AKS)
WTG982 (AKT)
WTG983 (AKU)
WTG984 (AKV)
WTG985 (AKW)
WTG986 (AKX)
WTG987 (AKY)
WTG988 (AKZ)
WTG989 (ALA)
WTG990 (ALB)
WTG991 (ALC)
WTG992 (ALD)
WTG993 (ALE)
WTG994 (ALF)
WTG995 (ALG)
WTG996 (ALH)
WTG997 (ALI)
WTG998 (ALJ)
WTG999 (ALK)
WTG1000 (ALL)
WTG1001 (ALM)
WTG1002 (ALN)
WTG1003 (ALO)
WTG1004 (ALP)
WTG1005 (ALQ)
WTG1006 (ALR)
WTG1007 (ALS)
WTG1008 (ALT)
WTG1009 (ALU)
WTG1010 (ALV)
WTG1011 (ALW)
WTG1012 (ALX)
WTG1013 (ALY)
WTG1014 (ALZ)
WTG1015 (AMA)
WTG1016 (AMB)
WTG1017 (AMC)
WTG1018 (AMD)
WTG1019 (AME)
WTG1020 (AMF)
WTG1021 (AMG)
WTG1022 (AMH)
WTG1023 (AMI)
WTG1024 (AMJ)
WTG1025 (AMK)
WTG1026 (AML)
WTG1027 (AMM)
WTG1028 (AMN)
WTG1029 (AMO)
WTG1030 (AMP)
WTG1031 (AMQ)
WTG1032 (AMR)
WTG1033 (AMS)
WTG1034 (AMT)
WTG1035 (AMU)
WTG1036 (AMV)
WTG1037 (AMW)
WTG1038 (AMX)
WTG1039 (AMY)
WTG1040 (AMZ)
WTG1041 (ANA)
WTG1042 (ANB)
WTG1043 (ANC)
WTG1044 (AND)
WTG1045 (ANE)
WTG1046 (ANF)
WTG1047 (ANG)
WTG1048 (ANH)
WTG1049 (ANI)
WTG1050 (ANJ)
WTG1051 (ANK)
WTG1052 (ANL)
WTG1053 (ANM)
WTG1054 (ANN)
WTG1055 (ANO)
WTG1056 (ANP)
WTG1057 (ANQ)
WTG1058 (ANR)
WTG1059 (ANS)
WTG1060 (ANT)
WTG1061 (ANU)
WTG1062 (ANV)
WTG1063 (ANW)
WTG1064 (ANX)
WTG1065 (ANY)
WTG1066 (ANZ)
WTG1067 (AOA)
WTG1068 (AOB)
WTG1069 (AOC)
WTG1070 (AOD)
WTG1071 (AOE)
WTG1072 (AOF)
WTG1073 (AOG)
WTG1074 (AOH)
WTG1075 (AOI)
WTG1076 (AOJ)
WTG1077 (AOK)
WTG1078 (AOL)
WTG1079 (AOM)
WTG1080 (AON)
WTG1081 (AOO)
WTG1082 (AOP)
WTG1083 (AOQ)
WTG1084 (AOR)
WTG1085 (AOS)
WTG1086 (AOT)
WTG1087 (AOU)
WTG1088 (AOV)
WTG1089 (AOW)
WTG1090 (AOX)
WTG1091 (AOY)
WTG1092 (AOZ)
WTG1093 (APA)
WTG1094 (APB)
WTG1095 (APC)
WTG1096 (APD)
WTG1097 (APE)
WTG1098 (APF)
WTG1099 (APG)
WTG1100 (APH)
WTG1101 (API)
WTG1102 (APJ)
WTG1103 (APK)
WTG1104 (APL)
WTG1105 (APM)
WTG1106 (APN)
WTG1107 (APO)
WTG1108 (APP)
WTG1109 (APQ)
WTG1110 (APR)
WTG1111 (APS)
WTG1112 (APT)
WTG1113 (APU)
WTG1114 (APV)
WTG1115 (APW)
WTG1116 (APX)
WTG1117 (APY)
WTG1118 (APZ)
WTG1119 (AQA)
WTG1120 (AQB)
WTG1121 (AQC)
WTG1122 (AQD)
WTG1123 (AQE)
WTG1124 (AQF)
WTG1125 (AQG)
WTG1126 (AQH)
WTG1127 (AQI)
WTG1128 (AQJ)
WTG1129 (AQK)
WTG1130 (AQL)
WTG1131 (AQM)
WTG1132 (AQN)
WTG1133 (AQO)
WTG1134 (AQP)
WTG1135 (AQQ)
WTG1136 (AQR)
WTG1137 (AQS)
WTG1138 (AQT)
WTG1139 (AQU)
WTG1140 (AQV)
WTG1141 (AQW)
WTG1142 (AQX)
WTG1143 (AQY)
WTG1144 (AQZ)
WTG1145 (ARA)
WTG1146 (ARB)
WTG1147 (ARC)
WTG1148 (ARD)
WTG1149 (ARE)
WTG1150 (ARF)
WTG1151 (ARG)
WTG1152 (ARH)
WTG1153 (ARI)
WTG1154 (ARJ)
WTG1155 (ARK)
WTG1156 (ARL)
WTG1157 (ARM)
WTG1158 (ARN)
WTG1159 (ARO)
WTG1160 (ARP)
WTG1161 (ARQ)
WTG1162 (ARR)
WTG1163 (ARS)
WTG1164 (ART)
WTG1165 (ARU)
WTG1166 (ARV)
WTG1167 (ARW)
WTG1168 (ARX)
WTG1169 (ARY)
WTG1170 (ARZ)
WTG1171 (ASA)
WTG1172 (ASB)
WTG1173 (ASC)
WTG1174 (ASD)
WTG1175 (ASE)
WTG1176 (ASF)
WTG1177 (ASG)
WTG1178 (ASH)
WTG1179 (ASI)
WTG1180 (ASJ)
WTG1181 (ASK)
WTG1182 (ASL)
WTG1183 (ASM)
WTG1184 (ASN)
WTG1185 (ASO)
WTG1186 (ASP)
WTG1187 (ASQ)
WTG1188 (ASR)
WTG1189 (ASS)
WTG1190 (AST)
WTG1191 (ASU)
WTG1192 (ASV)
WTG1193 (ASW)
WTG1194 (ASX)
WTG1195 (ASY)
WTG1196 (ASZ)
WTG1197 (ATA)
WTG1198 (ATB)
WTG1199 (ATC)
WTG1200 (ATD)
WTG1201 (ATE)
WTG1202 (ATF)
WTG1203 (ATG)
WTG1204 (ATH)
WTG1205 (ATI)
WTG1206 (ATJ)
WTG1207 (ATK)
WTG1208 (ATL)
WTG1209 (ATM)
WTG1210 (ATN)
WTG1211 (ATO)
WTG1212 (ATP)
WTG1213 (ATQ)
WTG1214 (ATR)
WTG1215 (ATS)
WTG1216 (ATT)
WTG1217 (ATU)
WTG1218 (ATV)
WTG1219 (ATW)
WTG1220 (ATX)
WTG1221 (ATY)
WTG1222 (ATZ)
WTG1223 (AUA)
WTG1224 (AUB)
WTG1225 (AUC)
WTG1226 (AUD)
WTG1227 (AUE)
WTG1228 (AUF)
WTG1229 (AUG)
WTG1230 (AUH)
WTG1231 (AUI)
WTG1232 (AUJ)
WTG1233 (AUK)
WTG1234 (AUL)
WTG1235 (AUM)
WTG1236 (AUN)
WTG1237 (AUO)
WTG1238 (AUP)
WTG1239 (AUQ)
WTG1240 (AUR)
WTG1241 (AUS)
WTG1242 (AUT)
WTG1243 (AUU)
WTG1244 (AUV)
WTG1245 (AUW)
WTG1246 (AUX)
WTG1247 (AUY)
WTG1248 (AUZ)
WTG1249 (AVA)
WTG1250 (AVB)
WTG1251 (AVC)
WTG1252 (AVD)
WTG1253 (AVE)
WTG1254 (AVF)
WTG1255 (AVG)
WTG1256 (AVH)
WTG1257 (AVI)
WTG1258 (AVJ)
WTG1259 (AVK)
WTG1260 (AVL)
WTG1261 (AVM)
WTG1262 (AVN)
WTG1263 (AVO)
WTG1264 (AVP)
WTG1265 (AVQ)
WTG1266 (AVR)
WTG1267 (AVS)
WTG1268 (AVT)
WTG1269 (AVU)
WTG1270 (AVV)
WTG1271 (AVW)
WTG1272 (AVX)
WTG1273 (AVY)
WTG1274 (AVZ)
WTG1275 (AWA)
WTG1276 (AWB)
WTG1277 (AWC)
WTG1278 (AWD)
WTG1279 (AWE)
WTG1280 (AWF)
WTG1281 (AWG)
WTG1282 (AWH)
WTG1283 (AWI)
WTG1284 (AWJ)
WTG1285 (AWK)
WTG1286 (AWL)
WTG1287 (AWM)
WTG1288 (AWN)
WTG1289 (AWO)
WTG1290 (AWP)
WTG1291 (AWQ)
WTG1292 (AWR)
WTG1293 (AWS)
WTG1294 (AWT)
WTG1295 (AWU)
WTG1296 (AWV)
WTG1297 (AWW)
WTG1298 (AWX)
WTG1299 (AWY)
WTG1300 (AWZ)
WTG1301 (AXA)
WTG1302 (AXB)
WTG1303 (AXC)
WTG1304 (AXD)
WTG1305 (AXE)
WTG1306 (AXF)
WTG1307 (AXG)
WTG1308 (AXH)
WTG1309 (AXI)
WTG1310 (AXJ)
WTG1311 (AXK)
WTG1312 (AXL)
WTG1313 (AXM)
WTG1314 (AXN)
WTG1315 (AXO)
WTG1316 (AXP)
WTG1317 (AXQ)
WTG1318 (AXR)
WTG1319 (AXS)
WTG1320 (AXT)
WTG1321 (AXU)
WTG1322 (AXV)
WTG1323 (AXW)
WTG1324 (AXX)
WTG1325 (AXY)
WTG1326 (AXZ)
WTG1327 (AYA)
WTG1328 (AYB)
WTG1329 (AYC)
WTG1330 (AYD)
WTG1331 (AYE)
WTG1332 (AYF)
WTG1333 (AYG)
WTG1334 (AYH)
WTG1335 (AYI)
WTG1336 (AYJ)
WTG1337 (AYK)
WTG1338 (AYL)
WTG1339 (AYM)
WTG1340 (AYN)
WTG1341 (AYO)
WTG1342 (AYP)
WTG1343 (AYQ)
WTG1344 (AYR)
WTG1345 (AYS)
WTG1346 (AYT)
WTG1347 (AYU)
WTG1348 (AYV)
WTG1349 (AYW)
WTG1350 (AYX)
WTG1351 (AYY)
WTG1352 (AYZ)
WTG1353 (AZA)
WTG1354 (AZB)
WTG1355 (AZC)
WTG1356 (AZD)
WTG1357 (AZE)
WTG1358 (AZF)
WTG1359 (AZG)
WTG1360 (AZH)
WTG1361 (AZI)
WTG1362 (AZJ)
WTG1363 (AZK)
WTG1364 (AZL)
WTG1365 (AZM)
WTG1366 (AZN)
WTG1367 (AZO)
WTG1368 (AZP)
WTG1369 (AZQ)
WTG1370 (AZR)
WTG1371 (AZS)
WTG1372 (AZT)
WTG1373 (AZU)
WTG1374 (AZV)
WTG1375 (AZW)
WTG1376 (AZX)
WTG1377 (AZY)
WTG1378 (AZZ)
WTG1379 (BAA)
WTG1380 (BAB)
WTG1381 (BAC)
WTG1382 (BAD)
WTG1383 (BAE)
WTG1384 (BAF)
WTG1385 (BAG)
WTG1386 (BAH)
WTG1387 (BAI)
WTG1388 (BAJ)
WTG1389 (BAK)
WTG1390 (BAL)
WTG1391 (BAM)
WTG1392 (BAN)
WTG1393 (BAO)
WTG1394 (BAP)
WTG1395 (BAQ)
WTG1396 (BAR)
WTG1397 (BAS)
WTG1398 (BAT)
WTG1399 (BAU)
WTG1400 (BAV)
WTG1401 (BAW)
WTG1402 (BAX)
WTG1403 (BAY)
WTG1404 (BAZ)
WTG1405 (BBA)
WTG1406 (BBB)
WTG1407 (BBC)
WTG1408 (BBD)
WTG1409 (BBE)
WTG1410 (BBF)
WTG1411 (BBG)
WTG1412 (BBH)
WTG1413 (BBI)
WTG1414 (BBJ)
WTG1415 (BBK)
WTG1416 (BBL)
WTG1417 (BBM)
WTG1418 (BBN)
WTG1419 (BBO)
WTG1420 (BBP)
WTG1421 (BBQ)
WTG1422 (BBR)
WTG1423 (BBS)
WTG1424 (BBT)
WTG1425 (BBU)
WTG1426 (BBV)
WTG1427 (BBW)
WTG1428 (BBX)
WTG1429 (BBY)
WTG1430 (BBZ)
WTG1431 (BCA)
WTG1432 (BCB)
WTG1433 (BCC)
WTG1434 (BCD)
WTG1435 (BCE)
WTG1436 (BCF)
WTG1437 (BCG)
WTG1438 (BCH)
WTG1439 (BCI)
WTG1440 (BCJ)
WTG1441 (BCK)
WTG1442 (BCL)
WTG1443 (BCM)
WTG1444 (BCN)
WTG1445 (BCO)
WTG1446 (BCP)
WTG1447 (BCQ)
WTG1448 (BCR)
WTG1449 (BCS)
WTG1450 (BCT)
WTG1451 (BCU)
WTG1452 (BCV)
WTG1453 (BCW)
WTG1454 (BCX)
WTG1455 (BCY)
WTG1456 (BCZ)
WTG1457 (BDA)
WTG1458 (BDB)
WTG1459 (


WTG01 (A)
WTG02 (B)
WTG03 (C)
WTG04 (D)
WTG05 (E)
WTG06 (F)
WTG07 (G)
WTG08 (H)
WTG09 (I)
TLB 9
TLB 10
TLB 11
TLB 12
TLB 13
TLB 14
TLB 15
TLB 16
TLB 17
TLB 18
TLC20
TLC21
TLC22
TLC23
TLC24
TLC25
TLC26
TLC27
TLC28
TLC29
TLC30
TLC31
TLC32
TLC33
TLC34
TLC35
TLC36
WTG-12-1
WTG-12-2
WTG-12-3
WTG-12-3A
WTG-11-1
WTG-11-1-1
WTG-11-2 West
WTG-11-2A
WTG-11-3
WTG-11-3A
WTG-10-1
WTG-10-2
WTG-10-3
WTG-10-3A
WTG-10-4
WTG-10-5
WTG-10-6
WTG-10-7
WTG-9-1
WTG-9-1-1
WTG-9-2
WTG-9-3
WTG-9-3A
WTG-9-4
WTG-9-4-1A
WTG-9-4
WTG-9-5
WTG-9-6
WTG-9-7
WTG-8-1
WTG-8-2
WTG-8-3
WTG-8-3A
WTG-8-4
WTG-8-5
WTG-8-6
WTG-8-7
WTG-8-8
Spare
Alternate
Spare
Spare
GS-17
GS-18
GS-19
GS-20
GS-21
GS-22
GS-23
GS-24
GS-25
GS-26
GS-27
GS-28
GS-29
GS-30
GS-31
GS-32
GS-33
GS-34
GS-35
GS-36
GS-37
GS-38
GS-39
GS-40
GS-41
GS-42
GS-43
GS-44
GS-45
GS-46
GS-47
GS-48
GS-49
GS-50
GS-51
GS-52
GS-53
GS-54
GS-55
GS-56
GS-57
GS-58
GS-59
GS-60
GS-61
GS-62
GS-63
GS-64
GS-65
GS-66
GS-67
GS-68
GS-69
GS-70
GS-71
GS-72
GS-73
GS-74
GS-75
GS-76
GS-77
GS-78
GS-79
GS-80
GS-81
GS-82
GS-83
GS-84
GS-85
GS-86
GS-87
GS-88
GS-89
GS-90
GS-91
GS-92
GS-93
GS-94
GS-95
GS-96
GS-97
GS-98
GS-99
GS-100
GS-101
GS-102
GS-103
GS-104
GS-105
GS-106
GS-107
GS-108
GS-109
GS-110
GS-111
GS-112
GS-113
GS-114
GS-115
GS-116
GS-117
GS-118
GS-119
GS-120
GS-121
GS-122
GS-123
GS-124
GS-125
GS-126
GS-127
GS-128
GS-129
GS-130
GS-131
GS-132
GS-133
GS-134
GS-135
GS-136
GS-137
GS-138
GS-139
GS-140
GS-141
GS-142
GS-143
GS-144
GS-145
GS-146
GS-147
GS-148
GS-149
GS-150
GS-151
GS-152
GS-153
GS-154
GS-155
GS-156
GS-157
GS-158
GS-159
GS-160
GS-161
GS-162
GS-163
GS-164
GS-165
GS-166
GS-167
GS-168
GS-169
GS-170
GS-171
GS-172
GS-173
GS-174
GS-175
GS-176
GS-177
GS-178
GS-179
GS-180
GS-181
GS-182
GS-183
GS-184
GS-185
GS-186
GS-187
GS-188
GS-189
GS-190
GS-191
GS-192
GS-193
GS-194
GS-195
GS-196
GS-197
GS-198
GS-199
GS-200
GS-201
GS-202
GS-203
GS-204
GS-205
GS-206
GS-207
GS-208
GS-209
GS-210
GS-211
GS-212
GS-213
GS-214
GS-215
GS-216
GS-217
GS-218
GS-219
GS-220
GS-221
GS-222
GS-223
GS-224
GS-225
GS-226
GS-227
GS-228
GS-229
GS-230
GS-231
GS-232
GS-233
GS-234
GS-235
GS-236
GS-237
GS-238
GS-239
GS-240
GS-241
GS-242
GS-243
GS-244
GS-245
GS-246
GS-247
GS-248
GS-249
GS-250
GS-251
GS-252
GS-253
GS-254
GS-255
GS-256
GS-257
GS-258
GS-259
GS-260
GS-261
GS-262
GS-263
GS-264
GS-265
GS-266
GS-267
GS-268
GS-269
GS-270
GS-271
GS-272
GS-273
GS-274
GS-275
GS-276
GS-277
GS-278
GS-279
GS-280
GS-281
GS-282
GS-283
GS-284
GS-285
GS-286
GS-287
GS-288
GS-289
GS-290
GS-291
GS-292
GS-293
GS-294
GS-295
GS-296
GS-297
GS-298
GS-299
GS-300
GS-301
GS-302
GS-303
GS-304
GS-305
GS-306
GS-307
GS-308
GS-309
GS-310
GS-311
GS-312
GS-313
GS-314
GS-315
GS-316
GS-317
GS-318
GS-319
GS-320
GS-321
GS-322
GS-323
GS-324
GS-325
GS-326
GS-327
GS-328
GS-329
GS-330
GS-331
GS-332
GS-333
GS-334
GS-335
GS-336
GS-337
GS-338
GS-339
GS-340
GS-341
GS-342
GS-343
GS-344
GS-345
GS-346
GS-347
GS-348
GS-349
GS-350
GS-351
GS-352
GS-353
GS-354
GS-355
GS-356
GS-357
GS-358
GS-359
GS-360
GS-361
GS-362
GS-363
GS-364
GS-365
GS-366
GS-367
GS-368
GS-369
GS-370
GS-371
GS-372
GS-373
GS-374
GS-375
GS-376
GS-377
GS-378
GS-379
GS-380
GS-381
GS-382
GS-383
GS-384
GS-385
GS-386
GS-387
GS-388
GS-389
GS-390
GS-391
GS-392
GS-393
GS-394
GS-395
GS-396
GS-397
GS-398
GS-399
GS-400
GS-401
GS-402
GS-403
GS-404
GS-405
GS-406
GS-407
GS-408
GS-409
GS-410
GS-411
GS-412
GS-413
GS-414
GS-415
GS-416
GS-417
GS-418
GS-419
GS-420
GS-421
GS-422
GS-423
GS-424
GS-425
GS-426
GS-427
GS-428
GS-429
GS-430
GS-431
GS-432
GS-433
GS-434
GS-435
GS-436
GS-437
GS-438
GS-439
GS-440
GS-441
GS-442
GS-443
GS-444
GS-445
GS-446
GS-447
GS-448
GS-449
GS-450
GS-451
GS-452
GS-453
GS-454
GS-455
GS-456
GS-457
GS-458
GS-459
GS-460
GS-461
GS-462
GS-463
GS-464
GS-465
GS-466
GS-467
GS-468
GS-469
GS-470
GS-471
GS-472
GS-473
GS-474
GS-475
GS-476
GS-477
GS-478
GS-479
GS-480
GS-481
GS-482
GS-483
GS-484
GS-485
GS-486
GS-487
GS-488
GS-489
GS-490
GS-491
GS-492
GS-493
GS-494
GS-495
GS-496
GS-497
GS-498
GS-499
GS-500
GS-501
GS-502
GS-503
GS-504
GS-505
GS-506
GS-507
GS-508
GS-509
GS-510
GS-511
GS-512
GS-513
GS-514
GS-515
GS-516
GS-517
GS-518
GS-519
GS-520
GS-521
GS-522
GS-523
GS-524
GS-525
GS-526
GS-527
GS-528
GS-529
GS-530
GS-531
GS-532
GS-533
GS-534
GS-535
GS-536
GS-537
GS-538
GS-539
GS-540
GS-541
GS-542
GS-543
GS-544
GS-545
GS-546
GS-547
GS-548
GS-549
GS-550
GS-551
GS-552
GS-553
GS-554
GS-555
GS-556
GS-557
GS-558
GS-559
GS-560
GS-561
GS-562
GS-563
GS-564
GS-565
GS-566
GS-567
GS-568
GS-569
GS-570
GS-571
GS-572
GS-573
GS-574
GS-575
GS-576
GS-577
GS-578
GS-579
GS-580
GS-581
GS-582
GS-583
GS-584
GS-585
GS-586
GS-587
GS-588
GS-589
GS-590
GS-591
GS-592
GS-593
GS-594
GS-595
GS-596
GS-597
GS-598
GS-599
GS-600
GS-601
GS-602
GS-603
GS-604
GS-605
GS-606
GS-607
GS-608
GS-609
GS-610
GS-611
GS-612
GS-613
GS-614
GS-615
GS-616
GS-617
GS-618
GS-619
GS-620
GS-621
GS-622
GS-623
GS-624
GS-625
GS-626
GS-627
GS-628
GS-629
GS-630
GS-631
GS-632
GS-633
GS-634
GS-635
GS-636
GS-637
GS-638
GS-639
GS-640
GS-641
GS-642
GS-643
GS-644
GS-645
GS-646
GS-647
GS-648
GS-649
GS-650
GS-651
GS-652
GS-653
GS-654
GS-655
GS-656
GS-657
GS-658
GS-659
GS-660
GS-661
GS-662
GS-663
GS-664
GS-665
GS-666
GS-667
GS-668
GS-669
GS-670
GS-671
GS-672
GS-673
GS-674
GS-675
GS-676
GS-677
GS-678
GS-679
GS-680
GS-681
GS-682
GS-683
GS-684
GS-685
GS-686
GS-687
GS-688
GS-689
GS-690
GS-691
GS-692
GS-693
GS-694
GS-695
GS-696
GS-697
GS-698
GS-699
GS-700
GS-701
GS-702
GS-703
GS-704
GS-705
GS-706
GS-707
GS-708
GS-709
GS-710
GS-711
GS-712
GS-713
GS-714
GS-715
GS-716
GS-717
GS-718
GS-719
GS-720
GS-721
GS-722
GS-723
GS-724
GS-725
GS-726
GS-727
GS-728
GS-729
GS-730
GS-731
GS-732
GS-733
GS-734
GS-735
GS-736
GS-737
GS-738
GS-739
GS-740
GS-741
GS-742
GS-743
GS-744
GS-745
GS-746
GS-747
GS-748
GS-749
GS-750
GS-751
GS-752
GS-753
GS-754
GS-755
GS-756
GS-757
GS-758
GS-759
GS-760
GS-761
GS-762
GS-763
GS-764
GS-765
GS-766
GS-767
GS-768
GS-769
GS-770
GS-771
GS-772
GS-773
GS-774
GS-775
GS-776
GS-777
GS-778
GS-779
GS-780
GS-781
GS-782
GS-783
GS-784
GS-785
GS-786
GS-787
GS-788
GS-789
GS-790
GS-791
GS-792
GS-793
GS-794
GS-795
GS-796
GS-797
GS-798
GS-799
GS-800
GS-801
GS-802
GS-803
GS-804
GS-805
GS-806
GS-807
GS-808
GS-809
GS-810
GS-811
GS-812
GS-813
GS-814
GS-815
GS-816
GS-817
GS-818
GS-819
GS-820
GS-821
GS-822
GS-823
GS-824
GS-825
GS-826
GS-827
GS-828
GS-829
GS-830
GS-831
GS-832
GS-833
GS-834
GS-835
GS-836
GS-837
GS-838
GS-839
GS-840
GS-841
GS-842
GS-843
GS-844
GS-845
GS-846
GS-847
GS-848
GS-849
GS-850
GS-851
GS-852
GS-853
GS-854
GS-855
GS-856
GS-857
GS-858
GS-859
GS-860
GS-861
GS-862
GS-863
GS-864
GS-865
GS-866
GS-867
GS-868
GS-869
GS-870
GS-871
GS-872
GS-873
GS-874
GS-875
GS-876
GS-877
GS-878
GS-879
GS-880
GS-881
GS-882
GS-883
GS-884
GS-885
GS-886
GS-887
GS-888
GS-889
GS-890
GS-891
GS-892
GS-893
GS-894
GS-895
GS-896
GS-897
GS-898
GS-899
GS-900
GS-901
GS-902
GS-903
GS-904
GS-905
GS-906
GS-907
GS-908
GS-909
GS-910
GS-911
GS-912
GS-913
GS-914
GS-915
GS-916
GS-917
GS-918
GS-919
GS-920
GS-921
GS-922
GS-923
GS-924
GS-925
GS-926
GS-927
GS-928
GS-929
GS-930
GS-931
GS-932
GS-933
GS-934
GS-935
GS-936
GS-937
GS-938
GS-939
GS-940
GS-941
GS-942
GS-943
GS-944
GS-945
GS-946
GS-947
GS-948
GS-949
GS-950
GS-951
GS-952
GS-953
GS-954
GS-955
GS-956
GS-957
GS-958
GS-959
GS-960
GS-961
GS-962
GS-963
GS-964
GS-965
GS-966
GS-967
GS-968
GS-969
GS-970
GS-971
GS-972
GS-973
GS-974
GS-975
GS-976
GS-977
GS-978
GS-979
GS-980
GS-981
GS-982
GS-983
GS-984
GS-985
GS-986
GS-987
GS-988
GS-989
GS-990
GS-991
GS-992
GS-993
GS-994
GS-995
GS-996
GS-997
GS-998
GS-999
GS-1000
GS-1001
GS-1002
GS-1003
GS-1004
GS-1005
GS-1006
GS-1007
GS-1008
GS-1009
GS-1010
GS-1011
GS-1012
GS-1013
GS-1014
GS-1015
GS-1016
GS-1017
GS-1018
GS-1019
GS-1020
GS-1021
GS-1022
GS-1023
GS-1024
GS-1025
GS-1026
GS-1027
GS-1028
GS-1029
GS-1030
GS-1031
GS-1032
GS-1033
GS-1034
GS-1035
GS-1036
GS-1037
GS-1038
GS-1039
GS-1040
GS-1041
GS-1042
GS-1043
GS-1044
GS-1045
GS-1046
GS-1047
GS-1048
GS-1049
GS-1050
GS-1051
GS-1052
GS-1053
GS-1054
GS-1055
GS-1056
GS-1057
GS-1058
GS-1059
GS-1060
GS-1061
GS-1062
GS-1063
GS-1064
GS-1065
GS-1066
GS-1067
GS-1068
GS-1069
GS-1070
GS-1071
GS-1072
GS-1073
GS-1074
GS-1075
GS-1076
GS-1077
GS-1078
GS-1079
GS-1080
GS-1081
GS-1082
GS-1083
GS-1084
GS-1085
GS-1086
GS-1087
GS-1088
GS-1089
GS-1090
GS-1091
GS-1092
GS-1093
GS-1094
GS-1095
GS-1096
GS-1097
GS-1098
GS-1099
GS-1100
GS-1101
GS-1102
GS-1103
GS-1104
GS-1105
GS-1106
GS-1107
GS-1108
GS-1109
GS-1110
GS-1111
GS-1112
GS-1113
GS-1114
GS-1115
GS-1116
GS-1117
GS-1118
GS-1119
GS-1120
GS-1121
GS-1122
GS-1123
GS-1124
GS-1125
GS-1126
GS-1127
GS-1128
GS-1129
GS-1130
GS-1131
GS-1132
GS-1133
GS-1134
GS-1135
GS-1136
GS-1137
GS-1138
GS-1139
GS-1140
GS-1141
GS-1142
GS-1143
GS-1144
GS-1145
GS-1146
GS-1147
GS-1148
GS-1149
GS-1150
GS-1151
GS-1152
GS-1153
GS-1154
GS-1155
GS-1156
GS-1157
GS-1158
GS-1159
GS-1160
GS-1161
GS-1162
GS-1163
GS-1164
GS-1165
GS-1166
GS-1167
GS-1168
GS-1169
GS-1170
GS-1171
GS-1172
GS-1173
GS-1174
GS-1175
GS-1176
GS-1177
GS-1178
GS-1179
GS-1180
GS-1181
GS-1182
GS-1183
GS-1184
GS-1185
GS-1186
GS-1187
GS-1188
GS-1189
GS-1190
GS-1191
GS-1192
GS-1193
GS-1194
GS-1195
GS-1196
GS-1197
GS-1198
GS-1199
GS-1200
GS-1201
GS-1202
GS-1203
GS-1204
GS-1205
GS-1206
GS-1207
GS-1208
GS-1209
GS-1210
GS-1211
GS-1212
GS-1213
GS-1214
GS-1215
GS-1216
GS-1217
GS-1218
GS-1219
GS-1220
GS-1221
GS-1222
GS-1223
GS-1224
GS-1225
GS-1226
GS-1227
GS-1228
GS-1229
GS-1230
GS-1231
GS-1232
GS-1233
GS-1234
GS-1235
GS-1236
GS-1237
GS-1238
GS-1239
GS-1240
GS-1241
GS-1242
GS-1243
GS-1244
GS-1245
GS-1246
GS-1247
GS-1248
GS-1249
GS-1250
GS-1251
GS-1252
GS-1253
GS-1254
GS-1255
GS-1256
GS-1257
GS-1258
GS-1259
GS-1260
GS-1261
GS-1262
GS-1263
GS-1264
GS-1265
GS-1266
GS-1267
GS-1268
GS-1269
GS-1270
GS-1271
GS-1272
GS-1273
GS-1274
GS-1275
GS-1276
GS-1277
GS-1278
GS-1279
GS-1280
GS-1281
GS-1282
GS-1283
GS-1284
GS-1285
GS-1286
GS-1287
GS-1288
GS-1289
GS-1290
GS-1291
GS-1292
GS-1293
GS-1294
GS-1295
GS-1296
GS-1297
GS-1298
GS-1299
GS-1300
GS-1301
GS-1302
GS-1303
GS-1304
GS-1305
GS-1306
GS-1307
GS-1308
GS-1309
GS-1310
GS-1311
GS-1312
GS-1313
GS-1314
GS-1315
GS-1316
GS-1317
GS-1318
GS-1319
GS-1320
GS-1321
GS-1322
GS-1323
GS-1324
GS-1325
GS-1326
GS-1327
GS-1328
GS-1329
GS-1330
GS-1331
GS-1332
GS-1333
GS-1334
GS-1335
GS-1336
GS-1337
GS-1338
GS-1339
GS-1340
GS-1341
GS-1342
GS-1343
GS-1344
GS-1345
GS-1346
GS-1347
GS-1348
GS-1349
GS-1350
GS-1351
GS-1352
GS-1353
GS-1354
GS-1355
GS-1356
GS-1357
GS-1358
GS-1359
GS-1360
GS-1361
GS-1362
GS-1363
GS-1364
GS-1365
GS-1366
GS-1367
GS-1368
GS-1369
GS-1370
GS-1371
GS-1372
GS-1373
GS-1374
GS-1375
GS-1376
GS-1377
GS-1378
GS-1379
GS-1380
GS-1381
GS-1382
GS-1383
GS-1384
GS-1385
GS-1386
GS-1387
GS-1388
GS-1389
GS-1390
GS-1391
GS-1392
GS-1393
GS-1394
GS-1395
GS-1396
GS-1397
GS-1398
GS-1399
GS-1400
GS-1401
GS-1402
GS-1403
GS-1404
GS-1405
GS-1406
GS-1407
GS-1408
GS-1409
GS-1410
GS-1411
GS-1412
GS-1413
GS-1414
GS-1415
GS-1416
GS-1417
GS-1418
GS-1419
GS-1420
GS-1421
GS-1422
GS-1423
GS-1424
GS-1425
GS-1426
GS-1427
GS-1428
GS-1429
GS-1430
GS-1431
GS-1432
GS-1433
GS-1434
GS-1435
GS-1436
GS-1437
GS-1438
GS-1439
GS-1440
GS-1441
GS-1442
GS-1443
GS-1444
GS-1445
GS-1446
GS-1447
GS-1448
GS-1449
GS-1450
GS-1451
GS-1452
GS-1453
GS-1454
GS-1455
GS-1456
GS-1457
GS-1458
GS-1459
GS-1460
GS-1461
GS-1462
GS-1463
GS-1464
GS-1465
GS-1466
GS-1467
GS-1468
GS-1469
GS-1470
GS-1471
GS-1472
GS-1473
GS-1474
GS-1475
GS-1476
GS-1477
GS-1478
GS-1479
GS-1480
GS-1481
GS-1482
GS-1483
GS-1484
GS-1485
GS-1486
GS-1487
GS-1488
GS-1489
GS-1490
GS-1491
GS-1492
GS-1493
GS-1494
GS-1495
GS-1496
GS-1497
GS-1498
GS-1499
GS-1500
GS-1501
GS-1502
GS-1503
GS-1504
GS-1505
GS-1506
GS-1507
GS-1508
GS-1509
GS-1510
GS-1511
GS-1512
GS-1513
GS-1514
GS-1515
GS-1516
GS-1517
GS-1518
GS-1519
GS-1520
GS-1521
GS-1522
GS-1523
GS-1524
GS-1525
GS-1526
GS-1527
GS-1528
GS-1529
GS-1530
GS-1531
GS-1532
GS-1533
GS-1534
GS-1535
GS-1536
GS-1537
GS-1538
GS-1539
GS-1540
GS-1541
GS-1542
GS-1543
GS-1544
GS-1545
GS-1546
GS-1547
GS-1548
GS-1549
GS-1550
GS-1551
GS-1552
GS-1553
GS-1554
GS-1555
GS-1556
GS-1557
GS-1558
GS-1559
GS-1560
GS-1561
GS-1562
GS-1563
GS-1564
GS-1565
GS-1566
GS-1567
GS-1568
GS-1569
GS-1570
GS-1571
GS-1572
GS-1573
GS-1574
GS-1575
GS-1576
GS-1577
GS-1578
GS-1579
GS-1580
GS-1581
GS-1582
GS-1583
GS-1584
GS-1585
GS-1586
GS-1587
GS-1588
GS-1589
GS-1590
GS-1591
GS-1592
GS-1593
GS-1594
GS-1595
GS-1596
GS-1597
GS-1598
GS-1599
GS-1600
GS-1601
GS-1602
GS-1603
GS-1604
GS-1605
GS-1606
GS-1607
GS-1608
GS-1609
GS-1610
GS-1611
GS-1612
GS-1613
GS-1614
GS-1615
GS-1616
GS-1617
GS-1618
GS-1619
GS-1620
GS-1621
GS-1622
GS-1623
GS-1624
GS-1625
GS-1626
GS-1627
GS-1628
GS-1629
GS-1630
GS-1631
GS-1632
GS-1633
GS-1634
GS-1635
GS-1636
GS-1637
GS-1638
GS-1639
GS-1640
GS-1641
GS-1642
GS-1643
GS-1644
GS-1645
GS-1646
GS-1647
GS-1648
GS-1649
GS-1650
GS-1651
GS-1652
GS-1653
GS-1654
GS-1655
GS-1656
GS-1657
GS-1658
GS-1659
GS-1660
GS-1661
GS-1662
GS-1663
GS-1664
GS-1665
GS-1666
GS-1667
GS-1668
GS-1669
GS-1670
GS-1671
GS-1672
GS-1673
GS-1674
GS-1675
GS-1676
GS-1677
GS-1678
GS-1679
GS-1680
GS-1681
GS-1682
GS-1683
GS-1684
GS-1685
GS-1686
GS-1687
GS-1688
GS-1689
GS-1690
GS-1691
GS-1692
GS-1693
GS-1694
GS-1695
GS-1696
GS-1697
GS-1698
GS-1699
GS-1700
GS-1701
GS-1702
GS-1703
GS-1704
GS-1705
GS-1706
GS-1707
GS-1708
GS-1709
GS-1710
GS-1711
GS-1712
GS-1713
GS-1714
GS-1715
GS-1716
GS-1717
GS-1718
GS-1719
GS-1720
GS-1721
GS-1722
GS-1723
GS-1724
GS-1725
GS-1726
GS-1727
GS-1728
GS-1729
GS-1730
GS-1731
GS-1732
GS-1733
GS-1734
GS-1735
GS-1736
GS-1737
GS-1738
GS-1739
GS-1740
GS-1741
GS-1742
GS-1743
GS-1744
GS-1745
GS-1746
GS-1747
GS-1748
GS-1749
GS-1750
GS-1751
GS-1752
GS-1753
GS-1754
GS-1755
GS-1756
GS-1757
GS-1758
GS-1759
GS-1760
GS-1761
GS-1762
GS-1763
GS-1764
GS-1765
GS-1766
GS-1767
GS-1768
GS-1769
GS-1770
GS-1771
GS-1772
GS-1773
GS-1774
GS-1775
GS-1776
GS-1777
GS-1778
GS-1779
GS-1780
GS-1781
GS-1782
GS-1783
GS-1784
GS-1785
GS-1786
GS-1787
GS-1788
GS-1789
GS-1790
GS-1791
GS-1792
GS-1793
GS-1794
GS-1795
GS-1796
GS-1797
GS-1798
GS-1799
GS-1800
GS-1801
GS-1802
GS-1803
GS-1804
GS-1805
GS-1806
GS-1807
GS-1808
GS-1809
GS-1810
GS-1811
GS-1812
GS-1813
GS-1814
GS-1815
GS-1816
GS-1817
GS-1818
GS-1819
GS-1820
GS-1821
GS-1822
GS-1823
GS-1824
GS-1825
GS-1826
GS-1827
GS-1828
GS-1829
GS-1830
GS-1831
GS-1832
GS-1833
GS-1834
GS-1835
GS-1836
GS-1837
GS-1838
GS-1839
GS-1840
GS-1841
GS-1842
GS-1843
GS-1844
GS-1845
GS-1846
GS-1847
GS-1848
GS-1849
GS-1850
GS-1851
GS-1852
GS-1853
GS-1854
GS-1855
GS-1856
GS-1857
GS-1858
GS-1859
GS-1860
GS-1861
GS-1862
GS-1863
GS-1864
GS-1865
GS-1866
GS-1867
GS-1868
GS-1869
GS-1870
GS-1871
GS-1872
GS-1873
GS-1874
GS-1875
GS-1876
GS-1877
GS-1878
GS-1879
GS-1880
GS-1881
GS-1882
GS-1883
GS-1884
GS-1885
GS-1886
GS-1887
GS-1888
GS-1889
GS-1890
GS-1891
GS-1892
GS-1893
GS-1894
GS-1895
GS-1896
GS-1897
GS-1898
GS-1899
GS-1900
GS-1901
GS-1902
GS-1903
GS-1904
GS-1905
GS-1906
GS-1907
GS-1908
GS-1909
GS-1910
GS-1911
GS-1912
GS-1913
GS-1914
GS-1915
GS-1916
GS-1917
GS-1918
GS-1919
GS-1920
GS-1921
GS-1922
GS-1923
GS-1924
GS-1925
GS-1926
GS-1927
GS-1928
GS-1929
GS-1930
GS-1931
GS-1932
GS-1933
GS-1934
GS-1935
GS-1936
GS-1937
GS-1938
GS-1939
GS-1940
GS-1941
GS-1942
GS-1943
GS-1944
GS-1945
GS-1946
GS-1947
GS-1948
GS-1949
GS-1950
GS-1951
GS-1952
GS-1953
GS-1954
GS-1955
GS-1956
GS-1957
GS-1958
GS-1959
GS-1960
GS-1961
GS-1962
GS-1963
GS-1964
GS-1965
GS-1966
GS-1967
GS-1968
GS-1969
GS-1970
GS-1971
GS-1972
GS-1973
GS-1974
GS-1975
GS-1976
GS-1977
GS-1978
GS-1979
GS-1980
GS-1981
GS-1982
GS-1983
GS-1984
GS-1985
GS-1986
GS-1987
GS-1988
GS-1989
GS-1990
GS-1991
GS-1992
GS-1993
GS-1994
GS-1995
GS-1996
GS-1997
GS-1998
GS-1999
GS-2000
GS-2001
GS-2002
GS-2003
GS-2004
GS-2005
GS-2006
GS-2007
GS-2008
GS-2009
GS-2010
GS-2011
GS-2012
GS-2013
GS-2014
GS-2015
GS-2016
GS-2017
GS-2018
GS-2019
GS-2020
GS-2021
GS-2022
GS-2023
GS-2024
GS-2025
GS-2026
GS-2027
GS-2028
GS-2029
GS-2030
GS-2031
GS-2032
GS-2033
GS-2034
GS-2035
GS-2036
GS-2037
GS-2038
GS-2039
GS-2040
GS-2041
GS-2042
GS-2043
GS-2044
GS-2045
GS-2046
GS-2047
GS-2048
GS-2049
GS-2050
GS-2051
GS-2052
GS-2053
GS-2054
GS-2055
GS-2056
GS-2057
GS-2058
GS-2059
GS-2060
GS-2061
GS-2062
GS-2063
GS-2064
GS-2065
GS-2066
GS-2067
GS-2068
GS-2069
GS-2070
GS-2071
GS-2072
GS-2073
GS-2074
GS-2075
GS-2076
GS-2077
GS-2078
GS-2079
GS-2080
GS-2081
GS-2082
GS-2083
GS-2084
GS-2085
GS-2086
GS-2087
GS-2088
GS-2089
GS-2090
GS-2091
GS-2092
GS-2093
GS-2094
GS-2095
GS-2096
GS-2097
GS-2098
GS-2099
GS-2100
GS-2101
GS-2102
GS-2103
GS-2104
GS-2105
GS-2106
GS-2107
GS-2108
GS-2109
GS-2110
GS-2111
GS-2112
GS-2113
GS-2114
GS-2115
GS-2116
GS-2117
GS-2118
GS-2119
GS-2120
GS-2121
GS-2122
GS-2123
GS-2124
GS-2125
GS-2126
GS-2127
GS-2128
GS-2129
GS-2130
GS-2131
GS-2132
GS-2133
GS-2134
GS-2135
GS-2136
GS-2137
GS-2138
GS-2139
GS-2140
GS-2141
GS-2142
GS-2143
GS-2144
GS-2145
GS-2146
GS-2147
GS-2148
GS-2149
GS-2150
GS-2151
GS-2152
GS-2153
GS-2154
GS-2155
GS-2156
GS-2157
GS-2158
GS-2159
GS-2160
GS-2161
GS-2162
GS-2163
GS-2164
GS-2165
GS-2166
GS-2167
GS-2168
GS-2169
GS-2170
GS-2171
GS-2172
GS-2173
GS-2174
GS-2175
GS-2176
GS-2177
GS-2178
GS-2179
GS-2180
GS-2181
GS-2182
GS-2183
GS-2184
GS-2185
GS-2186
GS-2187
GS-2188
GS-2189
GS-2190
GS-2191
GS-2192
GS-2193
GS-2194
GS-2195
GS-2196
GS-2197
GS-2198
GS-2199
GS-2200
GS-2201
GS-2202
GS-2203
GS-2204
GS-2205
GS-2206
GS-2207
GS-2208
GS-2209
GS-2210
GS-2211
GS-2212
GS-2213
GS-2214
GS-2215
GS-2216
GS-2217
GS-2218
GS-2219
GS-2220
GS-2221
GS-2222
GS-2223
GS-2224
GS-2225
GS-2226
GS-2227
GS-2228
GS-2229
GS-2230
GS-2231
GS-2232
GS-2233
GS-2234
GS-2235
GS-2236
GS-2237
GS-2238
GS-2239
GS-2240
GS-2241
GS-2242
GS-2243
GS-2244
GS-2245
GS-2246
GS-2247
GS-2248
GS-2249
GS-2250
GS-2251
GS-2252
GS-2253
GS-2254
GS-2255
GS-2256
GS-2257
GS-2258
GS-2259
GS-2260
GS-2261
GS-2262
GS-2263
GS-2264
GS-2265
GS-2266
GS-2267
GS-2268
GS-2269
GS-2270
GS-2271
GS-2272
GS-2273
GS-2274
GS-2275
GS-2276
GS-2277
GS-2278
GS-2279
GS-2280
GS-2281
GS-2282
GS-2283
GS-2284
GS-2285
GS-2286
GS-2287
GS-2288
GS-2289
GS-2290
GS-2291
GS-2292
GS-2293
GS-2294
GS-2295
GS-2296
GS-2297
GS-2298
GS-2299
GS-2300
GS-2301
GS-2302
GS-2303
GS-2304
GS-2305
GS-2306
GS-2307
GS-2308
GS-2309
GS-2310
GS-2311
GS-2312
GS-2313
GS-2314
GS-2315
GS-2316
GS-2317
GS-2318
GS-2319
GS-2320
GS-2321
GS-2322
GS-2323
GS-2324
GS-2325
GS-2326
GS-2327
GS-2328
GS-2329
GS-2330
GS-2331
GS-2332
GS-2333
GS-2334
GS-2335
GS-2336
GS-2337
GS-2338
GS-2339
GS-2340
GS-2341
GS-2342
GS-2343
GS-2344
GS-2345
GS-2346
GS-2347
GS-2348
GS-2349
GS-2350
GS-2351
GS-2352
GS-2353
GS-2354
GS-2355
GS-2356
GS-2357
GS-2358
GS-2359
GS-2360
GS-2361
GS-2362
GS-2363
GS-2364
GS-2365
GS-2366
GS-2367
GS-2368
GS-2369
GS-2370
GS-2371
GS-2372
GS-2373
GS-2374
GS-2375
GS-2376
GS-2377
GS-2378
GS-2379
GS-2380
GS-2381
GS-2382
GS-2383
GS-2384
GS-2385
GS-2386
GS-2387
GS-2388
GS-2389
GS-2390
GS-2391
GS-2392
GS-2393
GS-2394
GS-2395
GS-2396
GS-2397
GS-2398
GS-2399
GS-2400
GS-2401
GS-2402
GS-2403
GS-2404
GS-2405
GS-2406
GS-2407
GS-2408
GS-2409
GS-2410
GS-2411
GS-2412
GS-2413
GS-2414
GS-2415
GS-2416
GS-2417
GS-2418
GS-2419
GS-2420
GS-2421
GS-2422
GS-2423
GS-2424
GS-2425
GS-2426
GS-2427
GS-2428
GS-2429
GS-2430
GS-2431
GS-2432
GS-2433
GS-2434
GS-2435
GS-2436
GS-2437
GS-2438
GS-2439
GS-2440
GS-2441
GS-2442
GS-2443
GS-2444
GS-2445
GS-2446
GS-2447
GS-2448
GS-2449
GS-2450
GS-2451
GS-2452
GS-2453
GS-2454
GS-2455
GS-2456
GS-2457
GS-2458
GS-2459
GS-2460
GS-2461
GS-2462
GS-2463
GS-2464
GS-2465
GS-2466
GS-2467
GS-2468
GS-2469
GS-2470
GS-2471
GS-2472
GS-2473
GS-2474
GS-2475
GS-2476
GS-2477
GS-2478
GS-2479
GS-2480
GS-2481
GS-2482
GS-2483
GS-2484
GS-2485
GS-2486
GS-2487
GS-2488
GS-2489
GS-2490
GS-2491
GS-2492
GS-2493
GS-2494
GS-2495
GS-2496
GS-2497
GS-2498
GS-2499
GS-2500
GS-2501
GS-2502
GS-2503
GS-2504
GS-2505
GS-2506
GS-2507
GS-2508
GS-2509
GS-2510
GS-2511
GS-2512
GS-2513
GS-2514
GS-2515
GS-2516
GS-2517
GS-2518
GS-2519
GS-2520
GS-2521
GS-2522
GS-2523
GS-2524
GS-2525
GS-2526
GS-2527
GS-2528
GS-2529
GS-2530
GS-2531
GS-2532
GS-2533
GS-2534
GS-2535
GS-2536
GS-2537
GS-2538
GS-2539
GS-2540
GS-2541
GS-2542
GS-2543
GS-2544
GS-2545
GS-2546
GS-2547
GS-2548
GS-2549
GS-2550
GS-2551
GS-2552
GS-2553
GS-2554
GS-2555
GS-2556
GS-2557
GS-2558
GS-2559
GS-2560
GS-2561
GS-2562
GS-2563
GS-2564
GS-2565
GS-2566
GS-2567
GS-2568
GS-2569
GS-2570
GS-2571
GS-2572
GS-2573
GS-2574
GS-2575
GS-2576
GS-2577
GS-2578
GS-2579
GS-2580
GS-2581
GS-2582
GS-2583
GS-2584
GS-2585
GS-2586
GS-2587
GS-2588
GS-2589
GS-2590
GS-2591
GS-2592
GS-2593
GS-2594
GS-2595
GS-2596
GS-2597
GS-2598
GS-2599
GS-2600
GS-2601
GS-2602
GS-2603
GS-2604
GS-2605
GS-2606
GS-2607
GS-2608
GS-2609
GS-2610
GS-2611
GS-2612
GS-2613
GS-2614
GS-2615
GS-2616
GS-2617
GS-2618
GS-2619
GS-2620
GS-2621
GS-2622
GS-2623
GS-2624
GS-2625
GS-2626
GS-2627
GS-2628
GS-2629
GS-2630
GS-2631
GS-2632
GS-2633
GS-2634
GS-2635
GS-2636
GS-2637
GS-2638
GS-2639
GS-2640
GS-2641
GS-2642
GS-2643
GS-2644
GS-2645
GS-2646
GS-2647
GS-2648
GS-2649
GS-2650
GS-2651
GS-2652
GS-2653
GS-2654
GS-2655
GS-2656
GS-2657
GS-2658
GS-2659
GS-2660
GS-2661
GS-2662
GS-2663
GS-2664
GS-2665
GS-2666
GS-2667
GS-2668
GS-2669
GS-2670
GS-2671
GS-2672
GS-2673
GS-2674
GS-2675
GS-2676
GS-2677
GS-2678
GS-2679
GS-2680
GS-2681
GS-2682
GS-2683
GS-2684
GS-2685
GS-2686
GS-2687
GS-2688
GS-2689
GS-2690
GS-2691
GS-2692
GS-2693
GS-2694
GS-2695
GS-2696
GS-2697
GS-2698
GS-2699
GS-2700
GS-2701
GS-2702
GS-2703
GS-2704
GS-2705
GS-2706
GS-2707
GS-2708
GS-2709
GS-2710
GS-2711
GS-2712
GS-2713
GS-2714
GS-2715
GS-2716
GS-2717
GS-2718
GS-2719
GS-2720
GS-2721
GS-2722
GS-2723
GS-2724
GS-2725
GS-2726
GS-2727
GS-2728
GS-2729
GS-2730
GS-2731
GS-2732
GS-2733
GS-2734
GS-2735
GS-2736
GS-2737
GS-2738
GS-2739
GS-2740
GS-2741
GS-2742
GS


N
W
E
S
TLB 18
TLB 19
TLB 20
TLB 21
TLB 22
TLB 23
TLB 24
TLB 17
TLB 16
TLB 15
TLB 14
TLB 13
WTG04 (D)
WTG05 (E)
WTG06 (F)
WTG07 (G)
WTG08 (H)
WTG09 (I)
WTG10 (J)
WTG11 (K)
WTG12 (L)
WTG13 (M)
WTG14 (N)
WTG15 (O)
TLC24
TLC25
TLC26
TLC27
TLC28
TLC29
TLC30
TLC31
TLC32
TLC33
TLC34
TLC35
TLC36
TLC37
TLC38
TLC39
TLC40
TLC41
TLC42
TLC43
TLC44
6013 6014
6014 6015
6013 6014
6063 6064
6014 6015
6064 6065
4093000
4088000
4083000
WTG-12-4
2
WTG-12-5
WTG-12-6
3
WTG-12-7
WTG-11-4
WTG-11-5
5
WTG-11-6
WTG-11-7
Spare
10
WTG-10-7
14
WTG-10-8
WTG-10-9
WTG-10-10
15
WTG-10-11
WTG-10-12
Spare
WTG-10-13
WTG-9-6
WTG-9-7
23
WTG-9-8
WTG-9-9
21
Spare
WTG-9-10
WTG-9-11
22
WTG-9-12
WTG-8-6
WTG-8-7
20
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
20
WTG-8-12
WTG-8-10
112
WTG-8-9A
107
WTG-8-8
110
WTG-8-10B
116
WTG-8-11B
118
WTG-8-12B
114
WTG-8-13B
120
WTG-8-14B
122
WTG-8-15B
124
WTG-8-16B
126
WTG-8-17B
128
WTG-8-18B
130
WTG-8-19B
132
WTG-8-20B
134
WTG-8-21B
136
WTG-8-22B
138
WTG-8-23B
140
WTG-8-24B
142
WTG-8-25B
144
WTG-8-26B
146
WTG-8-27B
148
WTG-8-28B
150
WTG-8-29B
152
WTG-8-30B
154
WTG-8-31B
156
WTG-8-32B
158
WTG-8-33B
160
WTG-8-34B
162
WTG-8-35B
164
WTG-8-36B
166
WTG-8-37B
168
WTG-8-38B
170
WTG-8-39B
172
WTG-8-40B
174
WTG-8-41B
176
WTG-8-42B
178
WTG-8-43B
180
WTG-8-44B
182
WTG-8-45B
184
WTG-8-46B
186
WTG-8-47B
188
WTG-8-48B
190
WTG-8-49B
192
WTG-8-50B
194
WTG-8-51B
196
WTG-8-52B
198
WTG-8-53B
200
WTG-8-54B
202
WTG-8-55B
204
WTG-8-56B
206
WTG-8-57B
208
WTG-8-58B
210
WTG-8-59B
212
WTG-8-60B
214
WTG-8-61B
216
WTG-8-62B
218
WTG-8-63B
220
WTG-8-64B
222
WTG-8-65B
224
WTG-8-66B
226
WTG-8-67B
228
WTG-8-68B
230
WTG-8-69B
232
WTG-8-70B
234
WTG-8-71B
236
WTG-8-72B
238
WTG-8-73B
240
WTG-8-74B
242
WTG-8-75B
244
WTG-8-76B
246
WTG-8-77B
248
WTG-8-78B
250
WTG-8-79B
252
WTG-8-80B
254
WTG-8-81B
256
WTG-8-82B
258
WTG-8-83B
260
WTG-8-84B
262
WTG-8-85B
264
WTG-8-86B
266
WTG-8-87B
268
WTG-8-88B
270
WTG-8-89B
272
WTG-8-90B
274
WTG-8-91B
276
WTG-8-92B
278
WTG-8-93B
280
WTG-8-94B
282
WTG-8-95B
284
WTG-8-96B
286
WTG-8-97B
288
WTG-8-98B
290
WTG-8-99B
292
WTG-8-100B
294
WTG-8-101B
296
WTG-8-102B
298
WTG-8-103B
300
WTG-8-104B
302
WTG-8-105B
304
WTG-8-106B
306
WTG-8-107B
308
WTG-8-108B
310
WTG-8-109B
312
WTG-8-110B
314
WTG-8-111B
316
WTG-8-112B
318
WTG-8-113B
320
WTG-8-114B
322
WTG-8-115B
324
WTG-8-116B
326
WTG-8-117B
328
WTG-8-118B
330
WTG-8-119B
332
WTG-8-120B
334
WTG-8-121B
336
WTG-8-122B
338
WTG-8-123B
340
WTG-8-124B
342
WTG-8-125B
344
WTG-8-126B
346
WTG-8-127B
348
WTG-8-128B
350
WTG-8-129B
352
WTG-8-130B
354
WTG-8-131B
356
WTG-8-132B
358
WTG-8-133B
360
WTG-8-134B
362
WTG-8-135B
364
WTG-8-136B
366
WTG-8-137B
368
WTG-8-138B
370
WTG-8-139B
372
WTG-8-140B
374
WTG-8-141B
376
WTG-8-142B
378
WTG-8-143B
380
WTG-8-144B
382
WTG-8-145B
384
WTG-8-146B
386
WTG-8-147B
388
WTG-8-148B
390
WTG-8-149B
392
WTG-8-150B
394
WTG-8-151B
396
WTG-8-152B
398
WTG-8-153B
400
WTG-8-154B
402
WTG-8-155B
404
WTG-8-156B
406
WTG-8-157B
408
WTG-8-158B
410
WTG-8-159B
412
WTG-8-160B
414
WTG-8-161B
416
WTG-8-162B
418
WTG-8-163B
420
WTG-8-164B
422
WTG-8-165B
424
WTG-8-166B
426
WTG-8-167B
428
WTG-8-168B
430
WTG-8-169B
432
WTG-8-170B
434
WTG-8-171B
436
WTG-8-172B
438
WTG-8-173B
440
WTG-8-174B
442
WTG-8-175B
444
WTG-8-176B
446
WTG-8-177B
448
WTG-8-178B
450
WTG-8-179B
452
WTG-8-180B
454
WTG-8-181B
456
WTG-8-182B
458
WTG-8-183B
460
WTG-8-184B
462
WTG-8-185B
464
WTG-8-186B
466
WTG-8-187B
468
WTG-8-188B
470
WTG-8-189B
472
WTG-8-190B
474
WTG-8-191B
476
WTG-8-192B
478
WTG-8-193B
480
WTG-8-194B
482
WTG-8-195B
484
WTG-8-196B
486
WTG-8-197B
488
WTG-8-198B
490
WTG-8-199B
492
WTG-8-200B
494
WTG-8-201B
496
WTG-8-202B
498
WTG-8-203B
500
WTG-8-204B
502
WTG-8-205B
504
WTG-8-206B
506
WTG-8-207B
508
WTG-8-208B
510
WTG-8-209B
512
WTG-8-210B
514
WTG-8-211B
516
WTG-8-212B
518
WTG-8-213B
520
WTG-8-214B
522
WTG-8-215B
524
WTG-8-216B
526
WTG-8-217B
528
WTG-8-218B
530
WTG-8-219B
532
WTG-8-220B
534
WTG-8-221B
536
WTG-8-222B
538
WTG-8-223B
540
WTG-8-224B
542
WTG-8-225B
544
WTG-8-226B
546
WTG-8-227B
548
WTG-8-228B
550
WTG-8-229B
552
WTG-8-230B
554
WTG-8-231B
556
WTG-8-232B
558
WTG-8-233B
560
WTG-8-234B
562
WTG-8-235B
564
WTG-8-236B
566
WTG-8-237B
568
WTG-8-238B
570
WTG-8-239B
572
WTG-8-240B
574
WTG-8-241B
576
WTG-8-242B
578
WTG-8-243B
580
WTG-8-244B
582
WTG-8-245B
584
WTG-8-246B
586
WTG-8-247B
588
WTG-8-248B
590
WTG-8-249B
592
WTG-8-250B
594
WTG-8-251B
596
WTG-8-252B
598
WTG-8-253B
600
WTG-8-254B
602
WTG-8-255B
604
WTG-8-256B
606
WTG-8-257B
608
WTG-8-258B
610
WTG-8-259B
612
WTG-8-260B
614
WTG-8-261B
616
WTG-8-262B
618
WTG-8-263B
620
WTG-8-264B
622
WTG-8-265B
624
WTG-8-266B
626
WTG-8-267B
628
WTG-8-268B
630
WTG-8-269B
632
WTG-8-270B
634
WTG-8-271B
636
WTG-8-272B
638
WTG-8-273B
640
WTG-8-274B
642
WTG-8-275B
644
WTG-8-276B
646
WTG-8-277B
648
WTG-8-278B
650
WTG-8-279B
652
WTG-8-280B
654
WTG-8-281B
656
WTG-8-282B
658
WTG-8-283B
660
WTG-8-284B
662
WTG-8-285B
664
WTG-8-286B
666
WTG-8-287B
668
WTG-8-288B
670
WTG-8-289B
672
WTG-8-290B
674
WTG-8-291B
676
WTG-8-292B
678
WTG-8-293B
680
WTG-8-294B
682
WTG-8-295B
684
WTG-8-296B
686
WTG-8-297B
688
WTG-8-298B
690
WTG-8-299B
692
WTG-8-300B
694
WTG-8-301B
696
WTG-8-302B
698
WTG-8-303B
700
WTG-8-304B
702
WTG-8-305B
704
WTG-8-306B
706
WTG-8-307B
708
WTG-8-308B
710
WTG-8-309B
712
WTG-8-310B
714
WTG-8-311B
716
WTG-8-312B
718
WTG-8-313B
720
WTG-8-314B
722
WTG-8-315B
724
WTG-8-316B
726
WTG-8-317B
728
WTG-8-318B
730
WTG-8-319B
732
WTG-8-320B
734
WTG-8-321B
736
WTG-8-322B
738
WTG-8-323B
740
WTG-8-324B
742
WTG-8-325B
744
WTG-8-326B
746
WTG-8-327B
748
WTG-8-328B
750
WTG-8-329B
752
WTG-8-330B
754
WTG-8-331B
756
WTG-8-332B
758
WTG-8-333B
760
WTG-8-334B
762
WTG-8-335B
764
WTG-8-336B
766
WTG-8-337B
768
WTG-8-338B
770
WTG-8-339B
772
WTG-8-340B
774
WTG-8-341B
776
WTG-8-342B
778
WTG-8-343B
780
WTG-8-344B
782
WTG-8-345B
784
WTG-8-346B
786
WTG-8-347B
788
WTG-8-348B
790
WTG-8-349B
792
WTG-8-350B
794
WTG-8-351B
796
WTG-8-352B
798
WTG-8-353B
800
WTG-8-354B
802
WTG-8-355B
804
WTG-8-356B
806
WTG-8-357B
808
WTG-8-358B
810
WTG-8-359B
812
WTG-8-360B
814
WTG-8-361B
816
WTG-8-362B
818
WTG-8-363B
820
WTG-8-364B
822
WTG-8-365B
824
WTG-8-366B
826
WTG-8-367B
828
WTG-8-368B
830
WTG-8-369B
832
WTG-8-370B
834
WTG-8-371B
836
WTG-8-372B
838
WTG-8-373B
840
WTG-8-374B
842
WTG-8-375B
844
WTG-8-376B
846
WTG-8-377B
848
WTG-8-378B
850
WTG-8-379B
852
WTG-8-380B
854
WTG-8-381B
856
WTG-8-382B
858
WTG-8-383B
860
WTG-8-384B
862
WTG-8-385B
864
WTG-8-386B
866
WTG-8-387B
868
WTG-8-388B
870
WTG-8-389B
872
WTG-8-390B
874
WTG-8-391B
876
WTG-8-392B
878
WTG-8-393B
880
WTG-8-394B
882
WTG-8-395B
884
WTG-8-396B
886
WTG-8-397B
888
WTG-8-398B
890
WTG-8-399B
892
WTG-8-400B
894
WTG-8-401B
896
WTG-8-402B
898
WTG-8-403B
900
WTG-8-404B
902
WTG-8-405B
904
WTG-8-406B
906
WTG-8-407B
908
WTG-8-408B
910
WTG-8-409B
912
WTG-8-410B
914
WTG-8-411B
916
WTG-8-412B
918
WTG-8-413B
920
WTG-8-414B
922
WTG-8-415B
924
WTG-8-416B
926
WTG-8-417B
928
WTG-8-418B
930
WTG-8-419B
932
WTG-8-420B
934
WTG-8-421B
936
WTG-8-422B
938
WTG-8-423B
940
WTG-8-424B
942
WTG-8-425B
944
WTG-8-426B
946
WTG-8-427B
948
WTG-8-428B
950
WTG-8-429B
952
WTG-8-430B
954
WTG-8-431B
956
WTG-8-432B
958
WTG-8-433B
960
WTG-8-434B
962
WTG-8-435B
964
WTG-8-436B
966
WTG-8-437B
968
WTG-8-438B
970
WTG-8-439B
972
WTG-8-440B
974
WTG-8-441B
976
WTG-8-442B
978
WTG-8-443B
980
WTG-8-444B
982
WTG-8-445B
984
WTG-8-446B
986
WTG-8-447B
988
WTG-8-448B
990
WTG-8-449B
992
WTG-8-450B
994
WTG-8-451B
996
WTG-8-452B
998
WTG-8-453B
1000
WTG-8-454B
1002
WTG-8-455B
1004
WTG-8-456B
1006
WTG-8-457B
1008
WTG-8-458B
1010
WTG-8-459B
1012
WTG-8-460B
1014
WTG-8-461B
1016
WTG-8-462B
1018
WTG-8-463B
1020
WTG-8-464B
1022
WTG-8-465B
1024
WTG-8-466B
1026
WTG-8-467B
1028
WTG-8-468B
1030
WTG-8-469B
1032
WTG-8-470B
1034
WTG-8-471B
1036
WTG-8-472B
1038
WTG-8-473B
1040
WTG-8-474B
1042
WTG-8-475B
1044
WTG-8-476B
1046
WTG-8-477B
1048
WTG-8-478B
1050
WTG-8-479B
1052
WTG-8-480B
1054
WTG-8-481B
1056
WTG-8-482B
1058
WTG-8-483B
1060
WTG-8-484B
1062
WTG-8-485B
1064
WTG-8-486B
1066
WTG-8-487B
1068
WTG-8-488B
1070
WTG-8-489B
1072
WTG-8-490B
1074
WTG-8-491B
1076
WTG-8-492B
1078
WTG-8-493B
1080
WTG-8-494B
1082
WTG-8-495B
1084
WTG-8-496B
1086
WTG-8-497B
1088
WTG-8-498B
1090
WTG-8-499B
1092
WTG-8-500B
1094
WTG-8-501B
1096
WTG-8-502B
1098
WTG-8-503B
1100
WTG-8-504B
1102
WTG-8-505B
1104
WTG-8-506B
1106
WTG-8-507B
1108
WTG-8-508B
1110
WTG-8-509B
1112
WTG-8-510B
1114
WTG-8-511B
1116
WTG-8-512B
1118
WTG-8-513B
1120
WTG-8-514B
1122
WTG-8-515B
1124
WTG-8-516B
1126
WTG-8-517B
1128
WTG-8-518B
1130
WTG-8-519B
1132
WTG-8-520B
1134
WTG-8-521B
1136
WTG-8-522B
1138
WTG-8-523B
1140
WTG-8-524B
1142
WTG-8-525B
1144
WTG-8-526B
1146
WTG-8-527B
1148
WTG-8-528B
1150
WTG-8-529B
1152
WTG-8-530B
1154
WTG-8-531B
1156
WTG-8-532B
1158
WTG-8-533B
1160
WTG-8-534B
1162
WTG-8-535B
1164
WTG-8-536B
1166
WTG-8-537B
1168
WTG-8-538B
1170
WTG-8-539B
1172
WTG-8-540B
1174
WTG-8-541B
1176
WTG-8-542B
1178
WTG-8-543B
1180
WTG-8-544B
1182
WTG-8-545B
1184
WTG-8-546B
1186
WTG-8-547B
1188
WTG-8-548B
1190
WTG-8-549B
1192
WTG-8-550B
1194
WTG-8-551B
1196
WTG-8-552B
1198
WTG-8-553B
1200
WTG-8-554B
1202
WTG-8-555B
1204
WTG-8-556B
1206
WTG-8-557B
1208
WTG-8-558B
1210
WTG-8-559B
1212
WTG-8-560B
1214
WTG-8-561B
1216
WTG-8-562B
1218
WTG-8-563B
1220
WTG-8-564B
1222
WTG-8-565B
1224
WTG-8-566B
1226
WTG-8-567B
1228
WTG-8-568B
1230
WTG-8-569B
1232
WTG-8-570B
1234
WTG-8-571B
1236
WTG-8-572B
1238
WTG-8-573B
1240
WTG-8-574B
1242
WTG-8-575B
1244
WTG-8-576B
1246
WTG-8-577B
1248
WTG-8-578B
1250
WTG-8-579B
1252
WTG-8-580B
1254
WTG-8-581B
1256
WTG-8-582B
1258
WTG-8-583B
1260
WTG-8-584B
1262
WTG-8-585B
1264
WTG-8-586B
1266
WTG-8-587B
1268
WTG-8-588B
1270
WTG-8-589B
1272
WTG-8-590B
1274
WTG-8-591B
1276
WTG-8-592B
1278
WTG-8-593B
1280
WTG-8-594B
1282
WTG-8-595B
1284
WTG-8-596B
1286
WTG-8-597B
1288
WTG-8-598B
1290
WTG-8-599B
1292
WTG-8-600B
1294
WTG-8-601B
1296
WTG-8-602B
1298
WTG-8-603B
1300
WTG-8-604B
1302
WTG-8-605B
1304
WTG-8-606B
1306
WTG-8-607B
1308
WTG-8-608B
1310
WTG-8-609B
1312
WTG-8-610B
1314
WTG-8-611B
1316
WTG-8-612B
1318
WTG-8-613B
1320
WTG-8-614B
1322
WTG-8-615B
1324
WTG-8-616B
1326
WTG-8-617B
1328
WTG-8-618B
1330
WTG-8-619B
1332
WTG-8-620B
1334
WTG-8-621B
1336
WTG-8-622B
1338
WTG-8-623B
1340
WTG-8-624B
1342
WTG-8-625B
1344
WTG-8-626B
1346
WTG-8-627B
1348
WTG-8-628B
1350
WTG-8-629B
1352
WTG-8-630B
1354
WTG-8-631B
1356
WTG-8-632B
1358
WTG-8-633B
1360
WTG-8-634B
1362
WTG-8-635B
1364
WTG-8-636B
1366
WTG-8-637B
1368
WTG-8-638B
1370
WTG-8-639B
1372
WTG-8-640B
1374
WTG-8-641B
1376
WTG-8-642B
1378
WTG-8-643B
1380
WTG-8-644B
1382
WTG-8-645B
1384
WTG-8-646B
1386
WTG-8-647B
1388
WTG-8-648B
1390
WTG-8-649B
1392
WTG-8-650B
1394
WTG-8-651B
1396
WTG-8-652B
1398
WTG-8-653B
1400
WTG-8-654B
1402
WTG-8-655B
1404
WTG-8-656B
1406
WTG-8-657B
1408
WTG-8-658B
1410
WTG-8-659B
1412
WTG-8-660B
1414
WTG-8-661B
1416
WTG-8-662B
1418
WTG-8-663B
1420
WTG-8-664B
1422
WTG-8-665B
1424
WTG-8-666B
1426
WTG-8-667B
1428
WTG-8-668B
1430
WTG-8-669B
1432
WTG-8-670B
1434
WTG-8-671B
1436
WTG-8-672B
1438
WTG-8-673B
1440
WTG-8-674B
1442
WTG-8-675B
1444
WTG-8-676B
1446
WTG-8-677B
1448
WTG-8-678B
1450
WTG-8-679B
1452
WTG-8-680B
1454
WTG-8-681B
1456
WTG-8-682B
1458
WTG-8-683B
1460
WTG-8-684B
1462
WTG-8-685B
1464
WTG-8-686B
1466
WTG-8-687B
1468
WTG-8-688B
1470
WTG-8-689B
1472
WTG-8-690B
1474
WTG-8-691B
1476
WTG-8-692B
1478
WTG-8-693B
1480
WTG-8-694B
1482
WTG-8-695B
1484
WTG-8-696B
1486
WTG-8-697B
1488
WTG-8-698B
1490
WTG-8-699B
1492
WTG-8-700B
1494
WTG-8-701B
1496
WTG-8-702B
1498
WTG-8-703B
1500
WTG-8-704B
1502
WTG-8-705B
1504
WTG-8-706B
1506
WTG-8-707B
1508
WTG-8-708B
1510
WTG-8-709B
1512
WTG-8-710B
1514
WTG-8-711B
1516
WTG-8-712B
1518
WTG-8-713B
1520
WTG-8-714B
1522
WTG-8-715B
1524
WTG-8-716B
1526
WTG-8-717B
1528
WTG-8-718B
1530
WTG-8-719B
1532
WTG-8-720B
1534
WTG-8-721B
1536
WTG-8-722B
1538
WTG-8-723B
1540
WTG-8-724B
1542
WTG-8-725B
1544
WTG-8-726B
1546
WTG-8-727B
1548
WTG-8-728B
1550
WTG-8-729B
1552
WTG-8-730B
1554
WTG-8-731B
1556
WTG-8-732B
1558
WTG-8-733B
1560
WTG-8-734B
1562
WTG-8-735B
1564
WTG-8-736B
1566
WTG-8-737B
1568
WTG-8-738B
1570
WTG-8-739B
1572
WTG-8-740B
1574
WTG-8-741B
1576
WTG-8-742B
1578
WTG-8-743B
1580
WTG-8-744B
1582
WTG-8-745B
1584
WTG-8-746B
1586
WTG-8-747B
1588
WTG-8-748B
1590
WTG-8-749B
1592
WTG-8-750B
1594
WTG-8-751B
1596
WTG-8-752B
1598
WTG-8-753B
1600
WTG-8-754B
1602
WTG-8-755B
1604
WTG-8-756B
1606
WTG-8-757B
1608
WTG-8-758B
1610
WTG-8-759B
1612
WTG-8-760B
1614
WTG-8-761B
1616
WTG-8-762B
1618
WTG-8-763B
1620
WTG-8-764B
1622
WTG-8-765B
1624
WTG-8-766B
1626
WTG-8-767B
1628
WTG-8-768B
1630
WTG-8-769B
1632
WTG-8-770B
1634
WTG-8-771B
1636
WTG-8-772B
1638
WTG-8-773B
1640
WTG-8-774B
1642
WTG-8-775B
1644
WTG-8-776B
1646
WTG-8-777B
1648
WTG-8-778B
1650
WTG-8-779B
1652
WTG-8-780B
1654
WTG-8-781B
1656
WTG-8-782B
1658
WTG-8-783B
1660
WTG-8-784B
1662
WTG-8-785B
1664
WTG-8-786B
1666
WTG-8-787B
1668
WTG-8-788B
1670
WTG-8-789B
1672
WTG-8-790B
1674
WTG-8-791B
1676
WTG-8-792B
1678
WTG-8-793B
1680
WTG-8-794B
1682
WTG-8-795B
1684
WTG-8-796B
1686
WTG-8-797B
1688
WTG-8-798B
1690
WTG-8-799B
1692
WTG-8-800B
1694
WTG-8-801B
1696
WTG-8-802B
1698
WTG-8-803B
1700
WTG-8-804B
1702
WTG-8-805B
1704
WTG-8-806B
1706
WTG-8-807B
1708
WTG-8-808B
1710
WTG-8-809B
1712
WTG-8-810B
1714
WTG-8-811B
1716
WTG-8-812B
1718
WTG-8-813B
1720
WTG-8-814B
1722
WTG-8-815B
1724
WTG-8-816B
1726
WTG-8-817B
1728
WTG-8-818B
1730
WTG-8-819B
1732
WTG-8-820B
1734
WTG-8-821B
1736
WTG-8-822B
1738
WTG-8-823B
1740
WTG-8-824B
1742
WTG-8-825B
1744
WTG-8-826B
1746
WTG-8-827B
1748
WTG-8-828B
1750
WTG-8-829B
1752
WTG-8-830B
1754
WTG-8-831B
1756
WTG-8-832B
1758
WTG-8-833B
1760
WTG-8-834B
1762
WTG-8-835B
1764
WTG-8-836B
1766
WTG-8-837B
1768
WTG-8-838B
1770
WTG-8-839B
1772
WTG-8-840B
1774
WTG-8-841B
1776
WTG-8-842B
1778
WTG-8-843B
1780
WTG-8-844B
1782
WTG-8-845B
1784
WTG-8-846B
1786
WTG-8-847B
1788
WTG-8-848B
1790
WTG-8-849B
1792
WTG-8-850B
1794
WTG-8-851B
1796
WTG-8-852B
1798
WTG-8-853B
1800
WTG-8-854B
1802
WTG-8-855B
1804
WTG-8-856B
1806
WTG-8-857B
1808
WTG-8-858B
1810
WTG-8-859B
1812
WTG-8-860B
1814
WTG-8-861B
1816
WTG-8-862B
1818
WTG-8-863B
1820
WTG-8-864B
1822
WTG-8-865B
1824
WTG-8-866B
1826
WTG-8-867B
1828
WTG-8-868B
1830
WTG-8-869B
1832
WTG-8-870B
1834
WTG-8-871B
1836
WTG-8-872B
1838
WTG-8-873B
1840
WTG-8-874B
1842
WTG-8-875B
1844
WTG-8-876B
1846
WTG-8-877B
1848
WTG-8-878B
1850
WTG-8-879B
1852
WTG-8-880B
1854
WTG-8-881B
1856
WTG-8-882B
1858
WTG-8-883B
1860
WTG-8-884B
1862
WTG-8-885B
1864
WTG-8-886B
1866
WTG-8-887B
1868
WTG-8-888B
1870
WTG-8-889B
1872
WTG-8-890B
1874
WTG-8-891B
1876
WTG-8-892B
1878
WTG-8-893B
1880
WTG-8-894B
1882
WTG-8-895B
1884
WTG-8-896B
1886
WTG-8-897B
1888
WTG-8-898B
1890
WTG-8-899B
1892
WTG-8-900B
1894
WTG-8-901B
1896
WTG-8-902B
1898
WTG-8-903B
1900
WTG-8-904B
1902
WTG-8-905B
1904
WTG-8-906B
1906
WTG-8-907B
1908
WTG-8-908B
1910
WTG-8-909B
1912
WTG-8-910B
1914
WTG-8-911B
1916
WTG-8-912B
1918
WTG-8-913B
1920
WTG-8-914B
1922
WTG-8-915B
1924
WTG-8-916B
1926
WTG-8-917B
1928
WTG-8-918B
1930
WTG-8-919B
1932
WTG-8-920B
1934
WTG-8-921B
1936
WTG-8-922B
1938
WTG-8-923B
1940
WTG-8-924B
1942
WTG-8-925B
1944
WTG-8-926B
1946
WTG-8-927B
1948
WTG-8-928B
1950
WTG-8-929B
1952
WTG-8-930B
1954
WTG-8-931B
1956
WTG-8-932B
1958
WTG-8-933B
1960
WTG-8-934B
1962
WTG-8-935B
1964
WTG-8-936B
1966
WTG-8-937B
1968
WTG-8-938B
1970
WTG-8-939B
1972
WTG-8-940B
1974
WTG-8-941B
1976
WTG-8-942B
1978
WTG-8-943B
1980
WTG-8-944B
1982
WTG-8-945B
1984
WTG-8-946B
1986
WTG-8-947B
1988
WTG-8-948B
1990
WTG-8-949B
1992
WTG-8-950B
1994
WTG-8-951B
1996
WTG-8-952B
1998
WTG-8-953B
2000
WTG-8-954B
2002
WTG-8-955B
2004
WTG-8-956B
2006
WTG-8-957B
2008
WTG-8-958B
2010
WTG-8-959B
2012
WTG-8-960B
2014
WTG-8-961B
2016
WTG-8-962B
2018
WTG-8-963B
2020
WTG-8-964B
2022
WTG-8-965B
2024
WTG-8-966B
2026
WTG-8-967B
2028
WTG-8-968B
2030
WTG-8-969B
2032
WTG-8-970B
2034
WTG-8-971B
2036
WTG-8-972B
2038
WTG-8-973B
2040
WTG-8-974B
2042
WTG-8-975B
2044
WTG-8-976B
2046
WTG-8-977B
2048
WTG-8-978B
2050
WTG-8-979B
2052
WTG-8-980B
2054
WTG-8-981B
2056
WTG-8-982B
2058
WTG-8-983B
2060
WTG-8-984B
2062
WTG-8-985B
2064
WTG-8-986B
2066
WTG-8-987B
2068
WTG-8-988B
2070
WTG-8-989B
2072
WTG-8-990B
2074
WTG-8-991B
2076
WTG-8-992B
2078
WTG-8-993B
2080
WTG-8-994B
2082
WTG-8-995B
2084
WTG-8-996B
2086
WTG-8-997B
2088
WTG-8-998B
2090
WTG-8-999B
2092
WTG-8-1000B
2094
WTG-8-1001B
2096
WTG-8-1002B
2098
WTG-8-1003B
2100
WTG-8-1004B
2102
WTG-8-1005B
2104
WTG-8-1006B
2106
WTG-8-1007B
2108
WTG-8-1008B
2110
WTG-8-1009B
2112
WTG-8-1010B
2114
WTG-8-1011B
2116
WTG-8-1012B
2118
WTG-8-1013B
2120
WTG-8-1014B
2122
WTG-8-1015B
2124
WTG-8-1016B
2126
WTG-8-1017B
2128
WTG-8-1018B
2130
WTG-8-1019B
2132
WTG-8-1020B
2134
WTG-8-1021B
2136
WTG-8-1022B
2138
WTG-8-1023B
2140
WTG-8-1024B
2142
WTG-8-1025B
2144
WTG-8-1026B
2146
WTG-8-1027B
2148
WTG-8-1028B
2150
WTG-8-1029B
2152
WTG-8-1030B
2154
WTG-8-1031B
2156
WTG-8-1032B
2158
WTG-8-1033B
2160
WTG-8-1034B
2162
WTG-8-1035B
2164
WTG-8-1036B
2166
WTG-8-1037B
2168
WTG-8-1038B
2170
WTG-8-1039B
2172
WTG-8-1040B
2174
WTG-8-1041B
2176
WTG-8-1042B
2178
WTG-8-1043B
2180
WTG-8-1044B
2182
WTG-8-1045B
2184
WTG-8-1046B
2186
WTG-8-1047B
2188
WTG-8-1048B
2190
WTG-8-1049B
2192
WTG-8-1050B
2194
WTG-8-1051B
2196
WTG-8-1052B
2198
WTG-8-1053B
2200
WTG-8-1054B
2202
WTG-8-1055B
2204
WTG-8-1056B
2206
WTG-8-1057B
2208
WTG-8-1058B
2210
WTG-8-1059B
2212
WTG-8-1060B
2214
WTG-8-1061B
2216
WTG-8-1062B
2218
WTG-8-1063B
2220
WTG-8-1064B
2222
WTG-8-1065B
2224
WTG-8-1066B
2226
WTG-8-1067B
2228
WTG-8-1068B
2230
WTG-8-1069B
2232
WTG-8-1070B
2234
WTG-8-1071B
2236
WTG-8-1072B
2238
WTG-8-1073B
2240
WTG-8-1074B
2242
WTG-8-1075B
2244
WTG-8-1076B
2246
WTG-8-1077B
2248
WTG-8-1078B
2250
WTG-8-1079B
2252
WTG-8-1080B
2254
WTG-8-1081B
2256
WTG-8-1082B
2258
WTG-8-1083B
2260
WTG-8-1084B
2262
WTG-8-1085B
2264
WTG-8-1086B
2266
WTG-8-1087B
2268
WTG-8-1088B
2270
WTG-8-1089B
2272
WTG-8-1090B
2274
WTG-8-1091B
2276
WTG-8-1092B
2278
WTG-8-1093B
2280
WTG-8-1094B
2282
WTG-8-1095B
2284
WTG-8-1096B
2286
WTG-8-1097B
2288
WTG-8-1098B
2290
WTG-8-1099B
2292
WTG-8-1100B
2294
WTG-8-1101B
2296
WTG-8-1102B
2298
WTG-8-1103B
2300
WTG-8-1104B
2302
WTG-8-1105B
2304
WTG-8-1106B
2306
WTG-8-1107B
2308
WTG-8-1108B
2310
WTG-8-1109B
2312
WTG-8-1110B
2314
WTG-8-1111B
2316
WTG-8-1112B
2318
WTG-8-1113B
2320
WTG-8-1114B
2322
WTG-8-1115B
2324
WTG-8-1116B
2326
WTG-8-1117B
2328
WTG-8-1118B
2330
WTG-8-1119B
2332
WTG-8-1120B
2334
WTG-8-1121B
2336
WTG-8-1122B
2338
WTG-8-1123B
2340
WTG-8-1124B
2342
WTG-8-1125B
2344
WTG-8-1126B
2346
WTG-8-1127B
2348
WTG-8-1128B
2350
WTG-8-1129B
2352
WTG-8-1130B
2354
WTG-8-1131B
2356
WTG-8-1132B
2358
WTG-8-1133B
2360
WTG-8-1134B
2362
WTG-8-1135B
2364
WTG-8-1136B
2366
WTG-8-1137B
2368
WTG-8-1138B
2370
WTG-8-1139B
2372
WTG-8-1140B
2374
WTG-8-1141B
2376
WTG-8-1142B
2378
WTG-8-1143B
2380
WTG-8-1144B
2382
WTG-8-1145B
2384
WTG-8-1146B
2386
WTG-8-1147B
2388
WTG-8-1148B
2390
WTG-8-1149B
2392
WTG-8-1150B
2394
WTG-8-1151B
2396
WTG-8-1152B
2398
WTG-8-1153B
2400
WTG-8-1154B
2402
WTG-8-1155B
2404
WTG-8-1156B
2406
WTG-8-1157B
2408
WTG-8-1158B
2410
WTG-8-1159B
2412
WTG-8-1160B
2414
WTG-8-1161B
2416
WTG-8-1162B
2418
WTG-8-1163B
2420
WTG-8-1164B
2422
WTG-8-1165B
2424
WTG-8-1166B
2426
WTG-8-1167B
2428
WTG-8-1168B
2430
WTG-8-1169B
2432
WTG-8-1170B
2434
WTG-8-1171B
2436
WTG-8-1172B
2438
WTG-8-1173B
2440
WTG-8-1174B
2442
WTG-8-1175B
2444
WTG-8-1176B
2446
WTG-8-1177B
2448
WTG-8-1178B
2450
WTG-8-1179B
2452
WTG-8-1180B
2454
WTG-8-1181B
2456
WTG-8-1182B
2458
WTG-8-1183B
2460
WTG-8-1184B
2462
WTG-8-1185B
2464
WTG-8-1186B
2466
WTG-8-1187B
2468
WTG-8-1188B
2470
WTG-8-1189B
2472
WTG-8-1190B
2474
WTG-8-1191B
2476
WTG-8-1192B
2478
WTG-8-1193B
2480
WTG-8-1194B
2482
WTG-8-1195B
2484
WTG-8-1196B
2486
WTG-8-1197B
2488
WTG-8-1198B
2490
WTG-8-1199B
2492
WTG-8-1200B
2494
WTG-8-1201B
2496
WTG-8-1202B
2498
WTG-8-1203B
2500
WTG-8-1204B
2502
WTG-8-1205B
2504
WTG-8-1206B
2506
WTG-8-1207B
2508
WTG-8-1208B
2510
WTG-8-1209B
2512
WTG-8-1210B
2514
WTG-8-1211B
2516
WTG-8-1212B
2518
WTG-8-1213B
2520
WTG-8-1214B
2522
WTG-8-1215B
2524
WTG-8-1216B
2526
WTG-8-1217B
2528
WTG-8-1218B
2530
WTG-8-1219B
2532
WTG-8-1220B
2534
WTG-8-1221B
2536
WTG-8-1222B
2538
WTG-8-1223B
2540
WTG-8-1224B
2542
WTG-8-1225B
2544
WTG-8-1226B
2546
WTG-8-1227B
2548
WTG-8-1228B
2550
WTG-8-1229B
2552
WTG-8-1230B
2554
WTG-8-1231B
2556
WTG-8-1232B
2558
WTG-8-1233B
2560
WTG-8-1234B
2562
WTG-8-1235B
2564
WTG-8-1236B
2566
WTG-8-1237B
2568
WTG-8-1238B
2570
WTG-8-1239B
2572
WTG-8-1240B
2574
WTG-8-1241B
2576
WTG-8-1242B
2578
WTG-8-1243B
2580
WTG-8-1244B
2582
WTG-8-1245B
2584
WTG-8-1246B
2586
WTG-8-1247B
2588
WTG-8-1248B
2590
WTG-8-1249B
2592
WTG-8-1250B
2594
WTG-8-1251B
2596
WTG-8-1252B
2598
WTG-8-1253B
2600
WTG-8-1254B
2602
WTG-8-1255B
2604
WTG-8-1256B
2606
WTG-8-1257B
2608
WTG-8-1258B
2610
WTG-8-1259B
2612
WTG-8-1260B
2614
WTG-8-1261B
2616
WTG-8-1262B
2618
WTG-8-1263B
2620
WTG-8-1264B
2622
WTG-8-1265B
2624
WTG-8-1266B
2626
WTG-8-1267B
2628
WTG-8-1268B
2630
WTG-8-1269B
2632
WTG-8-1270B
2634
WTG-8-1271B
2636
WTG-8-1272B
2638
WTG-8-1273B
2640
WTG-8-1274B
2642
WTG-8-1275B
2644
WTG-8-1276B
2646
WTG-8-1277B
2648
WTG-8-1278B
2650
WTG-8-1279B
2652
WTG-8-1280B
2654
WTG-8-1281B
2656
WTG-8-1282B
2658
WTG-8-1283B
2660
WTG-8-1284B
2662
WTG-8-1285B
2664
WTG-8-1286B
2666
WTG-8-1287B
2668
WTG-8-1288B
2670
WTG-8-1289B
2672
WTG-8-1290B
2674
WTG-8-1291B
2676
WTG-8-1292B
2678
WTG-8-1293B
2680
WTG-8-1294B
2682
WTG-8-1295B
2684
WTG-8-1296B
2686
W



General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block — Main Chart OCS-A 0483
- Tile Panel 1 - 9 — Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA-Office of Coast Survey

USA State and Cities - Geographic Data: download from ESRI
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community, U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand — minimum grain size 0.0625mm, maximum grain size 0.25mm
- Medium Sand — minimum grain size 0.25mm, maximum grain size 0.5mm
- Coarse Sand — minimum grain size 0.5mm retained by #40, maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification

Class	Gravel		Coarse Sand	Medium Sand		Fine Sand		
Sieve Size or No.	3/8"	#4	#10	#18	#35	#60	#140	#270
Particle Size (mm)	9.500	4.750	2.000	0.850	0.425	0.250	0.106	0.053
Particle Size (mm)	64	4	2	1	0.5	0.25	0.125	0.063
Substrate SubGroup	Pebble	Granule	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand/Very Fine Sand		
CMECS Classification								

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the
CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment

Survey Vessels	:	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	:	Applanix POSMV and Hemisphere
USBL	:	Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	:	Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	:	EdgeTech 4200 (300/600 kHz)
Magnetometer	:	Geometrics G-882 (TVG)
Subbottom Profiler	:	Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	:	AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,5,6] Sparker[2]	:	AAS-Boom and SCS Streamer ; Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	:	AML MVP30/MVP200[3]
Acquistion Software	:	QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

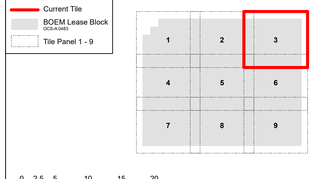
This geophysical survey was conducted April 29th, 2020 through June13th, 2021

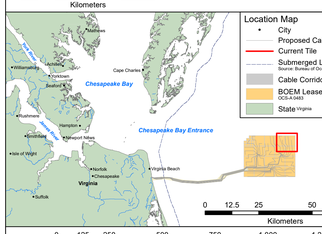
Coordinate Reference System

Horizontal Coordinate Reference System
CRS Name :NAD 1983 (2011) UTM Zone 18N
EPSG Code :6347
Geodetic Datum :North American 1983
Projection :Universal Transverse Mercator
Units :Meter

Vertical Coordinate Reference System
Datum :Mean Lower Low Water (MLLW)
Axis -down :Depth

Tile Index Overview
- Current Tile
- BOEM Lease Block OCS-A 0483
- Tile Panel 1 - 9





Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title:
CVOW-C Geophysical Survey 2021

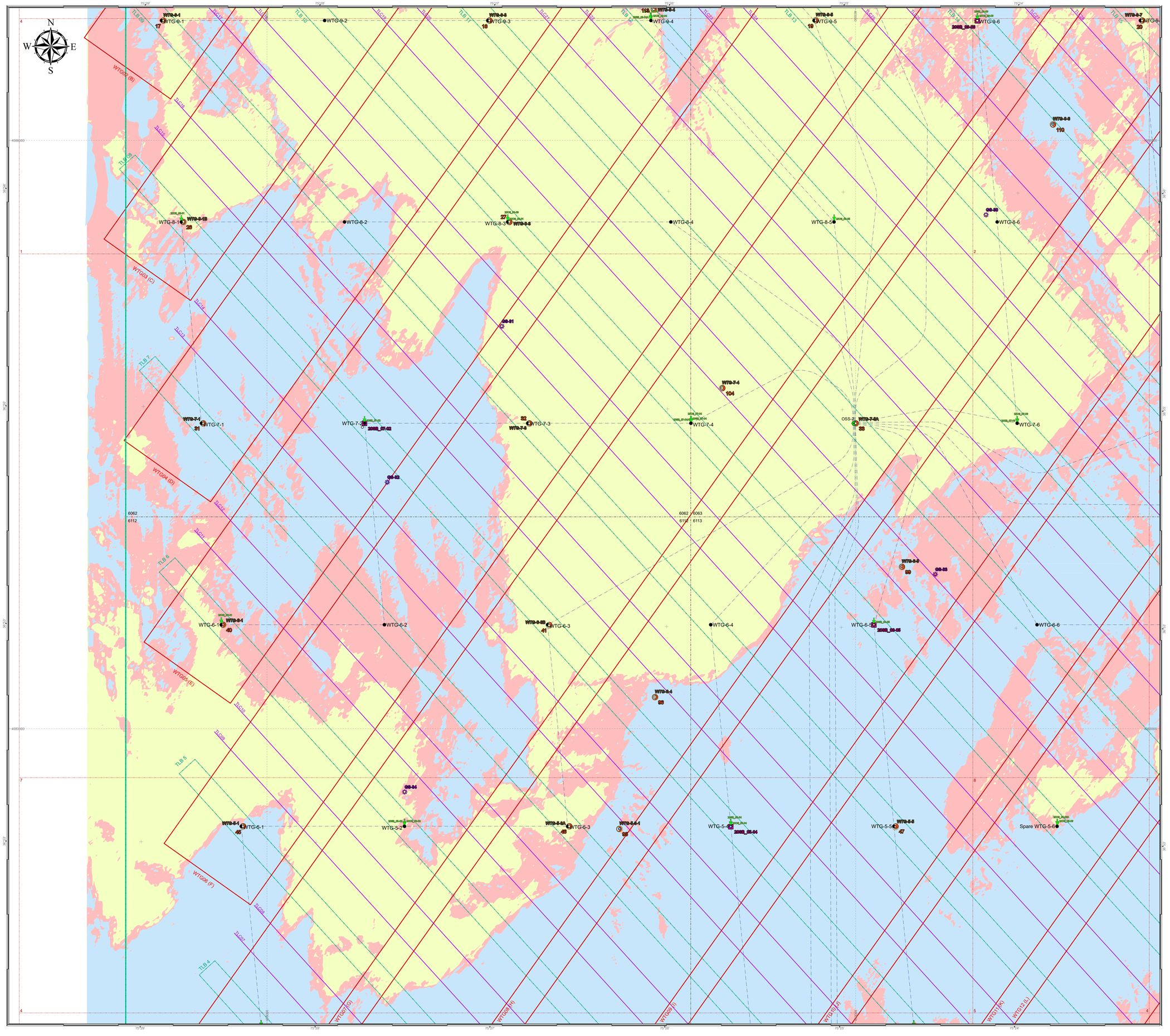
Chart Title:
CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 3 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/30/2021

File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.



General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block — Main Chart OCS-A 0483
- Tile Panel 1 - 9 — Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA States and Cities - Geographic Data: download from ESRI
Source: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand — minimum grain size 0.0625mm; maximum grain size 0.25mm
- Medium Sand — minimum grain size 0.25mm; maximum grain size 0.5mm
- Coarse Sand — minimum grain size 0.5mm retained by #40; maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification

Class	Gravel		Coarse Sand	Medium Sand		Fine Sand		
Sieve Size or No.	3/8"	#4	#10	#40	#60	#140	#200	
Particle Size (mm)	9.500	4.750	2.000	0.850	0.425	0.250	0.150	0.075
Particle Size (mm)	64	4	2	0.5		0.25	0.125	0.062
Substrate SubGroup	Pebble	Granule	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand/Very Fine Sand		
CMECS Classification								

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the
CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment

Survey Vessels	M/V Marcelle[7]/M/V Sarah Bordelon[7] R/V Kommandor Iona[7] R/V Kommandor Stuart[7] M/V GO Discovery[6]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,5,6]	: AAS-Boom and SCS Streamer
Sparker[3]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

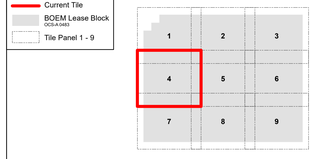
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

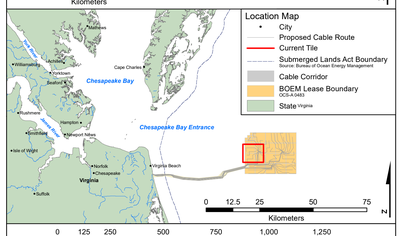
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block — OCS-A 0483
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title:
CVOW-C Geophysical Survey 2021

Chart Title:
CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 4 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/30/2021

File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block Main Chart — OCS-A 0483
- Tile Panel 1 - 9 Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA State and Cities - Geographic Data: download from ESRI
Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand — minimum grain size 0.0625mm; maximum grain size 0.25mm
- Medium Sand — minimum grain size 0.25mm; maximum grain size 0.5mm
- Coarse Sand — minimum grain size 0.5mm retained by #40; maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification											
Class	Gravel		Coarse Sand	Medium Sand			Fine Sand				
Sieve Size or No.	3.5"	#4	#10	#18	#35	#60	#140	#230	#325	#450	#635
Particle Size (mm)	4.500	4.750	2.000	0.850	0.425	0.250	0.106	0.063	0.045	0.032	0.025
Particle Size (mm)	64	4	2	1/2	1/4	1/8	1/16	1/32			
Substrate SubGroup	Pebble		Granule	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand/Very Fine Sand				
CMECS Classification											

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6] Sparker[3]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquisition Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Midon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

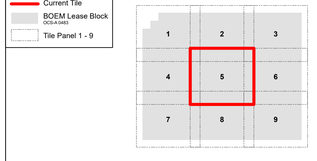
This geophysical survey was conducted April 29th, 2020 through June13th, 2021

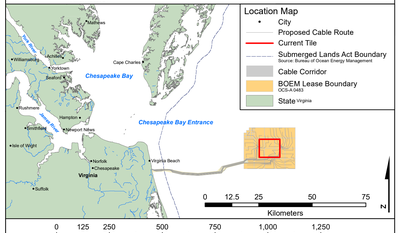
Coordinate Reference System

Horizontal Coordinate Reference System
CRS Name :NAD 1983 (2011) UTM Zone 18N
EPSG Code :6347
Geodetic Datum :North American 1983
Projection :Universal Transverse Mercator
Units :Meter

Vertical Coordinate Reference System
Datum :Mean Lower Low Water (MLLW)
Axis -down :Depth

Tile Index Overview





0 125 250 500 750 1,000 1,250 Meters
0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title:

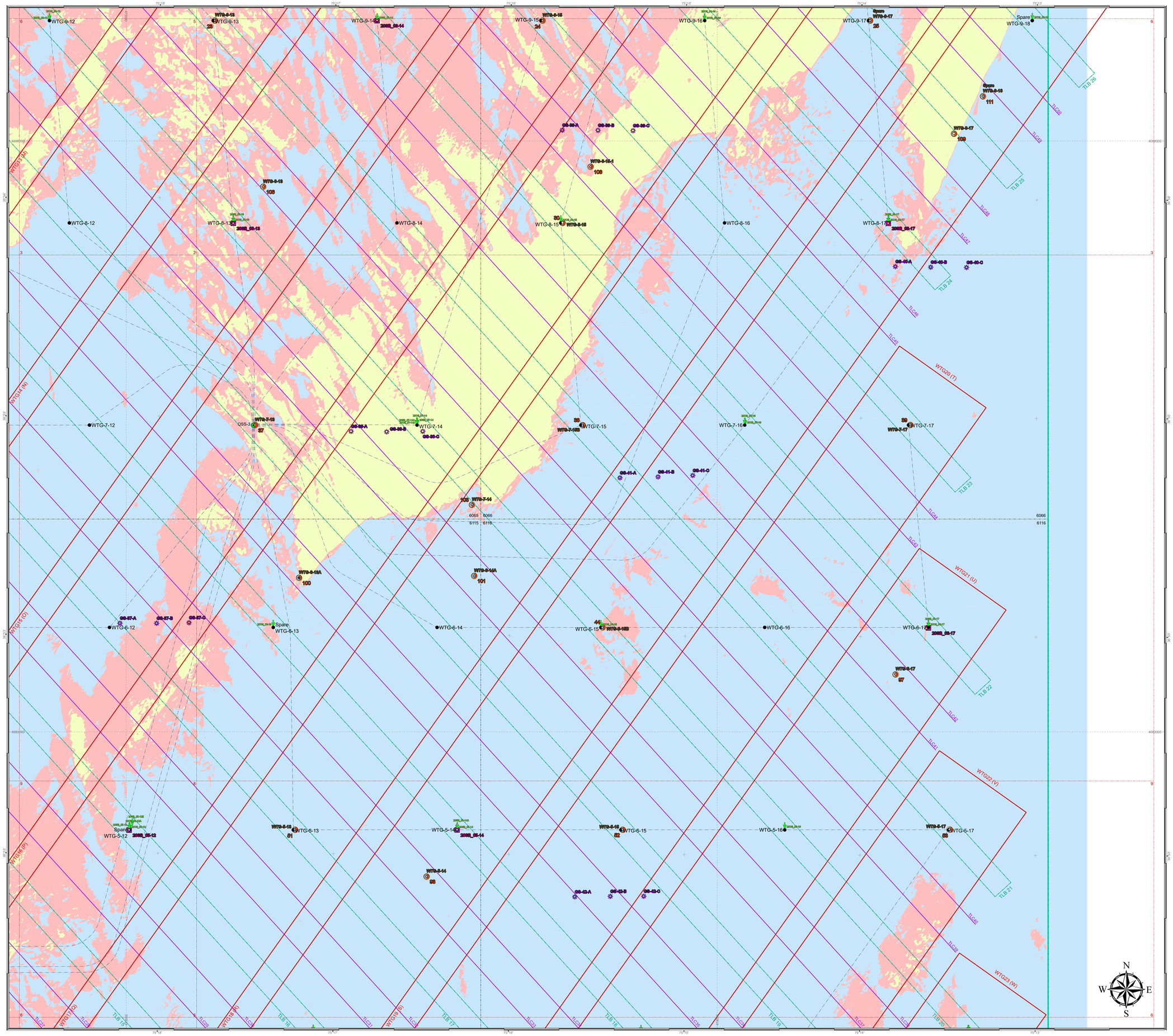
CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 5 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/30/2021

File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.



General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block — Main Chart OCS-A 0483
- Tile Panel 1 - 9 — Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA States and Cities - Geographic Data: download from ESRI
Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand — minimum grain size 0.0625mm; maximum grain size 0.25mm
- Medium Sand — minimum grain size 0.25mm; maximum grain size 0.5mm
- Coarse Sand — minimum grain size 0.5mm retained by #40; maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification										
Class	Gravel		Coarse Sand		Medium Sand		Fine Sand			
Sieve Size or No.	3/8"	#4	#8	#16	#30	#40	#60	#100	#140	#200
Particle Size (mm)	9.500	4.750	2.000	1.000	0.850	0.425	0.250	0.150	0.106	0.075
Particle Size (mm)	64	4	2	1	0.5	0.25	0.125	0.063		
Substrate SubGroup	Pebble	Granule	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand/Very Fine Sand				
CMECS Classification										

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment

Survey Vessels		M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[3]/ M/V GO Discovery[3]/M/V Minerva Uno[4]
Positioning System	:	Applanix POSMV and Hemisphere
USBL	:	Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	:	Teledyne T50 (200-400 kHz) / RZSonic 2024 (200-400 kHz)[3]
Sidescan Sonar	:	EdgeTech 4200 (300/600 kHz)
Magnetometer	:	Geometrics G-882 (TVG)
Subbottom Profiler	:	Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	:	AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,4]	:	AAS-Boom and SCS Streamer
Sparker[2]	:	Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	:	AML MVP30/MVP200[3]
Acquistion Software	:	QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System
CRS Name :NAD 1983 (2011) UTM Zone 18N
EPSG Code :6347
Geodetic Datum :North American 1983
Projection :Universal Transverse Mercator
Units :Meter

Vertical Coordinate Reference System
Datum :Mean Lower Low Water (MLLW)
Axis -down :Depth

Tile Index Overview
- Current Tile
- BOEM Lease Block OCS-A 0483
- Tile Panel 1 - 9

1 2 3 / 4 5 6 / 7 8 9

0 2.5 5 10 15 20 Kilometers

Location Map
- City
- Proposed Cable Route
- Current Tile
- Submerged Lands Act Boundary — Source: Bureau of Ocean Energy Management
- Cable Corridor
- BOEM Lease Boundary OCS-A 0483
- State Virginia

Chesapeake Bay
Chesapeake Bay Entrance
Cape Charles
Hampton Roads
Virginia Beach
Norfolk
Chesapeake
Suffolk
Isle of Wight
Smithfield
Williamsburg
Yorktown
Seaford
Tabb
Hampton
Newport News

0 12.5 25 50 75 Kilometers

0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND — PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 6 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/30/2021

File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block Main Chart — OCS-A 0483
- Tile Panel 1 - 9 Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA States and Cities - Geographic Data: download from ESRI
Source: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand — minimum grain size 0.0625mm; maximum grain size 0.25mm
- Medium Sand — minimum grain size 0.25mm; maximum grain size 0.5mm
- Coarse Sand — minimum grain size 0.5mm retained by #40; maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification

Class	Gravel		Coarse Sand	Medium Sand		Fine Sand		
Sieve Size or No.	3/8"	#4	#10	#40	#60	#140	#200	#270
Particle Size (mm)	9.500	4.750	2.000	0.850	0.425	0.250	0.150	0.106
Particle Size (mm)	64	4	2	1	0.5	0.25	0.125	0.0625
Substrate SubGroup	Pebble	Granule	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand/Very Fine Sand		
CMECS Classification								

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the
CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment		
Survey Vessels		M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[3]/ M/V GO Discovery[3]/M/V Minerva Uno[4]
Positioning System	:	Applanix POSMV and Hemisphere
USBL	:	Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	:	Teledyne T50 (200-400 kHz) R2Sonic 2024 (200-400 kHz)[4]
Sidescan Sonar	:	EdgeTech 4200 (300/600 kHz)
Magnetometer	:	Geometrics G-882 (TVG)
Subbottom Profiler	:	Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	:	AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,5] Sparker[1]	:	AAS-Boom and SCS Streamer Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	:	AML MVP30/MVP200[3]
Acquisition Software	:	QINSy

TerraSond Personnel	
Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System
CRS Name :NAD 1983 (2011) UTM Zone 18N
EPSG Code :6347
Geodetic Datum :North American 1983
Projection :Universal Transverse Mercator
Units :Meter

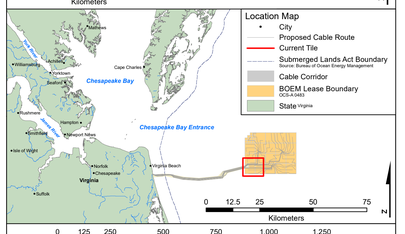
Vertical Coordinate Reference System
Datum :Mean Lower Low Water (MLLW)
Axis -down :Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block OCS-A 0483
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

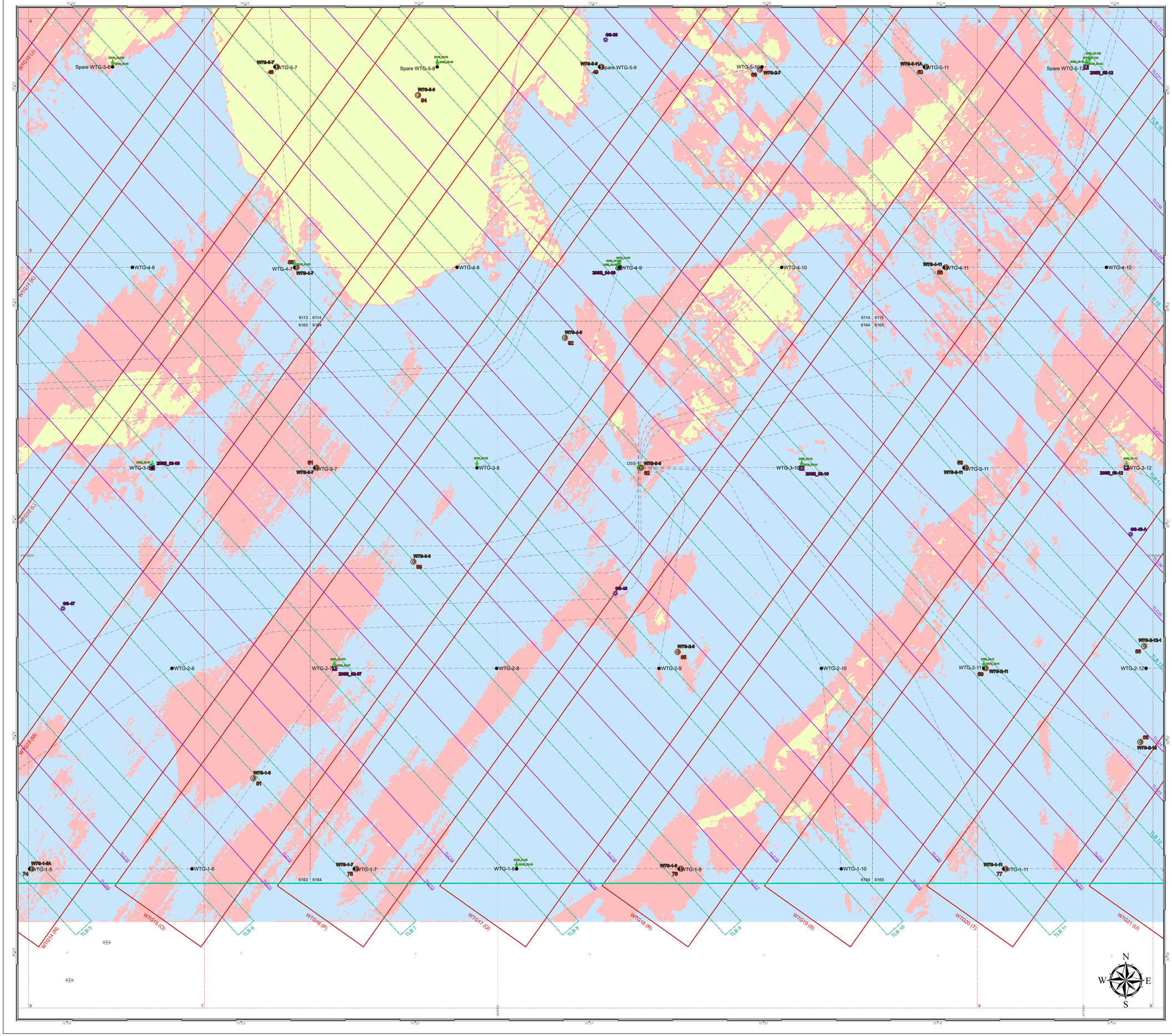
Chart Title: CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 7 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/30/2021

File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.



General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block Main Chart (OCS-A 0483)
- Tile Panel 1 - 9 Main Chart
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA State and Cities - Geographic Data: download from ESRI
Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand: minimum grain size 0.0625mm, maximum grain size 0.25mm
- Medium Sand: minimum grain size 0.25mm, maximum grain size 0.5mm
- Coarse Sand: minimum grain size 0.5mm retained by #40, maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification												
Class	Gravel			Coarse Sand		Medium Sand			Fine Sand			
Sieve Size or No.	3.5"		#4	#10	#18	#35	#40	#60	#140	#200	#230	#270
Particle Size (mm)	4.000	2.362		1.000		0.850	0.425		0.250	0.150	0.106	0.075
Particle Size (mm)	64		4	2		1		0.5	0.25	0.125		0.063
Substrate SubGroup	Pebble		Granule	Very Coarse Sand		Coarse Sand		Medium Sand	Fine Sand/Very Fine Sand			
CMECS Classification												

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the
CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6] Sparker[3]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

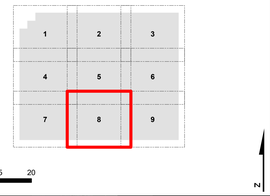
This geophysical survey was conducted April 29th, 2020 through June13th, 2021

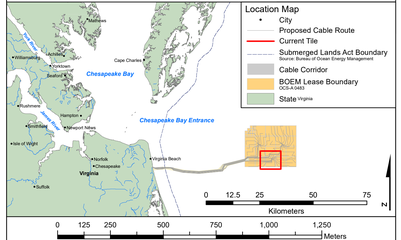
Coordinate Reference System

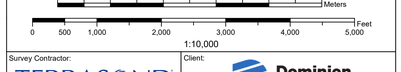
Horizontal Coordinate Reference System
CRS Name :NAD 1983 (2011) UTM Zone 18N
EPSG Code :6347
Geodetic Datum :North American 1983
Projection :Universal Transverse Mercator
Units :Meter

Vertical Coordinate Reference System
Datum :Mean Lower Low Water (MLLW)
Axis -down :Depth

Tile Index Overview
- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9







Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

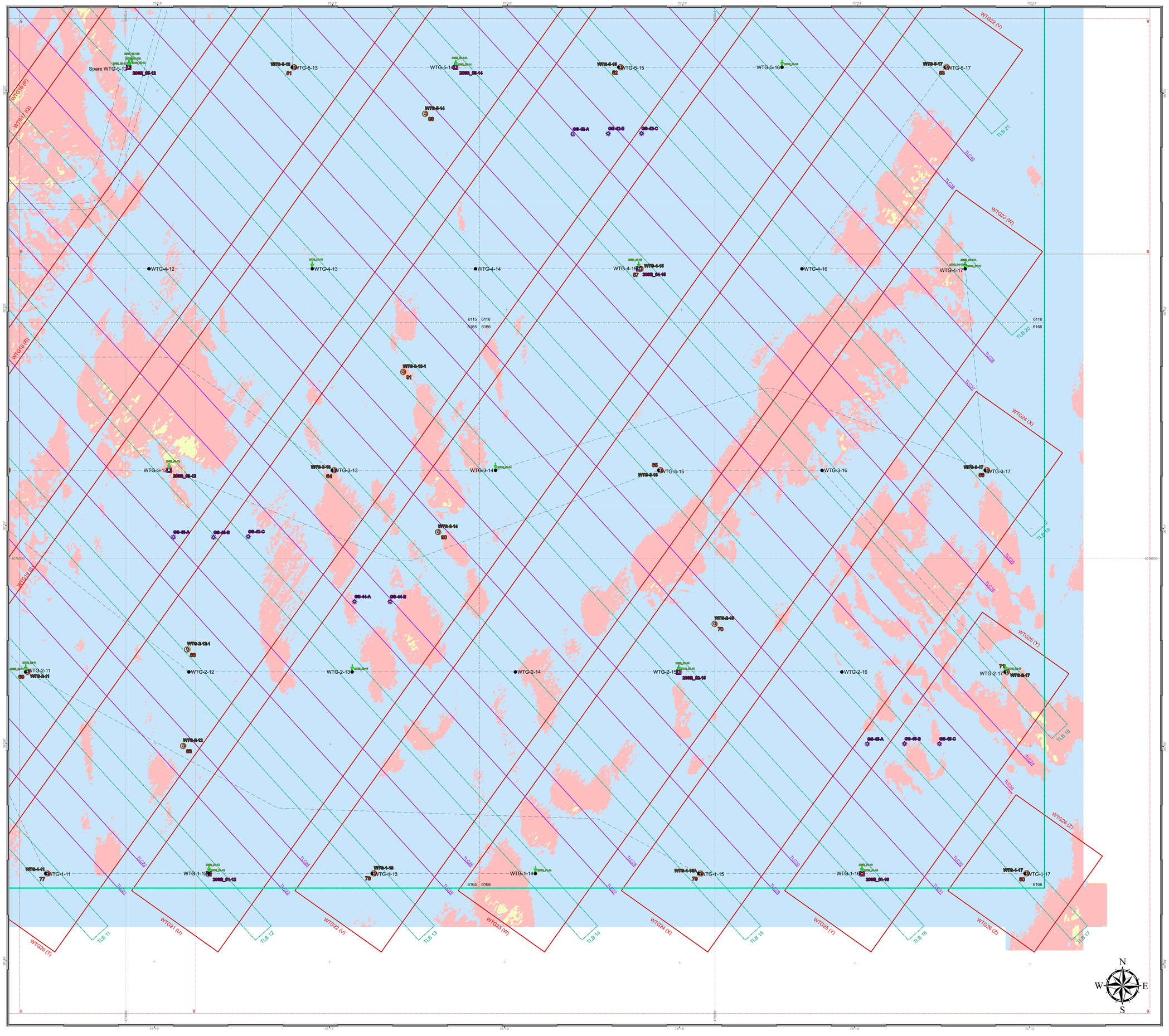
Chart Title:
CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 8 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/30/2021

File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.



General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block — Main Chart OCS-A 0483
- Tile Panel 1 - 9 — Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA State and Cities - Geographic Data: download from ESRI
Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

CMECS Subgroup Classification

- Fine Sand — minimum grain size 0.0625mm; maximum grain size 0.25mm
- Medium Sand — minimum grain size 0.25mm; maximum grain size 0.5mm
- Coarse Sand — minimum grain size 0.5mm retained by #40; maximum grain size 2.0mm passing #10

Geotechnical Samples

- Fine Sand/Very Fine Sand
- Medium Sand
- Coarse Sand
- Very Coarse Sand
- Granule/Pebble

ASTM Classification												
Class	Gravel			Coarse Sand	Medium Sand			Fine Sand				
Sieve Size or No.	3/8"		#4	#8	#16	#30	#40	#50	#60	#100	#140	#200
Particle Size (mm)	9.500	4.750	4.750	2.000	0.850	0.600	0.425	0.300	0.250	0.150	0.106	0.075
Particle Size (mm)	64	4	4	2	1/2			1/4			1/8	
Substrate SubGroup	Pebble		Granule	Very Coarse Sand	Coarse Sand		Medium Sand	Fine Sand/Very Fine Sand				
CMECS Classification												

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Sediment Mapping

Backscatter data and sediment sample locations were imported into Blue Marble Geographics Global Mapper v20.0. A correlation of the samples grainsize with the backscatter amplitude was used to generate contours consistent with backscatter intensity.
The generated contours were then adjusted on the basis of the bathymetry and SSS data.
The resulting interpreted boundaries were classified using the
CMECS Substrate Component (SC) and the ASTM D2488 to describe the surficial sediments.
The digitized regions were then imported into a GIS project using ESRI ArcCatalog 10.7.1 and ESRI ArcMap 10.7.1.
Metadata was generated for the sediment boundaries in ESRI ArcCatalog 10.7.1.

General Information

Equipment

Survey Vessels	M/V Marcelle[3]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[1]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[3]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6], Sparker[1]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquisition Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

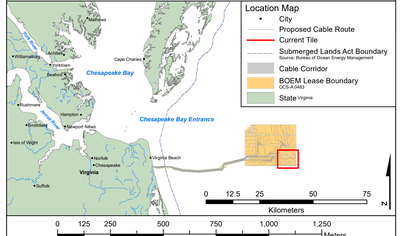
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block — OCS-A 0483
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title:

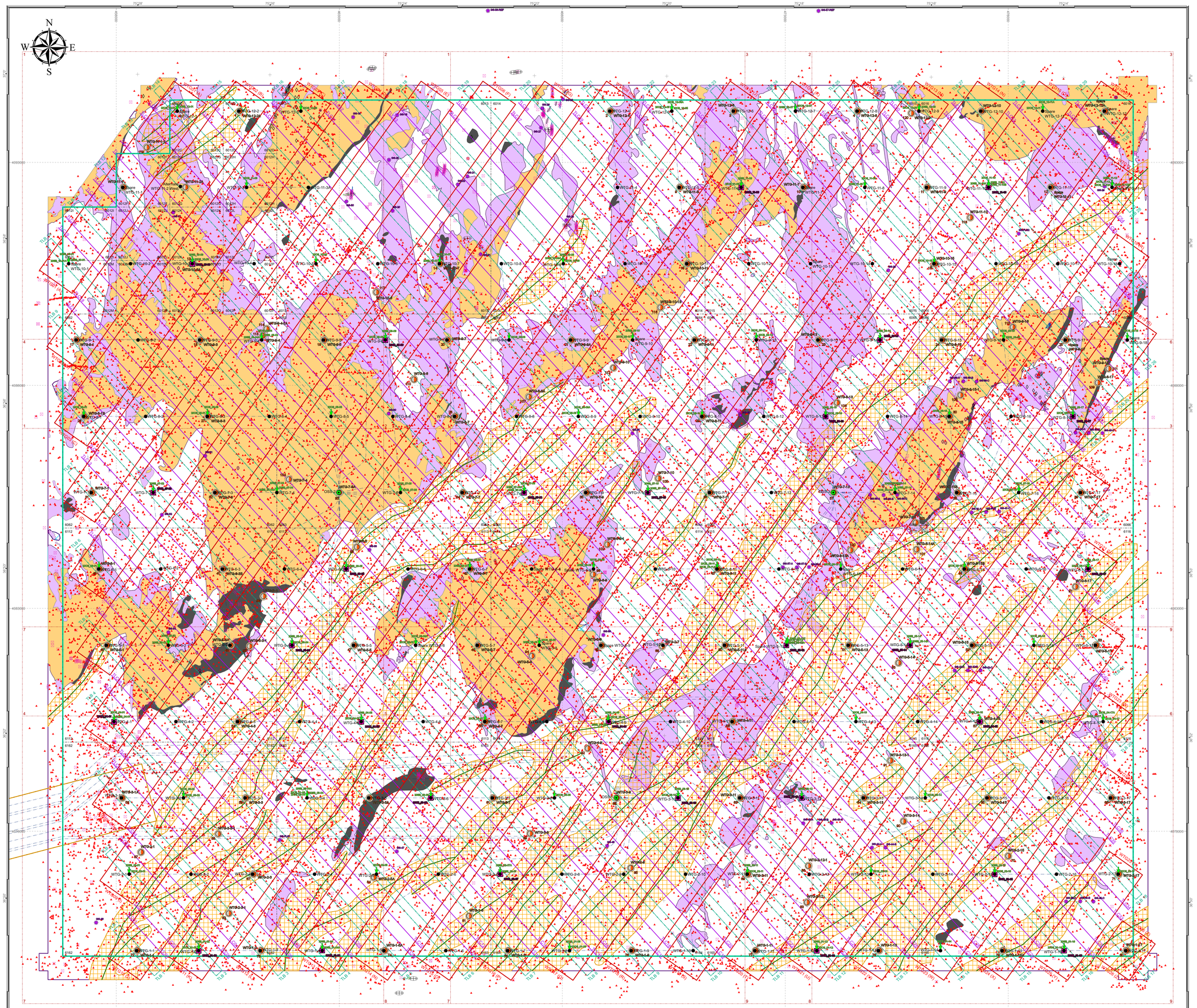
CHART 3d
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED SEDIMENT CLASSIFICATION (CMECS)
TILE 9 of 9

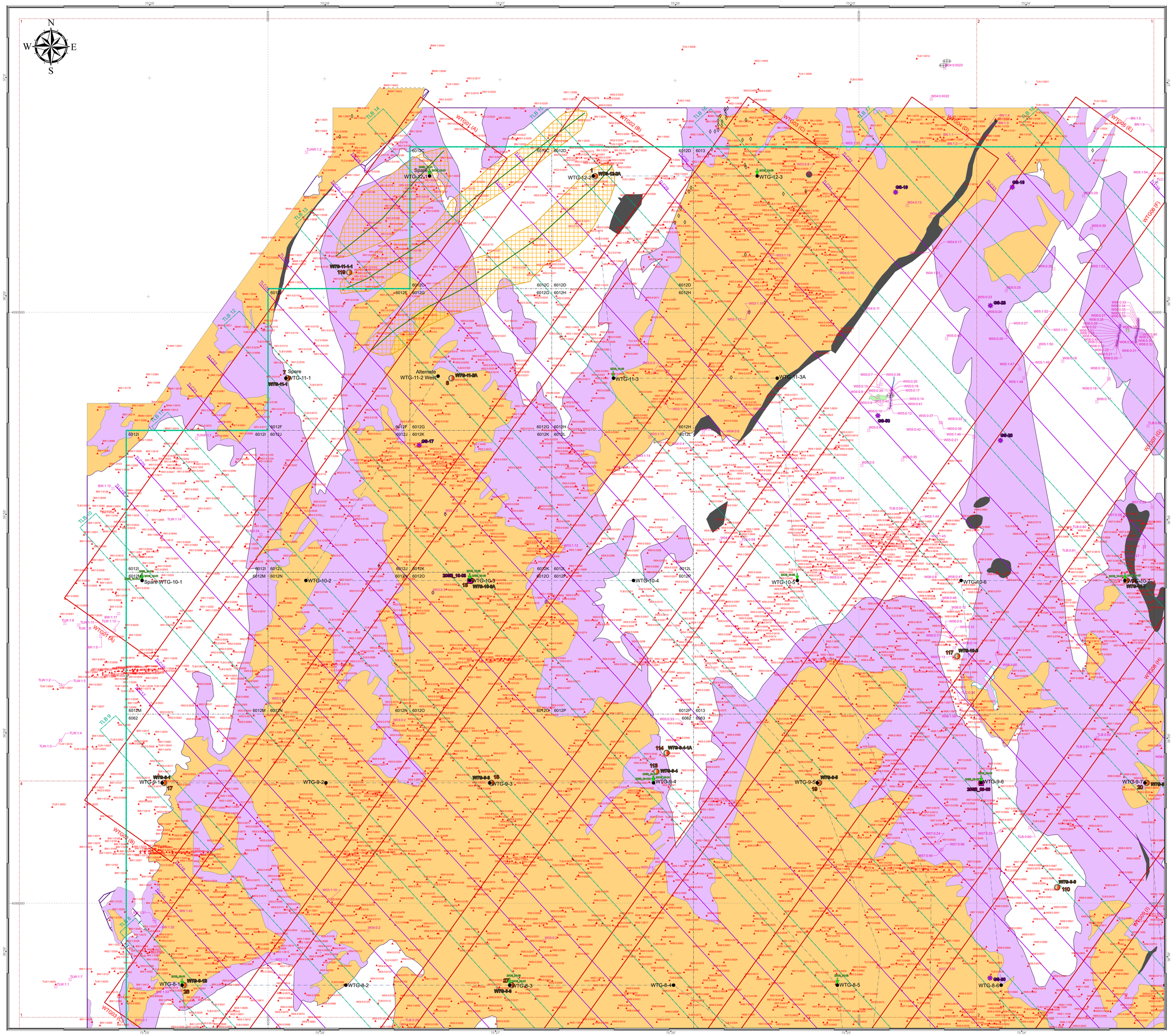
DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

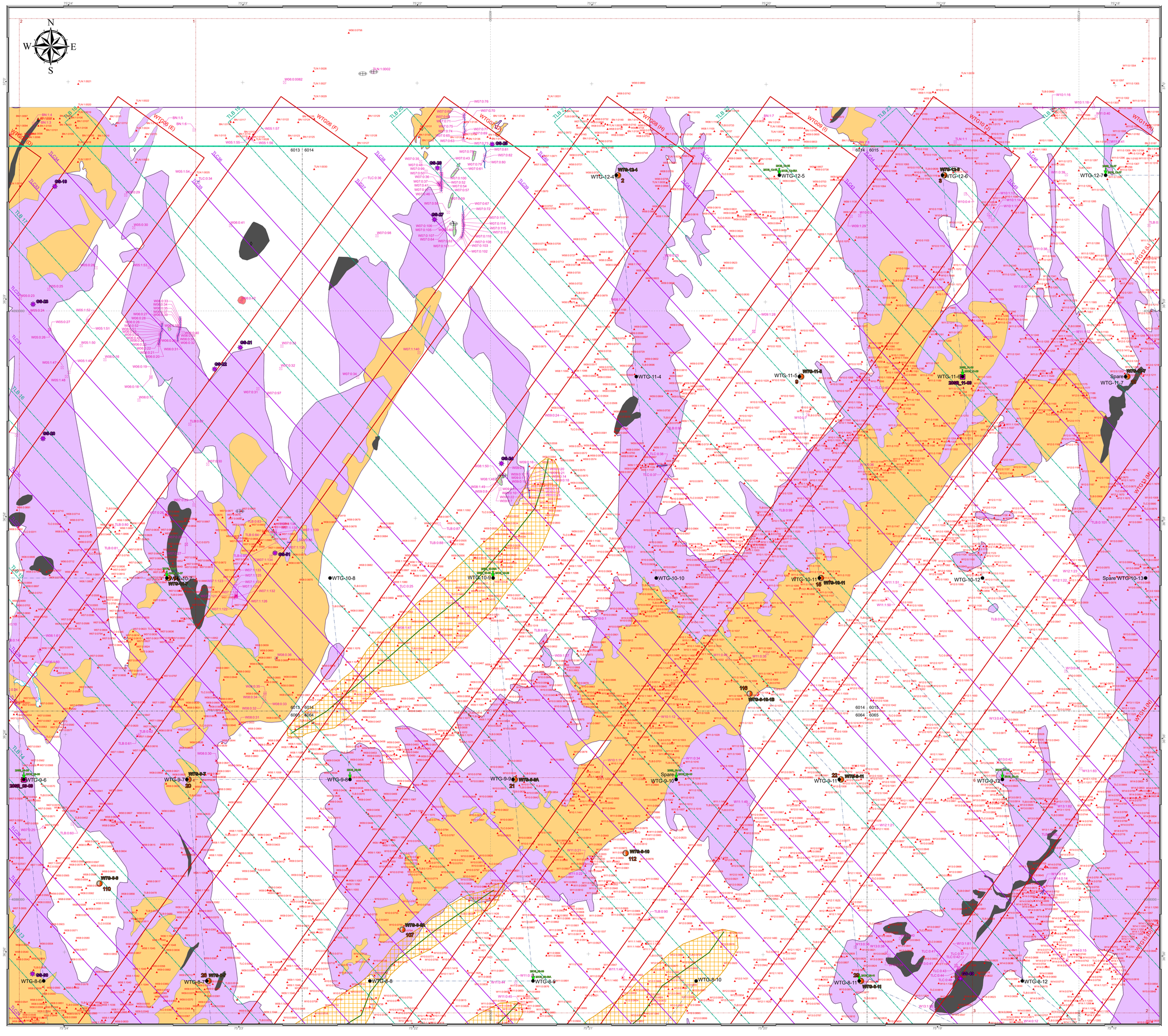
Rev01
Date: 7/30/2021

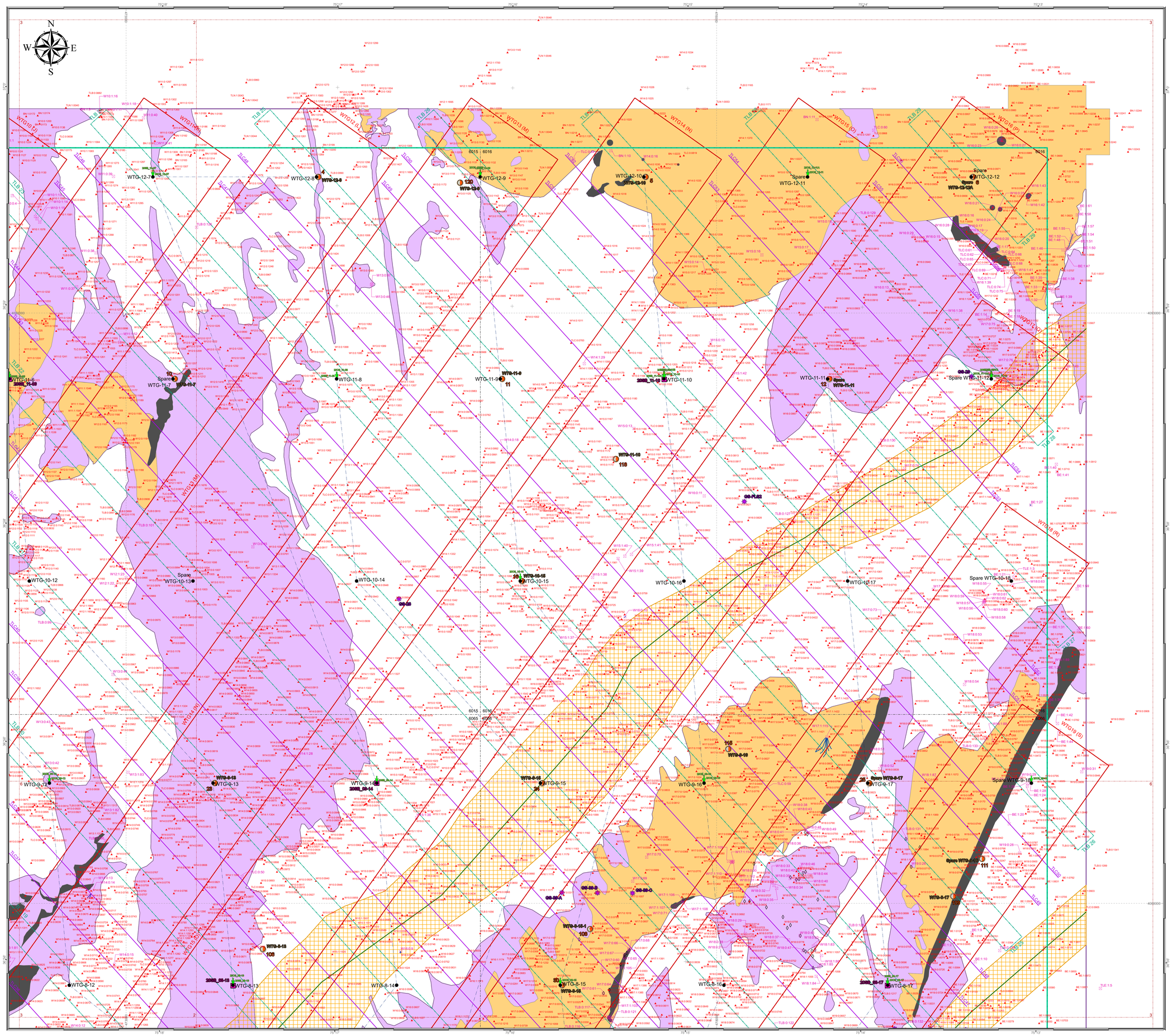
File Name: Dominion_GeoSurfaceFeatures_Sediment_CMECS_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


N
W
E
S
75°29'
75°28'
75°27'
75°26'
75°25'
75°24'
75°23'
75°22'
36°32'
36°31'
36°30'
36°29'
4093000
4088000
4083000
4078000
403000
408000
413000
418000
423000
428000
08-03-REF
08-07-REF
08-01-REF
08-02-REF
WTG-1-A
WTG-1-B
WTG-1-C
WTG-1-D
WTG-1-E
WTG-1-F
WTG-1-G
WTG-1-H
WTG-1-I
WTG-1-J
WTG-1-K
WTG-1-L
WTG-1-M
WTG-1-N
WTG-1-O
WTG-1-P
WTG-1-Q
WTG-1-R
WTG-1-S
WTG-1-T
WTG-1-U
WTG-1-V
WTG-1-W
WTG-1-X
WTG-1-Y
WTG-1-Z
TLB-1
TLB-2
TLB-3
TLB-4
TLB-5
TLB-6
TLB-7
TLB-8
TLB-9
TLB-10
TLB-11
TLB-12
TLB-13
TLB-14
TLB-15
TLB-16
TLB-17
TLB-18
TLB-19
TLB-20
TLB-21
TLB-22
TLB-23
TLB-24
TLB-25
TLB-26
TLB-27
TLB-28
TLB-29
TLB-30
TLB-31
TLB-32
TLB-33
TLB-34
TLB-35
TLB-36
TLB-37
TLB-38
TLB-39
TLB-40
TLB-41
TLB-42
TLB-43
TLB-44
TLB-45
TLB-46
TLB-47
TLB-48
TLB-49
TLB-50
TLB-51
TLB-52
TLB-53
TLB-54
TLB-55
TLB-56
TLB-57
TLB-58
TLB-59
TLB-60
TLB-61
TLB-62
TLB-63
TLB-64
TLB-65
TLB-66
TLB-67
TLB-68
TLB-69
TLB-70
TLB-71
TLB-72
TLB-73
TLB-74
TLB-75
TLB-76
TLB-77
TLB-78
TLB-79
TLB-80
TLB-81
TLB-82
TLB-83
TLB-84
TLB-85
TLB-86
TLB-87
TLB-88
TLB-89
TLB-90
TLB-91
TLB-92
TLB-93
TLB-94
TLB-95
TLB-96
TLB-97
TLB-98
TLB-99
TLB-100
TLB-101
TLB-102
TLB-103
TLB-104
TLB-105
TLB-106
TLB-107
TLB-108
TLB-109
TLB-110
TLB-111
TLB-112
TLB-113
TLB-114
TLB-115
TLB-116
TLB-117
TLB-118
TLB-119
TLB-120
TLB-121
TLB-122
TLB-123
TLB-124
TLB-125
TLB-126
TLB-127
TLB-128
TLB-129
TLB-130
TLB-131
TLB-132
TLB-133
TLB-134
TLB-135
TLB-136
TLB-137
TLB-138
TLB-139
TLB-140
TLB-141
TLB-142
TLB-143
TLB-144
TLB-145
TLB-146
TLB-147
TLB-148
TLB-149
TLB-150
TLB-151
TLB-152
TLB-153
TLB-154
TLB-155
TLB-156
TLB-157
TLB-158
TLB-159
TLB-160
TLB-161
TLB-162
TLB-163
TLB-164
TLB-165
TLB-166
TLB-167
TLB-168
TLB-169
TLB-170
TLB-171
TLB-172
TLB-173
TLB-174
TLB-175
TLB-176
TLB-177
TLB-178
TLB-179
TLB-180
TLB-181
TLB-182
TLB-183
TLB-184
TLB-185
TLB-186
TLB-187
TLB-188
TLB-189
TLB-190
TLB-191
TLB-192
TLB-193
TLB-194
TLB-195
TLB-196
TLB-197
TLB-198
TLB-199
TLB-200
TLB-201
TLB-202
TLB-203
TLB-204
TLB-205
TLB-206
TLB-207
TLB-208
TLB-209
TLB-210
TLB-211
TLB-212
TLB-213
TLB-214
TLB-215
TLB-216
TLB-217
TLB-218
TLB-219
TLB-220
TLB-221
TLB-222
TLB-223
TLB-224
TLB-225
TLB-226
TLB-227
TLB-228
TLB-229
TLB-230
TLB-231
TLB-232
TLB-233
TLB-234
TLB-235
TLB-236
TLB-237
TLB-238
TLB-239
TLB-240
TLB-241
TLB-242
TLB-243
TLB-244
TLB-245
TLB-246
TLB-247
TLB-248
TLB-249
TLB-250
TLB-251
TLB-252
TLB-253
TLB-254
TLB-255
TLB-256
TLB-257
TLB-258
TLB-259
TLB-260
TLB-261
TLB-262
TLB-263
TLB-264
TLB-265
TLB-266
TLB-267
TLB-268
TLB-269
TLB-270
TLB-271
TLB-272
TLB-273
TLB-274
TLB-275
TLB-276
TLB-277
TLB-278
TLB-279
TLB-280
TLB-281
TLB-282
TLB-283
TLB-284
TLB-285
TLB-286
TLB-287
TLB-288
TLB-289
TLB-290
TLB-291
TLB-292
TLB-293
TLB-294
TLB-295
TLB-296
TLB-297
TLB-298
TLB-299
TLB-300
TLB-301
TLB-302
TLB-303
TLB-304
TLB-305
TLB-306
TLB-307
TLB-308
TLB-309
TLB-310
TLB-311
TLB-312
TLB-313
TLB-314
TLB-315
TLB-316
TLB-317
TLB-318
TLB-319
TLB-320
TLB-321
TLB-322
TLB-323
TLB-324
TLB-325
TLB-326
TLB-327
TLB-328
TLB-329
TLB-330
TLB-331
TLB-332
TLB-333
TLB-334
TLB-335
TLB-336
TLB-337
TLB-338
TLB-339
TLB-340
TLB-341
TLB-342
TLB-343
TLB-344
TLB-345
TLB-346
TLB-347
TLB-348
TLB-349
TLB-350
TLB-351
TLB-352
TLB-353
TLB-354
TLB-355
TLB-356
TLB-357
TLB-358
TLB-359
TLB-360
TLB-361
TLB-362
TLB-363
TLB-364
TLB-365
TLB-366
TLB-367
TLB-368
TLB-369
TLB-370
TLB-371
TLB-372
TLB-373
TLB-374
TLB-375
TLB-376
TLB-377
TLB-378
TLB-379
TLB-380
TLB-381
TLB-382
TLB-383
TLB-384
TLB-385
TLB-386
TLB-387
TLB-388
TLB-389
TLB-390
TLB-391
TLB-392
TLB-393
TLB-394
TLB-395
TLB-396
TLB-397
TLB-398
TLB-399
TLB-400
TLB-401
TLB-402
TLB-403
TLB-404
TLB-405
TLB-406
TLB-407
TLB-408
TLB-409
TLB-410
TLB-411
TLB-412
TLB-413
TLB-414
TLB-415
TLB-416
TLB-417
TLB-418
TLB-419
TLB-420
TLB-421
TLB-422
TLB-423
TLB-424
TLB-425
TLB-426
TLB-427
TLB-428
TLB-429
TLB-430
TLB-431
TLB-432
TLB-433
TLB-434
TLB-435
TLB-436
TLB-437
TLB-438
TLB-439
TLB-440
TLB-441
TLB-442
TLB-443
TLB-444
TLB-445
TLB-446
TLB-447
TLB-448
TLB-449
TLB-450
TLB-451
TLB-452
TLB-453
TLB-454
TLB-455
TLB-456
TLB-457
TLB-458
TLB-459
TLB-460
TLB-461
TLB-462
TLB-463
TLB-464
TLB-465
TLB-466
TLB-467
TLB-468
TLB-469
TLB-470
TLB-471
TLB-472
TLB-473
TLB-474
TLB-475
TLB-476
TLB-477
TLB-478
TLB-479
TLB-480
TLB-481
TLB-482
TLB-483
TLB-484
TLB-485
TLB-486
TLB-487
TLB-488
TLB-489
TLB-490
TLB-491
TLB-492
TLB-493
TLB-494
TLB-495
TLB-496
TLB-497
TLB-498
TLB-499
TLB-500
TLB-501
TLB-502
TLB-503
TLB-504
TLB-505
TLB-506
TLB-507
TLB-508
TLB-509
TLB-510
TLB-511
TLB-512
TLB-513
TLB-514
TLB-515
TLB-516
TLB-517
TLB-518
TLB-519
TLB-520
TLB-521
TLB-522
TLB-523
TLB-524
TLB-525
TLB-526
TLB-527
TLB-528
TLB-529
TLB-530
TLB-531
TLB-532
TLB-533
TLB-534
TLB-535
TLB-536
TLB-537
TLB-538
TLB-539
TLB-540
TLB-541
TLB-542
TLB-543
TLB-544
TLB-545
TLB-546
TLB-547
TLB-548
TLB-549
TLB-550
TLB-551
TLB-552
TLB-553
TLB-554
TLB-555
TLB-556
TLB-557
TLB-558
TLB-559
TLB-560
TLB-561
TLB-562
TLB-563
TLB-564
TLB-565
TLB-566
TLB-567
TLB-568
TLB-569
TLB-570
TLB-571
TLB-572
TLB-573
TLB-574
TLB-575
TLB-576
TLB-577
TLB-578
TLB-579
TLB-580
TLB-581
TLB-582
TLB-583
TLB-584
TLB-585
TLB-586
TLB-587
TLB-588
TLB-589
TLB-590
TLB-591
TLB-592
TLB-593
TLB-594
TLB-595
TLB-596
TLB-597
TLB-598
TLB-599
TLB-600
TLB-601
TLB-602
TLB-603
TLB-604
TLB-605
TLB-606
TLB-607
TLB-608
TLB-609
TLB-610
TLB-611
TLB-612
TLB-613
TLB-614
TLB-615
TLB-616
TLB-617
TLB-618
TLB-619
TLB-620
TLB-621
TLB-622
TLB-623
TLB-624
TLB-625
TLB-626
TLB-627
TLB-628
TLB-629
TLB-630
TLB-631
TLB-632
TLB-633
TLB-634
TLB-635
TLB-636
TLB-637
TLB-638
TLB-639
TLB-640
TLB-641
TLB-642
TLB-643
TLB-644
TLB-645
TLB-646
TLB-647
TLB-648
TLB-649
TLB-650
TLB-651
TLB-652
TLB-653
TLB-654
TLB-655
TLB-656
TLB-657
TLB-658
TLB-659
TLB-660
TLB-661
TLB-662
TLB-663
TLB-664
TLB-665
TLB-666
TLB-667
TLB-668
TLB-669
TLB-670
TLB-671
TLB-672
TLB-673
TLB-674
TLB-675
TLB-676
TLB-677
TLB-678
TLB-679
TLB-680
TLB-681
TLB-682
TLB-683
TLB-684
TLB-685
TLB-686
TLB-687
TLB-688
TLB-689
TLB-690
TLB-691
TLB-692
TLB-693
TLB-694
TLB-695
TLB-696
TLB-697
TLB-698
TLB-699
TLB-700
TLB-701
TLB-702
TLB-703
TLB-704
TLB-705
TLB-706
TLB-707
TLB-708
TLB-709
TLB-710
TLB-711
TLB-712
TLB-713
TLB-714
TLB-715
TLB-716
TLB-717
TLB-718
TLB-719
TLB-720
TLB-721
TLB-722
TLB-723
TLB-724
TLB-725
TLB-726
TLB-727
TLB-728
TLB-729
TLB-730
TLB-731
TLB-732
TLB-733
TLB-734
TLB-735
TLB-736
TLB-737
TLB-738
TLB-739
TLB-740
TLB-741
TLB-742
TLB-743
TLB-744
TLB-745
TLB-746
TLB-747
TLB-748
TLB-749
TLB-750
TLB-751
TLB-752
TLB-753
TLB-754
TLB-755
TLB-756
TLB-757
TLB-758
TLB-759
TLB-760
TLB-761
TLB-762
TLB-763
TLB-764
TLB-765
TLB-766
TLB-767
TLB-768
TLB-769
TLB-770
TLB-771
TLB-772
TLB-773
TLB-774
TLB-775
TLB-776
TLB-777
TLB-778
TLB-779
TLB-780
TLB-781
TLB-782
TLB-783
TLB-784
TLB-785
TLB-786
TLB-787
TLB-788
TLB-789
TLB-790
TLB-791
TLB-792
TLB-793
TLB-794
TLB-795
TLB-796
TLB-797
TLB-798
TLB-799
TLB-800
TLB-801
TLB-802
TLB-803
TLB-804
TLB-805
TLB-806
TLB-807
TLB-808
TLB-809
TLB-810
TLB-811
TLB-812
TLB-813
TLB-814
TLB-815
TLB-816
TLB-817
TLB-818
TLB-819
TLB-820
TLB-821
TLB-822
TLB-823
TLB-824
TLB-825
TLB-826
TLB-827
TLB-828
TLB-829
TLB-830
TLB-831
TLB-832
TLB-833
TLB-834
TLB-835
TLB-836
TLB-837
TLB-838
TLB-839
TLB-840
TLB-841
TLB-842
TLB-843
TLB-844
TLB-845
TLB-846
TLB-847
TLB-848
TLB-849
TLB-850
TLB-851
TLB-852
TLB-853
TLB-854
TLB-855
TLB-856
TLB-857
TLB-858
TLB-859
TLB-860
TLB-861
TLB-862
TLB-863
TLB-864
TLB-865
TLB-866
TLB-867
TLB-868
TLB-869
TLB-870
TLB-871
TLB-872
TLB-873
TLB-874
TLB-875
TLB-876
TLB-877
TLB-878
TLB-879
TLB-880
TLB-881
TLB-882
TLB-883
TLB-884
TLB-885
TLB-886
TLB-887
TLB-888
TLB-889
TLB-890
TLB-891
TLB-892
TLB-893
TLB-894
TLB-895
TLB-896
TLB-897
TLB-898
TLB-899
TLB-900
TLB-901
TLB-902
TLB-903
TLB-904
TLB-905
TLB-906
TLB-907
TLB-908
TLB-909
TLB-910
TLB-911
TLB-912
TLB-913
TLB-914
TLB-915
TLB-916
TLB-917
TLB-918
TLB-919
TLB-920
TLB-921
TLB-922
TLB-923
TLB-924
TLB-925
TLB-926
TLB-927
TLB-928
TLB-929
TLB-930
TLB-931
TLB-932
TLB-933
TLB-934
TLB-935
TLB-936
TLB-937
TLB-938
TLB-939
TLB-940
TLB-941
TLB-942
TLB-943
TLB-944
TLB-945
TLB-946
TLB-947
TLB-948
TLB-949
TLB-950
TLB-951
TLB-952
TLB-953
TLB-954
TLB-955
TLB-956
TLB-957
TLB-958
TLB-959
TLB-960
TLB-961
TLB-962
TLB-963
TLB-964
TLB-965
TLB-966
TLB-967
TLB-968
TLB-969
TLB-970
TLB-971
TLB-972
TLB-973
TLB-974
TLB-975
TLB-976
TLB-977
TLB-978
TLB-979
TLB-980
TLB-981
TLB-982
TLB-983
TLB-984
TLB-985
TLB-986
TLB-987
TLB-988
TLB-989
TLB-990
TLB-991
TLB-992
TLB-993
TLB-994
TLB-995
TLB-996
TLB-997
TLB-998
TLB-999
TLB-1000
TLB-1001
TLB-1002
TLB-1003
TLB-1004
TLB-1005
TLB-1006
TLB-1007
TLB-1008
TLB-1009
TLB-1010
TLB-1011
TLB-1012
TLB-1013
TLB-1014
TLB-1015
TLB-1016
TLB-1017
TLB-1018
TLB-1019
TLB-1020
TLB-1021
TLB-1022
TLB-1023
TLB-1024
TLB-1025
TLB-1026
TLB-1027
TLB-1028
TLB-1029
TLB-1030
TLB-1031
TLB-1032
TLB-1033
TLB-1034
TLB-1035
TLB-1036
TLB-1037
TLB-1038
TLB-1039
TLB-1040
TLB-1041
TLB-1042
TLB-1043
TLB-1044
TLB-1045
TLB-1046
TLB-1047
TLB-1048
TLB-1049
TLB-1050
TLB-1051
TLB-1052
TLB-1053
TLB-1054
TLB-1055
TLB-1056
TLB-1057
TLB-1058
TLB-1059
TLB-1060
TLB-1061
TLB-1062
TLB-1063
TLB-1064
TLB-1065
TLB-1066
TLB-1067
TLB-1068
TLB-1069
TLB-1070
TLB-1071
TLB-1072
TLB-1073
TLB-1074
TLB-1075
TLB-1076
TLB-1077
TLB-1078
TLB-1079
TLB-1080
TLB-1081
TLB-1082
TLB-1083
TLB-1084
TLB-1085
TLB-1086
TLB-1087
TLB-1088
TLB-1089
TLB-1090
TLB-1091
TLB-1092
TLB-1093
TLB-1094
TLB-1095
TLB-1096
TLB-1097
TLB-1098
TLB-1099
TLB-1100
TLB-1101
TLB-1102
TLB-1103
TLB-1104
TLB-1105
TLB-1106
TLB-1107
TLB-1108
TLB-1109
TLB-1110
TLB-1111
TLB-1112
TLB-1113
TLB-1114
TLB-1115
TLB-1116
TLB-1117
TLB-1118
TLB-1119
TLB-1120
TLB-1121
TLB-1122
TLB-1123
TLB-1124
TLB-1125
TLB-1126
TLB-1127
TLB-1128
TLB-1129
TLB-1130
TLB-1131
TLB-1132
TLB-1133
TLB-1134
TLB-1135
TLB-1136
TLB-1137
TLB-1138
TLB-1139
TLB-1140
TLB-1141
TLB-1142
TLB-1143
TLB-1144
TLB-1145
TLB-1146
TLB-1147
TLB-1148
TLB-1149
TLB-1150
TLB-1151
TLB-1152
TLB-1153
TLB-1154
TLB-1155
TLB-1156
TLB-1157
TLB-1158
TLB-1159
TLB-1160
TLB-1161
TLB-1162
TLB-1163
TLB-1164
TLB-1165
TLB-1166
TLB-1167
TLB-1168
TLB-1169
TLB-1170
TLB-1171
TLB-1172
TLB-1173
TLB-1174
TLB-1175
TLB-1176
TLB-1177
TLB-1178
TLB-1179
TLB-1180
TLB-1181
TLB-1182
TLB-1183
TLB-1184
TLB-1185
TLB-1186
TLB-1187
TLB-1188
TLB-1189
TLB-1190
TLB-1191
TLB-1192
TLB-1193
TLB-1194
TLB-1195
TLB-1196
TLB-1197
TLB-1198
TLB-1199
TLB-1200
TLB-1201
TLB-1202
TLB-1203
TLB-1204
TLB-1205
TLB-1206
TLB-1207
TLB-1208
TLB-1209
TLB-1210
TLB-1211
TLB-1212
TLB-1213
TLB-1214
TLB-1215
TLB-1216
TLB-1217
TLB-1218
TLB-1219
TLB-1220
TLB-1221
TLB-1222
TLB-1223
TLB-1224
TLB-1225
TLB-1226
TLB-1227
TLB-1228
TLB-1229
TLB-1230
TLB-1231
TLB-1232
TLB-1233
TLB-1234
TLB-1235
TLB-1236
TLB-1237
TLB-1238
TLB-1239
TLB-1240
TLB-1241
TLB-1242
TLB-1243
TLB-1244
TLB-1245
TLB-1246
TLB-1247
TLB-1248
TLB-1249
TLB-1250
TLB-1251
TLB-1252
TLB-1253
TLB-1254
TLB-1255
TLB-1256
TLB-1257
TLB-1258
TLB-1259
TLB-1260
TLB-1261
TLB-1262
TLB-1263
TLB-1264
TLB-1265
TLB-1266
TLB-1267
TLB-1268
TLB-1269
TLB-1270
TLB-1271
TLB-1272
TLB-1273
TLB-1274
TLB-1275
TLB-1276
TLB-1277
TLB-1278
TLB-1279
TLB-1280
TLB-1281
TLB-1282
TLB-1283
TLB-1284
TLB-1285
TLB-1286
TLB-1287
TLB-1288
TLB-1289
TLB-1290
TLB-1291
TLB-1292
TLB-1293
TLB-1294
TLB-1295
TLB-1296
TLB-1297
TLB-1298
TLB-1299
TLB-1300
TLB-1301
TLB-1302
TLB-1303
TLB-1304
TLB-1305
TLB-1306
TLB-1307
TLB-1308
TLB-1309
TLB-1310
TLB-1311
TLB-1312
TLB-1313
TLB-1314
TLB-1315
TLB-1316
TLB-1317
TLB-1318
TLB-1319
TLB-1320
TLB-1321
TLB-1322
TLB-1323
TLB-1324
TLB-1325
TLB-1326
TLB-1327
TLB-1328
TLB-1329
TLB-1330
TLB-1331
TLB-1332
TLB-1333
TLB-1334
TLB-1335
TLB-1336
TLB-1337
TLB-1338
TLB-1339
TLB-1340
TLB-1341
TLB-1342
TLB-1343
TLB-1344
TLB-1345
TLB-1346
TLB-1347
TLB-1348
TLB-1349
TLB-1350
TLB-1351
TLB-1352
TLB-1353
TLB-1354
TLB-1355
TLB-1356
TLB-1357
TLB-1358
TLB-1359
TLB-1360
TLB-1361
TLB-1362
TLB-1363
TLB-1364
TLB-1365
TLB-1366
TLB-1367
TLB-1368
TLB-1369
TLB-1370
TLB-1371
TLB-1372
TLB-1373
TLB-1374
TLB-1375
TLB-1376
TLB-1377
TLB-1378
TLB-1379
TLB-1380
TLB-1381
TLB-1382
TLB-1383
TLB-1384
TLB-1385
TLB-1386
TLB-1387
TLB-1388
TLB-1389
TLB-1390
TLB-1391
TLB-1392
TLB-1393
TLB-1394
TLB-1395
TLB-1396
TLB-1397
TLB-1398
TLB-1399
TLB-1400
TLB-1401
TLB-1402
TLB-1403
TLB-1404
TLB-1405
TLB-1406
TLB-1407
TLB-1408
TLB-1409
TLB-1410
TLB-1411
TLB-1412
TLB-1413
TLB-1414
TLB-1415
TLB-1416
TLB-1417
TLB-1418
TLB-1419
TLB-1420
TLB-1421
TLB-1422
TLB-1423
TLB-1424
TLB-1425
TLB-1426
TLB-1427
TLB-1428
TLB-1429
TLB-1430
TLB-1431
TLB-1432
TLB-1433
TLB-1434
TLB-1435
TLB-1436
TLB-1437
TLB-1438
TLB-1439
TLB-1440
TLB-1441
TLB-1442
TLB-1443
TLB-1444
TLB-1445
TLB-1446
TLB-1447
TLB-1448
TLB-1449
TLB-1450
TLB-1451
TLB-1452
TLB-1453
TLB-1454
TLB-1455
TLB-1456
TLB-1457
TLB-1458
TLB-1459
TLB-1460
TLB-1461
TLB-1462
TLB-1463
TLB-1464
TLB-1465
TLB-1466
TLB-1467
TLB-1468
TLB-1469
TLB-1470
TLB-1471
TLB-1472
TLB-1473
TLB-1474
TLB-1475
TLB-1476
TLB-1477
TLB-1478
TLB-1479
TLB-1480
TLB-1481
TLB-1482
TLB-1483
TLB-1484
TLB-1485
TLB-1486
TLB-1487
TLB-1488
TLB-1489
TLB-1490
TLB-1491
TLB-1492
TLB-1493
TLB-1494
TLB-1495
TLB-1496
TLB-1497
TLB-1498
TLB-1499
TLB-1500
TLB-1501
TLB-1502
TLB-1503
TLB-1504
TLB-1505
TLB-1506
TLB-1507
TLB-1508
TLB-1509
TLB-1510
TLB-1511
TLB-1512
TLB-1513
TLB-1514
TLB-1515
TLB-1516
TLB-1517
TLB-1518
TLB-1519
TLB-1520
TLB-1521
TLB-1522
TLB-1523
TLB-1524
TLB-1525
TLB-1526
TLB-1527
TLB-1528
TLB-1529
TLB-1530
TLB-1531
TLB-1532
TLB-1533
TLB-1534
TLB-1535
TLB-1536
TLB-1537
TLB-1538
TLB-1539
TLB-1540
TLB-1541
TLB-1542
TLB-1543
TLB-1544
TLB-1545
TLB-1546
TLB-1547
TLB-1548
TLB-1549
TLB-1550
TLB-1551
TLB-1552
TLB-1553
TLB-1554
TLB-1555
TLB-1556
TLB-1557
TLB-1558
TLB-1559
TLB-1560
TLB-1561
TLB-1562
TLB-1563
TLB-1564
TLB-1565
TLB-1566
TLB-1567
TLB-1568
TLB-1569
TLB-1570
TLB-1571
TLB-1572
TLB-1573
TLB-1574
TLB-1575
TLB-1576
TLB-1577
TLB-1578
TLB-1579
TLB-1580
TLB-1581
TLB-1582
TLB-1583
TLB-1584
TLB-1585
TLB-1586
TLB-1587
TLB-1588
TLB-1589
TLB-1590
TLB-1591
TLB-1592
TLB-1593
TLB-1594
TLB-1595
TLB-1596
TLB-1597
TLB-1598
TLB-1599
TLB-1600
TLB-1601
TLB-1602
TLB-1603
TLB-1604
TLB-1605
TLB-1606
TLB-1607
TLB-1608
TLB-1609
TLB-1610
TLB-1611
TLB-1612
TLB-1613
TLB-1614
TLB-1615
TLB-1616
TLB-1617
TLB-1618
TLB-1619
TLB-1620
TLB-1621
TLB-1622
TLB-1623
TLB-1624
TLB-1625
TLB-1626
TLB-1627
TLB-1628
TLB-1629
TLB-1630
TLB-1631
TLB-1632
TLB-1633
TLB-1634
TLB-1635
TLB-1636
TLB-1637
TLB-1638
TLB-1639
TLB-1640
TLB-1641
TLB-1642
TLB-1643
TLB-1644
TLB-1645
TLB-1646
TLB-1647
TLB-1648
TLB-1649
TLB-1650
TLB-1651
TLB-1652
TLB-1653
TLB-1654
TLB-1655
TLB-1656
TLB-1657
TLB-1658
TLB-1659
TLB-1660
TLB-1661
TLB-1662
TLB-1663
TLB-1664
TLB-1665
TLB-1666
TLB-1667
TLB-1668
TLB-1669
TLB-1670
TLB-1671
TLB-1672
TLB-1673
TLB-1674
TLB-1675
TLB-1676
TLB-1677
TLB-1678
TLB-1679
TLB-1680
TLB-1681
TLB-1682
TLB-1683
TLB-1684
TLB-1685
TLB-1686
TLB-1687
TLB-1688
TLB-1689
TLB-1690
TLB-1691
TLB-1692
TLB-1693
TLB-1694
TLB-1695
TLB-1696
TLB-1697
TLB-1698
TLB-1699
TLB-1700
TLB-1701
TLB-1702
TLB-1703
TLB-1704
TLB-1705
TLB-1706
TLB-1707
TLB-1708
TLB-1709
TLB-1710
TLB-1711
TLB-1712
TLB-1713
TLB-1714
TLB-1715
TLB-1716
TLB-1717
TLB-1718
TLB-1719
TLB-1720
TLB-1721
TLB-1722
TLB-1723
TLB-1724
TLB-1725
TLB-1726
TLB-1727
TLB-1728
TLB-1729
TLB-1730
TLB-1731
TLB-1732
TLB-1733
TLB-1734
TLB-1735
TLB-1736
TLB-1737
TLB-1738
TLB-1739
TLB-1740
TLB-1741
TLB-1742
TLB-1743
TLB-1744
TLB-1745
TLB-1746
TLB-1747
TLB-1748
TLB-1749
TLB-1750
TLB-1751
TLB-1752
TLB-1753
TLB-1754
TLB-1755
TLB-1756
TLB-1757
TLB-1758
TLB-1759
TLB-1760
TLB-1761
TLB-1762
TLB-1763
TLB-1764
TLB-1765
TLB-1766
TLB-1767
TLB-1768
TLB-1769
TLB-1770
TLB-1771
TLB-1772
TLB-1773
TLB-1774
TLB-1775
TLB-1776
TLB-1777
TLB-1778
TLB-1779
TLB-1780
TLB-1781
TLB-1782
TLB-1783
TLB-1784
TLB-1785
TLB-1786
TLB-1787
TLB-1788
TLB-1789
TLB-1790
TLB-1791
TLB-1792
TLB-1793
TLB-1794
TLB-1795
TLB-1796
TLB-1797
TLB-1798
TLB-1799
TLB-1800
TLB-1801
TLB-1802
TLB-1803
TLB-1804
TLB-1805
TLB-1806
TLB-1807
TLB-1808
TLB-1809
TLB-1810
TLB-1811
TLB-1812
TLB-1813
TLB-1814
TLB-1815
TLB-1816
TLB-1817
TLB-1818
TLB-1819
TLB-1820
TLB-1821
TLB-1822
TLB-1823
TLB-1824
TLB-1825
TLB-1826
TLB-1827
TLB-1828
TLB-1829
TLB-1830
TLB-1831
TLB-1832
TLB-1833
TLB-1834
TLB-1835
TLB-1836
TLB-1837
TLB-1838
TLB-1839
TLB-1840
TLB-1841
TLB-1842
TLB-1843
TLB-1844
TLB-1845
TLB-1846
TLB-1847
TLB-1848
TLB-1849
TLB-1850
TLB-1851
TLB-1852
TLB-1853
TLB-1854
TLB-1855
TLB-1856
TLB-1857
TLB-1858
TLB-1859
TLB-1860
TLB-1861
TLB-1862
TLB-1863
TLB-1864
TLB-1865
TLB-1866
TLB-1867
TLB-1868
TLB-1869
TLB-1870
TLB-1871
TLB-1872
TLB-1873
TLB-1874
TLB-1875
TLB-1876
TLB-1877
TLB-1878
TLB-1879
TLB-1880
TLB-1881
TLB-1882
TLB-1883
TLB-1884
TLB-1885
TLB-1886
TLB-1887
TLB-1888
TLB-1889
TLB-1890
TLB-1891
TLB-1892
TLB-1893
TLB-1894
TLB-1895
TLB-1896
TLB-1897
TLB-1898
TLB-1899
TLB-1900
TLB-1901
TLB-1902
TLB-1903
TLB-1904
TLB-1905
TLB-1906
TLB-1907
TLB-1908
TLB-1909
TLB-1910
TLB-1911
TLB-1912
TLB-1913
TLB-1914
TLB-1915
TLB-1916
TLB-1917
TLB-1918
TLB-1919
TLB-1920
TLB-1921
TLB-1922
TLB-1923
TLB-1924
TLB-1925
TLB-1926
TLB-1927
TLB-1928
TLB-1929
TLB-1930
TLB-1931
TLB-1932
TLB-1933
TLB-1934
TLB-1935
TLB-1936
TLB-1937
TLB-1938
TLB-1939
TLB-1940
TLB-1941
TLB-1942
TLB-1943
TLB-1944
TLB-1945
TLB-1946
TLB-1947
TLB-1948
TLB-1949
TLB-1950
TLB-1951
TLB-1952
TLB-1953
TLB-1954
TLB-1955
TLB-1956
TLB-1957
TLB-1958
TLB-1959
TLB-1960
TLB-1961
TLB-1962
TLB-1963
TLB-1964
TLB-1965
TLB-1966
TLB-1967
TLB-1968
TLB-1969
TLB-1970
TLB-1971
TLB-1972
TLB-1973
TLB-1974
TLB-1975
TLB-1976
TLB-1977
TLB-1978
TLB-1979
TLB-1980
TLB-1981
TLB-1982
TLB-1983
TLB-1984
TLB-1985
TLB-1986
TLB-1987
TLB-1988
TLB-1989
TLB-1990
TLB-1991
TLB-1992
TLB-1993
TLB-1994
TLB-1995
TLB-1996
TLB-1997
TLB-1998
TLB-1999
TLB-2000
TLB-2001
TLB-2002
TLB-2003
TLB-2004
TLB-2005
TLB-2006
TLB-2007
TLB-2008
TLB-2009
TLB-2010
TLB-2011
TLB-2012
TLB-2013
TLB-2014
TLB-2015
TLB-2016
TLB-2017
TLB-2018
TLB-2019
TLB-2020
TLB-2021
TLB-2022
TLB-2023
TLB-2024
TLB-2025
TLB-2026
TLB-2027
TLB-2028
TLB-2029
TLB-2030
TLB-2031
TLB-2032
TLB-2033
TLB-2034
TLB-2035
TLB-2036
TLB-2037
TLB-2038
TLB-2039
TLB-2040
TLB-2041
TLB-2042
TLB-2043
TLB-2044
TLB-2045
TLB-2046
TLB-2047
TLB-2048
TLB-2049
TLB-2050
TLB-2051
TLB-2052
TLB-2053
TLB-2054
TLB-2055
TLB-2056
TLB-2057
TLB-2058
TLB-2059
TLB-2060
TLB-2061
TLB-2062
TLB-2063
TLB-2064
TLB-2065
TLB-2066
TLB-2067
TLB-2068
TLB-2069
TLB-2070
TLB-2071
TLB-2072
TLB-2073
TLB-2074
TLB-2075
TLB-2076
TLB-2077
TLB-2078
TLB-2079
TLB-2080
TLB-2081
TLB-2082
TLB-2083
TLB-2084
TLB-2085
TLB-2086
TLB-2087
TLB-2088
TLB-2089
TLB-2090
TLB-2091
TLB-2092
TLB-2093
TLB-2094
TLB-2095
TLB-2096
TLB-2097
TLB-2098
TLB-2099
TLB-2100
TLB-2101
TLB-2102
TLB-2103
TLB-2104
TLB-2105
TLB-2106
TLB-2107
TLB-2108
TLB-2109
TLB-2110
TLB-2111
TLB-2112
TLB-2113
TLB-2114
TLB-2115
TLB-2116
TLB-2117
TLB-2118
TLB-2119
TLB-2120
TLB-2121
TLB-2122
TLB-2123
TLB-2124
TLB-2125
TLB-2126
TLB-2127
TLB-2128
TLB-2129
TLB-2130
TLB-2131
TLB-2132
TLB-2133
TLB-2134
TLB-2135
TLB-2136
TLB-2137
TLB-2138
TLB-2139
TLB-2140
TLB-2141
TLB-2142
TLB-2143
TLB-2144
TLB-2145
TLB-2146
TLB-2147
TLB-2148
TLB-2149
TLB-2150
TLB-2151
TLB-2152
TLB-2153
TLB-2154
TLB-2155
TLB-2156
TLB-2157
TLB-2158
TLB-2159
TLB-2160
TLB-2161
TLB-2162
TLB-2163
TLB-2164
TLB-2165
TLB-2166
TLB-2167
TLB-2168
TLB-2169
TLB-2170
TLB-2171
TLB-2172
TLB-2173
TLB-2174
TLB-2175
TLB-2176
TLB-2177
TLB-2178
TLB-2179
TLB-2180
TLB-2181
TLB-2182
TLB-2183
TLB-2184
TLB-2185
TLB-2186
TLB-2187
TLB-2188
TLB-2189
TLB-2190
TLB-2191
TLB-2192
TLB-2193
TLB-2194
TLB-2195
TLB-2196
TLB-2197
TLB-2198
TLB-2199
TLB-2200
TLB-2201
TLB-2202
TLB-2203
TLB-2204
TLB-2205
TLB-2206
TLB-2207
TLB-2208
TLB-2209
TLB-2210
TLB-2211
TLB-2212
TLB-2213
TLB-2214
TLB-2215
TLB-2216
TLB-2217
TLB-2218
TLB-2219
TLB-2220
TLB-2221
TLB-2222
TLB-2223
TLB-2224
TLB-2225
TLB-2226
TLB-2227
TLB-2228
TLB-2229
TLB-2230
TLB-2231
TLB-2232
TLB-2233
TLB-2234
TLB-2235
TLB-2236
TLB-2237
TLB-2238
TLB-2239
TLB-2240
TLB-2241
TLB-2242
TLB-2243
TLB-2244
TLB-2245
TLB-2246
TLB-2247
TLB-2248
TLB-2249
TLB-2250
TLB-2251
TLB-2252
TLB-2253
TLB-2254
TLB-2255
TLB-2256
TLB-2257
TLB-2258
TLB-2259
TLB-2260
TLB-2261
TLB-2262
TLB-2263
TLB-2264
TLB-2265
TLB-2266
TLB-2267
TLB-2268
TLB-2269
TLB-2270
TLB-2271
TLB-2272
TLB-2273
TLB-2274
TLB-2275
TLB-2276
TLB-2277
TLB-2278
TLB-2279
TLB-2280
TLB-2281
TLB-2282
TLB-2283
TLB-2284
TLB-2285
TLB-2286
TLB-2287
TLB-2288
TLB-2289
TLB-2290
TLB-2291
TLB-2292
TLB-2293
TLB-2294
TLB-2295
TLB-2296
TLB-2297
TLB-2298
TLB-2299
TLB-2300
TLB-2301
TLB-2302
TLB-2303
TLB-2304
TLB-2305
TLB-2306
TLB-2307
TLB-2308
TLB-2309
TLB-2310
TLB-2311
TLB-2312
TLB-2313
TLB-2314
TLB-2315
TLB-2316
TLB-2317
TLB-2318
TLB-2319
TLB-2320
TLB-2321
TLB-2322
TLB-2323
TLB-2324
TLB-2325
TLB-2326
TLB-2327
TLB-2328
TLB-2329
TLB-2330
TLB-2331
TLB-2332
TLB-2333
TLB-2334
TLB-2335
TLB-2336
TLB-2337
TLB-2338
TLB-2339
TLB-2340
TLB-2341
TLB-2342
TLB-2343
TLB-2344
TLB-2345
TLB-2346
TLB-2347
TLB-2348
TLB-2349
TLB-2350
TLB-2351
TLB-2352
TLB-2353
TLB-2354
TLB-2355
TLB-2356
TLB-2357
TLB-2358
TLB-2359
TLB-2360
TLB-2361
TLB-2362
TLB-2363
TLB-2364
TLB-2365
TLB-2366
TLB-2367
TLB-2368
TLB-2369
TLB-2370
TLB-2


N
W
E
S
WTG-12-1
WTG-12-2
WTG-12-3
WTG-11-1
WTG-11-2 West
WTG-11-3
WTG-11-3A
WTG-11-4
WTG-10-1
WTG-10-2
WTG-10-3
WTG-10-4
WTG-10-5
WTG-10-6
WTG-10-7
WTG-9-1
WTG-9-2
WTG-9-3
WTG-9-4
WTG-9-5
WTG-9-6
WTG-9-7
WTG-8-1
WTG-8-2
WTG-8-3
WTG-8-4
WTG-8-5
WTG-8-6
WTG-8-7
WTG01 (A)
WTG02 (B)
WTG03 (C)
WTG04 (D)
WTG05 (E)
WTG06 (F)
WTG07 (G)
WTG08 (H)
WTG09 (I)
WTG10 (J)
WTG11 (K)
WTG12 (L)
WTG13 (M)
WTG14 (N)
WTG15 (O)
WTG16 (P)
WTG17 (Q)
WTG18 (R)
WTG19 (S)
WTG20 (T)
WTG21 (U)
WTG22 (V)
WTG23 (W)
WTG24 (X)
WTG25 (Y)
WTG26 (Z)
WTG27 (AA)
WTG28 (AB)
WTG29 (AC)
WTG30 (AD)
WTG31 (AE)
WTG32 (AF)
WTG33 (AG)
WTG34 (AH)
WTG35 (AI)
WTG36 (AJ)
WTG37 (AK)
WTG38 (AL)
WTG39 (AM)
WTG40 (AN)
WTG41 (AO)
WTG42 (AP)
WTG43 (AQ)
WTG44 (AR)
WTG45 (AS)
WTG46 (AT)
WTG47 (AU)
WTG48 (AV)
WTG49 (AW)
WTG50 (AX)
WTG51 (AY)
WTG52 (AZ)
WTG53 (BA)
WTG54 (BB)
WTG55 (BC)
WTG56 (BD)
WTG57 (BE)
WTG58 (BF)
WTG59 (BG)
WTG60 (BH)
WTG61 (BI)
WTG62 (BJ)
WTG63 (BK)
WTG64 (BL)
WTG65 (BM)
WTG66 (BN)
WTG67 (BO)
WTG68 (BP)
WTG69 (BQ)
WTG70 (BR)
WTG71 (BS)
WTG72 (BT)
WTG73 (BU)
WTG74 (BV)
WTG75 (BW)
WTG76 (BX)
WTG77 (BY)
WTG78 (BZ)
WTG79 (CA)
WTG80 (CB)
WTG81 (CC)
WTG82 (CD)
WTG83 (CE)
WTG84 (CF)
WTG85 (CG)
WTG86 (CH)
WTG87 (CI)
WTG88 (CJ)
WTG89 (CK)
WTG90 (CL)
WTG91 (CM)
WTG92 (CN)
WTG93 (CO)
WTG94 (CP)
WTG95 (CQ)
WTG96 (CR)
WTG97 (CS)
WTG98 (CT)
WTG99 (CU)
WTG100 (CV)
WTG101 (CW)
WTG102 (CX)
WTG103 (CY)
WTG104 (CZ)
WTG105 (DA)
WTG106 (DB)
WTG107 (DC)
WTG108 (DD)
WTG109 (DE)
WTG110 (DF)
WTG111 (DG)
WTG112 (DH)
WTG113 (DI)
WTG114 (DJ)
WTG115 (DK)
WTG116 (DL)
WTG117 (DM)
WTG118 (DN)
WTG119 (DO)
WTG120 (DP)
WTG121 (DQ)
WTG122 (DR)
WTG123 (DS)
WTG124 (DT)
WTG125 (DU)
WTG126 (DV)
WTG127 (DW)
WTG128 (DX)
WTG129 (DY)
WTG130 (DZ)
WTG131 (EA)
WTG132 (EB)
WTG133 (EC)
WTG134 (ED)
WTG135 (EE)
WTG136 (EF)
WTG137 (EG)
WTG138 (EH)
WTG139 (EI)
WTG140 (EJ)
WTG141 (EK)
WTG142 (EL)
WTG143 (EM)
WTG144 (EN)
WTG145 (EO)
WTG146 (EP)
WTG147 (EQ)
WTG148 (ER)
WTG149 (ES)
WTG150 (ET)
WTG151 (EU)
WTG152 (EV)
WTG153 (EW)
WTG154 (EX)
WTG155 (EY)
WTG156 (EZ)
WTG157 (FA)
WTG158 (FB)
WTG159 (FC)
WTG160 (FD)
WTG161 (FE)
WTG162 (FF)
WTG163 (FG)
WTG164 (FH)
WTG165 (FI)
WTG166 (FJ)
WTG167 (FK)
WTG168 (FL)
WTG169 (FM)
WTG170 (FN)
WTG171 (FO)
WTG172 (FP)
WTG173 (FQ)
WTG174 (FR)
WTG175 (FS)
WTG176 (FT)
WTG177 (FU)
WTG178 (FV)
WTG179 (FW)
WTG180 (FX)
WTG181 (FY)
WTG182 (FZ)
WTG183 (GA)
WTG184 (GB)
WTG185 (GC)
WTG186 (GD)
WTG187 (GE)
WTG188 (GF)
WTG189 (GG)
WTG190 (GH)
WTG191 (GI)
WTG192 (GJ)
WTG193 (GK)
WTG194 (GL)
WTG195 (GM)
WTG196 (GN)
WTG197 (GO)
WTG198 (GP)
WTG199 (GQ)
WTG200 (GR)
WTG201 (GS)
WTG202 (GT)
WTG203 (GU)
WTG204 (GV)
WTG205 (GW)
WTG206 (GX)
WTG207 (GY)
WTG208 (GZ)
WTG209 (HA)
WTG210 (HB)
WTG211 (HC)
WTG212 (HD)
WTG213 (HE)
WTG214 (HF)
WTG215 (HG)
WTG216 (HH)
WTG217 (HI)
WTG218 (HJ)
WTG219 (HK)
WTG220 (HL)
WTG221 (HM)
WTG222 (HN)
WTG223 (HO)
WTG224 (HP)
WTG225 (HQ)
WTG226 (HR)
WTG227 (HS)
WTG228 (HT)
WTG229 (HU)
WTG230 (HV)
WTG231 (HW)
WTG232 (HX)
WTG233 (HY)
WTG234 (HZ)
WTG235 (IA)
WTG236 (IB)
WTG237 (IC)
WTG238 (ID)
WTG239 (IE)
WTG240 (IF)
WTG241 (IG)
WTG242 (IH)
WTG243 (II)
WTG244 (IJ)
WTG245 (IK)
WTG246 (IL)
WTG247 (IM)
WTG248 (IN)
WTG249 (IO)
WTG250 (IP)
WTG251 (IQ)
WTG252 (IR)
WTG253 (IS)
WTG254 (IT)
WTG255 (IU)
WTG256 (IV)
WTG257 (IW)
WTG258 (IX)
WTG259 (IY)
WTG260 (IZ)
WTG261 (JA)
WTG262 (JB)
WTG263 (JC)
WTG264 (JD)
WTG265 (JE)
WTG266 (JF)
WTG267 (JG)
WTG268 (JH)
WTG269 (JI)
WTG270 (JJ)
WTG271 (JK)
WTG272 (JL)
WTG273 (JM)
WTG274 (JN)
WTG275 (JO)
WTG276 (JP)
WTG277 (JQ)
WTG278 (JR)
WTG279 (JS)
WTG280 (JT)
WTG281 (JU)
WTG282 (JV)
WTG283 (JW)
WTG284 (JX)
WTG285 (JY)
WTG286 (JZ)
WTG287 (KA)
WTG288 (KB)
WTG289 (KC)
WTG290 (KD)
WTG291 (KE)
WTG292 (KF)
WTG293 (KG)
WTG294 (KH)
WTG295 (KI)
WTG296 (KJ)
WTG297 (KK)
WTG298 (KL)
WTG299 (KM)
WTG300 (KN)
WTG301 (KO)
WTG302 (KP)
WTG303 (KQ)
WTG304 (KR)
WTG305 (KS)
WTG306 (KT)
WTG307 (KU)
WTG308 (KV)
WTG309 (KW)
WTG310 (KX)
WTG311 (KY)
WTG312 (KZ)
WTG313 (LA)
WTG314 (LB)
WTG315 (LC)
WTG316 (LD)
WTG317 (LE)
WTG318 (LF)
WTG319 (LG)
WTG320 (LH)
WTG321 (LI)
WTG322 (LJ)
WTG323 (LK)
WTG324 (LL)
WTG325 (LM)
WTG326 (LN)
WTG327 (LO)
WTG328 (LP)
WTG329 (LQ)
WTG330 (LR)
WTG331 (LS)
WTG332 (LT)
WTG333 (LU)
WTG334 (LV)
WTG335 (LW)
WTG336 (LX)
WTG337 (LY)
WTG338 (LZ)
WTG339 (MA)
WTG340 (MB)
WTG341 (MC)
WTG342 (MD)
WTG343 (ME)
WTG344 (MF)
WTG345 (MG)
WTG346 (MH)
WTG347 (MI)
WTG348 (MJ)
WTG349 (MK)
WTG350 (ML)
WTG351 (MM)
WTG352 (MN)
WTG353 (MO)
WTG354 (MP)
WTG355 (MQ)
WTG356 (MR)
WTG357 (MS)
WTG358 (MT)
WTG359 (MU)
WTG360 (MV)
WTG361 (MW)
WTG362 (MX)
WTG363 (MY)
WTG364 (MZ)
WTG365 (NA)
WTG366 (NB)
WTG367 (NC)
WTG368 (ND)
WTG369 (NE)
WTG370 (NF)
WTG371 (NG)
WTG372 (NH)
WTG373 (NI)
WTG374 (NJ)
WTG375 (NK)
WTG376 (NL)
WTG377 (NM)
WTG378 (NN)
WTG379 (NO)
WTG380 (NP)
WTG381 (NQ)
WTG382 (NR)
WTG383 (NS)
WTG384 (NT)
WTG385 (NU)
WTG386 (NV)
WTG387 (NW)
WTG388 (NX)
WTG389 (NY)
WTG390 (NZ)
WTG391 (OA)
WTG392 (OB)
WTG393 (OC)
WTG394 (OD)
WTG395 (OE)
WTG396 (OF)
WTG397 (OG)
WTG398 (OH)
WTG399 (OI)
WTG400 (OJ)
WTG401 (OK)
WTG402 (OL)
WTG403 (OM)
WTG404 (ON)
WTG405 (OO)
WTG406 (OP)
WTG407 (OQ)
WTG408 (OR)
WTG409 (OS)
WTG410 (OT)
WTG411 (OU)
WTG412 (OV)
WTG413 (OW)
WTG414 (OX)
WTG415 (OY)
WTG416 (OZ)
WTG417 (PA)
WTG418 (PB)
WTG419 (PC)
WTG420 (PD)
WTG421 (PE)
WTG422 (PF)
WTG423 (PG)
WTG424 (PH)
WTG425 (PI)
WTG426 (PJ)
WTG427 (PK)
WTG428 (PL)
WTG429 (PM)
WTG430 (PN)
WTG431 (PO)
WTG432 (PP)
WTG433 (PQ)
WTG434 (PR)
WTG435 (PS)
WTG436 (PT)
WTG437 (PU)
WTG438 (PV)
WTG439 (PW)
WTG440 (PX)
WTG441 (PY)
WTG442 (PZ)
WTG443 (QA)
WTG444 (QB)
WTG445 (QC)
WTG446 (QD)
WTG447 (QE)
WTG448 (QF)
WTG449 (QG)
WTG450 (QH)
WTG451 (QI)
WTG452 (QJ)
WTG453 (QK)
WTG454 (QL)
WTG455 (QM)
WTG456 (QN)
WTG457 (QO)
WTG458 (QP)
WTG459 (QQ)
WTG460 (QR)
WTG461 (QS)
WTG462 (QT)
WTG463 (QU)
WTG464 (QV)
WTG465 (QW)
WTG466 (QX)
WTG467 (QY)
WTG468 (QZ)
WTG469 (RA)
WTG470 (RB)
WTG471 (RC)
WTG472 (RD)
WTG473 (RE)
WTG474 (RF)
WTG475 (RG)
WTG476 (RH)
WTG477 (RI)
WTG478 (RJ)
WTG479 (RK)
WTG480 (RL)
WTG481 (RM)
WTG482 (RN)
WTG483 (RO)
WTG484 (RP)
WTG485 (RQ)
WTG486 (RR)
WTG487 (RS)
WTG488 (RT)
WTG489 (RU)
WTG490 (RV)
WTG491 (RW)
WTG492 (RX)
WTG493 (RY)
WTG494 (RZ)
WTG495 (SA)
WTG496 (SB)
WTG497 (SC)
WTG498 (SD)
WTG499 (SE)
WTG500 (SF)
WTG501 (SG)
WTG502 (SH)
WTG503 (SI)
WTG504 (SJ)
WTG505 (SK)
WTG506 (SL)
WTG507 (SM)
WTG508 (SN)
WTG509 (SO)
WTG510 (SP)
WTG511 (SQ)
WTG512 (SR)
WTG513 (SS)
WTG514 (ST)
WTG515 (SU)
WTG516 (SV)
WTG517 (SW)
WTG518 (SX)
WTG519 (SY)
WTG520 (SZ)
WTG521 (TA)
WTG522 (TB)
WTG523 (TC)
WTG524 (TD)
WTG525 (TE)
WTG526 (TF)
WTG527 (TG)
WTG528 (TH)
WTG529 (TI)
WTG530 (TJ)
WTG531 (TK)
WTG532 (TL)
WTG533 (TM)
WTG534 (TN)
WTG535 (TO)
WTG536 (TP)
WTG537 (TQ)
WTG538 (TR)
WTG539 (TS)
WTG540 (TT)
WTG541 (TU)
WTG542 (TV)
WTG543 (TW)
WTG544 (TX)
WTG545 (TY)
WTG546 (TZ)
WTG547 (UA)
WTG548 (UB)
WTG549 (UC)
WTG550 (UD)
WTG551 (UE)
WTG552 (UF)
WTG553 (UG)
WTG554 (UH)
WTG555 (UI)
WTG556 (UJ)
WTG557 (UK)
WTG558 (UL)
WTG559 (UM)
WTG560 (UN)
WTG561 (UO)
WTG562 (UP)
WTG563 (UQ)
WTG564 (UR)
WTG565 (US)
WTG566 (UT)
WTG567 (UU)
WTG568 (UV)
WTG569 (UW)
WTG570 (UX)
WTG571 (UY)
WTG572 (UZ)
WTG573 (VA)
WTG574 (VB)
WTG575 (VC)
WTG576 (VD)
WTG577 (VE)
WTG578 (VF)
WTG579 (VG)
WTG580 (VH)
WTG581 (VI)
WTG582 (VJ)
WTG583 (VK)
WTG584 (VL)
WTG585 (VM)
WTG586 (VN)
WTG587 (VO)
WTG588 (VP)
WTG589 (VQ)
WTG590 (VR)
WTG591 (VS)
WTG592 (VT)
WTG593 (VU)
WTG594 (VV)
WTG595 (VW)
WTG596 (VX)
WTG597 (VY)
WTG598 (VZ)
WTG599 (WA)
WTG600 (WB)
WTG601 (WC)
WTG602 (WD)
WTG603 (WE)
WTG604 (WF)
WTG605 (WG)
WTG606 (WH)
WTG607 (WI)
WTG608 (WJ)
WTG609 (WK)
WTG610 (WL)
WTG611 (WM)
WTG612 (WN)
WTG613 (WO)
WTG614 (WP)
WTG615 (WQ)
WTG616 (WR)
WTG617 (WS)
WTG618 (WT)
WTG619 (WU)
WTG620 (WV)
WTG621 (WW)
WTG622 (WX)
WTG623 (WY)
WTG624 (WZ)
WTG625 (XA)
WTG626 (XB)
WTG627 (XC)
WTG628 (XD)
WTG629 (XE)
WTG630 (XF)
WTG631 (XG)
WTG632 (XH)
WTG633 (XI)
WTG634 (XJ)
WTG635 (XK)
WTG636 (XL)
WTG637 (XM)
WTG638 (XN)
WTG639 (XO)
WTG640 (XP)
WTG641 (XQ)
WTG642 (XR)
WTG643 (XS)
WTG644 (XT)
WTG645 (XU)
WTG646 (XV)
WTG647 (XW)
WTG648 (XX)
WTG649 (XY)
WTG650 (XZ)
WTG651 (YA)
WTG652 (YB)
WTG653 (YC)
WTG654 (YD)
WTG655 (YE)
WTG656 (YF)
WTG657 (YG)
WTG658 (YH)
WTG659 (YI)
WTG660 (YJ)
WTG661 (YK)
WTG662 (YL)
WTG663 (YM)
WTG664 (YN)
WTG665 (YO)
WTG666 (YP)
WTG667 (YQ)
WTG668 (YR)
WTG669 (YS)
WTG670 (YT)
WTG671 (YU)
WTG672 (YV)
WTG673 (YW)
WTG674 (YX)
WTG675 (YY)
WTG676 (YZ)
WTG677 (ZA)
WTG678 (ZB)
WTG679 (ZC)
WTG680 (ZD)
WTG681 (ZE)
WTG682 (ZF)
WTG683 (ZG)
WTG684 (ZH)
WTG685 (ZI)
WTG686 (ZJ)
WTG687 (ZK)
WTG688 (ZL)
WTG689 (ZM)
WTG690 (ZN)
WTG691 (ZO)
WTG692 (ZP)
WTG693 (ZQ)
WTG694 (ZR)
WTG695 (ZS)
WTG696 (ZT)
WTG697 (ZU)
WTG698 (ZV)
WTG699 (ZW)
WTG700 (ZX)
WTG701 (ZY)
WTG702 (ZZ)
WTG703 (AAA)
WTG704 (AAB)
WTG705 (AAC)
WTG706 (AAD)
WTG707 (AAE)
WTG708 (AAF)
WTG709 (AAG)
WTG710 (AAH)
WTG711 (AAI)
WTG712 (AAJ)
WTG713 (AAK)
WTG714 (AAL)
WTG715 (AAM)
WTG716 (AAN)
WTG717 (AAO)
WTG718 (AAP)
WTG719 (AAQ)
WTG720 (AAR)
WTG721 (AAS)
WTG722 (AAT)
WTG723 (AAU)
WTG724 (AAV)
WTG725 (AAW)
WTG726 (AAX)
WTG727 (AAY)
WTG728 (AAZ)
WTG729 (ABA)
WTG730 (ABB)
WTG731 (ABC)
WTG732 (ABD)
WTG733 (ABE)
WTG734 (ABF)
WTG735 (ABG)
WTG736 (ABH)
WTG737 (ABI)
WTG738 (ABJ)
WTG739 (ABK)
WTG740 (ABL)
WTG741 (ABM)
WTG742 (ABN)
WTG743 (ABO)
WTG744 (ABP)
WTG745 (ABQ)
WTG746 (ABR)
WTG747 (ABS)
WTG748 (ABT)
WTG749 (ABU)
WTG750 (ABV)
WTG751 (ABW)
WTG752 (ABX)
WTG753 (ABY)
WTG754 (ABZ)
WTG755 (ACA)
WTG756 (ACB)
WTG757 (ACC)
WTG758 (ACD)
WTG759 (ACE)
WTG760 (ACF)
WTG761 (ACG)
WTG762 (ACH)
WTG763 (ACI)
WTG764 (ACJ)
WTG765 (ACK)
WTG766 (ACL)
WTG767 (ACM)
WTG768 (ACN)
WTG769 (ACO)
WTG770 (ACP)
WTG771 (ACQ)
WTG772 (ACR)
WTG773 (ACS)
WTG774 (ACT)
WTG775 (ACU)
WTG776 (ACV)
WTG777 (ACW)
WTG778 (ACX)
WTG779 (ACY)
WTG780 (ACZ)
WTG781 (ADA)
WTG782 (ADB)
WTG783 (ADC)
WTG784 (ADD)
WTG785 (ADE)
WTG786 (ADF)
WTG787 (ADG)
WTG788 (ADH)
WTG789 (ADI)
WTG790 (ADJ)
WTG791 (ADK)
WTG792 (ADL)
WTG793 (ADM)
WTG794 (ADN)
WTG795 (ADO)
WTG796 (ADP)
WTG797 (ADQ)
WTG798 (ADR)
WTG799 (ADS)
WTG800 (ADT)
WTG801 (ADU)
WTG802 (ADV)
WTG803 (ADW)
WTG804 (ADX)
WTG805 (ADY)
WTG806 (ADZ)
WTG807 (AEA)
WTG808 (AEB)
WTG809 (AEC)
WTG810 (AED)
WTG811 (AEE)
WTG812 (AEF)
WTG813 (AEG)
WTG814 (AEH)
WTG815 (AEI)
WTG816 (AEJ)
WTG817 (AEK)
WTG818 (AEL)
WTG819 (AEM)
WTG820 (AEN)
WTG821 (AEO)
WTG822 (AEP)
WTG823 (AEQ)
WTG824 (AER)
WTG825 (AES)
WTG826 (AET)
WTG827 (AEU)
WTG828 (AEV)
WTG829 (AEW)
WTG830 (AEX)
WTG831 (AEY)
WTG832 (AEZ)
WTG833 (AFA)
WTG834 (AFB)
WTG835 (AFC)
WTG836 (AFD)
WTG837 (AFE)
WTG838 (AFF)
WTG839 (AFG)
WTG840 (AFH)
WTG841 (AFI)
WTG842 (AFJ)
WTG843 (AFK)
WTG844 (AFL)
WTG845 (AFM)
WTG846 (AFN)
WTG847 (AFO)
WTG848 (AFP)
WTG849 (AFQ)
WTG850 (AFR)
WTG851 (AFS)
WTG852 (AFT)
WTG853 (AFU)
WTG854 (AFV)
WTG855 (AFW)
WTG856 (AFX)
WTG857 (AFY)
WTG858 (AFZ)
WTG859 (AGA)
WTG860 (AGB)
WTG861 (AGC)
WTG862 (AGD)
WTG863 (AGE)
WTG864 (AGF)
WTG865 (AGG)
WTG866 (AGH)
WTG867 (AGI)
WTG868 (AGJ)
WTG869 (AGK)
WTG870 (AGL)
WTG871 (AGM)
WTG872 (AGN)
WTG873 (AGO)
WTG874 (AGP)
WTG875 (AGQ)
WTG876 (AGR)
WTG877 (AGS)
WTG878 (AGT)
WTG879 (AGU)
WTG880 (AGV)
WTG881 (AGW)
WTG882 (AGX)
WTG883 (AGY)
WTG884 (AGZ)
WTG885 (AHA)
WTG886 (AHB)
WTG887 (AHC)
WTG888 (AHD)
WTG889 (AHE)
WTG890 (AHF)
WTG891 (AHG)
WTG892 (AHH)
WTG893 (AHI)
WTG894 (AHJ)
WTG895 (AHK)
WTG896 (AHL)
WTG897 (AHM)
WTG898 (AHN)
WTG899 (AHO)
WTG900 (AHP)
WTG901 (AHQ)
WTG902 (AHR)
WTG903 (AHS)
WTG904 (AHT)
WTG905 (AHU)
WTG906 (AHV)
WTG907 (AHW)
WTG908 (AHX)
WTG909 (AHY)
WTG910 (AHZ)
WTG911 (AIA)
WTG912 (AIB)
WTG913 (AIC)
WTG914 (AID)
WTG915 (AIE)
WTG916 (AIF)
WTG917 (AIG)
WTG918 (AIH)
WTG919 (AII)
WTG920 (AIJ)
WTG921 (AIK)
WTG922 (AIL)
WTG923 (AIM)
WTG924 (AIN)
WTG925 (AIO)
WTG926 (AIP)
WTG927 (AIQ)
WTG928 (AIR)
WTG929 (AIS)
WTG930 (AIT)
WTG931 (AIU)
WTG932 (AIV)
WTG933 (AIW)
WTG934 (AIX)
WTG935 (AIY)
WTG936 (AIZ)
WTG937 (AJA)
WTG938 (AJB)
WTG939 (AJC)
WTG940 (AJD)
WTG941 (AJE)
WTG942 (AJF)
WTG943 (AJG)
WTG944 (AJH)
WTG945 (AJI)
WTG946 (AJJ)
WTG947 (AJK)
WTG948 (AJL)
WTG949 (AJM)
WTG950 (AJN)
WTG951 (AJO)
WTG952 (AJP)
WTG953 (AJQ)
WTG954 (AJR)
WTG955 (AJS)
WTG956 (AJT)
WTG957 (AJU)
WTG958 (AJV)
WTG959 (AJW)
WTG960 (AJX)
WTG961 (AJY)
WTG962 (AJZ)
WTG963 (AKA)
WTG964 (AKB)
WTG965 (AKC)
WTG966 (AKD)
WTG967 (AKE)
WTG968 (AKF)
WTG969 (AKG)
WTG970 (AKH)
WTG971 (AKI)
WTG972 (AKJ)
WTG973 (AKK)
WTG974 (AKL)
WTG975 (AKM)
WTG976 (AKN)
WTG977 (AKO)
WTG978 (AKP)
WTG979 (AKQ)
WTG980 (AKR)
WTG981 (AKS)
WTG982 (AKT)
WTG983 (AKU)
WTG984 (AKV)
WTG985 (AKW)
WTG986 (AKX)
WTG987 (AKY)
WTG988 (AKZ)
WTG989 (ALA)
WTG990 (ALB)
WTG991 (ALC)
WTG992 (ALD)
WTG993 (ALE)
WTG994 (ALF)
WTG995 (ALG)
WTG996 (ALH)
WTG997 (ALI)
WTG998 (ALJ)
WTG999 (ALK)
WTG1000 (ALL)
WTG1001 (ALM)
WTG1002 (ALN)
WTG1003 (ALO)
WTG1004 (ALP)
WTG1005 (ALQ)
WTG1006 (ALR)
WTG1007 (ALS)
WTG1008 (ALT)
WTG1009 (ALU)
WTG1010 (ALV)
WTG1011 (ALW)
WTG1012 (ALX)
WTG1013 (ALY)
WTG1014 (ALZ)
WTG1015 (AMA)
WTG1016 (AMB)
WTG1017 (AMC)
WTG1018 (AMD)
WTG1019 (AME)
WTG1020 (AMF)
WTG1021 (AMG)
WTG1022 (AMH)
WTG1023 (AMI)
WTG1024 (AMJ)
WTG1025 (AMK)
WTG1026 (AML)
WTG1027 (AMM)
WTG1028 (AMN)
WTG1029 (AMO)
WTG1030 (AMP)
WTG1031 (AMQ)
WTG1032 (AMR)
WTG1033 (AMS)
WTG1034 (AMT)
WTG1035 (AMU)
WTG1036 (AMV)
WTG1037 (AMW)
WTG1038 (AMX)
WTG1039 (AMY)
WTG1040 (AMZ)
WTG1041 (ANA)
WTG1042 (ANB)
WTG1043 (ANC)
WTG1044 (AND)
WTG1045 (ANE)
WTG1046 (ANF)
WTG1047 (ANG)
WTG1048 (ANH)
WTG1049 (ANI)
WTG1050 (ANJ)
WTG1051 (ANK)
WTG1052 (ANL)
WTG1053 (ANM)
WTG1054 (ANN)
WTG1055 (ANO)
WTG1056 (ANP)
WTG1057 (ANQ)
WTG1058 (ANR)
WTG1059 (ANS)
WTG1060 (ANT)
WTG1061 (ANU)
WTG1062 (ANV)
WTG1063 (ANW)
WTG1064 (ANX)
WTG1065 (ANY)
WTG1066 (ANZ)
WTG1067 (AOA)
WTG1068 (AOB)
WTG1069 (AOC)
WTG1070 (AOD)
WTG1071 (AOE)
WTG1072 (AOF)
WTG1073 (AOG)
WTG1074 (AOH)
WTG1075 (AOI)
WTG1076 (AOJ)
WTG1077 (AOK)
WTG1078 (AOL)
WTG1079 (AOM)
WTG1080 (AON)
WTG1081 (AOO)
WTG1082 (AOP)
WTG1083 (AOQ)
WTG1084 (AOR)
WTG1085 (AOS)
WTG1086 (AOT)
WTG1087 (AOU)
WTG1088 (AOV)
WTG1089 (AOW)
WTG1090 (AOX)
WTG1091 (AOY)
WTG1092 (AOZ)
WTG1093 (APA)
WTG1094 (APB)
WTG1095 (APC)
WTG1096 (APD)
WTG1097 (APE)
WTG1098 (APF)
WTG1099 (APG)
WTG1100 (APH)
WTG1101 (API)
WTG1102 (APJ)
WTG1103 (APK)
WTG1104 (APL)
WTG1105 (APM)
WTG1106 (APN)
WTG1107 (APO)
WTG1108 (APP)
WTG1109 (APQ)
WTG1110 (APR)
WTG1111 (APS)
WTG1112 (APT)
WTG1113 (APU)
WTG1114 (APV)
WTG1115 (APW)
WTG1116 (APX)
WTG1117 (APY)
WTG1118 (APZ)
WTG1119 (AQA)
WTG1120 (AQB)
WTG1121 (AQC)
WTG1122 (AQD)
WTG1123 (AQE)
WTG1124 (AQF)
WTG1125 (AQG)
WTG1126 (AQH)
WTG1127 (AQI)
WTG1128 (AQJ)
WTG1129 (AQK)
WTG1130 (AQL)
WTG1131 (AQM)
WTG1132 (AQN)
WTG1133 (AQO)
WTG1134 (AQP)
WTG1135 (AQQ)
WTG1136 (AQR)
WTG1137 (AQS)
WTG1138 (AQT)
WTG1139 (AQU)
WTG1140 (AQV)
WTG1141 (AQW)
WTG1142 (AQX)
WTG1143 (AQY)
WTG1144 (AQZ)
WTG1145 (ARA)
WTG1146 (ARB)
WTG1147 (ARC)
WTG1148 (ARD)
WTG1149 (ARE)
WTG1150 (ARF)
WTG1151 (ARG)
WTG1152 (ARH)
WTG1153 (ARI)
WTG1154 (ARJ)
WTG1155 (ARK)
WTG1156 (ARL)
WTG1157 (ARM)
WTG1158 (ARN)
WTG1159 (ARO)
WTG1160 (ARP)
WTG1161 (ARQ)
WTG1162 (ARR)
WTG1163 (ARS)
WTG1164 (ART)
WTG1165 (ARU)
WTG1166 (ARV)
WTG1167 (ARW)
WTG1168 (ARX)
WTG1169 (ARY)
WTG1170 (ARZ)
WTG1171 (ASA)
WTG1172 (ASB)
WTG1173 (ASC)
WTG1174 (ASD)
WTG1175 (ASE)
WTG1176 (ASF)
WTG1177 (ASG)
WTG1178 (ASH)
WTG1179 (ASI)
WTG1180 (ASJ)
WTG1181 (ASK)
WTG1182 (ASL)
WTG1183 (ASM)
WTG1184 (ASN)
WTG1185 (ASO)
WTG1186 (ASP)
WTG1187 (ASQ)
WTG1188 (ASR)
WTG1189 (ASS)
WTG1190 (AST)
WTG1191 (ASU)
WTG1192 (ASV)
WTG1193 (ASW)
WTG1194 (ASX)
WTG1195 (ASY)
WTG1196 (ASZ)
WTG1197 (ATA)
WTG1198 (ATB)
WTG1199 (ATC)
WTG1200 (ATD)
WTG1201 (ATE)
WTG1202 (ATF)
WTG1203 (ATG)
WTG1204 (ATH)
WTG1205 (ATI)
WTG1206 (ATJ)
WTG1207 (ATK)
WTG1208 (ATL)
WTG1209 (ATM)
WTG1210 (ATN)
WTG1211 (ATO)
WTG1212 (ATP)
WTG1213 (ATQ)
WTG1214 (ATR)
WTG1215 (ATS)
WTG1216 (ATT)
WTG1217 (ATU)
WTG1218 (ATV)
WTG1219 (ATW)
WTG1220 (ATX)
WTG1221 (ATY)
WTG1222 (ATZ)
WTG1223 (AUA)
WTG1224 (AUB)
WTG1225 (AUC)
WTG1226 (AUD)
WTG1227 (AUE)
WTG1228 (AUF)
WTG1229 (AUG)
WTG1230 (AUH)
WTG1231 (AUI)
WTG1232 (AUJ)
WTG1233 (AUK)
WTG1234 (AUL)
WTG1235 (AUM)
WTG1236 (AUN)
WTG1237 (AUO)
WTG1238 (AUP)
WTG1239 (AUQ)
WTG1240 (AUR)
WTG1241 (AUS)
WTG1242 (AUT)
WTG1243 (AUU)
WTG1244 (AUV)
WTG1245 (AUW)
WTG1246 (AUX)
WTG1247 (AUY)
WTG1248 (AUZ)
WTG1249 (AVA)
WTG1250 (AVB)
WTG1251 (AVC)
WTG1252 (AVD)
WTG1253 (AVE)
WTG1254 (AVF)
WTG1255 (AVG)
WTG1256 (AVH)
WTG1257 (AVI)
WTG1258 (AVJ)
WTG1259 (AVK)
WTG1260 (AVL)
WTG1261 (AVM)
WTG1262 (AVN)
WTG1263 (AVO)
WTG1264 (AVP)
WTG1265 (AVQ)
WTG1266 (AVR)
WTG1267 (AVS)
WTG1268 (AVT)
WTG1269 (AVU)
WTG1270 (AVV)
WTG1271 (AVW)
WTG1272 (AVX)
WTG1273 (AVY)
WTG1274 (AVZ)
WTG1275 (AWA)
WTG1276 (AWB)
WTG1277 (AWC)
WTG1278 (AWD)
WTG1279 (AWE)
WTG1280 (AWF)
WTG1281 (AWG)
WTG1282 (AWH)
WTG1283 (AWI)
WTG1284 (AWJ)
WTG1285 (AWK)
WTG1286 (AWL)
WTG1287 (AWM)
WTG1288 (AWN)
WTG1289 (AWO)
WTG1290 (AWP)
WTG1291 (AWQ)
WTG1292 (AWR)
WTG1293 (AWS)
WTG1294 (AWT)
WTG1295 (AWU)
WTG1296 (AWV)
WTG1297 (AWW)
WTG1298 (AWX)
WTG1299 (AWY)
WTG1300 (AWZ)
WTG1301 (AXA)
WTG1302 (AXB)
WTG1303 (AXC)
WTG1304 (AXD)
WTG1305 (AXE)
WTG1306 (AXF)
WTG1307 (AXG)
WTG1308 (AXH)
WTG1309 (AXI)
WTG1310 (AXJ)
WTG1311 (AXK)
WTG1312 (AXL)
WTG1313 (AXM)
WTG1314 (AXN)
WTG1315 (AXO)
WTG1316 (AXP)
WTG1317 (AXQ)
WTG1318 (AXR)
WTG1319 (AXS)
WTG1320 (AXT)
WTG1321 (AXU)
WTG1322 (AXV)
WTG1323 (AXW)
WTG1324 (AXX)
WTG1325 (AXY)
WTG1326 (AXZ)
WTG1327 (AYA)
WTG1328 (AYB)
WTG1329 (AYC)
WTG1330 (AYD)
WTG1331 (AYE)
WTG1332 (AYF)
WTG1333 (AYG)
WTG1334 (AYH)
WTG1335 (AYI)
WTG1336 (AYJ)
WTG1337 (AYK)
WTG1338 (AYL)
WTG1339 (AYM)
WTG1340 (AYN)
WTG1341 (AYO)
WTG1342 (AYP)
WTG1343 (AYQ)
WTG1344 (AYR)
WTG1345 (AYS)
WTG1346 (AYT)
WTG1347 (AYU)
WTG1348 (AYV)
WTG1349 (AYW)
WTG1350 (AYX)
WTG1351 (AYY)
WTG1352 (AYZ)
WTG1353 (AZA)
WTG1354 (AZB)
WTG1355 (AZC)
WTG1356 (AZD)
WTG1357 (AZE)
WTG1358 (AZF)
WTG1359 (AZG)
WTG1360 (AZH)
WTG1361 (AZI)
WTG1362 (AZJ)
WTG1363 (AZK)
WTG1364 (AZL)
WTG1365 (AZM)
WTG1366 (AZN)
WTG1367 (AZO)
WTG1368 (AZP)
WTG1369 (AZQ)
WTG1370 (AZR)
WTG1371 (AZS)
WTG1372 (AZT)
WTG1373 (AZU)
WTG1374 (AZV)
WTG1375 (AZW)
WTG1376 (AZX)
WTG1377 (AZY)
WTG1378 (AZZ)
WTG1379 (BAA)
WTG1380 (BAB)
WTG1381 (BAC)
WTG1382 (BAD)
WTG1383 (BAE)
WTG1384 (BAF)
WTG1385 (BAG)
WTG1386 (BAH)
WTG1387 (BAI)
WTG1388 (BAJ)
WTG1389 (BAK)
WTG1390 (BAL)
WTG1391 (BAM)
WTG1392 (BAN)
WTG1393 (BAO)
WTG1394 (BAP)
WTG1395 (BAQ)
WTG1396 (BAR)
WTG1397 (BAS)
WTG1398 (BAT)
WTG1399 (BAU)
WTG1400 (BAV)
WTG1401 (BAW)
WTG1402 (BAX)
WTG1403 (BAY)
WTG1404 (BAZ)
WTG1405 (BBA)
WTG1406 (BBB)
WTG1407 (BBC)
WTG1408 (BBD)
WTG1409 (BBE)
WTG1410 (BBF)
WTG1411 (BBG)
WTG1412 (BBH)
WTG1413 (BBI)
WTG1414 (BBJ)
WTG1415 (BBK)
WTG1416 (BBL)
WTG1417 (BBM)
WTG1418 (BBN)
WTG1419 (BBO)
WTG1420 (BBP)
WTG1421 (BBQ)
WTG1422 (BBR)
WTG1423 (BBS)
WTG1424 (BBT)
WTG1425 (BBU)
WTG1426 (BBV)
WTG1427 (BBW)
WTG1428 (BBX)
WTG1429 (BBY)
WTG1430 (BBZ)
WTG1431 (BCA)
WTG1432 (BCB)
WTG1433 (BCC)
WTG1434 (BCD)
WTG1435 (BCE)
WTG1436 (BCF)
WTG1437 (BCG)
WTG1438 (BCH)
WTG1439 (BCI)
WTG


N
W
E
S
WTG-12-4
WTG-12-5
WTG-12-6
WTG-12-7
WTG-11-4
WTG-11-5
WTG-11-6
WTG-11-7
Spare
WTG-10-8
WTG-10-9
WTG-10-10
WTG-10-11
WTG-10-12
Spare
WTG-10-13
WTG-9-6
WTG-9-7
WTG-9-8
WTG-9-9
Spare
WTG-9-10
WTG-9-11
WTG-9-12
WTG-8-6
WTG-8-7
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
WTG-8-12
6013
6014
6015
6064
6065
TLC 0.36
TLC 0.37
TLB 0.90
TLB 0.96
TLB 0.98
TLB 0.99
TLC 0.41
TLC 0.42
TLC 0.43
TLC 0.44
TLC 0.46
TLC 0.47
TLB 0.91
TLB 0.92
TLB 0.93
TLB 0.94
TLB 0.95
TLB 0.97
TLC 0.38
TLC 0.39
TLC 0.40
TLC 0.45
TLB 0.81
TLB 0.82
TLB 0.83
TLB 0.84
TLB 0.85
TLB 0.86
TLB 0.87
TLB 0.88
TLB 0.89
TLC 0.25
TLC 0.26
TLC 0.27
TLC 0.28
TLC 0.29
TLC 0.30
TLC 0.31
TLC 0.32
TLC 0.33
TLC 0.34
TLC 0.35
TLB 0.61
TLB 0.62
TLB 0.63
TLB 0.64
TLB 0.65
TLB 0.66
TLB 0.67
TLB 0.68
TLB 0.69
TLB 0.70
TLB 0.71
TLB 0.72
TLB 0.73
TLB 0.74
TLB 0.75
TLB 0.76
TLB 0.77
TLB 0.78
TLB 0.79
TLB 0.80
TLC 0.20
TLC 0.21
TLC 0.22
TLC 0.23
TLC 0.24
TLB 0.41
TLB 0.42
TLB 0.43
TLB 0.44
TLB 0.45
TLB 0.46
TLB 0.47
TLB 0.48
TLB 0.49
TLB 0.50
TLB 0.51
TLB 0.52
TLB 0.53
TLB 0.54
TLB 0.55
TLB 0.56
TLB 0.57
TLB 0.58
TLB 0.59
TLB 0.60
TLC 0.15
TLC 0.16
TLC 0.17
TLC 0.18
TLC 0.19
TLB 0.21
TLB 0.22
TLB 0.23
TLB 0.24
TLB 0.25
TLB 0.26
TLB 0.27
TLB 0.28
TLB 0.29
TLB 0.30
TLB 0.31
TLB 0.32
TLB 0.33
TLB 0.34
TLB 0.35
TLB 0.36
TLB 0.37
TLB 0.38
TLB 0.39
TLB 0.40
TLC 0.10
TLC 0.11
TLC 0.12
TLC 0.13
TLC 0.14
TLB 0.01
TLB 0.02
TLB 0.03
TLB 0.04
TLB 0.05
TLB 0.06
TLB 0.07
TLB 0.08
TLB 0.09
TLB 0.10
TLB 0.11
TLB 0.12
TLB 0.13
TLB 0.14
TLB 0.15
TLB 0.16
TLB 0.17
TLB 0.18
TLB 0.19
TLB 0.20
TLC 0.01
TLC 0.02
TLC 0.03
TLC 0.04
TLC 0.05
TLC 0.06
TLC 0.07
TLC 0.08
TLC 0.09
WTG05 (E)
WTG06 (F)
WTG07 (G)
WTG08 (H)
WTG09 (I)
WTG10 (J)
WTG11 (K)
WTG12 (L)
WTG13 (M)
WTG14 (N)
WTG15 (O)
WTG16 (P)
WTG17 (Q)
WTG18 (R)
WTG19 (S)
WTG20 (T)
WTG21 (U)
WTG22 (V)
WTG23 (W)
WTG24 (X)
WTG25 (Y)
WTG26 (Z)
WTG27 (AA)
WTG28 (AB)
WTG29 (AC)
WTG30 (AD)
WTG31 (AE)
WTG32 (AF)
WTG33 (AG)
WTG34 (AH)
WTG35 (AI)
WTG36 (AJ)
WTG37 (AK)
WTG38 (AL)
WTG39 (AM)
WTG40 (AN)
WTG41 (AO)
WTG42 (AP)
WTG43 (AQ)
WTG44 (AR)
WTG45 (AS)
WTG46 (AT)
WTG47 (AU)
WTG48 (AV)
WTG49 (AW)
WTG50 (AX)
WTG51 (AY)
WTG52 (AZ)
WTG53 (BA)
WTG54 (BB)
WTG55 (BC)
WTG56 (BD)
WTG57 (BE)
WTG58 (BF)
WTG59 (BG)
WTG60 (BH)
WTG61 (BI)
WTG62 (BJ)
WTG63 (BK)
WTG64 (BL)
WTG65 (BM)
WTG66 (BN)
WTG67 (BO)
WTG68 (BP)
WTG69 (BQ)
WTG70 (BR)
WTG71 (BS)
WTG72 (BT)
WTG73 (BU)
WTG74 (BV)
WTG75 (BW)
WTG76 (BX)
WTG77 (BY)
WTG78 (BZ)
WTG79 (CA)
WTG80 (CB)
WTG81 (CC)
WTG82 (CD)
WTG83 (CE)
WTG84 (CF)
WTG85 (CG)
WTG86 (CH)
WTG87 (CI)
WTG88 (CJ)
WTG89 (CK)
WTG90 (CL)
WTG91 (CM)
WTG92 (CN)
WTG93 (CO)
WTG94 (CP)
WTG95 (CQ)
WTG96 (CR)
WTG97 (CS)
WTG98 (CT)
WTG99 (CU)
WTG100 (CV)
WTG101 (CW)
WTG102 (CX)
WTG103 (CY)
WTG104 (CZ)
WTG105 (DA)
WTG106 (DB)
WTG107 (DC)
WTG108 (DD)
WTG109 (DE)
WTG110 (DF)
WTG111 (DG)
WTG112 (DH)
WTG113 (DI)
WTG114 (DJ)
WTG115 (DK)
WTG116 (DL)
WTG117 (DM)
WTG118 (DN)
WTG119 (DO)
WTG120 (DP)
WTG121 (DQ)
WTG122 (DR)
WTG123 (DS)
WTG124 (DT)
WTG125 (DU)
WTG126 (DV)
WTG127 (DW)
WTG128 (DX)
WTG129 (DY)
WTG130 (DZ)
WTG131 (EA)
WTG132 (EB)
WTG133 (EC)
WTG134 (ED)
WTG135 (EE)
WTG136 (EF)
WTG137 (EG)
WTG138 (EH)
WTG139 (EI)
WTG140 (EJ)
WTG141 (EK)
WTG142 (EL)
WTG143 (EM)
WTG144 (EN)
WTG145 (EO)
WTG146 (EP)
WTG147 (EQ)
WTG148 (ER)
WTG149 (ES)
WTG150 (ET)
WTG151 (EU)
WTG152 (EV)
WTG153 (EW)
WTG154 (EX)
WTG155 (EY)
WTG156 (EZ)
WTG157 (FA)
WTG158 (FB)
WTG159 (FC)
WTG160 (FD)
WTG161 (FE)
WTG162 (FF)
WTG163 (FG)
WTG164 (FH)
WTG165 (FI)
WTG166 (FJ)
WTG167 (FK)
WTG168 (FL)
WTG169 (FM)
WTG170 (FN)
WTG171 (FO)
WTG172 (FP)
WTG173 (FQ)
WTG174 (FR)
WTG175 (FS)
WTG176 (FT)
WTG177 (FU)
WTG178 (FV)
WTG179 (FW)
WTG180 (FX)
WTG181 (FY)
WTG182 (FZ)
WTG183 (GA)
WTG184 (GB)
WTG185 (GC)
WTG186 (GD)
WTG187 (GE)
WTG188 (GF)
WTG189 (GG)
WTG190 (GH)
WTG191 (GI)
WTG192 (GJ)
WTG193 (GK)
WTG194 (GL)
WTG195 (GM)
WTG196 (GN)
WTG197 (GO)
WTG198 (GP)
WTG199 (GQ)
WTG200 (GR)
WTG201 (GS)
WTG202 (GT)
WTG203 (GU)
WTG204 (GV)
WTG205 (GW)
WTG206 (GX)
WTG207 (GY)
WTG208 (GZ)
WTG209 (HA)
WTG210 (HB)
WTG211 (HC)
WTG212 (HD)
WTG213 (HE)
WTG214 (HF)
WTG215 (HG)
WTG216 (HH)
WTG217 (HI)
WTG218 (HJ)
WTG219 (HK)
WTG220 (HL)
WTG221 (HM)
WTG222 (HN)
WTG223 (HO)
WTG224 (HP)
WTG225 (HQ)
WTG226 (HR)
WTG227 (HS)
WTG228 (HT)
WTG229 (HU)
WTG230 (HV)
WTG231 (HW)
WTG232 (HX)
WTG233 (HY)
WTG234 (HZ)
WTG235 (IA)
WTG236 (IB)
WTG237 (IC)
WTG238 (ID)
WTG239 (IE)
WTG240 (IF)
WTG241 (IG)
WTG242 (IH)
WTG243 (II)
WTG244 (IJ)
WTG245 (IK)
WTG246 (IL)
WTG247 (IM)
WTG248 (IN)
WTG249 (IO)
WTG250 (IP)
WTG251 (IQ)
WTG252 (IR)
WTG253 (IS)
WTG254 (IT)
WTG255 (IU)
WTG256 (IV)
WTG257 (IW)
WTG258 (IX)
WTG259 (IY)
WTG260 (IZ)
WTG261 (JA)
WTG262 (JB)
WTG263 (JC)
WTG264 (JD)
WTG265 (JE)
WTG266 (JF)
WTG267 (JG)
WTG268 (JH)
WTG269 (JI)
WTG270 (JJ)
WTG271 (JK)
WTG272 (JL)
WTG273 (JM)
WTG274 (JN)
WTG275 (JO)
WTG276 (JP)
WTG277 (JQ)
WTG278 (JR)
WTG279 (JS)
WTG280 (JT)
WTG281 (JU)
WTG282 (JV)
WTG283 (JW)
WTG284 (JX)
WTG285 (JY)
WTG286 (JZ)
WTG287 (KA)
WTG288 (KB)
WTG289 (KC)
WTG290 (KD)
WTG291 (KE)
WTG292 (KF)
WTG293 (KG)
WTG294 (KH)
WTG295 (KI)
WTG296 (KJ)
WTG297 (KK)
WTG298 (KL)
WTG299 (KM)
WTG300 (KN)
WTG301 (KO)
WTG302 (KP)
WTG303 (KQ)
WTG304 (KR)
WTG305 (KS)
WTG306 (KT)
WTG307 (KU)
WTG308 (KV)
WTG309 (KW)
WTG310 (KX)
WTG311 (KY)
WTG312 (KZ)
WTG313 (LA)
WTG314 (LB)
WTG315 (LC)
WTG316 (LD)
WTG317 (LE)
WTG318 (LF)
WTG319 (LG)
WTG320 (LH)
WTG321 (LI)
WTG322 (LJ)
WTG323 (LK)
WTG324 (LL)
WTG325 (LM)
WTG326 (LN)
WTG327 (LO)
WTG328 (LP)
WTG329 (LQ)
WTG330 (LR)
WTG331 (LS)
WTG332 (LT)
WTG333 (LU)
WTG334 (LV)
WTG335 (LW)
WTG336 (LX)
WTG337 (LY)
WTG338 (LZ)
WTG339 (MA)
WTG340 (MB)
WTG341 (MC)
WTG342 (MD)
WTG343 (ME)
WTG344 (MF)
WTG345 (MG)
WTG346 (MH)
WTG347 (MI)
WTG348 (MJ)
WTG349 (MK)
WTG350 (ML)
WTG351 (MM)
WTG352 (MN)
WTG353 (MO)
WTG354 (MP)
WTG355 (MQ)
WTG356 (MR)
WTG357 (MS)
WTG358 (MT)
WTG359 (MU)
WTG360 (MV)
WTG361 (MW)
WTG362 (MX)
WTG363 (MY)
WTG364 (MZ)
WTG365 (NA)
WTG366 (NB)
WTG367 (NC)
WTG368 (ND)
WTG369 (NE)
WTG370 (NF)
WTG371 (NG)
WTG372 (NH)
WTG373 (NI)
WTG374 (NJ)
WTG375 (NK)
WTG376 (NL)
WTG377 (NM)
WTG378 (NN)
WTG379 (NO)
WTG380 (NP)
WTG381 (NQ)
WTG382 (NR)
WTG383 (NS)
WTG384 (NT)
WTG385 (NU)
WTG386 (NV)
WTG387 (NW)
WTG388 (NX)
WTG389 (NY)
WTG390 (NZ)
WTG391 (OA)
WTG392 (OB)
WTG393 (OC)
WTG394 (OD)
WTG395 (OE)
WTG396 (OF)
WTG397 (OG)
WTG398 (OH)
WTG399 (OI)
WTG400 (OJ)
WTG401 (OK)
WTG402 (OL)
WTG403 (OM)
WTG404 (ON)
WTG405 (OO)
WTG406 (OP)
WTG407 (OQ)
WTG408 (OR)
WTG409 (OS)
WTG410 (OT)
WTG411 (OU)
WTG412 (OV)
WTG413 (OW)
WTG414 (OX)
WTG415 (OY)
WTG416 (OZ)
WTG417 (PA)
WTG418 (PB)
WTG419 (PC)
WTG420 (PD)
WTG421 (PE)
WTG422 (PF)
WTG423 (PG)
WTG424 (PH)
WTG425 (PI)
WTG426 (PJ)
WTG427 (PK)
WTG428 (PL)
WTG429 (PM)
WTG430 (PN)
WTG431 (PO)
WTG432 (PP)
WTG433 (PQ)
WTG434 (PR)
WTG435 (PS)
WTG436 (PT)
WTG437 (PU)
WTG438 (PV)
WTG439 (PW)
WTG440 (PX)
WTG441 (PY)
WTG442 (PZ)
WTG443 (QA)
WTG444 (QB)
WTG445 (QC)
WTG446 (QD)
WTG447 (QE)
WTG448 (QF)
WTG449 (QG)
WTG450 (QH)
WTG451 (QI)
WTG452 (QJ)
WTG453 (QK)
WTG454 (QL)
WTG455 (QM)
WTG456 (QN)
WTG457 (QO)
WTG458 (QP)
WTG459 (QQ)
WTG460 (QR)
WTG461 (QS)
WTG462 (QT)
WTG463 (QU)
WTG464 (QV)
WTG465 (QW)
WTG466 (QX)
WTG467 (QY)
WTG468 (QZ)
WTG469 (RA)
WTG470 (RB)
WTG471 (RC)
WTG472 (RD)
WTG473 (RE)
WTG474 (RF)
WTG475 (RG)
WTG476 (RH)
WTG477 (RI)
WTG478 (RJ)
WTG479 (RK)
WTG480 (RL)
WTG481 (RM)
WTG482 (RN)
WTG483 (RO)
WTG484 (RP)
WTG485 (RQ)
WTG486 (RR)
WTG487 (RS)
WTG488 (RT)
WTG489 (RU)
WTG490 (RV)
WTG491 (RW)
WTG492 (RX)
WTG493 (RY)
WTG494 (RZ)
WTG495 (SA)
WTG496 (SB)
WTG497 (SC)
WTG498 (SD)
WTG499 (SE)
WTG500 (SF)
WTG501 (SG)
WTG502 (SH)
WTG503 (SI)
WTG504 (SJ)
WTG505 (SK)
WTG506 (SL)
WTG507 (SM)
WTG508 (SN)
WTG509 (SO)
WTG510 (SP)
WTG511 (SQ)
WTG512 (SR)
WTG513 (SS)
WTG514 (ST)
WTG515 (SU)
WTG516 (SV)
WTG517 (SW)
WTG518 (SX)
WTG519 (SY)
WTG520 (SZ)
WTG521 (TA)
WTG522 (TB)
WTG523 (TC)
WTG524 (TD)
WTG525 (TE)
WTG526 (TF)
WTG527 (TG)
WTG528 (TH)
WTG529 (TI)
WTG530 (TJ)
WTG531 (TK)
WTG532 (TL)
WTG533 (TM)
WTG534 (TN)
WTG535 (TO)
WTG536 (TP)
WTG537 (TQ)
WTG538 (TR)
WTG539 (TS)
WTG540 (TT)
WTG541 (TU)
WTG542 (TV)
WTG543 (TW)
WTG544 (TX)
WTG545 (TY)
WTG546 (TZ)
WTG547 (UA)
WTG548 (UB)
WTG549 (UC)
WTG550 (UD)
WTG551 (UE)
WTG552 (UF)
WTG553 (UG)
WTG554 (UH)
WTG555 (UI)
WTG556 (UJ)
WTG557 (UK)
WTG558 (UL)
WTG559 (UM)
WTG560 (UN)
WTG561 (UO)
WTG562 (UP)
WTG563 (UQ)
WTG564 (UR)
WTG565 (US)
WTG566 (UT)
WTG567 (UU)
WTG568 (UV)
WTG569 (UW)
WTG570 (UX)
WTG571 (UY)
WTG572 (UZ)
WTG573 (VA)
WTG574 (VB)
WTG575 (VC)
WTG576 (VD)
WTG577 (VE)
WTG578 (VF)
WTG579 (VG)
WTG580 (VH)
WTG581 (VI)
WTG582 (VJ)
WTG583 (VK)
WTG584 (VL)
WTG585 (VM)
WTG586 (VN)
WTG587 (VO)
WTG588 (VP)
WTG589 (VQ)
WTG590 (VR)
WTG591 (VS)
WTG592 (VT)
WTG593 (VU)
WTG594 (VV)
WTG595 (VW)
WTG596 (VX)
WTG597 (VY)
WTG598 (VZ)
WTG599 (WA)
WTG600 (WB)
WTG601 (WC)
WTG602 (WD)
WTG603 (WE)
WTG604 (WF)
WTG605 (WG)
WTG606 (WH)
WTG607 (WI)
WTG608 (WJ)
WTG609 (WK)
WTG610 (WL)
WTG611 (WM)
WTG612 (WN)
WTG613 (WO)
WTG614 (WP)
WTG615 (WQ)
WTG616 (WR)
WTG617 (WS)
WTG618 (WT)
WTG619 (WU)
WTG620 (WV)
WTG621 (WW)
WTG622 (WX)
WTG623 (WY)
WTG624 (WZ)
WTG625 (XA)
WTG626 (XB)
WTG627 (XC)
WTG628 (XD)
WTG629 (XE)
WTG630 (XF)
WTG631 (XG)
WTG632 (XH)
WTG633 (XI)
WTG634 (XJ)
WTG635 (XK)
WTG636 (XL)
WTG637 (XM)
WTG638 (XN)
WTG639 (XO)
WTG640 (XP)
WTG641 (XQ)
WTG642 (XR)
WTG643 (XS)
WTG644 (XT)
WTG645 (XU)
WTG646 (XV)
WTG647 (XW)
WTG648 (XX)
WTG649 (XY)
WTG650 (XZ)
WTG651 (YA)
WTG652 (YB)
WTG653 (YC)
WTG654 (YD)
WTG655 (YE)
WTG656 (YF)
WTG657 (YG)
WTG658 (YH)
WTG659 (YI)
WTG660 (YJ)
WTG661 (YK)
WTG662 (YL)
WTG663 (YM)
WTG664 (YN)
WTG665 (YO)
WTG666 (YP)
WTG667 (YQ)
WTG668 (YR)
WTG669 (YS)
WTG670 (YT)
WTG671 (YU)
WTG672 (YV)
WTG673 (YW)
WTG674 (YX)
WTG675 (YY)
WTG676 (YZ)
WTG677 (ZA)
WTG678 (ZB)
WTG679 (ZC)
WTG680 (ZD)
WTG681 (ZE)
WTG682 (ZF)
WTG683 (ZG)
WTG684 (ZH)
WTG685 (ZI)
WTG686 (ZJ)
WTG687 (ZK)
WTG688 (ZL)
WTG689 (ZM)
WTG690 (ZN)
WTG691 (ZO)
WTG692 (ZP)
WTG693 (ZQ)
WTG694 (ZR)
WTG695 (ZS)
WTG696 (ZT)
WTG697 (ZU)
WTG698 (ZV)
WTG699 (ZW)
WTG700 (ZX)
WTG701 (ZY)
WTG702 (ZZ)
WTG703 (AAA)
WTG704 (AAB)
WTG705 (AAC)
WTG706 (AAD)
WTG707 (AAE)
WTG708 (AAF)
WTG709 (AAG)
WTG710 (AAH)
WTG711 (AAI)
WTG712 (AAJ)
WTG713 (AAK)
WTG714 (AAL)
WTG715 (AAM)
WTG716 (AAN)
WTG717 (AAO)
WTG718 (AAP)
WTG719 (AAQ)
WTG720 (AAR)
WTG721 (AAS)
WTG722 (AAT)
WTG723 (AAU)
WTG724 (AAV)
WTG725 (AAW)
WTG726 (AAX)
WTG727 (AAY)
WTG728 (AAZ)
WTG729 (ABA)
WTG730 (ABB)
WTG731 (ABC)
WTG732 (ABD)
WTG733 (ABE)
WTG734 (ABF)
WTG735 (ABG)
WTG736 (ABH)
WTG737 (ABI)
WTG738 (ABJ)
WTG739 (ABK)
WTG740 (ABL)
WTG741 (ABM)
WTG742 (ABN)
WTG743 (ABO)
WTG744 (ABP)
WTG745 (ABQ)
WTG746 (ABR)
WTG747 (ABS)
WTG748 (ABT)
WTG749 (ABU)
WTG750 (ABV)
WTG751 (ABW)
WTG752 (ABX)
WTG753 (ABY)
WTG754 (ABZ)
WTG755 (ACA)
WTG756 (ACB)
WTG757 (ACC)
WTG758 (ACD)
WTG759 (ACE)
WTG760 (ACF)
WTG761 (ACG)
WTG762 (ACH)
WTG763 (ACI)
WTG764 (ACJ)
WTG765 (ACK)
WTG766 (ACL)
WTG767 (ACM)
WTG768 (ACN)
WTG769 (ACO)
WTG770 (ACP)
WTG771 (ACQ)
WTG772 (ACR)
WTG773 (ACS)
WTG774 (ACT)
WTG775 (ACU)
WTG776 (ACV)
WTG777 (ACW)
WTG778 (ACX)
WTG779 (ACY)
WTG780 (ACZ)
WTG781 (ADA)
WTG782 (ADB)
WTG783 (ADC)
WTG784 (ADD)
WTG785 (ADE)
WTG786 (ADF)
WTG787 (ADG)
WTG788 (ADH)
WTG789 (ADI)
WTG790 (ADJ)
WTG791 (ADK)
WTG792 (ADL)
WTG793 (ADM)
WTG794 (ADN)
WTG795 (ADO)
WTG796 (ADP)
WTG797 (ADQ)
WTG798 (ADR)
WTG799 (ADS)
WTG800 (ADT)
WTG801 (ADU)
WTG802 (ADV)
WTG803 (ADW)
WTG804 (ADX)
WTG805 (ADY)
WTG806 (ADZ)
WTG807 (AEA)
WTG808 (AEB)
WTG809 (AEC)
WTG810 (AED)
WTG811 (AEE)
WTG812 (AEF)
WTG813 (AEG)
WTG814 (AEH)
WTG815 (AEI)
WTG816 (AEJ)
WTG817 (AEK)
WTG818 (AEL)
WTG819 (AEM)
WTG820 (AEN)
WTG821 (AEO)
WTG822 (AEP)
WTG823 (AEQ)
WTG824 (AER)
WTG825 (AES)
WTG826 (AET)
WTG827 (AEU)
WTG828 (AEV)
WTG829 (AEW)
WTG830 (AEX)
WTG831 (AEY)
WTG832 (AEZ)
WTG833 (AFA)
WTG834 (AFB)
WTG835 (AFC)
WTG836 (AFD)
WTG837 (AFE)
WTG838 (AFF)
WTG839 (AFG)
WTG840 (AFH)
WTG841 (AFI)
WTG842 (AFJ)
WTG843 (AFK)
WTG844 (AFL)
WTG845 (AFM)
WTG846 (AFN)
WTG847 (AFO)
WTG848 (AFP)
WTG849 (AFQ)
WTG850 (AFR)
WTG851 (AFS)
WTG852 (AFT)
WTG853 (AFU)
WTG854 (AFV)
WTG855 (AFW)
WTG856 (AFX)
WTG857 (AFY)
WTG858 (AFZ)
WTG859 (AGA)
WTG860 (AGB)
WTG861 (AGC)
WTG862 (AGD)
WTG863 (AGE)
WTG864 (AGF)
WTG865 (AGG)
WTG866 (AGH)
WTG867 (AGI)
WTG868 (AGJ)
WTG869 (AGK)
WTG870 (AGL)
WTG871 (AGM)
WTG872 (AGN)
WTG873 (AGO)
WTG874 (AGP)
WTG875 (AGQ)
WTG876 (AGR)
WTG877 (AGS)
WTG878 (AGT)
WTG879 (AGU)
WTG880 (AGV)
WTG881 (AGW)
WTG882 (AGX)
WTG883 (AGY)
WTG884 (AGZ)
WTG885 (AHA)
WTG886 (AHB)
WTG887 (AHC)
WTG888 (AHD)
WTG889 (AHE)
WTG890 (AHF)
WTG891 (AHG)
WTG892 (AHH)
WTG893 (AHI)
WTG894 (AHJ)
WTG895 (AHK)
WTG896 (AHL)
WTG897 (AHM)
WTG898 (AHN)
WTG899 (AHO)
WTG900 (AHP)
WTG901 (AHQ)
WTG902 (AHR)
WTG903 (AHS)
WTG904 (AHT)
WTG905 (AHU)
WTG906 (AHV)
WTG907 (AHW)
WTG908 (AHX)
WTG909 (AHY)
WTG910 (AHZ)
WTG911 (AIA)
WTG912 (AIB)
WTG913 (AIC)
WTG914 (AID)
WTG915 (AIE)
WTG916 (AIF)
WTG917 (AIG)
WTG918 (AIH)
WTG919 (AII)
WTG920 (AIJ)
WTG921 (AIK)
WTG922 (AIL)
WTG923 (AIM)
WTG924 (AIN)
WTG925 (AIO)
WTG926 (AIP)
WTG927 (AIQ)
WTG928 (AIR)
WTG929 (AIS)
WTG930 (AIT)
WTG931 (AIU)
WTG932 (AIV)
WTG933 (AIW)
WTG934 (AIX)
WTG935 (AIY)
WTG936 (AIZ)
WTG937 (AJA)
WTG938 (AJB)
WTG939 (AJC)
WTG940 (AJD)
WTG941 (AJE)
WTG942 (AJF)
WTG943 (AJG)
WTG944 (AJH)
WTG945 (AJI)
WTG946 (AJJ)
WTG947 (AJK)
WTG948 (AJL)
WTG949 (AJM)
WTG950 (AJN)
WTG951 (AJO)
WTG952 (AJP)
WTG953 (AJQ)
WTG954 (AJR)
WTG955 (AJS)
WTG956 (AJT)
WTG957 (AJU)
WTG958 (AJV)
WTG959 (AJW)
WTG960 (AJX)
WTG961 (AJY)
WTG962 (AJZ)
WTG963 (AKA)
WTG964 (AKB)
WTG965 (AKC)
WTG966 (AKD)
WTG967 (AKE)
WTG968 (AKF)
WTG969 (AKG)
WTG970 (AKH)
WTG971 (AKI)
WTG972 (AKJ)
WTG973 (AKK)
WTG974 (AKL)
WTG975 (AKM)
WTG976 (AKN)
WTG977 (AKO)
WTG978 (AKP)
WTG979 (AKQ)
WTG980 (AKR)
WTG981 (AKS)
WTG982 (AKT)
WTG983 (AKU)
WTG984 (AKV)
WTG985 (AKW)
WTG986 (AKX)
WTG987 (AKY)
WTG988 (AKZ)
WTG989 (ALA)
WTG990 (ALB)
WTG991 (ALC)
WTG992 (ALD)
WTG993 (ALE)
WTG994 (ALF)
WTG995 (ALG)
WTG996 (ALH)
WTG997 (ALI)
WTG998 (ALJ)
WTG999 (ALK)
WTG1000 (ALL)
WTG1001 (ALM)
WTG1002 (ALN)
WTG1003 (ALO)
WTG1004 (ALP)
WTG1005 (ALQ)
WTG1006 (ALR)
WTG1007 (ALS)
WTG1008 (ALT)
WTG1009 (ALU)
WTG1010 (ALV)
WTG1011 (ALW)
WTG1012 (ALX)
WTG1013 (ALY)
WTG1014 (ALZ)
WTG1015 (AMA)
WTG1016 (AMB)
WTG1017 (AMC)
WTG1018 (AMD)
WTG1019 (AME)
WTG1020 (AMF)
WTG1021 (AMG)
WTG1022 (AMH)
WTG1023 (AMI)
WTG1024 (AMJ)
WTG1025 (AMK)
WTG1026 (AML)
WTG1027 (AMM)
WTG1028 (AMN)
WTG1029 (AMO)
WTG1030 (AMP)
WTG1031 (AMQ)
WTG1032 (AMR)
WTG1033 (AMS)
WTG1034 (AMT)
WTG1035 (AMU)
WTG1036 (AMV)
WTG1037 (AMW)
WTG1038 (AMX)
WTG1039 (AMY)
WTG1040 (AMZ)
WTG1041 (ANA)
WTG1042 (ANB)
WTG1043 (ANC)
WTG1044 (AND)
WTG1045 (ANE)
WTG1046 (ANF)
WTG1047 (ANG)
WTG1048 (ANH)
WTG1049 (ANI)
WTG1050 (ANJ)
WTG1051 (ANK)
WTG1052 (ANL)
WTG1053 (ANM)
WTG1054 (ANN)
WTG1055 (ANO)
WTG1056 (ANP)
WTG1057 (ANQ)
WTG1058 (ANR)
WTG1059 (ANS)
WTG1060 (ANT)
WTG1061 (ANU)
WTG1062 (ANV)
WTG1063 (ANW)
WTG1064 (ANX)
WTG1065 (ANY)
WTG1066 (ANZ)
WTG1067 (AOA)
WTG1068 (AOB)
WTG1069 (AOC)
WTG1070 (AOD)
WTG1071 (AOE)
WTG1072 (AOF)
WTG1073 (AOG)
WTG1074 (AOH)
WTG1075 (AOI)
WTG1076 (AOJ)
WTG1077 (AOK)
WTG1078 (AOL)
WTG1079 (AOM)
WTG1080 (AON)
WTG1081 (AOO)
WTG1082 (AOP)
WTG1083 (AOQ)
WTG1084 (AOR)
WTG1085 (AOS)
WTG1086 (AOT)
WTG1087 (AOU)
WTG1088 (AOV)
WTG1089 (AOW)
WTG1090 (AOX)
WTG1091 (AOY)
WTG1092 (AOZ)
WTG1093 (APA)
WTG1094 (APB)
WTG1095 (APC)
WTG1096 (APD)
WTG1097 (APE)
WTG1098 (APF)
WTG1099 (APG)
WTG1100 (APH)
WTG1101 (API)
WTG1102 (APJ)
WTG1103 (APK)
WTG1104 (APL)
WTG1105 (APM)
WTG1106 (APN)
WTG1107 (APO)
WTG1108 (APP)
WTG1109 (APQ)
WTG1110 (APR)
WTG1111 (APS)
WTG1112 (APT)
WTG1113 (APU)
WTG1114 (APV)
WTG1115 (APW)
WTG1116 (APX)
WTG1117 (APY)
WTG1118 (APZ)
WTG1119 (AQA)
WTG1120 (AQB)
WTG1121 (AQC)
WTG1122 (AQD)
WTG1123 (AQE)
WTG1124 (AQF)
WTG1125 (AQG)
WTG1126 (AQH)
WTG1127 (AQI)
WTG1128 (AQJ)
WTG1129 (AQK)
WTG1130 (AQL)
WTG1131 (AQM)
WTG1132 (AQN)
WTG1133 (AQO)
WTG1134 (AQP)
WTG1135 (AQQ)
WTG1136 (AQR)
WTG1137 (AQS)
WTG1138 (AQT)
WTG1139 (AQU)
WTG1140 (AQV)
WTG1141 (AQW)
WTG1142 (AQX)
WTG1143 (AQY)
WTG1144 (AQZ)
WTG1145 (ARA)
WTG1146 (ARB)
WTG1147 (ARC)
WTG1148 (ARD)
WTG1149 (ARE)
WTG1150 (ARF)
WTG1151 (ARG)
WTG1152 (ARH)
WTG1153 (ARI)
WTG1154 (ARJ)
WTG1155 (ARK)
WTG1156 (ARL)
WTG1157 (ARM)
WTG1158 (ARN)
WTG1159 (ARO)
WTG1160 (ARP)
WTG1161 (ARQ)
WTG1162 (ARR)
WTG1163 (ARS)
WTG1164 (ART)
WTG1165 (ARU)
WTG1166 (ARV)
WTG1167 (ARW)
WTG1168 (ARX)
WTG1169 (ARY)
WTG1170 (ARZ)
WTG1171 (ASA)
WTG1172 (ASB)
WTG1173 (ASC)
WTG1174 (ASD)
WTG1175 (ASE)
WTG1176 (ASF)
WTG1177 (ASG)
WTG1178 (ASH)
WTG1179 (ASI)
WTG1180 (ASJ)
WTG1181 (ASK)
WTG1182 (ASL)
WTG1183 (ASM)
WTG1184 (ASN)
WTG1185 (ASO)
WTG1186 (ASP)
WTG1187 (ASQ)
WTG1188 (ASR)
WTG1189 (ASS)
WTG1190 (AST)
WTG1191 (ASU)
WTG1192 (ASV)
WTG1193 (ASW)
WTG1194 (ASX)
WTG1195 (ASY)
WTG1196 (ASZ)
WTG1197 (ATA)
WTG1198 (ATB)
WTG1199 (ATC)
WTG1200 (ATD)
WTG1201 (ATE)
WTG1202 (ATF)
WTG1203 (ATG)
WTG1204 (ATH)
WTG1205 (ATI)
WTG1206 (ATJ)
WTG1207 (ATK)
WTG1208 (ATL)
WTG1209 (ATM)
WTG1210 (ATN)
WTG1211 (ATO)
WTG1212 (ATP)
WTG1213 (ATQ)
WTG1214 (ATR)
WTG1215 (ATS)
WTG1216 (ATT)
WTG1217 (ATU)
WTG1218 (ATV)
WTG1219 (ATW)
WTG1220 (ATX)
WTG1221 (ATY)
WTG1222 (ATZ)
WTG1223 (AUA)
WTG1224 (AUB)
WTG1225 (AUC)
WTG1226 (AUD)
WTG1227 (AUE)
WTG1228 (AUF)
WTG1229 (AUG)
WTG1230 (AUH)
WTG1231 (AUI)
WTG1232 (AUJ)
WTG1233 (AUK)
WTG1234 (AUL)
WTG1235 (AUM)
WTG1236 (AUN)
WTG1237 (AUO)
WTG1238 (AUP)
WTG1239 (AUQ)
WTG1240 (AUR)
WTG1241 (AUS)
WTG1242 (AUT)
WTG1243 (AUU)
WTG1244 (AUV)
WTG1245 (AUW)
WTG1246 (AUX)
WTG1247 (AUY)
WTG1248 (AUZ)
WTG1249 (AVA)
WTG1250 (AVB)
WTG1251 (AVC)
WTG1252 (AVD)
WTG1253 (AVE)
WTG1254 (AVF)
WTG1255 (AVG)
WTG1256 (AVH)
WTG1257 (AVI)
WTG1258 (AVJ)
WTG1259 (AVK)
WTG1260 (AVL)
WTG1261 (AVM)
WTG1262 (AVN)
WTG1263 (AVO)
WTG1264 (AVP)
WTG1265 (AVQ)
WTG1266 (AVR)
WTG1267 (AVS)
WTG1268 (AVT)
WTG1269 (AVU)
WTG1270 (AVV)
WTG1271 (AVW)
WTG1272 (AVX)
WTG1273 (AVY)
WTG1274 (AVZ)
WTG1275 (AWA)
WTG1276 (AWB)
WTG1277 (AWC)
WTG1278 (AWD)
WTG1279 (AWE)
WTG1280 (AWF)
WTG1281 (AWG)
WTG1282 (AWH)
WTG1283 (AWI)
WTG1284 (AWJ)
WTG1285 (AWK)
WTG1286 (AWL)
WTG1287 (AWM)
WTG1288 (AWN)
WTG1289 (AWO)
WTG1290 (AWP)
WTG1291 (AWQ)
WTG1292 (AWR)
WTG1293 (AWS)
WTG1294 (AWT)
WTG1295 (AWU)
WTG1296 (AWV)
WTG1297 (AWW)
WTG1298 (AWX)
WTG1299 (AWY)
WTG1300 (AWZ)
WTG1301 (AXA)
WTG1302 (AXB)
WTG1303 (AXC)
WTG1304 (AXD)
WTG1305 (AXE)
WTG1306 (AXF)
WTG1307 (AXG)
WTG1308 (AXH)
WTG1309 (AXI)
WTG1310 (AXJ)
WTG1311 (AXK)
WTG1312 (AXL)
WTG1313 (AXM)
WTG1314 (AXN)
WTG1315 (AXO)
WTG1316 (AXP)
WTG1317 (AXQ)
WTG1318 (AXR)
WTG1319 (AXS)
WTG1320 (AXT)
WTG1321 (AXU)
WTG1322 (AXV)
WTG1323 (AXW)
WTG1324 (AXX)
WTG1325 (AXY)
WTG1326 (AXZ)
WTG1327 (AYA)
WTG1328 (AYB)
WTG1329 (AYC)
WTG1330 (AYD)
WTG1331 (AYE)
WTG1332 (AYF)
WTG1333 (AYG)
WTG1334 (AYH)
WTG1335 (AYI)
WTG1336 (AYJ)
WTG1337 (AYK)
WTG1338 (AYL)
WTG1339 (AYM)
WTG1340 (AYN)
WTG1341 (AYO)
WTG1342 (AYP)
WTG1343 (AYQ)
WTG1344 (AYR)
WTG1345



General Map Symbols

- Dominion Lease Boundary OCS-A 0483
- Proposed Cable Route "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block Main Chart OCS-A 0483
- Tile Panel 1 - 9 Main Chart
- WTG Location Preliminary position/subject to change
- OSS Location Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck Source: NOAA Office of Coast Survey

USA State and Cities - Geographic Data, downloaded from ESRI Sources: Esri, TomTom, North America Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

Seabed Features

- Slope
- Flat
- Wreck
- Scour/Erosion Features
- Boulder/Boulderfield
- Linear Seabed Feature
- Seabed Feature Depression Point
- Trash Aggregation
- Depression

Seabed Morphology

- Ripple
- Megaripple
- Sediment Wavefield
- Sand Ridge Area
- Sand Ridge Crest
- Side Scan Sonar Contact
- Magnetic Anomaly

Note: Contact and anomaly labels are truncated.

Geologic Setting

The survey area lies along a portion of mid North Atlantic continental shelf that is subject to multiple concurrent processes that shape the overall geologic/stratigraphic framework of the region. These include glacio-eustatic sea level changes, variations in sediment supply from and proximity to the Chesapeake Bay drainage system, and storm related effects on sediment supply and distribution.

Multiple studies have been conducted that examine the transgressive/regressive influence on the seismic stratigraphy of the Atlantic shelf. On broader timescales, the work of Greenlee et al. (1992) and others provides the overall identifying characteristics of high stand, low stand, transgressive and regressive system tracts as evidenced along the outer New Jersey shelf and slope. This work is complemented by that of Duncan et al. (2000) who focus on the latest quaternary portion of the record. Closer to the CVOW survey area (approximately 180 km SSW), the work of Mallinson et al. (2005 and 2010) and that of Theiler et al. (2015) provide a more immediate stratigraphic framework over the late Quaternary that can be correlated to the acquired data.

Fluvial influence over the late quaternary has been investigated extensively by Chen et al.(1995), Oertel and Foyle (1995) and others. These investigations, based primarily on very shallow sub-bottom profiles, seek to establish a sequence stratigraphic framework and chronology for the numerous channel features imaged in the shallow subsurface proximal to the mouth of the Chesapeake Bay. However, these interpretations are extremely limited by the quality of data collected and are reflective of the state of technology at the time. The dominant bathymetric features within the survey area are pronounced sand ridges. These features, which create a "ridge and swale" topography, are present as a result of storm related sediment dynamics and hydrodynamic interactions with transgressive/regressive relict features such as beach ridges, etc. (Swift et al. 1973, 1986; Trowbridge 1995).

Seabed Feature Interpretation

Regions containing seabed features and hazards were identified and digitized from gridded multibeam, backscatter, sidescan, and slope gradient datasets.

The digitized seabed features and hazards were given classifications according to the Coastal Marine Ecological Classification Standard (CMECS) 2012 in addition to classifications based on the prevalence of 'Moderate' to 'Very Steep' BOEM slope gradients.

Morphology Interpretation

Morphological bedforms; Ripples, Megaripples, and/or Sand Waves were identified and digitized from gridded multibeam, backscatter, and sidescan data.

Digitized morphology was given classifications according to the Coastal Marine Ecological Classification Standard (CMECS) 2012.

Magnetometer Interpretation

Evaluation of the 10Hz gradiometric magnetometer data involved processing the total field of individual magnetometer readings and reducing them to a residual magnetic profile. A total of 28094 magnetic anomalies were interpreted within the survey area.

General Information

Equipment		TerraSond Personnel	
Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommander Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]	Commercial Manager	: Scott Croft
		Project Manager	: Don Ross
		Project Manager	: James Hougham
		Production Manager	: Kate Mildon
Positioning System	: Applanix POSMV and Hemisphere	Technical Manager	: Chris McHugh
USBL	: Sonardyne Ranger 2 (19-34 kHz)	Geophysical Manager	: Scott Hiller
Multibeam Echosounder	: Teledyne T50 (200-400 kHz)	Operations Manager	: William Busey
	: RZSonic 2024 (200-400 kHz)[6]	Party Chief	: Mark MacLean
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)	Lead Surveyor	: Larry Andrews
Magnetometer	: Geometrics G-882 (TVG)	Director HSEQ	: Forrest Davis
Subbottom Profiler	: Innomar SES-2000 medium		
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200×400 and 96-Element Streamer		
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer		
Sparker[2]	: Geospark 200×400 and 96-Element Streamer		
Sound Velocity Profiler	: AML MVP30/MVP200[7]	This geophysical survey was conducted April 29th, 2020 through June13th, 2021	
Acquistion Software	: QINSy		

Coordinate Reference System

Horizontal Coordinate Reference System

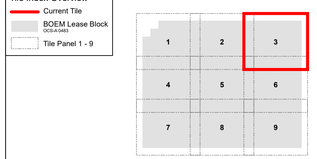
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

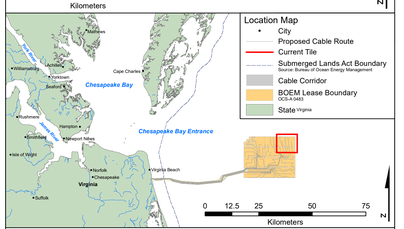
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block OCS-A 0483
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



0 12.5 25 50 75 Kilometers

0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 3c
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURE
SEABED FEATURES AND MORPHOLOGY (CMECS)
TILE 3 of 9

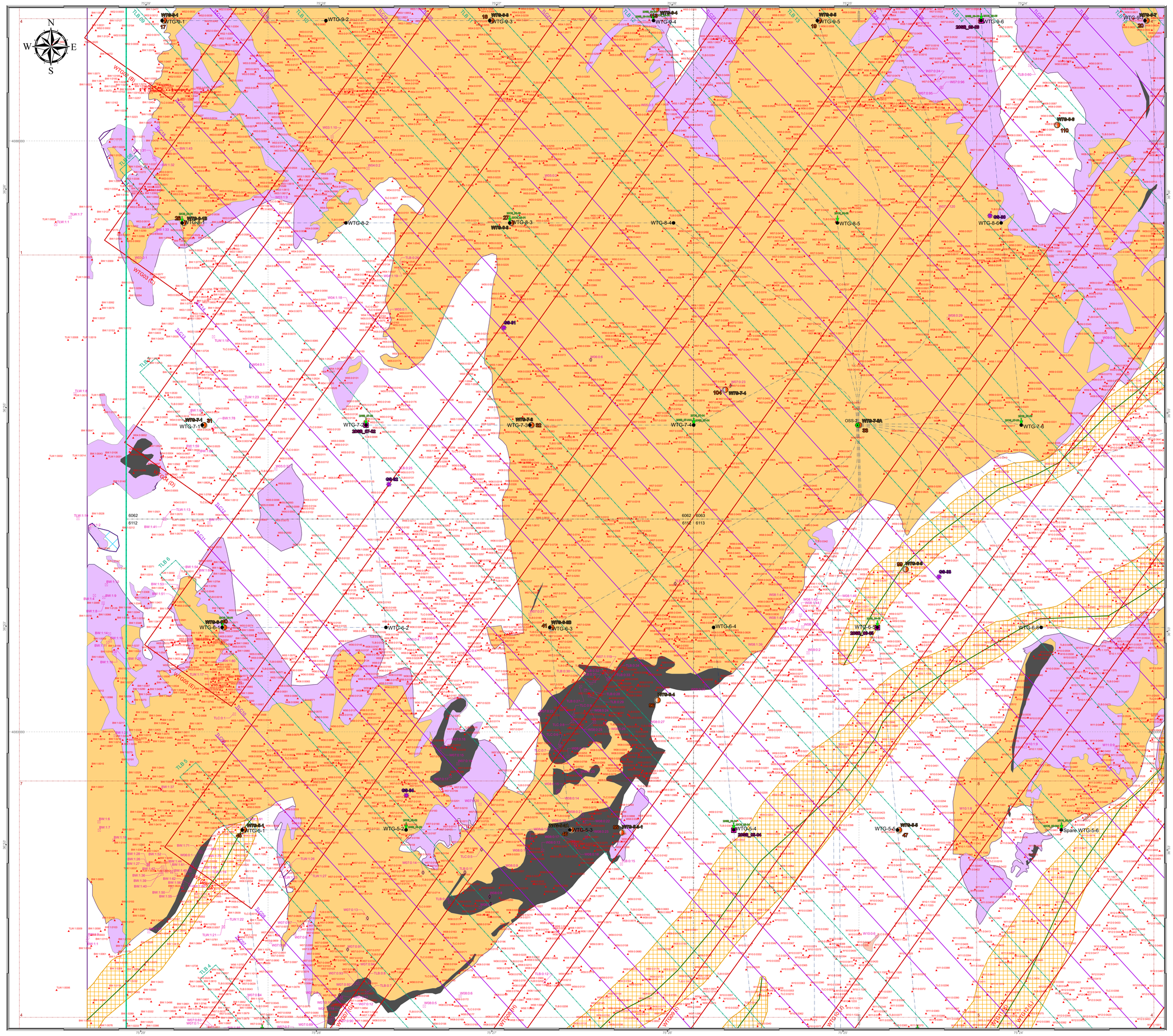
DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/21/21	Rev00	CLS	KDW	KMM
07/30/21	Rev01	CLS	KDW	KMM

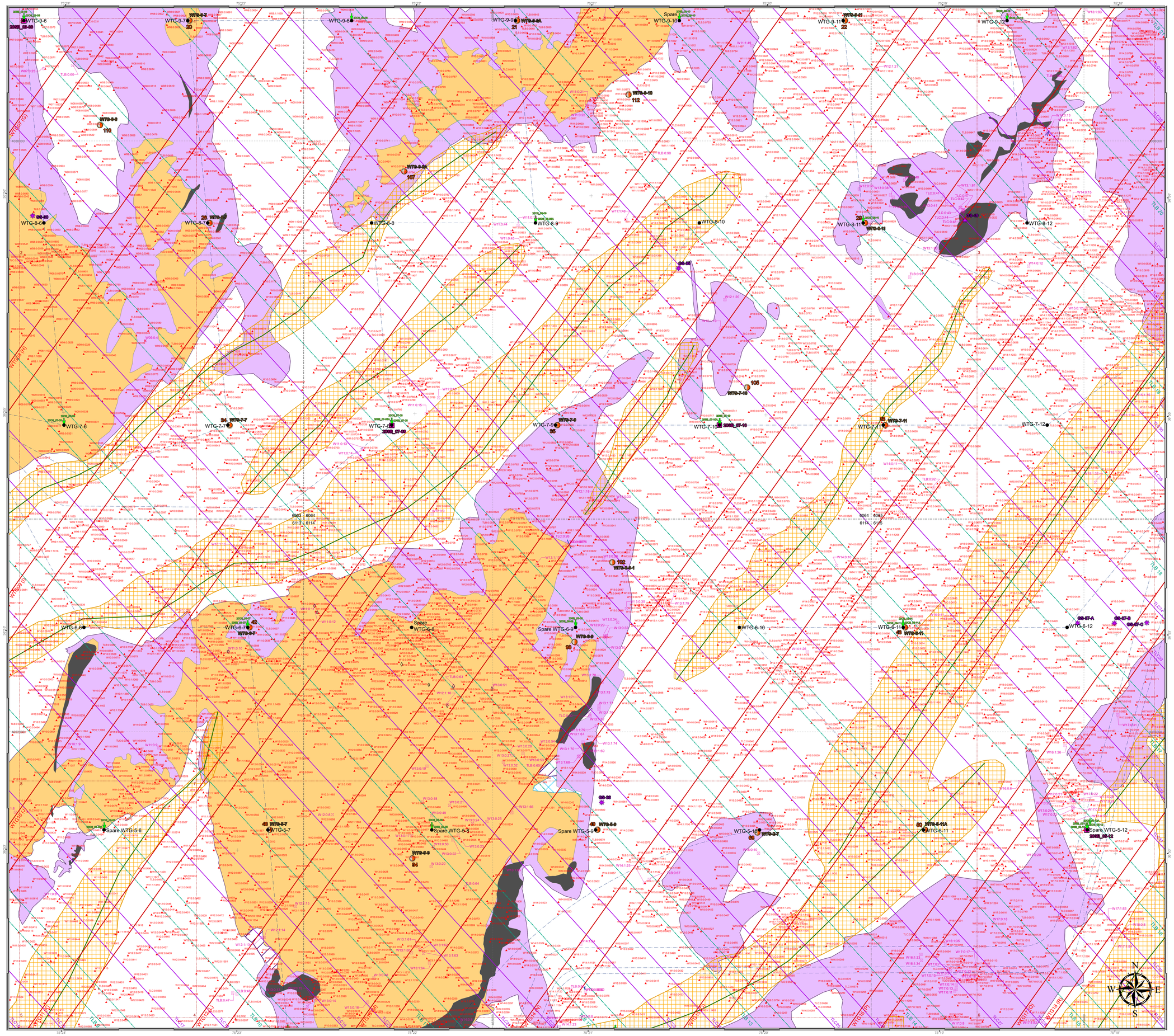
Rev01

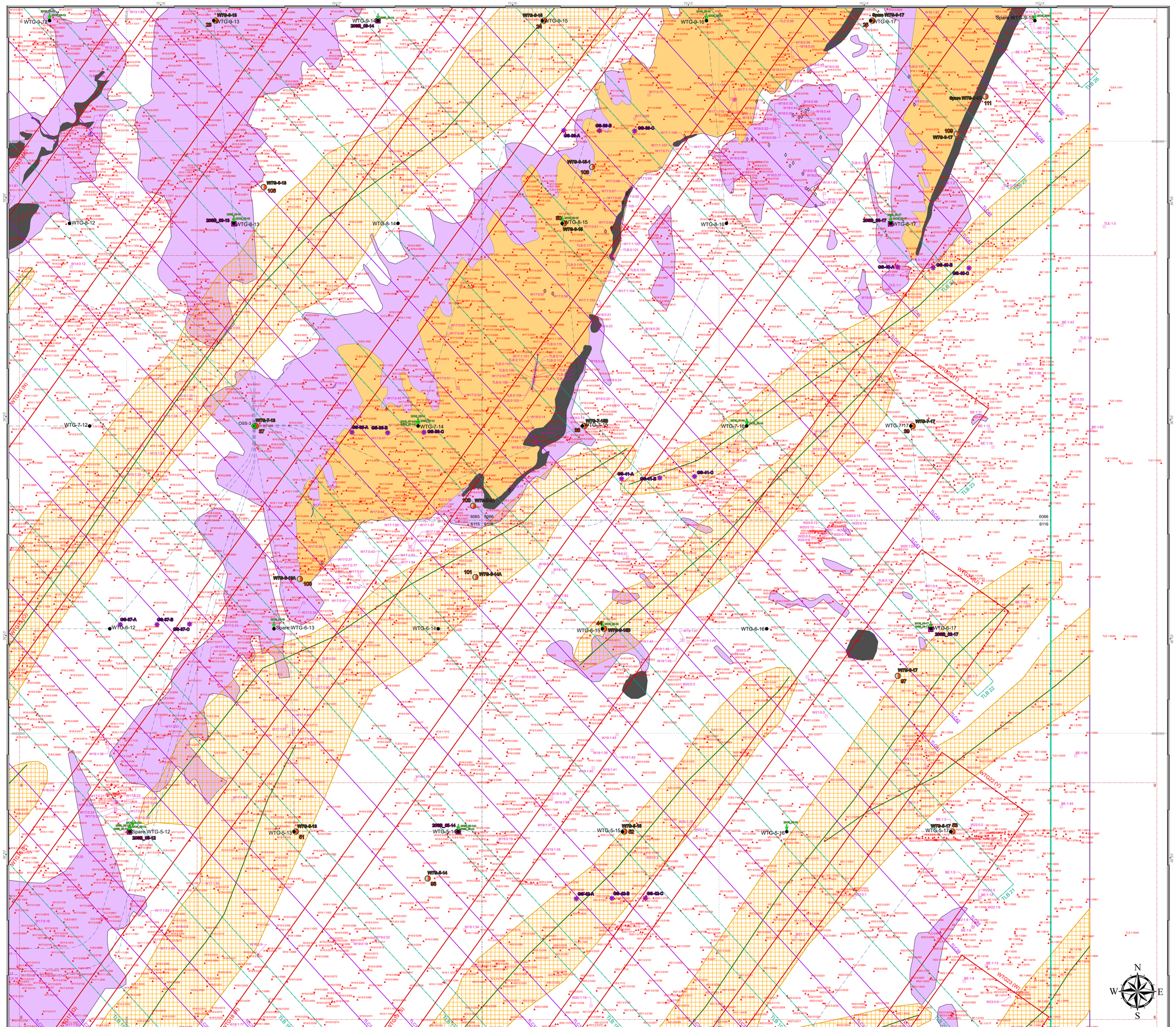
Date: 7/31/2021

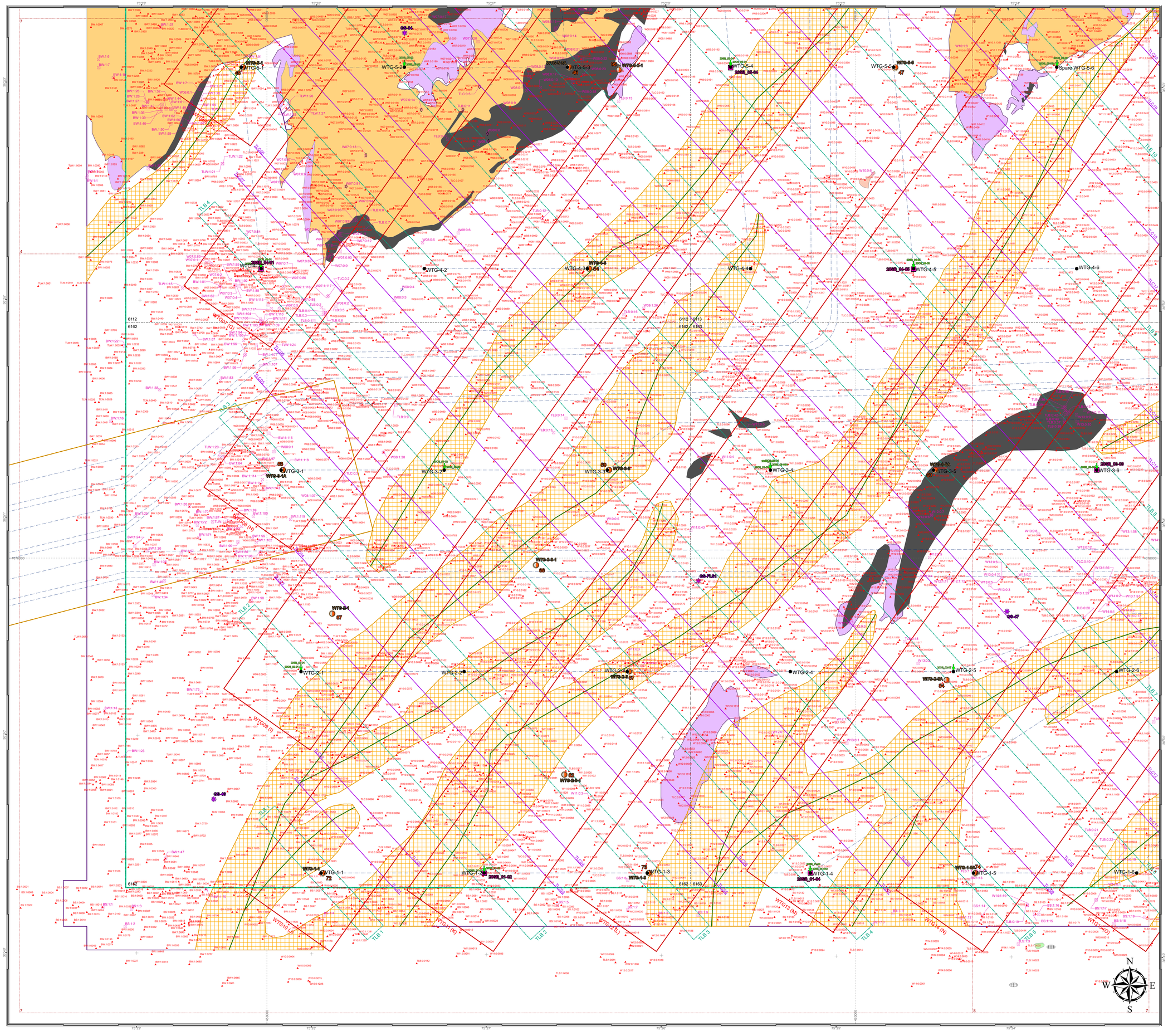
File Name: Dominion_GeoSurfaceFeatures_FeaturesMorph_CMECS_Rev01.pdf

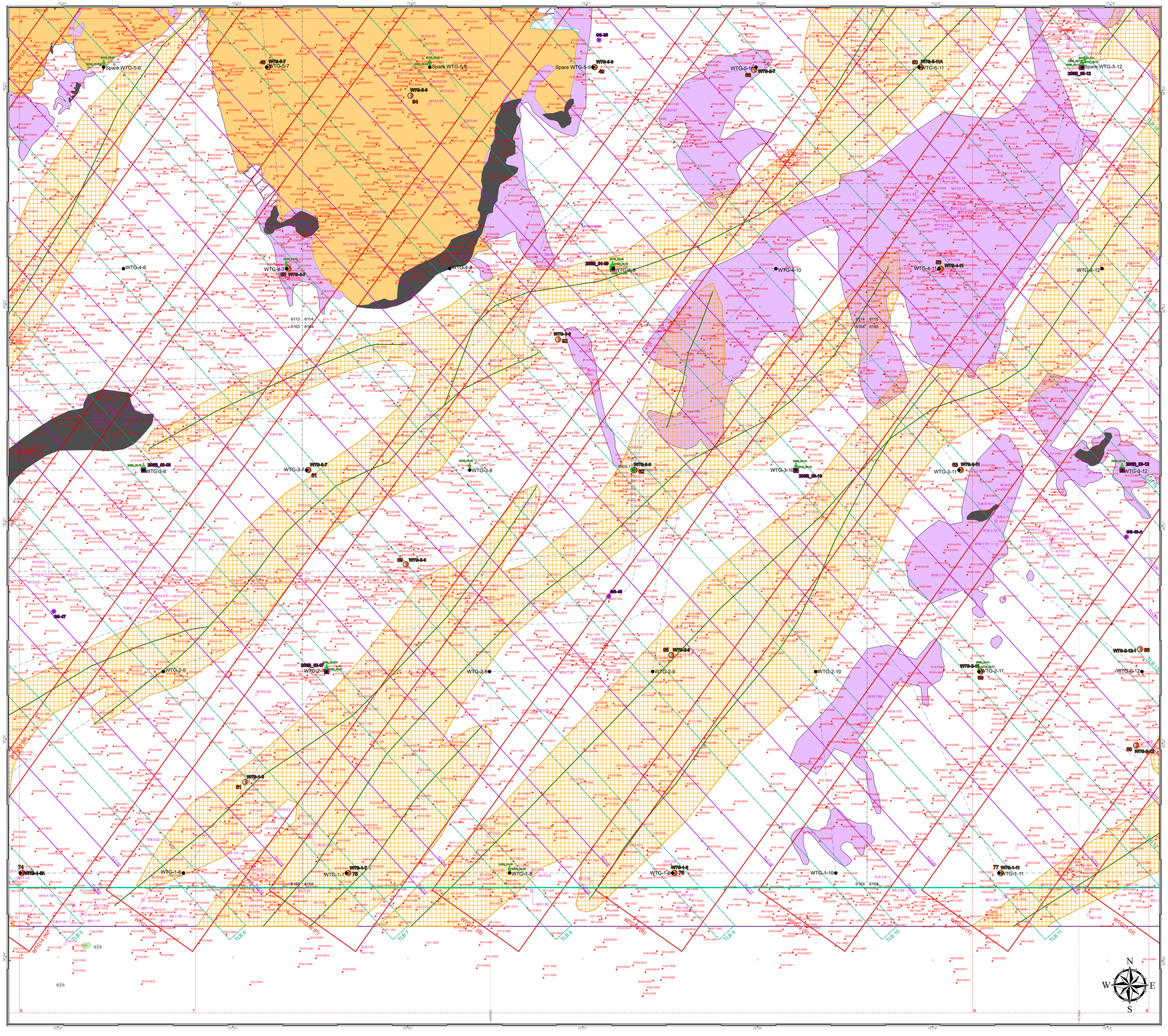
This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

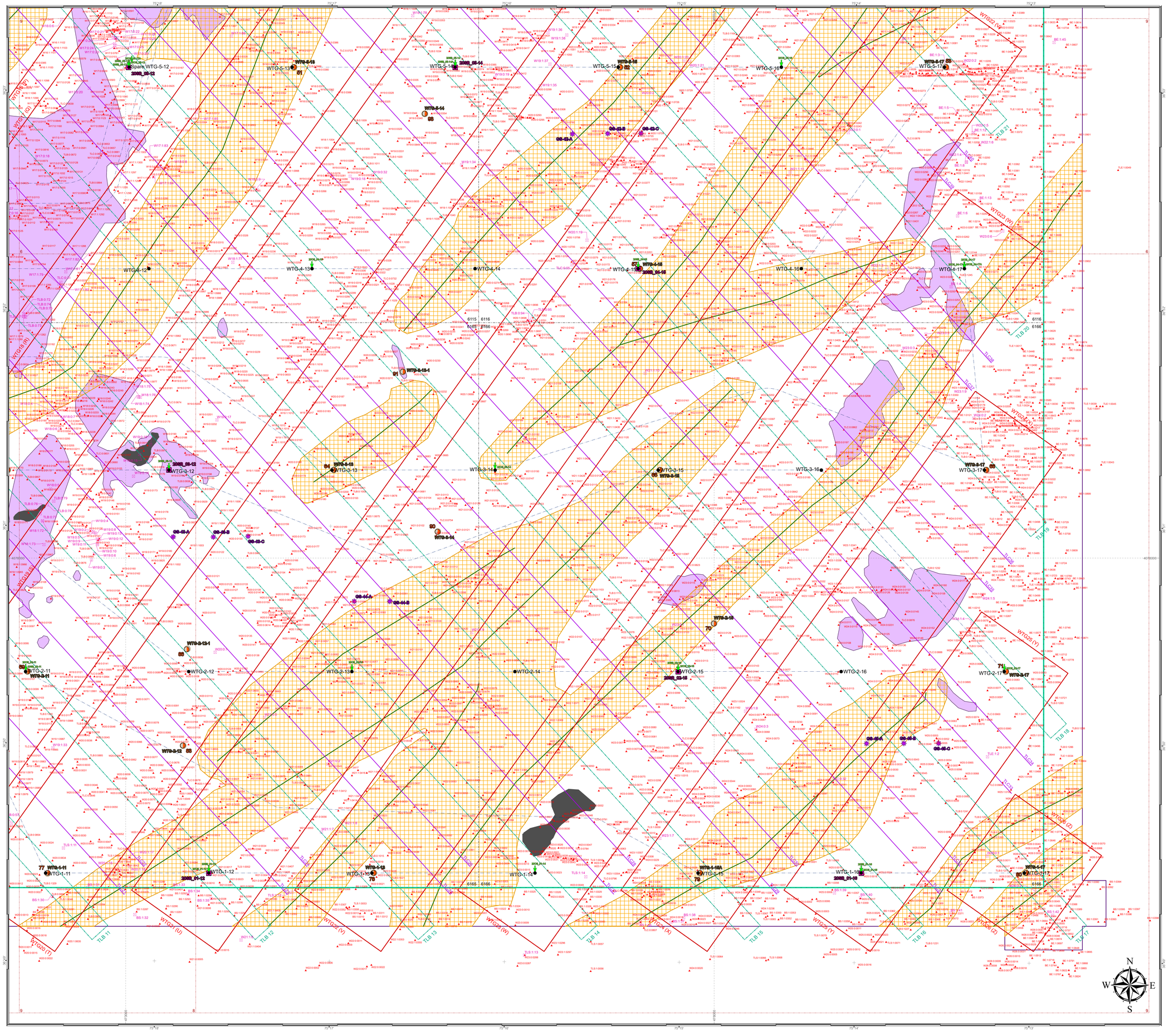

WTG-9-1
WTG-9-2
WTG-9-3
WTG-9-4
WTG-9-5
WTG-9-6
WTG-9-7
WTG-8-1
WTG-8-2
WTG-8-3
WTG-8-4
WTG-8-5
WTG-8-6
WTG-7-1
WTG-7-2
WTG-7-3
WTG-7-4
WTG-7-5
WTG-7-6
WTG-6-1
WTG-6-2
WTG-6-3
WTG-6-4
WTG-6-5
WTG-6-6
WTG-5-1
WTG-5-2
WTG-5-3
WTG-5-4
WTG-5-5
Spare WTG-5-6
OSS-2
WTG-7-5A
WTG-8-4A
WTG-6-4A
WTG-5-4A
WTG03 (E)
WTG04 (E)
WTG05 (E)
WTG06 (E)
WTG07 (E)
WTG08 (E)
WTG09 (E)
WTG10 (E)
WTG11 (E)
WTG12 (E)
WTG13 (E)
WTG14 (E)
WTG15 (E)
WTG16 (E)
WTG17 (E)
WTG18 (E)
WTG19 (E)
WTG20 (E)
WTG21 (E)
WTG22 (E)
WTG23 (E)
WTG24 (E)
WTG25 (E)
WTG26 (E)
WTG27 (E)
WTG28 (E)
WTG29 (E)
WTG30 (E)
WTG31 (E)
WTG32 (E)
WTG33 (E)
WTG34 (E)
WTG35 (E)
WTG36 (E)
WTG37 (E)
WTG38 (E)
WTG39 (E)
WTG40 (E)
WTG41 (E)
WTG42 (E)
WTG43 (E)
WTG44 (E)
WTG45 (E)
WTG46 (E)
WTG47 (E)
WTG48 (E)
WTG49 (E)
WTG50 (E)
WTG51 (E)
WTG52 (E)
WTG53 (E)
WTG54 (E)
WTG55 (E)
WTG56 (E)
WTG57 (E)
WTG58 (E)
WTG59 (E)
WTG60 (E)
WTG61 (E)
WTG62 (E)
WTG63 (E)
WTG64 (E)
WTG65 (E)
WTG66 (E)
WTG67 (E)
WTG68 (E)
WTG69 (E)
WTG70 (E)
WTG71 (E)
WTG72 (E)
WTG73 (E)
WTG74 (E)
WTG75 (E)
WTG76 (E)
WTG77 (E)
WTG78 (E)
WTG79 (E)
WTG80 (E)
WTG81 (E)
WTG82 (E)
WTG83 (E)
WTG84 (E)
WTG85 (E)
WTG86 (E)
WTG87 (E)
WTG88 (E)
WTG89 (E)
WTG90 (E)
WTG91 (E)
WTG92 (E)
WTG93 (E)
WTG94 (E)
WTG95 (E)
WTG96 (E)
WTG97 (E)
WTG98 (E)
WTG99 (E)
WTG100 (E)
WTG101 (E)
WTG102 (E)
WTG103 (E)
WTG104 (E)
WTG105 (E)
WTG106 (E)
WTG107 (E)
WTG108 (E)
WTG109 (E)
WTG110 (E)
WTG111 (E)
WTG112 (E)
WTG113 (E)
WTG114 (E)
WTG115 (E)
WTG116 (E)
WTG117 (E)
WTG118 (E)
WTG119 (E)
WTG120 (E)
WTG121 (E)
WTG122 (E)
WTG123 (E)
WTG124 (E)
WTG125 (E)
WTG126 (E)
WTG127 (E)
WTG128 (E)
WTG129 (E)
WTG130 (E)
WTG131 (E)
WTG132 (E)
WTG133 (E)
WTG134 (E)
WTG135 (E)
WTG136 (E)
WTG137 (E)
WTG138 (E)
WTG139 (E)
WTG140 (E)
WTG141 (E)
WTG142 (E)
WTG143 (E)
WTG144 (E)
WTG145 (E)
WTG146 (E)
WTG147 (E)
WTG148 (E)
WTG149 (E)
WTG150 (E)
WTG151 (E)
WTG152 (E)
WTG153 (E)
WTG154 (E)
WTG155 (E)
WTG156 (E)
WTG157 (E)
WTG158 (E)
WTG159 (E)
WTG160 (E)
WTG161 (E)
WTG162 (E)
WTG163 (E)
WTG164 (E)
WTG165 (E)
WTG166 (E)
WTG167 (E)
WTG168 (E)
WTG169 (E)
WTG170 (E)
WTG171 (E)
WTG172 (E)
WTG173 (E)
WTG174 (E)
WTG175 (E)
WTG176 (E)
WTG177 (E)
WTG178 (E)
WTG179 (E)
WTG180 (E)
WTG181 (E)
WTG182 (E)
WTG183 (E)
WTG184 (E)
WTG185 (E)
WTG186 (E)
WTG187 (E)
WTG188 (E)
WTG189 (E)
WTG190 (E)
WTG191 (E)
WTG192 (E)
WTG193 (E)
WTG194 (E)
WTG195 (E)
WTG196 (E)
WTG197 (E)
WTG198 (E)
WTG199 (E)
WTG200 (E)
WTG201 (E)
WTG202 (E)
WTG203 (E)
WTG204 (E)
WTG205 (E)
WTG206 (E)
WTG207 (E)
WTG208 (E)
WTG209 (E)
WTG210 (E)
WTG211 (E)
WTG212 (E)
WTG213 (E)
WTG214 (E)
WTG215 (E)
WTG216 (E)
WTG217 (E)
WTG218 (E)
WTG219 (E)
WTG220 (E)
WTG221 (E)
WTG222 (E)
WTG223 (E)
WTG224 (E)
WTG225 (E)
WTG226 (E)
WTG227 (E)
WTG228 (E)
WTG229 (E)
WTG230 (E)
WTG231 (E)
WTG232 (E)
WTG233 (E)
WTG234 (E)
WTG235 (E)
WTG236 (E)
WTG237 (E)
WTG238 (E)
WTG239 (E)
WTG240 (E)
WTG241 (E)
WTG242 (E)
WTG243 (E)
WTG244 (E)
WTG245 (E)
WTG246 (E)
WTG247 (E)
WTG248 (E)
WTG249 (E)
WTG250 (E)
WTG251 (E)
WTG252 (E)
WTG253 (E)
WTG254 (E)
WTG255 (E)
WTG256 (E)
WTG257 (E)
WTG258 (E)
WTG259 (E)
WTG260 (E)
WTG261 (E)
WTG262 (E)
WTG263 (E)
WTG264 (E)
WTG265 (E)
WTG266 (E)
WTG267 (E)
WTG268 (E)
WTG269 (E)
WTG270 (E)
WTG271 (E)
WTG272 (E)
WTG273 (E)
WTG274 (E)
WTG275 (E)
WTG276 (E)
WTG277 (E)
WTG278 (E)
WTG279 (E)
WTG280 (E)
WTG281 (E)
WTG282 (E)
WTG283 (E)
WTG284 (E)
WTG285 (E)
WTG286 (E)
WTG287 (E)
WTG288 (E)
WTG289 (E)
WTG290 (E)
WTG291 (E)
WTG292 (E)
WTG293 (E)
WTG294 (E)
WTG295 (E)
WTG296 (E)
WTG297 (E)
WTG298 (E)
WTG299 (E)
WTG300 (E)
WTG301 (E)
WTG302 (E)
WTG303 (E)
WTG304 (E)
WTG305 (E)
WTG306 (E)
WTG307 (E)
WTG308 (E)
WTG309 (E)
WTG310 (E)
WTG311 (E)
WTG312 (E)
WTG313 (E)
WTG314 (E)
WTG315 (E)
WTG316 (E)
WTG317 (E)
WTG318 (E)
WTG319 (E)
WTG320 (E)
WTG321 (E)
WTG322 (E)
WTG323 (E)
WTG324 (E)
WTG325 (E)
WTG326 (E)
WTG327 (E)
WTG328 (E)
WTG329 (E)
WTG330 (E)
WTG331 (E)
WTG332 (E)
WTG333 (E)
WTG334 (E)
WTG335 (E)
WTG336 (E)
WTG337 (E)
WTG338 (E)
WTG339 (E)
WTG340 (E)
WTG341 (E)
WTG342 (E)
WTG343 (E)
WTG344 (E)
WTG345 (E)
WTG346 (E)
WTG347 (E)
WTG348 (E)
WTG349 (E)
WTG350 (E)
WTG351 (E)
WTG352 (E)
WTG353 (E)
WTG354 (E)
WTG355 (E)
WTG356 (E)
WTG357 (E)
WTG358 (E)
WTG359 (E)
WTG360 (E)
WTG361 (E)
WTG362 (E)
WTG363 (E)
WTG364 (E)
WTG365 (E)
WTG366 (E)
WTG367 (E)
WTG368 (E)
WTG369 (E)
WTG370 (E)
WTG371 (E)
WTG372 (E)
WTG373 (E)
WTG374 (E)
WTG375 (E)
WTG376 (E)
WTG377 (E)
WTG378 (E)
WTG379 (E)
WTG380 (E)
WTG381 (E)
WTG382 (E)
WTG383 (E)
WTG384 (E)
WTG385 (E)
WTG386 (E)
WTG387 (E)
WTG388 (E)
WTG389 (E)
WTG390 (E)
WTG391 (E)
WTG392 (E)
WTG393 (E)
WTG394 (E)
WTG395 (E)
WTG396 (E)
WTG397 (E)
WTG398 (E)
WTG399 (E)
WTG400 (E)
WTG401 (E)
WTG402 (E)
WTG403 (E)
WTG404 (E)
WTG405 (E)
WTG406 (E)
WTG407 (E)
WTG408 (E)
WTG409 (E)
WTG410 (E)
WTG411 (E)
WTG412 (E)
WTG413 (E)
WTG414 (E)
WTG415 (E)
WTG416 (E)
WTG417 (E)
WTG418 (E)
WTG419 (E)
WTG420 (E)
WTG421 (E)
WTG422 (E)
WTG423 (E)
WTG424 (E)
WTG425 (E)
WTG426 (E)
WTG427 (E)
WTG428 (E)
WTG429 (E)
WTG430 (E)
WTG431 (E)
WTG432 (E)
WTG433 (E)
WTG434 (E)
WTG435 (E)
WTG436 (E)
WTG437 (E)
WTG438 (E)
WTG439 (E)
WTG440 (E)
WTG441 (E)
WTG442 (E)
WTG443 (E)
WTG444 (E)
WTG445 (E)
WTG446 (E)
WTG447 (E)
WTG448 (E)
WTG449 (E)
WTG450 (E)
WTG451 (E)
WTG452 (E)
WTG453 (E)
WTG454 (E)
WTG455 (E)
WTG456 (E)
WTG457 (E)
WTG458 (E)
WTG459 (E)
WTG460 (E)
WTG461 (E)
WTG462 (E)
WTG463 (E)
WTG464 (E)
WTG465 (E)
WTG466 (E)
WTG467 (E)
WTG468 (E)
WTG469 (E)
WTG470 (E)
WTG471 (E)
WTG472 (E)
WTG473 (E)
WTG474 (E)
WTG475 (E)
WTG476 (E)
WTG477 (E)
WTG478 (E)
WTG479 (E)
WTG480 (E)
WTG481 (E)
WTG482 (E)
WTG483 (E)
WTG484 (E)
WTG485 (E)
WTG486 (E)
WTG487 (E)
WTG488 (E)
WTG489 (E)
WTG490 (E)
WTG491 (E)
WTG492 (E)
WTG493 (E)
WTG494 (E)
WTG495 (E)
WTG496 (E)
WTG497 (E)
WTG498 (E)
WTG499 (E)
WTG500 (E)
WTG501 (E)
WTG502 (E)
WTG503 (E)
WTG504 (E)
WTG505 (E)
WTG506 (E)
WTG507 (E)
WTG508 (E)
WTG509 (E)
WTG510 (E)
WTG511 (E)
WTG512 (E)
WTG513 (E)
WTG514 (E)
WTG515 (E)
WTG516 (E)
WTG517 (E)
WTG518 (E)
WTG519 (E)
WTG520 (E)
WTG521 (E)
WTG522 (E)
WTG523 (E)
WTG524 (E)
WTG525 (E)
WTG526 (E)
WTG527 (E)
WTG528 (E)
WTG529 (E)
WTG530 (E)
WTG531 (E)
WTG532 (E)
WTG533 (E)
WTG534 (E)
WTG535 (E)
WTG536 (E)
WTG537 (E)
WTG538 (E)
WTG539 (E)
WTG540 (E)
WTG541 (E)
WTG542 (E)
WTG543 (E)
WTG544 (E)
WTG545 (E)
WTG546 (E)
WTG547 (E)
WTG548 (E)
WTG549 (E)
WTG550 (E)
WTG551 (E)
WTG552 (E)
WTG553 (E)
WTG554 (E)
WTG555 (E)
WTG556 (E)
WTG557 (E)
WTG558 (E)
WTG559 (E)
WTG560 (E)
WTG561 (E)
WTG562 (E)
WTG563 (E)
WTG564 (E)
WTG565 (E)
WTG566 (E)
WTG567 (E)
WTG568 (E)
WTG569 (E)
WTG570 (E)
WTG571 (E)
WTG572 (E)
WTG573 (E)
WTG574 (E)
WTG575 (E)
WTG576 (E)
WTG577 (E)
WTG578 (E)
WTG579 (E)
WTG580 (E)
WTG581 (E)
WTG582 (E)
WTG583 (E)
WTG584 (E)
WTG585 (E)
WTG586 (E)
WTG587 (E)
WTG588 (E)
WTG589 (E)
WTG590 (E)
WTG591 (E)
WTG592 (E)
WTG593 (E)
WTG594 (E)
WTG595 (E)
WTG596 (E)
WTG597 (E)
WTG598 (E)
WTG599 (E)
WTG600 (E)
WTG601 (E)
WTG602 (E)
WTG603 (E)
WTG604 (E)
WTG605 (E)
WTG606 (E)
WTG607 (E)
WTG608 (E)
WTG609 (E)
WTG610 (E)
WTG611 (E)
WTG612 (E)
WTG613 (E)
WTG614 (E)
WTG615 (E)
WTG616 (E)
WTG617 (E)
WTG618 (E)
WTG619 (E)
WTG620 (E)
WTG621 (E)
WTG622 (E)
WTG623 (E)
WTG624 (E)
WTG625 (E)
WTG626 (E)
WTG627 (E)
WTG628 (E)
WTG629 (E)
WTG630 (E)
WTG631 (E)
WTG632 (E)
WTG633 (E)
WTG634 (E)
WTG635 (E)
WTG636 (E)
WTG637 (E)
WTG638 (E)
WTG639 (E)
WTG640 (E)
WTG641 (E)
WTG642 (E)
WTG643 (E)
WTG644 (E)
WTG645 (E)
WTG646 (E)
WTG647 (E)
WTG648 (E)
WTG649 (E)
WTG650 (E)
WTG651 (E)
WTG652 (E)
WTG653 (E)
WTG654 (E)
WTG655 (E)
WTG656 (E)
WTG657 (E)
WTG658 (E)
WTG659 (E)
WTG660 (E)
WTG661 (E)
WTG662 (E)
WTG663 (E)
WTG664 (E)
WTG665 (E)
WTG666 (E)
WTG667 (E)
WTG668 (E)
WTG669 (E)
WTG670 (E)
WTG671 (E)
WTG672 (E)
WTG673 (E)
WTG674 (E)
WTG675 (E)
WTG676 (E)
WTG677 (E)
WTG678 (E)
WTG679 (E)
WTG680 (E)
WTG681 (E)
WTG682 (E)
WTG683 (E)
WTG684 (E)
WTG685 (E)
WTG686 (E)
WTG687 (E)
WTG688 (E)
WTG689 (E)
WTG690 (E)
WTG691 (E)
WTG692 (E)
WTG693 (E)
WTG694 (E)
WTG695 (E)
WTG696 (E)
WTG697 (E)
WTG698 (E)
WTG699 (E)
WTG700 (E)
WTG701 (E)
WTG702 (E)
WTG703 (E)
WTG704 (E)
WTG705 (E)
WTG706 (E)
WTG707 (E)
WTG708 (E)
WTG709 (E)
WTG710 (E)
WTG711 (E)
WTG712 (E)
WTG713 (E)
WTG714 (E)
WTG715 (E)
WTG716 (E)
WTG717 (E)
WTG718 (E)
WTG719 (E)
WTG720 (E)
WTG721 (E)
WTG722 (E)
WTG723 (E)
WTG724 (E)
WTG725 (E)
WTG726 (E)
WTG727 (E)
WTG728 (E)
WTG729 (E)
WTG730 (E)
WTG731 (E)
WTG732 (E)
WTG733 (E)
WTG734 (E)
WTG735 (E)
WTG736 (E)
WTG737 (E)
WTG738 (E)
WTG739 (E)
WTG740 (E)
WTG741 (E)
WTG742 (E)
WTG743 (E)
WTG744 (E)
WTG745 (E)
WTG746 (E)
WTG747 (E)
WTG748 (E)
WTG749 (E)
WTG750 (E)
WTG751 (E)
WTG752 (E)
WTG753 (E)
WTG754 (E)
WTG755 (E)
WTG756 (E)
WTG757 (E)
WTG758 (E)
WTG759 (E)
WTG760 (E)
WTG761 (E)
WTG762 (E)
WTG763 (E)
WTG764 (E)
WTG765 (E)
WTG766 (E)
WTG767 (E)
WTG768 (E)
WTG769 (E)
WTG770 (E)
WTG771 (E)
WTG772 (E)
WTG773 (E)
WTG774 (E)
WTG775 (E)
WTG776 (E)
WTG777 (E)
WTG778 (E)
WTG779 (E)
WTG780 (E)
WTG781 (E)
WTG782 (E)
WTG783 (E)
WTG784 (E)
WTG785 (E)
WTG786 (E)
WTG787 (E)
WTG788 (E)
WTG789 (E)
WTG790 (E)
WTG791 (E)
WTG792 (E)
WTG793 (E)
WTG794 (E)
WTG795 (E)
WTG796 (E)
WTG797 (E)
WTG798 (E)
WTG799 (E)
WTG800 (E)
WTG801 (E)
WTG802 (E)
WTG803 (E)
WTG804 (E)
WTG805 (E)
WTG806 (E)
WTG807 (E)
WTG808 (E)
WTG809 (E)
WTG810 (E)
WTG811 (E)
WTG812 (E)
WTG813 (E)
WTG814 (E)
WTG815 (E)
WTG816 (E)
WTG817 (E)
WTG818 (E)
WTG819 (E)
WTG820 (E)
WTG821 (E)
WTG822 (E)
WTG823 (E)
WTG824 (E)
WTG825 (E)
WTG826 (E)
WTG827 (E)
WTG828 (E)
WTG829 (E)
WTG830 (E)
WTG831 (E)
WTG832 (E)
WTG833 (E)
WTG834 (E)
WTG835 (E)
WTG836 (E)
WTG837 (E)
WTG838 (E)
WTG839 (E)
WTG840 (E)
WTG841 (E)
WTG842 (E)
WTG843 (E)
WTG844 (E)
WTG845 (E)
WTG846 (E)
WTG847 (E)
WTG848 (E)
WTG849 (E)
WTG850 (E)
WTG851 (E)
WTG852 (E)
WTG853 (E)
WTG854 (E)
WTG855 (E)
WTG856 (E)
WTG857 (E)
WTG858 (E)
WTG859 (E)
WTG860 (E)
WTG861 (E)
WTG862 (E)
WTG863 (E)
WTG864 (E)
WTG865 (E)
WTG866 (E)
WTG867 (E)
WTG868 (E)
WTG869 (E)
WTG870 (E)
WTG871 (E)
WTG872 (E)
WTG873 (E)
WTG874 (E)
WTG875 (E)
WTG876 (E)
WTG877 (E)
WTG878 (E)
WTG879 (E)
WTG880 (E)
WTG881 (E)
WTG882 (E)
WTG883 (E)
WTG884 (E)
WTG885 (E)
WTG886 (E)
WTG887 (E)
WTG888 (E)
WTG889 (E)
WTG890 (E)
WTG891 (E)
WTG892 (E)
WTG893 (E)
WTG894 (E)
WTG895 (E)
WTG896 (E)
WTG897 (E)
WTG898 (E)
WTG899 (E)
WTG900 (E)
WTG901 (E)
WTG902 (E)
WTG903 (E)
WTG904 (E)
WTG905 (E)
WTG906 (E)
WTG907 (E)
WTG908 (E)
WTG909 (E)
WTG910 (E)
WTG911 (E)
WTG912 (E)
WTG913 (E)
WTG914 (E)
WTG915 (E)
WTG916 (E)
WTG917 (E)
WTG918 (E)
WTG919 (E)
WTG920 (E)
WTG921 (E)
WTG922 (E)
WTG923 (E)
WTG924 (E)
WTG925 (E)
WTG926 (E)
WTG927 (E)
WTG928 (E)
WTG929 (E)
WTG930 (E)
WTG931 (E)
WTG932 (E)
WTG933 (E)
WTG934 (E)
WTG935 (E)
WTG936 (E)
WTG937 (E)
WTG938 (E)
WTG939 (E)
WTG940 (E)
WTG941 (E)
WTG942 (E)
WTG943 (E)
WTG944 (E)
WTG945 (E)
WTG946 (E)
WTG947 (E)
WTG948 (E)
WTG949 (E)
WTG950 (E)
WTG951 (E)
WTG952 (E)
WTG953 (E)
WTG954 (E)
WTG955 (E)
WTG956 (E)
WTG957 (E)
WTG958 (E)
WTG959 (E)
WTG960 (E)
WTG961 (E)
WTG962 (E)
WTG963 (E)
WTG964 (E)
WTG965 (E)
WTG966 (E)
WTG967 (E)
WTG968 (E)
WTG969 (E)
WTG970 (E)
WTG971 (E)
WTG972 (E)
WTG973 (E)
WTG974 (E)
WTG975 (E)
WTG976 (E)
WTG977 (E)
WTG978 (E)
WTG979 (E)
WTG980 (E)
WTG981 (E)
WTG982 (E)
WTG983 (E)
WTG984 (E)
WTG985 (E)
WTG986 (E)
WTG987 (E)
WTG988 (E)
WTG989 (E)
WTG990 (E)
WTG991 (E)
WTG992 (E)
WTG993 (E)
WTG994 (E)
WTG995 (E)
WTG996 (E)
WTG997 (E)
WTG998 (E)
WTG999 (E)
WTG1000 (E)
WTG1001 (E)
WTG1002 (E)
WTG1003 (E)
WTG1004 (E)
WTG1005 (E)
WTG1006 (E)
WTG1007 (E)
WTG1008 (E)
WTG1009 (E)
WTG1010 (E)
WTG1011 (E)
WTG1012 (E)
WTG1013 (E)
WTG1014 (E)
WTG1015 (E)
WTG1016 (E)
WTG1017 (E)
WTG1018 (E)
WTG1019 (E)
WTG1020 (E)
WTG1021 (E)
WTG1022 (E)
WTG1023 (E)
WTG1024 (E)
WTG1025 (E)
WTG1026 (E)
WTG1027 (E)
WTG1028 (E)
WTG1029 (E)
WTG1030 (E)
WTG1031 (E)
WTG1032 (E)
WTG1033 (E)
WTG1034 (E)
WTG1035 (E)
WTG1036 (E)
WTG1037 (E)
WTG1038 (E)
WTG1039 (E)
WTG1040 (E)
WTG1041 (E)
WTG1042 (E)
WTG1043 (E)
WTG1044 (E)
WTG1045 (E)
WTG1046 (E)
WTG1047 (E)
WTG1048 (E)
WTG1049 (E)
WTG1050 (E)
WTG1051 (E)
WTG1052 (E)
WTG1053 (E)
WTG1054 (E)
WTG1055 (E)
WTG1056 (E)
WTG1057 (E)
WTG1058 (E)
WTG1059 (E)
WTG1060 (E)
WTG1061 (E)
WTG1062 (E)
WTG1063 (E)
WTG1064 (E)
WTG1065 (E)
WTG1066 (E)
WTG1067 (E)
WTG1068 (E)
WTG1069 (E)
WTG1070 (E)
WTG1071 (E)
WTG1072 (E)
WTG1073 (E)
WTG1074 (E)
WTG1075 (E)
WTG1076 (E)
WTG1077 (E)
WTG1078 (E)
WTG1079 (E)
WTG1080 (E)
WTG1081 (E)
WTG1082 (E)
WTG1083 (E)
WTG1084 (E)
WTG1085 (E)
WTG1086 (E)
WTG1087 (E)
WTG1088 (E)
WTG1089 (E)
WTG1090 (E)
WTG1091 (E)
WTG1092 (E)
WTG1093 (E)
WTG1094 (E)
WTG1095 (E)
WTG1096 (E)
WTG1097 (E)
WTG1098 (E)
WTG1099 (E)
WTG1100 (E)
WTG1101 (E)
WTG1102 (E)
WTG1103 (E)
WTG1104 (E)
WTG1105 (E)
WTG1106 (E)
WTG1107 (E)
WTG1108 (E)
WTG1109 (E)
WTG1110 (E)
WTG1111 (E)
WTG1112 (E)
WTG1113 (E)
WTG1114 (E)
WTG1115 (E)
WTG1116 (E)
WTG1117 (E)
WTG1118 (E)
WTG1119 (E)
WTG1120 (E)
WTG1121 (E)
WTG1122 (E)
WTG1123 (E)
WTG1124 (E)
WTG1125 (E)
WTG1126 (E)
WTG1127 (E)
WTG1128 (E)
WTG1129 (E)
WTG1130 (E)
WTG1131 (E)
WTG1132 (E)
WTG1133 (E)
WTG1134 (E)
WTG1135 (E)
WTG1136 (E)
WTG1137 (E)
WTG1138 (E)
WTG1139 (E)
WTG1140 (E)
WTG1141 (E)
WTG1142 (E)
WTG1143 (E)
WTG1144 (E)
WTG1145 (E)
WTG1146 (E)
WTG1147 (E)
WTG1148 (E)
WTG1149 (E)
WTG1150 (E)
WTG1151 (E)
WTG1152 (E)
WTG1153 (E)
WTG1154 (E)
WTG1155 (E)
WTG1156 (E)
WTG1157 (E)
WTG1158 (E)
WTG1159 (E)
WTG1160 (E)
WTG1161 (E)
WTG1162 (E)
WTG1163 (E)
WTG1164 (E)
WTG1165 (E)
WTG1166 (E)
WTG1167 (E)
WTG1168 (E)
WTG1169 (E)
WTG1170 (E)
WTG1171 (E)
WTG1172 (E)
WTG1173 (E)
WTG1174 (E)
WTG1175 (E)
WTG1176 (E)
WTG1177 (E)
WTG1178 (E)
WTG1179 (E)
WTG1180 (E)
WTG1181 (E)
WTG1182 (E)
WTG1183 (E)
WTG1184 (E)
WTG1185 (E)
WTG1186 (E)
WTG1187 (E)
WTG1188 (E)
WTG1189 (E)
WTG1190 (E)
WTG1191 (E)
WTG1192 (E)
WTG1193 (E)
WTG1194 (E)
WTG1195 (E)
WTG1196 (E)
WTG1197 (E)
WTG1198 (E)
WTG1199 (E)
WTG1200 (E)
WTG1201 (E)
WTG1202 (E)
WTG1203 (E)
WTG1204 (E)
WTG1205 (E)
WTG1206 (E)
WTG1207 (E)
WTG1208 (E)
WTG1209 (E)
WTG1210 (E)
WTG1211 (E)
WTG1212 (E)
WTG1213 (E)
WTG1214 (E)
WTG1215 (E)
WTG1216 (E)
WTG1217 (E)
WTG1218 (E)
WTG1219 (E)
WTG1220 (E)
WTG1221 (E)
WTG1222 (E)
WTG1223 (E)
WTG1224 (E)
WTG1225 (E)
WTG1226 (E)
WTG1227 (E)
WTG1228 (E)
WTG1229 (E)
WTG1230 (E)
WTG1231 (E)
WTG1232 (E)
WTG1233 (E)
WTG1234 (E)
WTG1235 (E)
WTG1236 (E)
WTG1237 (E)
WTG1238 (E)
WTG1239 (E)
WTG1240 (E)
WTG1241 (E)
WTG1242 (E)
WTG1243 (E)
WTG1244 (E)
WTG1245 (E)
WTG1246 (E)
WTG1247 (E)
WTG1248 (E)
WTG1249 (E)
WTG1250 (E)
WTG1251 (E)
WTG1252 (E)
WTG1253 (E)
WTG1254 (E)
WTG1255 (E)
WTG1256 (E)
WTG1257 (E)
WTG1258 (E)
WTG1259 (E)
WTG1260 (E)
WTG1261 (E)
WTG1262 (E)
WTG1263 (E)
WTG1264 (E)
WTG1265 (E)
WTG1266 (E)
WTG1267 (E)
WTG1268 (E)
WTG1269 (E)
WTG1270 (E)
WTG1271 (E)
WTG1272 (E)
WTG1273 (E)
WTG1274 (E)
WTG1275 (E)
WTG1276 (E)
WTG1277 (E)
WTG1278 (E)
WTG1279 (E)
WTG1280 (E)
WTG1281 (E)
WTG1282 (E)
WTG1283 (E)
WTG1284 (E)
WTG1285 (E)
WTG1286 (E)
WTG1287 (E)
WTG1288 (E)
WTG1289 (E)
WTG1290 (E)
WTG1291 (E)
WTG1292 (E)
WTG1293 (E)
WTG1294 (E)
WTG1295 (E)
WTG1296 (E)
WTG1297 (E)
WTG1298 (E)
WTG1299 (E)
WTG1300 (E)
WTG1301 (E)
WTG1302 (E)
WTG1303 (E)
WTG1304 (E)
WTG1305 (E)
WTG1306 (E)
WTG1307 (E)
WTG1308 (E)
WTG1309 (E)
WTG1310 (E)
WTG1311 (E)
WTG1312 (E)
WTG1313 (E)
WTG1314 (E)
WTG1315 (E)
WTG1316 (E)
WTG1317 (E)
WTG1318 (E)
WTG1319 (E)
WTG1320 (E)
WTG1321 (E)
WTG1322 (E)
WTG1323 (E)
WTG1324 (E)
WTG1325 (E)
WTG1326 (E)
WTG1327 (E)
WTG1328 (E)
WTG1329 (E)
WTG1330 (E)
WTG1331 (E)
WTG1332 (E)
WTG1333 (E)
WTG1334 (E)
WTG1335 (E)
WTG1336 (E)
WTG1337 (E)
WTG1338 (E)
WTG1339 (E)
WTG1340 (E)
WTG1341 (E)
WTG1342 (E)
WTG1343 (E)
WTG1344 (E)
WTG1345 (E)
WTG1346 (E)
WTG1347 (E)
WTG1348 (E)
WTG1349 (E)
WTG1350 (E)
WTG1351 (E)
WTG1352 (E)
WTG1353 (E)
WTG1354 (E)
WTG1355 (E)
WTG1356 (E)
WTG1357 (E)
WTG1358 (E)
WTG1359 (E)
WTG1360 (E)
WTG1361 (E)
WTG1362 (E)
WTG1363 (E)
WTG1364 (E)
WTG1365 (E)
WTG1366 (E)
WTG1367 (E)
WTG1368 (E)
WTG1369 (E)
WTG1370 (E)
WTG1371 (E)
WTG1372 (E)
WTG1373 (E)
WTG1374 (E)
WTG1375 (E)
WTG1376 (E)
WTG1377 (E)
WTG1378 (E)
WTG1379 (E)
WTG1380 (E)
WTG1381 (E)
WTG1382 (E)
WTG1383 (E)
WTG1384 (E)
WTG1385 (E)
WTG1386 (E)
WTG1387 (E)
WTG1388 (E)
WTG1389 (E)
WTG1390 (E)
WTG1391 (E)
WTG1392 (E)
WTG1393 (E)
WTG1394 (E)
WTG1395 (E)
WTG1396 (E)
WTG1397 (E)
WTG1398 (E)
WTG1399 (E)
WTG1400 (E)
WTG1401 (E)
WTG1402 (E)
WTG1403 (E)
WTG1404 (E)
WTG1405 (E)
WTG1406 (E)
WTG1407 (E)
WTG1408 (E)
WTG1409 (E)
WTG1410 (E)
WTG1411 (E)
WTG1412 (E)
WTG1413 (E)
WTG1414 (E)
WTG1415 (E)
WTG1416 (E)
WTG1417 (E)
WTG1418 (E)
WTG1419 (E)
WTG1420 (E)
WTG1421 (E)
WTG1422 (E)
WTG1423 (E)
WTG1424 (E)
WTG1425 (E)
WTG1426 (E)
WTG1427 (E)
WTG1428 (E)
WTG1429 (E)
WTG1430 (E)
WTG1431 (E)
WTG1432 (E)
WTG1433 (E)
WTG1434 (E)
WTG1435 (E)
WTG1436 (E)
WTG1437 (E)
WTG1438 (E)
WTG1439 (E)
WTG1440 (E)
WTG1441 (E)
WTG1442 (E)
WTG1443 (E)
WTG1444 (E)
WTG1445 (E)
WTG1446 (E)
WTG1447 (E)
WTG1448 (E)
WTG1449 (E)
WTG1450 (E)
WTG1451 (E)
WTG1452 (E)
WTG1453 (E)
WTG1454 (E)
WTG1455 (E)
WTG1456 (E)
WTG1457 (E)
WTG1458 (E)
WTG1459 (E)
WTG1460 (E)
WTG1461 (E)
WTG1462 (E)
WTG1463 (E)
WTG1464 (E)
WTG1465 (E)
WTG1466 (E)
WTG1467 (E)
WTG1468 (E)
WTG1469 (E)
WTG1470 (E)
WTG1471 (E)
WTG1472 (E)
WTG1473 (E)
WTG1474 (E)
WTG1475 (E)
WTG1476 (E)
WTG1477 (E)
WTG1478 (E)
WTG1479 (E)
WTG1480 (E)
WTG1481 (E)
WTG1482 (E)
WTG1483 (E)
WTG1484 (E)
WTG1485 (E)
WTG1486 (E)
WTG1487 (E)
WTG1488 (E)
WTG1489 (E)
WTG1490 (E)
WTG1491 (E)
WTG1492 (E)
WTG1493 (E)
WTG1494 (E)
WTG1495 (E)
WTG1496 (E)
WTG1497 (E)
WTG1498 (E)
WTG1499 (E)
WTG1500 (E)
WTG1501 (E)
WTG1502 (E)
WTG1503 (E)
WTG1504 (E)
WTG1505 (E)
WTG1506 (E)
WTG1507 (E)
WTG1508 (E)
WTG1509 (E)
WTG1510 (E)
WTG1511 (E)
WTG1512 (E)
WTG1513 (E)
WTG1514 (E)
WTG1515 (E)
WTG1516 (E)
WTG1517 (E)
WTG1518 (E)
WTG1519 (E)
WTG1520 (E)
WTG1521 (E)
WTG1522 (E)
WTG1523 (E)
WTG1524 (E)
WTG1525 (E)
WTG1526 (E)
WTG1527 (E)
WTG1528 (E)
WTG1529 (E)
WTG1530 (E)
WTG1531 (E)
WTG1532 (E)
WTG1533 (E)
WTG1534 (E)
WTG1535 (E)
WTG1536 (E)
WTG1537 (E)
WTG1538 (E)
WTG1539 (E)
WTG1540 (E)
WTG1541 (E)
WTG1542 (E)
WTG1543 (E)
WTG1544 (E)
WTG1545 (E)
WTG1546 (E)
WTG1547 (E)
WTG1548 (E)
WTG1549 (E)
WTG1550 (E)
WTG1551 (E)
WTG1552 (E)
WTG1553 (E)
WTG1554 (E)
WTG1555 (E)
WTG1556 (E)
WTG1557 (E)
WTG1558 (E)
WTG1559 (E)
WTG1560 (E)
WTG1561 (E)
WTG1562 (E)
WTG1563 (E)
WTG1564 (E)
WTG1565 (E)
WTG1566 (E)
WTG1567 (E)
WTG1568 (E)
WTG1569 (E)
WTG1570 (E)
WTG1571 (E)
WTG1572 (E)
WTG1573 (E)
WTG1574 (E)
WTG1575 (E)
WTG1576 (E)
WTG1577 (E)
WTG1578 (E)
WTG1579 (E)
WTG1580 (E)
WTG1581 (E)
WTG1582 (E)
WTG1583 (E)
WTG1584 (E)
WTG1585 (E)
WTG1586 (E)
WTG1587 (E)
WTG1588 (E)
WTG1589 (E)
WTG1590 (E)
WTG1591 (E)
WTG1592 (E)
WTG1593 (E)
WTG1594 (E)
WTG1595 (E)
WTG1596 (E)
WTG1597 (E)
WTG1598 (E)
WTG1599 (E)
WTG1600 (E)
WTG1601 (E)
WTG1602 (E)
WTG1603 (E)
WTG1604 (E)
WTG1605 (E)
WTG1606 (E)
WTG1607 (E)
WTG1608 (E)
WTG1609 (E)
WTG1610 (E)
WTG1611 (E)
WTG1612 (E)
WTG1613 (E)
WTG1614 (E)
WTG1615 (E)
WTG1616 (E)
WTG1617 (E)
WTG1618 (E)
WTG1619 (E)
WTG1620 (E)
WTG1621 (E)
WTG1622 (E)
WTG1623 (E)
WTG1624 (E)
WTG1625 (E)
WTG1626 (E)
WTG1627 (E)
WTG1628 (E)
WTG1629 (E)
WTG1630 (E)
WTG1631 (E)
WTG1632 (E)
WTG1633 (E)
WTG1634 (E)
WTG1635 (E)
WTG1636 (E)
WTG1637 (E)
WTG1638 (E)
WTG1639 (E)
WTG1640 (E)
WTG1641 (E)
WTG1642 (E)
WTG1643 (E)
WTG1644 (E)
WTG1645 (E)
WTG1646 (E)
WTG1647 (E)
WTG1648 (E)
WTG1649 (E)
WTG1650 (E)
WTG1651 (E)
WTG1652 (E)
WTG1653 (E)
WTG1654 (E)
WTG1655 (E)
WTG1656 (E)
WTG1657 (E)
WTG1658 (E)
WTG1659 (E)
WTG1660 (E)
WTG1661 (E)
WTG1662 (E)
WTG1663 (E)
WTG1664 (E)
WTG1665 (E)
WTG1666 (E)
W

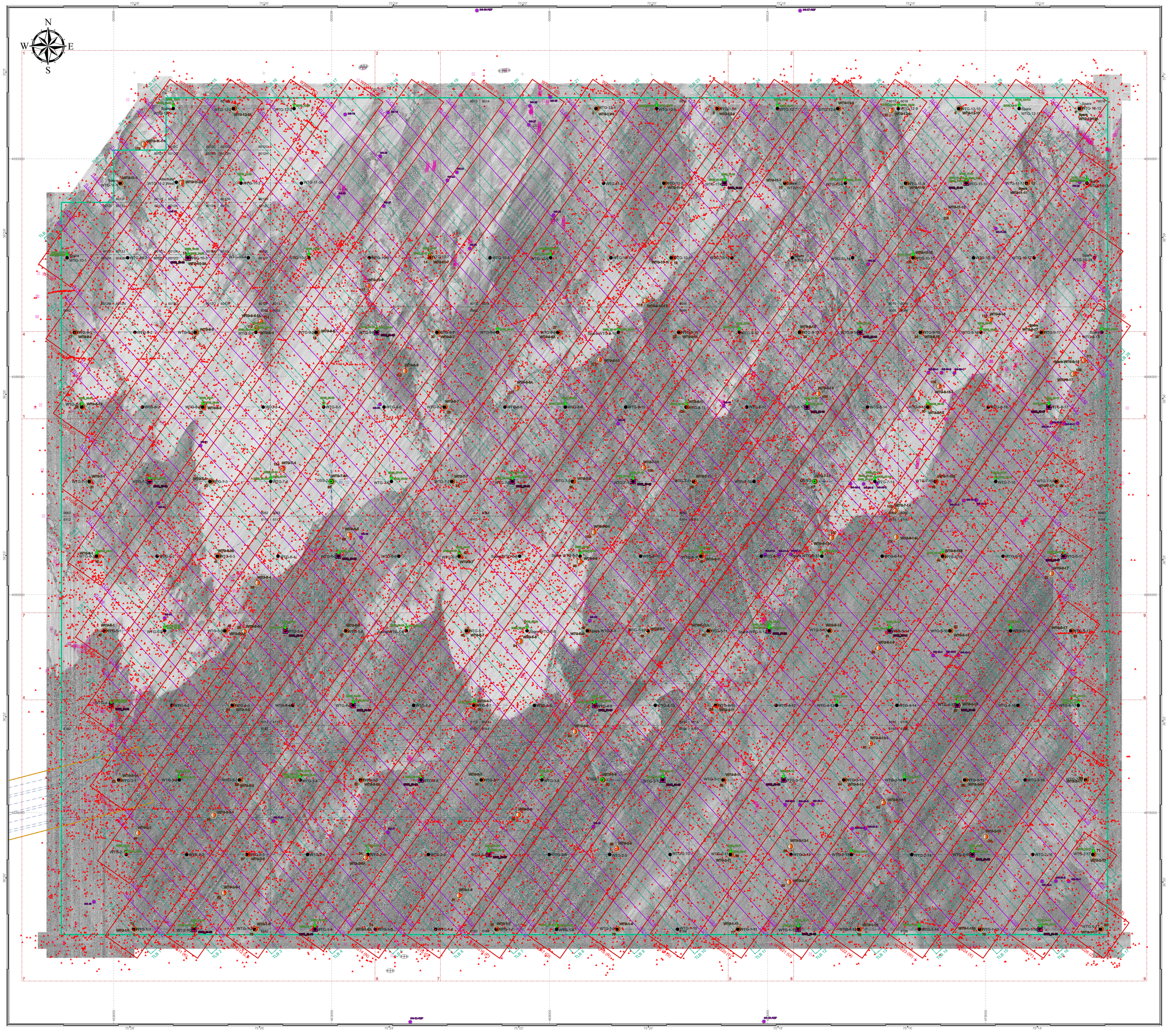

WTG-9-6
WTG-9-7
WTG-9-8
WTG-9-9
WTG-9-9-A
WTG-9-10
WTG-9-11
WTG-9-12
WTG-8-6
WTG-8-7
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
WTG-8-12
WTG-7-6
WTG-7-7
WTG-7-8
WTG-7-9
WTG-7-10
WTG-7-11
WTG-7-12
WTG-6-6
WTG-6-7
WTG-6-8
WTG-6-9
WTG-6-10
WTG-6-11
WTG-6-12
WTG-5-6
WTG-5-7
WTG-5-8
WTG-5-9
WTG-5-10
WTG-5-11
WTG-5-12
Spare WTG-6-8
Spare WTG-6-9
Spare WTG-5-6
Spare WTG-5-8
Spare WTG-5-9
Spare WTG-5-12
WTG-6-8-A
WTG-6-10
WTG-5-10
WTG-5-11A
WTG-7-10
WTG-7-11
WTG-8-11
WTG-9-9-A
WTG-9-11
WTG-9-12
WTG-8-7
WTG-8-8
WTG-8-9
WTG-8-10
WTG-8-11
WTG-8-12
WTG-7-6
WTG-7-7
WTG-7-8
WTG-7-9
WTG-7-10
WTG-7-11
WTG-7-12
WTG-6-6
WTG-6-7
WTG-6-8
WTG-6-9
WTG-6-10
WTG-6-11
WTG-6-12
WTG-5-6
WTG-5-7
WTG-5-8
WTG-5-9
WTG-5-10
WTG-5-11
WTG-5-12
GS-30
GS-31
GS-32
GS-33
GS-34
GS-35
GS-36
GS-37-A
GS-37-B
GS-37-C
WTG18B (H)
WTG18A (H)
WTG17 (H)
WTG16 (H)
WTG15 (H)
WTG14 (H)
WTG13 (H)
WTG12 (H)
WTG11 (H)
WTG10 (H)
WTG9 (H)
WTG8 (H)
WTG7 (H)
WTG6 (H)
WTG5 (H)
WTG4 (H)
WTG3 (H)
WTG2 (H)
WTG1 (H)
TLB 0.0
TLB 0.1
TLB 0.2
TLB 0.3
TLB 0.4
TLB 0.5
TLB 0.6
TLB 0.7
TLB 0.8
TLB 0.9
TLB 0.10
TLB 0.11
TLB 0.12
TLB 0.13
TLB 0.14
TLB 0.15
TLB 0.16
TLB 0.17
TLB 0.18
TLB 0.19
TLB 0.20
TLB 0.21
TLB 0.22
TLB 0.23
TLB 0.24
TLB 0.25
TLB 0.26
TLB 0.27
TLB 0.28
TLB 0.29
TLB 0.30
TLB 0.31
TLB 0.32
TLB 0.33
TLB 0.34
TLB 0.35
TLB 0.36
TLB 0.37
TLB 0.38
TLB 0.39
TLB 0.40
TLB 0.41
TLB 0.42
TLB 0.43
TLB 0.44
TLB 0.45
TLB 0.46
TLB 0.47
TLB 0.48
TLB 0.49
TLB 0.50
TLB 0.51
TLB 0.52
TLB 0.53
TLB 0.54
TLB 0.55
TLB 0.56
TLB 0.57
TLB 0.58
TLB 0.59
TLB 0.60
TLB 0.61
TLB 0.62
TLB 0.63
TLB 0.64
TLB 0.65
TLB 0.66
TLB 0.67
TLB 0.68
TLB 0.69
TLB 0.70
TLB 0.71
TLB 0.72
TLB 0.73
TLB 0.74
TLB 0.75
TLB 0.76
TLB 0.77
TLB 0.78
TLB 0.79
TLB 0.80
TLB 0.81
TLB 0.82
TLB 0.83
TLB 0.84
TLB 0.85
TLB 0.86
TLB 0.87
TLB 0.88
TLB 0.89
TLB 0.90
TLB 0.91
TLB 0.92
TLB 0.93
TLB 0.94
TLB 0.95
TLB 0.96
TLB 0.97
TLB 0.98
TLB 0.99
TLB 0.100
TLB 0.101
TLB 0.102
TLB 0.103
TLB 0.104
TLB 0.105
TLB 0.106
TLB 0.107
TLB 0.108
TLB 0.109
TLB 0.110
TLB 0.111
TLB 0.112
TLB 0.113
TLB 0.114
TLB 0.115
TLB 0.116
TLB 0.117
TLB 0.118
TLB 0.119
TLB 0.120
TLB 0.121
TLB 0.122
TLB 0.123
TLB 0.124
TLB 0.125
TLB 0.126
TLB 0.127
TLB 0.128
TLB 0.129
TLB 0.130
TLB 0.131
TLB 0.132
TLB 0.133
TLB 0.134
TLB 0.135
TLB 0.136
TLB 0.137
TLB 0.138
TLB 0.139
TLB 0.140
TLB 0.141
TLB 0.142
TLB 0.143
TLB 0.144
TLB 0.145
TLB 0.146
TLB 0.147
TLB 0.148
TLB 0.149
TLB 0.150
TLB 0.151
TLB 0.152
TLB 0.153
TLB 0.154
TLB 0.155
TLB 0.156
TLB 0.157
TLB 0.158
TLB 0.159
TLB 0.160
TLB 0.161
TLB 0.162
TLB 0.163
TLB 0.164
TLB 0.165
TLB 0.166
TLB 0.167
TLB 0.168
TLB 0.169
TLB 0.170
TLB 0.171
TLB 0.172
TLB 0.173
TLB 0.174
TLB 0.175
TLB 0.176
TLB 0.177
TLB 0.178
TLB 0.179
TLB 0.180
TLB 0.181
TLB 0.182
TLB 0.183
TLB 0.184
TLB 0.185
TLB 0.186
TLB 0.187
TLB 0.188
TLB 0.189
TLB 0.190
TLB 0.191
TLB 0.192
TLB 0.193
TLB 0.194
TLB 0.195
TLB 0.196
TLB 0.197
TLB 0.198
TLB 0.199
TLB 0.200
TLB 0.201
TLB 0.202
TLB 0.203
TLB 0.204
TLB 0.205
TLB 0.206
TLB 0.207
TLB 0.208
TLB 0.209
TLB 0.210
TLB 0.211
TLB 0.212
TLB 0.213
TLB 0.214
TLB 0.215
TLB 0.216
TLB 0.217
TLB 0.218
TLB 0.219
TLB 0.220
TLB 0.221
TLB 0.222
TLB 0.223
TLB 0.224
TLB 0.225
TLB 0.226
TLB 0.227
TLB 0.228
TLB 0.229
TLB 0.230
TLB 0.231
TLB 0.232
TLB 0.233
TLB 0.234
TLB 0.235
TLB 0.236
TLB 0.237
TLB 0.238
TLB 0.239
TLB 0.240
TLB 0.241
TLB 0.242
TLB 0.243
TLB 0.244
TLB 0.245
TLB 0.246
TLB 0.247
TLB 0.248
TLB 0.249
TLB 0.250
TLB 0.251
TLB 0.252
TLB 0.253
TLB 0.254
TLB 0.255
TLB 0.256
TLB 0.257
TLB 0.258
TLB 0.259
TLB 0.260
TLB 0.261
TLB 0.262
TLB 0.263
TLB 0.264
TLB 0.265
TLB 0.266
TLB 0.267
TLB 0.268
TLB 0.269
TLB 0.270
TLB 0.271
TLB 0.272
TLB 0.273
TLB 0.274
TLB 0.275
TLB 0.276
TLB 0.277
TLB 0.278
TLB 0.279
TLB 0.280
TLB 0.281
TLB 0.282
TLB 0.283
TLB 0.284
TLB 0.285
TLB 0.286
TLB 0.287
TLB 0.288
TLB 0.289
TLB 0.290
TLB 0.291
TLB 0.292
TLB 0.293
TLB 0.294
TLB 0.295
TLB 0.296
TLB 0.297
TLB 0.298
TLB 0.299
TLB 0.300
TLB 0.301
TLB 0.302
TLB 0.303
TLB 0.304
TLB 0.305
TLB 0.306
TLB 0.307
TLB 0.308
TLB 0.309
TLB 0.310
TLB 0.311
TLB 0.312
TLB 0.313
TLB 0.314
TLB 0.315
TLB 0.316
TLB 0.317
TLB 0.318
TLB 0.319
TLB 0.320
TLB 0.321
TLB 0.322
TLB 0.323
TLB 0.324
TLB 0.325
TLB 0.326
TLB 0.327
TLB 0.328
TLB 0.329
TLB 0.330
TLB 0.331
TLB 0.332
TLB 0.333
TLB 0.334
TLB 0.335
TLB 0.336
TLB 0.337
TLB 0.338
TLB 0.339
TLB 0.340
TLB 0.341
TLB 0.342
TLB 0.343
TLB 0.344
TLB 0.345
TLB 0.346
TLB 0.347
TLB 0.348
TLB 0.349
TLB 0.350
TLB 0.351
TLB 0.352
TLB 0.353
TLB 0.354
TLB 0.355
TLB 0.356
TLB 0.357
TLB 0.358
TLB 0.359
TLB 0.360
TLB 0.361
TLB 0.362
TLB 0.363
TLB 0.364
TLB 0.365
TLB 0.366
TLB 0.367
TLB 0.368
TLB 0.369
TLB 0.370
TLB 0.371
TLB 0.372
TLB 0.373
TLB 0.374
TLB 0.375
TLB 0.376
TLB 0.377
TLB 0.378
TLB 0.379
TLB 0.380
TLB 0.381
TLB 0.382
TLB 0.383
TLB 0.384
TLB 0.385
TLB 0.386
TLB 0.387
TLB 0.388
TLB 0.389
TLB 0.390
TLB 0.391
TLB 0.392
TLB 0.393
TLB 0.394
TLB 0.395
TLB 0.396
TLB 0.397
TLB 0.398
TLB 0.399
TLB 0.400
TLB 0.401
TLB 0.402
TLB 0.403
TLB 0.404
TLB 0.405
TLB 0.406
TLB 0.407
TLB 0.408
TLB 0.409
TLB 0.410
TLB 0.411
TLB 0.412
TLB 0.413
TLB 0.414
TLB 0.415
TLB 0.416
TLB 0.417
TLB 0.418
TLB 0.419
TLB 0.420
TLB 0.421
TLB 0.422
TLB 0.423
TLB 0.424
TLB 0.425
TLB 0.426
TLB 0.427
TLB 0.428
TLB 0.429
TLB 0.430
TLB 0.431
TLB 0.432
TLB 0.433
TLB 0.434
TLB 0.435
TLB 0.436
TLB 0.437
TLB 0.438
TLB 0.439
TLB 0.440
TLB 0.441
TLB 0.442
TLB 0.443
TLB 0.444
TLB 0.445
TLB 0.446
TLB 0.447
TLB 0.448
TLB 0.449
TLB 0.450
TLB 0.451
TLB 0.452
TLB 0.453
TLB 0.454
TLB 0.455
TLB 0.456
TLB 0.457
TLB 0.458
TLB 0.459
TLB 0.460
TLB 0.461
TLB 0.462
TLB 0.463
TLB 0.464
TLB 0.465
TLB 0.466
TLB 0.467
TLB 0.468
TLB 0.469
TLB 0.470
TLB 0.471
TLB 0.472
TLB 0.473
TLB 0.474
TLB 0.475
TLB 0.476
TLB 0.477
TLB 0.478
TLB 0.479
TLB 0.480
TLB 0.481
TLB 0.482
TLB 0.483
TLB 0.484
TLB 0.485
TLB 0.486
TLB 0.487
TLB 0.488
TLB 0.489
TLB 0.490
TLB 0.491
TLB 0.492
TLB 0.493
TLB 0.494
TLB 0.495
TLB 0.496
TLB 0.497
TLB 0.498
TLB 0.499
TLB 0.500
TLB 0.501
TLB 0.502
TLB 0.503
TLB 0.504
TLB 0.505
TLB 0.506
TLB 0.507
TLB 0.508
TLB 0.509
TLB 0.510
TLB 0.511
TLB 0.512
TLB 0.513
TLB 0.514
TLB 0.515
TLB 0.516
TLB 0.517
TLB 0.518
TLB 0.519
TLB 0.520
TLB 0.521
TLB 0.522
TLB 0.523
TLB 0.524
TLB 0.525
TLB 0.526
TLB 0.527
TLB 0.528
TLB 0.529
TLB 0.530
TLB 0.531
TLB 0.532
TLB 0.533
TLB 0.534
TLB 0.535
TLB 0.536
TLB 0.537
TLB 0.538
TLB 0.539
TLB 0.540
TLB 0.541
TLB 0.542
TLB 0.543
TLB 0.544
TLB 0.545
TLB 0.546
TLB 0.547
TLB 0.548
TLB 0.549
TLB 0.550
TLB 0.551
TLB 0.552
TLB 0.553
TLB 0.554
TLB 0.555
TLB 0.556
TLB 0.557
TLB 0.558
TLB 0.559
TLB 0.560
TLB 0.561
TLB 0.562
TLB 0.563
TLB 0.564
TLB 0.565
TLB 0.566
TLB 0.567
TLB 0.568
TLB 0.569
TLB 0.570
TLB 0.571
TLB 0.572
TLB 0.573
TLB 0.574
TLB 0.575
TLB 0.576
TLB 0.577
TLB 0.578
TLB 0.579
TLB 0.580
TLB 0.581
TLB 0.582
TLB 0.583
TLB 0.584
TLB 0.585
TLB 0.586
TLB 0.587
TLB 0.588
TLB 0.589
TLB 0.590
TLB 0.591
TLB 0.592
TLB 0.593
TLB 0.594
TLB 0.595
TLB 0.596
TLB 0.597
TLB 0.598
TLB 0.599
TLB 0.600
TLB 0.601
TLB 0.602
TLB 0.603
TLB 0.604
TLB 0.605
TLB 0.606
TLB 0.607
TLB 0.608
TLB 0.609
TLB 0.610
TLB 0.611
TLB 0.612
TLB 0.613
TLB 0.614
TLB 0.615
TLB 0.616
TLB 0.617
TLB 0.618
TLB 0.619
TLB 0.620
TLB 0.621
TLB 0.622
TLB 0.623
TLB 0.624
TLB 0.625
TLB 0.626
TLB 0.627
TLB 0.628
TLB 0.629
TLB 0.630
TLB 0.631
TLB 0.632
TLB 0.633
TLB 0.634
TLB 0.635
TLB 0.636
TLB 0.637
TLB 0.638
TLB 0.639
TLB 0.640
TLB 0.641
TLB 0.642
TLB 0.643
TLB 0.644
TLB 0.645
TLB 0.646
TLB 0.647
TLB 0.648
TLB 0.649
TLB 0.650
TLB 0.651
TLB 0.652
TLB 0.653
TLB 0.654
TLB 0.655
TLB 0.656
TLB 0.657
TLB 0.658
TLB 0.659
TLB 0.660
TLB 0.661
TLB 0.662
TLB 0.663
TLB 0.664
TLB 0.665
TLB 0.666
TLB 0.667
TLB 0.668
TLB 0.669
TLB 0.670
TLB 0.671
TLB 0.672
TLB 0.673
TLB 0.674
TLB 0.675
TLB 0.676
TLB 0.677
TLB 0.678
TLB 0.679
TLB 0.680
TLB 0.681
TLB 0.682
TLB 0.683
TLB 0.684
TLB 0.685
TLB 0.686
TLB 0.687
TLB 0.688
TLB 0.689
TLB 0.690
TLB 0.691
TLB 0.692
TLB 0.693
TLB 0.694
TLB 0.695
TLB 0.696
TLB 0.697
TLB 0.698
TLB 0.699
TLB 0.700
TLB 0.701
TLB 0.702
TLB 0.703
TLB 0.704
TLB 0.705
TLB 0.706
TLB 0.707
TLB 0.708
TLB 0.709
TLB 0.710
TLB 0.711
TLB 0.712
TLB 0.713
TLB 0.714
TLB 0.715
TLB 0.716
TLB 0.717
TLB 0.718
TLB 0.719
TLB 0.720
TLB 0.721
TLB 0.722
TLB 0.723
TLB 0.724
TLB 0.725
TLB 0.726
TLB 0.727
TLB 0.728
TLB 0.729
TLB 0.730
TLB 0.731
TLB 0.732
TLB 0.733
TLB 0.734
TLB 0.735
TLB 0.736
TLB 0.737
TLB 0.738
TLB 0.739
TLB 0.740
TLB 0.741
TLB 0.742
TLB 0.743
TLB 0.744
TLB 0.745
TLB 0.746
TLB 0.747
TLB 0.748
TLB 0.749
TLB 0.750
TLB 0.751
TLB 0.752
TLB 0.753
TLB 0.754
TLB 0.755
TLB 0.756
TLB 0.757
TLB 0.758
TLB 0.759
TLB 0.760
TLB 0.761
TLB 0.762
TLB 0.763
TLB 0.764
TLB 0.765
TLB 0.766
TLB 0.767
TLB 0.768
TLB 0.769
TLB 0.770
TLB 0.771
TLB 0.772
TLB 0.773
TLB 0.774
TLB 0.775
TLB 0.776
TLB 0.777
TLB 0.778
TLB 0.779
TLB 0.780
TLB 0.781
TLB 0.782
TLB 0.783
TLB 0.784
TLB 0.785
TLB 0.786
TLB 0.787
TLB 0.788
TLB 0.789
TLB 0.790
TLB 0.791
TLB 0.792
TLB 0.793
TLB 0.794
TLB 0.795
TLB 0.796
TLB 0.797
TLB 0.798
TLB 0.799
TLB 0.800
TLB 0.801
TLB 0.802
TLB 0.803
TLB 0.804
TLB 0.805
TLB 0.806
TLB 0.807
TLB 0.808
TLB 0.809
TLB 0.810
TLB 0.811
TLB 0.812
TLB 0.813
TLB 0.814
TLB 0.815
TLB 0.816
TLB 0.817
TLB 0.818
TLB 0.819
TLB 0.820
TLB 0.821
TLB 0.822
TLB 0.823
TLB 0.824
TLB 0.825
TLB 0.826
TLB 0.827
TLB 0.828
TLB 0.829
TLB 0.830
TLB 0.831
TLB 0.832
TLB 0.833
TLB 0.834
TLB 0.835
TLB 0.836
TLB 0.837
TLB 0.838
TLB 0.839
TLB 0.840
TLB 0.841
TLB 0.842
TLB 0.843
TLB 0.844
TLB 0.845
TLB 0.846
TLB 0.847
TLB 0.848
TLB 0.849
TLB 0.850
TLB 0.851
TLB 0.852
TLB 0.853
TLB 0.854
TLB 0.855
TLB 0.856
TLB 0.857
TLB 0.858
TLB 0.859
TLB 0.860
TLB 0.861
TLB 0.862
TLB 0.863
TLB 0.864
TLB 0.865
TLB 0.866
TLB 0.867
TLB 0.868
TLB 0.869
TLB 0.870
TLB 0.871
TLB 0.872
TLB 0.873
TLB 0.874
TLB 0.875
TLB 0.876
TLB 0.877
TLB 0.878
TLB 0.879
TLB 0.880
TLB 0.881
TLB 0.882
TLB 0.883
TLB 0.884
TLB 0.885
TLB 0.886
TLB 0.887
TLB 0.888
TLB 0.889
TLB 0.890
TLB 0.891
TLB 0.892
TLB 0.893
TLB 0.894
TLB 0.895
TLB 0.896
TLB 0.897
TLB 0.898
TLB 0.899
TLB 0.900
TLB 0.901
TLB 0.902
TLB 0.903
TLB 0.904
TLB 0.905
TLB 0.906
TLB 0.907
TLB 0.908
TLB 0.909
TLB 0.910
TLB 0.911
TLB 0.912
TLB 0.913
TLB 0.914
TLB 0.915
TLB 0.916
TLB 0.917
TLB 0.918
TLB 0.919
TLB 0.920
TLB 0.921
TLB 0.922
TLB 0.923
TLB 0.924
TLB 0.925
TLB 0.926
TLB 0.927
TLB 0.928
TLB 0.929
TLB 0.930
TLB 0.931
TLB 0.932
TLB 0.933
TLB 0.934
TLB 0.935
TLB 0.936
TLB 0.937
TLB 0.938
TLB 0.939
TLB 0.940
TLB 0.941
TLB 0.942
TLB 0.943
TLB 0.944
TLB 0.945
TLB 0.946
TLB 0.947
TLB 0.948
TLB 0.949
TLB 0.950
TLB 0.951
TLB 0.952
TLB 0.953
TLB 0.954
TLB 0.955
TLB 0.956
TLB 0.957
TLB 0.958
TLB 0.959
TLB 0.960
TLB 0.961
TLB 0.962
TLB 0.963
TLB 0.964
TLB 0.965
TLB 0.966
TLB 0.967
TLB 0.968
TLB 0.969
TLB 0.970
TLB 0.971
TLB 0.972
TLB 0.973
TLB 0.974
TLB 0.975
TLB 0.976
TLB 0.977
TLB 0.978
TLB 0.979
TLB 0.980
TLB 0.981
TLB 0.982
TLB 0.983
TLB 0.984
TLB 0.985
TLB 0.986
TLB 0.987
TLB 0.988
TLB 0.989
TLB 0.990
TLB 0.991
TLB 0.992
TLB 0.993
TLB 0.994
TLB 0.995
TLB 0.996
TLB 0.997
TLB 0.998
TLB 0.999
TLB 0.1000
TLB 0.1001
TLB 0.1002
TLB 0.1003
TLB 0.1004
TLB 0.1005
TLB 0.1006
TLB 0.1007
TLB 0.1008
TLB 0.1009
TLB 0.1010
TLB 0.1011
TLB 0.1012
TLB 0.1013
TLB 0.1014
TLB 0.1015
TLB 0.1016
TLB 0.1017
TLB 0.1018
TLB 0.1019
TLB 0.1020
TLB 0.1021
TLB 0.1022
TLB 0.1023
TLB 0.1024
TLB 0.1025
TLB 0.1026
TLB 0.1027
TLB 0.1028
TLB 0.1029
TLB 0.1030
TLB 0.1031
TLB 0.1032
TLB 0.1033
TLB 0.1034
TLB 0.1035
TLB 0.1036
TLB 0.1037
TLB 0.1038
TLB 0.1039
TLB 0.1040
TLB 0.1041
TLB 0.1042
TLB 0.1043
TLB 0.1044
TLB 0.1045
TLB 0.1046
TLB 0.1047
TLB 0.1048
TLB 0.1049
TLB 0.1050
TLB 0.1051
TLB 0.1052
TLB 0.1053
TLB 0.1054
TLB 0.1055
TLB 0.1056
TLB 0.1057
TLB 0.1058
TLB 0.1059
TLB 0.1060
TLB 0.1061
TLB 0.1062
TLB 0.1063
TLB 0.1064
TLB 0.1065
TLB 0.1066
TLB 0.1067
TLB 0.1068
TLB 0.1069
TLB 0.1070
TLB 0.1071
TLB 0.1072
TLB 0.1073
TLB 0.1074
TLB 0.1075
TLB 0.1076
TLB 0.1077
TLB 0.1078
TLB 0.1079
TLB 0.1080
TLB 0.1081
TLB 0.1082
TLB 0.1083
TLB 0.1084
TLB 0.1085
TLB 0.1086
TLB 0.1087
TLB 0.1088
TLB 0.1089
TLB 0.1090
TLB 0.1091
TLB 0.1092
TLB 0.1093
TLB 0.1094
TLB 0.1095
TLB 0.1096
TLB 0.1097
TLB 0.1098
TLB 0.1099
TLB 0.1100
TLB 0.1101
TLB 0.1102
TLB 0.1103
TLB 0.1104
TLB 0.1105
TLB 0.1106
TLB 0.1107
TLB 0.1108
TLB 0.1109
TLB 0.1110
TLB 0.1111
TLB 0.1112
TLB 0.1113
TLB 0.1114
TLB 0.1115
TLB 0.1116
TLB 0.1117
TLB 0.1118
TLB 0.1119
TLB 0.1120
TLB 0.1121
TLB 0.1122
TLB 0.1123
TLB 0.1124
TLB 0.1125
TLB 0.1126
TLB 0.1127
TLB 0.1128
TLB 0.1129
TLB 0.1130
TLB 0.1131
TLB 0.1132
TLB 0.1133
TLB 0.1134
TLB 0.1135
TLB 0.1136
TLB 0.1137
TLB 0.1138
TLB 0.1139
TLB 0.1140
TLB 0.1141
TLB 0.1142
TLB 0.1143
TLB 0.1144
TLB 0.1145
TLB 0.1146
TLB 0.1147
TLB 0.1148
TLB 0.1149
TLB 0.1150
TLB 0.1151
TLB 0.1152
TLB 0.1153
TLB 0.1154
TLB 0.1155
TLB 0.1156
TLB 0.1157
TLB 0.1158
TLB 0.1159
TLB 0.1160
TLB 0.1161
TLB 0.1162
TLB 0.1163
TLB 0.1164
TLB 0.1165
TLB 0.1166
TLB 0.1167
TLB 0.1168
TLB 0.1169
TLB 0.1170
TLB 0.1171
TLB 0.1172
TLB 0.1173
TLB 0.1174
TLB 0.1175
TLB 0.1176
TLB 0.1177
TLB 0.1178
TLB 0.1179
TLB 0.1180
TLB 0.1181
TLB 0.1182
TLB 0.1183
TLB 0.1184
TLB 0.1185
TLB 0.1186
TLB 0.1187
TLB 0.1188
TLB 0.1189
TLB 0.1190
TLB 0.1191
TLB 0.1192
TLB 0.1193
TLB 0.1194
TLB 0.1195
TLB 0.1196
TLB 0.1197
TLB 0.1198
TLB 0.1199
TLB 0.1200
TLB 0.1201
TLB 0.1202
TLB 0.1203
TLB 0.1204
TLB 0.1205
TLB 0.1206
TLB 0.1207
TLB 0.1208
TLB 0.1209
TLB 0.1210
TLB 0.1211
TLB 0.1212
TLB 0.1213
TLB 0.1214
TLB 0.1215
TLB 0.1216
TLB 0.1217
TLB 0.1218
TLB 0.1219
TLB 0.1220
TLB 0.1221
TLB 0.1222
TLB 0.1223
TLB 0.1224
TLB 0.1225
TLB 0.1226
TLB 0.1227
TLB 0.1228
TLB 0.1229
TLB 0.1230
TLB 0.1231
TLB 0.1232
TLB 0.1233
TLB 0.1234
TLB 0.1235
TLB 0.1236
TLB 0.1237
TLB 0.1238
TLB 0.1239
TLB 0.1240
TLB 0.1241
TLB 0.1242
TLB 0.1243
TLB 0.1244
TLB 0.1245
TLB 0.1246
TLB 0.1247
TLB 0.1248
TLB 0.1249
TLB 0.1250
TLB 0.1251
TLB 0.1252
TLB 0.1253
TLB 0.1254
TLB 0.1255
TLB 0.1256
TLB 0.1257
TLB 0.1258
TLB 0.1259
TLB 0.1260
TLB 0.1261
TLB 0.1262
TLB 0.1263
TLB 0.1264
TLB 0.1265
TLB 0.1266
TLB 0.1267
TLB 0.1268
TLB 0.1269
TLB 0.1270
TLB 0.1271
TLB 0.1272
TLB 0.1273
TLB 0.1274
TLB 0.1275
TLB 0.1276
TLB 0.1277
TLB 0.1278
TLB 0.1279
TLB 0.1280
TLB 0.1281
TLB 0.1282
TLB 0.1283
TLB 0.1284
TLB 0.1285
TLB 0.1286
TLB 0.1287
TLB 0.1288
TLB 0.1289
TLB 0.1290
TLB 0.1291
TLB 0.1292
TLB 0.1293
TLB 0.1294
TLB 0.1295
TLB 0.1296
TLB 0.1297
TLB 0.1298
TLB 0.1299
TLB 0.1300
TLB 0.1301
TLB 0.1302
TLB 0.1303
TLB 0.1304
TLB 0.1305
TLB 0.1306
TLB 0.1307
TLB 0.1308
TLB 0.1309
TLB 0.1310
TLB 0.1311
TLB 0.1312
TLB 0.1313
TLB 0.1314
TLB 0.1315
TLB 0.1316
TLB 0.1317
TLB 0.1318
TLB 0.1319
TLB 0.1320
TLB 0.1321
TLB 0.1322
TLB 0.1323
TLB 0.1324
TLB 0.1325
TLB 0.1326
TLB 0.1327
TLB 0.1328
TLB 0.1329
TLB 0.1330
TLB 0.1331
TLB 0.1332
TLB 0.1333
TLB 0.1334
TLB 0.1335
TLB 0.1336
TLB 0.1337
TLB 0.1338
TLB 0.1339
TLB 0.1340
TLB 0.1341
TLB 0.1342
TLB 0.1343
TLB 0.1344
TLB 0.1345
TLB 0.1346
TLB 0.1347
TLB 0.1348
TLB 0.1349
TLB 0.1350
TLB 0.1351
TLB 0.1352
TLB 0.1353
TLB 0.1354
TLB 0.1355
TLB 0.1356
TLB 0.1357
TLB 0.1358
TLB 0.1359
TLB 0.1360
TLB 0.1361
TLB 0.1362
TLB 0.1363
TLB 0.1364
TLB 0.1365
TLB 0.1366
TLB 0.1367
TLB 0.1368
TLB 0.1369
TLB 0.1370
TLB 0.1371
TLB 0.1372
TLB 0.1373
TLB 0.1374
TLB 0.1375
TLB 0.1376
TLB 0.1377
TLB 0.1378
TLB 0.1379
TLB 0.1380
TLB 0.1381
TLB 0.1382
TLB 0.1383
TLB 0.1384
TLB 0.1385
TLB 0.1386
TLB 0.1387
TLB 0.1388
TLB 0.1389
TLB 0.1390
TLB 0.1391
TLB 0.1392
TLB 0.1393
TLB 0.1394
TLB 0.1395
TLB 0.1396
TLB 0.1397
TLB 0.1398
TLB 0.1399
TLB 0.1400
TLB 0.1401
TLB 0.1402
TLB 0.1403
TLB 0.1404
TLB 0.1405
TLB 0.1406
TLB 0.1407
TLB 0.1408
TLB 0.1409
TLB 0.1410
TLB 0.1411
TLB 0.1412
TLB 0.1413
TLB 0.1414
TLB 0.1415
TLB 0.1416
TLB 0.1417
TLB 0.1418
TLB 0.1419
TLB 0.1420
TLB 0.1421
TLB 0.1422
TLB 0.1423
TLB 0.1424
TLB 0.1425
TLB 0.1426
TLB 0.1427
TLB 0.1428
TLB 0.1429
TLB 0.1430
TLB 0.1431
TLB 0.1432
TLB 0.1433
TLB 0.1434
TLB 0.1435
TLB 0.1436
TLB 0.1437
TLB 0.1438
TLB 0.1439
TLB 0.1440
TLB 0.1441
TLB 0.1442
TLB 0.1443
TLB 0.1444
TLB 0.1445
TLB 0.1446
TLB 0.1447
TLB 0.1448
TLB 0.1449
TLB 0.1450
TLB 0.1451
TLB 0.1452
TLB 0.1453
TLB 0.1454
TLB 0.1455
TLB 0.1456
TLB 0.1457
TLB 0.1458
TLB 0.1459
TLB 0.1460
TLB 0.1461
TLB 0.1462
TLB 0.1463
TLB 0.1464
TLB 0.1465
TLB 0.1466
TLB 0.1467
TLB 0.1468
TLB 0.1469
TLB 0.1470
TLB 0.1471
TLB 0.1472
TLB 0.1473
TLB 0.1474
TLB 0.1475
TLB 0.1476
TLB 0.1477
TLB 0.1478
TLB 0.1479
TLB 0.1480
TLB 0.1481
TLB 0.1482
TLB 0.1483
TLB 0.1484
TLB 0.1485
TLB 0.1486
TLB 0.1487
TLB 0.1488
TLB 0.1489
TLB 0.1490
TLB 0.1491
TLB 0.1492
TLB 0.1493
TLB 0.1494
TLB 0.1495
TLB 0.1496
TLB 0.1497
TLB 0.1498
TLB 0.1499
TLB 0.1500
TLB 0.1501
TLB 0.1502
TLB 0.1503
TLB 0.1504
TLB 0.1505
TLB 0.1506
TLB 0.1507
TLB 0.1508
TLB 0.1509
TLB 0.1510
TLB 0.1511
TLB 0.1512
TLB 0.1513
TLB 0.1514
TLB 0.1515
TLB 0.1516
TLB 0.1517
TLB 0.1518
TLB 0.1519
TLB 0.1520
TLB 0.1521
TLB 0.1522
TLB 0.1523
TLB 0.1524
TLB 0.1525
TLB 0.1526
TLB 0.1527
TLB 0.1528
TLB 0.1529
TLB 0.1530
TLB 0.1531
TLB 0.1532
TLB 0.1533
TLB 0.1534
TLB 0.1535
TLB 0.1536
TLB 0.1537
TLB 0.1538
TLB 0.1539
TLB 0.1540
TLB 0.1541
TLB 0.1542
TLB 0.1543
TLB 0.1544
TLB 0.1545
TLB 0.1546
TLB 0.1547
TLB 0.1548
TLB 0.1549
TLB 0.1550
TLB 0.1551
TLB 0.1552
TLB 0.1553
TLB 0.1554
TLB 0.1555
TLB 0.1556
TLB 0.1557
TLB 0.1558
TLB 0.1559
TLB 0.1560
TLB 0.1561
TLB 0.1562
TLB 0.1563
TLB 0.1564
TLB 0.1565
TLB 0.1566
TLB 0.1567
TLB 0.1568
TLB 0.1569
TLB 0.1570
TLB 0.1571
TLB 0.1572
TLB 0.1573
TLB 0.1574
TLB 0.1575
TLB 0.1576
TLB 0.1577
TLB 0.1578
TLB 0.1579
TLB 0.1580
TLB 0.1581
TLB 0.1582
TLB 0.1583
TLB 0.1584
TLB 0.1585
TLB 0.1586
TLB 0.1587
TLB 0.1588
TLB 0.1589
TLB 0.1590
TLB 0.1591
TLB 0.1592
TLB 0.1593
TLB 0.1594
TLB 0.1595
TLB 0.1596
TLB 0.1597
TLB 0.1598
TLB 0.1599
TLB 0.1600
TLB 0.1601
TLB 0.1602
TLB 0.1603
TLB 0.1604
TLB 0.1605
TLB 0.1606
TLB 0.1607
TLB 0.1608
TLB 0.1609
TLB 0.1610
TLB 0.1611
TLB 0.1612
TLB 0.1613
TLB 0.1614
TLB 0.1615
TLB 0.1616
TLB 0.1617
TLB 0.1618
TLB 0.1619
TLB 0.1620
TLB 0.1621
TLB 0.1622
TLB 0.1623
TLB 0.1624
TLB 0.1625
TLB 0.1626
TLB 0.1627
TLB 0.1628
TLB 0.1629
TLB 0.1630
TLB 0.1631
TLB 0.1632
TLB 0.1633
TLB 0.1634
TLB 0.1635
TLB 0.1636
TLB 0.1637
TLB 0.1638
TLB 0.1639
TLB 0.1640
TLB 0.1641
TLB 0.1642
TLB 0.1643
TLB 0.1644
TLB 0.1645
TLB 0.1646
TLB 0.1647
TLB 0.1648
TLB 0.1649
TLB 0.1650
TLB 0.1651
TLB 0.1652
TLB 0.1653
TLB 0.1654
TLB 0.1655
TLB 0.1656
TLB 0.1657
TLB 0.1658
TLB 0.1659
TLB 0.1660
TLB 0.1661
TLB 0.1662
TLB 0.1663
TLB 0.1664
TLB 0.1665
TLB 0.1666
TLB 0.1667
TLB 0.1668
TLB 0.1669
TLB 0.1670
TLB 0.1671
TLB 0.1672
TLB 0.1673
TLB 0.1674
TLB 0.1675
TLB 0.1676
TLB 0.1677
TLB 0.1678
TLB 0.1679
TLB 0.1680
TLB 0.1681
TLB 0.1682
TLB 0.1683
TLB 0.1684
TLB 0.1685
TLB 0.1686
TLB 0.1687
TLB 0.1688
TLB 0.1689
TLB 0.1690
TLB 0.1691
TLB 0.1692
TLB 0.1693
TLB 0.1694
TLB 0.1695
TLB 0.1696
TLB 0.1697
TLB 0.1698
TLB 0.1699
TLB 0.1700
TLB 0.1701
TLB 0.1702
TLB 0.1703
TLB 0.1704
TLB 0.1705
TLB 0.1706
TLB 0.1707
TLB 0.1708
TLB 0.1709
TLB 0.1710
TLB 0.1711
TLB 0.1712
TLB 0.1713
TLB 0.1714
TLB 0.1715
TLB 0.1716
TLB 0.1717
TLB 0.1718
TLB 0.1719
TLB 0.1720
TLB 0.1721
TLB 0.1722
TLB 0.1723
TLB 0.1724
TLB 0.1725
TLB 0.1726
TLB 0.1727
TLB 0.1728
TLB 0.1729
TLB 0.1730
TLB 0.1731
TLB 0.1732
TLB 0.1733
TLB 0.1734
TLB 0.1735
TLB 0.1736
TLB 0.1737
TLB 0.1738
TLB 0.1739
TLB 0.1740
TLB 0.1741
TLB 0.1742
TLB 0.1743
TLB 0.1744
TLB 0.1745
TLB 0.1746
TLB 0.1747
TLB 0.1748
TLB 0.1749
TLB 0.1750
TLB 0.1751
TLB 0.1752
TLB 0.1753
TLB 0.1754
TLB 0.1755
TLB 0.1756
TLB 0.1757
TLB 0.1758
TLB 0.1759
TLB 0.1760
TLB 0.1761
TLB 0.1762
TLB 0.1763
TLB 0.1764
TLB 0.1765
TLB 0.1766
TLB 0.1767
TLB 0.1768
TLB 0.1769
TLB 0.1770
TLB 0.1771
TLB 0.1772
TLB 0.1773
TLB 0.1774
TLB 0.1775
TLB 0.1776
TLB 0.1777
TLB 0.1778
TLB 0.1779
TLB 0.1780
TLB 0.1781
TLB 0.1782
TLB 0.


WTG-9-12
WTG-9-13
WTG-9-14
WTG-9-15
WTG-9-16
WTG-9-17
Spare WTG-9-18
WTG-8-12
WTG-8-13
WTG-8-14
WTG-8-15
WTG-8-16
WTG-8-17
WTG-7-12
WTG-7-14
WTG-7-16
WTG-7-17
WTG-6-12
Spare WTG-6-13
WTG-6-14
WTG-6-15
WTG-6-16
WTG-6-17
WTG-5-12
WTG-5-13
WTG-5-14
WTG-5-15
WTG-5-16
WTG-5-17
OSS-3
WTG-9-14A
WTG-6-14A
WTG-5-14A
WTG-7-16A
WTG-8-16A
WTG-9-16A
WTG-6-16A
WTG-5-16A
WTG-7-17A
WTG-8-17A
WTG-9-17A
WTG-9-18A
WTG-6-17A
WTG-5-17A
WTG-8-15-1
WTG-6-14B
WTG-5-14B
WTG-7-16B
WTG-6-16B
WTG-5-16B
WTG-7-17B
WTG-8-17B
WTG-6-17B
WTG-5-17B
GS-57-A
GS-57-B
GS-57-C
GS-58-A
GS-58-B
GS-58-C
GS-59-A
GS-59-B
GS-59-C
GS-60-A
GS-60-B
GS-60-C
GS-61-A
GS-61-B
GS-61-C
2008_09-13
2008_09-14
2008_09-15
2008_09-16
2008_09-17
2008_09-18
2008_09-12
2008_09-14A
2008_09-16A
2008_09-17A
2008_09-18A
2008_09-15
2008_09-17B
2008_09-16B
2008_09-14B
2008_09-15A
WTG-9-14B
WTG-8-15-1
WTG-6-14B
WTG-5-14B
WTG-7-16B
WTG-6-16B
WTG-5-16B
WTG-7-17B
WTG-8-17B
WTG-6-17B
WTG-5-17B


WTG-1-1
WTG-1-2
WTG-1-3
WTG-1-4
WTG-1-5
WTG-1-6
WTG-2-1
WTG-2-2
WTG-2-3
WTG-2-4
WTG-2-5
WTG-2-6
WTG-3-1
WTG-3-2
WTG-3-3
WTG-3-4
WTG-3-5
WTG-3-6
WTG-4-1
WTG-4-2
WTG-4-3
WTG-4-4
WTG-4-5
WTG-4-6
WTG-5-1
WTG-5-2
WTG-5-3
WTG-5-4
WTG-5-5
Spare WTG-5-6
WTG-1-1A
WTG-2-3A
WTG-3-3A
WTG-4-3A
WTG-5-3A
WTG-5-4A
WTG-1-4A
WTG-2-4A
WTG-3-4A
WTG-4-4A
WTG-5-5A
WTG-5-6A
WTG-1-5A
WTG-2-5A
WTG-3-5A
WTG-4-5A
WTG-5-6A
WTG-1-6A
WTG-2-6A
WTG-3-6A
WTG-4-6A
WTG-5-6A
WTG-5-5A
WTG-5-4A
WTG-5-3A
WTG-5-2A
WTG-5-1A
WTG-4-1A
WTG-4-2A
WTG-4-3A
WTG-4-4A
WTG-4-5A
WTG-4-6A
WTG-3-1A
WTG-3-2A
WTG-3-3A
WTG-3-4A
WTG-3-5A
WTG-3-6A
WTG-2-1A
WTG-2-2A
WTG-2-3A
WTG-2-4A
WTG-2-5A
WTG-2-6A
WTG-1-1A
WTG-1-2A
WTG-1-3A
WTG-1-4A
WTG-1-5A
WTG-1-6A
WTG16 (I)
WTG15 (I)
WTG14 (I)
WTG13 (I)
WTG12 (I)
WTG11 (I)
WTG10 (I)
WTG9 (I)
WTG8 (I)
WTG7 (I)
WTG6 (I)
WTG5 (I)
WTG4 (I)
WTG3 (I)
WTG2 (I)
WTG1 (I)
WTG16 (O)
WTG15 (O)
WTG14 (O)
WTG13 (O)
WTG12 (O)
WTG11 (O)
WTG10 (O)
WTG9 (O)
WTG8 (O)
WTG7 (O)
WTG6 (O)
WTG5 (O)
WTG4 (O)
WTG3 (O)
WTG2 (O)
WTG1 (O)
TLB1
TLB2
TLB3
TLB4
TLB5
TLB6
TLB7
TLB8
TLB9
TLB10
TLB11
TLB12
TLB13
TLB14
TLB15
TLB16
TLB17
TLB18
TLB19
TLB20
TLB21
TLB22
TLC1
TLC2
TLC3
TLC4
TLC5
TLC6
TLC7
TLC8
TLC9
TLC10
TLC11
TLC12
TLC13
TLC14
TLC15
TLC16
TLC17
TLC18
TLC19
TLC20
TLC21
TLC22
TLC23
TLC24
TLC25
TLC26
TLC27
TLC28
TLC29
TLC30
TLC31
TLC32
TLC33
TLC34
TLC35
TLC36
TLC37
TLC38
TLC39
TLC40
TLC41
TLC42
TLC43
TLC44
TLC45
TLC46
TLC47
TLC48
TLC49
TLC50
TLC51
TLC52
TLC53
TLC54
TLC55
TLC56
TLC57
TLC58
TLC59
TLC60
TLC61
TLC62
TLC63
TLC64
TLC65
TLC66
TLC67
TLC68
TLC69
TLC70
TLC71
TLC72
TLC73
TLC74
TLC75
TLC76
TLC77
TLC78
TLC79
TLC80
TLC81
TLC82
TLC83
TLC84
TLC85
TLC86
TLC87
TLC88
TLC89
TLC90
TLC91
TLC92
TLC93
TLC94
TLC95
TLC96
TLC97
TLC98
TLC99
TLC100
TLC101
TLC102
TLC103
TLC104
TLC105
TLC106
TLC107
TLC108
TLC109
TLC110
TLC111
TLC112
TLC113
TLC114
TLC115
TLC116
TLC117
TLC118
TLC119
TLC120
TLC121
TLC122
TLC123
TLC124
TLC125
TLC126
TLC127
TLC128
TLC129
TLC130
TLC131
TLC132
TLC133
TLC134
TLC135
TLC136
TLC137
TLC138
TLC139
TLC140
TLC141
TLC142
TLC143
TLC144
TLC145
TLC146
TLC147
TLC148
TLC149
TLC150
TLC151
TLC152
TLC153
TLC154
TLC155
TLC156
TLC157
TLC158
TLC159
TLC160
TLC161
TLC162
TLC163
TLC164
TLC165
TLC166
TLC167
TLC168
TLC169
TLC170
TLC171
TLC172
TLC173
TLC174
TLC175
TLC176
TLC177
TLC178
TLC179
TLC180
TLC181
TLC182
TLC183
TLC184
TLC185
TLC186
TLC187
TLC188
TLC189
TLC190
TLC191
TLC192
TLC193
TLC194
TLC195
TLC196
TLC197
TLC198
TLC199
TLC200
TLC201
TLC202
TLC203
TLC204
TLC205
TLC206
TLC207
TLC208
TLC209
TLC210
TLC211
TLC212
TLC213
TLC214
TLC215
TLC216
TLC217
TLC218
TLC219
TLC220
TLC221
TLC222
TLC223
TLC224
TLC225
TLC226
TLC227
TLC228
TLC229
TLC230
TLC231
TLC232
TLC233
TLC234
TLC235
TLC236
TLC237
TLC238
TLC239
TLC240
TLC241
TLC242
TLC243
TLC244
TLC245
TLC246
TLC247
TLC248
TLC249
TLC250
TLC251
TLC252
TLC253
TLC254
TLC255
TLC256
TLC257
TLC258
TLC259
TLC260
TLC261
TLC262
TLC263
TLC264
TLC265
TLC266
TLC267
TLC268
TLC269
TLC270
TLC271
TLC272
TLC273
TLC274
TLC275
TLC276
TLC277
TLC278
TLC279
TLC280
TLC281
TLC282
TLC283
TLC284
TLC285
TLC286
TLC287
TLC288
TLC289
TLC290
TLC291
TLC292
TLC293
TLC294
TLC295
TLC296
TLC297
TLC298
TLC299
TLC300
TLC301
TLC302
TLC303
TLC304
TLC305
TLC306
TLC307
TLC308
TLC309
TLC310
TLC311
TLC312
TLC313
TLC314
TLC315
TLC316
TLC317
TLC318
TLC319
TLC320
TLC321
TLC322
TLC323
TLC324
TLC325
TLC326
TLC327
TLC328
TLC329
TLC330
TLC331
TLC332
TLC333
TLC334
TLC335
TLC336
TLC337
TLC338
TLC339
TLC340
TLC341
TLC342
TLC343
TLC344
TLC345
TLC346
TLC347
TLC348
TLC349
TLC350
TLC351
TLC352
TLC353
TLC354
TLC355
TLC356
TLC357
TLC358
TLC359
TLC360
TLC361
TLC362
TLC363
TLC364
TLC365
TLC366
TLC367
TLC368
TLC369
TLC370
TLC371
TLC372
TLC373
TLC374
TLC375
TLC376
TLC377
TLC378
TLC379
TLC380
TLC381
TLC382
TLC383
TLC384
TLC385
TLC386
TLC387
TLC388
TLC389
TLC390
TLC391
TLC392
TLC393
TLC394
TLC395
TLC396
TLC397
TLC398
TLC399
TLC400
TLC401
TLC402
TLC403
TLC404
TLC405
TLC406
TLC407
TLC408
TLC409
TLC410
TLC411
TLC412
TLC413
TLC414
TLC415
TLC416
TLC417
TLC418
TLC419
TLC420
TLC421
TLC422
TLC423
TLC424
TLC425
TLC426
TLC427
TLC428
TLC429
TLC430
TLC431
TLC432
TLC433
TLC434
TLC435
TLC436
TLC437
TLC438
TLC439
TLC440
TLC441
TLC442
TLC443
TLC444
TLC445
TLC446
TLC447
TLC448
TLC449
TLC450
TLC451
TLC452
TLC453
TLC454
TLC455
TLC456
TLC457
TLC458
TLC459
TLC460
TLC461
TLC462
TLC463
TLC464
TLC465
TLC466
TLC467
TLC468
TLC469
TLC470
TLC471
TLC472
TLC473
TLC474
TLC475
TLC476
TLC477
TLC478
TLC479
TLC480
TLC481
TLC482
TLC483
TLC484
TLC485
TLC486
TLC487
TLC488
TLC489
TLC490
TLC491
TLC492
TLC493
TLC494
TLC495
TLC496
TLC497
TLC498
TLC499
TLC500
TLC501
TLC502
TLC503
TLC504
TLC505
TLC506
TLC507
TLC508
TLC509
TLC510
TLC511
TLC512
TLC513
TLC514
TLC515
TLC516
TLC517
TLC518
TLC519
TLC520
TLC521
TLC522
TLC523
TLC524
TLC525
TLC526
TLC527
TLC528
TLC529
TLC530
TLC531
TLC532
TLC533
TLC534
TLC535
TLC536
TLC537
TLC538
TLC539
TLC540
TLC541
TLC542
TLC543
TLC544
TLC545
TLC546
TLC547
TLC548
TLC549
TLC550
TLC551
TLC552
TLC553
TLC554
TLC555
TLC556
TLC557
TLC558
TLC559
TLC560
TLC561
TLC562
TLC563
TLC564
TLC565
TLC566
TLC567
TLC568
TLC569
TLC570
TLC571
TLC572
TLC573
TLC574
TLC575
TLC576
TLC577
TLC578
TLC579
TLC580
TLC581
TLC582
TLC583
TLC584
TLC585
TLC586
TLC587
TLC588
TLC589
TLC590
TLC591
TLC592
TLC593
TLC594
TLC595
TLC596
TLC597
TLC598
TLC599
TLC600
TLC601
TLC602
TLC603
TLC604
TLC605
TLC606
TLC607
TLC608
TLC609
TLC610
TLC611
TLC612
TLC613
TLC614
TLC615
TLC616
TLC617
TLC618
TLC619
TLC620
TLC621
TLC622
TLC623
TLC624
TLC625
TLC626
TLC627
TLC628
TLC629
TLC630
TLC631
TLC632
TLC633
TLC634
TLC635
TLC636
TLC637
TLC638
TLC639
TLC640
TLC641
TLC642
TLC643
TLC644
TLC645
TLC646
TLC647
TLC648
TLC649
TLC650
TLC651
TLC652
TLC653
TLC654
TLC655
TLC656
TLC657
TLC658
TLC659
TLC660
TLC661
TLC662
TLC663
TLC664
TLC665
TLC666
TLC667
TLC668
TLC669
TLC670
TLC671
TLC672
TLC673
TLC674
TLC675
TLC676
TLC677
TLC678
TLC679
TLC680
TLC681
TLC682
TLC683
TLC684
TLC685
TLC686
TLC687
TLC688
TLC689
TLC690
TLC691
TLC692
TLC693
TLC694
TLC695
TLC696
TLC697
TLC698
TLC699
TLC700
TLC701
TLC702
TLC703
TLC704
TLC705
TLC706
TLC707
TLC708
TLC709
TLC710
TLC711
TLC712
TLC713
TLC714
TLC715
TLC716
TLC717
TLC718
TLC719
TLC720
TLC721
TLC722
TLC723
TLC724
TLC725
TLC726
TLC727
TLC728
TLC729
TLC730
TLC731
TLC732
TLC733
TLC734
TLC735
TLC736
TLC737
TLC738
TLC739
TLC740
TLC741
TLC742
TLC743
TLC744
TLC745
TLC746
TLC747
TLC748
TLC749
TLC750
TLC751
TLC752
TLC753
TLC754
TLC755
TLC756
TLC757
TLC758
TLC759
TLC760
TLC761
TLC762
TLC763
TLC764
TLC765
TLC766
TLC767
TLC768
TLC769
TLC770
TLC771
TLC772
TLC773
TLC774
TLC775
TLC776
TLC777
TLC778
TLC779
TLC780
TLC781
TLC782
TLC783
TLC784
TLC785
TLC786
TLC787
TLC788
TLC789
TLC790
TLC791
TLC792
TLC793
TLC794
TLC795
TLC796
TLC797
TLC798
TLC799
TLC800
TLC801
TLC802
TLC803
TLC804
TLC805
TLC806
TLC807
TLC808
TLC809
TLC810
TLC811
TLC812
TLC813
TLC814
TLC815
TLC816
TLC817
TLC818
TLC819
TLC820
TLC821
TLC822
TLC823
TLC824
TLC825
TLC826
TLC827
TLC828
TLC829
TLC830
TLC831
TLC832
TLC833
TLC834
TLC835
TLC836
TLC837
TLC838
TLC839
TLC840
TLC841
TLC842
TLC843
TLC844
TLC845
TLC846
TLC847
TLC848
TLC849
TLC850
TLC851
TLC852
TLC853
TLC854
TLC855
TLC856
TLC857
TLC858
TLC859
TLC860
TLC861
TLC862
TLC863
TLC864
TLC865
TLC866
TLC867
TLC868
TLC869
TLC870
TLC871
TLC872
TLC873
TLC874
TLC875
TLC876
TLC877
TLC878
TLC879
TLC880
TLC881
TLC882
TLC883
TLC884
TLC885
TLC886
TLC887
TLC888
TLC889
TLC890
TLC891
TLC892
TLC893
TLC894
TLC895
TLC896
TLC897
TLC898
TLC899
TLC900
TLC901
TLC902
TLC903
TLC904
TLC905
TLC906
TLC907
TLC908
TLC909
TLC910
TLC911
TLC912
TLC913
TLC914
TLC915
TLC916
TLC917
TLC918
TLC919
TLC920
TLC921
TLC922
TLC923
TLC924
TLC925
TLC926
TLC927
TLC928
TLC929
TLC930
TLC931
TLC932
TLC933
TLC934
TLC935
TLC936
TLC937
TLC938
TLC939
TLC940
TLC941
TLC942
TLC943
TLC944
TLC945
TLC946
TLC947
TLC948
TLC949
TLC950
TLC951
TLC952
TLC953
TLC954
TLC955
TLC956
TLC957
TLC958
TLC959
TLC960
TLC961
TLC962
TLC963
TLC964
TLC965
TLC966
TLC967
TLC968
TLC969
TLC970
TLC971
TLC972
TLC973
TLC974
TLC975
TLC976
TLC977
TLC978
TLC979
TLC980
TLC981
TLC982
TLC983
TLC984
TLC985
TLC986
TLC987
TLC988
TLC989
TLC990
TLC991
TLC992
TLC993
TLC994
TLC995
TLC996
TLC997
TLC998
TLC999
TLC1000
TLC1001
TLC1002
TLC1003
TLC1004
TLC1005
TLC1006
TLC1007
TLC1008
TLC1009
TLC1010
TLC1011
TLC1012
TLC1013
TLC1014
TLC1015
TLC1016
TLC1017
TLC1018
TLC1019
TLC1020
TLC1021
TLC1022
TLC1023
TLC1024
TLC1025
TLC1026
TLC1027
TLC1028
TLC1029
TLC1030
TLC1031
TLC1032
TLC1033
TLC1034
TLC1035
TLC1036
TLC1037
TLC1038
TLC1039
TLC1040
TLC1041
TLC1042
TLC1043
TLC1044
TLC1045
TLC1046
TLC1047
TLC1048
TLC1049
TLC1050
TLC1051
TLC1052
TLC1053
TLC1054
TLC1055
TLC1056
TLC1057
TLC1058
TLC1059
TLC1060
TLC1061
TLC1062
TLC1063
TLC1064
TLC1065
TLC1066
TLC1067
TLC1068
TLC1069
TLC1070
TLC1071
TLC1072
TLC1073
TLC1074
TLC1075
TLC1076
TLC1077
TLC1078
TLC1079
TLC1080
TLC1081
TLC1082
TLC1083
TLC1084
TLC1085
TLC1086
TLC1087
TLC1088
TLC1089
TLC1090
TLC1091
TLC1092
TLC1093
TLC1094
TLC1095
TLC1096
TLC1097
TLC1098
TLC1099
TLC1100
TLC1101
TLC1102
TLC1103
TLC1104
TLC1105
TLC1106
TLC1107
TLC1108
TLC1109
TLC1110
TLC1111
TLC1112
TLC1113
TLC1114
TLC1115
TLC1116
TLC1117
TLC1118
TLC1119
TLC1120
TLC1121
TLC1122
TLC1123
TLC1124
TLC1125
TLC1126
TLC1127
TLC1128
TLC1129
TLC1130
TLC1131
TLC1132
TLC1133
TLC1134
TLC1135
TLC1136
TLC1137
TLC1138
TLC1139
TLC1140
TLC1141
TLC1142
TLC1143
TLC1144
TLC1145
TLC1146
TLC1147
TLC1148
TLC1149
TLC1150
TLC1151
TLC1152
TLC1153
TLC1154
TLC1155
TLC1156
TLC1157
TLC1158
TLC1159
TLC1160
TLC1161
TLC1162
TLC1163
TLC1164
TLC1165
TLC1166
TLC1167
TLC1168
TLC1169
TLC1170
TLC1171
TLC1172
TLC1173
TLC1174
TLC1175
TLC1176
TLC1177
TLC1178
TLC1179
TLC1180
TLC1181
TLC1182
TLC1183
TLC1184
TLC1185
TLC1186
TLC1187
TLC1188
TLC1189
TLC1190
TLC1191
TLC1192
TLC1193
TLC1194
TLC1195
TLC1196
TLC1197
TLC1198
TLC1199
TLC1200
TLC1201
TLC1202
TLC1203
TLC1204
TLC1205
TLC1206
TLC1207
TLC1208
TLC1209
TLC1210
TLC1211
TLC1212
TLC1213
TLC1214
TLC1215
TLC1216
TLC1217
TLC1218
TLC1219
TLC1220
TLC1221
TLC1222
TLC1223
TLC1224
TLC1225
TLC1226
TLC1227
TLC1228
TLC1229
TLC1230
TLC1231
TLC1232
TLC1233
TLC1234
TLC1235
TLC1236
TLC1237
TLC1238
TLC1239
TLC1240
TLC1241
TLC1242
TLC1243
TLC1244
TLC1245
TLC1246
TLC1247
TLC1248
TLC1249
TLC1250
TLC1251
TLC1252
TLC1253
TLC1254
TLC1255
TLC1256
TLC1257
TLC1258
TLC1259
TLC1260
TLC1261
TLC1262
TLC1263
TLC1264
TLC1265
TLC1266
TLC1267
TLC1268
TLC1269
TLC1270
TLC1271
TLC1272
TLC1273
TLC1274
TLC1275
TLC1276
TLC1277
TLC1278
TLC1279
TLC1280
TLC1281
TLC1282
TLC1283
TLC1284
TLC1285
TLC1286
TLC1287
TLC1288
TLC1289
TLC1290
TLC1291
TLC1292
TLC1293
TLC1294
TLC1295
TLC1296
TLC1297
TLC1298
TLC1299
TLC1300
TLC1301
TLC1302
TLC1303
TLC1304
TLC1305
TLC1306
TLC1307
TLC1308
TLC1309
TLC1310
TLC1311
TLC1312
TLC1313
TLC1314
TLC1315
TLC1316
TLC1317
TLC1318
TLC1319
TLC1320
TLC1321
TLC1322
TLC1323
TLC1324
TLC1325
TLC1326
TLC1327
TLC1328
TLC1329
TLC1330
TLC1331
TLC1332
TLC1333
TLC1334
TLC1335
TLC1336
TLC1337
TLC1338
TLC1339
TLC1340
TLC1341
TLC1342
TLC1343
TLC1344
TLC1345
TLC1346
TLC1347
TLC1348
TLC1349
TLC1350
TLC1351
TLC1352
TLC1353
TLC1354
TLC1355
TLC1356
TLC1357
TLC1358
TLC1359
TLC1360
TLC1361
TLC1362
TLC1363
TLC1364
TLC1365
TLC1366
TLC1367
TLC1368
TLC1369
TLC1370
TLC1371
TLC1372
TLC1373
TLC1374
TLC1375
TLC1376
TLC1377
TLC1378
TLC1379
TLC1380
TLC1381
TLC1382
TLC1383
TLC1384
TLC1385
TLC1386
TLC1387
TLC1388
TLC1389
TLC1390
TLC1391
TLC1392
TLC1393
TLC1394
TLC1395
TLC1396
TLC1397
TLC1398
TLC1399
TLC1400
TLC1401
TLC1402
TLC1403
TLC1404
TLC1405
TLC1406
TLC1407
TLC1408
TLC1409
TLC1410
TLC1411
TLC1412
TLC1413
TLC1414
TLC1415
TLC1416
TLC1417
TLC1418
TLC1419
TLC1420
TLC1421
TLC1422
TLC1423
TLC1424
TLC1425
TLC1426
TLC1427
TLC1428
TLC1429
TLC1430
TLC1431
TLC1432
TLC1433
TLC1434
TLC1435
TLC1436
TLC1437
TLC1438
TLC1439
TLC1440
TLC1441
TLC1442
TLC1443
TLC1444
TLC1445
TLC1446
TLC1447
TLC1448
TLC1449
TLC1450
TLC1451
TLC1452
TLC1453
TLC1454
TLC1455
TLC1456
TLC1457
TLC1458
TLC1459
TLC1460
TLC1461
TLC1462
TLC1463
TLC1464
TLC1465
TLC1466
TLC1467
TLC1468
TLC1469
TLC1470
TLC1471
TLC1472
TLC1473
TLC1474
TLC1475
TLC1476
TLC1477
TLC1478
TLC1479
TLC1480
TLC1481
TLC1482
TLC1483
TLC1484
TLC1485
TLC1486
TLC1487
TLC1488
TLC1489
TLC1490
TLC1491
TLC1492
TLC1493
TLC1494
TLC1495
TLC1496
TLC1497
TLC1498
TLC1499
TLC1500
TLC1501
TLC1502
TLC1503
TLC1504
TLC1505
TLC1506
TLC1507
TLC1508
TLC1509
TLC1510
TLC1511
TLC1512
TLC1513
TLC1514
TLC1515
TLC1516
TLC1517
TLC1518
TLC1519
TLC1520
TLC1521
TLC1522
TLC1523
TLC1524
TLC1525
TLC1526
TLC1527
TLC1528
TLC1529
TLC1530
TLC1531
TLC1532
TLC1533
TLC1534
TLC1535
TLC1536
TLC1537
TLC1538
TLC1539
TLC1540
TLC1541
TLC1542
TLC1543
TLC1544
TLC1545
TLC1546
TLC1547
TLC1548
TLC1549
TLC1550
TLC1551
TLC1552
TLC1553
TLC1554
TLC1555
TLC1556
TLC1557
TLC1558
TLC1559
TLC1560
TLC1561
TLC1562
TLC1563
TLC1564
TLC1565
TLC1566
TLC1567
TLC1568
TLC1569
TLC1570
TLC1571
TLC1572
TLC1573
TLC1574
TLC1575
TLC1576
TLC1577
TLC1578
TLC1579
TLC1580
TLC1581
TLC1582
TLC1583
TLC1584
TLC1585
TLC1586
TLC1587
TLC1588
TLC1589
TLC1590
TLC1591
TLC1592
TLC1593
TLC1594
TLC1595
TLC1596
TLC1597
TLC1598
TLC1599
TLC1600
TLC1601
TLC1602
TLC1603
TLC1604
TLC1605
TLC1606
TLC1607
TLC1608
TLC1609
TLC1610
TLC1611
TLC1612
TLC1613
TLC1614
TLC1615
TLC1616
TLC1617
TLC1618
TLC1619
TLC1620
TLC1621
TLC1622
TLC1623
TLC1624
TLC1625
TLC1626
TLC1627
TLC1628
TLC1629
TLC1630
TLC1631
TLC1632
TLC1633
TLC1634
TLC1635
TLC1636
TLC1637
TLC1638
TLC1639
TLC1640
TLC1641
TLC1642
TLC1643
TLC1644
TLC1645
TLC1646
TLC1647
TLC1648
TLC1649
TLC1650
TLC1651
TLC1652
TLC1653
TLC1654
TLC1655
TLC1656
TLC1657
TLC1658
TLC1659
TLC1660
TLC1661
TLC1662
TLC1663
TLC1664
TLC1665
TLC1666
TLC1667
TLC1668
TLC1669
TLC1670
TLC1671
TLC1672
TLC1673
TLC1674
TLC1675
TLC1676
TLC1677
TLC1678
TLC1679
TLC1680
TLC1681
TLC1682
TLC1683
TLC1684
TLC1685
TLC1686
TLC1687
TLC1688
TLC1689
TLC1690
TLC1691
TLC1692
TLC1693
TLC1694
TLC1695
TLC1696
TLC1697
TLC1698
TLC1699
TLC1700
TLC1701
TLC1702
TLC1703
TLC1704
TLC1705
TLC1706
TLC1707
TLC1708
TLC1709
TLC1710
TLC1711
TLC1712
TLC1713
TLC1714
TLC1715
TLC1716
TLC1717
TLC1718
TLC1719
TLC1720
TLC1721
TLC1722
TLC1723
TLC1724
TLC1725
TLC1726
TLC1727
TLC1728
TLC1729
TLC1730
TLC1731
TLC1732
TLC1733
TLC1734
TLC1735
TLC1736
TLC1737
TLC1738
TLC1739
TLC1740
TLC1741
TLC1742
TLC1743
TLC1744
TLC1745
TLC1746
TLC1747
TLC1748
TLC1749
TLC1750
TLC1751
TLC1752
TLC1753
TLC1754
TLC1755
TLC1756
TLC1757
TLC1758
TLC1759
TLC1760
TLC1761
TLC1762
TLC1763
TLC1764
TLC1765
TLC1766
TLC1767
TLC1768
TLC1769
TLC1770
TLC1771
TLC1772
TLC1773
TLC1774
TLC1775
TLC1776
TLC1777
TLC1778
TLC1779
TLC1780
TLC1781
TLC1782
TLC1783
TLC1784
TLC1785
TLC1786
TLC1787
TLC1788
TLC1789
TLC1790
TLC1791
TLC1792
TLC1793
TLC1794
TLC1795
TLC1796
TLC1797
TLC1798
TLC1799
TLC1800
TLC1801
TLC1802
TLC1803
TLC1804
TLC1805
TLC1806
TLC1807
TLC1808
TLC1809
TLC1810
TLC1811
TLC1812
TLC1813
TLC1814
TLC1815
TLC1816
TLC1817
TLC1818
TLC1819
TLC1820
TLC1821
TLC1822
TLC1823
TLC1824
TLC1825
TLC1826
TLC1827
TLC1828
TLC1829
TLC1830
TLC1831
TLC1832
TLC1833
TLC1834
TLC1835
TLC1836
TLC1837
TLC1838
TLC1839
TLC1840
TLC1841
TLC1842
TLC1843
TLC1844
TLC1845
TLC1846
TLC1847
TLC1848
TLC1849
TLC1850
TLC1851
TLC1852
TLC1853
TLC1854
TLC1855
TLC1856
TLC1857
TLC1858
TLC1859
TLC1860
TLC1861
TLC1862
TLC1863
TLC1864
TLC1865
TLC1866
TLC1867
TLC1868
TLC1869
TLC1870
TLC1871
TLC1872
TLC1873
TLC1874
TLC1875
TLC1876
TLC1877
TLC1878
TLC1879
TLC1880
TLC1881
TLC1882
TLC1883
TLC1884
TLC1885
TLC1886
TLC1887
TLC1888
TLC1889
TLC1890
TLC1891
TLC1892
TLC1893
TLC1894
TLC1895
TLC1896
TLC1897
TLC1898
TLC1899
TLC1900
TLC1901
TLC1902
TLC1903
TLC1904
TLC1905
TLC1906
TLC1907
TLC1908
TLC1909
TLC1910
TLC1911
TLC1912
TLC1913
TLC1914
TLC1915
TLC1916
TLC1917
TLC1918
TLC1919
TLC1920
TLC1921
TLC1922
TLC1923
TLC1924
TLC1925
TLC1926
TLC1927
TLC1928
TLC1929
TLC1930
TLC1931
TLC1932
TLC1933
TLC1934
TLC1935
TLC1936
TLC1937
TLC1938
TLC1939
TLC1940
TLC1941
TLC1942
TLC1943
TLC1944
TLC1945
TLC1946
TLC1947
TLC1948
TLC1949
TLC1950
TLC1951
TLC1952
TLC1953
TLC1954
TLC1955
TLC1956
TLC1957
TLC1958
TLC1959
TLC1960
TLC1961
TLC1962
TLC1963
TLC1964
TLC1965
TLC1966
TLC1967
TLC1968
TLC1969
TLC1970
TLC1971
TLC1972
TLC1973
TLC1974
TLC1975
TLC1976
TLC1977
TLC1978
TLC1979
TLC1980
TLC1981
TLC1982
TLC1983
TLC1984
TLC1985
TLC1986
TLC1987
TLC1988
TLC1989
TLC1990
TLC1991
TLC1992
TLC1993
TLC1994
TLC1995
TLC1996
TLC1997
TLC1998
TLC1999
TLC2000
TLC2001
TLC2002
TLC2003
TLC2004
TLC2005
TLC2006
TLC2007
TLC2008
TLC2009
TLC2010
TLC2011
TLC2012
TLC2013
TLC2014
TLC2015
TLC2016
TLC2017
TLC2018
TLC2019
TLC2020
TLC2021
TLC2022
TLC2023
TLC2024
TLC2025
TLC2026
TLC2027
TLC2028
TLC2029
TLC2030
TLC2031
TLC2032
TLC2033
TLC2034
TLC2035
TLC2036
TLC2037
TLC2038
TLC2039
TLC2040
TLC2041
TLC2042
TLC2043
TLC2044
TLC2045
TLC2046
TLC2047
TLC2048
TLC2049
TLC2050
TLC2051
TLC2052
TLC2053
TLC2054
TLC2055
TLC2056
TLC2057
TLC2058
TLC2059
TLC2060
TLC2061
TLC2062
TLC2063
TLC2064
TLC2065
TLC2066
TLC2067
TLC2068
TLC2069
TLC2070
TLC2071
TLC2072
TLC2073
TLC2074
TLC2075
TLC2076
TLC2077
TLC2078
TLC2079
TLC2080
TLC2081
TLC2082
TLC2083
TLC2084
TLC2085
TLC2086
TLC2087
TLC2088
TLC2089
TLC2090
TLC2091
TLC2092
TLC2093
TLC2094
TLC2095
TLC2096
TLC2097
TLC2098
TLC2099
TLC2100
TLC2101
TLC2102
TLC2103
TLC2104
TLC2105
TLC2106
TLC2107
TLC2108
TLC2109
TLC2110
TLC2111
TLC2112
TLC2113
TLC2114
TLC2115
TLC2116
TLC2117
TLC2118
TLC2119
TLC2120
TLC2121
TLC2122
TLC2123
TLC2124
TLC2125
TLC2126
TLC2127
TLC2128
TLC2129
TLC2130
TLC2131
TLC2132
TLC2133
TLC2134
TLC2135
TLC2136
TLC2137
TLC2138
TLC2139
TLC2140
TLC2141
TLC2142
TLC2143
TLC2144
TLC2145
TLC2146
TLC2147
TLC2148
TLC2149
TLC2150
TLC2151
TLC2152
TLC2153
TLC2154
TLC2155
TLC2156
TLC2157
TLC2158
TLC2159
TLC2160
TLC2161
TLC2162
TLC2163
TLC2164
TLC2165
TLC2166
TLC2167
TLC2168
TLC2169
TLC2170
TLC2171
TLC2172
TLC2173
TLC2174
TLC2175
TLC2176
TLC2177
TLC2178
TLC2179
TLC2180
TLC2181
TLC2182
TLC2183
TLC2184
TLC2185
TLC2186
TLC2187
TLC2188
TLC2189
TLC2190
TLC2191
TLC2192
TLC2193
TLC2194
TLC2195
TLC2196
TLC2197
TLC2198
TLC2199
TLC2200
TLC2201
TLC2202
TLC2203
TLC2204
TLC2205
TLC2206
TLC2207
TLC2208
TLC2209
TLC2210
TLC2211
TLC2212
TLC2213
TLC2214
TLC2215
TLC2216
TLC2217
TLC2218
TLC2219
TLC2220
TLC2221
TLC2222
TLC2223
TLC2224
TLC2225
TLC2226
TLC2227
TLC2228
TLC2229
TLC2230
TLC2231
TLC2232
TLC2233
TLC2234
TLC2235
TLC2236
TLC2237
TLC2238
TLC2239
TLC2240
TLC2241
TLC2242
TLC2243
TLC2244
TLC2245
TLC2246
TLC2247
TLC2248
TLC2249
TLC2250
TLC2251
TLC2252
TLC2253
TLC2254
TLC2255
TLC2256
TLC2257
TLC2258
TLC2259
TLC2260
TLC2261
TLC2262
TLC2263
TLC2264
TLC2265
TLC2266
TLC2267
TLC2268
TLC2269
TLC2270
TLC2271
TLC2272
TLC2273
TLC2274
TLC2275
TLC2276
TLC2277
TLC2278
TLC2279
TLC2280
TLC2281
TLC2282
TLC2283
TLC2284
TLC2285
TLC2286
TLC2287
TLC2288
TLC2289
TLC2290
TLC2291
TLC2292
TLC2293
TLC2294
TLC2295
TLC2296
TLC2297
TLC2298
TLC2299
TLC2300
TLC2301
TLC2302
TLC2303
TLC2304
TLC2305
TLC2306
TLC2307
TLC2308
TLC2309
TLC2310
TLC2311
TLC2312
TLC2313
TLC2314
TLC2315
TLC2316
TLC2317
TLC2318
TLC2319
TLC2320
TLC2321
TLC2322
TLC2323
TLC2324
TLC2325
TLC2326
TLC2327
TLC2328
TLC2329
TLC2330
TLC2331
TLC2332
TLC2333
TLC2334
TLC2335
TLC2336
TLC2337
TLC2338
TLC2339
TLC2340
TLC2341
TLC2342
TLC2343
TLC2344
TLC2345
TLC2346
TLC2347
TLC2348
TLC2349
TLC2350
TLC2351
TLC2352
TLC2353
TLC2354
TLC2355
TLC2356
TLC2357
TLC2358
TLC2359
TLC2360
TLC2361
TLC2362
TLC2363
TLC2364
TLC2365
TLC2366
TLC2367
TLC2368
TLC2369
TLC2370
TLC2371
TLC2372
TLC2373
TLC2374
TLC2375
TLC2376
TLC2377
TLC2378
TLC2379
TLC2380
TLC2381
TLC2382
TLC2383
TLC2384
TLC2385
TLC2386
TLC2387
TLC2388
TLC2389
TLC2390
TLC2391
TLC2392
TLC2393
TLC2394
TLC2395
TLC2396
TLC2397
TLC2398
TLC2399
TLC2400
TLC2401
TLC2402
TLC2403
TLC2404
TLC2405
TLC2406
TLC2407
TLC2408
TLC2409
TLC2410
TLC2411
TLC2412
TLC2413
TLC2414
TLC2415
TLC2416
TLC2417
TLC2418
TLC2419
TLC2420
TLC2421
TLC2422
TLC2423
TLC2424
TLC2425
TLC2426
TLC2427
TLC2428
TLC2429
TLC2430
TLC2431
TLC2432
TLC2433
TLC2434
TLC2435
TLC2436
TLC2437
TLC2438
TLC2439
TLC2440
TLC2441
TLC2442
TLC2443
TLC2444
TLC2445
TLC2446
TLC2447
TLC2448
TLC2449
TLC2450
TLC2451
TLC2452
TLC2453
TLC2454
TLC2455
TLC2456
TLC2457
TLC2458
TLC2459
TLC2460
TLC2461
TLC2462
TLC2463
TLC2464
TLC2465
TLC2466
TLC2467
TLC2468
TLC2469
TLC2470
TLC2471
TLC2472
TLC2473
TLC2474
TLC2475
TLC2476
TLC2477
TLC2478
TLC2479
TLC2480
TLC2481
TLC2482
TLC2483
TLC2484
TLC2485
TLC2486
TLC2487
TLC2488
TLC2489
TLC2490
TLC2491
TLC2492
TLC2493
TLC2494
TLC2495
TLC2496
TLC2497
TLC2498
TLC2499
TLC2500
TLC2501
TLC2502
TLC2503
TLC2504
TLC2505
TLC2506
TLC2507
TLC2508
TLC2509
TLC2510
TLC2511
TLC2512
TLC2513
TLC2514
TLC2515
TLC2516
TLC2517
TLC2518
TLC2519
TLC2520
TLC2521
TLC2522
TLC2523
TLC2524
TLC2525
TLC2526
TLC2527
TLC2528
TLC2529
TLC2530
TLC2531
TLC2532
TLC2533
TLC2534
TLC2535
TLC2536
TLC2537
TLC2538
TLC2539
TLC2540
TLC2541
TLC2542
TLC2543
TLC2544
TLC2545
TLC2546
TLC2547
TLC2548
TLC2549
TLC2550
TLC2551
TLC2552
TLC2553
TLC2554
TLC2555
TLC2556
TLC2557
TLC2558
TLC2559
TLC2560
TLC2561
TLC2562
TLC2563
TLC2564
TLC2565
TLC2566
TLC2567
TLC2568
TLC2569
TLC2570
TLC2571
TLC2572
TLC2573
TLC2574
TLC2575
TLC2576
TLC2577
TLC2578
TLC2579
TLC2580
TLC2581
TLC2582
TLC2583
TLC2584
TLC2585
TLC2586
TLC2587
TLC2588
TLC2589
TLC2590
TLC2591
TLC2592
TLC2593
TLC2594
TLC2595
TLC2596
TLC2597
TLC2598
TLC2599
TLC2600
TLC2601
TLC2602
TLC2603
TLC2604
TLC2605
TLC2606
TLC2607
TLC2608
TLC2609
TLC2610
TLC2611
TLC2612
TLC2613
TLC2614
TLC2615
TLC2616
TLC2617
TLC2618
TLC2619
TLC2620
TLC2621
TLC2622
TLC2623
TLC2624
TLC2625
TLC2626
TLC2627
TLC2628
TLC2629
TLC2630
TLC2631
TLC2632
TLC2633
TLC2634
TLC2635
TLC2636
TLC2637
TLC2638
TLC2639
TL


Spare WTG-5-6
Spare WTG-5-8
Spare WTG-5-9
Spare WTG-5-12
WTG-4-6
WTG-4-7
WTG-4-8
WTG-4-9
WTG-4-10
WTG-4-11
WTG-4-12
WTG-3-6
WTG-3-7
WTG-3-8
WTG-3-10
WTG-3-11
WTG-3-12
WTG-2-6
WTG-2-8
WTG-2-9
WTG-2-10
WTG-2-11
WTG-2-12
WTG-1-6
WTG-1-7
WTG-1-8
WTG-1-9
WTG-1-10
WTG-1-11
WTG-5-10
WTG-5-11
WTG-5-12
WTG-4-11
WTG-3-11
WTG-2-11
WTG-1-10
WTG-1-11
WTG-3-12
WTG-2-12
WTG-1-12
WTG-1-13
WTG-1-14
WTG-1-15
WTG-1-16
WTG-1-17
WTG-1-18
WTG-1-19
WTG-1-20
WTG-1-21
WTG-1-22
WTG-1-23
WTG-1-24
WTG-1-25
WTG-1-26
WTG-1-27
WTG-1-28
WTG-1-29
WTG-1-30
WTG-1-31
WTG-1-32
WTG-1-33
WTG-1-34
WTG-1-35
WTG-1-36
WTG-1-37
WTG-1-38
WTG-1-39
WTG-1-40
WTG-1-41
WTG-1-42
WTG-1-43
WTG-1-44
WTG-1-45
WTG-1-46
WTG-1-47
WTG-1-48
WTG-1-49
WTG-1-50
WTG-1-51
WTG-1-52
WTG-1-53
WTG-1-54
WTG-1-55
WTG-1-56
WTG-1-57
WTG-1-58
WTG-1-59
WTG-1-60
WTG-1-61
WTG-1-62
WTG-1-63
WTG-1-64
WTG-1-65
WTG-1-66
WTG-1-67
WTG-1-68
WTG-1-69
WTG-1-70
WTG-1-71
WTG-1-72
WTG-1-73
WTG-1-74
WTG-1-75
WTG-1-76
WTG-1-77
WTG-1-78
WTG-1-79
WTG-1-80
WTG-1-81
WTG-1-82
WTG-1-83
WTG-1-84
WTG-1-85
WTG-1-86
WTG-1-87
WTG-1-88
WTG-1-89
WTG-1-90
WTG-1-91
WTG-1-92
WTG-1-93
WTG-1-94
WTG-1-95
WTG-1-96
WTG-1-97
WTG-1-98
WTG-1-99
WTG-1-100
WTG-1-101
WTG-1-102
WTG-1-103
WTG-1-104
WTG-1-105
WTG-1-106
WTG-1-107
WTG-1-108
WTG-1-109
WTG-1-110
WTG-1-111
WTG-1-112
WTG-1-113
WTG-1-114
WTG-1-115
WTG-1-116
WTG-1-117
WTG-1-118
WTG-1-119
WTG-1-120
WTG-1-121
WTG-1-122
WTG-1-123
WTG-1-124
WTG-1-125
WTG-1-126
WTG-1-127
WTG-1-128
WTG-1-129
WTG-1-130
WTG-1-131
WTG-1-132
WTG-1-133
WTG-1-134
WTG-1-135
WTG-1-136
WTG-1-137
WTG-1-138
WTG-1-139
WTG-1-140
WTG-1-141
WTG-1-142
WTG-1-143
WTG-1-144
WTG-1-145
WTG-1-146
WTG-1-147
WTG-1-148
WTG-1-149
WTG-1-150
WTG-1-151
WTG-1-152
WTG-1-153
WTG-1-154
WTG-1-155
WTG-1-156
WTG-1-157
WTG-1-158
WTG-1-159
WTG-1-160
WTG-1-161
WTG-1-162
WTG-1-163
WTG-1-164
WTG-1-165
WTG-1-166
WTG-1-167
WTG-1-168
WTG-1-169
WTG-1-170
WTG-1-171
WTG-1-172
WTG-1-173
WTG-1-174
WTG-1-175
WTG-1-176
WTG-1-177
WTG-1-178
WTG-1-179
WTG-1-180
WTG-1-181
WTG-1-182
WTG-1-183
WTG-1-184
WTG-1-185
WTG-1-186
WTG-1-187
WTG-1-188
WTG-1-189
WTG-1-190
WTG-1-191
WTG-1-192
WTG-1-193
WTG-1-194
WTG-1-195
WTG-1-196
WTG-1-197
WTG-1-198
WTG-1-199
WTG-1-200
WTG-1-201
WTG-1-202
WTG-1-203
WTG-1-204
WTG-1-205
WTG-1-206
WTG-1-207
WTG-1-208
WTG-1-209
WTG-1-210
WTG-1-211
WTG-1-212
WTG-1-213
WTG-1-214
WTG-1-215
WTG-1-216
WTG-1-217
WTG-1-218
WTG-1-219
WTG-1-220
WTG-1-221
WTG-1-222
WTG-1-223
WTG-1-224
WTG-1-225
WTG-1-226
WTG-1-227
WTG-1-228
WTG-1-229
WTG-1-230
WTG-1-231
WTG-1-232
WTG-1-233
WTG-1-234
WTG-1-235
WTG-1-236
WTG-1-237
WTG-1-238
WTG-1-239
WTG-1-240
WTG-1-241
WTG-1-242
WTG-1-243
WTG-1-244
WTG-1-245
WTG-1-246
WTG-1-247
WTG-1-248
WTG-1-249
WTG-1-250
WTG-1-251
WTG-1-252
WTG-1-253
WTG-1-254
WTG-1-255
WTG-1-256
WTG-1-257
WTG-1-258
WTG-1-259
WTG-1-260
WTG-1-261
WTG-1-262
WTG-1-263
WTG-1-264
WTG-1-265
WTG-1-266
WTG-1-267
WTG-1-268
WTG-1-269
WTG-1-270
WTG-1-271
WTG-1-272
WTG-1-273
WTG-1-274
WTG-1-275
WTG-1-276
WTG-1-277
WTG-1-278
WTG-1-279
WTG-1-280
WTG-1-281
WTG-1-282
WTG-1-283
WTG-1-284
WTG-1-285
WTG-1-286
WTG-1-287
WTG-1-288
WTG-1-289
WTG-1-290
WTG-1-291
WTG-1-292
WTG-1-293
WTG-1-294
WTG-1-295
WTG-1-296
WTG-1-297
WTG-1-298
WTG-1-299
WTG-1-300
WTG-1-301
WTG-1-302
WTG-1-303
WTG-1-304
WTG-1-305
WTG-1-306
WTG-1-307
WTG-1-308
WTG-1-309
WTG-1-310
WTG-1-311
WTG-1-312
WTG-1-313
WTG-1-314
WTG-1-315
WTG-1-316
WTG-1-317
WTG-1-318
WTG-1-319
WTG-1-320
WTG-1-321
WTG-1-322
WTG-1-323
WTG-1-324
WTG-1-325
WTG-1-326
WTG-1-327
WTG-1-328
WTG-1-329
WTG-1-330
WTG-1-331
WTG-1-332
WTG-1-333
WTG-1-334
WTG-1-335
WTG-1-336
WTG-1-337
WTG-1-338
WTG-1-339
WTG-1-340
WTG-1-341
WTG-1-342
WTG-1-343
WTG-1-344
WTG-1-345
WTG-1-346
WTG-1-347
WTG-1-348
WTG-1-349
WTG-1-350
WTG-1-351
WTG-1-352
WTG-1-353
WTG-1-354
WTG-1-355
WTG-1-356
WTG-1-357
WTG-1-358
WTG-1-359
WTG-1-360
WTG-1-361
WTG-1-362
WTG-1-363
WTG-1-364
WTG-1-365
WTG-1-366
WTG-1-367
WTG-1-368
WTG-1-369
WTG-1-370
WTG-1-371
WTG-1-372
WTG-1-373
WTG-1-374
WTG-1-375
WTG-1-376
WTG-1-377
WTG-1-378
WTG-1-379
WTG-1-380
WTG-1-381
WTG-1-382
WTG-1-383
WTG-1-384
WTG-1-385
WTG-1-386
WTG-1-387
WTG-1-388
WTG-1-389
WTG-1-390
WTG-1-391
WTG-1-392
WTG-1-393
WTG-1-394
WTG-1-395
WTG-1-396
WTG-1-397
WTG-1-398
WTG-1-399
WTG-1-400
WTG-1-401
WTG-1-402
WTG-1-403
WTG-1-404
WTG-1-405
WTG-1-406
WTG-1-407
WTG-1-408
WTG-1-409
WTG-1-410
WTG-1-411
WTG-1-412
WTG-1-413
WTG-1-414
WTG-1-415
WTG-1-416
WTG-1-417
WTG-1-418
WTG-1-419
WTG-1-420
WTG-1-421
WTG-1-422
WTG-1-423
WTG-1-424
WTG-1-425
WTG-1-426
WTG-1-427
WTG-1-428
WTG-1-429
WTG-1-430
WTG-1-431
WTG-1-432
WTG-1-433
WTG-1-434
WTG-1-435
WTG-1-436
WTG-1-437
WTG-1-438
WTG-1-439
WTG-1-440
WTG-1-441
WTG-1-442
WTG-1-443
WTG-1-444
WTG-1-445
WTG-1-446
WTG-1-447
WTG-1-448
WTG-1-449
WTG-1-450
WTG-1-451
WTG-1-452
WTG-1-453
WTG-1-454
WTG-1-455
WTG-1-456
WTG-1-457
WTG-1-458
WTG-1-459
WTG-1-460
WTG-1-461
WTG-1-462
WTG-1-463
WTG-1-464
WTG-1-465
WTG-1-466
WTG-1-467
WTG-1-468
WTG-1-469
WTG-1-470
WTG-1-471
WTG-1-472
WTG-1-473
WTG-1-474
WTG-1-475
WTG-1-476
WTG-1-477
WTG-1-478
WTG-1-479
WTG-1-480
WTG-1-481
WTG-1-482
WTG-1-483
WTG-1-484
WTG-1-485
WTG-1-486
WTG-1-487
WTG-1-488
WTG-1-489
WTG-1-490
WTG-1-491
WTG-1-492
WTG-1-493
WTG-1-494
WTG-1-495
WTG-1-496
WTG-1-497
WTG-1-498
WTG-1-499
WTG-1-500
WTG-1-501
WTG-1-502
WTG-1-503
WTG-1-504
WTG-1-505
WTG-1-506
WTG-1-507
WTG-1-508
WTG-1-509
WTG-1-510
WTG-1-511
WTG-1-512
WTG-1-513
WTG-1-514
WTG-1-515
WTG-1-516
WTG-1-517
WTG-1-518
WTG-1-519
WTG-1-520
WTG-1-521
WTG-1-522
WTG-1-523
WTG-1-524
WTG-1-525
WTG-1-526
WTG-1-527
WTG-1-528
WTG-1-529
WTG-1-530
WTG-1-531
WTG-1-532
WTG-1-533
WTG-1-534
WTG-1-535
WTG-1-536
WTG-1-537
WTG-1-538
WTG-1-539
WTG-1-540
WTG-1-541
WTG-1-542
WTG-1-543
WTG-1-544
WTG-1-545
WTG-1-546
WTG-1-547
WTG-1-548
WTG-1-549
WTG-1-550
WTG-1-551
WTG-1-552
WTG-1-553
WTG-1-554
WTG-1-555
WTG-1-556
WTG-1-557
WTG-1-558
WTG-1-559
WTG-1-560
WTG-1-561
WTG-1-562
WTG-1-563
WTG-1-564
WTG-1-565
WTG-1-566
WTG-1-567
WTG-1-568
WTG-1-569
WTG-1-570
WTG-1-571
WTG-1-572
WTG-1-573
WTG-1-574
WTG-1-575
WTG-1-576
WTG-1-577
WTG-1-578
WTG-1-579
WTG-1-580
WTG-1-581
WTG-1-582
WTG-1-583
WTG-1-584
WTG-1-585
WTG-1-586
WTG-1-587
WTG-1-588
WTG-1-589
WTG-1-590
WTG-1-591
WTG-1-592
WTG-1-593
WTG-1-594
WTG-1-595
WTG-1-596
WTG-1-597
WTG-1-598
WTG-1-599
WTG-1-600
WTG-1-601
WTG-1-602
WTG-1-603
WTG-1-604
WTG-1-605
WTG-1-606
WTG-1-607
WTG-1-608
WTG-1-609
WTG-1-610
WTG-1-611
WTG-1-612
WTG-1-613
WTG-1-614
WTG-1-615
WTG-1-616
WTG-1-617
WTG-1-618
WTG-1-619
WTG-1-620
WTG-1-621
WTG-1-622
WTG-1-623
WTG-1-624
WTG-1-625
WTG-1-626
WTG-1-627
WTG-1-628
WTG-1-629
WTG-1-630
WTG-1-631
WTG-1-632
WTG-1-633
WTG-1-634
WTG-1-635
WTG-1-636
WTG-1-637
WTG-1-638
WTG-1-639
WTG-1-640
WTG-1-641
WTG-1-642
WTG-1-643
WTG-1-644
WTG-1-645
WTG-1-646
WTG-1-647
WTG-1-648
WTG-1-649
WTG-1-650
WTG-1-651
WTG-1-652
WTG-1-653
WTG-1-654
WTG-1-655
WTG-1-656
WTG-1-657
WTG-1-658
WTG-1-659
WTG-1-660
WTG-1-661
WTG-1-662
WTG-1-663
WTG-1-664
WTG-1-665
WTG-1-666
WTG-1-667
WTG-1-668
WTG-1-669
WTG-1-670
WTG-1-671
WTG-1-672
WTG-1-673
WTG-1-674
WTG-1-675
WTG-1-676
WTG-1-677
WTG-1-678
WTG-1-679
WTG-1-680
WTG-1-681
WTG-1-682
WTG-1-683
WTG-1-684
WTG-1-685
WTG-1-686
WTG-1-687
WTG-1-688
WTG-1-689
WTG-1-690
WTG-1-691
WTG-1-692
WTG-1-693
WTG-1-694
WTG-1-695
WTG-1-696
WTG-1-697
WTG-1-698
WTG-1-699
WTG-1-700
WTG-1-701
WTG-1-702
WTG-1-703
WTG-1-704
WTG-1-705
WTG-1-706
WTG-1-707
WTG-1-708
WTG-1-709
WTG-1-710
WTG-1-711
WTG-1-712
WTG-1-713
WTG-1-714
WTG-1-715
WTG-1-716
WTG-1-717
WTG-1-718
WTG-1-719
WTG-1-720
WTG-1-721
WTG-1-722
WTG-1-723
WTG-1-724
WTG-1-725
WTG-1-726
WTG-1-727
WTG-1-728
WTG-1-729
WTG-1-730
WTG-1-731
WTG-1-732
WTG-1-733
WTG-1-734
WTG-1-735
WTG-1-736
WTG-1-737
WTG-1-738
WTG-1-739
WTG-1-740
WTG-1-741
WTG-1-742
WTG-1-743
WTG-1-744
WTG-1-745
WTG-1-746
WTG-1-747
WTG-1-748
WTG-1-749
WTG-1-750
WTG-1-751
WTG-1-752
WTG-1-753
WTG-1-754
WTG-1-755
WTG-1-756
WTG-1-757
WTG-1-758
WTG-1-759
WTG-1-760
WTG-1-761
WTG-1-762
WTG-1-763
WTG-1-764
WTG-1-765
WTG-1-766
WTG-1-767
WTG-1-768
WTG-1-769
WTG-1-770
WTG-1-771
WTG-1-772
WTG-1-773
WTG-1-774
WTG-1-775
WTG-1-776
WTG-1-777
WTG-1-778
WTG-1-779
WTG-1-780
WTG-1-781
WTG-1-782
WTG-1-783
WTG-1-784
WTG-1-785
WTG-1-786
WTG-1-787
WTG-1-788
WTG-1-789
WTG-1-790
WTG-1-791
WTG-1-792
WTG-1-793
WTG-1-794
WTG-1-795
WTG-1-796
WTG-1-797
WTG-1-798
WTG-1-799
WTG-1-800
WTG-1-801
WTG-1-802
WTG-1-803
WTG-1-804
WTG-1-805
WTG-1-806
WTG-1-807
WTG-1-808
WTG-1-809
WTG-1-810
WTG-1-811
WTG-1-812
WTG-1-813
WTG-1-814
WTG-1-815
WTG-1-816
WTG-1-817
WTG-1-818
WTG-1-819
WTG-1-820
WTG-1-821
WTG-1-822
WTG-1-823
WTG-1-824
WTG-1-825
WTG-1-826
WTG-1-827
WTG-1-828
WTG-1-829
WTG-1-830
WTG-1-831
WTG-1-832
WTG-1-833
WTG-1-834
WTG-1-835
WTG-1-836
WTG-1-837
WTG-1-838
WTG-1-839
WTG-1-840
WTG-1-841
WTG-1-842
WTG-1-843
WTG-1-844
WTG-1-845
WTG-1-846
WTG-1-847
WTG-1-848
WTG-1-849
WTG-1-850
WTG-1-851
WTG-1-852
WTG-1-853
WTG-1-854
WTG-1-855
WTG-1-856
WTG-1-857
WTG-1-858
WTG-1-859
WTG-1-860
WTG-1-861
WTG-1-862
WTG-1-863
WTG-1-864
WTG-1-865
WTG-1-866
WTG-1-867
WTG-1-868
WTG-1-869
WTG-1-870
WTG-1-871
WTG-1-872
WTG-1-873
WTG-1-874
WTG-1-875
WTG-1-876
WTG-1-877
WTG-1-878
WTG-1-879
WTG-1-880
WTG-1-881
WTG-1-882
WTG-1-883
WTG-1-884
WTG-1-885
WTG-1-886
WTG-1-887
WTG-1-888
WTG-1-889
WTG-1-890
WTG-1-891
WTG-1-892
WTG-1-893
WTG-1-894
WTG-1-895
WTG-1-896
WTG-1-897
WTG-1-898
WTG-1-899
WTG-1-900
WTG-1-901
WTG-1-902
WTG-1-903
WTG-1-904
WTG-1-905
WTG-1-906
WTG-1-907
WTG-1-908
WTG-1-909
WTG-1-910
WTG-1-911
WTG-1-912
WTG-1-913
WTG-1-914
WTG-1-915
WTG-1-916
WTG-1-917
WTG-1-918
WTG-1-919
WTG-1-920
WTG-1-921
WTG-1-922
WTG-1-923
WTG-1-924
WTG-1-925
WTG-1-926
WTG-1-927
WTG-1-928
WTG-1-929
WTG-1-930
WTG-1-931
WTG-1-932
WTG-1-933
WTG-1-934
WTG-1-935
WTG-1-936
WTG-1-937
WTG-1-938
WTG-1-939
WTG-1-940
WTG-1-941
WTG-1-942
WTG-1-943
WTG-1-944
WTG-1-945
WTG-1-946
WTG-1-947
WTG-1-948
WTG-1-949
WTG-1-950
WTG-1-951
WTG-1-952
WTG-1-953
WTG-1-954
WTG-1-955
WTG-1-956
WTG-1-957
WTG-1-958
WTG-1-959
WTG-1-960
WTG-1-961
WTG-1-962
WTG-1-963
WTG-1-964
WTG-1-965
WTG-1-966
WTG-1-967
WTG-1-968
WTG-1-969
WTG-1-970
WTG-1-971
WTG-1-972
WTG-1-973
WTG-1-974
WTG-1-975
WTG-1-976
WTG-1-977
WTG-1-978
WTG-1-979
WTG-1-980
WTG-1-981
WTG-1-982
WTG-1-983
WTG-1-984
WTG-1-985
WTG-1-986
WTG-1-987
WTG-1-988
WTG-1-989
WTG-1-990
WTG-1-991
WTG-1-992
WTG-1-993
WTG-1-994
WTG-1-995
WTG-1-996
WTG-1-997
WTG-1-998
WTG-1-999
WTG-1-1000
WTG-1-1001
WTG-1-1002
WTG-1-1003
WTG-1-1004
WTG-1-1005
WTG-1-1006
WTG-1-1007
WTG-1-1008
WTG-1-1009
WTG-1-1010
WTG-1-1011
WTG-1-1012
WTG-1-1013
WTG-1-1014
WTG-1-1015
WTG-1-1016
WTG-1-1017
WTG-1-1018
WTG-1-1019
WTG-1-1020
WTG-1-1021
WTG-1-1022
WTG-1-1023
WTG-1-1024
WTG-1-1025
WTG-1-1026
WTG-1-1027
WTG-1-1028
WTG-1-1029
WTG-1-1030
WTG-1-1031
WTG-1-1032
WTG-1-1033
WTG-1-1034
WTG-1-1035
WTG-1-1036
WTG-1-1037
WTG-1-1038
WTG-1-1039
WTG-1-1040
WTG-1-1041
WTG-1-1042
WTG-1-1043
WTG-1-1044
WTG-1-1045
WTG-1-1046
WTG-1-1047
WTG-1-1048
WTG-1-1049
WTG-1-1050
WTG-1-1051
WTG-1-1052
WTG-1-1053
WTG-1-1054
WTG-1-1055
WTG-1-1056
WTG-1-1057
WTG-1-1058
WTG-1-1059
WTG-1-1060
WTG-1-1061
WTG-1-1062
WTG-1-1063
WTG-1-1064
WTG-1-1065
WTG-1-1066
WTG-1-1067
WTG-1-1068
WTG-1-1069
WTG-1-1070
WTG-1-1071
WTG-1-1072
WTG-1-1073
WTG-1-1074
WTG-1-1075
WTG-1-1076
WTG-1-1077
WTG-1-1078
WTG-1-1079
WTG-1-1080
WTG-1-1081
WTG-1-1082
WTG-1-1083
WTG-1-1084
WTG-1-1085
WTG-1-1086
WTG-1-1087
WTG-1-1088
WTG-1-1089
WTG-1-1090
WTG-1-1091
WTG-1-1092
WTG-1-1093
WTG-1-1094
WTG-1-1095
WTG-1-1096
WTG-1-1097
WTG-1-1098
WTG-1-1099
WTG-1-1100
WTG-1-1101
WTG-1-1102
WTG-1-1103
WTG-1-1104
WTG-1-1105
WTG-1-1106
WTG-1-1107
WTG-1-1108
WTG-1-1109
WTG-1-1110
WTG-1-1111
WTG-1-1112
WTG-1-1113
WTG-1-1114
WTG-1-1115
WTG-1-1116
WTG-1-1117
WTG-1-1118
WTG-1-1119
WTG-1-1120
WTG-1-1121
WTG-1-1122
WTG-1-1123
WTG-1-1124
WTG-1-1125
WTG-1-1126
WTG-1-1127
WTG-1-1128
WTG-1-1129
WTG-1-1130
WTG-1-1131
WTG-1-1132
WTG-1-1133
WTG-1-1134
WTG-1-1135
WTG-1-1136
WTG-1-1137
WTG-1-1138
WTG-1-1139
WTG-1-1140
WTG-1-1141
WTG-1-1142
WTG-1-1143
WTG-1-1144
WTG-1-1145
WTG-1-1146
WTG-1-1147
WTG-1-1148
WTG-1-1149
WTG-1-1150
WTG-1-1151
WTG-1-1152
WTG-1-1153
WTG-1-1154
WTG-1-1155
WTG-1-1156
WTG-1-1157
WTG-1-1158
WTG-1-1159
WTG-1-1160
WTG-1-1161
WTG-1-1162
WTG-1-1163
WTG-1-1164
WTG-1-1165
WTG-1-1166
WTG-1-1167
WTG-1-1168
WTG-1-1169
WTG-1-1170
WTG-1-1171
WTG-1-1172
WTG-1-1173
WTG-1-1174
WTG-1-1175
WTG-1-1176
WTG-1-1177
WTG-1-1178
WTG-1-1179
WTG-1-1180
WTG-1-1181
WTG-1-1182
WTG-1-1183
WTG-1-1184
WTG-1-1185
WTG-1-1186
WTG-1-1187
WTG-1-1188
WTG-1-1189
WTG-1-1190
WTG-1-1191
WTG-1-1192
WTG-1-1193
WTG-1-1194
WTG-1-1195
WTG-1-1196
WTG-1-1197
WTG-1-1198
WTG-1-1199
WTG-1-1200
WTG-1-1201
WTG-1-1202
WTG-1-1203
WTG-1-1204
WTG-1-1205
WTG-1-1206
WTG-1-1207
WTG-1-1208
WTG-1-1209
WTG-1-1210
WTG-1-1211
WTG-1-1212
WTG-1-1213
WTG-1-1214
WTG-1-1215
WTG-1-1216
WTG-1-1217
WTG-1-1218
WTG-1-1219
WTG-1-1220
WTG-1-1221
WTG-1-1222
WTG-1-1223
WTG-1-1224
WTG-1-1225
WTG-1-1226
WTG-1-1227
WTG-1-1228
WTG-1-1229
WTG-1-1230
WTG-1-1231
WTG-1-1232
WTG-1-1233
WTG-1-1234
WTG-1-1235
WTG-1-1236
WTG-1-1237
WTG-1-1238
WTG-1-1239
WTG-1-1240
WTG-1-1241
WTG-1-1242
WTG-1-1243
WTG-1-1244
WTG-1-1245
WTG-1-1246
WTG-1-1247
WTG-1-1248
WTG-1-1249
WTG-1-1250
WTG-1-1251
WTG-1-1252
WTG-1-1253
WTG-1-1254
WTG-1-1255
WTG-1-1256
WTG-1-1257
WTG-1-1258
WTG-1-1259
WTG-1-1260
WTG-1-1261
WTG-1-1262
WTG-1-1263
WTG-1-1264
WTG-1-1265
WTG-1-1266
WTG-1-1267
WTG-1-1268
WTG-1-1269
WTG-1-1270
WTG-1-1271
WTG-1-1272
WTG-1-1273
WTG-1-1274
WTG-1-1275
WTG-1-1276
WTG-1-1277
WTG-1-1278
WTG-1-1279
WTG-1-1280
WTG-1-1281
WTG-1-1282
WTG-1-1283
WTG-1-1284
WTG-1-1285
WTG-1-1286
WTG-1-1287
WTG-1-1288
WTG-1-1289
WTG-1-1290
WTG-1-1291
WTG-1-1292
WTG-1-1293
WTG-1-1294
WTG-1-1295
WTG-1-1296
WTG-1-1297
WTG-1-1298
WTG-1-1299
WTG-1-1300
WTG-1-1301
WTG-1-1302
WTG-1-1303
WTG-1-1304
WTG-1-1305
WTG-1-1306
WTG-1-1307
WTG-1-1308
WTG-1-1309
WTG-1-1310
WTG-1-1311
WTG-1-1312
WTG-1-1313
WTG-1-1314
WTG-1-1315
WTG-1-1316
WTG-1-1317
WTG-1-1318
WTG-1-1319
WTG-1-1320
WTG-1-1321
WTG-1-1322
WTG-1-1323
WTG-1-1324
WTG-1-1325
WTG-1-1326
WTG-1-1327
WTG-1-1328
WTG-1-1329
WTG-1-1330
WTG-1-1331
WTG-1-1332
WTG-1-1333
WTG-1-1334
WTG-1-1335
WTG-1-1336
WTG-1-1337
WTG-1-1338
WTG-1-1339
WTG-1-1340
WTG-1-1341
WTG-1-1342
WTG-1-1343
WTG-1-1344
WTG-1-1345
WTG-1-1346
WTG-1-1347
WTG-1-1348
WTG-1-1349
WTG-1-1350
WTG-1-1351
WTG-1-1352
WTG-1-1353
WTG-1-1354
WTG-1-1355
WTG-1-1356
WTG-1-1357
WTG-1-1358
WTG-1-1359
WTG-1-1360
WTG-1-1361
WTG-1-1362
WTG-1-1363
WTG-1-1364
WTG-1-1365
WTG-1-1366
WTG-1-1367
WTG-1-1368
WTG-1-1369
WTG-1-1370
WTG-1-1371
WTG-1-1372
WTG-1-1373
WTG-1-1374
WTG-1-1375
WTG-1-1376
WTG-1-1377
WTG-1-1378
WTG-1-1379
WTG-1-1380
WTG-1-1381
WTG-1-1382
WTG-1-1383
WTG-1-1384
WTG-1-1385
WTG-1-1386
WTG-1-1387
WTG-1-1388
WTG-1-1389
WTG-1-1390
WTG-1-1391
WTG-1-1392
WTG-1-1393
WTG-1-1394
WTG-1-1395
WTG-1-1396
WTG-1-1397
WTG-1-1398
WTG-1-1399
WTG-1-1400
WTG-1-1401
WTG-1-1402
WTG-1-1403
WTG-1-1404
WTG-1-1405
WTG-1-1406
WTG-1-1407
WTG-1-1408
WTG-1-1409
WTG-1-1410
WTG-1-1411
WTG-1-1412
WTG-1-1413
WTG-1-1414
WTG-1-1415
WTG-1-1416
WTG-1-1417
WTG-1-1418
WTG-1-1419
WTG-1-1420
WTG-1-1421
WTG-1-1422
WTG-1-1423
WTG-1-1424
WTG-1-1425
WTG-1-1426
WTG-1-1427
WTG-1-1428
WTG-1-1429
WTG-1-1430
WTG-1-1431
WTG-1-1432
WTG-1-1433
WTG-1-1434
WTG-1-1435
WTG-1-1436
WTG-1-1437
WTG-1-1438
WTG-1-1439
WTG-1-1440
WTG-1-1441
WTG-1-1442
WTG-1-1443
WTG-1-1444
WTG-1-1445
WTG-1-1446
WTG-1-1447
WTG-1-1448
WTG-1-1449
WTG-1-1450
WTG-1-1451
WTG-1-1452
WTG-1-1453
WTG-1-1454
WTG-1-1455
WTG-1-1456
WTG-1-1457
WTG-1-1458
WTG-1-1459
WTG-1-1460
WTG-1-1461
WTG-1-1462
WTG-1-1463
WTG-1-1464
WTG-1-1465
WTG-1-1466
WTG-1-1467
WTG-1-1468
WTG-1-1469
WTG-1-1470
WTG-1-1471
WTG-1-1472
WTG-1-1473
WTG-1-1474
WTG-1-1475
WTG-1-1476
WTG-1-1477
WTG-1-1478
WTG-1-1479
WTG-1-1480
WTG-1-1481
WTG-1-1482
WTG-1-1483
WTG-1-1484
WTG-1-1485
WTG-1-1486
WTG-1-1487
WTG-1-1488
WTG-1-1489
WTG-1-1490
WTG-1-1491
WTG-1-1492
WTG-1-1493
WTG-1-1494
WTG-1-1495
WTG-1-1496
WTG-1-1497
WTG-1-1498
WTG-1-1499
WTG-1-1500
WTG-1-1501
WTG-1-1502
WTG-1-1503
WTG-1-1504
WTG-1-1505
WTG-1-1506
WTG-1-1507
WTG-1-1508
WTG-1-1509
WTG-1-1510
WTG-1-1511
WTG-1-1512
WTG-1-1513
WTG-1-1514
WTG-1-1515
WTG-1-1516
WTG-1-1517
WTG-1-1518
WTG-1-1519
WTG-1-1520
WTG-1-1521
WTG-1-1522
WTG-1-1523
WTG-1-1524
WTG-1-1525
WTG-1-1526
WTG-1-1527
WTG-1-1528
WTG-1-1529
WTG-1-1530
WTG-1-1531
WTG-1-1532
WTG-1-1533
WTG-1-1534
WTG-1-1535
WTG-1-1536
WTG-1-1537
WTG-1-1538
WTG-1-1539
WTG-1-1540
WTG-1-1541
WTG-1-1542
WTG-1-1543
WTG-1-1544
WTG-1-1545
WTG-1-1546
WTG-1-1547
WTG-1-1548
WTG-1-1549
WTG-1-1550
WTG-1-1551
WTG-1-1552
WTG-1-1553
WTG-1-1554
WTG-1-1555
WTG-1-1556
WTG-1-1557
WTG-1-1558
WTG-1-1559
WTG-1-1560
WTG-1-1561
WTG-1-1562
WTG-1-1563
WTG-1-1564
WTG-1-1565
WTG-1-1566
WTG-1-1567
WTG-1-1568
WTG-1-1569
WTG-1-1570
WTG-1-1571
WTG-1-1572
WTG-1-1573
WTG-1-1574
WTG-1-1575
WTG-1-1576
WTG-1-1577
WTG-1-1578
WTG-1-1579
WTG-1-1580
WTG-1-1581
WTG-1-1582
WTG-1-1583
WTG-1-1584
WTG-1-1585
WTG-1-1586
WTG-1-1587
WTG-1-1588
WTG-1-1589
WTG-1-1590
WTG-1-1591
WTG-1-1592
WTG-1-1593
WTG-1-1594
WTG-1-1595
WTG-1-1596
WTG-1-1597
WTG-1-1598
WTG-1-1599
WTG-1-1600
WTG-1-1601
WTG-1-1602
WTG-1-1603
WTG-1-1604
WTG-1-1605
WTG-1-1606
WTG-1-1607
WTG-1-1608
WTG-1-1609
WTG-1-1610
WTG-1-1611
WTG-1-1612
WTG-1-1613
WTG-1-1614
WTG-1-1615
WTG-1-1616
WTG-1-1617
WTG-1-1618
WTG-1-1619
WTG-1-1620
WTG-1-1621
WTG-1-1622
WTG-1-1623
WTG-1-1624
WTG-1-1625
WTG-1-1626
WTG-1-1627
WTG-1-1628
WTG-1-1629
WTG-1-1630
WTG-1-1631
WTG-1-1632
WTG-1-1633
WTG-1-1634
WTG-1-1635
WTG-1-1636
WTG-1-1637
WTG-1-1638
WTG-1-1639
WTG-1-1640
WTG-1-1641
WTG-1-1642
WTG-1-1643
WTG-1-1644
WTG-1-1645
WTG-1-1646
WTG-1-1647
WTG-1-1648
WTG-1-1649
WTG-1-1650
WTG-1-1651
WTG-1-1652
WTG-1-1653
WTG-1-1654
WTG-1-1655
WTG-1-1656
WTG-1-1657
WTG-1-1658
WTG-1-1659
WTG-1-1660
WTG-1-1661
WTG-1-1662
WTG-1-1663
WTG-1-1664
WTG-1-1665
WTG-1-1666
WTG-1-1667
WTG-1-1668
WTG-1-1669
WTG-1-1670
WTG-1-1671
WTG-1-1672
WTG-1-1673
WTG-1-1674
WTG-1-1675
WTG-1-1676
WTG-1-1677
WTG-1-1678
WTG-1-1679
WTG-1-1680
WTG-1-1681
WTG-1-1682
WTG-1-1683
WTG-1-1684
WTG-1-1685
WTG-1-1686
WTG-1-1687
WTG-1-1688
WTG-1-1689
WTG-1-1690
WTG-1-1691
WTG-1-1692
WTG-1-1693
WTG-1-1694
WTG-1-1695
WTG-1-1696
WTG-1-1697
WTG-1-1698
WTG-1-1699
WTG-1-1700
WTG-1-1701
WTG-1-1702
WTG-1-1703
WTG-1-1704
WTG-1-1705
WTG-1-1706
WTG-1-1707
WTG-1-1708
WTG-1-1709
WTG-1-1710
WTG-1-1711
WTG-1-1712
WTG-1-1713
WTG-1-1714
WTG-1-1715
WTG-1-1716
WTG-1-1717
WTG-1-1718
WTG-1-1719
WTG-1-1720
WTG-1-1721
WTG-1-1722
WTG-1-1723
WTG-1-1724
WTG-1-1725
WTG-1-1726
WTG-1-1727
WTG-1-1728
WTG-1-1729
WTG-1-1730
WTG-1-1731
WTG-1-1732
WTG-1-1733
WTG-1-1734
WTG-1-1735
WTG-1-1736
WTG-1-1737
WTG-1-1738
WTG-1-1739
WTG-1-1740
WTG-1-1741
WTG-1-1742
WTG-1-1743
WTG-1-1744
WTG-1-1745
WTG-1-1746
WTG-1-1747
WTG-1-1748
WTG-1-1749
WTG-1-1750
WTG-1-1751
WTG-1-1752
WTG-1-1753
WTG-1-1754
WTG-1-1755
WTG-1-1756
WTG-1-1757
WTG-1-1758
WTG-1-1759
WTG-1-1760
WTG-1-1761
WTG-1-1762
WTG-1-1763
WTG-1-1764
WTG-1-1765
WTG-1-1766
WTG-1-1767
WTG-1-1768
WTG-1-1769
WTG-1-1770
WTG-1-1771
WTG-1-1772
WTG-1-1773
WTG-1-1774
WTG-1-1775
WTG-1-1776
WTG-1-1777
WTG-1-1778
WTG-1-1779
WTG-1-1780
WTG-1-1781
WTG-1-1782
WTG-1-1783
WTG-1-1784
WTG-1-1785
WTG-1-1786
WTG-1-1787
WTG-1-1788
WTG-1-1789
WTG-1-1790
WTG-1-1791
WTG-1-1792
WTG-1-1793
WTG-1-1794
WTG-1-1795
WTG-1-1796
WTG-1-1797
WTG-1-1798
WTG-1-1799
WTG-1-1800
WTG-1-1801
WTG-1-1802
WTG-1-1803
WTG-1-1804
WTG-1-1805
WTG-1-1806
WTG-1-1807
WTG-1-1808
WTG-1-1809
WTG-1-1810
WTG-1-1811
WTG-1-1812
WTG-1-1813
WTG-1-1814
WTG-1-1815
WTG-1-1816
WTG-1-1817
WTG-1-1818
WTG-1-1819
WTG-1-1820
WTG-1-1821
WTG-1-1822
WTG-1-1823
WTG-1-1824
WTG-1-1825
WTG-1-1826
WTG-1-1827
WTG-1-1828
WTG-1-1829
WTG-1-1830
WTG-1-1831
WTG-1-1832
WTG-1-1833
WTG-1-1834
WTG-1-1835
WTG-1-1836
WTG-1-1837
WTG-1-1838
WTG-1-1839
WTG-1-1840
WTG-1-1841
WTG-1-1842
WTG-1-1843
WTG-1-1844
WTG-1-1845
WTG-1-1846
WTG-1-1847
WTG-1-1848
WTG-1-1849
WTG-1-1850
WTG-1-1851
WTG-1-1852
WTG-1-1853
WTG-1-1854
WTG-1-1855
WTG-1


WTG-5-13
WTG-5-14
WTG-5-15
WTG-5-16
WTG-5-17
WTG-4-12
WTG-4-13
WTG-4-14
WTG-4-15
WTG-4-16
WTG-4-17
WTG-3-12
WTG-3-13
WTG-3-14
WTG-3-15
WTG-3-16
WTG-3-17
WTG-2-11
WTG-2-12
WTG-2-13
WTG-2-14
WTG-2-15
WTG-2-16
WTG-2-17
WTG-1-11
WTG-1-12
WTG-1-13
WTG-1-14
WTG-1-15
WTG-1-16
WTG-1-17
WTG-3-12-1
WTG-3-13-1
WTG-3-14-1
WTG-3-15-1
WTG-3-16-1
WTG-3-17-1
WTG-4-13-1
WTG-4-14-1
WTG-4-15-1
WTG-4-16-1
WTG-4-17-1
WTG-5-13-1
WTG-5-14-1
WTG-5-15-1
WTG-5-16-1
WTG-5-17-1
Spare WTG-5-12
WTG-1-14A
WTG-1-15A
WTG-1-16A
WTG-1-17A
WTG-2-11-1
WTG-2-12-1
WTG-2-13-1
WTG-2-14-1
WTG-2-15-1
WTG-2-16-1
WTG-2-17-1
WTG-3-11-1
WTG-3-12-1
WTG-3-13-1
WTG-3-14-1
WTG-3-15-1
WTG-3-16-1
WTG-3-17-1
WTG-4-11-1
WTG-4-12-1
WTG-4-13-1
WTG-4-14-1
WTG-4-15-1
WTG-4-16-1
WTG-4-17-1
WTG-5-12-1
WTG-5-13-1
WTG-5-14-1
WTG-5-15-1
WTG-5-16-1
WTG-5-17-1
GS-44-A
GS-44-B
GS-44-C
GS-43-A
GS-43-B
GS-43-C
GS-45-A
GS-45-B
GS-45-C
2008_05-12
2008_05-13
2008_05-14
2008_05-15
2008_05-16
2008_05-17
2008_06-45
2008_06-46
2008_06-47
2008_06-48
2008_06-49
2008_06-50
2008_06-51
2008_06-52
2008_06-53
2008_06-54
2008_06-55
2008_06-56
2008_06-57
2008_06-58
2008_06-59
2008_06-60
2008_06-61
2008_06-62
2008_06-63
2008_06-64
2008_06-65
2008_06-66
2008_06-67
2008_06-68
2008_06-69
2008_06-70
2008_06-71
2008_06-72
2008_06-73
2008_06-74
2008_06-75
2008_06-76
2008_06-77
2008_06-78
2008_06-79
2008_06-80
2008_06-81
2008_06-82
2008_06-83
2008_06-84
2008_06-85
2008_06-86
2008_06-87
2008_06-88
2008_06-89
2008_06-90
2008_06-91
2008_06-92
2008_06-93
2008_06-94
2008_06-95
2008_06-96
2008_06-97
2008_06-98
2008_06-99
2008_06-100
2008_06-101
2008_06-102
2008_06-103
2008_06-104
2008_06-105
2008_06-106
2008_06-107
2008_06-108
2008_06-109
2008_06-110
2008_06-111
2008_06-112
2008_06-113
2008_06-114
2008_06-115
2008_06-116
2008_06-117
2008_06-118
2008_06-119
2008_06-120
2008_06-121
2008_06-122
2008_06-123
2008_06-124
2008_06-125
2008_06-126
2008_06-127
2008_06-128
2008_06-129
2008_06-130
2008_06-131
2008_06-132
2008_06-133
2008_06-134
2008_06-135
2008_06-136
2008_06-137
2008_06-138
2008_06-139
2008_06-140
2008_06-141
2008_06-142
2008_06-143
2008_06-144
2008_06-145
2008_06-146
2008_06-147
2008_06-148
2008_06-149
2008_06-150
2008_06-151
2008_06-152
2008_06-153
2008_06-154
2008_06-155
2008_06-156
2008_06-157
2008_06-158
2008_06-159
2008_06-160
2008_06-161
2008_06-162
2008_06-163
2008_06-164
2008_06-165
2008_06-166
2008_06-167
2008_06-168
2008_06-169
2008_06-170
2008_06-171
2008_06-172
2008_06-173
2008_06-174
2008_06-175
2008_06-176
2008_06-177
2008_06-178
2008_06-179
2008_06-180
2008_06-181
2008_06-182
2008_06-183
2008_06-184
2008_06-185
2008_06-186
2008_06-187
2008_06-188
2008_06-189
2008_06-190
2008_06-191
2008_06-192
2008_06-193
2008_06-194
2008_06-195
2008_06-196
2008_06-197
2008_06-198
2008_06-199
2008_06-200
2008_06-201
2008_06-202
2008_06-203
2008_06-204
2008_06-205
2008_06-206
2008_06-207
2008_06-208
2008_06-209
2008_06-210
2008_06-211
2008_06-212
2008_06-213
2008_06-214
2008_06-215
2008_06-216
2008_06-217
2008_06-218
2008_06-219
2008_06-220
2008_06-221
2008_06-222
2008_06-223
2008_06-224
2008_06-225
2008_06-226
2008_06-227
2008_06-228
2008_06-229
2008_06-230
2008_06-231
2008_06-232
2008_06-233
2008_06-234
2008_06-235
2008_06-236
2008_06-237
2008_06-238
2008_06-239
2008_06-240
2008_06-241
2008_06-242
2008_06-243
2008_06-244
2008_06-245
2008_06-246
2008_06-247
2008_06-248
2008_06-249
2008_06-250
2008_06-251
2008_06-252
2008_06-253
2008_06-254
2008_06-255
2008_06-256
2008_06-257
2008_06-258
2008_06-259
2008_06-260
2008_06-261
2008_06-262
2008_06-263
2008_06-264
2008_06-265
2008_06-266
2008_06-267
2008_06-268
2008_06-269
2008_06-270
2008_06-271
2008_06-272
2008_06-273
2008_06-274
2008_06-275
2008_06-276
2008_06-277
2008_06-278
2008_06-279
2008_06-280
2008_06-281
2008_06-282
2008_06-283
2008_06-284
2008_06-285
2008_06-286
2008_06-287
2008_06-288
2008_06-289
2008_06-290
2008_06-291
2008_06-292
2008_06-293
2008_06-294
2008_06-295
2008_06-296
2008_06-297
2008_06-298
2008_06-299
2008_06-300
2008_06-301
2008_06-302
2008_06-303
2008_06-304
2008_06-305
2008_06-306
2008_06-307
2008_06-308
2008_06-309
2008_06-310
2008_06-311
2008_06-312
2008_06-313
2008_06-314
2008_06-315
2008_06-316
2008_06-317
2008_06-318
2008_06-319
2008_06-320
2008_06-321
2008_06-322
2008_06-323
2008_06-324
2008_06-325
2008_06-326
2008_06-327
2008_06-328
2008_06-329
2008_06-330
2008_06-331
2008_06-332
2008_06-333
2008_06-334
2008_06-335
2008_06-336
2008_06-337
2008_06-338
2008_06-339
2008_06-340
2008_06-341
2008_06-342
2008_06-343
2008_06-344
2008_06-345
2008_06-346
2008_06-347
2008_06-348
2008_06-349
2008_06-350
2008_06-351
2008_06-352
2008_06-353
2008_06-354
2008_06-355
2008_06-356
2008_06-357
2008_06-358
2008_06-359
2008_06-360
2008_06-361
2008_06-362
2008_06-363
2008_06-364
2008_06-365
2008_06-366
2008_06-367
2008_06-368
2008_06-369
2008_06-370
2008_06-371
2008_06-372
2008_06-373
2008_06-374
2008_06-375
2008_06-376
2008_06-377
2008_06-378
2008_06-379
2008_06-380
2008_06-381
2008_06-382
2008_06-383
2008_06-384
2008_06-385
2008_06-386
2008_06-387
2008_06-388
2008_06-389
2008_06-390
2008_06-391
2008_06-392
2008_06-393
2008_06-394
2008_06-395
2008_06-396
2008_06-397
2008_06-398
2008_06-399
2008_06-400
2008_06-401
2008_06-402
2008_06-403
2008_06-404
2008_06-405
2008_06-406
2008_06-407
2008_06-408
2008_06-409
2008_06-410
2008_06-411
2008_06-412
2008_06-413
2008_06-414
2008_06-415
2008_06-416
2008_06-417
2008_06-418
2008_06-419
2008_06-420
2008_06-421
2008_06-422
2008_06-423
2008_06-424
2008_06-425
2008_06-426
2008_06-427
2008_06-428
2008_06-429
2008_06-430
2008_06-431
2008_06-432
2008_06-433
2008_06-434
2008_06-435
2008_06-436
2008_06-437
2008_06-438
2008_06-439
2008_06-440
2008_06-441
2008_06-442
2008_06-443
2008_06-444
2008_06-445
2008_06-446
2008_06-447
2008_06-448
2008_06-449
2008_06-450
2008_06-451
2008_06-452
2008_06-453
2008_06-454
2008_06-455
2008_06-456
2008_06-457
2008_06-458
2008_06-459
2008_06-460
2008_06-461
2008_06-462
2008_06-463
2008_06-464
2008_06-465
2008_06-466
2008_06-467
2008_06-468
2008_06-469
2008_06-470
2008_06-471
2008_06-472
2008_06-473
2008_06-474
2008_06-475
2008_06-476
2008_06-477
2008_06-478
2008_06-479
2008_06-480
2008_06-481
2008_06-482
2008_06-483
2008_06-484
2008_06-485
2008_06-486
2008_06-487
2008_06-488
2008_06-489
2008_06-490
2008_06-491
2008_06-492
2008_06-493
2008_06-494
2008_06-495
2008_06-496
2008_06-497
2008_06-498
2008_06-499
2008_06-500
2008_06-501
2008_06-502
2008_06-503
2008_06-504
2008_06-505
2008_06-506
2008_06-507
2008_06-508
2008_06-509
2008_06-510
2008_06-511
2008_06-512
2008_06-513
2008_06-514
2008_06-515
2008_06-516
2008_06-517
2008_06-518
2008_06-519
2008_06-520
2008_06-521
2008_06-522
2008_06-523
2008_06-524
2008_06-525
2008_06-526
2008_06-527
2008_06-528
2008_06-529
2008_06-530
2008_06-531
2008_06-532
2008_06-533
2008_06-534
2008_06-535
2008_06-536
2008_06-537
2008_06-538
2008_06-539
2008_06-540
2008_06-541
2008_06-542
2008_06-543
2008_06-544
2008_06-545
2008_06-546
2008_06-547
2008_06-548
2008_06-549
2008_06-550
2008_06-551
2008_06-552
2008_06-553
2008_06-554
2008_06-555
2008_06-556
2008_06-557
2008_06-558
2008_06-559
2008_06-560
2008_06-561
2008_06-562
2008_06-563
2008_06-564
2008_06-565
2008_06-566
2008_06-567
2008_06-568
2008_06-569
2008_06-570
2008_06-571
2008_06-572
2008_06-573
2008_06-574
2008_06-575
2008_06-576
2008_06-577
2008_06-578
2008_06-579
2008_06-580
2008_06-581
2008_06-582
2008_06-583
2008_06-584
2008_06-585
2008_06-586
2008_06-587
2008_06-588
2008_06-589
2008_06-590
2008_06-591
2008_06-592
2008_06-593
2008_06-594
2008_06-595
2008_06-596
2008_06-597
2008_06-598
2008_06-599
2008_06-600
2008_06-601
2008_06-602
2008_06-603
2008_06-604
2008_06-605
2008_06-606
2008_06-607
2008_06-608
2008_06-609
2008_06-610
2008_06-611
2008_06-612
2008_06-613
2008_06-614
2008_06-615
2008_06-616
2008_06-617
2008_06-618
2008_06-619
2008_06-620
2008_06-621
2008_06-622
2008_06-623
2008_06-624
2008_06-625
2008_06-626
2008_06-627
2008_06-628
2008_06-629
2008_06-630
2008_06-631
2008_06-632
2008_06-633
2008_06-634
2008_06-635
2008_06-636
2008_06-637
2008_06-638
2008_06-639
2008_06-640
2008_06-641
2008_06-642
2008_06-643
2008_06-644
2008_06-645
2008_06-646
2008_06-647
2008_06-648
2008_06-649
2008_06-650
2008_06-651
2008_06-652
2008_06-653
2008_06-654
2008_06-655
2008_06-656
2008_06-657
2008_06-658
2008_06-659
2008_06-660
2008_06-661
2008_06-662
2008_06-663
2008_06-664
2008_06-665
2008_06-666
2008_06-667
2008_06-668
2008_06-669
2008_06-670
2008_06-671
2008_06-672
2008_06-673
2008_06-674
2008_06-675
2008_06-676
2008_06-677
2008_06-678
2008_06-679
2008_06-680
2008_06-681
2008_06-682
2008_06-683
2008_06-684
2008_06-685
2008_06-686
2008_06-687
2008_06-688
2008_06-689
2008_06-690
2008_06-691
2008_06-692
2008_06-693
2008_06-694
2008_06-695
2008_06-696
2008_06-697
2008_06-698
2008_06-699
2008_06-700
2008_06-701
2008_06-702
2008_06-703
2008_06-704
2008_06-705
2008_06-706
2008_06-707
2008_06-708
2008_06-709
2008_06-710
2008_06-711
2008_06-712
2008_06-713
2008_06-714
2008_06-715
2008_06-716
2008_06-717
2008_06-718
2008_06-719
2008_06-720
2008_06-721
2008_06-722
2008_06-723
2008_06-724
2008_06-725
2008_06-726
2008_06-727
2008_06-728
2008_06-729
2008_06-730
2008_06-731
2008_06-732
2008_06-733
2008_06-734
2008_06-735
2008_06-736
2008_06-737
2008_06-738
2008_06-739
2008_06-740
2008_06-741
2008_06-742
2008_06-743
2008_06-744
2008_06-745
2008_06-746
2008_06-747
2008_06-748
2008_06-749
2008_06-750
2008_06-751
2008_06-752
2008_06-753
2008_06-754
2008_06-755
2008_06-756
2008_06-757
2008_06-758
2008_06-759
2008_06-760
2008_06-761
2008_06-762
2008_06-763
2008_06-764
2008_06-765
2008_06-766
2008_06-767
2008_06-768
2008_06-769
2008_06-770
2008_06-771
2008_06-772
2008_06-773
2008_06-774
2008_06-775
2008_06-776
2008_06-777
2008_06-778
2008_06-779
2008_06-780
2008_06-781
2008_06-782
2008_06-783
2008_06-784
2008_06-785
2008_06-786
2008_06-787
2008_06-788
2008_06-789
2008_06-790
2008_06-791
2008_06-792
2008_06-793
2008_06-794
2008_06-795
2008_06-796
2008_06-797
2008_06-798
2008_06-799
2008_06-800
2008_06-801
2008_06-802
2008_06-803
2008_06-804
2008_06-805
2008_06-806
2008_06-807
2008_06-808
2008_06-809
2008_06-810
2008_06-811
2008_06-812
2008_06-813
2008_06-814
2008_06-815
2008_06-816
2008_06-817
2008_06-818
2008_06-819
2008_06-820
2008_06-821
2008_06-822
2008_06-823
2008_06-824
2008_06-825
2008_06-826
2008_06-827
2008_06-828
2008_06-829
2008_06-830
2008_06-831
2008_06-832
2008_06-833
2008_06-834
2008_06-835
2008_06-836
2008_06-837
2008_06-838
2008_06-839
2008_06-840
2008_06-841
2008_06-842
2008_06-843
2008_06-844
2008_06-845
2008_06-846
2008_06-847
2008_06-848
2008_06-849
2008_06-850
2008_06-851
2008_06-852
2008_06-853
2008_06-854
2008_06-855
2008_06-856
2008_06-857
2008_06-858
2008_06-859
2008_06-860
2008_06-861
2008_06-862
2008_06-863
2008_06-864
2008_06-865
2008_06-866
2008_06-867
2008_06-868
2008_06-869
2008_06-870
2008_06-871
2008_06-872
2008_06-873
2008_06-874
2008_06-875
2008_06-876
2008_06-877
2008_06-878
2008_06-879
2008_06-880
2008_06-881
2008_06-882
2008_06-883
2008_06-884
2008_06-885
2008_06-886
2008_06-887
2008_06-888
2008_06-889
2008_06-890
2008_06-891
2008_06-892
2008_06-893
2008_06-894
2008_06-895
2008_06-896
2008_06-897
2008_06-898
2008_06-899
2008_06-900
2008_06-901
2008_06-902
2008_06-903
2008_06-904
2008_06-905
2008_06-906
2008_06-907
2008_06-908
2008_06-909
2008_06-910
2008_06-911
2008_06-912
2008_06-913
2008_06-914
2008_06-915
2008_06-916
2008_06-917
2008_06-918
2008_06-919
2008_06-920
2008_06-921
2008_06-922
2008_06-923
2008_06-924
2008_06-925
2008_06-926
2008_06-927
2008_06-928
2008_06-929
2008_06-930
2008_06-931
2008_06-932
2008_06-933
2008_06-934
2008_06-935
2008_06-936
2008_06-937
2008_06-938
2008_06-939
2008_06-940
2008_06-941
2008_06-942
2008_06-943
2008_06-944
2008_06-945
2008_06-946
2008_06-947
2008_06-948
2008_06-949
2008_06-950
2008_06-951
2008_06-952
2008_06-953
2008_06-954
2008_06-955
2008_06-956
2008_06-957
2008_06-958
2008_06-959
2008_06-960
2008_06-961
2008_06-962
2008_06-963
2008_06-964
2008_06-965
2008_06-966
2008_06-967
2008_06-968
2008_06-969
2008_06-970
2008_06-971
2008_06-972
2008_06-973
2008_06-974
2008_06-975
2008_06-976
2008_06-977
2008_06-978
2008_06-979
2008_06-980
2008_06-981
2008_06-982
2008_06-983
2008_06-984
2008_06-985
2008_06-986
2008_06-987
2008_06-988
2008_06-989
2008_06-990
2008_06-991
2008_06-992
2008_06-993
2008_06-994
2008_06-995
2008_06-996
2008_06-997
2008_06-998
2008_06-999
2008_06-1000
2008_06-1001
2008_06-1002
2008_06-1003
2008_06-1004
2008_06-1005
2008_06-1006
2008_06-1007
2008_06-1008
2008_06-1009
2008_06-1010
2008_06-1011
2008_06-1012
2008_06-1013
2008_06-1014
2008_06-1015
2008_06-1016
2008_06-1017
2008_06-1018
2008_06-1019
2008_06-1020
2008_06-1021
2008_06-1022
2008_06-1023
2008_06-1024
2008_06-1025
2008_06-1026
2008_06-1027
2008_06-1028
2008_06-1029
2008_06-1030
2008_06-1031
2008_06-1032
2008_06-1033
2008_06-1034
2008_06-1035
2008_06-1036
2008_06-1037
2008_06-1038
2008_06-1039
2008_06-1040
2008_06-1041
2008_06-1042
2008_06-1043
2008_06-1044
2008_06-1045
2008_06-1046
2008_06-1047
2008_06-1048
2008_06-1049
2008_06-1050
2008_06-1051
2008_06-1052
2008_06-1053
2008_06-1054
2008_06-1055
2008_06-1056
2008_06-1057
2008_06-1058
2008_06-1059
2008_06-1060
2008_06-1061
2008_06-1062
2008_06-1063
2008_06-1064
2008_06-1065
2008_06-1066
2008_06-1067
2008_06-1068
2008_06-1069
2008_06-1070
2008_06-1071
2008_06-1072
2008_06-1073
2008_06-1074
2008_06-1075
2008_06-1076
2008_06-1077
2008_06-1078
2008_06-1079
2008_06-1080
2008_06-1081
2008_06-1082
2008_06-1083
2008_06-1084
2008_06-1085
2008_06-1086
2008_06-1087
2008_06-1088
2008_06-1089
2008_06-1090
2008_06-1091
2008_06-1092
2008_06-1093
2008_06-1094
2008_06-1095
2008_06-1096
2008_06-1097
2008_06-1098
2008_06-1099
2008_06-1100
2008_06-1101
2008_06-1102
2008_06-1103
2008_06-1104
2008_06-1105
2008_06-1106
2008_06-1107
2008_06-1108
2008_06-1109
2008_06-1110
2008_06-1111
2008_06-1112
2008_06-1113
2008_06-1114
2008_06-1115
2008_06-1116
2008_06-1117
2008_06-1118
2008_06-1119
2008_06-1120
2008_06-1121
2008_06-1122
2008_06-1123
2008_06-1124
2008_06-1125
2008_06-1126
2008_06-1127
2008_06-1128
2008_06-1129
2008_06-1130
2008_06-1131
2008_06-1132
2008_06-1133
2008_06-1134
2008_06-1135
2008_06-1136
2008_06-1137
2008_06-1138
2008_06-1139
2008_06-1140
2008_06-1141
2008_06-1142
2008_06-1143
2008_06-1144
2008_06-1145
2008_06-1146
2008_06-1147
2008_06-1148
2008_06-1149
2008_06-1150
2008_06-1151
2008_06-1152
2008_06-1153
2008_06-1154
2008_06-1155
2008_06-1156
2008_06-1157
2008_06-1158
2008_06-1159
2008_06-1160
2008_06-1161
2008_06-1162
2008_06-1163
2008_06-1164
2008_06-1165
2008_06-1166
2008_06-1167
2008_06-1168
2008_06-1169
2008_06-1170
2008_06-1171
2008_06-1172
2008_06-1173
2008_06-1174
2008_06-1175
2008_06-1176
2008_06-1177
2008_06-1178
2008_06-1179
2008_06-1180
2008_06-1181
2008_06-1182
2008_06-1183
2008_06-1184
2008_06-1185
2008_06-1186
2008_06-1187
2008_06-1188
2008_06-1189
2008_06-1190
2008_06-1191
2008_06-1192
2008_06-1193
2008_06-1194
2008_06-1195
2008_06-1196
2008_06-1197
2008_06-1198
2008_06-1199
2008_06-1200
2008_06-1201
2008_06-1202
2008_06-1203
2008_06-1204
2008_06-1205
2008_06-1206
2008_06-1207
2008_06-1208
2008_06-1209
2008_06-1210
2008_06-1211
2008_06-1212
2008_06-1213
2008_06-1214
2008_06-1215
2008_06-1216
2008_06-1217
2008_06-1218
2008_06-1219
2008_06-1220
2008_06-1221
2008_06-1222
2008_06-1223
2008_06-1224
2008_06-1225
2008_06-1226
2008_06-1227
2008_06-1228
2008_06-1229
2008_06-1230
2008_06-1231
2008_06-1232
2008_06-1233
2008_06-1234
2008_06-1235
2008_06-1236
2008_06-1237
2008_06-1238
2008_06-1239
2008_06-1240
2008_06-1241
2008_06-1242
2008_06-1243
2008_06-1244
2008_06-1245
2008_06-1246
2008_06-1247
2008_06-1248
2008_06-1249
2008_06-1250
2008_06-1251
2008_06-1252
2008_06-1253
2008_06-1254
2008_06-1255
2008_06-1256
2008_06-1257
2008_06-1258
2008_06-1259
2008_06-1260
2008_06-1261
2008_06-1262
2008_06-1263
2008_06-1264
2008_06-1265
2008_06-1266
2008_06-1267
2008_06-1268
2008_06-1269
2008_06-1270
2008_06-1271
2008_06-1272
2008_06-1273
2008_06-1274
2008_06-1275
2008_06-1276
2008_06-1277
2008_06-1278
2008_06-1279
2008_06-1280
2008_06-1281
2008_06-1282
2008_06-1283
2008_06-1284
2008_06-1285
2008_06-1286
2008_06-1287
2008_06-1288
2008_06-1289
2008_06-1290
2008_06-1291
2008_06-1292
2008_06-1293
2008_06-1294
2008_06-1295
2008_06-1296
2008_06-1297
2008_06-1298
2008_06-1299
2008_06-1300
2008_06-1301
2008_06-1302
2008_06-1303
2008_06-1304
2008_06-1305
2008_06-1306
2008_06-1307
2008_06-1308
2008_06-1309
2008_06-1310
2008_06-1311
2008_06-1312
2008_06-1313
2008_06-1314
2008_06-1315
2008_06-1316
2008_06-1317
2008_06-1318
2008_06-1319
2008_06-1320
2008_06-1321
2008_06-1322
2008_06-1323
2008_06-1324
2008_06-1325
2008_06-1326
2008_06-1327
2008_06-1328
2008_06-1329
2008_06-1330
2008_06-1331
2008_06-1332
2008_06-1333
2008_06-1334
2008_06-1335
2008_06-1336
2008_06-1337
2008_06-1338
2008_06-1339
2008_06-1340
2008_06-1341
2008_06-1342
2008_06-1343
2008_06-1344
2008_06-1345
2008_06-1346
2008_06-1347
2008_06-1348
2008_06-1349
2008_06-1350
2008_06-1351
2008_06-1352
2008_06-1353
2008_06-1354
2008_06-1355
2008_06-1356
2008_06-1357
2008_06-1358
2008_06-1359
2008_06-1360
2008_06-1361
2008_06-1362
2008_06-1363
2008_06-1364
2008_06-1365
2008_06-1366
2008_06-1367
2008_06-1368
2008_06-1369
2008_06-1370
2008_06-1371
2008_06-1372
2008_06-1373
2008_06-1374
2008_06-1375
2008_06-1376
2008_06-1377
2008_06-1378
2008_06-1379
2008_06-1380
2008_06-1381
2008_06-1382
2008_06-1383
2008_06-1384
2008_06-1385
2008_06-1386
2008_06-1387
2008_06-1388
2008_06-1389
2008_06-1390
2008_06-1391
2008_06-1392
2008_06-1393
2008_06-1394
2008_06-1395
2008_06-1396
2008_06-1397
2008_06-1398
2008_06-1399
2008_06-1400
2008_06-1401
2008_06-1402
2008_06-1403
2008_06-1404
2008_06-1405
2008_06-1406
2008_06-1407
2008_06-1408
2008_06-1409
2008_06-1410
2008_06-1411
2008_06-1412
2008_06-1413
2008_06-1414
2008_06-1415
2008_06-1416
2008_06-1417
2008_06-1418
2008_06-1419
2008_06-1420
2008_06-1421
2008_06-1422
2008_06-1423
2008_06-1424
2008_06-1425
2008_06-1426
2008_06-1427
2008_06-1428
2008_06-1429
2008_06-1430
2008_06-1431
2008_06-1432
2008_06-1433
2008_06-1434
2008_06-1435
2008_06-1436
2008_06-1437
2008_06-1438
2008_06-1439
2008_06-1440
2008_06-1441
2008_06-1442
2008_06-1443
2008_06-1444
2008_06-1445
2008_06-1446
2008_06-1447
2008_06-1448
2008_06-1449
2008_06-1450
2008_06-1451
2008_06-1452
2008_06-1453
2008_06-1454
2008_06-1455
2008_06-1456
2008_06-1457
2008_06-1458
2008_06-1459
2008_06-1460
2008_06-1461
2008_06-1462
2008_06-1463
2008_06-1464
2008_06-1465
2008_06-1466
2008_06-1467
2008_06-1468
2008_06-1469
2008_06-1470
2008_06-1471
2008_06-1472
2008_06-1473
2008_06-1474
2008_06-1475
2008_06-1476
2008_06-1477
2008_06-1478
2008_06-1479
2008_06-1480
2008_06-1481
2008_06-1482
2008_06-1483
2008_06-1484
2008_06-1485
2008_06-1486
2008_06-1487
2008_06-1488
2008_06-1489
2008_06-1490
2008_06-1491
2008_06-1492
2008_06-1493
2008_06-1494
2008_06-1495
2008_06-1496
2008_06-1497
2008_06-1498
2008_06-1499
2008_06-1500
2008_06-1501
2008_06-1502
2008_06-1503
2008_06-1504
2008_06-1505
2008_06-1506
2008_06-1507
2008_06-1508
2008_06-1509
2008_06-1510
2008_06-1511
2008_06-1512
2008_06-1513
2008_06-1514
2008_06-1515
2008_06-1516
2008_06-1517
2008_06-1518
2008_06-1519
2008_06-1520
2008_06-1521
2008_06-1522
2008_06-1523
2008_06-1524
2008_06-1525
2008_06-1526
2008_06-1527
2008_06-1528
2008_06-1529
2008_06-1530
2008_06-1531
2008_06-1532
2008_06-1533
2008_06-1534
2008_06-1535
2008_06-1536
2008_06-1537
2008_06-1538
2008_06-1539
2008_06-1540
2008_06-1541
2008_06-1542
2008_06-1543
2008_06-1544
2008_06-1545
2008_06-1546
2008_06-1547
2008_06-1548
2008_06-1549
2008_06-1550
2008_06-1551
2008_06-1552
2008_06-1553
2008_06-1554
2008_06-1555
2008_06-1556
2008_06-1557
2008_06-1558
2008_06-1559
2008_06-1560
2008_06-1561
2008_06-1562
2008_06-1563
2008_06-1564
2008_06-1565
2008_06-1566
2008_06-1567
2008_06-1568
2008_06-1569
2008_06-1570
2008_06-1571
2008_06-1572
2008_06-1573
2008_06-1574
2008_06-1575
2008_06-1576
2008_06-1577
2008_06-1578
2008_06-1579
2008_06-1580
2008_06-1581
2008_06-1582
2008_06-1583
2008_06-1584
2008_06-1585
2008_06-1586
2008_06-1587
2008_06-1588
2008_06-1589
2008_06-1590
2008_06-1591
2008_06-1592
2008_06-1593
2008_06-1594
2008_06-1595
2008_06-1596
2008_06-1597
2008_06-1598
2008_06-1599
2008_06-1600
2008_06-1601
2008_06-1602
2008_06-1603
2008_06-1604
2008_06-1605
2008_06-1606
2008_06-1607
2008_06-1608
2008_06-1609
2008_06-1610
2008_06-1611
2008_06-1612
2008_06-1613
2008_06-1614
2008_06-1615
2008_06-1616
2008_06-1617
2008_06-1618
2008_06-1619
2008_06-1620
2008_06-1621
2008_06-1622
2008_06-1623
2008_06-1624
2008_06-1625
2008_06-1626
2008_06-1627
2008_06-1628
2008_06-1629
2008_06-1630
2008_06-1631
2008_06-1632
2008_06-1633
2008_06-1634
2008_06-1635
2008_06-1636
2008_06-1637
2008_06-1638
2008_06-1639
2008_06-1640
2008_06-1641
2008_06-1642
2008_06-1643
2008_06-1644
2008_06-1645
2008_06-1646
2008_06-1647
2008_06-1648
2008_06-1649
2008_06-1650
2008_06-1651
2008_06-1652
2008_06-1653
2008_06-1654
2008_06-1655
2008_06-1656
2008_06-1657
2008_06-1658
2008_06-1659
2008_06-1660
2008_06-1661
2008_06-1662
2008_06-1663
2008_06-1664
2008_06-1665
2008_06-1666
2008_06-1667
2008_06-1668
2008_06-1669
2008_06-1670
2008_06-1671
2008_06-1672
2008_06-1673
2008_06-1674
2008_06-1675
2008_06-1676
2008_06-1677
2008_06-1678
2008_06-1679
2008_06-1680
2008_06-1681
2008_06-1682
2008_06-1683
2008_06-1684
2008_06-1685
2008_06-1686
2008_06-1687
2008_06-1688
2008_06-1689
2008_06-1690
2008_06-1691
2008_06-1692
2008_06-1693
2008_06-1694
2008_06-1695
2008_06-1696
2008_06-1697
2008_06-1698
2008_06-1699
2008_06-1700
2008_06-1701
2008_06-1702
2008_06-1703
2008_06-1704
2008_06-1705
2008_06-1706
2008_06-1707
2008_06-1708
2008_06-1709
2008_06-1710
2008_06-1711
2008_06-1712
2008_06-1713
2008_06-1714
2008_06-1715
2008_06-1716
2008_06-1717
2008_06-1718
2008_06-1719
2008_06-1720
2008_06-1721
2008_06-1722
2008_06-1723
2008_06-1724
2008_06-1725
2008_06-1726
2008_06-1727
2008_06-1728
2008_06-1729
2008_06-1730
2008_06-1731
2008_06-1732
2008_06-1733
2008_06-1734
2008_06-1735
2008_06-1736
2008_06-1737
2008_06-1738
2008_06-1739
2008_06-1740
2008_06-1741
2008_06-1742
2008_06-1743
2008_06-1744
2008_06-1745
2008_06-1746
2008_06-1747
2008_06-1748
2008_06-1749
2008_06-1750
2008_06-1751
2008_06-1752
2008_06-1753
2008_06-1754
2008_06-1755
2008_06-1756
2008_06-1757
2008_06-1758
2008_06-1759
2008_06-1760
2008_06-1761
2008_06-1762
2008_06-1763
2008_06-1764
2008_06-1765
2008_06-1766
2008_06-1767
2008_06-1768
2008_06-1769
2008_06-1770
2008_06-1771
2008_06-1772
2008_06-1773
2008_06-1774
2008_06-1775
2008_06-1776
2008_06-1777
2008_06-1778
2008_06-1779
2008_06-1780
2008_06-1781
2008_06-1782
2008_06-1783
2008_06-1784
2008_06-1785
2008_06-1786
2008_06-1787
2008_06-1788
2008_06-1789
2008_06-1790
2008_06-1791
2008_06-1792
2008_06-1793
2008_06-1794
2008_06-1795
2008_06-1796
2008_06-1797
2008_06-1798
2008_06-1799
2008_06-1800
2008_06-1801
2008_06-1802
2008_06-1803
2008_06-1804
2008_06-1805
2008_06-1806
2008_06-1807
2008_06-1808
2008_06-1809
2008_06-1810
2008_06-1811
2008_06-1812
2008_06-1813
2008_06-1814
2008_06-1815
2008_06-1816
2008_06-1817
2008_06-1818
2008_06-1819
2008_06-1820
2008_06-1821
2008_06-1822
2008_06-1823
2008_06-1824
2008_06-1825
2008_06-1826
2008_06-1827
2008_06-1828
2008_06-1829
2008_06-1830
2008_06-1831
2008_06-1832
2008_06-1833
2008_06-1834
2008_06-1835
2008_06-1836
2008_06-1837
2008_06-1838
2008_06-1839
2008_06-1840
2008_06-1841
2008_06-1842
2008_06-1843
2008_06-1844
2008_06-1845
2008_06-1846
2008_06-1847
2008_06-1848
2008_06-1849
2008_06-1850
2008_06-1851
2008_06-1852
2008_06-1853
2008_06-1854
2008_06-1855
2008_06-1856
2008_06-1857
2008_06-1858
2008_06-1859
2008_06-1860
2008_06-1861
2008_06-1862
2008_06-1863
2008_06-1864
2008_06-1865
2008_06-1866
2008_06-1867
2008_06-1868
2008_06-1869
2008_06-1870
2008_06-1871
2008_06-1872
2008_06-1873
2008_06-1874
2008_06-1875
2008_06-1876
2008_06-1877
2008_06-1878
2008_06-1879
2008_06-1880
2008_06-1881
2008_06-1882
2008_06-1883
2008_06-1884
2008_06-1885
2008_06-1886
2008_06-1887
2008_06-1888
2008_06-1889
2008_06-1890
2008_06-1891
2008_06-1892
2008_06-1893
2008_06-1894
2008_06-1895
2008_06-1896
2008_06-1897
2008_06-1898
2008_06-1899
2008_06-1900
2008_06-1901
2008_06-1902
2008_06-1903
2008_06-1904
2008_06-1905
2008_06-1906
2008_06-1907
2008_06-1908
2008_06-1909
2008_06-1910
2008_06-1911
2008_06-1912
2008_06-1913
2008_06-1914
2008_06-1915
2008_06-1916
2008_06-1917
2008_06-1918
2008_06-1919
2008_06-1920
2008_06-1921
2008_06-1922
2008_06-1923
2008_06-1924
2008_06-1925
2008_06-1926
2008_06-1927
2008_06-1928
2008_06-1929
2008_06-1930
2008_06-1931
2008_06-1932
2008_06-1933
2008_06-1934
2008_06-1935
2008_06-1936
2008_06-1937
2008_06-1938
2008_06-1939
2008_06-1940
2008_06-1941
2008_06-1942
2008_06-1943
2008_06-1944
2008_06-1945
2008_06-1946
2008_06-1947
2008_06-1948
2008_06-1949
2008_06-1950
2008_06-1951
2008_06-1952
2008_06-1953
2008_06-1954
2008_06-1955
2008_06-1956
2008_06-1957
2008_06-1958
2008_06-1959
2008_06-1960
2008_06-1961
2008_06-1962
2008_06-1963
2008_06-1964
2008_06-1965
2008_06-1966
2008_06-1967
2008_06-1968
2008_06-1969
2008_06-1970
2008_06-1971
2008_06-1972
2008_06-1973
2008_06-1974
2008_06-1975
2008_06-1976
2008_06-1977
2008_06-1978
2008_06-1979
2008_06-1980
2008_06-1981
2008_06-1982
2008_06-1983
2008_06-1984
2008_06-1985
2008_06-1986
2008_06-1987
2008_06-1988
2008_06-1989
2008_06-1990
2008_06-1991
2008_06-1992
2008_06-1993
2008_06-1994
2008_06-1995
2008_06-1996
2008_06-1997
2008_06-1998
2008_06-1999
2008_06-2000
2008_06-2001
2008_06-2002
2008_06-2003
2008_06-2004
2008_06-2005
2008_06-2006
2008_06-2007
2008_06-2008
2008_06-2009
2008_06-2010
2008_06-2011
2008_06-2012
2008_06-2013
2008_06-2014
2008_06-2015
2008_06-2016
2008_06-2017
2008_06-2018
2008_06-2019
2008_06-2020
2008_06-2021
2008_06-2022
2008_06-2023
2008_06-2024
2008_06-2025
2008_06-2026
2008_06-2027
2008_06-2028
2008_06-2029
2008_06-2030
2008_06-2031
2008_06-2032
2008_06-2033
2008_06-2034
2008_06-2035
2008_06-2036
2008_06-2037
2008_06-2038
2008_06-2039
2008_06-2040
2008_06-2041
2008_06-2042
2008_06-2043
2008_06-2044
2008_06-2045
2008_06-2046
2008_06-2047
2008_06-2048
2008_06-2049
2008_06-2050
2008_06-2051
2008_06-2



General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block — Main Chart OCS-A 0483
- Tile Panel 1 - 9 — Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA States and Cities. Geographic Data. download from ESRI Source: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Relative Reflectivity: Low — Side Scan Mosaic — High

High Frequency Sidescan Mosaic (600 kHz)

- Side Scan Sonar Contact — Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTGMN-M2D-####. Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TLMN2D-####
- Magnetic Anomaly — Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTGMN-M2D-####

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

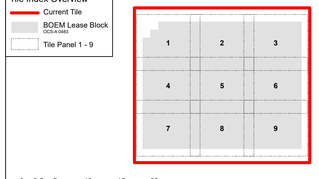
General Information

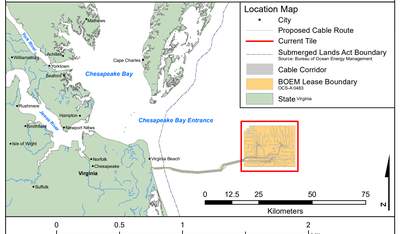
Equipment		Terrasond Personnel	
Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Commandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]	Commercial Manager	: Scott Croft
		Project Manager	: Don Ross
		Project Manager	: James Hougham
		Production Manager	: Kate Mildon
Positioning System	: Applanix POSMV and Hemisphere	Technical Manager	: Chris McHugh
USBL	: Sonardyne Ranger 2 (19-34 kHz)	Geophysical Manager	: Scott Hiller
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]	Operations Manager	: William Busey
		Party Chief	: Mark MacLean
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)	Lead Surveyor	: Larry Andrews
Magnetometer	: Geometrics G-882 (TVG)	Director HSEQ	: Forrest Davis
Subbottom Profiler	: Innomar SES-2000 medium		
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer		
Single Channel Seismic[2,3,6] Sparker[3]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer		
Sound Velocity Profiler	: AML MVP30/MVP200[3]	This geophysical survey was conducted April 29th, 2020 through June 13th, 2021	
Acquistion Software	: QINSy		

Coordinate Reference System

Horizontal Coordinate Reference System		Vertical Coordinate Reference System	
CRS Name	:NAD 1983 (2011) UTM Zone 18N	Datum	:Mean Lower Low Water (MLLW)
EPSG Code	:6347	Axis -down	:Depth
Geodetic Datum	:North American 1983		
Projection	:Universal Transverse Mercator		
Units	:Meter		

Tile Index Overview







Survey Contractor: TERRASOND — PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 4 HIGH FREQUENCY SIDE SCAN MOSAIC OVERVIEW

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	DRAFT	CLS	KMM	KMM
06/15/21	Rev00	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

Rev01

Date: 7/31/2021

File Name: Dominion_SSS_Mosaic_Rev01_Chart_Overview.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

General Map Symbols

- Dominion Lease Boundary OCS-A 0483
- Proposed Cable Route "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block Main Chart OCS-A 0483
- Tile Panel 1 - 9 Main Chart
- WTG Location Preliminary position/subject to change
- OSS Location Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck Source: NOAA Office of Coast Survey

USA State and Cities - Geographic Data: download from ESRI
Sources: Esri, TomTom, North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Relative Reflectivity: Low — Side Scan Mosaic — High

- Side Scan Sonar Contact
  Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTGMN-M2D-####
  Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TLMA2D-####
- Magnetic Anomaly
  Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTGMN-M2D-####

High Frequency Sidescan Mosaic (600 kHz)

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) / R2Sonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6] Sparker[1]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Milston
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

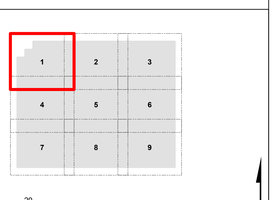
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

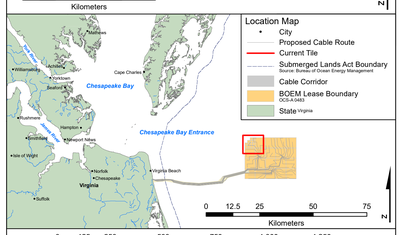
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block OCS-A 0483
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



0 125 250 500 750 1,000 1,250 Meters
0 500 1,000 2,000 3,000 4,000 5,000 Feet
1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 4 HIGH FREQUENCY SIDE SCAN MOSAIC TILE 1 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	Rev00	CLS	KDW	KMM
06/14/21	Rev01	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/31/2021

File Name: Dominion_SSS_Mosaic_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities - Geographic Data: downloaded from ESRI Source: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Relative Reflectivity: Low – Side Scan Mosaic – High

- Side Scan Sonar Contact (Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTG#M-NQ0-####; Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TL#A0Q-####)
- Magnetic Anomaly (Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTG#M-MZ0-####)

High Frequency Sidescan Mosaic (600 kHz)

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6] / Sparker[3]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquisition Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Milston
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June 13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

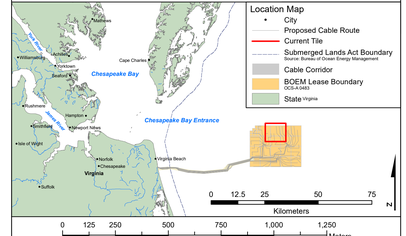
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 4 HIGH FREQUENCY SIDE SCAN MOSAIC TILE 2 of 9

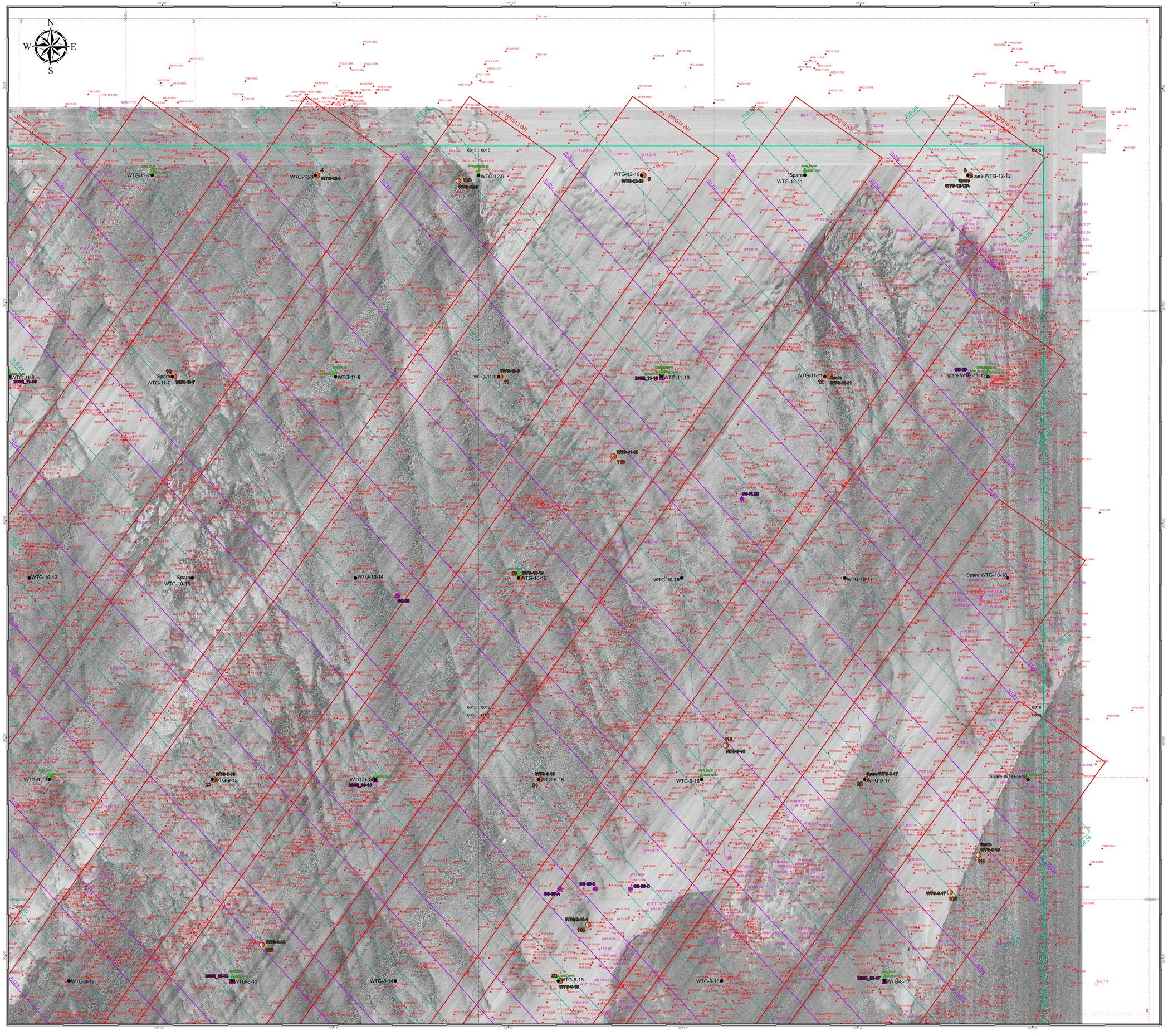
DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	Rev00	CLS	KDW	KMM
06/14/21	Rev01	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

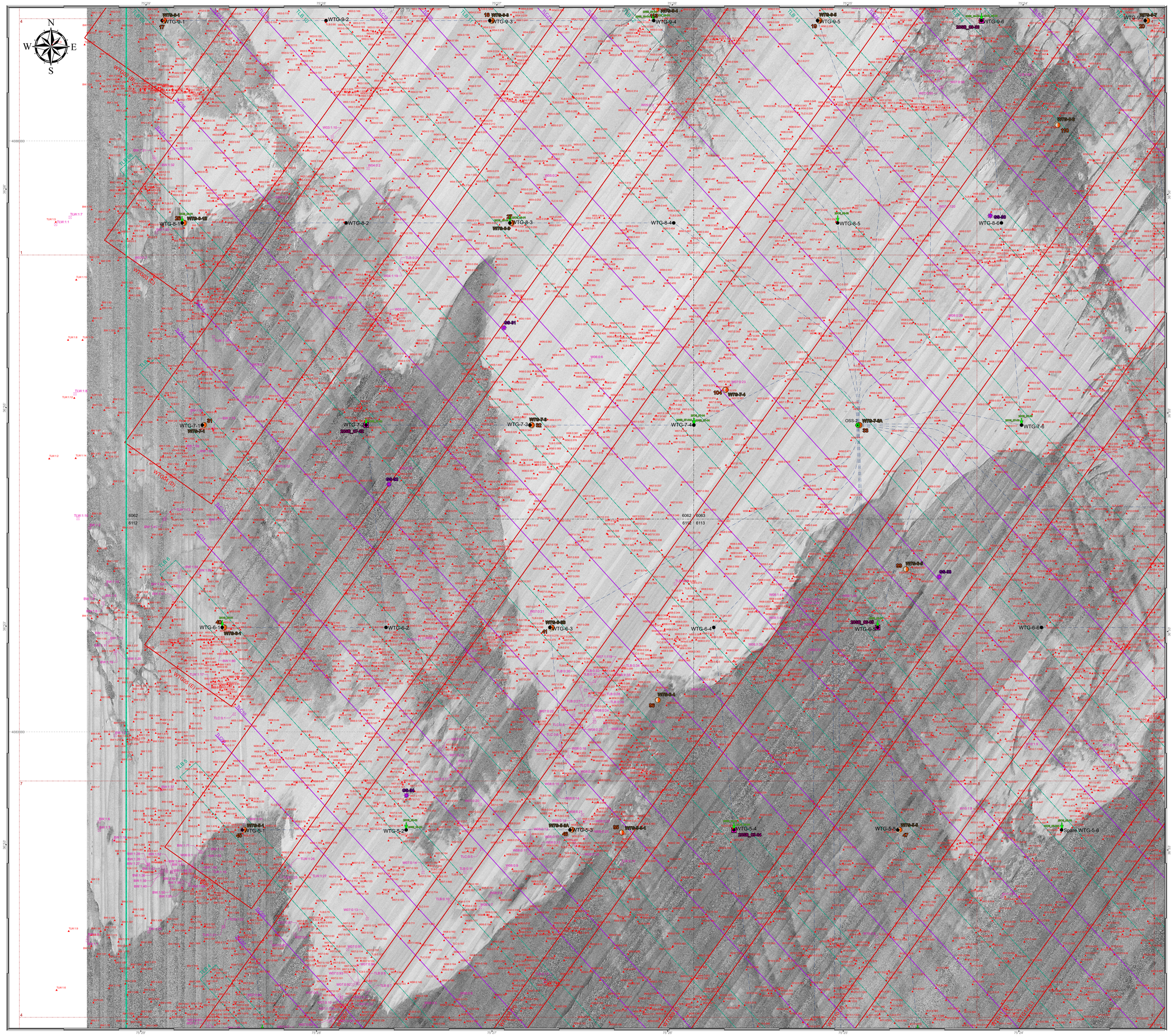
Rev01

Date: 7/31/2021

File Name: Dominion_SSS_Mosaic_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


N
W
E
S
WTG-12-7
WTG-12-8
WTG-12-9
WTG-12-10
WTG-12-11
Spare WTG-12-12
WTG-11-6
WTG-11-7
WTG-11-8
WTG-11-9
WTG-11-10
WTG-11-11
Spare WTG-11-12
WTG-10-12
Spare WTG-10-13
WTG-10-14
WTG-10-15
WTG-10-16
WTG-10-17
Spare WTG-10-18
WTG-9-12
WTG-9-13
WTG-9-14
WTG-9-15
WTG-9-16
WTG-9-17
Spare WTG-9-18
WTG-8-12
WTG-8-13
WTG-8-14
WTG-8-15
WTG-8-16
WTG-8-17
6015 | 6016
6055 | 6056
TLC-01
TLC-02
TLC-03
TLC-04
TLC-05
TLC-06
TLB-25
TLB-26
TLB-27
TLB-28
TLB-29
WTG10 (K)
WTG11 (K)
WTG12 (L)
WTG13 (M)
WTG14 (N)
WTG15 (O)
WTG16 (P)
WTG17 (Q)
WTG18 (R)
WTG19 (S)
WTG20 (T)
WTG21 (U)
WTG22 (V)
WTG23 (W)
WTG24 (X)
WTG25 (Y)
WTG26 (Z)
WTG27 (AA)
WTG28 (AB)
WTG29 (AC)
WTG30 (AD)
WTG31 (AE)
WTG32 (AF)
WTG33 (AG)
WTG34 (AH)
WTG35 (AI)
WTG36 (AJ)
WTG37 (AK)
WTG38 (AL)
WTG39 (AM)
WTG40 (AN)
WTG41 (AO)
WTG42 (AP)
WTG43 (AQ)
WTG44 (AR)
WTG45 (AS)
WTG46 (AT)
WTG47 (AU)
WTG48 (AV)
WTG49 (AW)
WTG50 (AX)
WTG51 (AY)
WTG52 (AZ)
WTG53 (BA)
WTG54 (BB)
WTG55 (BC)
WTG56 (BD)
WTG57 (BE)
WTG58 (BF)
WTG59 (BG)
WTG60 (BH)
WTG61 (BI)
WTG62 (BJ)
WTG63 (BK)
WTG64 (BL)
WTG65 (BM)
WTG66 (BN)
WTG67 (BO)
WTG68 (BP)
WTG69 (BQ)
WTG70 (BR)
WTG71 (BS)
WTG72 (BT)
WTG73 (BU)
WTG74 (BV)
WTG75 (BW)
WTG76 (BX)
WTG77 (BY)
WTG78 (BZ)
WTG79 (CA)
WTG80 (CB)
WTG81 (CC)
WTG82 (CD)
WTG83 (CE)
WTG84 (CF)
WTG85 (CG)
WTG86 (CH)
WTG87 (CI)
WTG88 (CJ)
WTG89 (CK)
WTG90 (CL)
WTG91 (CM)
WTG92 (CN)
WTG93 (CO)
WTG94 (CP)
WTG95 (CQ)
WTG96 (CR)
WTG97 (CS)
WTG98 (CT)
WTG99 (CU)
WTG100 (CV)
WTG101 (CW)
WTG102 (CX)
WTG103 (CY)
WTG104 (CZ)
WTG105 (DA)
WTG106 (DB)
WTG107 (DC)
WTG108 (DD)
WTG109 (DE)
WTG110 (DF)
WTG111 (DG)
WTG112 (DH)
WTG113 (DI)
WTG114 (DJ)
WTG115 (DK)
WTG116 (DL)
WTG117 (DM)
WTG118 (DN)
WTG119 (DO)
WTG120 (DP)
WTG121 (DQ)
WTG122 (DR)
WTG123 (DS)
WTG124 (DT)
WTG125 (DU)
WTG126 (DV)
WTG127 (DW)
WTG128 (DX)
WTG129 (DY)
WTG130 (DZ)
WTG131 (EA)
WTG132 (EB)
WTG133 (EC)
WTG134 (ED)
WTG135 (EE)
WTG136 (EF)
WTG137 (EG)
WTG138 (EH)
WTG139 (EI)
WTG140 (EJ)
WTG141 (EK)
WTG142 (EL)
WTG143 (EM)
WTG144 (EN)
WTG145 (EO)
WTG146 (EP)
WTG147 (EQ)
WTG148 (ER)
WTG149 (ES)
WTG150 (ET)
WTG151 (EU)
WTG152 (EV)
WTG153 (EW)
WTG154 (EX)
WTG155 (EY)
WTG156 (EZ)
WTG157 (FA)
WTG158 (FB)
WTG159 (FC)
WTG160 (FD)
WTG161 (FE)
WTG162 (FF)
WTG163 (FG)
WTG164 (FH)
WTG165 (FI)
WTG166 (FJ)
WTG167 (FK)
WTG168 (FL)
WTG169 (FM)
WTG170 (FN)
WTG171 (FO)
WTG172 (FP)
WTG173 (FQ)
WTG174 (FR)
WTG175 (FS)
WTG176 (FT)
WTG177 (FU)
WTG178 (FV)
WTG179 (FW)
WTG180 (FX)
WTG181 (FY)
WTG182 (FZ)
WTG183 (GA)
WTG184 (GB)
WTG185 (GC)
WTG186 (GD)
WTG187 (GE)
WTG188 (GF)
WTG189 (GG)
WTG190 (GH)
WTG191 (GI)
WTG192 (GJ)
WTG193 (GK)
WTG194 (GL)
WTG195 (GM)
WTG196 (GN)
WTG197 (GO)
WTG198 (GP)
WTG199 (GQ)
WTG200 (GR)
WTG201 (GS)
WTG202 (GT)
WTG203 (GU)
WTG204 (GV)
WTG205 (GW)
WTG206 (GX)
WTG207 (GY)
WTG208 (GZ)
WTG209 (HA)
WTG210 (HB)
WTG211 (HC)
WTG212 (HD)
WTG213 (HE)
WTG214 (HF)
WTG215 (HG)
WTG216 (HH)
WTG217 (HI)
WTG218 (HJ)
WTG219 (HK)
WTG220 (HL)
WTG221 (HM)
WTG222 (HN)
WTG223 (HO)
WTG224 (HP)
WTG225 (HQ)
WTG226 (HR)
WTG227 (HS)
WTG228 (HT)
WTG229 (HU)
WTG230 (HV)
WTG231 (HW)
WTG232 (HX)
WTG233 (HY)
WTG234 (HZ)
WTG235 (IA)
WTG236 (IB)
WTG237 (IC)
WTG238 (ID)
WTG239 (IE)
WTG240 (IF)
WTG241 (IG)
WTG242 (IH)
WTG243 (II)
WTG244 (IJ)
WTG245 (IK)
WTG246 (IL)
WTG247 (IM)
WTG248 (IN)
WTG249 (IO)
WTG250 (IP)
WTG251 (IQ)
WTG252 (IR)
WTG253 (IS)
WTG254 (IT)
WTG255 (IU)
WTG256 (IV)
WTG257 (IW)
WTG258 (IX)
WTG259 (IY)
WTG260 (IZ)
WTG261 (JA)
WTG262 (JB)
WTG263 (JC)
WTG264 (JD)
WTG265 (JE)
WTG266 (JF)
WTG267 (JG)
WTG268 (JH)
WTG269 (JI)
WTG270 (JJ)
WTG271 (JK)
WTG272 (JL)
WTG273 (JM)
WTG274 (JN)
WTG275 (JO)
WTG276 (JP)
WTG277 (JQ)
WTG278 (JR)
WTG279 (JS)
WTG280 (JT)
WTG281 (JU)
WTG282 (JV)
WTG283 (JW)
WTG284 (JX)
WTG285 (JY)
WTG286 (JZ)
WTG287 (KA)
WTG288 (KB)
WTG289 (KC)
WTG290 (KD)
WTG291 (KE)
WTG292 (KF)
WTG293 (KG)
WTG294 (KH)
WTG295 (KI)
WTG296 (KJ)
WTG297 (KK)
WTG298 (KL)
WTG299 (KM)
WTG300 (KN)
WTG301 (KO)
WTG302 (KP)
WTG303 (KQ)
WTG304 (KR)
WTG305 (KS)
WTG306 (KT)
WTG307 (KU)
WTG308 (KV)
WTG309 (KW)
WTG310 (KX)
WTG311 (KY)
WTG312 (KZ)
WTG313 (LA)
WTG314 (LB)
WTG315 (LC)
WTG316 (LD)
WTG317 (LE)
WTG318 (LF)
WTG319 (LG)
WTG320 (LH)
WTG321 (LI)
WTG322 (LJ)
WTG323 (LK)
WTG324 (LL)
WTG325 (LM)
WTG326 (LN)
WTG327 (LO)
WTG328 (LP)
WTG329 (LQ)
WTG330 (LR)
WTG331 (LS)
WTG332 (LT)
WTG333 (LU)
WTG334 (LV)
WTG335 (LW)
WTG336 (LX)
WTG337 (LY)
WTG338 (LZ)
WTG339 (MA)
WTG340 (MB)
WTG341 (MC)
WTG342 (MD)
WTG343 (ME)
WTG344 (MF)
WTG345 (MG)
WTG346 (MH)
WTG347 (MI)
WTG348 (MJ)
WTG349 (MK)
WTG350 (ML)
WTG351 (MM)
WTG352 (MN)
WTG353 (MO)
WTG354 (MP)
WTG355 (MQ)
WTG356 (MR)
WTG357 (MS)
WTG358 (MT)
WTG359 (MU)
WTG360 (MV)
WTG361 (MW)
WTG362 (MX)
WTG363 (MY)
WTG364 (MZ)
WTG365 (NA)
WTG366 (NB)
WTG367 (NC)
WTG368 (ND)
WTG369 (NE)
WTG370 (NF)
WTG371 (NG)
WTG372 (NH)
WTG373 (NI)
WTG374 (NJ)
WTG375 (NK)
WTG376 (NL)
WTG377 (NM)
WTG378 (NN)
WTG379 (NO)
WTG380 (NP)
WTG381 (NQ)
WTG382 (NR)
WTG383 (NS)
WTG384 (NT)
WTG385 (NU)
WTG386 (NV)
WTG387 (NW)
WTG388 (NX)
WTG389 (NY)
WTG390 (NZ)
WTG391 (OA)
WTG392 (OB)
WTG393 (OC)
WTG394 (OD)
WTG395 (OE)
WTG396 (OF)
WTG397 (OG)
WTG398 (OH)
WTG399 (OI)
WTG400 (OJ)
WTG401 (OK)
WTG402 (OL)
WTG403 (OM)
WTG404 (ON)
WTG405 (OO)
WTG406 (OP)
WTG407 (OQ)
WTG408 (OR)
WTG409 (OS)
WTG410 (OT)
WTG411 (OU)
WTG412 (OV)
WTG413 (OW)
WTG414 (OX)
WTG415 (OY)
WTG416 (OZ)
WTG417 (PA)
WTG418 (PB)
WTG419 (PC)
WTG420 (PD)
WTG421 (PE)
WTG422 (PF)
WTG423 (PG)
WTG424 (PH)
WTG425 (PI)
WTG426 (PJ)
WTG427 (PK)
WTG428 (PL)
WTG429 (PM)
WTG430 (PN)
WTG431 (PO)
WTG432 (PP)
WTG433 (PQ)
WTG434 (PR)
WTG435 (PS)
WTG436 (PT)
WTG437 (PU)
WTG438 (PV)
WTG439 (PW)
WTG440 (PX)
WTG441 (PY)
WTG442 (PZ)
WTG443 (QA)
WTG444 (QB)
WTG445 (QC)
WTG446 (QD)
WTG447 (QE)
WTG448 (QF)
WTG449 (QG)
WTG450 (QH)
WTG451 (QI)
WTG452 (QJ)
WTG453 (QK)
WTG454 (QL)
WTG455 (QM)
WTG456 (QN)
WTG457 (QO)
WTG458 (QP)
WTG459 (QQ)
WTG460 (QR)
WTG461 (QS)
WTG462 (QT)
WTG463 (QU)
WTG464 (QV)
WTG465 (QW)
WTG466 (QX)
WTG467 (QY)
WTG468 (QZ)
WTG469 (RA)
WTG470 (RB)
WTG471 (RC)
WTG472 (RD)
WTG473 (RE)
WTG474 (RF)
WTG475 (RG)
WTG476 (RH)
WTG477 (RI)
WTG478 (RJ)
WTG479 (RK)
WTG480 (RL)
WTG481 (RM)
WTG482 (RN)
WTG483 (RO)
WTG484 (RP)
WTG485 (RQ)
WTG486 (RR)
WTG487 (RS)
WTG488 (RT)
WTG489 (RU)
WTG490 (RV)
WTG491 (RW)
WTG492 (RX)
WTG493 (RY)
WTG494 (RZ)
WTG495 (SA)
WTG496 (SB)
WTG497 (SC)
WTG498 (SD)
WTG499 (SE)
WTG500 (SF)
WTG501 (SG)
WTG502 (SH)
WTG503 (SI)
WTG504 (SJ)
WTG505 (SK)
WTG506 (SL)
WTG507 (SM)
WTG508 (SN)
WTG509 (SO)
WTG510 (SP)
WTG511 (SQ)
WTG512 (SR)
WTG513 (SS)
WTG514 (ST)
WTG515 (SU)
WTG516 (SV)
WTG517 (SW)
WTG518 (SX)
WTG519 (SY)
WTG520 (SZ)
WTG521 (TA)
WTG522 (TB)
WTG523 (TC)
WTG524 (TD)
WTG525 (TE)
WTG526 (TF)
WTG527 (TG)
WTG528 (TH)
WTG529 (TI)
WTG530 (TJ)
WTG531 (TK)
WTG532 (TL)
WTG533 (TM)
WTG534 (TN)
WTG535 (TO)
WTG536 (TP)
WTG537 (TQ)
WTG538 (TR)
WTG539 (TS)
WTG540 (TT)
WTG541 (TU)
WTG542 (TV)
WTG543 (TW)
WTG544 (TX)
WTG545 (TY)
WTG546 (TZ)
WTG547 (UA)
WTG548 (UB)
WTG549 (UC)
WTG550 (UD)
WTG551 (UE)
WTG552 (UF)
WTG553 (UG)
WTG554 (UH)
WTG555 (UI)
WTG556 (UJ)
WTG557 (UK)
WTG558 (UL)
WTG559 (UM)
WTG560 (UN)
WTG561 (UO)
WTG562 (UP)
WTG563 (UQ)
WTG564 (UR)
WTG565 (US)
WTG566 (UT)
WTG567 (UU)
WTG568 (UV)
WTG569 (UW)
WTG570 (UX)
WTG571 (UY)
WTG572 (UZ)
WTG573 (VA)
WTG574 (VB)
WTG575 (VC)
WTG576 (VD)
WTG577 (VE)
WTG578 (VF)
WTG579 (VG)
WTG580 (VH)
WTG581 (VI)
WTG582 (VJ)
WTG583 (VK)
WTG584 (VL)
WTG585 (VM)
WTG586 (VN)
WTG587 (VO)
WTG588 (VP)
WTG589 (VQ)
WTG590 (VR)
WTG591 (VS)
WTG592 (VT)
WTG593 (VU)
WTG594 (VV)
WTG595 (VW)
WTG596 (VX)
WTG597 (VY)
WTG598 (VZ)
WTG599 (WA)
WTG600 (WB)
WTG601 (WC)
WTG602 (WD)
WTG603 (WE)
WTG604 (WF)
WTG605 (WG)
WTG606 (WH)
WTG607 (WI)
WTG608 (WJ)
WTG609 (WK)
WTG610 (WL)
WTG611 (WM)
WTG612 (WN)
WTG613 (WO)
WTG614 (WP)
WTG615 (WQ)
WTG616 (WR)
WTG617 (WS)
WTG618 (WT)
WTG619 (WU)
WTG620 (WV)
WTG621 (WW)
WTG622 (WX)
WTG623 (WY)
WTG624 (WZ)
WTG625 (XA)
WTG626 (XB)
WTG627 (XC)
WTG628 (XD)
WTG629 (XE)
WTG630 (XF)
WTG631 (XG)
WTG632 (XH)
WTG633 (XI)
WTG634 (XJ)
WTG635 (XK)
WTG636 (XL)
WTG637 (XM)
WTG638 (XN)
WTG639 (XO)
WTG640 (XP)
WTG641 (XQ)
WTG642 (XR)
WTG643 (XS)
WTG644 (XT)
WTG645 (XU)
WTG646 (XV)
WTG647 (XW)
WTG648 (XX)
WTG649 (XY)
WTG650 (XZ)
WTG651 (YA)
WTG652 (YB)
WTG653 (YC)
WTG654 (YD)
WTG655 (YE)
WTG656 (YF)
WTG657 (YG)
WTG658 (YH)
WTG659 (YI)
WTG660 (YJ)
WTG661 (YK)
WTG662 (YL)
WTG663 (YM)
WTG664 (YN)
WTG665 (YO)
WTG666 (YP)
WTG667 (YQ)
WTG668 (YR)
WTG669 (YS)
WTG670 (YT)
WTG671 (YU)
WTG672 (YV)
WTG673 (YW)
WTG674 (YX)
WTG675 (YY)
WTG676 (YZ)
WTG677 (ZA)
WTG678 (ZB)
WTG679 (ZC)
WTG680 (ZD)
WTG681 (ZE)
WTG682 (ZF)
WTG683 (ZG)
WTG684 (ZH)
WTG685 (ZI)
WTG686 (ZJ)
WTG687 (ZK)
WTG688 (ZL)
WTG689 (ZM)
WTG690 (ZN)
WTG691 (ZO)
WTG692 (ZP)
WTG693 (ZQ)
WTG694 (ZR)
WTG695 (ZS)
WTG696 (ZT)
WTG697 (ZU)
WTG698 (ZV)
WTG699 (ZW)
WTG700 (ZX)
WTG701 (ZY)
WTG702 (ZZ)
WTG703 (AAA)
WTG704 (AAB)
WTG705 (AAC)
WTG706 (AAD)
WTG707 (AAE)
WTG708 (AAF)
WTG709 (AAG)
WTG710 (AAH)
WTG711 (AAI)
WTG712 (AAJ)
WTG713 (AAK)
WTG714 (AAL)
WTG715 (AAM)
WTG716 (AAN)
WTG717 (AAO)
WTG718 (AAP)
WTG719 (AAQ)
WTG720 (AAR)
WTG721 (AAS)
WTG722 (AAT)
WTG723 (AAU)
WTG724 (AAV)
WTG725 (AAW)
WTG726 (AAX)
WTG727 (AAY)
WTG728 (AAZ)
WTG729 (ABA)
WTG730 (ABB)
WTG731 (ABC)
WTG732 (ABD)
WTG733 (ABE)
WTG734 (ABF)
WTG735 (ABG)
WTG736 (ABH)
WTG737 (ABI)
WTG738 (ABJ)
WTG739 (ABK)
WTG740 (ABL)
WTG741 (ABM)
WTG742 (ABN)
WTG743 (ABO)
WTG744 (ABP)
WTG745 (ABQ)
WTG746 (ABR)
WTG747 (ABS)
WTG748 (ABT)
WTG749 (ABU)
WTG750 (ABV)
WTG751 (ABW)
WTG752 (ABX)
WTG753 (ABY)
WTG754 (ABZ)
WTG755 (ACA)
WTG756 (ACB)
WTG757 (ACC)
WTG758 (ACD)
WTG759 (ACE)
WTG760 (ACF)
WTG761 (ACG)
WTG762 (ACH)
WTG763 (ACI)
WTG764 (ACJ)
WTG765 (ACK)
WTG766 (ACL)
WTG767 (ACM)
WTG768 (ACN)
WTG769 (ACO)
WTG770 (ACP)
WTG771 (ACQ)
WTG772 (ACR)
WTG773 (ACS)
WTG774 (ACT)
WTG775 (ACU)
WTG776 (ACV)
WTG777 (ACW)
WTG778 (ACX)
WTG779 (ACY)
WTG780 (ACZ)
WTG781 (ADA)
WTG782 (ADB)
WTG783 (ADC)
WTG784 (ADD)
WTG785 (ADE)
WTG786 (ADF)
WTG787 (ADG)
WTG788 (ADH)
WTG789 (ADI)
WTG790 (ADJ)
WTG791 (ADK)
WTG792 (ADL)
WTG793 (ADM)
WTG794 (ADN)
WTG795 (ADO)
WTG796 (ADP)
WTG797 (ADQ)
WTG798 (ADR)
WTG799 (ADS)
WTG800 (ADT)
WTG801 (ADU)
WTG802 (ADV)
WTG803 (ADW)
WTG804 (ADX)
WTG805 (ADY)
WTG806 (ADZ)
WTG807 (AEA)
WTG808 (AEB)
WTG809 (AEC)
WTG810 (AED)
WTG811 (AEE)
WTG812 (AEF)
WTG813 (AEG)
WTG814 (AEH)
WTG815 (AEI)
WTG816 (AEJ)
WTG817 (AEK)
WTG818 (AEL)
WTG819 (AEM)
WTG820 (AEN)
WTG821 (AEO)
WTG822 (AEP)
WTG823 (AEQ)
WTG824 (AER)
WTG825 (AES)
WTG826 (AET)
WTG827 (AEU)
WTG828 (AEV)
WTG829 (AEW)
WTG830 (AEX)
WTG831 (AEY)
WTG832 (AEZ)
WTG833 (AFA)
WTG834 (AFB)
WTG835 (AFC)
WTG836 (AFD)
WTG837 (AFE)
WTG838 (AFF)
WTG839 (AFG)
WTG840 (AFH)
WTG841 (AFI)
WTG842 (AFJ)
WTG843 (AFK)
WTG844 (AFL)
WTG845 (AFM)
WTG846 (AFN)
WTG847 (AFO)
WTG848 (AFP)
WTG849 (AFQ)
WTG850 (AFR)
WTG851 (AFS)
WTG852 (AFT)
WTG853 (AFU)
WTG854 (AFV)
WTG855 (AFW)
WTG856 (AFX)
WTG857 (AFY)
WTG858 (AFZ)
WTG859 (AGA)
WTG860 (AGB)
WTG861 (AGC)
WTG862 (AGD)
WTG863 (AGE)
WTG864 (AGF)
WTG865 (AGG)
WTG866 (AGH)
WTG867 (AGI)
WTG868 (AGJ)
WTG869 (AGK)
WTG870 (AGL)
WTG871 (AGM)
WTG872 (AGN)
WTG873 (AGO)
WTG874 (AGP)
WTG875 (AGQ)
WTG876 (AGR)
WTG877 (AGS)
WTG878 (AGT)
WTG879 (AGU)
WTG880 (AGV)
WTG881 (AGW)
WTG882 (AGX)
WTG883 (AGY)
WTG884 (AGZ)
WTG885 (AHA)
WTG886 (AHB)
WTG887 (AHC)
WTG888 (AHD)
WTG889 (AHE)
WTG890 (AHF)
WTG891 (AHG)
WTG892 (AHH)
WTG893 (AHI)
WTG894 (AHJ)
WTG895 (AHK)
WTG896 (AHL)
WTG897 (AHM)
WTG898 (AHN)
WTG899 (AHO)
WTG900 (AHP)
WTG901 (AHQ)
WTG902 (AHR)
WTG903 (AHS)
WTG904 (AHT)
WTG905 (AHU)
WTG906 (AHV)
WTG907 (AHW)
WTG908 (AHX)
WTG909 (AHY)
WTG910 (AHZ)
WTG911 (AIA)
WTG912 (AIB)
WTG913 (AIC)
WTG914 (AID)
WTG915 (AIE)
WTG916 (AIF)
WTG917 (AIG)
WTG918 (AIH)
WTG919 (AII)
WTG920 (AIJ)
WTG921 (AIK)
WTG922 (AIL)
WTG923 (AIM)
WTG924 (AIN)
WTG925 (AIO)
WTG926 (AIP)
WTG927 (AIQ)
WTG928 (AIR)
WTG929 (AIS)
WTG930 (AIT)
WTG931 (AIU)
WTG932 (AIV)
WTG933 (AIW)
WTG934 (AIX)
WTG935 (AIY)
WTG936 (AIZ)
WTG937 (AJA)
WTG938 (AJB)
WTG939 (AJC)
WTG940 (AJD)
WTG941 (AJE)
WTG942 (AJF)
WTG943 (AJG)
WTG944 (AJH)
WTG945 (AJI)
WTG946 (AJJ)
WTG947 (AJK)
WTG948 (AJL)
WTG949 (AJM)
WTG950 (AJN)
WTG951 (AJO)
WTG952 (AJP)
WTG953 (AJQ)
WTG954 (AJR)
WTG955 (AJS)
WTG956 (AJT)
WTG957 (AJU)
WTG958 (AJV)
WTG959 (AJW)
WTG960 (AJX)
WTG961 (AJY)
WTG962 (AJZ)
WTG963 (AKA)
WTG964 (AKB)
WTG965 (AKC)
WTG966 (AKD)
WTG967 (AKE)
WTG968 (AKF)
WTG969 (AKG)
WTG970 (AKH)
WTG971 (AKI)
WTG972 (AKJ)
WTG973 (AKK)
WTG974 (AKL)
WTG975 (AKM)
WTG976 (AKN)
WTG977 (AKO)
WTG978 (AKP)
WTG979 (AKQ)
WTG980 (AKR)
WTG981 (AKS)
WTG982 (AKT)
WTG983 (AKU)
WTG984 (AKV)
WTG985 (AKW)
WTG986 (AKX)
WTG987 (AKY)
WTG988 (AKZ)
WTG989 (ALA)
WTG990 (ALB)
WTG991 (ALC)
WTG992 (ALD)
WTG993 (ALE)
WTG994 (ALF)
WTG995 (ALG)
WTG996 (ALH)
WTG997 (ALI)
WTG998 (ALJ)
WTG999 (ALK)
WTG1000 (ALL)
WTG1001 (ALM)
WTG1002 (ALN)
WTG1003 (ALO)
WTG1004 (ALP)
WTG1005 (ALQ)
WTG1006 (ALR)
WTG1007 (ALS)
WTG1008 (ALT)
WTG1009 (ALU)
WTG1010 (ALV)
WTG1011 (ALW)
WTG1012 (ALX)
WTG1013 (ALY)
WTG1014 (ALZ)
WTG1015 (AMA)
WTG1016 (AMB)
WTG1017 (AMC)
WTG1018 (AMD)
WTG1019 (AME)
WTG1020 (AMF)
WTG1021 (AMG)
WTG1022 (AMH)
WTG1023 (AMI)
WTG1024 (AMJ)
WTG1025 (AMK)
WTG1026 (AML)
WTG1027 (AMM)
WTG1028 (AMN)
WTG1029 (AMO)
WTG1030 (AMP)
WTG1031 (AMQ)
WTG1032 (AMR)
WTG1033 (AMS)
WTG1034 (AMT)
WTG1035 (AMU)
WTG1036 (AMV)
WTG1037 (AMW)
WTG1038 (AMX)
WTG1039 (AMY)
WTG1040 (AMZ)
WTG1041 (ANA)
WTG1042 (ANB)
WTG1043 (ANC)
WTG1044 (AND)
WTG1045 (ANE)
WTG1046 (ANF)
WTG1047 (ANG)
WTG1048 (ANH)
WTG1049 (ANI)
WTG1050 (ANJ)
WTG1051 (ANK)
WTG1052 (ANL)
WTG1053 (ANM)
WTG1054 (ANN)
WTG1055 (ANO)
WTG1056 (ANP)
WTG1057 (ANQ)
WTG1058 (ANR)
WTG1059 (ANS)
WTG1060 (ANT)
WTG1061 (ANU)
WTG1062 (ANV)
WTG1063 (ANW)
WTG1064 (ANX)
WTG1065 (ANY)
WTG1066 (ANZ)
WTG1067 (AOA)
WTG1068 (AOB)
WTG1069 (AOC)
WTG1070 (AOD)
WTG1071 (AOE)
WTG1072 (AOF)
WTG1073 (AOG)
WTG1074 (AOH)
WTG1075 (AOI)
WTG1076 (AOJ)
WTG1077 (AOK)
WTG1078 (AOL)
WTG1079 (AOM)
WTG1080 (AON)
WTG1081 (AOO)
WTG1082 (AOP)
WTG1083 (AOQ)
WTG1084 (AOR)
WTG1085 (AOS)
WTG1086 (AOT)
WTG1087 (AOU)
WTG1088 (AOV)
WTG1089 (AOW)
WTG1090 (AOX)
WTG1091 (AOY)
WTG1092 (AOZ)
WTG1093 (APA)
WTG1094 (APB)
WTG1095 (APC)
WTG1096 (APD)
WTG1097 (APE)
WTG1098 (APF)
WTG1099 (APG)
WTG1100 (APH)
WTG1101 (API)
WTG1102 (APJ)
WTG1103 (APK)
WTG1104 (APL)
WTG1105 (APM)
WTG1106 (APN)
WTG1107 (APO)
WTG1108 (APP)
WTG1109 (APQ)
WTG1110 (APR)
WTG1111 (APS)
WTG1112 (APT)
WTG1113 (APU)
WTG1114 (APV)
WTG1115 (APW)
WTG1116 (APX)
WTG1117 (APY)
WTG1118 (APZ)
WTG1119 (AQA)
WTG1120 (AQB)
WTG1121 (AQC)
WTG1122 (AQD)
WTG1123 (AQE)
WTG1124 (AQF)
WTG1125 (AQG)
WTG1126 (AQH)
WTG1127 (AQI)
WTG1128 (AQJ)
WTG1129 (AQK)
WTG1130 (AQL)
WTG1131 (AQM)
WTG1132 (AQN)
WTG1133 (AQO)
WTG1134 (AQP)
WTG1135 (AQQ)
WTG1136 (AQR)
WTG1137 (AQS)
WTG1138 (AQT)
WTG1139 (AQU)
WTG1140 (AQV)
WTG1141 (AQW)
WTG1142 (AQX)
WTG1143 (AQY)
WTG1144 (AQZ)
WTG1145 (ARA)
WTG1146 (ARB)
WTG1147 (ARC)
WTG1148 (ARD)
WTG1149 (ARE)
WTG1150 (ARF)
WTG1151 (ARG)
WTG1152 (ARH)
WTG1153 (ARI)
WTG1154 (ARJ)
WTG1155 (ARK)
WTG1156 (ARL)
WTG1157 (ARM)
WTG1158 (ARN)
WTG1159 (ARO)
WTG1160 (ARP)
WTG1161 (ARQ)
WTG1162 (ARR)
WTG1163 (ARS)
WTG1164 (ART)
WTG1165 (ARU)
WTG1166 (ARV)
WTG1167 (ARW)
WTG1168 (ARX)
WTG1169 (ARY)
WTG1170 (ARZ)
WTG1171 (ASA)
WTG1172 (ASB)
WTG1173 (ASC)
WTG1174 (ASD)
WTG1175 (ASE)
WTG1176 (ASF)
WTG1177 (ASG)
WTG1178 (ASH)
WTG1179 (ASI)
WTG1180 (ASJ)
WTG1181 (ASK)
WTG1182 (ASL)
WTG1183 (ASM)
WTG1184 (ASN)
WTG1185 (ASO)
WTG1186 (ASP)
WTG1187 (ASQ)
WTG1188 (ASR)
WTG1189 (ASS)
WTG1190 (AST)
WTG1191 (ASU)
WTG1192 (ASV)
WTG1193 (ASW)
WTG1194 (ASX)
WTG1195 (ASY)
WTG1196 (ASZ)
WTG1197 (ATA)
WTG1198 (ATB)
WTG1199 (ATC)
WTG1200 (ATD)
WTG1201 (ATE)
WTG1202 (ATF)
WTG1203 (ATG)
WTG1204 (ATH)
WTG1205 (ATI)
WTG1206 (ATJ)
WTG1207 (ATK)
WTG1208 (ATL)
WTG1209 (ATM)
WTG1210 (ATN)
WTG1211 (ATO)
WTG1212 (ATP)
WTG1213 (ATQ)
WTG1214 (ATR)
WTG1215 (ATS)
WTG1216 (ATT)
WTG1217 (ATU)
WTG1218 (ATV)
WTG1219 (ATW)
WTG1220 (ATX)
WTG1221 (ATY)
WTG1222 (ATZ)
WTG1223 (AUA)
WTG1224 (AUB)
WTG1225 (AUC)
WTG1226 (AUD)
WTG1227 (AUE)
WTG1228 (AUF)
WTG1229 (AUG)
WTG1230 (AUH)
WTG1231 (AUI)
WTG1232 (AUJ)
WTG1233 (AUK)
WTG1234 (AUL)
WTG1235 (AUM)
WTG1236 (AUN)
WTG1237 (AUO)
WTG1238 (AUP)
WTG1239 (AUQ)
WTG1240 (AUR)
WTG1241 (AUS)
WTG1242 (AUT)
WTG1243 (AUU)
WTG1244 (AUV)
WTG1245 (AUW)
WTG1246 (AUX)
WTG1247 (AUY)
WTG1248 (AUZ)
WTG1249 (AVA)
WTG1250 (AVB)
WTG1251 (AVC)
WTG1252 (AVD)
WTG1253 (AVE)
WTG1254 (AVF)
WTG1255 (AVG)
WTG1256 (AVH)
WTG1257 (AVI)
WTG1258 (AVJ)
WTG1259 (AVK)
WTG1260 (AVL)
WTG1261 (AVM)
WTG1262 (AVN)
WTG1263 (AVO)
WTG1264 (AVP)
WTG1265 (AVQ)
WTG1266 (AVR)
WTG1267 (AVS)
WTG1268 (AVT)
WTG1269 (AVU)
WTG1270 (AVV)
WTG1271 (AVW)
WTG1272 (AVX)
WTG1273 (AVY)
WTG1274 (AVZ)
WTG1275 (AWA)
WTG1276 (AWB)
WTG1277 (AWC)
WTG1278 (AWD)
WTG1279 (AWE)
WTG1280 (AWF)
WTG1281 (AWG)
WTG1282 (AWH)
WTG1283 (AWI)
WTG1284 (AWJ)
WTG1285 (AWK)
WTG1286 (AWL)
WTG1287 (AWM)
WTG1288 (AWN)
WTG1289 (AWO)
WTG1290 (AWP)
WTG1291 (AWQ)
WTG1292 (AWR)
WTG1293 (AWS)
WTG1294 (AWT)
WTG1295 (AWU)
WTG1296 (AWV)
WTG1297 (AWW)
WTG1298 (AWX)
WTG1299 (AWY)
WTG1300 (AWZ)
WTG1301 (AXA)
WTG1302 (AXB)
WTG1303 (AXC)
WTG1304 (AXD)
WTG1305 (AXE)
WTG1306 (AXF)
WTG1307 (AXG)
WTG1308 (AXH)
WTG1309 (AXI)
WTG1310 (AXJ)
WTG1311 (AXK)
WTG1312 (AXL)
WTG1313 (AXM)
WTG1314 (AXN)
WTG1315 (AXO)
WTG1316 (AXP)
WTG1317 (AXQ)
WTG1318 (AXR)
WTG1319 (AXS)
WTG1320 (AXT)
WTG1321 (AXU)
WTG1322 (AXV)
WTG1323 (AXW)
WTG1324 (AXX)
WTG1325 (AXY)
WTG1326 (AXZ)
WTG1327 (AYA)
WTG1328 (AYB)
WTG1329 (AYC)
WTG1330 (AYD)
WTG1331 (AYE)
WTG1332 (AYF)
WTG1333 (AYG)
WTG1334 (AYH)
WTG1335 (AYI)
WTG1336 (AYJ)
WTG1337 (AYK)
WTG1338 (AYL)
WTG1339 (AYM)
WTG1340 (AYN)
WTG1341 (AYO)
WTG1342 (AYP)
WTG1343 (AYQ)
WTG1344 (AYR)
WTG1345 (AYS)
WTG1346 (AYT)
WTG1347 (AYU)
WTG1348 (AYV)
WTG1349 (AYW)
WTG1350 (AYX)
WTG1351 (AYY)
WTG1352 (AYZ)
WTG1353 (AZA)
WTG1354 (AZB)
WTG1355 (AZC)
WTG1356 (AZD)
WTG1357 (AZE)
WTG1358 (AZF)
WTG1359 (AZG)
WTG1360 (AZH)
WTG1361 (AZI)
WTG1362 (AZJ)
WTG1363 (AZK)
WTG1364 (AZL)
WTG1365 (AZM)
WTG1366 (AZN)
WTG1367 (AZO)
WTG1368 (AZP)
WTG1369 (AZQ)
WTG1370 (AZR)
WTG1371 (AZS)
WTG1372 (AZT)
WTG1373 (AZU)
WTG1374 (AZV)
WTG1375 (AZW)
WTG1376 (AZX)
WTG1377 (AZY)
WTG1378 (AZZ)
WTG1379 (BAA)
WTG1380 (BAB)
WTG1381 (BAC)
WTG1382 (BAD)
WTG1383 (BAE)
WTG1384 (BAF)
WTG1385 (BAG)
WTG1386 (BAH)
WTG1387 (BAI)
WTG1388 (BAJ)
WTG1389 (BAK)
WTG1390 (BAL)
WTG1391 (BAM)
WTG1392 (BAN)
WTG1393 (BAO)
WTG1394 (BAP)
WTG1395 (BAQ)
WTG1396 (BAR)
WTG1397 (BAS)
WTG1398 (BAT)
WTG1399 (BAU)
WTG1400 (BAV)
WTG1401 (BAW)
WTG1402 (BAX)
WTG1403 (BAY)
WTG1404 (BAZ)
WTG1405 (BBA)
WTG1406 (BBB)
WTG1407 (BBC)
WTG1408 (BBD)
WTG1409 (BBE)
WTG1410 (BBF)
WTG1411 (BBG)
WTG1412 (BBH)
WTG1413 (BBI)
WTG1414 (BBJ)
WTG1415 (BBK)
WTG1416 (BBL)
WTG1417 (BBM)
WTG1418 (BBN)
WTG1419 (BBO)
WTG1420 (BBP)
WTG1421 (BBQ)
WTG1422 (BBR)
WTG1423 (BBS)
WTG1424 (BBT)
WTG1425 (BBU)
WTG1426 (BBV)
WTG1427 (BBW)
WTG1428 (BBX)
WTG1429 (BBY)
WTG1430 (BBZ)
WTG1431 (BCA)
WTG1432 (BCB)
WTG1433 (BCC)
WTG1434 (BCD)
WTG1435 (BCE)
WTG1436


WTG-9-1
WTG-9-2
WTG-9-3
WTG-9-4
WTG-9-5
WTG-9-6
WTG-9-7
WTG-8-1
WTG-8-2
WTG-8-3
WTG-8-4
WTG-8-5
WTG-8-6
WTG-7-1
WTG-7-2
WTG-7-3
WTG-7-4
WTG-7-5
WTG-7-6
WTG-6-1
WTG-6-2
WTG-6-3
WTG-6-4
WTG-6-5
WTG-6-6
WTG-5-1
WTG-5-2
WTG-5-3
WTG-5-4
WTG-5-5
Spare WTG-5-6
OSS-2
OSS-1
Wrotte (D)
Wrotte (E)
WTG-A (D)
WTG-A (E)
TLB.10
TLB.11
TLB.12
TLB.13
TLB.6
TLB.5
TLC.1
TLC.2
TLC.3
TLC.4
TLC.5
TLC.6
TLC.7
TLC.8
TLC.9
TLC.10
TLC.11
TLC.12
TLC.13
TLC.14
TLC.15
TLC.16
TLC.17
TLC.18
TLC.19
TLC.20
TLC.21
TLC.22
TLC.23
TLC.24
TLC.25
TLC.26
TLC.27
TLC.28
TLC.29
TLC.30
TLC.31
TLC.32
TLC.33
TLC.34
TLC.35
TLC.36
TLC.37
TLC.38
TLC.39
TLC.40
TLC.41
TLC.42
TLC.43
TLC.44
TLC.45
TLC.46
TLC.47
TLC.48
TLC.49
TLC.50
TLC.51
TLC.52
TLC.53
TLC.54
TLC.55
TLC.56
TLC.57
TLC.58
TLC.59
TLC.60
TLC.61
TLC.62
TLC.63
TLC.64
TLC.65
TLC.66
TLC.67
TLC.68
TLC.69
TLC.70
TLC.71
TLC.72
TLC.73
TLC.74
TLC.75
TLC.76
TLC.77
TLC.78
TLC.79
TLC.80
TLC.81
TLC.82
TLC.83
TLC.84
TLC.85
TLC.86
TLC.87
TLC.88
TLC.89
TLC.90
TLC.91
TLC.92
TLC.93
TLC.94
TLC.95
TLC.96
TLC.97
TLC.98
TLC.99
TLC.100
TLC.101
TLC.102
TLC.103
TLC.104
TLC.105
TLC.106
TLC.107
TLC.108
TLC.109
TLC.110
TLC.111
TLC.112
TLC.113
TLC.114
TLC.115
TLC.116
TLC.117
TLC.118
TLC.119
TLC.120
TLC.121
TLC.122
TLC.123
TLC.124
TLC.125
TLC.126
TLC.127
TLC.128
TLC.129
TLC.130
TLC.131
TLC.132
TLC.133
TLC.134
TLC.135
TLC.136
TLC.137
TLC.138
TLC.139
TLC.140
TLC.141
TLC.142
TLC.143
TLC.144
TLC.145
TLC.146
TLC.147
TLC.148
TLC.149
TLC.150
TLC.151
TLC.152
TLC.153
TLC.154
TLC.155
TLC.156
TLC.157
TLC.158
TLC.159
TLC.160
TLC.161
TLC.162
TLC.163
TLC.164
TLC.165
TLC.166
TLC.167
TLC.168
TLC.169
TLC.170
TLC.171
TLC.172
TLC.173
TLC.174
TLC.175
TLC.176
TLC.177
TLC.178
TLC.179
TLC.180
TLC.181
TLC.182
TLC.183
TLC.184
TLC.185
TLC.186
TLC.187
TLC.188
TLC.189
TLC.190
TLC.191
TLC.192
TLC.193
TLC.194
TLC.195
TLC.196
TLC.197
TLC.198
TLC.199
TLC.200
TLC.201
TLC.202
TLC.203
TLC.204
TLC.205
TLC.206
TLC.207
TLC.208
TLC.209
TLC.210
TLC.211
TLC.212
TLC.213
TLC.214
TLC.215
TLC.216
TLC.217
TLC.218
TLC.219
TLC.220
TLC.221
TLC.222
TLC.223
TLC.224
TLC.225
TLC.226
TLC.227
TLC.228
TLC.229
TLC.230
TLC.231
TLC.232
TLC.233
TLC.234
TLC.235
TLC.236
TLC.237
TLC.238
TLC.239
TLC.240
TLC.241
TLC.242
TLC.243
TLC.244
TLC.245
TLC.246
TLC.247
TLC.248
TLC.249
TLC.250
TLC.251
TLC.252
TLC.253
TLC.254
TLC.255
TLC.256
TLC.257
TLC.258
TLC.259
TLC.260
TLC.261
TLC.262
TLC.263
TLC.264
TLC.265
TLC.266
TLC.267
TLC.268
TLC.269
TLC.270
TLC.271
TLC.272
TLC.273
TLC.274
TLC.275
TLC.276
TLC.277
TLC.278
TLC.279
TLC.280
TLC.281
TLC.282
TLC.283
TLC.284
TLC.285
TLC.286
TLC.287
TLC.288
TLC.289
TLC.290
TLC.291
TLC.292
TLC.293
TLC.294
TLC.295
TLC.296
TLC.297
TLC.298
TLC.299
TLC.300
TLC.301
TLC.302
TLC.303
TLC.304
TLC.305
TLC.306
TLC.307
TLC.308
TLC.309
TLC.310
TLC.311
TLC.312
TLC.313
TLC.314
TLC.315
TLC.316
TLC.317
TLC.318
TLC.319
TLC.320
TLC.321
TLC.322
TLC.323
TLC.324
TLC.325
TLC.326
TLC.327
TLC.328
TLC.329
TLC.330
TLC.331
TLC.332
TLC.333
TLC.334
TLC.335
TLC.336
TLC.337
TLC.338
TLC.339
TLC.340
TLC.341
TLC.342
TLC.343
TLC.344
TLC.345
TLC.346
TLC.347
TLC.348
TLC.349
TLC.350
TLC.351
TLC.352
TLC.353
TLC.354
TLC.355
TLC.356
TLC.357
TLC.358
TLC.359
TLC.360
TLC.361
TLC.362
TLC.363
TLC.364
TLC.365
TLC.366
TLC.367
TLC.368
TLC.369
TLC.370
TLC.371
TLC.372
TLC.373
TLC.374
TLC.375
TLC.376
TLC.377
TLC.378
TLC.379
TLC.380
TLC.381
TLC.382
TLC.383
TLC.384
TLC.385
TLC.386
TLC.387
TLC.388
TLC.389
TLC.390
TLC.391
TLC.392
TLC.393
TLC.394
TLC.395
TLC.396
TLC.397
TLC.398
TLC.399
TLC.400
TLC.401
TLC.402
TLC.403
TLC.404
TLC.405
TLC.406
TLC.407
TLC.408
TLC.409
TLC.410
TLC.411
TLC.412
TLC.413
TLC.414
TLC.415
TLC.416
TLC.417
TLC.418
TLC.419
TLC.420
TLC.421
TLC.422
TLC.423
TLC.424
TLC.425
TLC.426
TLC.427
TLC.428
TLC.429
TLC.430
TLC.431
TLC.432
TLC.433
TLC.434
TLC.435
TLC.436
TLC.437
TLC.438
TLC.439
TLC.440
TLC.441
TLC.442
TLC.443
TLC.444
TLC.445
TLC.446
TLC.447
TLC.448
TLC.449
TLC.450
TLC.451
TLC.452
TLC.453
TLC.454
TLC.455
TLC.456
TLC.457
TLC.458
TLC.459
TLC.460
TLC.461
TLC.462
TLC.463
TLC.464
TLC.465
TLC.466
TLC.467
TLC.468
TLC.469
TLC.470
TLC.471
TLC.472
TLC.473
TLC.474
TLC.475
TLC.476
TLC.477
TLC.478
TLC.479
TLC.480
TLC.481
TLC.482
TLC.483
TLC.484
TLC.485
TLC.486
TLC.487
TLC.488
TLC.489
TLC.490
TLC.491
TLC.492
TLC.493
TLC.494
TLC.495
TLC.496
TLC.497
TLC.498
TLC.499
TLC.500
TLC.501
TLC.502
TLC.503
TLC.504
TLC.505
TLC.506
TLC.507
TLC.508
TLC.509
TLC.510
TLC.511
TLC.512
TLC.513
TLC.514
TLC.515
TLC.516
TLC.517
TLC.518
TLC.519
TLC.520
TLC.521
TLC.522
TLC.523
TLC.524
TLC.525
TLC.526
TLC.527
TLC.528
TLC.529
TLC.530
TLC.531
TLC.532
TLC.533
TLC.534
TLC.535
TLC.536
TLC.537
TLC.538
TLC.539
TLC.540
TLC.541
TLC.542
TLC.543
TLC.544
TLC.545
TLC.546
TLC.547
TLC.548
TLC.549
TLC.550
TLC.551
TLC.552
TLC.553
TLC.554
TLC.555
TLC.556
TLC.557
TLC.558
TLC.559
TLC.560
TLC.561
TLC.562
TLC.563
TLC.564
TLC.565
TLC.566
TLC.567
TLC.568
TLC.569
TLC.570
TLC.571
TLC.572
TLC.573
TLC.574
TLC.575
TLC.576
TLC.577
TLC.578
TLC.579
TLC.580
TLC.581
TLC.582
TLC.583
TLC.584
TLC.585
TLC.586
TLC.587
TLC.588
TLC.589
TLC.590
TLC.591
TLC.592
TLC.593
TLC.594
TLC.595
TLC.596
TLC.597
TLC.598
TLC.599
TLC.600
TLC.601
TLC.602
TLC.603
TLC.604
TLC.605
TLC.606
TLC.607
TLC.608
TLC.609
TLC.610
TLC.611
TLC.612
TLC.613
TLC.614
TLC.615
TLC.616
TLC.617
TLC.618
TLC.619
TLC.620
TLC.621
TLC.622
TLC.623
TLC.624
TLC.625
TLC.626
TLC.627
TLC.628
TLC.629
TLC.630
TLC.631
TLC.632
TLC.633
TLC.634
TLC.635
TLC.636
TLC.637
TLC.638
TLC.639
TLC.640
TLC.641
TLC.642
TLC.643
TLC.644
TLC.645
TLC.646
TLC.647
TLC.648
TLC.649
TLC.650
TLC.651
TLC.652
TLC.653
TLC.654
TLC.655
TLC.656
TLC.657
TLC.658
TLC.659
TLC.660
TLC.661
TLC.662
TLC.663
TLC.664
TLC.665
TLC.666
TLC.667
TLC.668
TLC.669
TLC.670
TLC.671
TLC.672
TLC.673
TLC.674
TLC.675
TLC.676
TLC.677
TLC.678
TLC.679
TLC.680
TLC.681
TLC.682
TLC.683
TLC.684
TLC.685
TLC.686
TLC.687
TLC.688
TLC.689
TLC.690
TLC.691
TLC.692
TLC.693
TLC.694
TLC.695
TLC.696
TLC.697
TLC.698
TLC.699
TLC.700
TLC.701
TLC.702
TLC.703
TLC.704
TLC.705
TLC.706
TLC.707
TLC.708
TLC.709
TLC.710
TLC.711
TLC.712
TLC.713
TLC.714
TLC.715
TLC.716
TLC.717
TLC.718
TLC.719
TLC.720
TLC.721
TLC.722
TLC.723
TLC.724
TLC.725
TLC.726
TLC.727
TLC.728
TLC.729
TLC.730
TLC.731
TLC.732
TLC.733
TLC.734
TLC.735
TLC.736
TLC.737
TLC.738
TLC.739
TLC.740
TLC.741
TLC.742
TLC.743
TLC.744
TLC.745
TLC.746
TLC.747
TLC.748
TLC.749
TLC.750
TLC.751
TLC.752
TLC.753
TLC.754
TLC.755
TLC.756
TLC.757
TLC.758
TLC.759
TLC.760
TLC.761
TLC.762
TLC.763
TLC.764
TLC.765
TLC.766
TLC.767
TLC.768
TLC.769
TLC.770
TLC.771
TLC.772
TLC.773
TLC.774
TLC.775
TLC.776
TLC.777
TLC.778
TLC.779
TLC.780
TLC.781
TLC.782
TLC.783
TLC.784
TLC.785
TLC.786
TLC.787
TLC.788
TLC.789
TLC.790
TLC.791
TLC.792
TLC.793
TLC.794
TLC.795
TLC.796
TLC.797
TLC.798
TLC.799
TLC.800
TLC.801
TLC.802
TLC.803
TLC.804
TLC.805
TLC.806
TLC.807
TLC.808
TLC.809
TLC.810
TLC.811
TLC.812
TLC.813
TLC.814
TLC.815
TLC.816
TLC.817
TLC.818
TLC.819
TLC.820
TLC.821
TLC.822
TLC.823
TLC.824
TLC.825
TLC.826
TLC.827
TLC.828
TLC.829
TLC.830
TLC.831
TLC.832
TLC.833
TLC.834
TLC.835
TLC.836
TLC.837
TLC.838
TLC.839
TLC.840
TLC.841
TLC.842
TLC.843
TLC.844
TLC.845
TLC.846
TLC.847
TLC.848
TLC.849
TLC.850
TLC.851
TLC.852
TLC.853
TLC.854
TLC.855
TLC.856
TLC.857
TLC.858
TLC.859
TLC.860
TLC.861
TLC.862
TLC.863
TLC.864
TLC.865
TLC.866
TLC.867
TLC.868
TLC.869
TLC.870
TLC.871
TLC.872
TLC.873
TLC.874
TLC.875
TLC.876
TLC.877
TLC.878
TLC.879
TLC.880
TLC.881
TLC.882
TLC.883
TLC.884
TLC.885
TLC.886
TLC.887
TLC.888
TLC.889
TLC.890
TLC.891
TLC.892
TLC.893
TLC.894
TLC.895
TLC.896
TLC.897
TLC.898
TLC.899
TLC.900
TLC.901
TLC.902
TLC.903
TLC.904
TLC.905
TLC.906
TLC.907
TLC.908
TLC.909
TLC.910
TLC.911
TLC.912
TLC.913
TLC.914
TLC.915
TLC.916
TLC.917
TLC.918
TLC.919
TLC.920
TLC.921
TLC.922
TLC.923
TLC.924
TLC.925
TLC.926
TLC.927
TLC.928
TLC.929
TLC.930
TLC.931
TLC.932
TLC.933
TLC.934
TLC.935
TLC.936
TLC.937
TLC.938
TLC.939
TLC.940
TLC.941
TLC.942
TLC.943
TLC.944
TLC.945
TLC.946
TLC.947
TLC.948
TLC.949
TLC.950
TLC.951
TLC.952
TLC.953
TLC.954
TLC.955
TLC.956
TLC.957
TLC.958
TLC.959
TLC.960
TLC.961
TLC.962
TLC.963
TLC.964
TLC.965
TLC.966
TLC.967
TLC.968
TLC.969
TLC.970
TLC.971
TLC.972
TLC.973
TLC.974
TLC.975
TLC.976
TLC.977
TLC.978
TLC.979
TLC.980
TLC.981
TLC.982
TLC.983
TLC.984
TLC.985
TLC.986
TLC.987
TLC.988
TLC.989
TLC.990
TLC.991
TLC.992
TLC.993
TLC.994
TLC.995
TLC.996
TLC.997
TLC.998
TLC.999
TLC.1000
TLC.1001
TLC.1002
TLC.1003
TLC.1004
TLC.1005
TLC.1006
TLC.1007
TLC.1008
TLC.1009
TLC.1010
TLC.1011
TLC.1012
TLC.1013
TLC.1014
TLC.1015
TLC.1016
TLC.1017
TLC.1018
TLC.1019
TLC.1020
TLC.1021
TLC.1022
TLC.1023
TLC.1024
TLC.1025
TLC.1026
TLC.1027
TLC.1028
TLC.1029
TLC.1030
TLC.1031
TLC.1032
TLC.1033
TLC.1034
TLC.1035
TLC.1036
TLC.1037
TLC.1038
TLC.1039
TLC.1040
TLC.1041
TLC.1042
TLC.1043
TLC.1044
TLC.1045
TLC.1046
TLC.1047
TLC.1048
TLC.1049
TLC.1050
TLC.1051
TLC.1052
TLC.1053
TLC.1054
TLC.1055
TLC.1056
TLC.1057
TLC.1058
TLC.1059
TLC.1060
TLC.1061
TLC.1062
TLC.1063
TLC.1064
TLC.1065
TLC.1066
TLC.1067
TLC.1068
TLC.1069
TLC.1070
TLC.1071
TLC.1072
TLC.1073
TLC.1074
TLC.1075
TLC.1076
TLC.1077
TLC.1078
TLC.1079
TLC.1080
TLC.1081
TLC.1082
TLC.1083
TLC.1084
TLC.1085
TLC.1086
TLC.1087
TLC.1088
TLC.1089
TLC.1090
TLC.1091
TLC.1092
TLC.1093
TLC.1094
TLC.1095
TLC.1096
TLC.1097
TLC.1098
TLC.1099
TLC.1100
TLC.1101
TLC.1102
TLC.1103
TLC.1104
TLC.1105
TLC.1106
TLC.1107
TLC.1108
TLC.1109
TLC.1110
TLC.1111
TLC.1112
TLC.1113
TLC.1114
TLC.1115
TLC.1116
TLC.1117
TLC.1118
TLC.1119
TLC.1120
TLC.1121
TLC.1122
TLC.1123
TLC.1124
TLC.1125
TLC.1126
TLC.1127
TLC.1128
TLC.1129
TLC.1130
TLC.1131
TLC.1132
TLC.1133
TLC.1134
TLC.1135
TLC.1136
TLC.1137
TLC.1138
TLC.1139
TLC.1140
TLC.1141
TLC.1142
TLC.1143
TLC.1144
TLC.1145
TLC.1146
TLC.1147
TLC.1148
TLC.1149
TLC.1150
TLC.1151
TLC.1152
TLC.1153
TLC.1154
TLC.1155
TLC.1156
TLC.1157
TLC.1158
TLC.1159
TLC.1160
TLC.1161
TLC.1162
TLC.1163
TLC.1164
TLC.1165
TLC.1166
TLC.1167
TLC.1168
TLC.1169
TLC.1170
TLC.1171
TLC.1172
TLC.1173
TLC.1174
TLC.1175
TLC.1176
TLC.1177
TLC.1178
TLC.1179
TLC.1180
TLC.1181
TLC.1182
TLC.1183
TLC.1184
TLC.1185
TLC.1186
TLC.1187
TLC.1188
TLC.1189
TLC.1190
TLC.1191
TLC.1192
TLC.1193
TLC.1194
TLC.1195
TLC.1196
TLC.1197
TLC.1198
TLC.1199
TLC.1200
TLC.1201
TLC.1202
TLC.1203
TLC.1204
TLC.1205
TLC.1206
TLC.1207
TLC.1208
TLC.1209
TLC.1210
TLC.1211
TLC.1212
TLC.1213
TLC.1214
TLC.1215
TLC.1216
TLC.1217
TLC.1218
TLC.1219
TLC.1220
TLC.1221
TLC.1222
TLC.1223
TLC.1224
TLC.1225
TLC.1226
TLC.1227
TLC.1228
TLC.1229
TLC.1230
TLC.1231
TLC.1232
TLC.1233
TLC.1234
TLC.1235
TLC.1236
TLC.1237
TLC.1238
TLC.1239
TLC.1240
TLC.1241
TLC.1242
TLC.1243
TLC.1244
TLC.1245
TLC.1246
TLC.1247
TLC.1248
TLC.1249
TLC.1250
TLC.1251
TLC.1252
TLC.1253
TLC.1254
TLC.1255
TLC.1256
TLC.1257
TLC.1258
TLC.1259
TLC.1260
TLC.1261
TLC.1262
TLC.1263
TLC.1264
TLC.1265
TLC.1266
TLC.1267
TLC.1268
TLC.1269
TLC.1270
TLC.1271
TLC.1272
TLC.1273
TLC.1274
TLC.1275
TLC.1276
TLC.1277
TLC.1278
TLC.1279
TLC.1280
TLC.1281
TLC.1282
TLC.1283
TLC.1284
TLC.1285
TLC.1286
TLC.1287
TLC.1288
TLC.1289
TLC.1290
TLC.1291
TLC.1292
TLC.1293
TLC.1294
TLC.1295
TLC.1296
TLC.1297
TLC.1298
TLC.1299
TLC.1300
TLC.1301
TLC.1302
TLC.1303
TLC.1304
TLC.1305
TLC.1306
TLC.1307
TLC.1308
TLC.1309
TLC.1310
TLC.1311
TLC.1312
TLC.1313
TLC.1314
TLC.1315
TLC.1316
TLC.1317
TLC.1318
TLC.1319
TLC.1320
TLC.1321
TLC.1322
TLC.1323
TLC.1324
TLC.1325
TLC.1326
TLC.1327
TLC.1328
TLC.1329
TLC.1330
TLC.1331
TLC.1332
TLC.1333
TLC.1334
TLC.1335
TLC.1336
TLC.1337
TLC.1338
TLC.1339
TLC.1340
TLC.1341
TLC.1342
TLC.1343
TLC.1344
TLC.1345
TLC.1346
TLC.1347
TLC.1348
TLC.1349
TLC.1350
TLC.1351
TLC.1352
TLC.1353
TLC.1354
TLC.1355
TLC.1356
TLC.1357
TLC.1358
TLC.1359
TLC.1360
TLC.1361
TLC.1362
TLC.1363
TLC.1364
TLC.1365
TLC.1366
TLC.1367
TLC.1368
TLC.1369
TLC.1370
TLC.1371
TLC.1372
TLC.1373
TLC.1374
TLC.1375
TLC.1376
TLC.1377
TLC.1378
TLC.1379
TLC.1380
TLC.1381
TLC.1382
TLC.1383
TLC.1384
TLC.1385
TLC.1386
TLC.1387
TLC.1388
TLC.1389
TLC.1390
TLC.1391
TLC.1392
TLC.1393
TLC.1394
TLC.1395
TLC.1396
TLC.1397
TLC.1398
TLC.1399
TLC.1400
TLC.1401
TLC.1402
TLC.1403
TLC.1404
TLC.1405
TLC.1406
TLC.1407
TLC.1408
TLC.1409
TLC.1410
TLC.1411
TLC.1412
TLC.1413
TLC.1414
TLC.1415
TLC.1416
TLC.1417
TLC.1418
TLC.1419
TLC.1420
TLC.1421
TLC.1422
TLC.1423
TLC.1424
TLC.1425
TLC.1426
TLC.1427
TLC.1428
TLC.1429
TLC.1430
TLC.1431
TLC.1432
TLC.1433
TLC.1434
TLC.1435
TLC.1436
TLC.1437
TLC.1438
TLC.1439
TLC.1440
TLC.1441
TLC.1442
TLC.1443
TLC.1444
TLC.1445
TLC.1446
TLC.1447
TLC.1448
TLC.1449
TLC.1450
TLC.1451
TLC.1452
TLC.1453
TLC.1454
TLC.1455
TLC.1456
TLC.1457
TLC.1458
TLC.1459
TLC.1460
TLC.1461
TLC.1462
TLC.1463
TLC.1464
TLC.1465
TLC.1466
TLC.1467
TLC.1468
TLC.1469
TLC.1470
TLC.1471
TLC.1472
TLC.1473
TLC.1474
TLC.1475
TLC.1476
TLC.1477
TLC.1478
TLC.1479
TLC.1480
TLC.1481
TLC.1482
TLC.1483
TLC.1484
TLC.1485
TLC.1486
TLC.1487
TLC.1488
TLC.1489
TLC.1490
TLC.1491
TLC.1492
TLC.1493
TLC.1494
TLC.1495
TLC.1496
TLC.1497
TLC.1498
TLC.1499
TLC.1500
TLC.1501
TLC.1502
TLC.1503
TLC.1504
TLC.1505
TLC.1506
TLC.1507
TLC.1508
TLC.1509
TLC.1510
TLC.1511
TLC.1512
TLC.1513
TLC.1514
TLC.1515
TLC.1516
TLC.1517
TLC.1518
TLC.1519
TLC.1520
TLC.1521
TLC.1522
TLC.1523
TLC.1524
TLC.1525
TLC.1526
TLC.1527
TLC.1528
TLC.1529
TLC.1530
TLC.1531
TLC.1532
TLC.1533
TLC.1534
TLC.1535
TLC.1536
TLC.1537
TLC.1538
TLC.1539
TLC.1540
TLC.1541
TLC.1542
TLC.1543
TLC.1544
TLC.1545
TLC.1546
TLC.1547
TLC.1548
TLC.1549
TLC.1550
TLC.1551
TLC.1552
TLC.1553
TLC.1554
TLC.1555
TLC.1556
TLC.1557
TLC.1558
TLC.1559
TLC.1560
TLC.1561
TLC.1562
TLC.1563
TLC.1564
TLC.1565
TLC.1566
TLC.1567
TLC.1568
TLC.1569
TLC.1570
TLC.1571
TLC.1572
TLC.1573
TLC.1574
TLC.1575
TLC.1576
TLC.1577
TLC.1578
TLC.1579
TLC.1580
TLC.1581
TLC.1582
TLC.1583
TLC.1584
TLC.1585
TLC.1586
TLC.1587
TLC.1588
TLC.1589
TLC.1590
TLC.1591
TLC.1592
TLC.1593
TLC.1594
TLC.1595
TLC.1596
TLC.1597
TLC.1598
TLC.1599
TLC.1600
TLC.1601
TLC.1602
TLC.1603
TLC.1604
TLC.1605
TLC.1606
TLC.1607
TLC.1608
TLC.1609
TLC.1610
TLC.1611
TLC.1612
TLC.1613
TLC.1614
TLC.1615
TLC.1616
TLC.1617
TLC.1618
TLC.1619
TLC.1620
TLC.1621
TLC.1622
TLC.1623
TLC.1624
TLC.1625
TLC.1626
TLC.1627
TLC.1628
TLC.1629
TLC.1630
TLC.1631
TLC.1632
TLC.1633
TLC.1634
TLC.1635
TLC.1636
TLC.1637
TLC.1638
TLC.1639
TLC.1640
TLC.1641
TLC.1642
TLC.1643
TLC.1644
TLC.1645
TLC.1646
TLC.1647
TLC.1648
TLC.1649
TLC.1650
TLC.1651
TLC.1652
TLC.1653
TLC.1654
TLC.1655
TLC.1656
TLC.1657
TLC.1658
TLC.1659
TLC.1660
TLC.1661
TLC.1662
TLC.1663
TLC.1664
TLC.1665
TLC.1666
TLC.1667
TLC.1668
TLC.1669
TLC.1670
TLC.1671
TLC.1672
TLC.1673
TLC.1674
TLC.1675
TLC.1676
TLC.1677
TLC.1678
TLC.1679
TLC.1680
TLC.1681
TLC.1682
TLC.1683
TLC.1684
TLC.1685
TLC.1686
TLC.1687
TLC.1688
TLC.1689
TLC.1690
TLC.1691
TLC.1692
TLC.1693
TLC.1694
TLC.1695
TLC.1696
TLC.1697
TLC.1698
TLC.1699
TLC.1700
TLC.1701
TLC.1702
TLC.1703
TLC.1704
TLC.1705
TLC.1706
TLC.1707
TLC.1708
TLC.1709
TLC.1710
TLC.1711
TLC.1712
TLC.1713
TLC.1714
TLC.1715
TLC.1716
TLC.1717
TLC.1718
TLC.1719
TLC.1720
TLC.1721
TLC.1722
TLC.1723
TLC.1724
TLC.1725
TLC.1726
TLC.1727
TLC.1728
TLC.1729
TLC.1730
TLC.1731
TLC.1732
TLC.1733
TLC.1734
TLC.1735
TLC.1736
TLC.1737
TLC.1738
TLC.1739
TLC.1740
TLC.1741
TLC.1742
TLC.1743
TLC.1744
TLC.1745
TLC.1746
TLC.1747
TLC.1748
TLC.1749
TLC.1750
TLC.1751
TLC.1752
TLC.1753
TLC.1754
TLC.1755
TLC.1756
TLC.1757
TLC.1758
TLC.1759
TLC.1760
TLC.1761
TLC.1762
TLC.1763
TLC.1764
TLC.1765
TLC.1766
TLC.1767
TLC.1768
TLC.1769
TLC.1770
TLC.1771
TLC.1772
TLC.1773
TLC.1774
TLC.1775
TLC.1776
TLC.1777
TLC.1778
TLC.1779
TLC.1780
TLC.1781
TLC.1782
TLC.1783
TLC.1784
TLC.1785
TLC.1786
TLC.1787
TLC.1788
TLC.1789
TLC.1790
TLC.1791
TLC.1792
TLC.1793
TLC.1794
TLC.1795
TLC.1796
TLC.1797
TLC.1798
TLC.1799
TLC.1800
TLC.1801
TLC.1802
TLC.1803
TLC.1804
TLC.1805
TLC.1806
TLC.1807
TLC.1808
TLC.1809
TLC.1810
TLC.1811
TLC.1812
TLC.1813
TLC.1814
TLC.1815
TLC.1816
TLC.1817
TLC.1818
TLC.1819
TLC.1820
TLC.1821
TLC.1822
TLC.1823
TLC.1824
TLC.1825
TLC.1826
TLC.1827
TLC.1828
TLC.1829
TLC.1830
TLC.1831
TLC.1832
TLC.1833
TLC.1834
TLC.1835
TLC.1836
TLC.1837
TLC.1838
TLC.1839
TLC.1840
TLC.1841
TLC.1842
TLC.1843
TLC.1844
TLC.1845
TLC.1846
TLC.1847
TLC.1848
TLC.1849
TLC.1850
TLC.1851
TLC.1852
TLC.1853
TLC.1854
TLC.1855
TLC.1856
TLC.1857
TLC.1858
TLC.1859
TLC.1860
TLC.1861
TLC.1862
TLC.1863
TLC.1864
TLC.1865
TLC.1866
TLC.1867
TLC.1868
TLC.1869
TLC.1870
TLC.1871
TLC.1872
TLC.1873
TLC.1874
TLC.1875
TLC.1876
TLC.1877
TLC.1878
TLC.1879
TLC.1880
TLC.1881
TLC.1882
TLC.1883
TLC.1884
TLC.1885
TLC.1886
TLC.1887
TLC.1888
TLC.1889
TLC.1890
TLC.1891
TLC.1892
TLC.1893
TLC.1894
TLC.1895
TLC.1896
TLC.1897
TLC.1898
TLC.1899
TLC.1900
TLC.1901
TLC.1902
TLC.1903
TLC.1904
TLC.1905
TLC.1906
TLC.1907
TLC.1908
TLC.1909
TLC.1910
TLC.1911
TLC.1912
TLC.1913
TLC.1914
TLC.1915
TLC.1916
TLC.1917
TLC.1918
TLC.1919
TLC.1920
TLC.1921
TLC.1922
TLC.1923
TLC.1924
TLC.1925
TLC.1926
TLC.1927
TLC.1928
TLC.1929
TLC.1930
TLC.1931
TLC.1932
TLC.1933
TLC.1934
TLC.1935
TLC.1936
TLC.1937
TLC.1938
TLC.1939
TLC.1940
TLC.1941
TLC.1942
TLC.1943
TLC.1944
TLC.1945
TLC.1946
TLC.1947
TLC.1948
TLC.1949
TLC.1950
TLC.1951
TLC.1952
TLC.1953
TLC.1954
TLC.1955
TLC.1956
TLC.1957
TLC.1958
TLC.1959
TLC.1960
TLC.1961
TLC.1962
TLC.1963
TLC.1964
TLC.1965
TLC.1966
TLC.1967
TLC.1968
TLC.1969
TLC.1970
TLC.1971
TLC.1972
TLC.1973
TLC.1974
TLC.1975
TLC.1976
TLC.1977
TLC.1978
TLC.1979
TLC.1980
TLC.1981
TLC.1982
TLC.1983
TLC.1984
TLC.1985
TLC.1986
TLC.1987
TLC.1988
TLC.1989
TLC.1990
TLC.1991
TLC.1992
TLC.1993
TLC.1994
TLC.1995
TLC.1996
TLC.1997
TLC.1998
TLC.1999
TLC.2000
TLC.2001
TLC.2002
TLC.2003
TLC.2004
TLC.2005
TLC.2006
TLC.2007
TLC.2008
TLC.2009
TLC.2010
TLC.2011
TLC.2012
TLC.2013
TLC.2014
TLC.2015
TLC.2016
TLC.2017
TLC.2018
TLC.2019
TLC.2020
TLC.2021
TLC.2022
TLC.2023
TLC.2024
TLC.2025
TLC.2026
TLC.2027
TLC.2028
TLC.2029
TLC.2030
TLC.2031
TLC.2032
TLC.2033
TLC.2034
TLC.2035
TLC.2036
TLC.2037
TLC.2038
TLC.2039
TLC.2040
TLC.2041
TLC.2042
TLC.2043
TLC.2044
TLC.2045
TLC.2046
TLC.2047
TLC.2048
TLC.2049
TLC.2050
TLC.2051
TLC.2052
TLC.2053
TLC.2054
TLC.2055
TLC.2056
TLC.2057
TLC.2058
TLC.2059
TLC.2060
TLC.2061
TLC.2062
TLC.2063
TLC.2064
TLC.2065
TLC.2066
TLC.2067
TLC.2068
TLC.2069
TLC.2070
TLC.2071
TLC.2072
TLC.2073
TLC.2074
TLC.2075
TLC.2076
TLC.2077
TLC.2078
TLC.2079
TLC.2080
TLC.2081
TLC.2082
TLC.2083
TLC.2084
TLC.2085
TLC.2086
TLC.2087
TLC.2088
TLC.2089
TLC.2090
TLC.2091
TLC.2092
TLC.2093
TLC.2094
TLC.2095
TLC.2096
TLC.2097
TLC.2098
TLC.2099
TLC.2100
TLC.2101
TLC.2102
TLC.2103
TLC.2104
TLC.2105
TLC.2106
TLC.2107
TLC.2108
TLC.2109
TLC.2110
TLC.2111
TLC.2112
TLC.2113
TLC.2114
TLC.2115
TLC.2116
TLC.2117
TLC.2118
TLC.2119
TLC.2120
TLC.2121
TLC.2122
TLC.2123
TLC.2124
TLC.2125
TLC.2126
TLC.2127
TLC.2128
TLC.2129
TLC.2130
TLC.2131
TLC.2132
TLC.2133
TLC.2134
TLC.2135
TLC.2136
TLC.2137
TLC.2138
TLC.2139
TLC.2140
TLC.2141
TLC.2142
TLC.2143
TLC.2144
TLC.2145
TLC.2146
TLC.2147
TLC.2148
TLC.2149
TLC.2150
TLC.2151
TLC.2152
TLC.2153
TLC.2154
TLC.2155
TLC.2156
TLC.2157
TLC.2158
TLC.2159
TLC.2160
TLC.2161
TLC.2162
TLC.2163
TLC.2164
TLC.2165
TLC.2166
TLC.2167
TLC.2168
TLC.2169
TLC.2170
TLC.2171
TLC.2172
TLC.2173
TLC.2174
TLC.2175
TLC.2176
TLC.2177
TLC.2178
TLC.2179
TLC.2180
TLC.2181
TLC.2182
TLC.2183
TLC.2184
TLC.2185
TLC.2186
TLC.2187
TLC.2188
TLC.2189
TLC.2190
TLC.2191
TLC.2192
TLC.2193
TLC.2194
TLC.2195
TLC.2196
TLC.2197
TLC.2198
TLC.2199
TLC.2200
TLC.2201
TLC.2202
TLC.2203
TLC.2204
TLC.2205
TLC.2206
TLC.2207
TLC.2208
TLC.2209
TLC.2210
TLC.2211
TLC.2212
TLC.2213
TLC.2214
TLC.2215
TLC.2216
TLC.2217
TLC.2218
TLC.2219
TLC.2220
TLC.2221
TLC.2222
TLC.2223
TLC.2224
TLC.2225
TLC.2226
TLC.2227
TLC.2228
TLC.2229
TLC.2230
TLC.2231
TLC.2232
TLC.2233
TLC.2234
TLC.2235
TLC.2236
TLC.2237
TLC.2238
TLC.2239
TLC.2240
TLC.2241
TLC.2242
TLC.2243
TLC.2244
TLC.2245
TLC.2246
TLC.2247
TLC.2248
TLC.2249
TLC.2250
TLC.2251
TLC.2252
TLC.2253
TLC.2254
TLC.2255
TLC.2256
TLC.2257
TLC.2258
TLC.2259
TLC.2260
TLC.2261
TLC.2262
TLC.2263
TLC.2264
TLC.2265
TLC.2266
TLC.2267
TLC.2268
TLC.2269
TLC.2270
TLC.2271
TLC.2272
TLC.2273
TLC.2274
TLC.2275
TLC.2276
TLC.2277
TLC.2278
TLC.2279
TLC.2280
TLC.2281
TLC.2282
TLC.2283
TLC.2284
TLC.2285
TLC.2286
TLC.2287
TLC.2288
TLC.2289
TLC.2290
TLC.2291
TLC.2292
TLC.2293
TLC.2294
TLC.2295
TLC.2296
TLC.2297
TLC.2298
TLC.2299
TLC.2300
TLC.2301
TLC.2302
TLC.2303
TLC.2304
TLC.2305
TLC.2306
TLC.2307
TLC.2308
TLC.2309
TLC.2310
TLC.2311
TLC.2312
TLC.2313
TLC.2314
TLC.2315
TLC.2316
TLC.2317
TLC.2318
TLC.2319
TLC.2320
TLC.2321
TLC.2322
TLC.2323
TLC.2324
TLC.2325
TLC.2326
TLC.2327
TLC.2328
TLC.2329
TLC.2330
TLC.2331
TLC.2332
TLC.2333
TLC.2334
TLC.2335
TLC.2336
TLC.2337
TLC.2338
TLC.2339
TLC.2340
TLC.2341
TLC.2342
TLC.2343
TLC.2344
TLC.2345
TLC.2346
TLC.2347
TLC.2348
TLC.2349
TLC.2350
TLC.2351
TLC.2352
TLC.2353
TLC.2354
TLC.2355
TLC.2356
TLC.2357
TLC.2358
TLC.2359
TLC.2360
TLC.2361
TLC.2362
TLC.2363
TLC.2364
TLC.2365
TLC.2366
TLC.2367
TLC.2368
TLC.2369
TLC.2370
TLC.2371
TLC.

General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities: Geographic Data: download from ESRI Source: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Source: U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agriculture Statistics Service (NASS)

Relative Reflectivity: Low – Side Scan Mosaic – High

High Frequency Sidescan Mosaic (600 kHz)

- Side Scan Sonar Contact
  Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTG#M-M2D-####
  Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TL#A2D-####
- Magnetic Anomaly
  Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTG#M-M2D-####

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) : RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer
Sparker[2]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[7]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Milston
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

Horizontal Coordinate Reference System

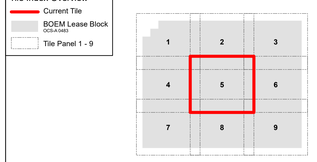
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

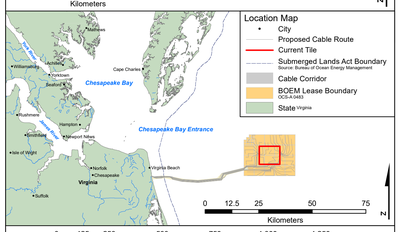
Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview

- Current Tile
- BOEM Lease Block (OCS-A 0483)
- Tile Panel 1 - 9



0 2.5 5 10 15 20 Kilometers



0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title:

CVOW-C Geophysical Survey 2021

Chart Title:

CHART 4
HIGH FREQUENCY SIDE SCAN MOSAIC
TILE 5 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	Rev00	CLS	KDW	KMM
06/14/21	Rev01	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/31/2021

File Name: Dominion_SSS_Mosaic_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

General Map Symbols

- Dominion Lease Boundary — OCS-A 0483
- Proposed Cable Route — "Conceptual cables routes; Detailed re-routing/micro-siting will follow"
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block Main Chart — OCS-A 0483
- Tile Panel 1 - 9 Main Chart
- WTG Location — Preliminary position/subject to change
- OSS Location — Preliminary position/subject to change
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck — Source: NOAA Office of Coast Survey

USA States and Cities - Geographic Data. download from ESRI Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

Relative Reflectivity: Low — Side Scan Mosaic — High

High Frequency Sidescan Mosaic (600 kHz)

- Side Scan Sonar Contact — Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTG#M-M2D-####. Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TL#A2D-####
- Magnetic Anomaly — Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTG#M-M2D-####

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) / R2Sonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6] / Sparker[2]	: AAS-Boom and SCS Streamer : Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Milston
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

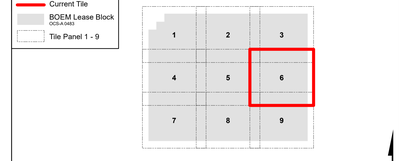
Horizontal Coordinate Reference System

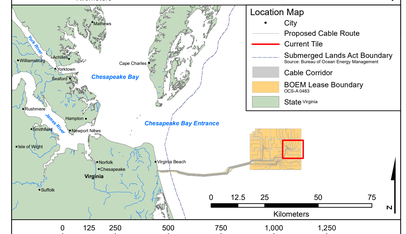
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

Datum	: Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview





Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 4 HIGH FREQUENCY SIDE SCAN MOSAIC TILE 6 of 9

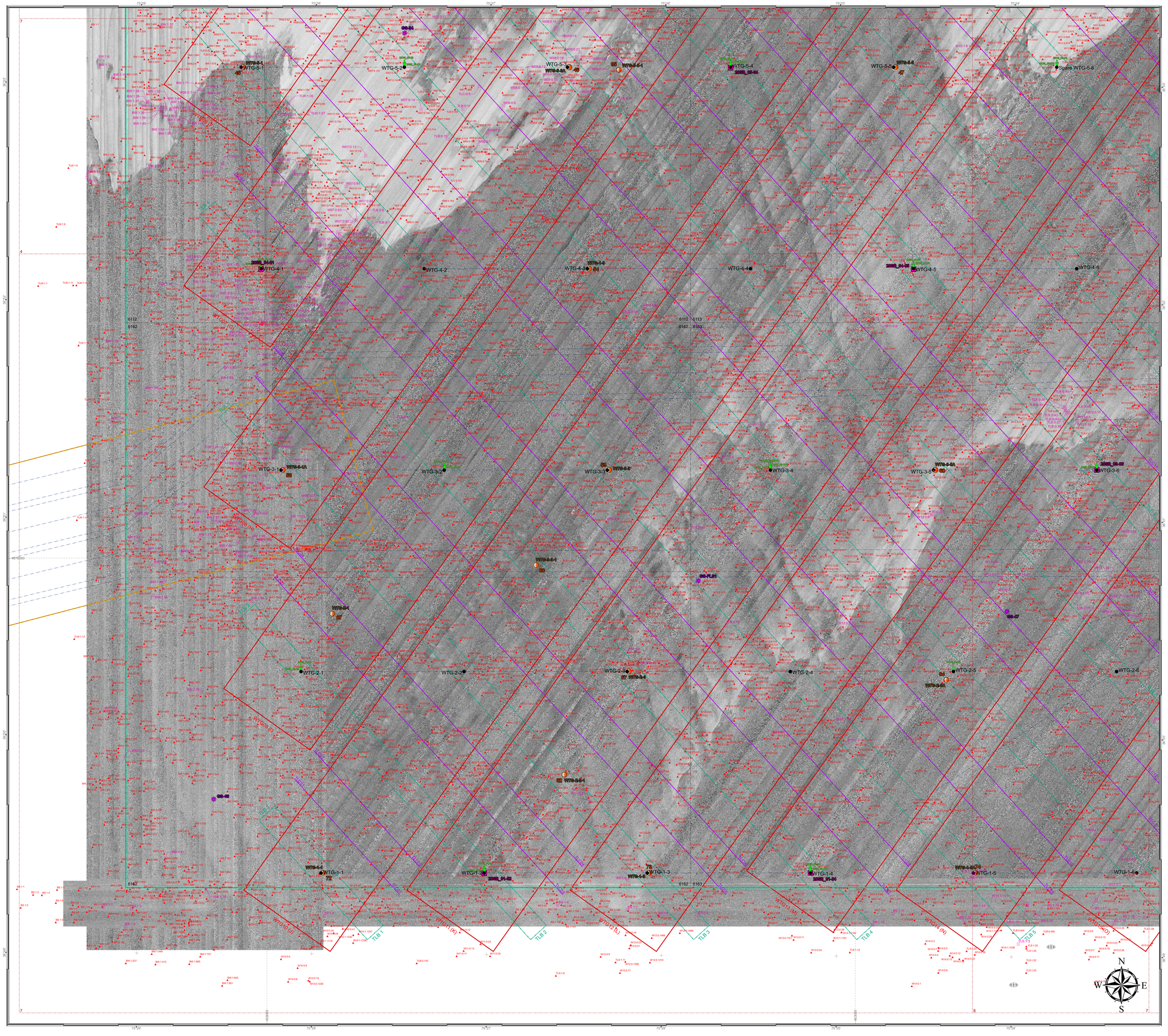
DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	Rev00	CLS	KDW	KMM
06/14/21	Rev01	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

Rev01

Date: 7/31/2021

File Name: Dominion_SSS_Mosaic_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.



General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities - Geographic Data: download from ESRI (Source: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS))

Relative Reflectivity: Low – Side Scan Mosaic – High

- Side Scan Sonar Contact
  Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTG##-M2D-####
  Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TL##M2D-####
- Magnetic Anomaly
  Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTG##-M2D-####

High Frequency Sidescan Mosaic (600 kHz)

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer
Sparker[2]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[3]
Acquisition Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

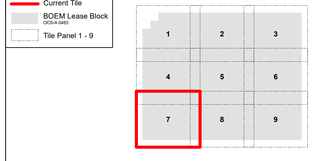
Horizontal Coordinate Reference System

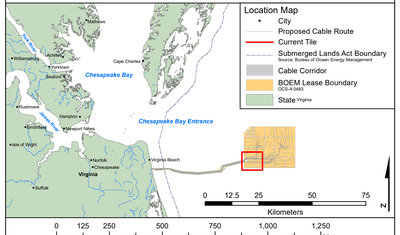
CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

Vertical Coordinate Reference System

Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview





0 125 250 500 750 1,000 1,250 Meters

0 500 1,000 2,000 3,000 4,000 5,000 Feet

1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

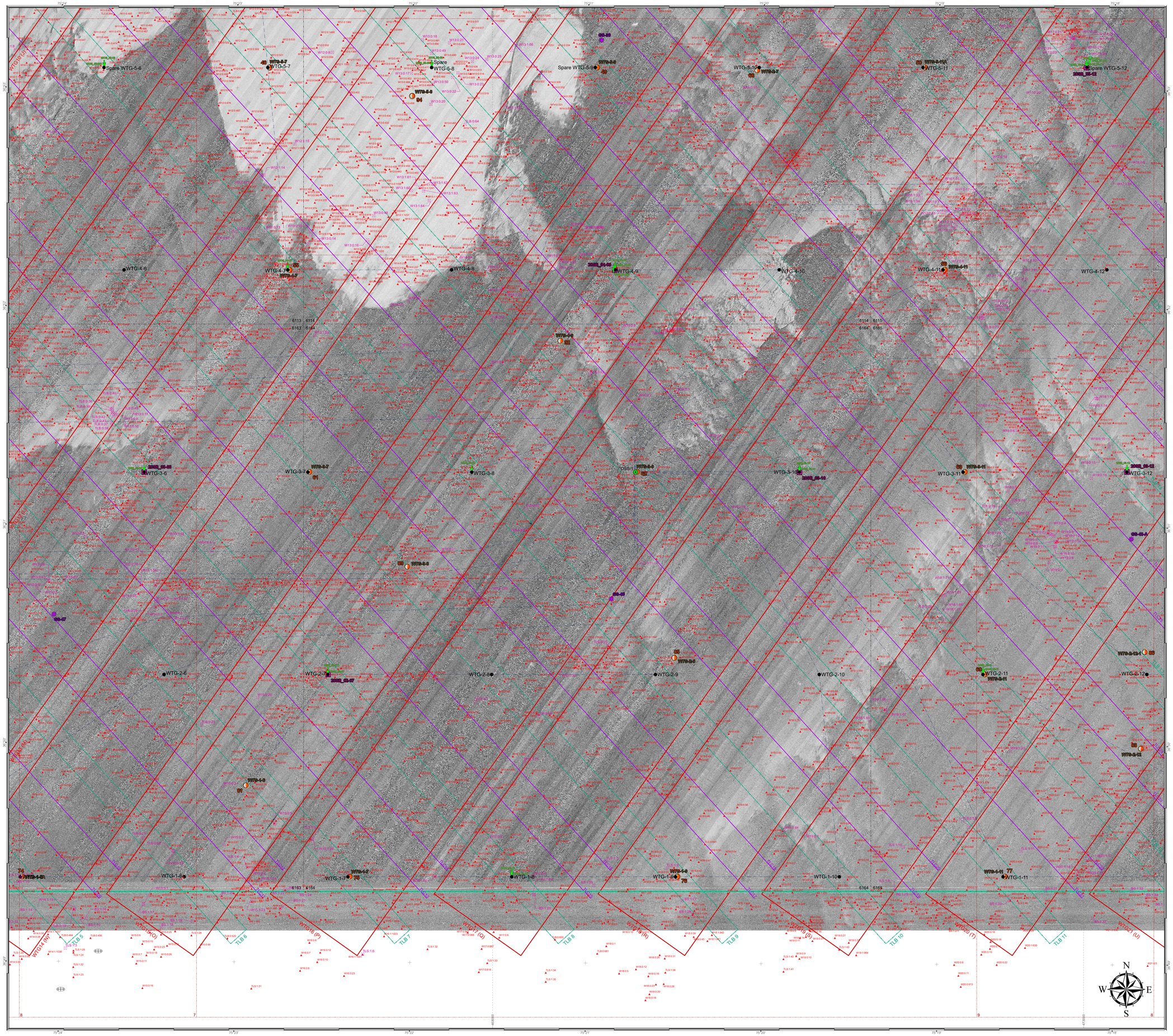
Chart Title: CHART 4 HIGH FREQUENCY SIDE SCAN MOSAIC TILE 7 of 9

DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	Rev00	CLS	KDW	KMM
06/14/21	Rev01	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/31/2021

File Name: Dominion_SSS_Mosaic_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.


Spare WTG-5-6
WTG-5-7
Spare WTG-5-8
Spare WTG-5-9
WTG-5-10
WTG-5-11
Spare WTG-5-12
WTG-4-6
WTG-4-7
WTG-4-8
WTG-4-9
WTG-4-10
WTG-4-11
WTG-4-12
WTG-3-6
WTG-3-7
WTG-3-8
WTG-3-10
WTG-3-11
WTG-3-12
WTG-2-6
WTG-2-7
WTG-2-8
WTG-2-9
WTG-2-10
WTG-2-11
WTG-2-12
WTG-1-6
WTG-1-7
WTG-1-8
WTG-1-9
WTG-1-10
WTG-1-11
WTG-1-12
WTG-5-8
WTG-5-9
WTG-5-10
WTG-5-11
WTG-4-7
WTG-4-9
WTG-4-11
WTG-3-7
WTG-3-10
WTG-3-11
WTG-2-7
WTG-2-8
WTG-2-9
WTG-2-11
WTG-2-12

General Map Symbols

- Dominion Lease Boundary (OCS-A 0483)
- Proposed Cable Route ("Conceptual cables routes; Detailed re-routing/micro-siting will follow")
- TLC Planned Line
- TLB Corridor
- WTG Corridor
- Cable Corridor
- BOEM Lease Block (Main Chart OCS-A 0483)
- Tile Panel 1 - 9 (Main Chart)
- WTG Location (Preliminary position/subject to change)
- OSS Location (Preliminary position/subject to change)
- Grab Sample
- Box Corer
- Geotechnical Boring
- Benthic Sample
- CPT
- Charted Shipwreck (Source: NOAA Office of Coast Survey)

USA States and Cities - Geographic Data downloaded from ESRI Sources: Esri, TomTom North America, Inc., U.S. Census Bureau, U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS)

Relative Reflectivity: Low – Side Scan Mosaic – High

- Side Scan Sonar Contact
  Note: Mainline SSS Contact labels are truncated to the WTG and the last four of contact ID. Reported anomaly ID: WTGMM-M2D-####
  Tieline SSS Contact labels are truncated to the TL and the last four of contact ID. Reported anomaly ID: TLMM2D-####
- Magnetic Anomaly
  Note: Magnetic Anomaly labels are truncated to the last four of anomaly ID. Reported anomaly ID: WTGMM-M2D-####

High Frequency Sidescan Mosaic (600 kHz)

Side Scan Sonar Processing Notes

Side scan sonar data were processed using SonarWiz 7 V7.05.008.

Data Import and Navigation

Ultra-Short Baseline (USBL) acoustic positioning system was employed for side scan sonar navigation. Positioning was set to 2 Hz refresh rate with under two meters of positional accuracy. Where USBL positioning exceeded two meters, SSS cable layback was utilized by verifying cable out values and aligning seafloor features with adjacent lines, where possible. JSF files were imported using project defined coordinate system, NAD83 UTM18N (EPSG: 6347). Upon import each file was inspected for erroneous navigation, ensuring the data met the positioning specification.

Altitude

Data were slant range corrected (SRC). SRC identified the first amplitude return, set the altitude and removed the water column of each record. SRC was performed using the automated bottom tracking algorithm in SonarWiz. After the automated SRC was complete the processors evaluated the results and performed manual edits where needed.

Signal Processing

Signal processing was conducted utilizing Empirical Gain Normalization (EGN). EGN tables were generated for each transect to sum and average the amplitudes based on transducer, altitude, and range. The EGN table results were applied to side scan sonar data to adjust the beam pattern and apply gains to each file to obtain a homogeneous color scale across each transect mosaic. Static gain was applied to all the data acquired by the Marcelle Bordelon. Mapping range was manually set to the minimum value at 0 and maximum value at 200 for high frequency and minimum value at 0 and maximum at 2000 for low frequency. Transect mosaics were combined and exported with a 25cm resolution.

General Information

Equipment

Survey Vessels	M/V Marcelle[1]/M/V Sarah Bordelon[2]/ R/V Kommandor Iona[3]/ R/V Kommandor Stuart[4]/ M/V GO Discovery[5]/M/V Minerva Uno[6]
Positioning System	: Applanix POSMV and Hemisphere
USBL	: Sonardyne Ranger 2 (19-34 kHz)
Multibeam Echosounder	: Teledyne T50 (200-400 kHz) / RZSonic 2024 (200-400 kHz)[6]
Sidescan Sonar	: EdgeTech 4200 (300/600 kHz)
Magnetometer	: Geometrics G-882 (TVG)
Subbottom Profiler	: Innomar SES-2000 medium
Multi Channel Seismic[1,4,5]	: AAS-Boom and Geospark 200+400 and 96-Element Streamer
Single Channel Seismic[2,3,6]	: AAS-Boom and SCS Streamer
Sparker[2]	: Geospark 200+400 and 96-Element Streamer
Sound Velocity Profiler	: AML MVP30/MVP200[1]
Acquistion Software	: QINSy

TerraSond Personnel

Commercial Manager	: Scott Croft
Project Manager	: Don Ross
Project Manager	: James Hougham
Production Manager	: Kate Mildon
Technical Manager	: Chris McHugh
Geophysical Manager	: Scott Hiller
Operations Manager	: William Busey
Party Chief	: Mark MacLean
Lead Surveyor	: Larry Andrews
Director HSEQ	: Forrest Davis

This geophysical survey was conducted April 29th, 2020 through June13th, 2021

Coordinate Reference System

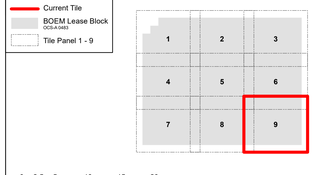
Horizontal Coordinate Reference System

CRS Name	:NAD 1983 (2011) UTM Zone 18N
EPSG Code	:6347
Geodetic Datum	:North American 1983
Projection	:Universal Transverse Mercator
Units	:Meter

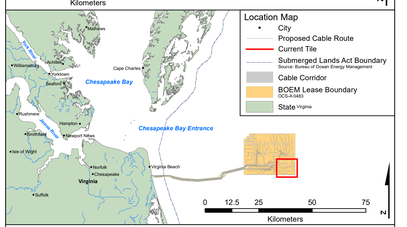
Vertical Coordinate Reference System

Datum	:Mean Lower Low Water (MLLW)
Axis -down	:Depth

Tile Index Overview



Location Map



1:10,000

Survey Contractor: TERRASOND PRECISION GEOSPATIAL SOLUTIONS

Client: Dominion Energy

Project Title: CVOW-C Geophysical Survey 2021

Chart Title: CHART 4 HIGH FREQUENCY SIDE SCAN MOSAIC TILE 9 of 9

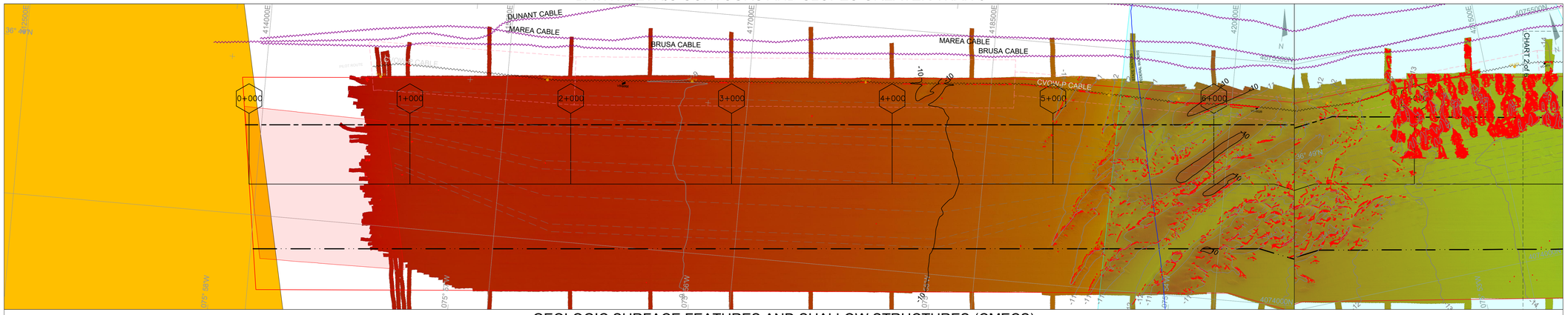
DATE	NOTE	AUTHOR	CHKD	APPD
06/08/21	Rev00	CLS	KDW	KMM
06/14/21	Rev01	CLS	KDW	KMM
07/31/21	Rev01	CLS	KDW	KMM

Rev01
Date: 7/31/2021

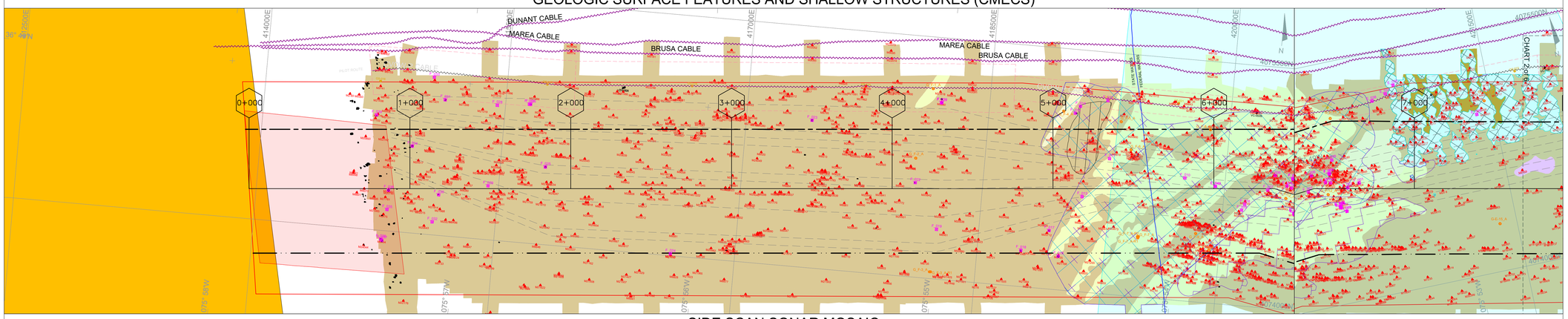
File Name: Dominion_SSS_Mosaic_Rev01.pdf

This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is undertaken entirely at the user's risk.

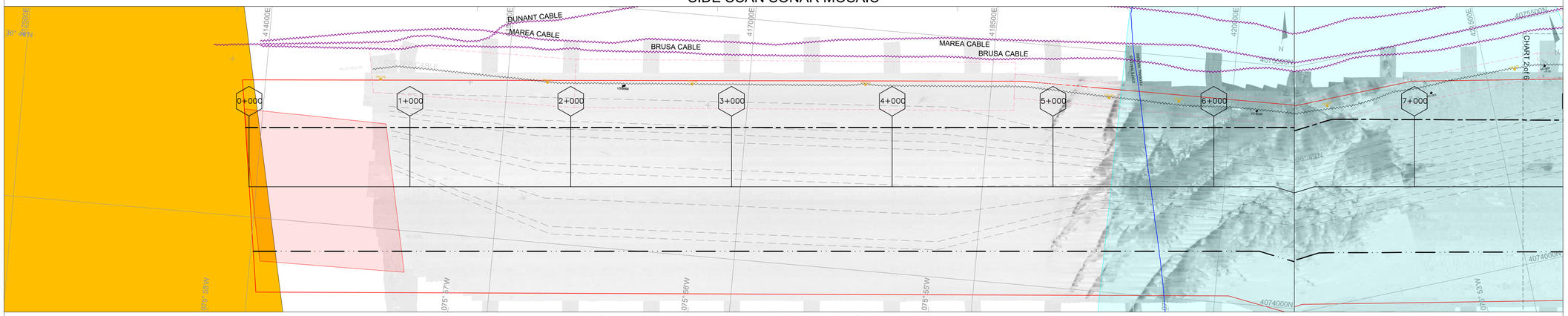
BATHYMETRIC CONTOURS AND SLOPES GREATER THAN 5°



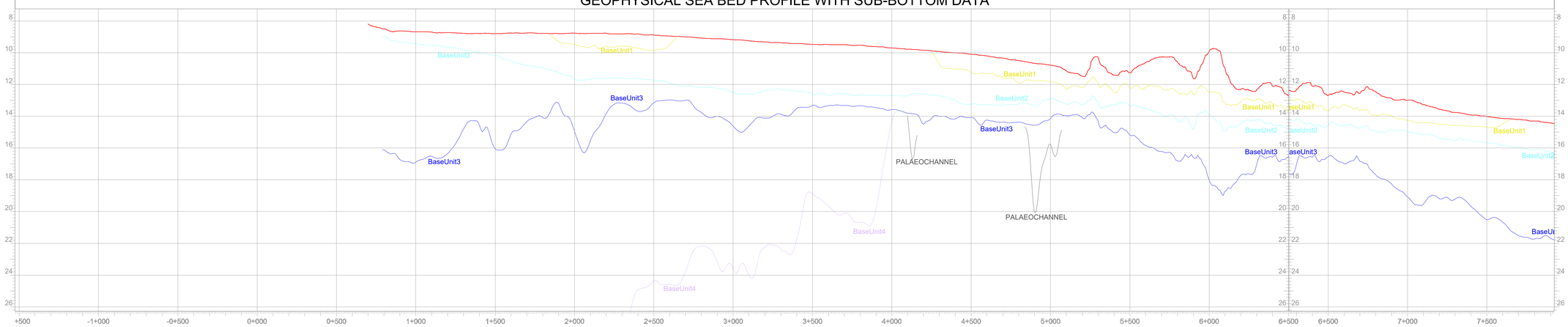
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURES (CMECS)



SIDE SCAN SONAR MOSAIC



GEOPHYSICAL SEA BED PROFILE WITH SUB-BOTTOM DATA



LEGEND

- DISTANCE POST (KILOMETERS) 1+234
- NORTH ROUTE CENTER ROUTE SOUTH ROUTE
- ROUTE*
- CONCEPTUAL CABLE ROUTE (DETAILED RE-ROUTING/MICRO-SITING WILL FOLLOW)*
- DIGITIZED SHORE *
- PILOT ROUTE CORRIDOR CVOW-P HVDC CABLE
- STATE / FEDERAL WATERS BOUNDARY *
- SURVEY AREA LIMITS *
- DAM NECK OCEAN DISPOSAL SITE *
- VA BEACH EXPLOSIVES DUMPING GROUNDS
- BOEM LEASE AREA *
- SUB-MARINE CABLE *
- D.O.D. BOUNDARY

BATHYMETRY LEGEND

- 20 MAJOR BATHYMETRY CONTOUR - MBES - @ 5m INTERVAL
- MINOR BATHYMETRY CONTOUR - MBES - @ 1m INTERVAL
- SLOPES EQUAL 5° OR GREATER

BATHYMETRIC COLOR SCALE KEY

-7.8 -10.0 -12.5 -15.0 -17.5 -20.0 -22.5 -25.0 -27.5 -29.0

OBSERVED SOUNDINGS HAVE BEEN REDUCED TO THE MLLW TIDAL DATUM.
THE BATHYMETRY CHART USES THE AVERAGE VALUES, GRID CELL SIZE 50cm BY 50cm. SUN ILLUMINATION FROM 45° AZIMUTH AND 45°ELEVATION WITH VERTICAL EXAGERRATION OF 1.0.

SURFACE FEATURES & SHALLOW STRUCTURES LEGEND

- SEA BED CLASSIFICATION - CONSTRUCTION HASH
- SEA BED CLASSIFICATION - FINE SAND
- SEA BED CLASSIFICATION - FINE TO MEDIUM SAND
- SEA BED CLASSIFICATION - COARSE TO VERY COARSE SAND
- SEA BED CLASSIFICATION - GRAVELLY SAND
- SEA BED CLASSIFICATION - MUD
- SEA BED CLASSIFICATION - MUDDY SAND
- SEA BED CLASSIFICATION - SANDY GRAVEL
- SEA BED FEATURE - SAND BANK
- SIDE SCAN SONAR TARGET & ID
- MAGNETOMETER TARGET & ID
- 20CS_A22 2020 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP
- SEA BED FEATURE - SAND WAVES
- SEA BED FEATURE - DEPRESSION LOCATION
- SEA BED FEATURE - DEPRESSION AREA
- SEA BED FEATURE - MEGARIPPLES
- SEA BED FEATURE - RIPPLES
- SEA BED FEATURE - SCAR
- CABLES (INTERPRETED POSITION)
- G_C-34_A GRAB SAMPLE LOCATION - ALPINE 2020
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2013*
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2020*
- VC-005 VIBROCORE SAMPLE LOCATION - TETRA TECH 2013*
- 21CS_A22 2021 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP

SIDE SCAN SONAR MOSAIC LEGEND

THE RESOLUTION OF THE CHARTED SIDE SCAN SONAR MOSAIC IS 1mpp. ONLY LOW FREQUENCY (APPROXIMATELY 233kHz) SIDE SCAN SONAR LINES ARE INCLUDED IN THE MOSAIC. ALL LINES WERE ACQUIRED USING A RANGE OF 50m.

HIGH — LOW

GEOPHYSICAL PROFILE LEGEND

- SEABED SURFACE
- BASE UNIT 1
- BASE UNIT 3
- PALAEOCHANNEL
- BASE UNIT 2
- BASE UNIT 4
- BASE QUATERNARY CHANNEL INFILL SEDIMENTS

20CS_A22

SEABED 0.000_
SAND 4.320_
GRAVEL 5.120_
CLAY 7.420_

* CPT LOCATION & ID w/ SEDIMENT TYPES, 'THICKNESS', & CPT TIP RESISTIVITY CURVE (2020 SAMPLES/2021 SAMPLES)

GENERAL NOTES:

1. THE SURVEY DATA DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED ON THE DATES LISTED BELOW AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ANY BACKGROUND IMAGERY USED IS FROM MICROSOFT CORP. EARTHSTAR GEOGRAPHICS SIO BING.
3. HORIZONTAL DATUM: UTM83-18 (m)
   VERTICAL DATUM: MLLW (m)

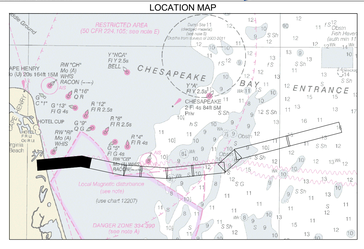
*INFORMATION PROVIDED BY CLIENT

LIST OF SURVEY EQUIPMENT

Item	RV Shearwater	RV Minerva Uno (2020 / 2021)
Positioning	Applanix POS MV OceanMaster CNAV 3050	Applanix POS MV OceanMaster CNAV 5000
SVP	AML Moving Vessel Profiler AML Plus SVP/CTD	AML Moving Vessel Profiler 350 AML Minos X
USBL	Sonardyne Scout / Ranger	Sonardyne Scout Plus
MBES	R2 Sonic 2024	R2 Sonic 2024
SSS	Edgetech 4200 (300-400kHz)	Edgetech 4200 (300-400kHz)
TVG	2 x Geometrics 882 Cesium Vapor	2 x Geometrics 882 Cesium Vapor
SBP	Innomar Medium SES 2000	Innomar Medium SES 2000
S-LHRS	AA301 Boomer Single-Channel 8 Element Hydrophone Streamer	AA301 Geomarine Boomer Single-Channel 8 Element Hydrophone Streamer
Grab Sampler	N/A	Harmon Surficial Day Grab Sampler

Dominion Energy, Inc.
8th & Main Building, 707 East Main St
Richmond, VA 23219

LOCATION MAP



Coastal Virginia Offshore Wind Commercial (CVOW-C) Export Cable Route Corridor

CENTERLINE ALIGNMENT CHART

kp 0+000 to kp 7+925

HORIZONTAL SCALE 1:10,000 (1cm = 100m = 328.1ft)
VERTICAL SCALE 1:100 (1cm = 1m = 3.3ft)

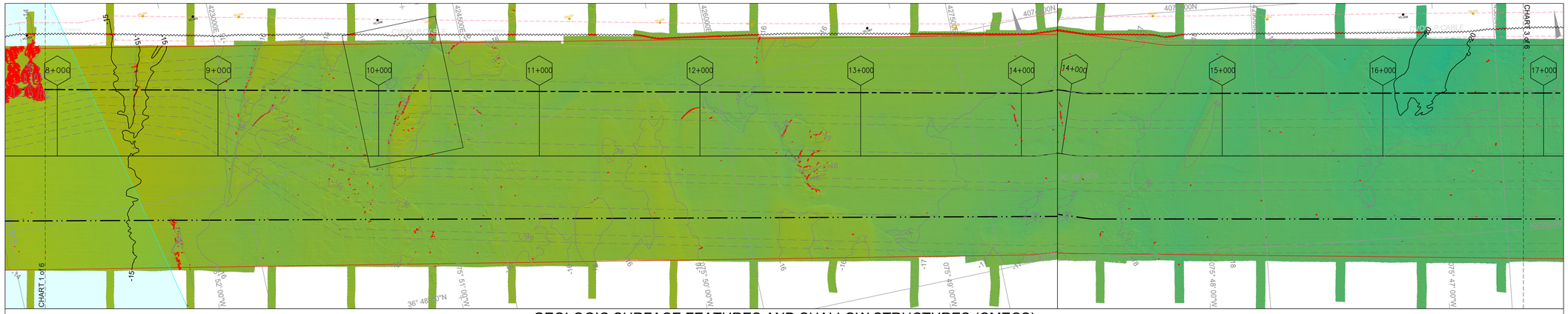
GEODETIC INFORMATION
DATUM : NAD83 (2011)
VERTICAL : MLLW (m)
PROJECTION : UTM83-18N

Drawing Name:	ALIGNMENT CENTERLINE-001
Vessel:	Minerva Uno / Shearwater
Approved By:	JB
Interp. By:	KR
Party Chief:	DW/TK
Drawn By:	BE
Revision:	3 18-Aug-2021
Issue Date:	08-Feb-2021
Survey Date:	May - Nov 2020 & Jan - May 2021
Chart Num:	1 of 6

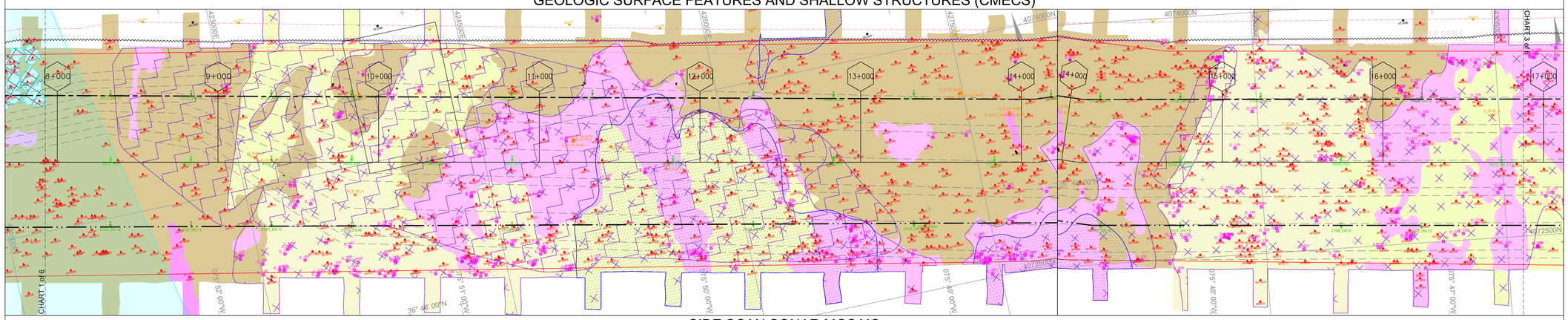
Alpine

ALPINE OCEAN SEISMIC SURVEY INC 155 Hudson Ave Norwood New Jersey 07648 Tel 201-768-8000 Fax 201-768-5750 www.alpineocean.com

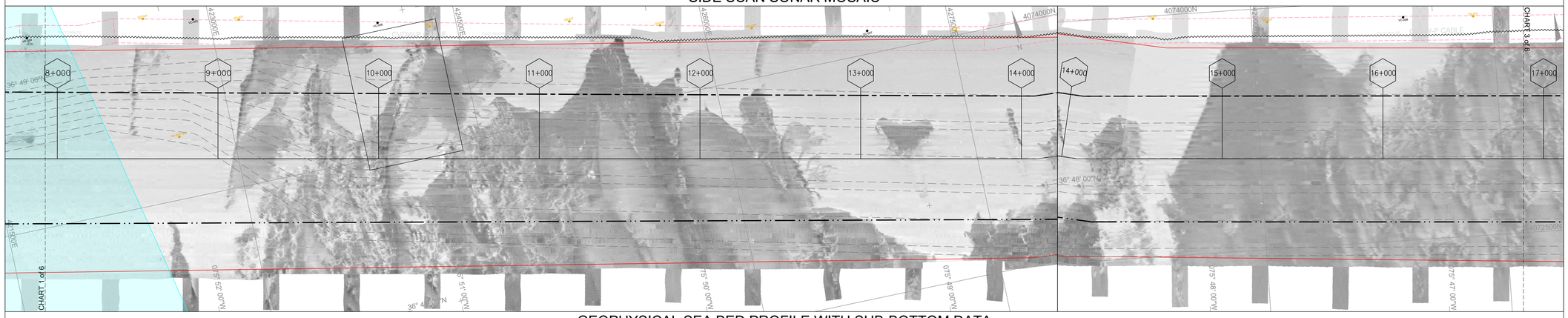
BATHYMETRIC CONTOURS AND SLOPES GREATER THAN 5°



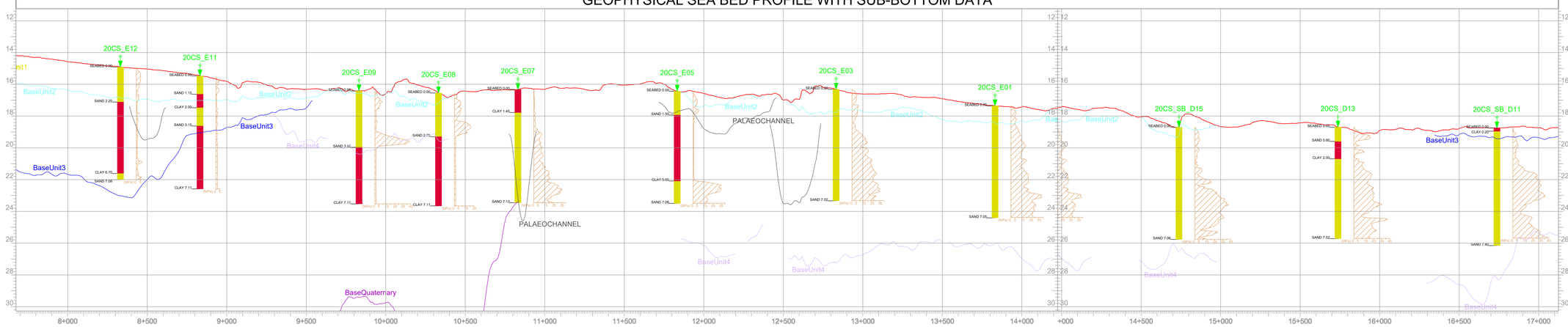
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURES (CMECS)



SIDE SCAN SONAR MOSAIC



GEOPHYSICAL SEA BED PROFILE WITH SUB-BOTTOM DATA



LEGEND

- DISTANCE POST (KILOMETERS) 1+234
- NORTH ROUTE / CENTER ROUTE / SOUTH ROUTE
- ROUTE*
- CONCEPTUAL CABLE ROUTE (DETAILED RE-ROUTING/MICRO-SITING WILL FOLLOW)*
- DIGITIZED SHORE *
- PILOT ROUTE CORRIDOR CVOW-P HVDC CABLE
- STATE / FEDERAL WATERS BOUNDARY *
- SURVEY AREA LIMITS *
- DAM NECK OCEAN DISPOSAL SITE *
- VA BEACH EXPLOSIVES DUMPING GROUNDS
- BOEM LEASE AREA *
- SUB-MARINE CABLE *
- D.O.D. BOUNDARY

BATHYMETRY LEGEND

- 20 MAJOR BATHYMETRY CONTOUR - MBES - @ 5m INTERVAL
- MINOR BATHYMETRY CONTOUR - MBES - @ 1m INTERVAL
- SLOPES EQUAL 5° OR GREATER

BATHYMETRIC COLOR SCALE KEY

-7.8 -10.0 -12.5 -15.0 -17.5 -20.0 -22.5 -25.0 -27.5 -29.0

OBSERVED SOUNDINGS HAVE BEEN REDUCED TO THE MLLW TIDAL DATUM.
THE BATHYMETRY CHART USES THE AVERAGE VALUES, GRID CELL SIZE 50cm BY 50cm. SUN ILLUMINATION FROM 45° AZIMUTH AND 45°ELEVATION WITH VERTICAL EXAGERRATION OF 1.0.

SURFACE FEATURES & SHALLOW STRUCTURES LEGEND

- SEA BED CLASSIFICATION - CONSTRUCTION HASH
- SEA BED CLASSIFICATION - FINE SAND
- SEA BED CLASSIFICATION - FINE TO MEDIUM SAND
- SEA BED CLASSIFICATION - COARSE TO VERY COARSE SAND
- SEA BED CLASSIFICATION - GRAVELLY SAND
- SEA BED CLASSIFICATION - MUD
- SEA BED CLASSIFICATION - MUDDY SAND
- SEA BED CLASSIFICATION - SANDY GRAVEL
- SEA BED FEATURE - SAND BANK
- SIDE SCAN SONAR TARGET & ID
- MAGNETOMETER TARGET & ID
- 20CS_A22 2020 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP
- SEA BED FEATURE - SAND WAVES
- SEA BED FEATURE - DEPRESSION LOCATION
- SEA BED FEATURE - DEPRESSION AREA
- SEA BED FEATURE - MEGARIPPLES
- SEA BED FEATURE - RIPPLES
- SEA BED FEATURE - SCAR
- CABLES (INTERPRETED POSITION)
- G_C-34_A GRAB SAMPLE LOCATION - ALPINE 2020
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2013*
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2020*
- VC-005 VIBROCORE SAMPLE LOCATION - TETRA TECH 2013*
- 21CS_A22 2021 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP

SIDE SCAN SONAR MOSAIC LEGEND

THE RESOLUTION OF THE CHARTED SIDE SCAN SONAR MOSAIC IS 1mpp. ONLY LOW FREQUENCY (APPROXIMATELY 233kHz) SIDE SCAN SONAR LINES ARE INCLUDED IN THE MOSAIC. ALL LINES WERE ACQUIRED USING A RANGE OF 50m.

HIGH — LOW

GEOPHYSICAL PROFILE LEGEND

- SEABED SURFACE
- BASE UNIT 1
- BASE UNIT 3
- PALAEOCHANNEL
- BASE UNIT 2
- BASE UNIT 4
- BASE QUATERNARY CHANNEL INFILL SEDIMENTS

20CS_A22

SEABED 0.000
SAND 4.320
GRAVEL 5.120
CLAY 7.420

* CPT LOCATION & ID w/ SEDIMENT TYPES, THICKNESS*, & CPT TIP RESISTIVITY CURVE (2020 SAMPLES/2021 SAMPLES)

GENERAL NOTES:

1. THE SURVEY DATA DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED ON THE DATES LISTED BELOW AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ANY BACKGROUND IMAGERY USED IS FROM MICROSOFT CORP. EARTHSTAR GEOGRAPHICS SIO BING.
3. HORIZONTAL DATUM: UTM83-18 (m)
   VERTICAL DATUM: MLLW (m)

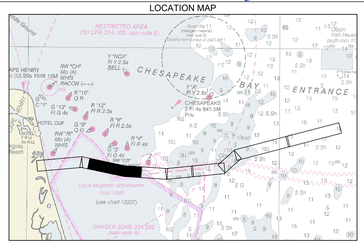
*INFORMATION PROVIDED BY CLIENT

LIST OF SURVEY EQUIPMENT

Item	RV Shearwater	RV Minerva Uno (2020 / 2021)
Positioning	Applanix POS MV OceanMaster CNAV 3050	Applanix POS MV OceanMaster CNAV 5000
SVP	AML Moving Vessel Profiler AML Plus SVP/CTD	AML Moving Vessel Profiler 350 AML Minos X
XBL	Sonardyne Scout Plus	Sonardyne Scout / Ranger
MBES	R2 Sonic 2024	R2 Sonic 2024
SSS	Edgetech 4200 (300-600kHz)	Edgetech 4200 (300-600kHz)
TVG	2 x Geometrics 882 Cesium Vapor	2 x Geometrics 882 Cesium Vapor
SBP	Innomar Medium SES 2000	Innomar Medium SES 2000
S-UHRS	AA301 Boomer Single-Channel 8 Element Hydrophone Streamer	AA301 / Geomarine Boomer Single-Channel 8 Element Hydrophone Streamer
Grab Sampler	N/A	Harmon Surficial Day Grab Sampler

Dominion Energy, Inc.
8th & Main Building, 707 East Main St
Richmond, VA 23219

LOCATION MAP



Coastal Virginia Offshore Wind Commercial (CVOW-C) Export Cable Route Corridor

CENTERLINE ALIGNMENT CHART

kp 7+675 to kp 17+125

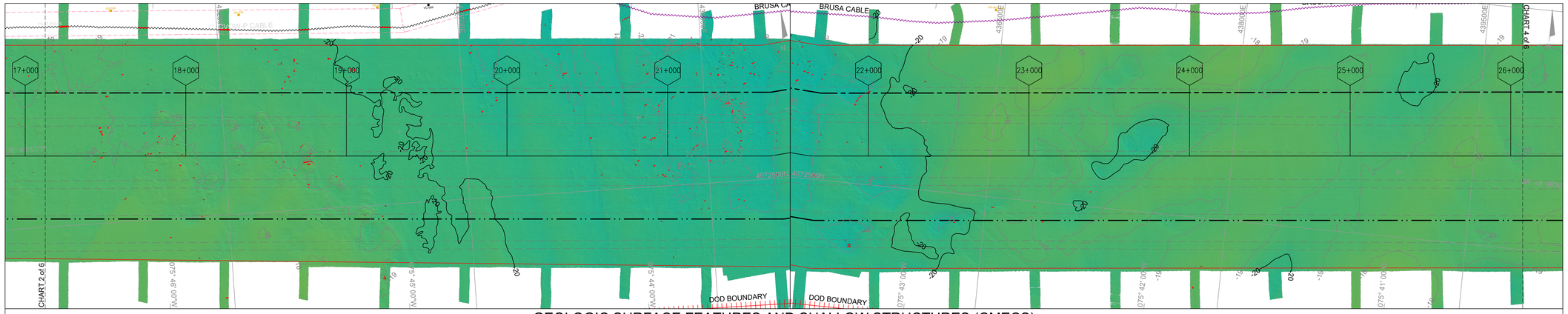
HORIZONTAL SCALE 1:10,000 (1cm = 100m = 328.1ft)
100 200 400 600
0 1 2 4 8
VERTICAL SCALE 1:100 (1cm = 1m = 3.3ft)

GEODETIC INFORMATION
DATUM : NAD83 (2011)
VERTICAL : MLLW (m)
PROJECTION : UTM83-18N

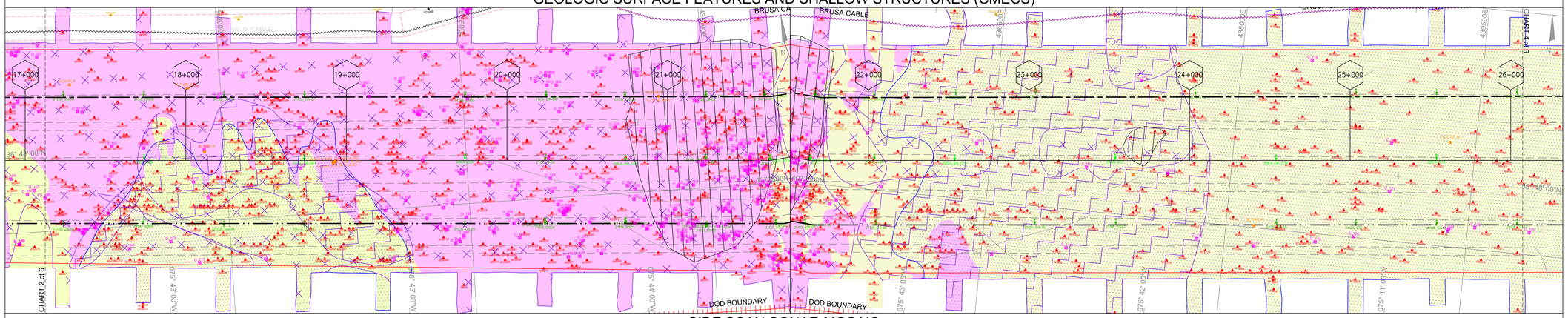
Drawing Name:	ALIGNMENT_CENTERLINE_001
Vessel:	Minerva Uno / Shearwater
Approved By:	JB
Interp. By:	KR
Party Chief:	DW/TK
Drawn By:	BE
Revision:	3 18-Aug-2021
Issue Date:	08-Feb-2021
Survey Date:	May - Nov 2020 & Jan - May 2021
Chart Num.:	2 of 6

Alpine

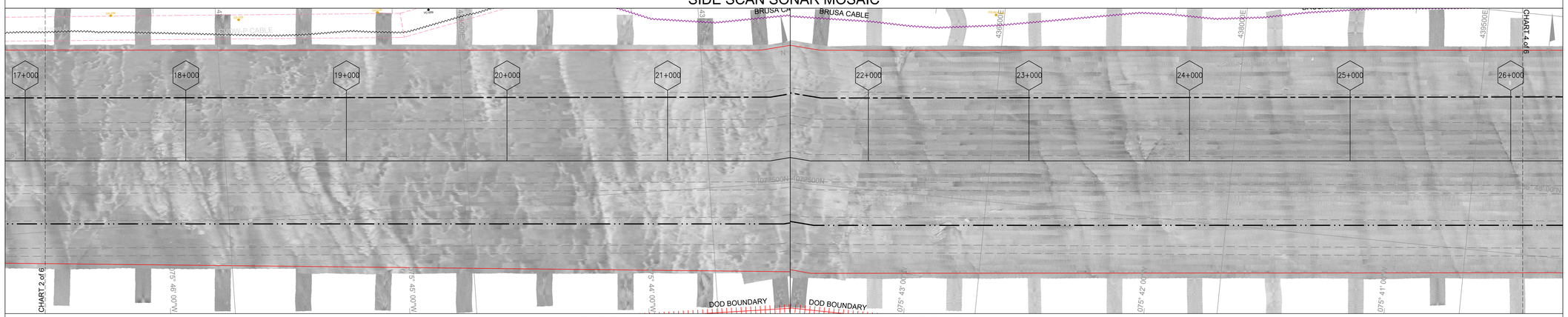
BATHYMETRIC CONTOURS AND SLOPES GREATER THAN 5°



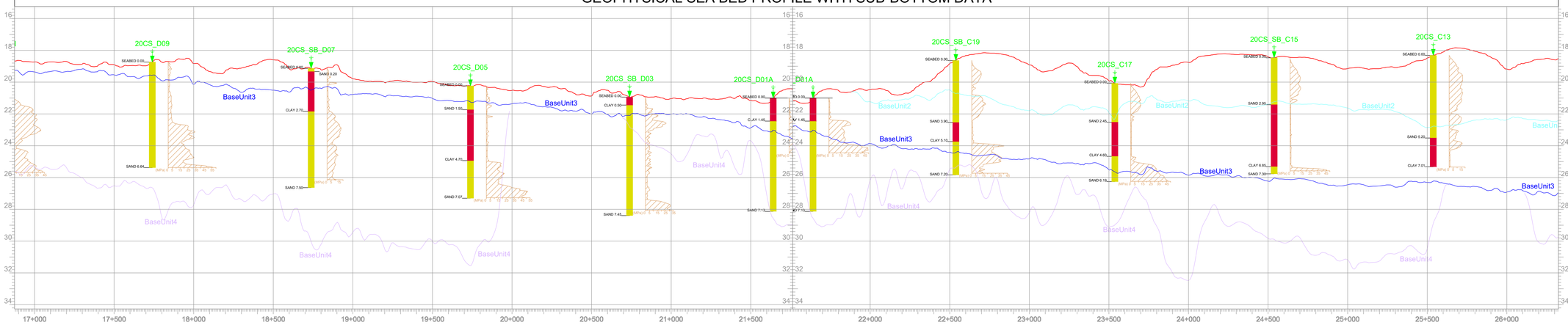
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURES (CMECS)



SIDE SCAN SONAR MOSAIC



GEOPHYSICAL SEA BED PROFILE WITH SUB-BOTTOM DATA



LEGEND

- DISTANCE POST (KILOMETERS) 1+234
- NORTH ROUTE / CENTER ROUTE / SOUTH ROUTE
- ROUTE*
- CONCEPTUAL CABLE ROUTE (DETAILED RE-ROUTING/MICRO-SITING WILL FOLLOW)*
- DIGITIZED SHORE *
- PILOT ROUTE CORRIDOR CVOW-P HVDC CABLE
- STATE / FEDERAL WATERS BOUNDARY *
- SURVEY AREA LIMITS *
- DAM NECK OCEAN DISPOSAL SITE *
- VA BEACH EXPLOSIVES DUMPING GROUNDS
- BOEM LEASE AREA *
- SUB-MARINE CABLE *
- D.O.D. BOUNDARY

BATHYMETRY LEGEND

- 20 MAJOR BATHYMETRY CONTOUR - MBES - @ 5m INTERVAL
- MINOR BATHYMETRY CONTOUR - MBES - @ 1m INTERVAL
- SLOPES EQUAL 5° OR GREATER

BATHYMETRIC COLOR SCALE KEY

-7.8 -10.0 -12.5 -15.0 -17.5 -20.0 -22.5 -25.0 -27.5 -29.0

OBSERVED SOUNDINGS HAVE BEEN REDUCED TO THE MLLW TIDAL DATUM.
THE BATHYMETRY CHART USES THE AVERAGE VALUES, GRID CELL SIZE 50cm BY 50cm. SUN ILLUMINATION FROM 45° AZIMUTH AND 45°ELEVATION WITH VERTICAL EXAGERRATION OF 1.0.

SURFACE FEATURES & SHALLOW STRUCTURES LEGEND

- SEA BED CLASSIFICATION - CONSTRUCTION HASH
- SEA BED CLASSIFICATION - FINE SAND
- SEA BED CLASSIFICATION - FINE TO MEDIUM SAND
- SEA BED CLASSIFICATION - COARSE TO VERY COARSE SAND
- SEA BED CLASSIFICATION - GRAVELLY SAND
- SEA BED CLASSIFICATION - MUD
- SEA BED CLASSIFICATION - MUDDY SAND
- SEA BED CLASSIFICATION - SANDY GRAVEL
- SEA BED FEATURE - SAND BANK
- SIDE SCAN SONAR TARGET & ID
- MAGNETOMETER TARGET & ID
- 20CS_A22 2020 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP
- SEA BED FEATURE - SAND WAVES
- SEA BED FEATURE - DEPRESSION LOCATION
- SEA BED FEATURE - DEPRESSION AREA
- SEA BED FEATURE - MEGARIPPLES
- SEA BED FEATURE - RIPPLES
- SEA BED FEATURE - SCAR
- CABLES (INTERPRETED POSITION)
- G_C-34_A GRAB SAMPLE LOCATION - ALPINE 2020
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2013*
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2020*
- VC-005 VIBROCORE SAMPLE LOCATION - TETRA TECH 2013*
- 21CS_A22 2021 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP

SIDE SCAN SONAR MOSAIC LEGEND

THE RESOLUTION OF THE CHARTED SIDE SCAN SONAR MOSAIC IS 1mpp. ONLY LOW FREQUENCY (APPROXIMATELY 233kHz) SIDE SCAN SONAR LINES ARE INCLUDED IN THE MOSAIC. ALL LINES WERE ACQUIRED USING A RANGE OF 50m.

HIGH — LOW

GEOPHYSICAL PROFILE LEGEND

- SEABED SURFACE
- BASE UNIT 1
- BASE UNIT 3
- PALAEOCHANNEL
- BASE UNIT 2
- BASE UNIT 4
- BASE QUATERNARY CHANNEL INFILL SEDIMENTS

20CS_A22

SEABED 0.000
SAND 4.320
GRAVEL 5.120
CLAY 7.420

* CPT LOCATION & ID w/ SEDIMENT TYPES, THICKNESS*, & CPT TIP RESISTIVITY CURVE (2020 SAMPLES/2021 SAMPLES)

GENERAL NOTES:

1. THE SURVEY DATA DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED ON THE DATES LISTED BELOW AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ANY BACKGROUND IMAGERY USED IS FROM MICROSOFT CORP. EARTHSTAR GEOGRAPHICS SIO BING.
3. HORIZONTAL DATUM: UTM83-18 (m)
   VERTICAL DATUM: MLLW (m)

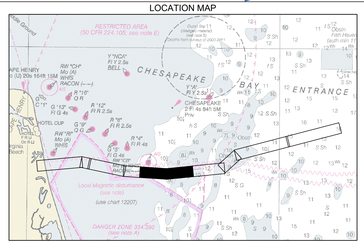
*INFORMATION PROVIDED BY CLIENT

LIST OF SURVEY EQUIPMENT

Item	RV Shearwater	RV Minerva Uno (2020 / 2021)
Positioning	Applanix POS MV OceanMaster CNAV 3050	Hyplarne POS MV OceanMaster CNAV 5000
SVP	AML Moving Vessel Profiler AML Plus SVP/CTD	AML Moving Vessel Profiler 350 AML Minos X
USBL	Sonardyne Scout Plus	Sonardyne Scout / Ranger
MBES	R2 Sonic 2024	R2 Sonic 2024
SSS	Edgetech 4200 (300-600kHz)	Edgetech 4200 (300-600kHz)
TVG	2 x Geometrics 882 Cesium Vapor	2 x Geometrics 882 Cesium Vapor
SBP	Innomar Medium SES 2000	Innomar Medium SES 2000
S-UHRS	AA301 Boomer Single-Channel 8 Element Hydrophone Streamer	AA301 / Geomarine Boomer Single-Channel 8 Element Hydrophone Streamer
Grab Sampler	N/A	Harmon Surficial Day Grab Sampler

Dominion Energy, Inc.
8th & Main Building, 707 East Main St
Richmond, VA 23219

LOCATION MAP



Coastal Virginia Offshore Wind Commercial (CVOW-C) Export Cable Route Corridor

CENTERLINE ALIGNMENT CHART

kp 16+875 to kp 26+324

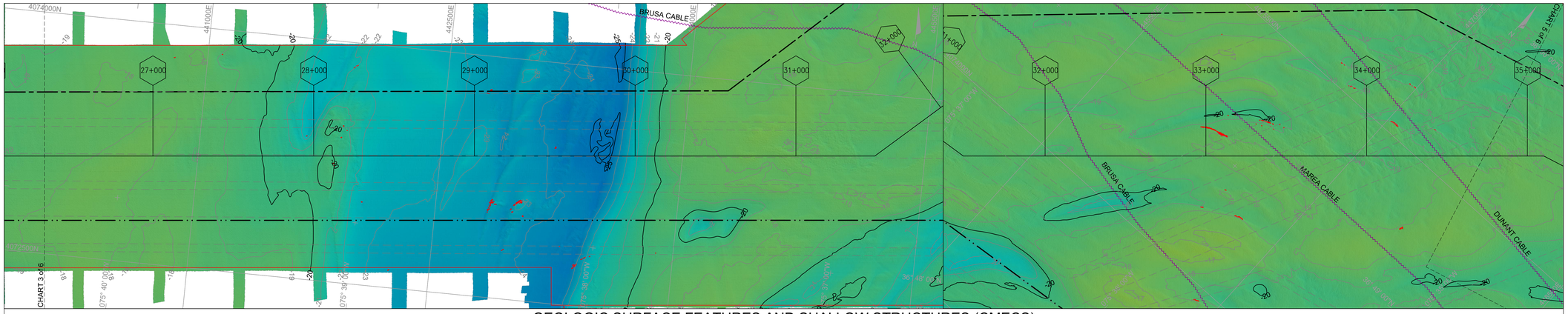
HORIZONTAL SCALE 1:10,000 (1cm = 100m = 328.1ft)
0 100 200 400 600
0 1 2 4 8
VERTICAL SCALE 1:100 (1cm = 1m = 3.3ft)

GEODETIC INFORMATION
DATUM : NAD83 (2011)
VERTICAL : MLLW (m)
PROJECTION : UTM83-18N

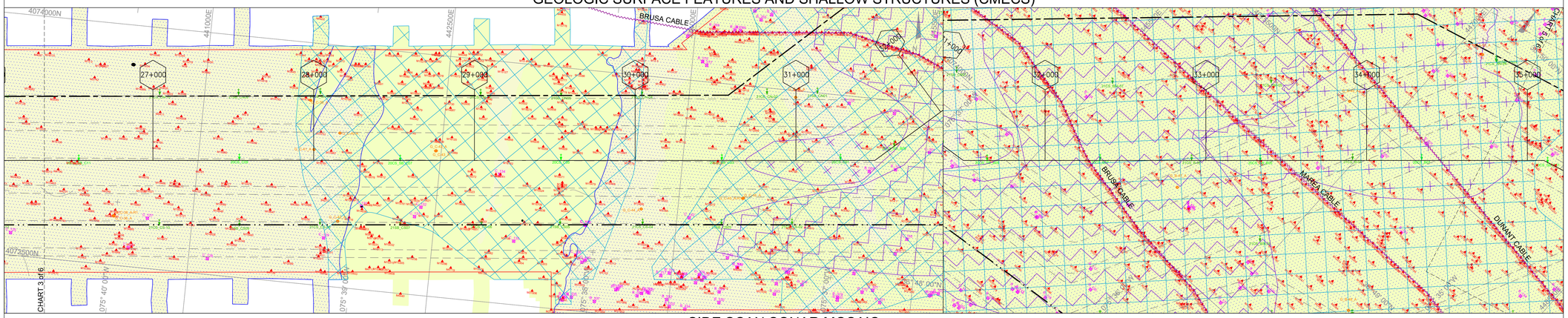
Drawing Name:	ALIGNMENT_CENTERLINE_001
Vessel:	Minerva Uno / Shearwater
Approved By:	JB
Interp. By:	KR
Party Chief:	DW/TK
Drawn By:	BE
Revision:	3 18-Aug-2021
Issue Date:	08-Feb-2021
Survey Date:	May - Nov 2020 & Jan - May 2021
Chart Num.:	3 of 6

Alpine

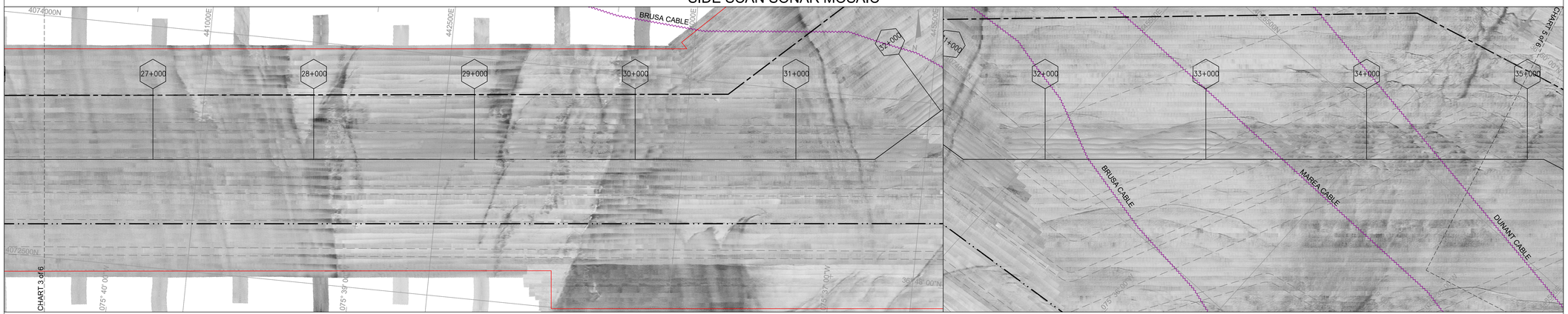
BATHYMETRIC CONTOURS AND SLOPES GREATER THAN 5°



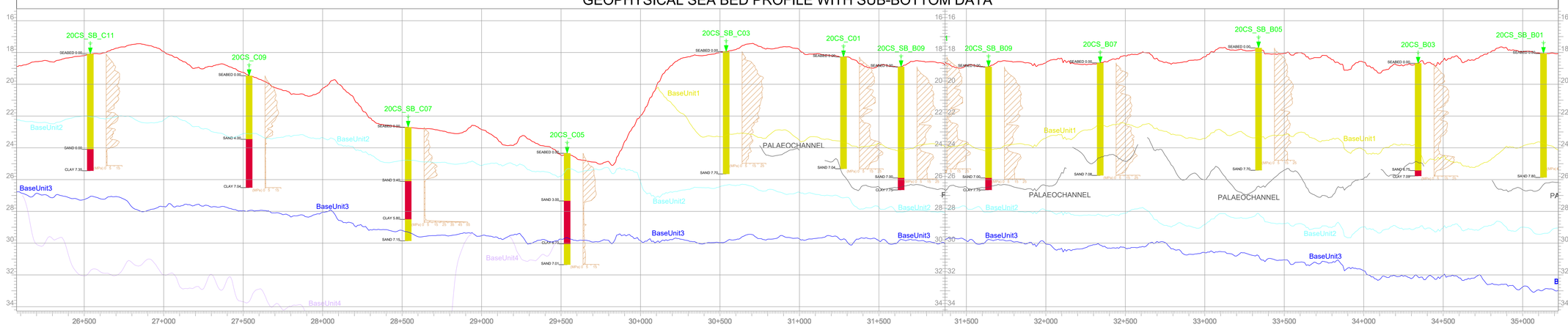
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURES (CMECS)



SIDE SCAN SONAR MOSAIC



GEOPHYSICAL SEA BED PROFILE WITH SUB-BOTTOM DATA



LEGEND

- DISTANCE POST (KILOMETERS) 1+234
- NORTH ROUTE / CENTER ROUTE / SOUTH ROUTE
- ROUTE*
- CONCEPTUAL CABLE ROUTE (DETAILED RE-ROUTING/MICRO-SITING WILL FOLLOW)*
- DIGITIZED SHORE *
- PILOT ROUTE CORRIDOR CVOW-P HVDC CABLE
- STATE / FEDERAL WATERS BOUNDARY *
- SURVEY AREA LIMITS *
- DAM NECK OCEAN DISPOSAL SITE *
- VA BEACH EXPLOSIVES DUMPING GROUNDS
- BOEM LEASE AREA *
- SUB-MARINE CABLE *
- D.O.D. BOUNDARY

BATHYMETRY LEGEND

- 20 MAJOR BATHYMETRY CONTOUR - MBES - @ 5m INTERVAL
- MINOR BATHYMETRY CONTOUR - MBES - @ 1m INTERVAL
- SLOPES EQUAL 5° OR GREATER

BATHYMETRIC COLOR SCALE KEY

-7.8 -10.0 -12.5 -15.0 -17.5 -20.0 -22.5 -25.0 -27.5 -29.0

OBSERVED SOUNDINGS HAVE BEEN REDUCED TO THE MLLW TIDAL DATUM.
THE BATHYMETRY CHART USES THE AVERAGE VALUES, GRID CELL SIZE 50cm BY 50cm. SUN ILLUMINATION FROM 45° AZIMUTH AND 45°ELEVATION WITH VERTICAL EXAGERRATION OF 1.0.

SURFACE FEATURES & SHALLOW STRUCTURES LEGEND

- SEA BED CLASSIFICATION - CONSTRUCTION HASH
- SEA BED CLASSIFICATION - FINE SAND
- SEA BED CLASSIFICATION - FINE TO MEDIUM SAND
- SEA BED CLASSIFICATION - COARSE TO VERY COARSE SAND
- SEA BED CLASSIFICATION - GRAVELLY SAND
- SEA BED CLASSIFICATION - MUD
- SEA BED CLASSIFICATION - MUDDY SAND
- SEA BED CLASSIFICATION - SANDY GRAVEL
- SEA BED FEATURE - SAND BANK
- SIDE SCAN SONAR TARGET & ID
- MAGNETOMETER TARGET & ID
- 20CS_A22 2020 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP
- SEA BED FEATURE - SAND WAVES
- SEA BED FEATURE - DEPRESSION LOCATION
- SEA BED FEATURE - DEPRESSION AREA
- SEA BED FEATURE - MEGARIPPLES
- SEA BED FEATURE - RIPPLES
- SEA BED FEATURE - SCAR
- CABLES (INTERPRETED POSITION)
- G_C-34_A GRAB SAMPLE LOCATION - ALPINE 2020
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2013*
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2020*
- VC-005 VIBROCORE SAMPLE LOCATION - TETRA TECH 2013*
- 21CS_A22 2021 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP

SIDE SCAN SONAR MOSAIC LEGEND

THE RESOLUTION OF THE CHARTED SIDE SCAN SONAR MOSAIC IS 1mpp. ONLY LOW FREQUENCY (APPROXIMATELY 233kHz) SIDE SCAN SONAR LINES ARE INCLUDED IN THE MOSAIC. ALL LINES WERE ACQUIRED USING A RANGE OF 50m.

HIGH — LOW

GEOPHYSICAL PROFILE LEGEND

- SEABED SURFACE
- BASE UNIT 1
- BASE UNIT 3
- PALAEOCHANNEL
- BASE UNIT 2
- BASE UNIT 4
- BASE QUATERNARY CHANNEL INFILL SEDIMENTS

20CS_A22

SEABED 0.000
SAND 4.320
GRAVEL 5.120
CLAY 7.420

* CPT LOCATION & ID w/ SEDIMENT TYPES, THICKNESS*, & CPT TIP RESISTIVITY CURVE (2020 SAMPLES/2021 SAMPLES)

GENERAL NOTES:

1. THE SURVEY DATA DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED ON THE DATES LISTED BELOW AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ANY BACKGROUND IMAGERY USED IS FROM MICROSOFT CORP. EARTHSTAR GEOGRAPHICS SIO BING.
3. HORIZONTAL DATUM: UTM83-18 (m)
   VERTICAL DATUM: MLLW (m)

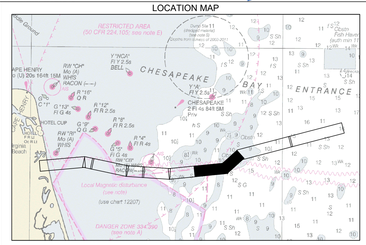
*INFORMATION PROVIDED BY CLIENT

LIST OF SURVEY EQUIPMENT

Item	RV Shearwater	RV Minerva Uno (2020 / 2021)
Positioning	Applanix POS MV OceanMaster CNAV 3050	Applanix POS MV OceanMaster CNAV 5000
SVP	AML Moving Vessel Profiler AML Plus SVP/CTD	AML Moving Vessel Profiler 350 AML Minos X
USBL	Sonardyne Scout Plus	Sonardyne Scout / Ranger
MBES	R2 Sonic 2024	R2 Sonic 2024
SSS	Edgetech 4200 (300–600kHz)	Edgetech 4200 (300–600kHz)
TVG	2 x Geometrics 882 Cesium Vapor	2 x Geometrics 882 Cesium Vapor
SBP	Innomar Medium SES 2000	Innomar Medium SES 2000
S-UHRS	AA301 Boomer Single-Channel 8 Element Hydrophone Streamer	AA301 Geomarine Boomer Single-Channel 8 Element Hydrophone Streamer
Grab Sampler	N/A	Harmon Surficial Day Grab Sampler

Dominion Energy, Inc.
8th & Main Building, 707 East Main St
Richmond, VA 23219

LOCATION MAP



Coastal Virginia Offshore Wind Commercial (CVOW-C) Export Cable Route Corridor

CENTERLINE ALIGNMENT CHART

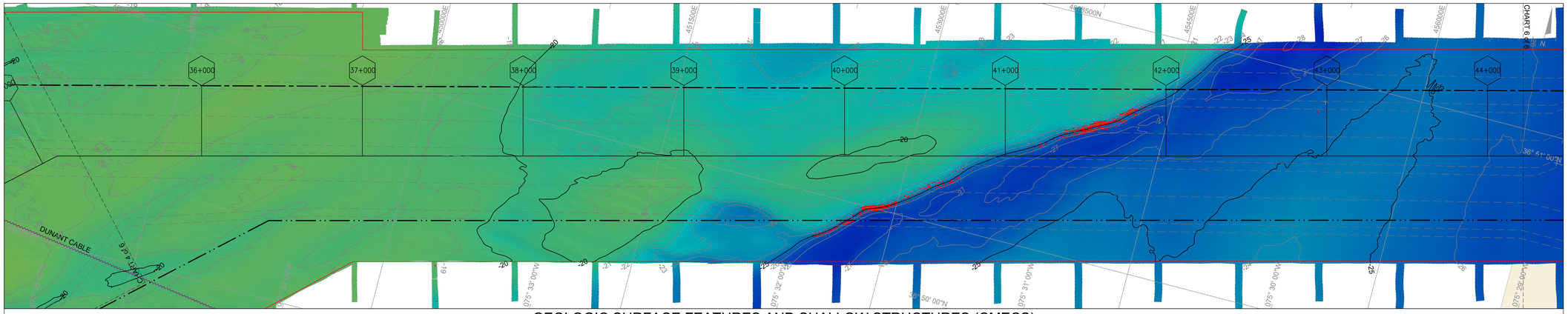
kp 26+074 to kp 35+224

HORIZONTAL SCALE 1:10,000 (1cm = 100m = 328.1ft)
0 100 200 400 600
0 1 2 4 8
VERTICAL SCALE 1:100 (1cm = 1m = 3.3ft)

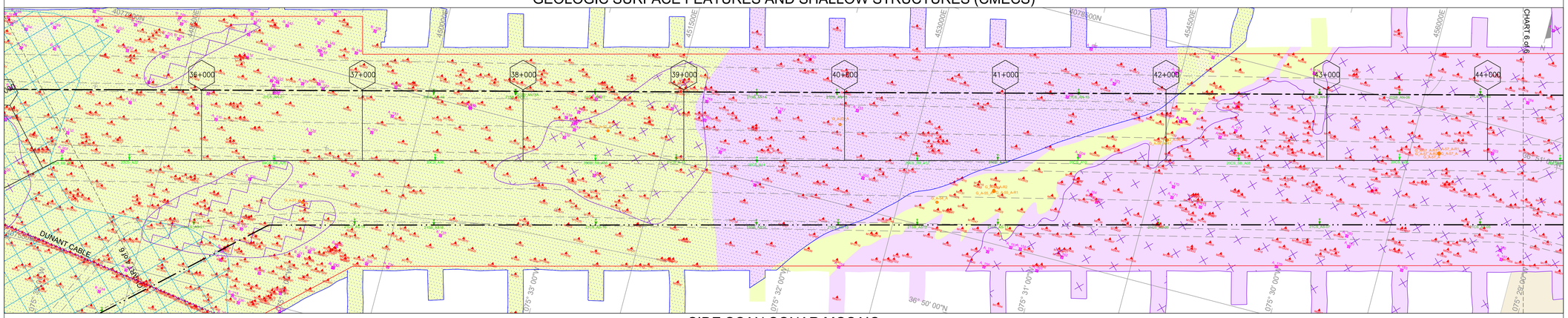
GEODETIC INFORMATION
DATUM : NAD83 (2011)
VERTICAL : MLLW (m)
PROJECTION : UTM83-18N

Drawing Name:	ALIGNMENT CENTERLINE-002
Drawn By:	Minerva Uno / Shearwater
Approved By:	JB
Interp. By:	KR
Party Chief:	DW/TK
Drawn By:	BE
Revision:	3 18-Aug-2021
Issue Date:	08-Feb-2021
Survey Date:	May - Nov 2020 & Jan - May 2021
Chart Num:	4 of 6

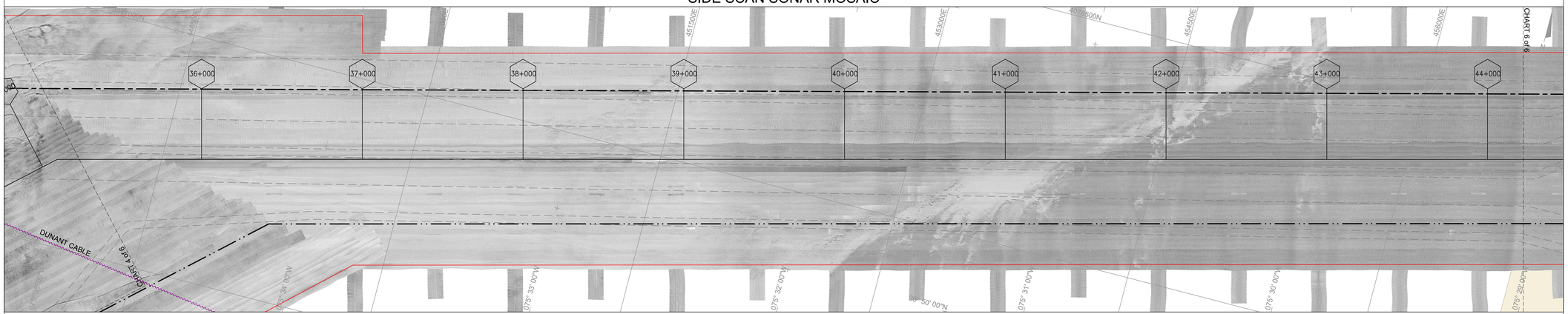
BATHYMETRIC CONTOURS AND SLOPES GREATER THAN 5°



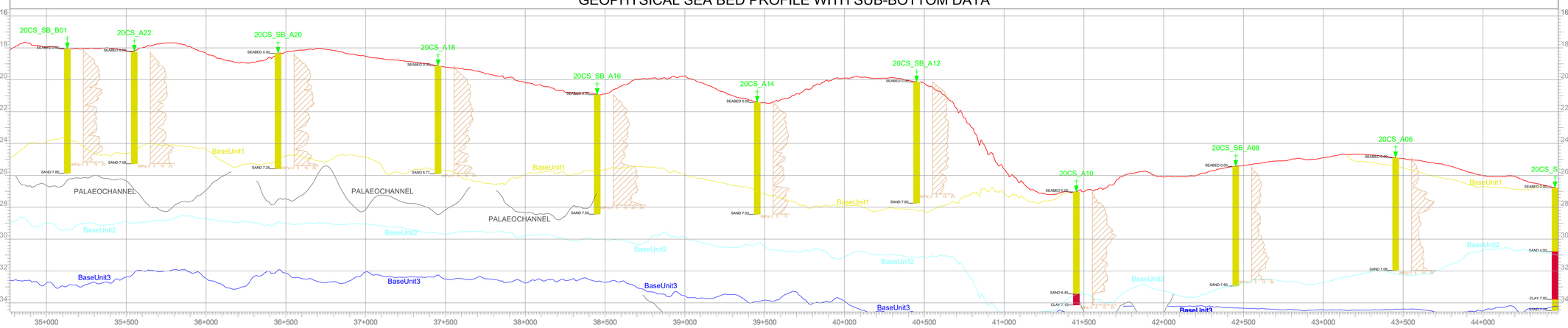
GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURES (CMECS)



SIDE SCAN SONAR MOSAIC



GEOPHYSICAL SEA BED PROFILE WITH SUB-BOTTOM DATA



LEGEND

- DISTANCE POST (KILOMETERS) 1+234
- NORTH ROUTE / CENTER ROUTE / SOUTH ROUTE
- ROUTE*
- CONCEPTUAL CABLE ROUTE (DETAILED RE-ROUTING/MICRO-SITING WILL FOLLOW)*
- DIGITIZED SHORE *
- PILOT ROUTE CORRIDOR CVOW-P HVDC CABLE
- STATE / FEDERAL WATERS BOUNDARY *
- SURVEY AREA LIMITS *
- DAM NECK OCEAN DISPOSAL SITE *
- VA BEACH EXPLOSIVES DUMPING GROUNDS
- BOEM LEASE AREA *
- SUB-MARINE CABLE *
- D.O.D. BOUNDARY

BATHYMETRY LEGEND

- 20 MAJOR BATHYMETRY CONTOUR - MBES - @ 5m INTERVAL
- MINOR BATHYMETRY CONTOUR - MBES - @ 1m INTERVAL
- SLOPES EQUAL 5° OR GREATER

BATHYMETRIC COLOR SCALE KEY

-7.8 -10.0 -12.5 -15.0 -17.5 -20.0 -22.5 -25.0 -27.5 -29.0

OBSERVED SOUNDINGS HAVE BEEN REDUCED TO THE MLLW TIDAL DATUM.
THE BATHYMETRY CHART USES THE AVERAGE VALUES, GRID CELL SIZE 50cm BY 50cm. SUN ILLUMINATION FROM 45° AZIMUTH AND 45°ELEVATION WITH VERTICAL EXAGERRATION OF 1.0.

SURFACE FEATURES & SHALLOW STRUCTURES LEGEND

- SEA BED CLASSIFICATION - CONSTRUCTION HASH
- SEA BED CLASSIFICATION - FINE SAND
- SEA BED CLASSIFICATION - FINE TO MEDIUM SAND
- SEA BED CLASSIFICATION - COARSE TO VERY COARSE SAND
- SEA BED CLASSIFICATION - GRAVELLY SAND
- SEA BED CLASSIFICATION - MUD
- SEA BED CLASSIFICATION - MUDDY SAND
- SEA BED CLASSIFICATION - SANDY GRAVEL
- SEA BED FEATURE - SAND BANK
- SEA BED FEATURE - SAND WAVES
- SEA BED FEATURE - DEPRESSION LOCATION
- SEA BED FEATURE - DEPRESSION AREA
- SEA BED FEATURE - MEGARIPPLES
- SEA BED FEATURE - RIPPLES
- SEA BED FEATURE - SCAR
- CABLES (INTERPRETED POSITION)
- G_C-34_A GRAB SAMPLE LOCATION - ALPINE 2020
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2013*
- G_C-34_A GRAB SAMPLE LOCATION - TETRA TECH 2020*
- SIDE SCAN SONAR TARGET & ID
- MAGNETOMETER TARGET & ID
- VC-005 VIBROCORE SAMPLE LOCATION - TETRA TECH 2013*
- 20CS_A22 2020 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP
- 21CS_A22 2021 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP

SIDE SCAN SONAR MOSAIC LEGEND

THE RESOLUTION OF THE CHARTED SIDE SCAN SONAR MOSAIC IS 1mpp. ONLY LOW FREQUENCY (APPROXIMATELY 233kHz) SIDE SCAN SONAR LINES ARE INCLUDED IN THE MOSAIC. ALL LINES WERE ACQUIRED USING A RANGE OF 50m.

HIGH — LOW

GEOPHYSICAL PROFILE LEGEND

- SEABED SURFACE
- BASE UNIT 1
- BASE UNIT 3
- PALAEOCHANNEL
- BASE UNIT 2
- BASE UNIT 4
- BASE QUATERNARY CHANNEL INFILL SEDIMENTS

20CS_A22

SEABED 0.000
SAND 4.320
GRAVEL 5.120
CLAY 7.420

* CPT LOCATION & ID w/ SEDIMENT TYPES, THICKNESS', & CPT TIP RESISTIVITY CURVE (2020 SAMPLES/2021 SAMPLES)

GENERAL NOTES:

1. THE SURVEY DATA DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED ON THE DATES LISTED BELOW AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ANY BACKGROUND IMAGERY USED IS FROM MICROSOFT CORP. EARTHSTAR GEOGRAPHICS SIO BING.
3. HORIZONTAL DATUM: UTM83-18 (m)
   VERTICAL DATUM: MLLW (m)

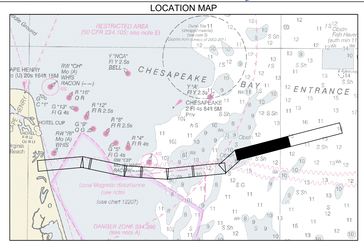
*INFORMATION PROVIDED BY CLIENT

LIST OF SURVEY EQUIPMENT

Item	RV Shearwater	RV Minerva Uno (2020 / 2021)
Positioning	Applanix POS MV OceanMaster CNAV 3050	Applanix POS MV OceanMaster CNAV 5000
SVP	AML Moving Vessel Profiler AML Plus SVP/CTD	AML Moving Vessel Profiler 350 AML Minos X
USBL	Sonardyne Scout Plus	Sonardyne Scout / Ranger
MBES	R2 Sonic 2024	R2 Sonic 2024
SSS	Edgetech 4200 (300–600kHz)	Edgetech 4200 (300–600kHz)
TVG	2 x Geometrics 882 Cesium Vapor	2 x Geometrics 882 Cesium Vapor
SBP	Innomar Medium SES 2000	Innomar Medium SES 2000
S-UHRS	AA301 Boomer Single-Channel 8 Element Hydrophone Streamer	AA301 Geomarine Boomer Single-Channel 8 Element Hydrophone Streamer
Grab Sampler	N/A	Harmon Surficial Day Grab Sampler

Dominion Energy, Inc.
8th & Main Building, 707 East Main St
Richmond, VA 23219

LOCATION MAP



Coastal Virginia Offshore Wind Commercial (CVOW-C) Export Cable Route Corridor

CENTERLINE ALIGNMENT CHART

kp 34+772 to kp 44+472

HORIZONTAL SCALE 1:10,000 (1cm = 100m = 328.1ft)
0 100 200 400 600

VERTICAL SCALE 1:100 (1cm = 1m = 3.3ft)
0 1 4 8

GEODETIC INFORMATION
DATUM : NAD83 (2011)
VERTICAL : MLLW (m)
PROJECTION : UTM83-18N

Drawing Name:	ALIGNMENT CENTERLINE-002
Created:	Minerva Uno / Shearwater
Approved By:	JB
Interp. By:	KR
Party Chief:	DW/TK
Drawn By:	BE
Revision:	3 18-Aug-2021
Issue Date:	08-Feb-2021
Survey Date:	May - Nov 2020 & Jan - May 2021
Chart Num:	5 of 6

ALPINE OCEAN SEISMIC SURVEY INC 155 Hudson Ave Norwood New Jersey 07648 Tel 201-768-8000 Fax 201-768-5750 www.alpineocean.com

BATHYMETRIC CONTOURS AND SLOPES GREATER THAN 5°



GEOLOGIC SURFACE FEATURES AND SHALLOW STRUCTURES (CMECS)



SIDE SCAN SONAR MOSAIC



GEOPHYSICAL SEA BED PROFILE WITH SUB-BOTTOM DATA



LEGEND

- DISTANCE POST (KILOMETERS) 1+234
- NORTH ROUTE / CENTER ROUTE / SOUTH ROUTE
- ROUTE*
- CONCEPTUAL CABLE ROUTE (DETAILED RE-ROUTING/MICRO-SITING WILL FOLLOW)*
- DIGITIZED SHORE *
- PILOT ROUTE CORRIDOR CVOW-P HVDC CABLE
- STATE / FEDERAL WATERS BOUNDARY *
- SURVEY AREA LIMITS *
- DAM NECK OCEAN DISPOSAL SITE *
- VA BEACH EXPLOSIVES DUMPING GROUNDS
- BOEM LEASE AREA *
- SUB-MARINE CABLE *
- D.O.D. BOUNDARY

BATHYMETRY LEGEND

- 20 — MAJOR BATHYMETRY CONTOUR - MBES - @ 5m INTERVAL
- MINOR BATHYMETRY CONTOUR - MBES - @ 1m INTERVAL
- SLOPES EQUAL 5° OR GREATER

BATHYMETRIC COLOR SCALE KEY

-7.8 -10.0 -12.5 -15.0 -17.5 -20.0 -22.5 -25.0 -27.5 -29.0

OBSERVED SOUNDINGS HAVE BEEN REDUCED TO THE MLLW TIDAL DATUM.
THE BATHYMETRY CHART USES THE AVERAGE VALUES, GRID CELL SIZE 50cm BY 50cm. SUN ILLUMINATION FROM 45° AZIMUTH AND 45°ELEVATION WITH VERTICAL EXAGERRATION OF 1.0.

SURFACE FEATURES & SHALLOW STRUCTURES LEGEND

- SEA BED CLASSIFICATION - CONSTRUCTION HASH
- SEA BED CLASSIFICATION - FINE SAND
- SEA BED CLASSIFICATION - FINE TO MEDIUM SAND
- SEA BED CLASSIFICATION - COARSE TO VERY COARSE SAND
- SEA BED CLASSIFICATION - GRAVELLY SAND
- SEA BED CLASSIFICATION - MUD
- SEA BED CLASSIFICATION - MUDDY SAND
- SEA BED CLASSIFICATION - SANDY GRAVEL
- SEA BED FEATURE - SAND BANK
- SIDE SCAN SONAR TARGET & ID
- MAGNETOMETER TARGET & ID
- 20CS_A22 — 2020 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP
- SEA BED FEATURE - SAND WAVES
- SEA BED FEATURE - DEPRESSION LOCATION
- SEA BED FEATURE - DEPRESSION AREA
- SEA BED FEATURE - MEGARIPPLES
- SEA BED FEATURE - RIPPLES
- SEA BED FEATURE - SCAR
- CABLES (INTERPRETED POSITION)
- G_C-34_A — GRAB SAMPLE LOCATION - ALPINE 2020
- G_C-34_A — GRAB SAMPLE LOCATION - TETRA TECH 2013*
- G_C-34_A — GRAB SAMPLE LOCATION - TETRA TECH 2020*
- VC-005 — VIBROCORE SAMPLE LOCATION - TETRA TECH 2013*
- 21CS_A22 — 2021 CPT AND/OR BOREHOLE SAMPLE LOCATION & ID* - GEOQUIP

SIDE SCAN SONAR MOSAIC LEGEND

THE RESOLUTION OF THE CHARTED SIDE SCAN SONAR MOSAIC IS 1mpp. ONLY LOW FREQUENCY (APPROXIMATELY 233kHz) SIDE SCAN SONAR LINES ARE INCLUDED IN THE MOSAIC. ALL LINES WERE ACQUIRED USING A RANGE OF 50m.

HIGH — LOW

GEOPHYSICAL PROFILE LEGEND

- SEABED SURFACE
- BASE UNIT 1
- BASE UNIT 3
- PALAEOCHANNEL
- BASE UNIT 2
- BASE UNIT 4
- BASE QUATERNARY CHANNEL INFILL SEDIMENTS

20CS_A22

SEABED 0.000
SAND 4.320
GRAVEL 5.120
CLAY 7.420

* CPT LOCATION & ID w/ SEDIMENT TYPES, THICKNESS*, & CPT TIP RESISTIVITY CURVE (2020 SAMPLES/2021 SAMPLES)

GENERAL NOTES:

1. THE SURVEY DATA DEPICTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED ON THE DATES LISTED BELOW AND CAN ONLY BE CONSIDERED TO INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ANY BACKGROUND IMAGERY USED IS FROM MICROSOFT CORP. EARTHSTAR GEOGRAPHICS SIO BING.
3. HORIZONTAL DATUM: UTM83-18 (m)
   VERTICAL DATUM: MLLW (m)

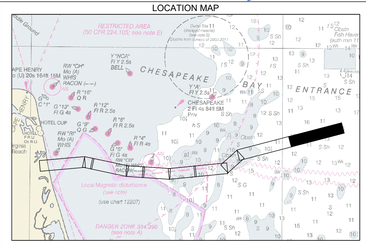
*INFORMATION PROVIDED BY CLIENT

LIST OF SURVEY EQUIPMENT

Item	RV Shearwater	RV Minerva Uno (2020 / 2021)
Positioning	Applanix POS MV OceanMaster CNAV 3050	Applanix POS MV OceanMaster CNAV 5000
SVP	AML Moving Vessel Profiler AML Plus SVP/CTD	AML Moving Vessel Profiler 350 AML Minos X
USBL	Sonardyne Scout Plus	Sonardyne Scout / Ranger
MBES	R2 Sonic 2024	R2 Sonic 2024
SSS	Edgetech 4200 (300–600kHz)	Edgetech 4200 (300–600kHz)
TVG	2 x Geometrics 882 Cesium Vapor	2 x Geometrics 882 Cesium Vapor
SBP	Innomar Medium SES 2000	Innomar Medium SES 2000
S-UHRS	AA301 Boomer Single-Channel 8 Element Hydrophone Streamer	AA301 / Geomarine Boomer Single-Channel 8 Element Hydrophone Streamer
Grab Sampler	N/A	Harmon Surficial Day Grab Sampler

Dominion Energy, Inc.
8th & Main Building, 707 East Main St
Richmond, VA 23219

LOCATION MAP



Coastal Virginia Offshore Wind Commercial (CVOW-C) Export Cable Route Corridor

CENTERLINE ALIGNMENT CHART

kp 44+222 to kp 46+328

HORIZONTAL SCALE 1:10,000 (1cm = 100m = 328.1ft)
0 100 200 400 600
0 1 4 8
VERTICAL SCALE 1:100 (1cm = 1m = 3.3ft)

GEODETIC INFORMATION
DATUM : NAD83 (2011)
VERTICAL : MLLW (m)
PROJECTION : UTM83-18N

Drawing Name:	ALIGNMENT CENTERLINE=002
Vessel:	Minerva Uno / Shearwater
Approved By:	JB
Interp. By:	KR
Party Chief:	DW/TK
Drawn By:	BE
Revision:	3 18-Aug-2021
Issue Date:	08-Feb-2021
Survey Date:	May - Nov 2020 & Jan - May 2021
Chart Num.:	6 of 6

Alpine