

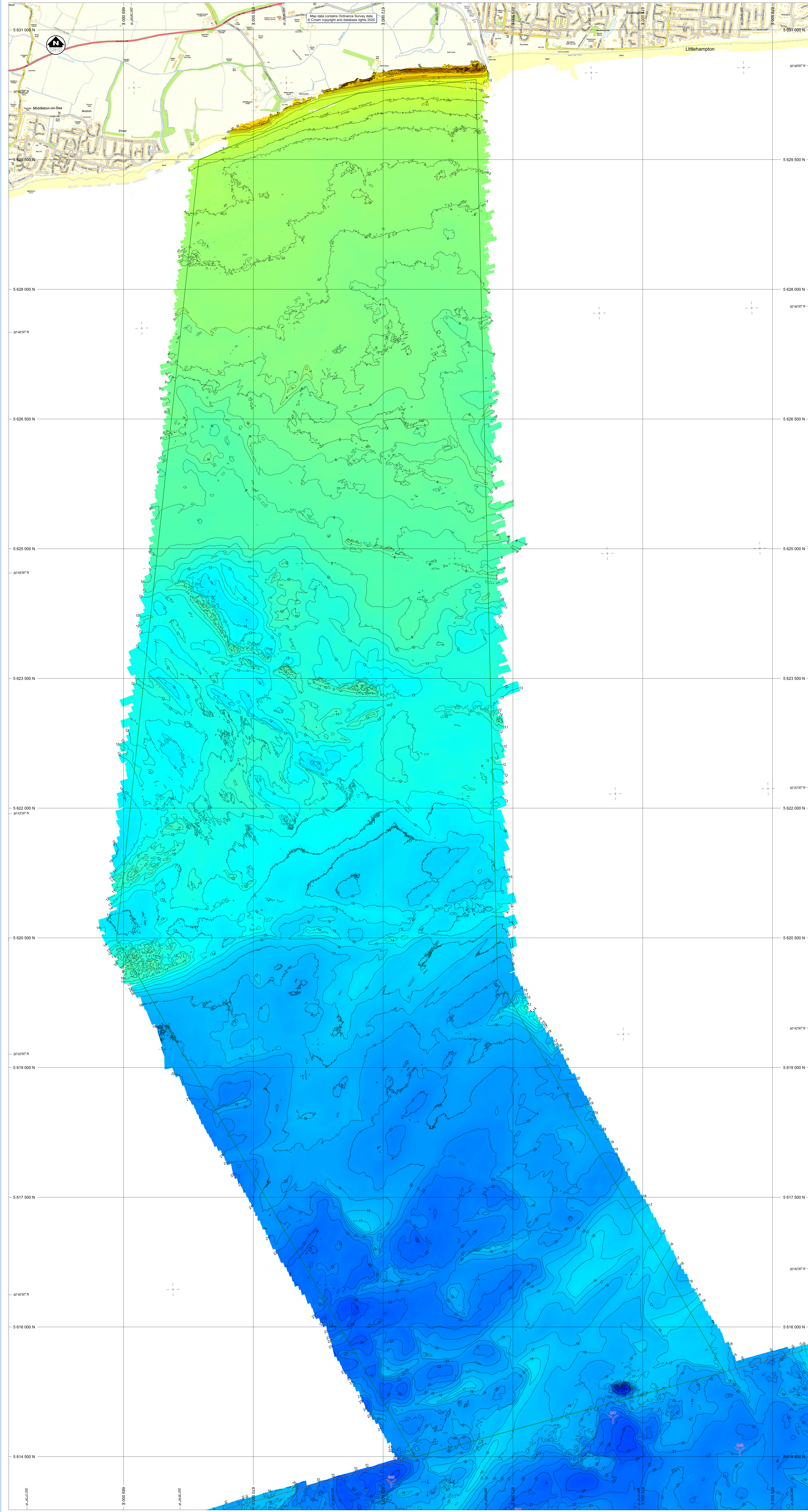
Rampion 2 Wind Farm
Category 6:
Environmental Statement
Volume 4, Appendix 9.4
Geophysical survey (Part 7 of 7)
Date: August 2023
Revision A

Document Reference: 6.4.9.4
Pursuant to: APFP Regulation 5 (2) (a)
Ecodoc number: 004866474-01



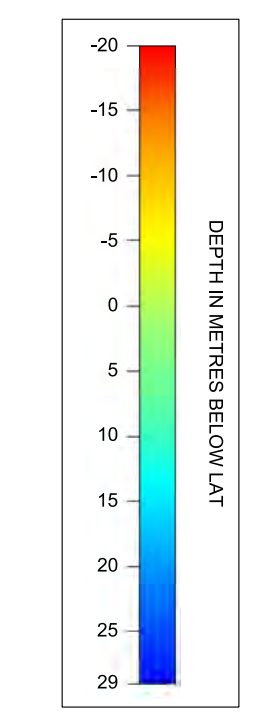
Document revisions

Revision	Date	Status/reason for issue	Author	Checked by	Approved by
A	04/08/2023	Final for DCO Application	GoBe	RED	RED



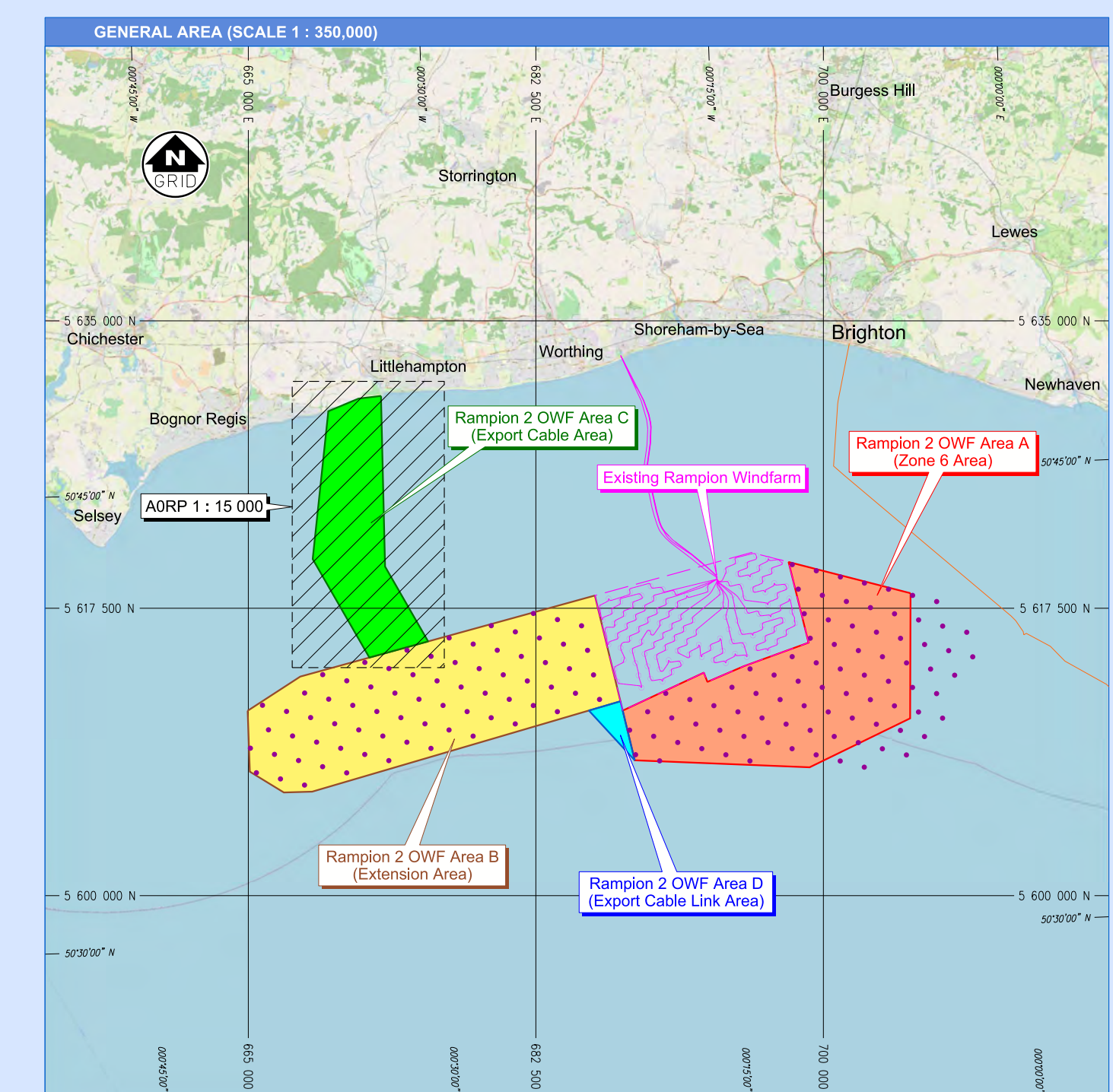
LEGEND

- PROPOSED RAMPION 2 OWF AREA C (EXPORT CABLE AREA)
- PROPOSED RAMPION 2 OWF AREA B (EXTENSION AREA)
- PROPOSED RAMPION 2 WIND TURBINE GENERATOR LAYOUT (SOURCE: CLIENT PROVIDED)
- BATHYMETRIC CONTOURS SHOWN AT 5 METRE INTERVALS LAT
- 19 — BATHYMETRIC CONTOURS SHOWN AT 1 METRE INTERVALS LAT



NOTES

- OBSERVED SOUNDINGS HAVE BEEN REDUCED TO LAT TIDAL DATUM USING ONES HEIGHT DATA PROCESSED USING PPP (PRECISE POINT POSITIONING) TECHNIQUES AND THE UKHO VORF MODEL.
- THE DIFFERENCE BETWEEN LAT TO MSL IS 3.3m
- DATA GRIDDED AT 1m x 1m

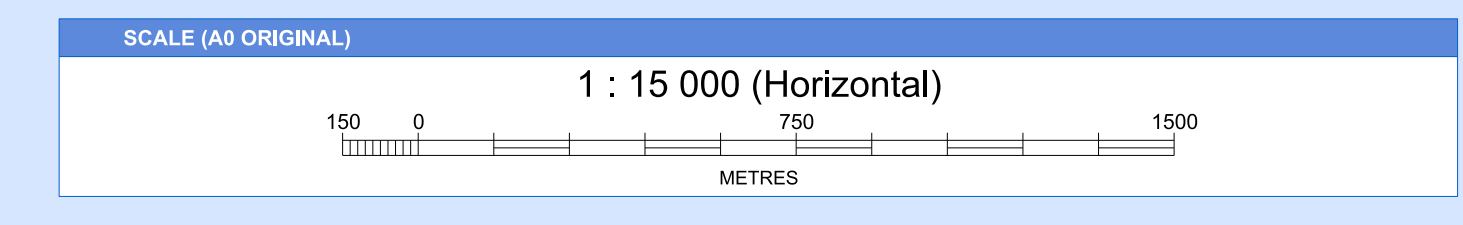


GEODETHIC REFERENCE SYSTEM

GEODETHIC DATUM: ELIPSOID
 PROJECTION: UTM ZONE 30 N (CENTRAL MERIDIAN 3° W)
 WGS84
 WGS84

SURVEY INFORMATION

SURVEY VESSEL: M.V. VIGILANT	30-AUG-2020 TO 01-AUG-2020	M.V. TITAN DISCOVERY	01-AUG-2020 TO 12-AUG-2020	M.V. OCEAN OBSERVER	16-SEP-2020 TO 19-OCT-2020
SURVEY DATE:		OCEAN RING C-MANUS	APPLANK POS MV WAVEMASTER	FURIO STARFIX DGSS	SONAR/ME RANGER USBL
POSITIONING SYSTEM:		SONAR/ME RANGER USBL	VOYAGER S	SONAR/ME RANGER USBL	VOYAGER S
NAVIGATION SYSTEM:		SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL
ECHO SOUNDER (MULTI-BEAM SYSTEM):	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL
ECHO SOUNDER (SINGLE-BEAM SYSTEM):	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL
SIDE SCAN SONAR:	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL
MARKET/CONTAINER:	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL
SUB-BOTTOM PROFILER:	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL
ULTRA-HIGH RESOLUTION SEISMIC (UHR):	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL	SONAR/ME RANGER USBL



TITLE

SURVEY CONTRACTOR

Gardline

GARDLINE LIMITED
 ENDEAVOUR HOUSE, ADMIRALTY ROAD, GREAT YARMOUTH, NORFOLK NR30 3NG, ENGLAND
 TELEPHONE: +44 (0) 1493 84800 FAX: +44 (0) 1493 85218 WEBSITE: WWW.GARDLINE.COM

CLIENT

RWE
 The energy to lead

PROJECT TITLE

**RAMPION 2 OFFSHORE WINDFARM DEVELOPMENT
 GEOPHYSICAL SITE SURVEY FOR AREA C**

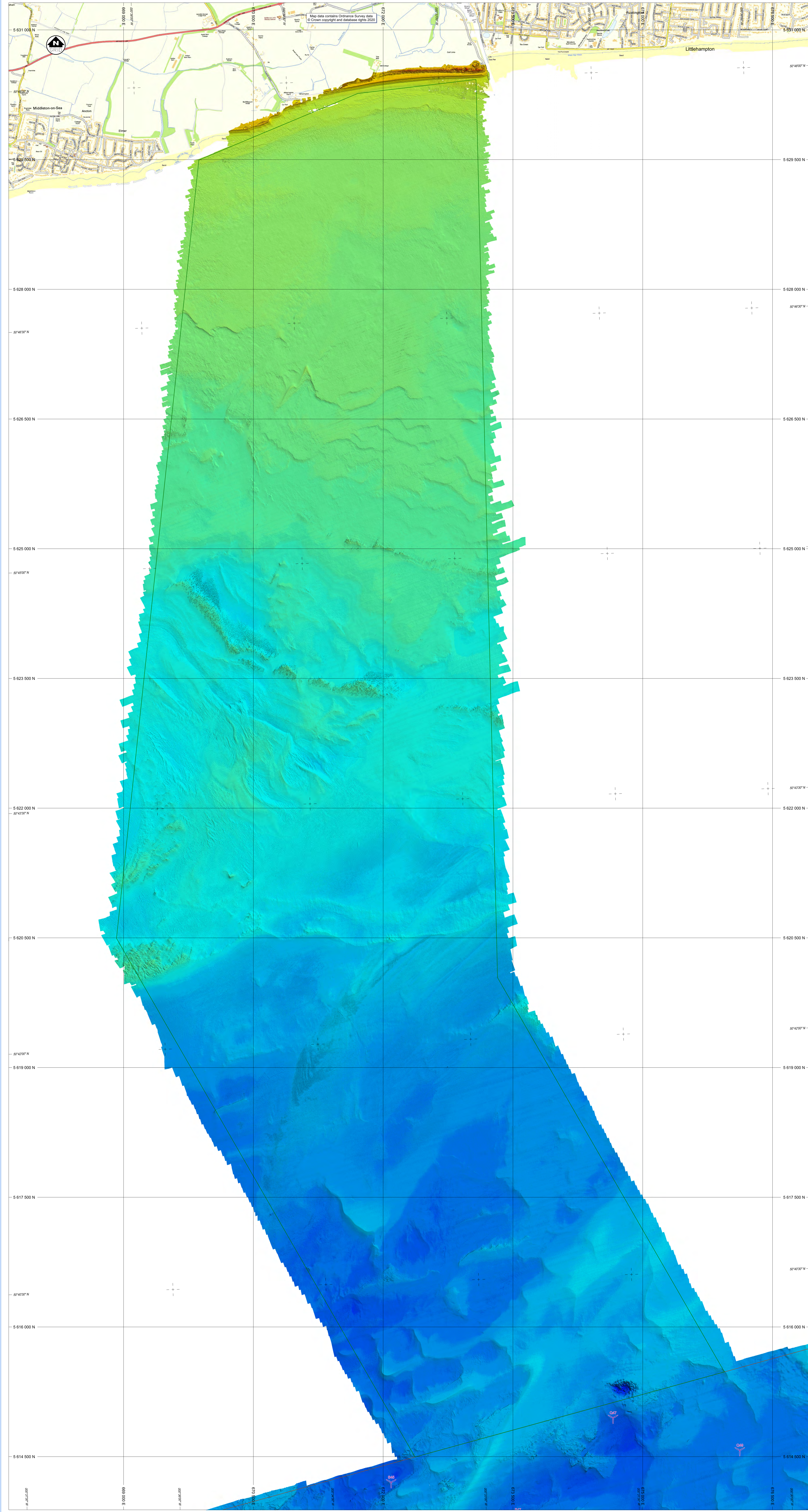
DRAWING TITLE

**BATHYMETRY
 CHART 4**

REVISION

REV.	DATE	TITLE	DESCRIPTION	AUTHOR	DRAWN	CHECKED	APPROVED
0	03-AUG-2020	DRAFT	FIRST ISSUE FOR CLIENT REVIEW, PDF ONLY	MC	JS	MC	CHG

CLIENT REFERENCE **REPORT REFERENCE** 11521.4 **DRAWING NUMBER** 11521.4.04

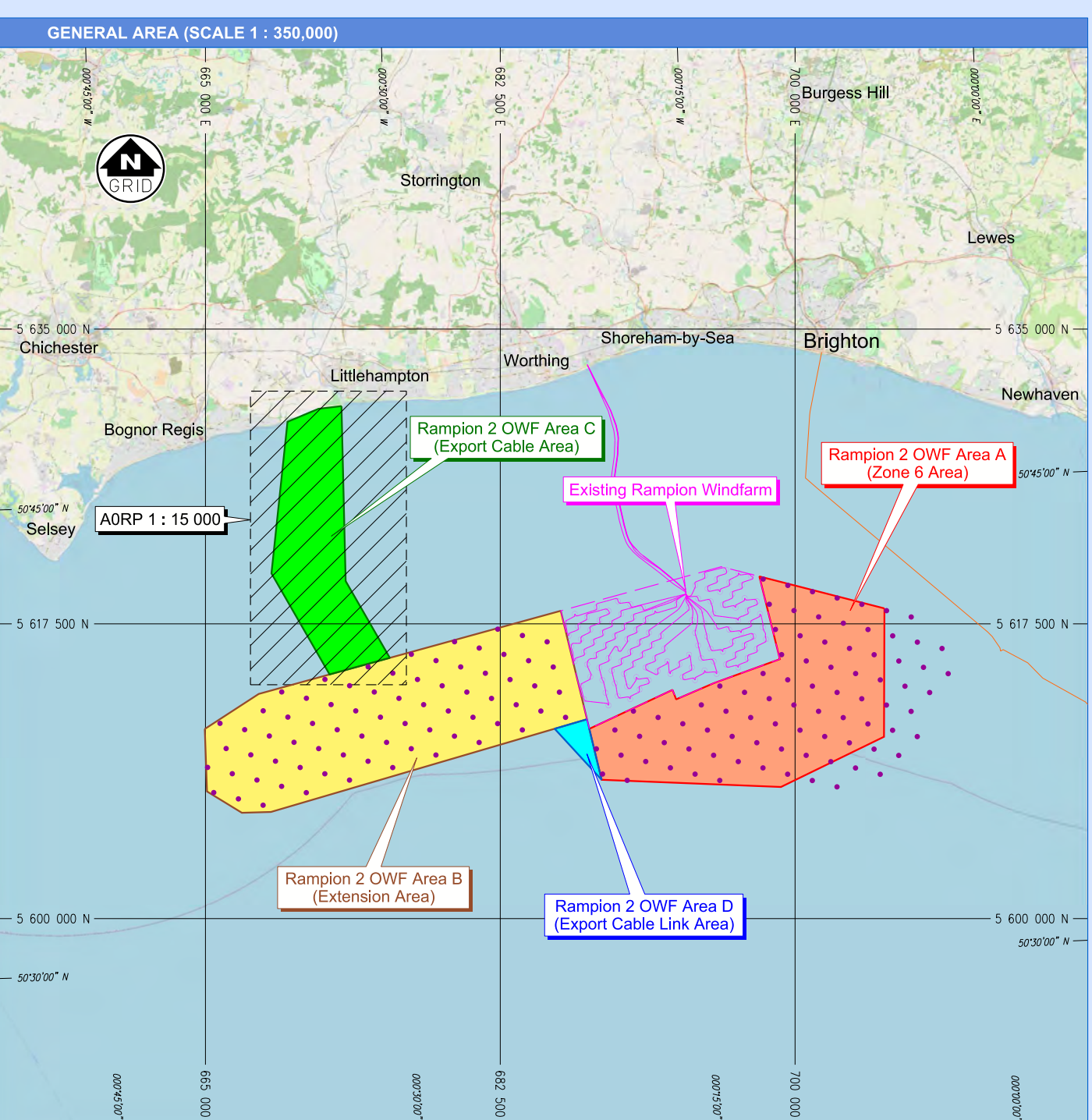


LEGEND

- PROPOSED RAMPION 2 OVF AREA C (EXPORT CABLE AREA)
- PROPOSED RAMPION 2 OVF AREA B (EXTENSION AREA)
- PROPOSED RAMPION 2 WIND TURBINE GENERATOR LAYOUT (SOURCE: CLIENT PROVIDED)

DEPTH (METRES)

- NOTES**
- OBSERVED SOUNDINGS HAVE BEEN REDUCED TO LAT TIDAL DATUM USING ONES HEIGHT DATA PROCESSED USING PPP (PRECISE POINT POSITIONING) TECHNIQUES AND THE UKHO VORF MODEL.
 - THE DIFFERENCE BETWEEN LAT TO MSL IS 3.3m
 - DATA GRIDDED AT 1m x 1m
 - SHADED RELIEF IMAGE - AZIMUTH=45°, ELEVATION=45°

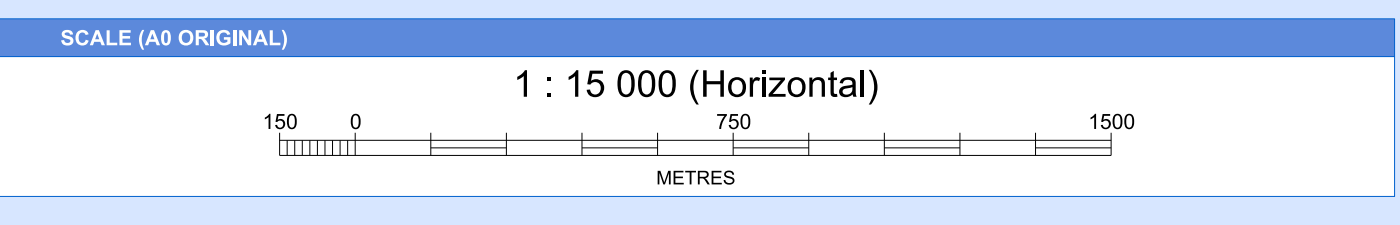


GEODETM REFERENCE SYSTEM

GEODETM DATUM: WGS84
 PROJECTION: UTM ZONE 30 N (CENTRAL MERIDIAN 3° W)

SURVEY INFORMATION

SURVEY VESSEL: M.V. VIGILANT	M.V. TITAN DISCOVERY	M.V. OCEAN OBSERVER
SURVEY DATE: 01-AUG-2020 TO 01-AUG-2020	01-AUG-2020 TO 12-AUG-2020	16-SEP-2020 TO 19-OCT-2020
POSITIONING SYSTEM: OCEANORING C-MAV DGNS	APPLANK POS MV WAVEMASTER	FURIO STAFFIX DGNS
NAVIGATION SYSTEM: SONAR/DYME RANGER USBL	SONAR/DYME RANGER USBL	SONAR/DYME RANGER USBL
VOYAGER 5	VOYAGER 5	VOYAGER 5
ECHO SOUNDER (MULTI-BEAM SYSTEM): SIMRAD EK600	REDON T25P DUAL HEAD	SIMRAD EK600
ECHO SOUNDER (SINGLE-BEAM SYSTEM): SIMRAD EK600	DDCM ECHOTRAC MKII	SIMRAD EK600
SIDE SCAN SONAR: EDGE TECH 400P/S	EDGE TECH 400P/S	EDGE TECH 400P/S
MAGNETOMETER: GEOMETRICK GMR2	GEOMETRICK GMR2	GEOMETRICK GMR2
SUB-BOTTOM PROFLER: GEACACOUSTICS PINGER	SURFACE TOW BOOMER	GEACACOUSTICS PINGER
ULTRA-HIGH RESOLUTION SEISMIC (UHR):		1 x 10' DIA. T.I. SLEEVE GUN 75m TELEDYNE STREAMER



TITLE

SURVEY CONTRACTOR
Gardline
 GARDLINE LIMITED
 ENDEAVOUR HOUSE, ADMIRALTY ROAD, GREAT YARMOUTH, NORFOLK NR30 3NG, ENGLAND
 TELEPHONE: +44 (0) 1493 84800 FAX: +44 (0) 1493 85278 WEBSITE: WWW.GARDLINE.COM

CLIENT
RWE
 The energy to lead

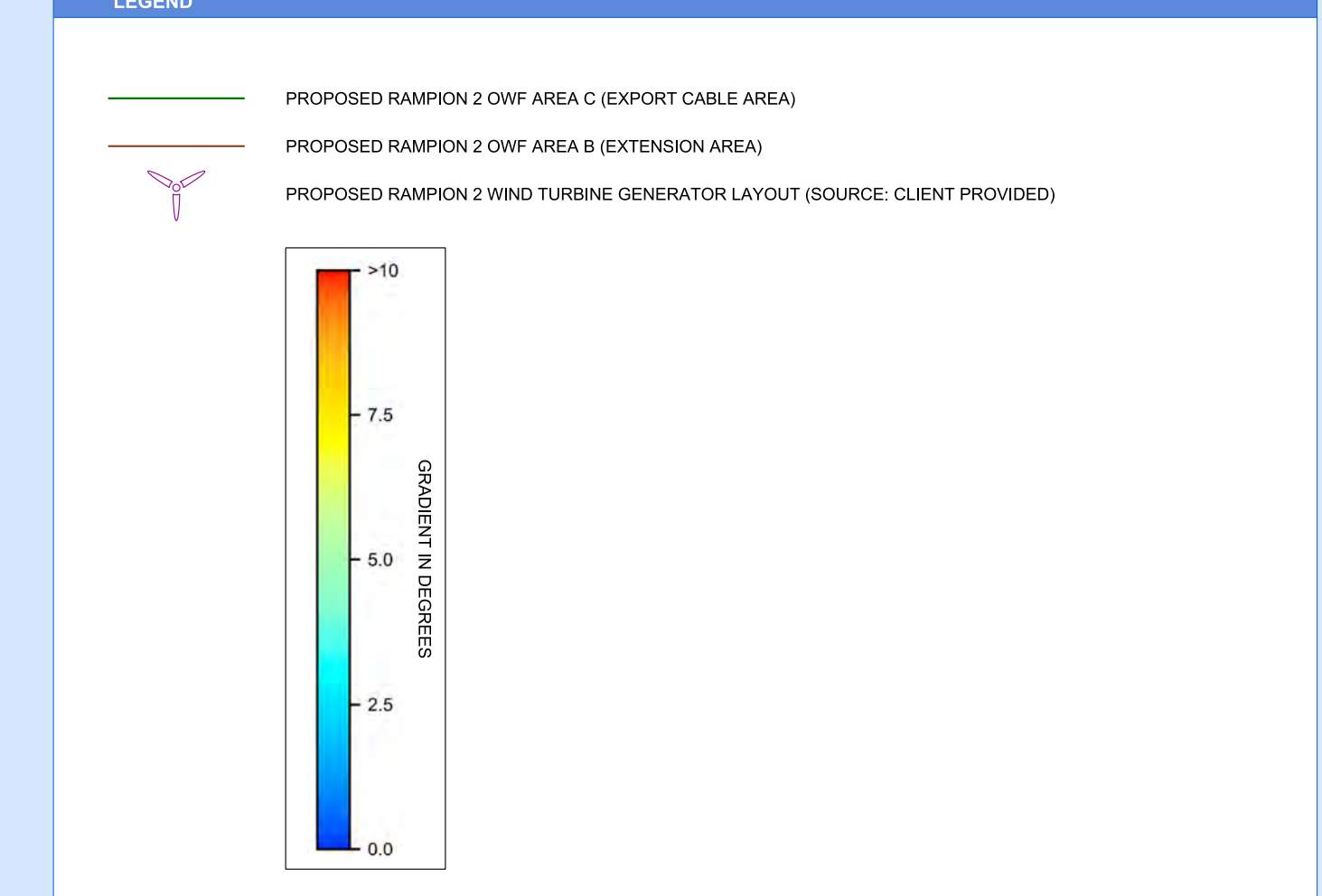
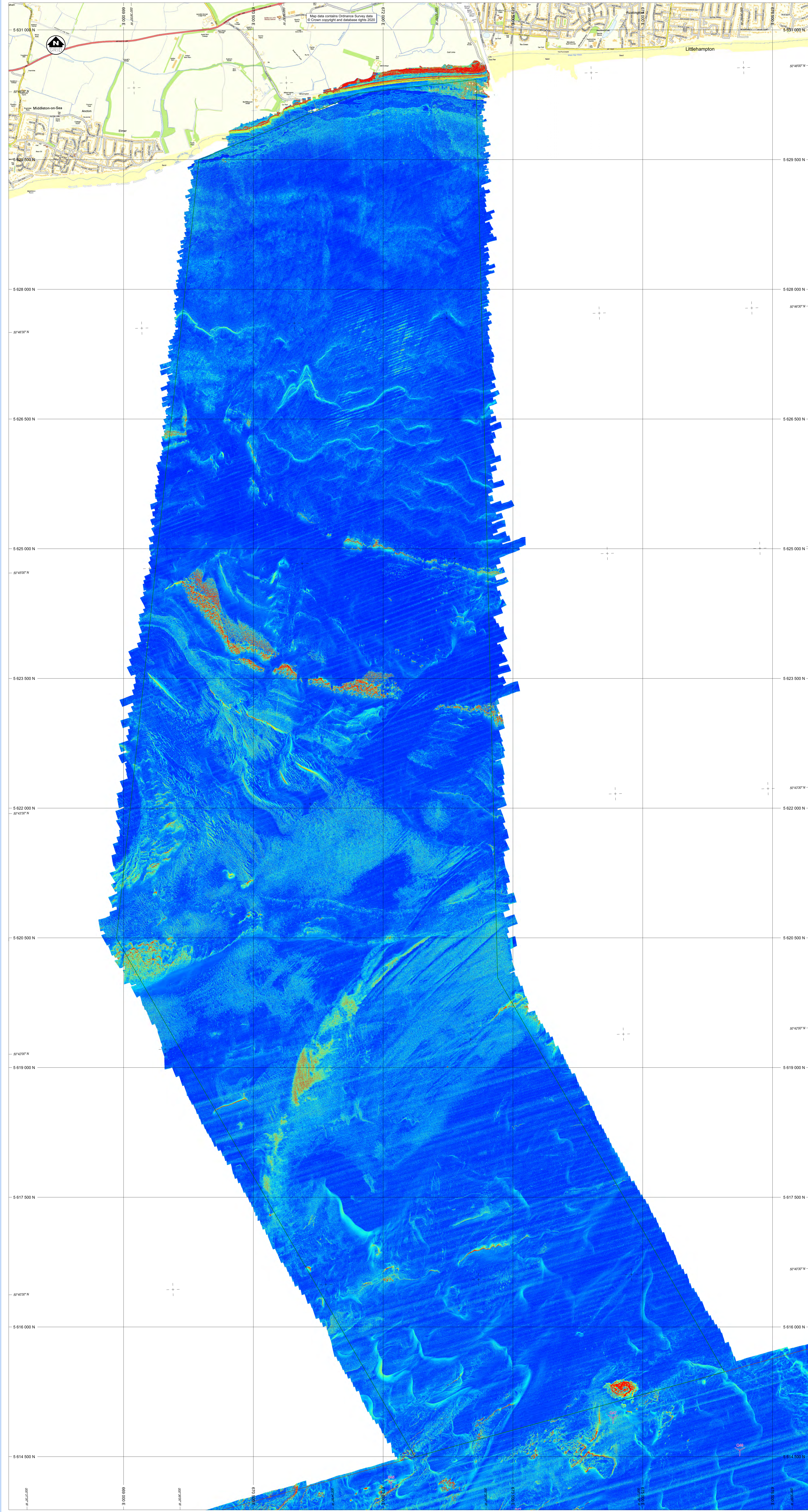
PROJECT TITLE
**RAMPION 2 OFFSHORE WINDFARM DEVELOPMENT
 GEOPHYSICAL SITE SURVEY FOR AREA C**

DRAWING TITLE
**SEABED SHADED RELIEF
 CHART 5**

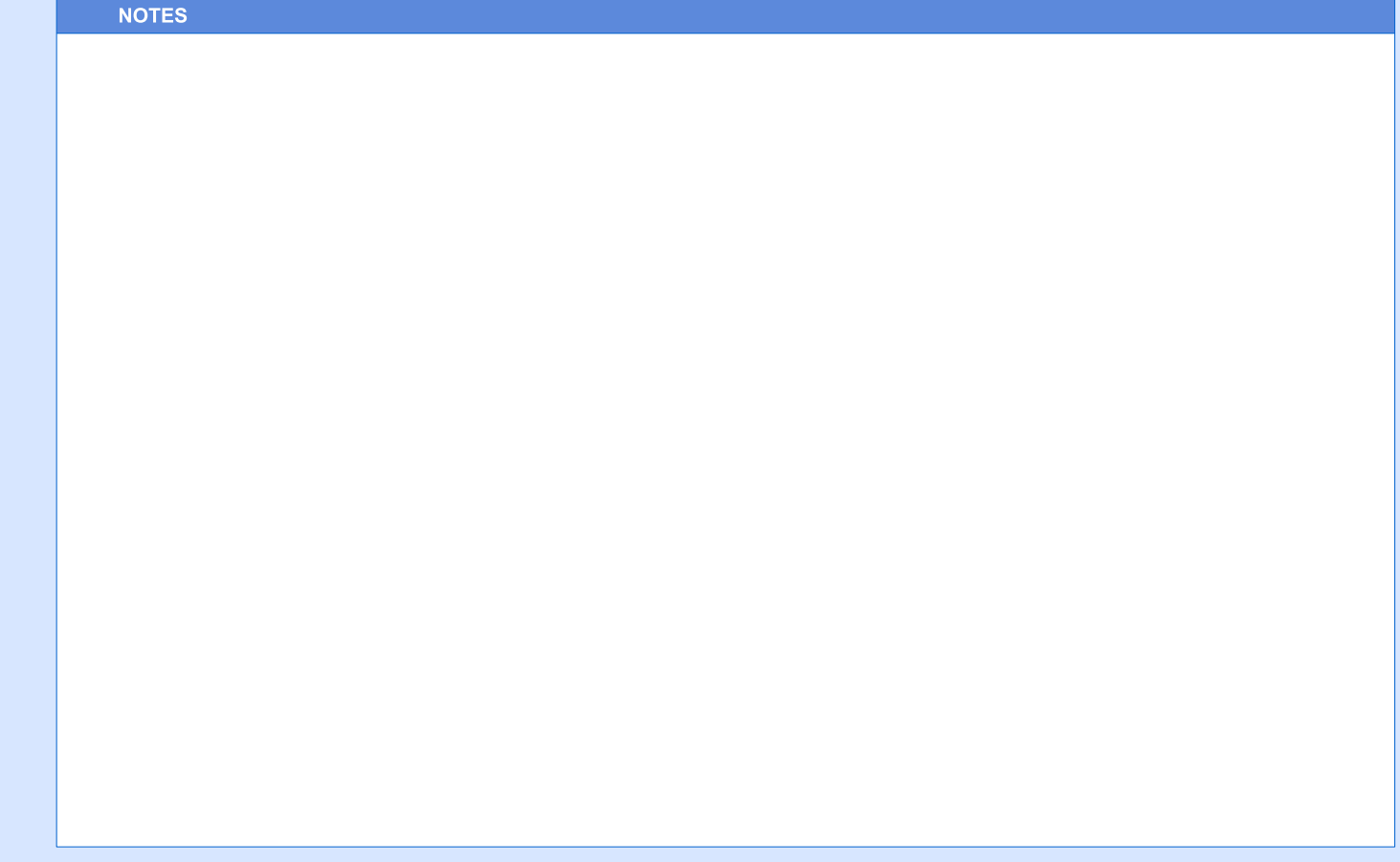
REVISION

REV.	DATE	TITLE	DESCRIPTION	AUTHOR	DRAWN	CHECKED	APPROVED
0	03-MAY-2020	DRAFT	FIRST ISSUE FOR CLIENT REVIEW, PDF ONLY	MC	JS	MC	CHG

CLIENT REFERENCE: REPORT REFERENCE: 11521.4 DRAWING NUMBER: 11521.4.05



NOTES

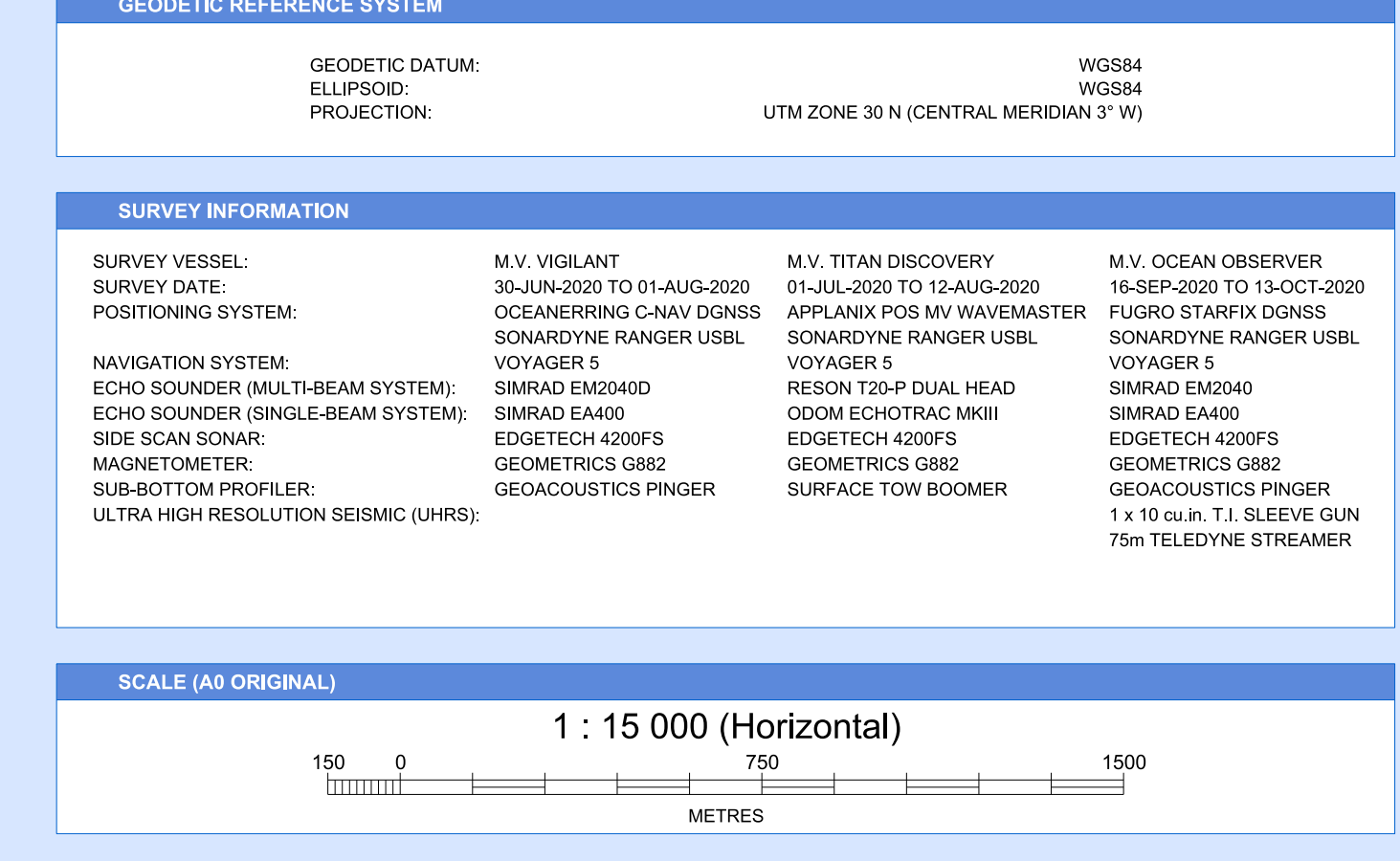


GEODETIC REFERENCE SYSTEM

GEODETIC DATUM:	ELIPSOID	WGS84
PROJECTION:	UTM ZONE 30 N (CENTRAL MERIDIAN 3° W)	

SURVEY INFORMATION

SURVEY VESSEL:	M.V. VIGILANT	M.V. TITAN DISCOVERY	M.V. OCEAN OBSERVER
SURVEY DATE:	30-JAN-2020 TO 01-AUG-2020	01-JUL-2020 TO 12-AUG-2020	16-SEP-2020 TO 19-OCT-2020
POSITIONING SYSTEM:	OCEANRING C-MAV DGNS	APPLANK POS MV WAVEMASTER	FURIO STARFIX DGNS
NAVIGATION SYSTEM:	VOYAGER 5	SONARBYNE RANGER USBL	SONARBYNE RANGER USBL
ECHO SOUNDER (MULTI-BEAM SYSTEM):	SIERRA DISCOVER	RESON 730P DUAL HEAD	SIERRA ECHO4D
ECHO SOUNDER (SINGLE-BEAM SYSTEM):	SIERRA EA400	DOCM ECHOTRAC-MKH	SIERRA EA400
SIDE SCAN SONAR:	EDGE TECH 4000S	EDGE TECH 4000S	EDGE TECH 4000S
MARKET CENTER:	GEOMETRICK G842	GEOMETRICK G842	GEOMETRICK G842
SUB-BOTTOM PROFLER:	GEACOUSTICS PINGER	SURFACE TOW BOOMER	GEACOUSTICS PINGER
ULTRA-HIGH RESOLUTION SEISMIC (UHR):			1 x 10' CH. T.S. SLEEVE GUN 75m TELEDYNE STREAMER



TITLE

SURVEY CONTRACTOR

GARDLINE LIMITED
 ENDEAVOUR HOUSE, ADMIRALTY ROAD, GREAT YARMOUTH, NORFOLK NR30 3NG, ENGLAND
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CLIENT

The energy to lead

PROJECT TITLE

RAMPION 2 OFFSHORE WINDFARM DEVELOPMENT
 GEOPHYSICAL SITE SURVEY FOR AREA C

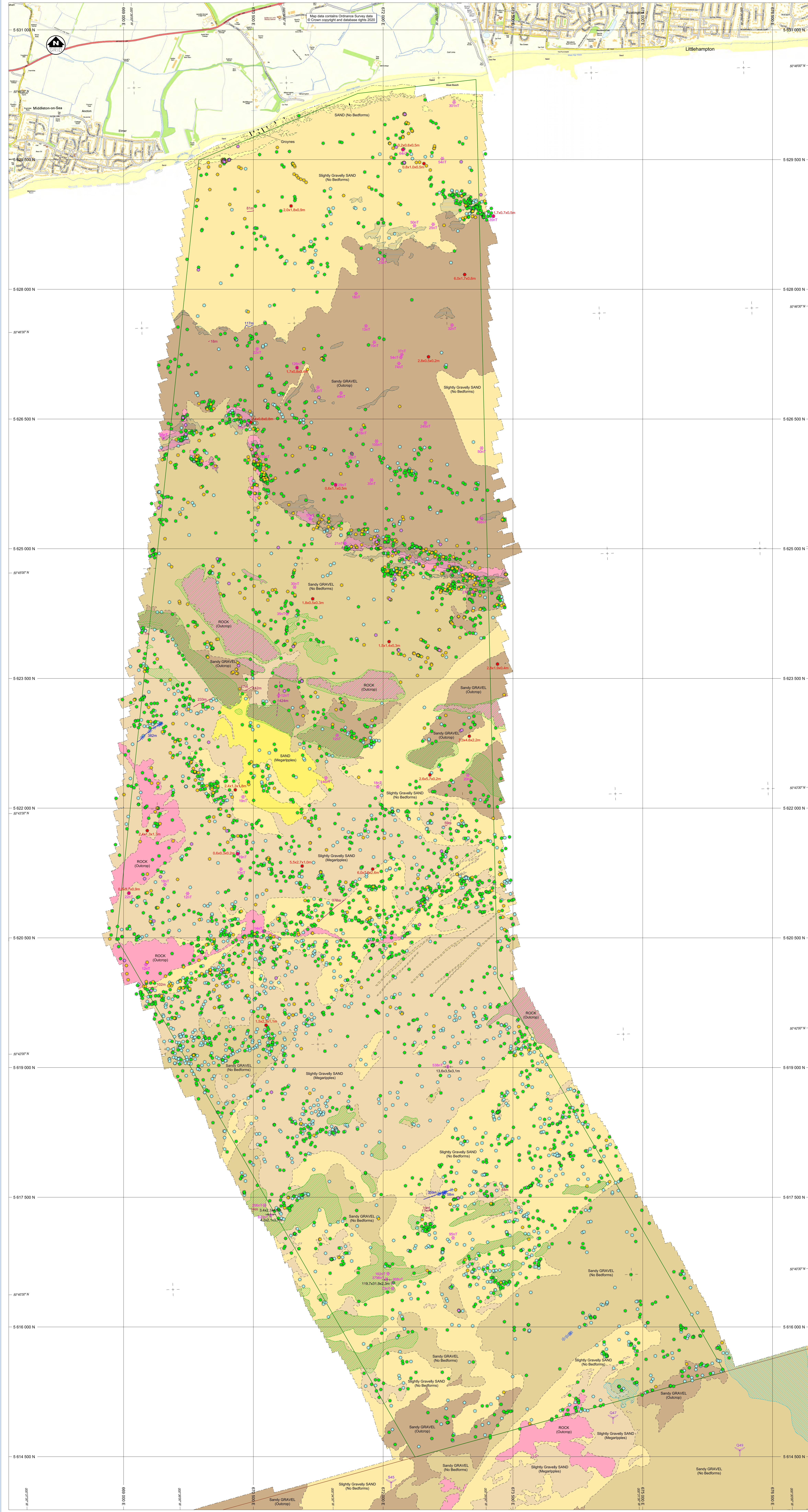
DRAWING TITLE

SEABED GRADIENT
 CHART 6

REVISION

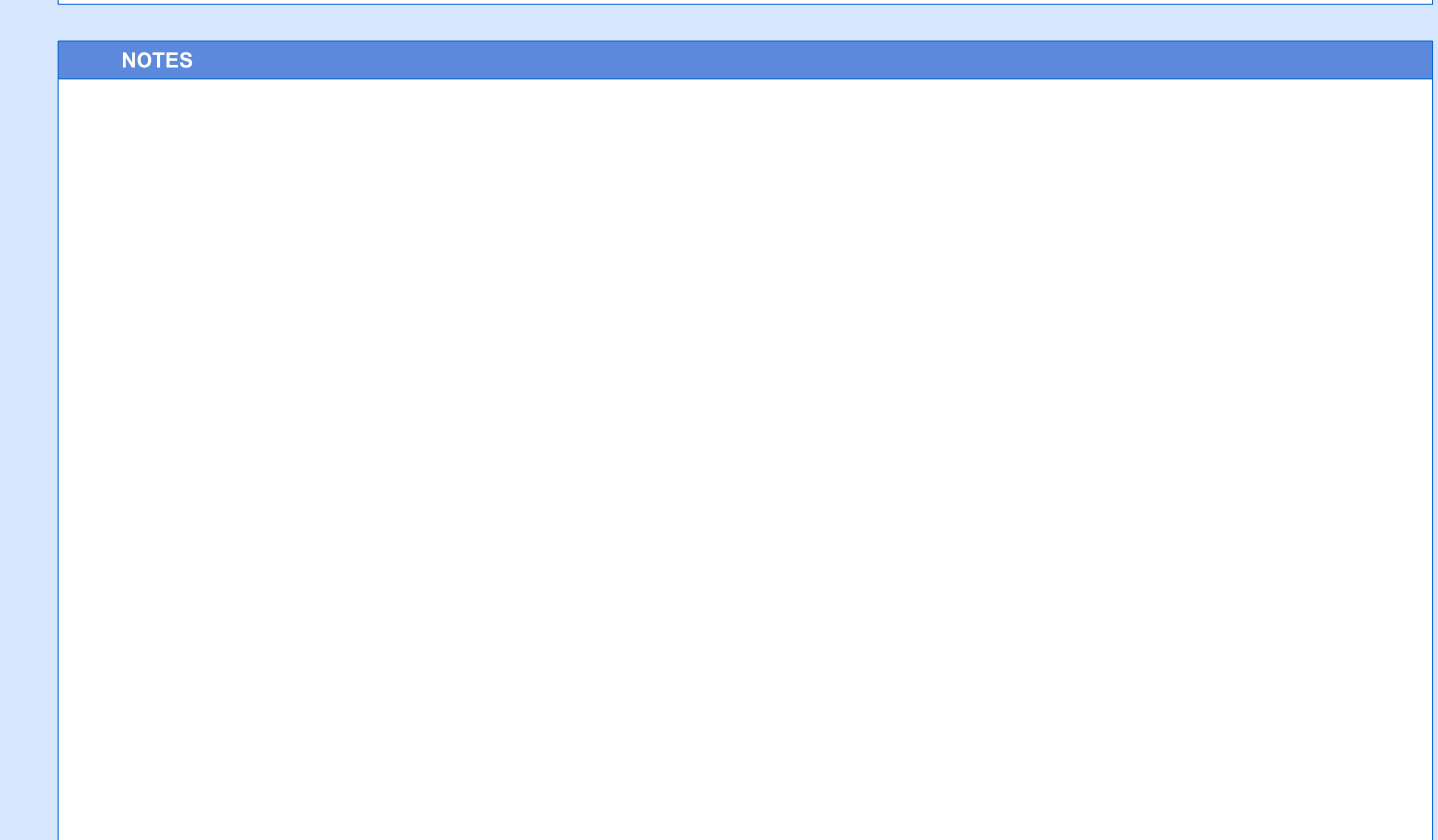
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0	03-AUG-2020	DRAFT	FIRST ISSUE FOR CLIENT REVIEW, PDF ONLY	MC	JS	MC	CHG

CLIENT REFERENCE: REPORT REFERENCE: 11521.4 DRAWING NUMBER: 11521.4.06



- LEGEND**
- PROPOSED RAMPION 2 OVF AREA C (EXPORT CABLE AREA)
 - PROPOSED RAMPION 2 OVF AREA B (EXTENSION AREA)
 - PROPOSED RAMPION 2 WIND TURBINE GENERATOR LAYOUT (SOURCE: CLIENT PROVIDED)
 - SAND (NO BEDFORMS)
 - SAND (MEGARIPPLED)
 - SLIGHTLY GRAVELLY SAND (NO BEDFORMS)
 - SLIGHTLY GRAVELLY SAND (MEGARIPPLED)
 - SANDY GRAVEL (NO BEDFORMS)
 - SANDY GRAVEL (MEGARIPPLED)
 - SANDY GRAVEL (OUTCROP)
 - ROCK (OUTCROP)
 - AREA OF NUMEROUS BOULDERS
 - AREA OF POSSIBLE DREDGING EXTRACTION
 - AREA OF BIOGENIC STRUCTURES - POSSIBLE DENSE BLACK BREAM NEST AGGREGATIONS
 - BOULDER WITH HEIGHT 0.1-0.2 METRES
 - BOULDER WITH HEIGHT 0.3-0.5 METRES
 - BOULDER WITH HEIGHT 0.6-1.0 METRES
 - BOULDER WITH HEIGHT GREATER THAN 1.0 METRES
 - DEBRIS WITH DIMENSIONS IN METRES (LxWxH)
 - MAGNETOMETER ANOMALY WITH FIELD STRENGTH IN nT
 - WRECK WITH DIMENSIONS IN METRES (LxWxH)
 - LINEAR DEBRIS WITH LENGTH IN METRES
 - FISHING POT
 - LINEAR FISHING GEAR WITH LENGTH IN METRES
 - POSSIBLE INFRASTRUCTURE WITH LENGTH IN METRES
 - GROYNES
 - LIMIT OF SIDE SCAN SONAR COVERAGE

NOTES

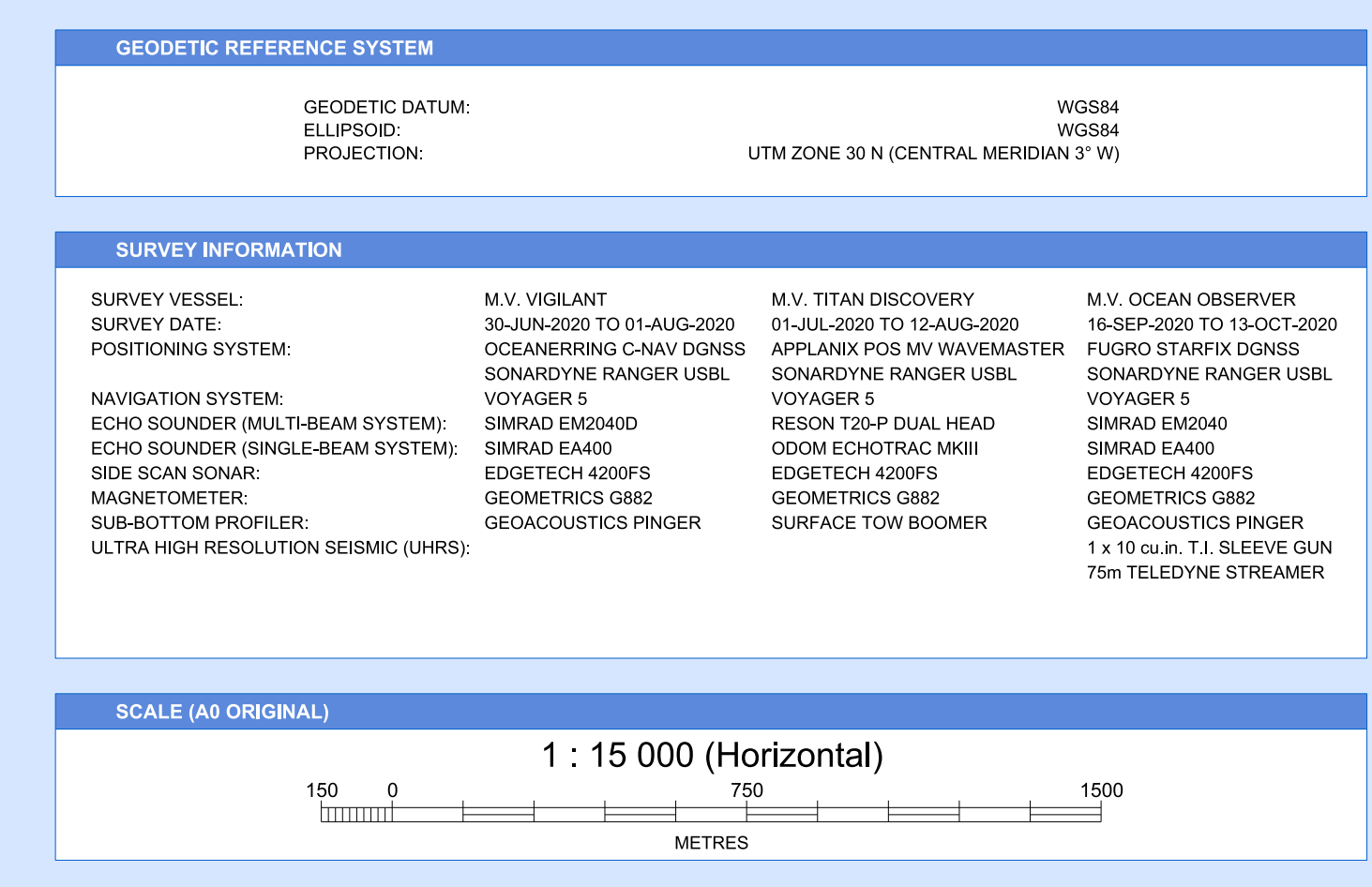


GEODETIC REFERENCE SYSTEM

GEODETIC DATUM:	WGS84
ELLIPSOID:	WGS84
PROJECTION:	UTM ZONE 30 N (CENTRAL MERIDIAN 3° W)

SURVEY INFORMATION

SURVEY VESSEL:	M.V. VIGILANT	M.V. TITAN DISCOVERY	M.V. OCEAN OBSERVER
SURVEY DATE:	30-JUN-2020 TO 01-AUG-2020	01-JUL-2020 TO 12-AUG-2020	16-SEP-2020 TO 19-OCT-2020
POSITIONING SYSTEM:	OCEANRING C-MAN GONNS SONAR/ME RANGER USBL VOYAGER 5	APLANK POS MV WAVEMASTER SONAR/ME RANGER USBL VOYAGER 5	FURIO STARFIX GONNS SONAR/ME RANGER USBL VOYAGER 5
NAVIGATION SYSTEM:	SHIMADZU D8000	RESON TSP DUAL HEAD	SHIMADZU E6040
ECHO SOUNDER (SINGLE-BEAM SYSTEM):	EDGETECH 4000S	EDGETECH 4000S	EDGETECH 4000S
MARKETOMETER:	GEOMETRICK G802	GEOMETRICK G802	GEOMETRICK G802
SUB-BOTTOM PROFILER:	GEACOUSTICS PINGER	GEACOUSTICS PINGER	GEACOUSTICS PINGER
ULTRA-HIGH RESOLUTION SEISMIC (UHRIS):		SURFACE TOW BOOMER	1 x 10' C&T, T-1 SLEEVE GUN 75m TELEDYNE STREAMER



TITLE

SURVEY CONTRACTOR

 GARDLINE LIMITED
 ENDEAVOUR HOUSE, ADMIRALTY ROAD, GREAT YARMOUTH, NORFOLK NR31 3NG, ENGLAND
 TELEPHONE: +44 (0) 1493 848000 FAX: +44 (0) 1493 827818 WEBSITE: WWW.GARDLINE.COM

CLIENT

 The energy to lead

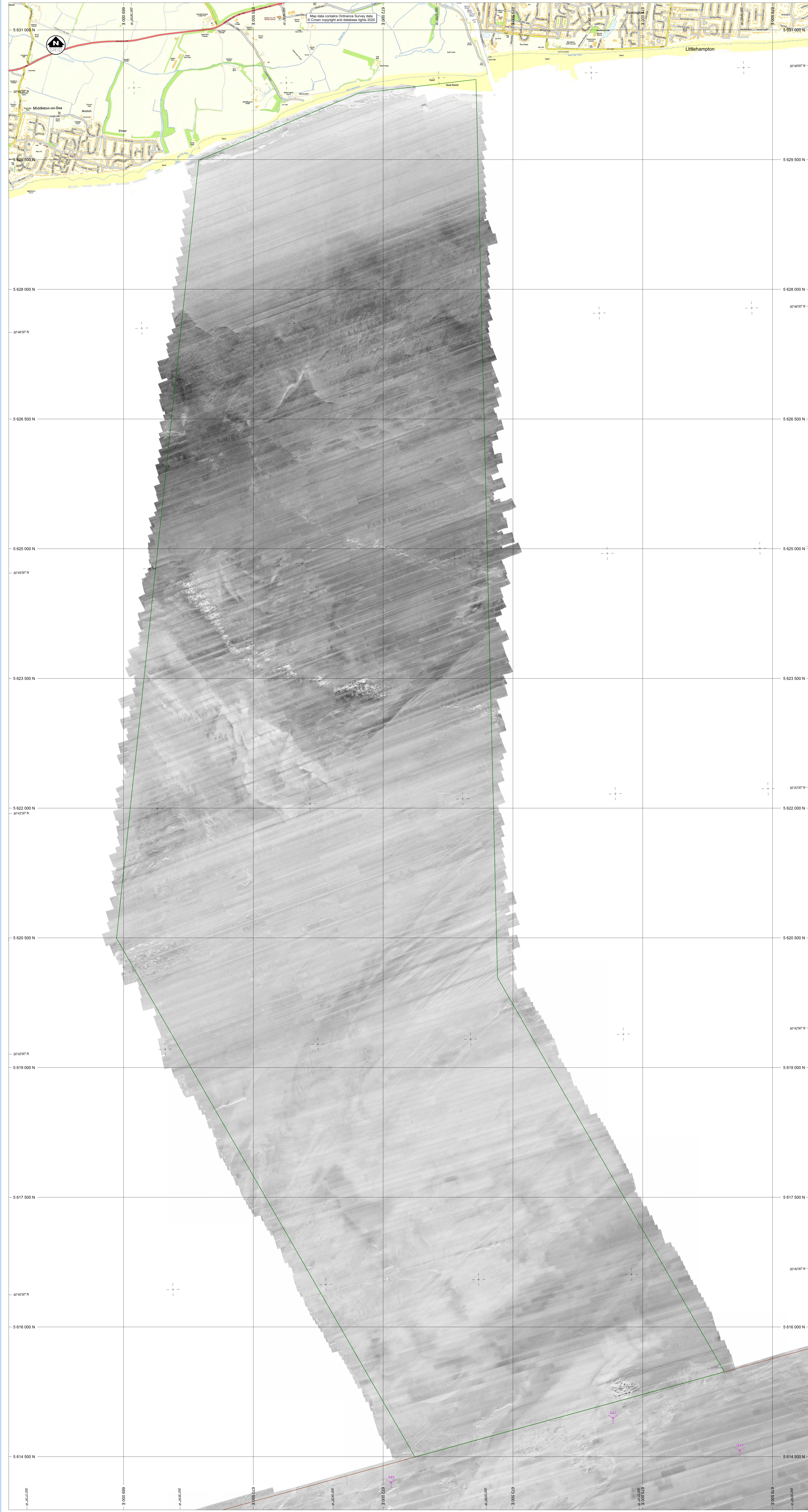
PROJECT TITLE
 RAMPION 2 OFFSHORE WINDFARM DEVELOPMENT
 GEOPHYSICAL SITE SURVEY FOR AREA C

DRAWING TITLE
 SEABED FEATURES
 CHART 7

REVISION

REV.	DATE	TITLE	DESCRIPTION	AUTHOR	DRAWN	CHECKED	APPROVED
0	03-AUG-2020	DRAFT	FIRST ISSUE FOR CLIENT REVIEW, PDF ONLY	CT	JS	MC	CHG

CLIENT REFERENCE: REPORT REFERENCE: 11521.4 DRAWING NUMBER: 11521.4.07

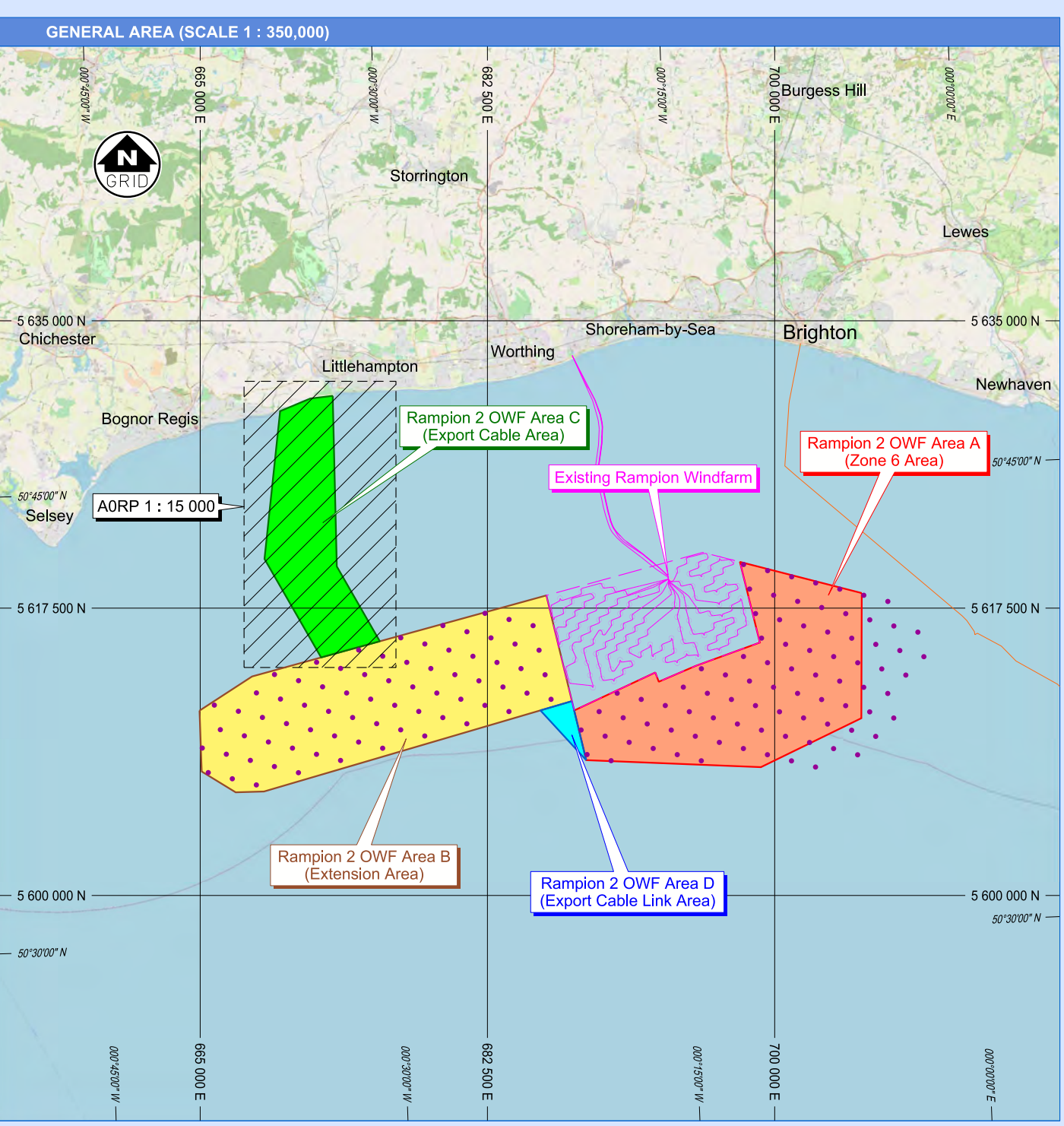


LEGEND

- PROPOSED RAMPION 2 OWF AREA C (EXPORT CABLE AREA)
- PROPOSED RAMPION 2 OWF AREA B (EXTENSION AREA)
- PROPOSED RAMPION 2 WIND TURBINE GENERATOR LAYOUT (SOURCE: CLIENT PROVIDED)

NOTES

1. THE SIDE SCAN SONAR MOSAIC HAS BEEN GENERATED FROM M.V. TITAN DISCOVERY USING A FREQUENCY OF 122550kHz AND M.V. VIGILANT USING A FREQUENCY 122410kHz AND EXPORTED AT A RESOLUTION OF 2 METRES PER PIXEL.

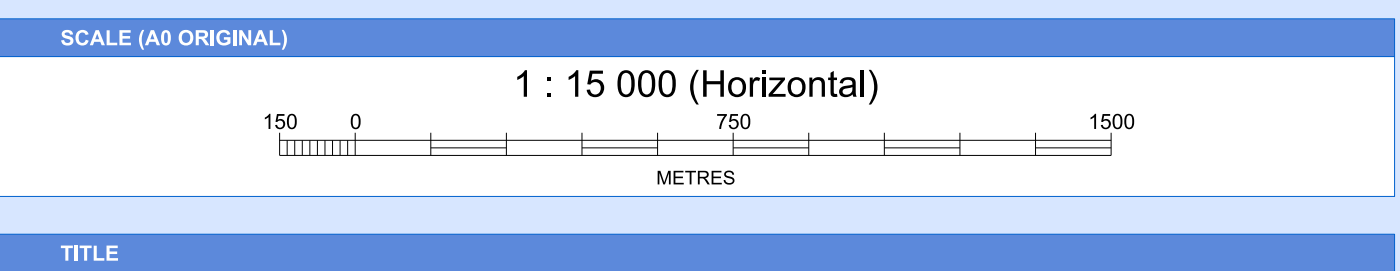


GEODETM REFERENCE SYSTEM

GEODETM DATUM: WGS84
 ELLIPSOID: WGS84
 PROJECTION: UTM ZONE 30 N (CENTRAL MERIDIAN 3° W)

SURVEY INFORMATION

SURVEY VESSEL:	M.V. VIGILANT	M.V. TITAN DISCOVERY	M.V. OCEAN OBSERVER
SURVEY DATE:	30-JUN-2020 TO 01-AUG-2020	01-JUL-2020 TO 12-AUG-2020	16-SEP-2020 TO 19-OCT-2020
POSITIONING SYSTEM:	OCEANORING C-NAV DGNS	APPLANK POS MV WAVEMASTER	FURIO STARFIX DGNS
NAVIGATION SYSTEM:	VOYAGER 5	SONARBYNE RANGER USBL	SONARBYNE RANGER USBL
ECHO SOUNDER (MULTI-BEAM SYSTEM):	SHIMADZU DSUB	SHIMADZU DSUB	SHIMADZU DSUB
ECHO SOUNDER (SINGLE-BEAM SYSTEM):	VOYAGER 5	VOYAGER 5	VOYAGER 5
SIDE SCAN SONAR:	EDGE TECH 4000S	EDGE TECH 4000S	EDGE TECH 4000S
MAGNETOMETER:	GEOMETRICK G862	GEOMETRICK G862	GEOMETRICK G862
SUB-BOTTOM PROFILER:	GEOMETRICK G862	GEOMETRICK G862	GEOMETRICK G862
ULTRA-HIGH RESOLUTION SEISMIC (UHR):	GEOMETRICKS PINGER	SURFACE TOW BOOMER	GEOMETRICKS PINGER



TITLE

SURVEY CONTRACTOR

Gardline

GARDLINE LIMITED
 ENDEAVOUR HOUSE, ADMIRALTY ROAD, GREAT YARMOUTH, NORFOLK NR31 3NG, ENGLAND
 TELEPHONE: +44 (0) 1493 848000 FAX: +44 (0) 1493 852176 WEBSITE: WWW.GARDLINE.COM

CLIENT

RWE
 The energy to lead

PROJECT TITLE

**RAMPION 2 OFFSHORE WINDFARM DEVELOPMENT
 GEOPHYSICAL SITE SURVEY FOR AREA C**

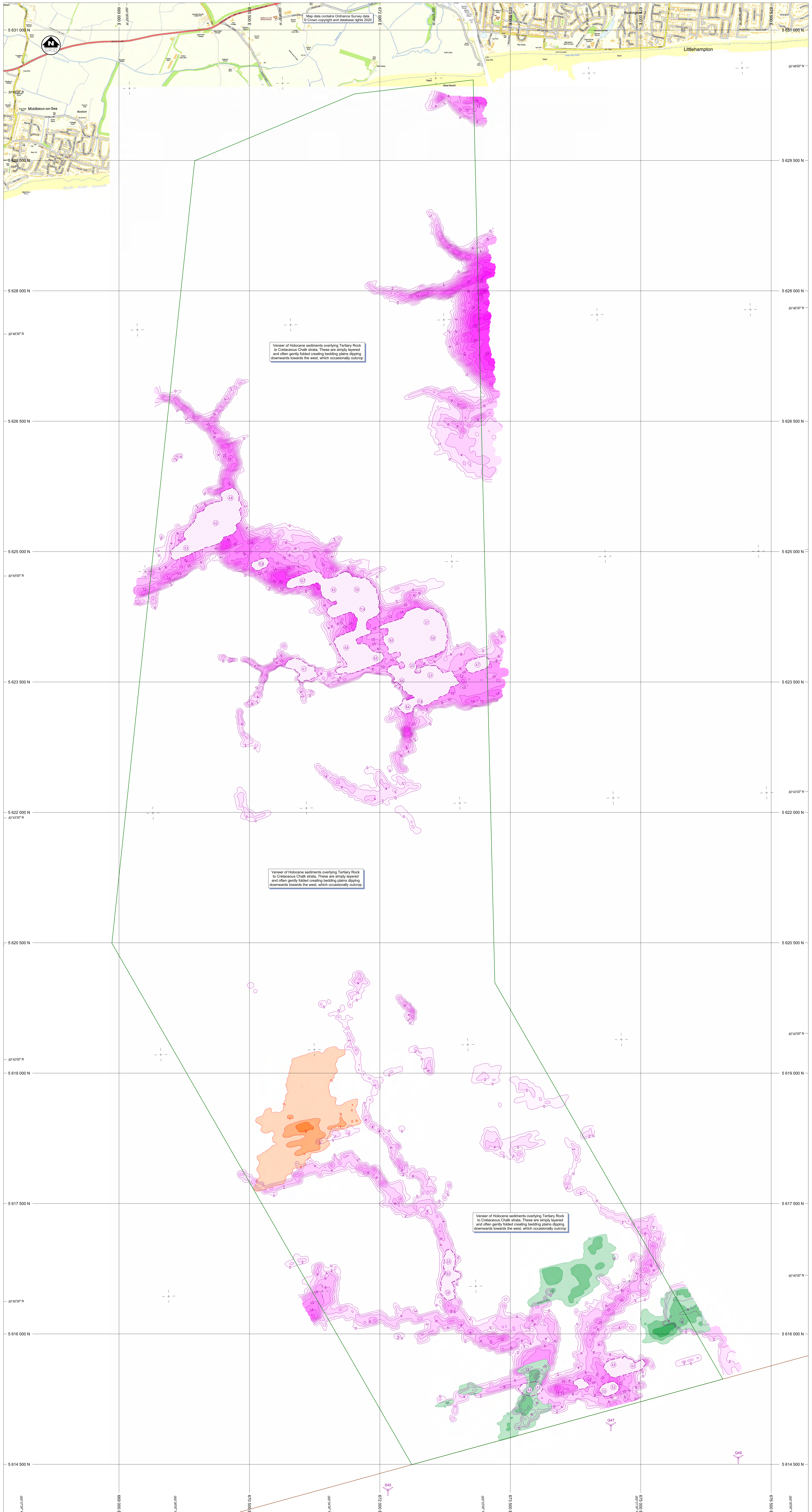
DRAWING TITLE

**SIDE SCAN SONAR MOSAIC
 CHART 8**

REVISION

REV.	DATE	TITLE	DESCRIPTION	AUTHOR	DRAWN	CHECKED	APPROVED
0	03-MAY-2020	DRAFT	FIRST ISSUE FOR CLIENT REVIEW, PDF ONLY	CT	JS	MC	CHG

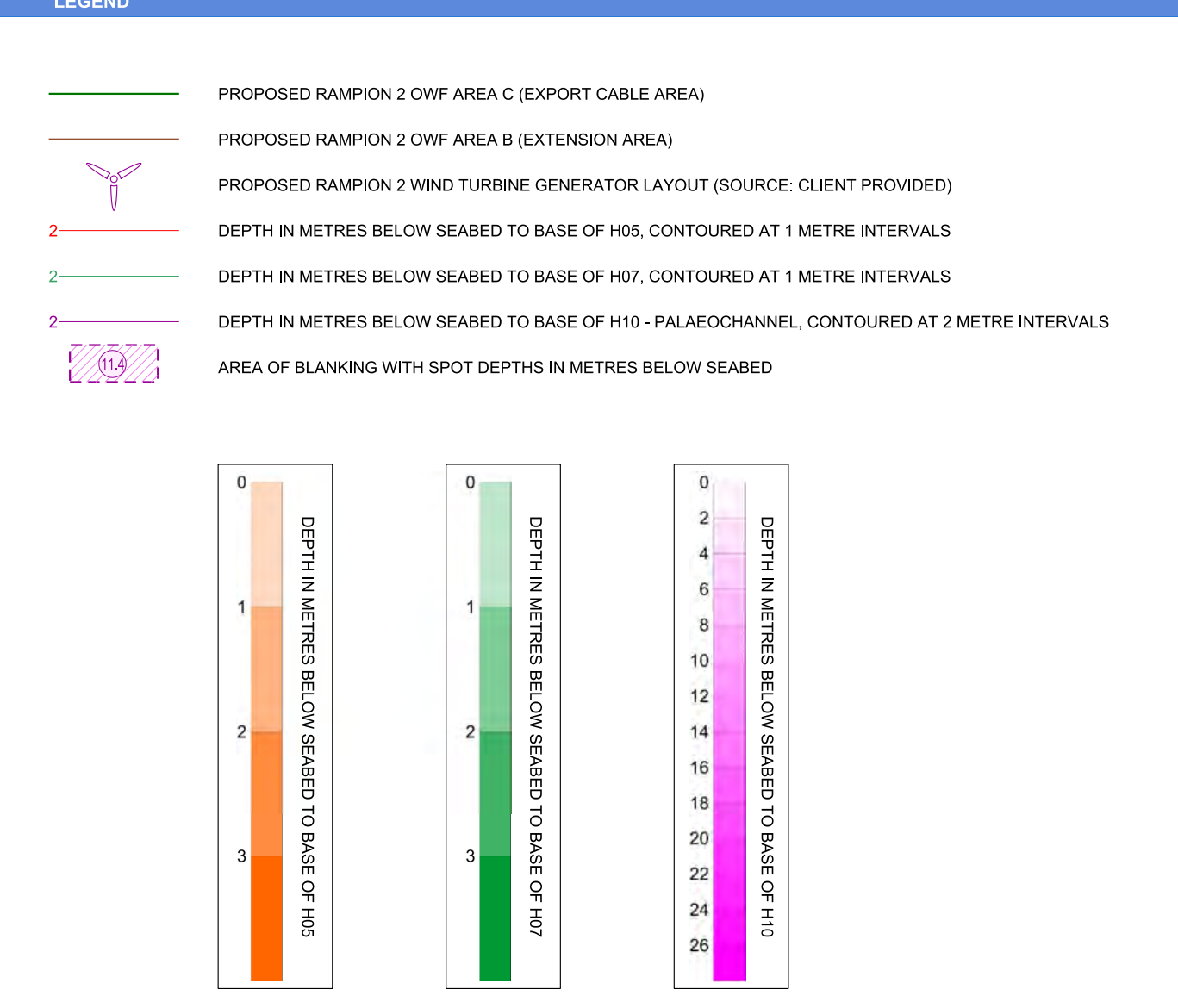
CLIENT REFERENCE **REPORT REFERENCE** 11521.4 **DRAWING NUMBER** 11521.4.08



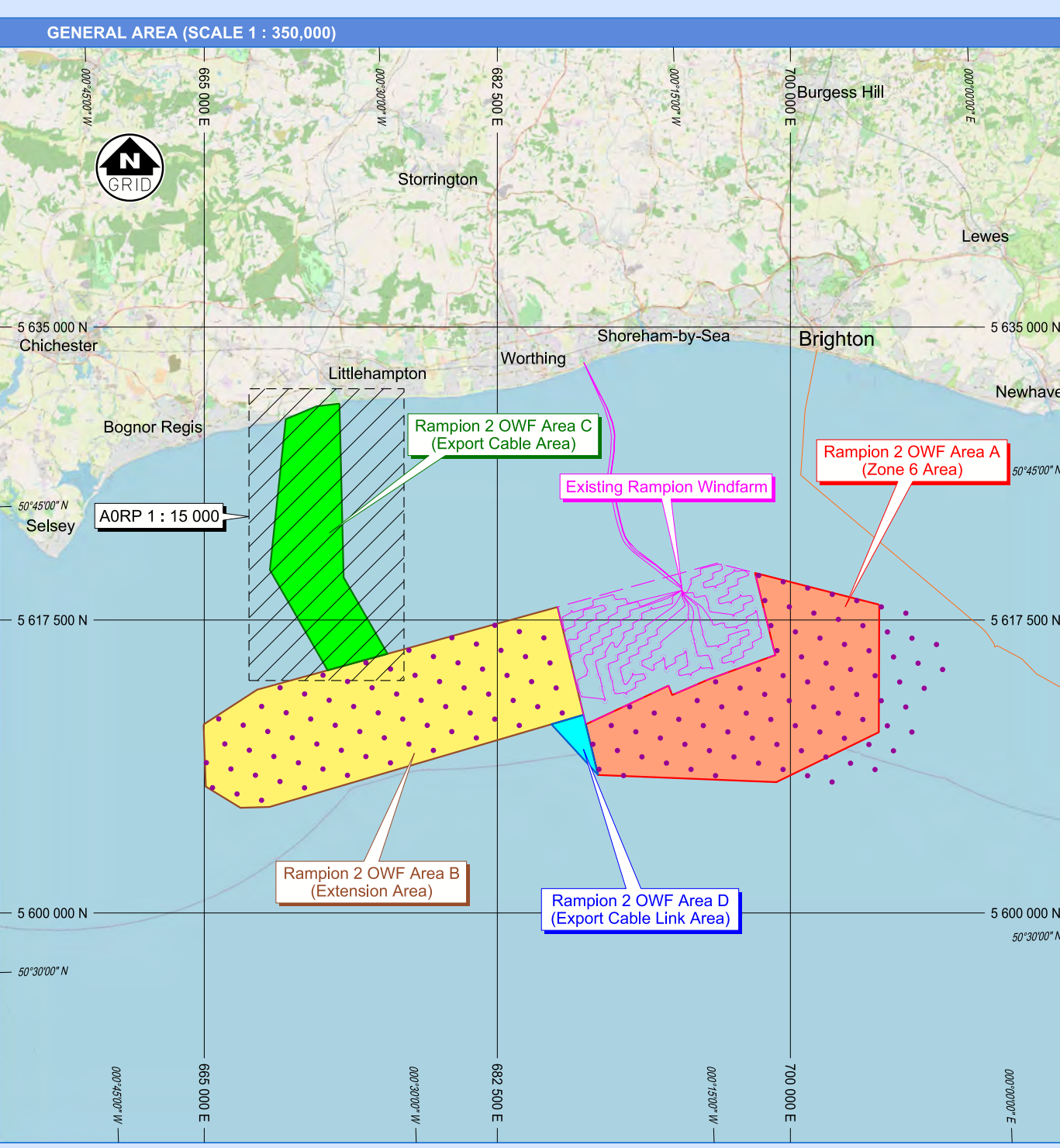
Veneer of Holocene sediments overlying Tertiary Rock to Cretaceous Chalk strata. These are simply layered and often gently folded creating bedding planes dipping downwards towards the west, which occasionally outcrop.

Veneer of Holocene sediments overlying Tertiary Rock to Cretaceous Chalk strata. These are simply layered and often gently folded creating bedding planes dipping downwards towards the west, which occasionally outcrop.

Veneer of Holocene sediments overlying Tertiary Rock to Cretaceous Chalk strata. These are simply layered and often gently folded creating bedding planes dipping downwards towards the west, which occasionally outcrop.



- NOTES**
1. ASSUMED SEISMIC VELOCITY = 1650m/s
 2. H05 = YOUNGER HOLOCENE DEPOSITS COMPRISING UNCONSOLIDATED SEDIMENTS, LARGELY SAND AND GRAVEL, POTENTIALLY MOBILE IN PLACES
 3. H07 = QUATERNARY DEPOSITS COMPRISING CONSOLIDATED SEDIMENTS, LARGELY SAND AND GRAVEL
 4. H10 = PALAEOCHANNELS ARE SEEN CUTTING THROUGH THE BEDROCK. THESE CHANNELS ARE INTERPRETED TO COMPRISE INTERBEDDED CLAY, SANDS AND GRAVELS, WITH PEAT LAYERS AND BASAL GRAVELS AND ARE ASSOCIATED WITH CLACAL ADVANCES AND THE ASSOCIATED FALLS IN SEA LEVEL.

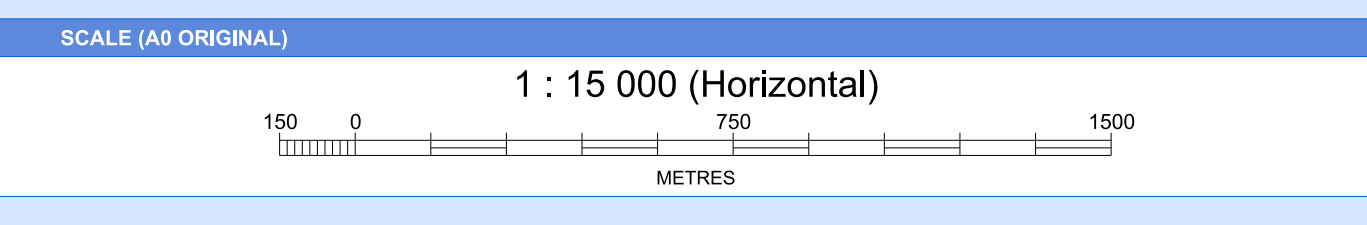


GEODETH REFERENCE SYSTEM

GEODETH DATUM:	WGS84
ELLIPSOID:	WGS84
PROJECTION:	UTM ZONE 30 N (CENTRAL MERIDIAN 3° W)

SURVEY INFORMATION

SURVEY VESSEL:	M.V. VIGILANT	M.V. TITAN DISCOVERY	M.V. OCEAN OBSERVER
SURVEY DATE:	30-JUN-2020 TO 01-AUG-2020	01-JUL-2020 TO 10-AUG-2020	16-SEP-2020 TO 19-OCT-2020
POSITIONING SYSTEM:	OCEANRING C-MAN DGNS	APPLANK PDS MV WAVEMASTER	FURRO STARFIX DGNS
NAVIGATION SYSTEM:	SONARBYNE RANGER USBL	SONARBYNE RANGER USBL	SONARBYNE RANGER USBL
ECHO SOUNDER (MULTI-BEAM SYSTEM):	VOYAGER 5	VOYAGER 5	VOYAGER 5
ECHO SOUNDER (SINGLE-BEAM SYSTEM):	SHIMADZU DS200	RESON 730P DUAL HEAD	SHIMADZU ECHOAD
SIDE SCAN SONAR:	SHIMADZU EK60	DOCM ECHOTRACMKH	SHIMADZU EK60
MARKER/TARGET:	EDGE TECH 400FS	EDGE TECH 400FS	EDGE TECH 400FS
SUB-BOTTOM PROFILER:	GEOMETRICK G82	GEOMETRICK G82	GEOMETRICK G82
ULTRA-HIGH RESOLUTION SEISMIC (UHRIS):	GEACOUSTICS PINGER	SURFACE TOW BOOMER	GEACOUSTICS PINGER
		1 x 10' DIA. T-1 SLEEVE SUN	75m TELEDYNE STREAMER



TITLE

Gardline
GARDLINE LIMITED
ENDEAVOUR HOUSE, ADMIRALTY ROAD, GREAT YARMOUTH, NORFOLK NR30 3NG, ENGLAND
TELEPHONE: +44 (0) 1493 84800 FAX: +44 (0) 1493 85276 WEBSITE: WWW.GARDLINE.COM

CLIENT

RWE
The energy to lead

PROJECT TITLE

**RAMPION 2 OFFSHORE WINDFARM DEVELOPMENT
GEOPHYSICAL SITE SURVEY FOR AREA C**

DRAWING TITLE

**SHALLOW SOILS
(BASE OF H05, H07 & H10)
CHART 9**

REVISION

REV.	DATE	TITLE	DESCRIPTION	AUTHOR	DRAWN	CHECKED	APPROVED
0	03-MAY-2020	DRAFT	FIRST ISSUE FOR CLIENT REVIEW, PDF ONLY	CT	JS	MC	CHG

CLIENT REFERENCE **REPORT REFERENCE** 11521.4 **DRAWING NUMBER** 11521.4.09