Utilising FOSS4G Tooling for Offshore Platform Electrification

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FOSS4G UK

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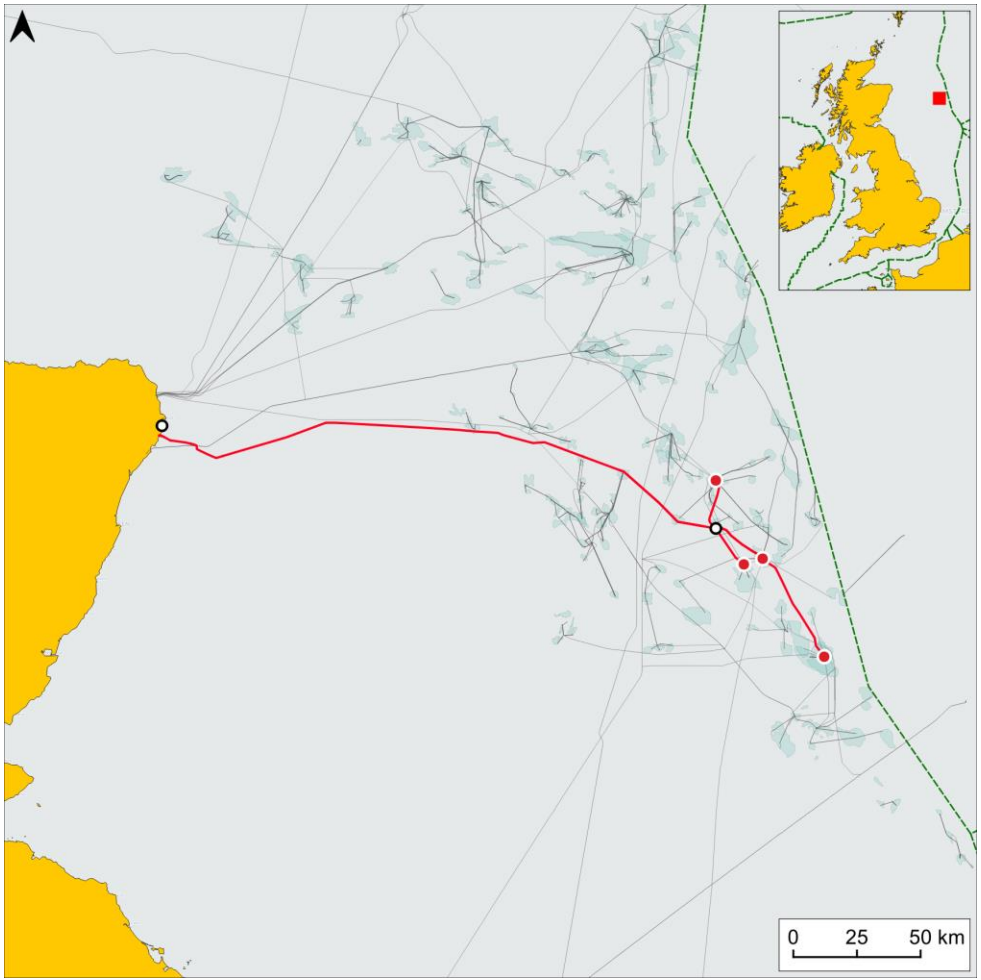
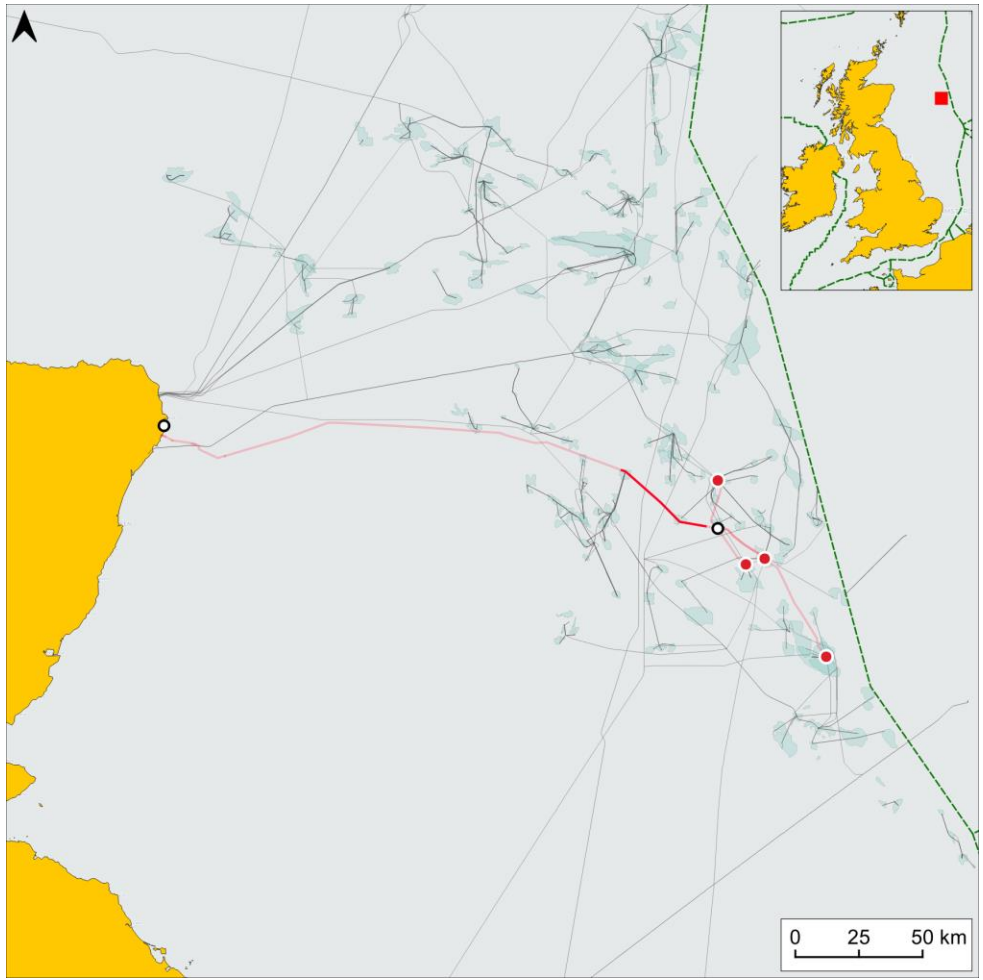
Introduction

- The electrification project aims to reduce GHG emissions of oil & gas platforms.
- Subsea power cables to be laid from a landfall location to an offshore hub, before linking up to a number of platforms
- Cables must be buried / trenched into the seabed – affected by shallow seabed geology



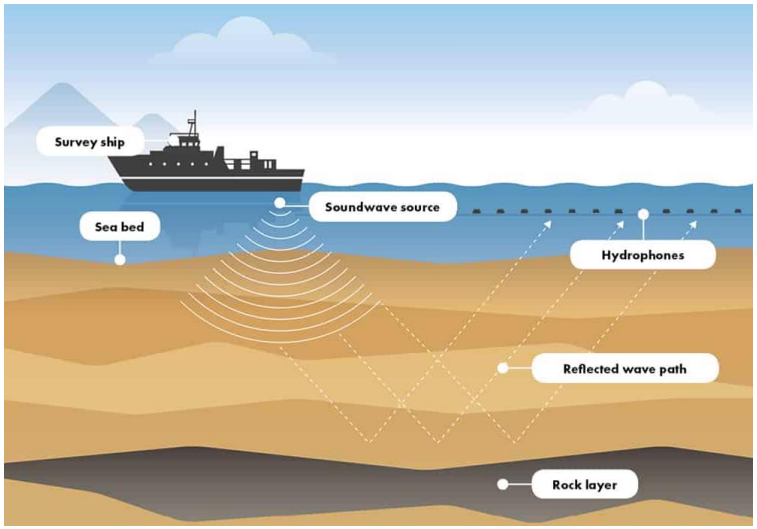
Aims

- For a section of the route the aim was to analyse recently acquired geophysical data to better understand the shallow seabed geology along the route
- Present these findings using FOSS4G tooling.
  - Raster surface generation
  - Python data visualization
  - QGIS map production via an Atlas



Raster Surface Processing

- Data collected within a 300m corridor of the proposed cable route



rburgess@rob-inosys

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412342.000 6359369.000 -101.886
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412345.000 6359369.000 -102.109
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412347.000 6359369.000 -102.147
412348.000 6359369.000 -102.08
412342.000 6359370.000 -101.9
412343.000 6359370.000 -101.993
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412345.000 6359370.000 -102.092
412346.000 6359370.000 -102.095
412347.000 6359370.000 -102.099
412348.000 6359370.000 -102.073
412349.000 6359370.000 -102.077
412350.000 6359370.000 -102.1
412351.000 6359370.000 -102.101
412352.000 6359370.000 -102.13
412341.000 6359371.000 -101.981
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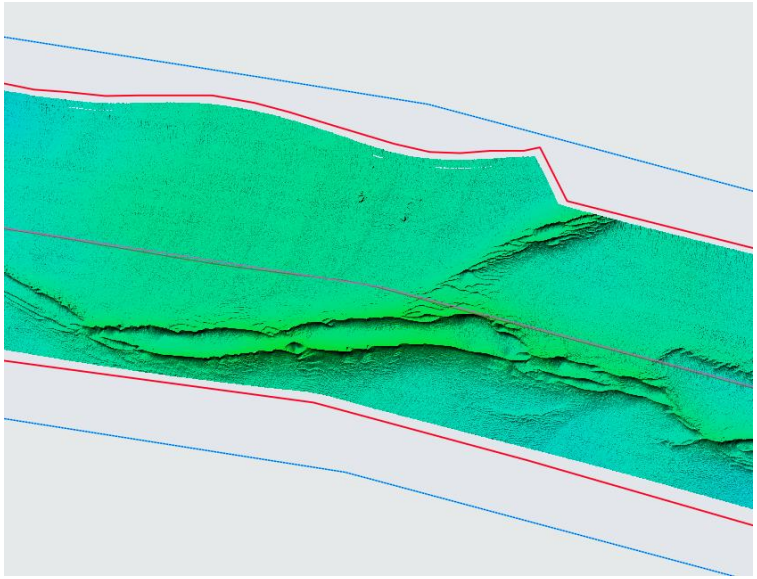
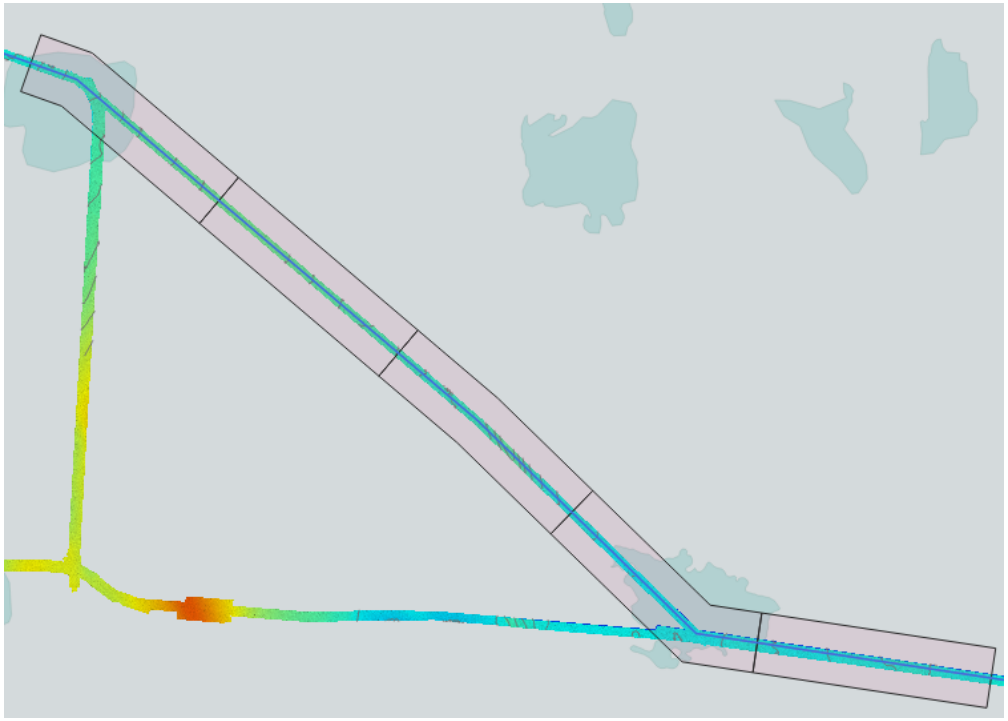
- Script that utilises command tools GMT & GDAL
  - xyz2grid
  - gdal_translate
  - gdaldem hillshade & color-relief



Raster Sampling

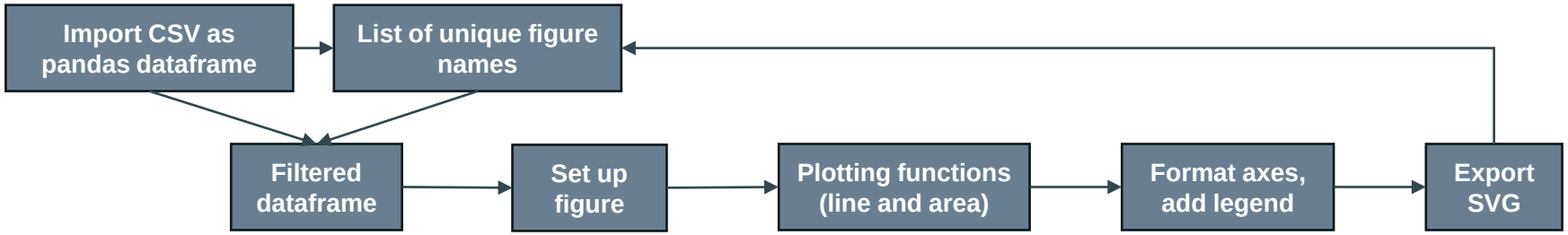
- Points generated at intervals along the cable and intersected with the soil unit rasters
- The route was also divided into 5 equally sized polygons – these would form the extents of each figure

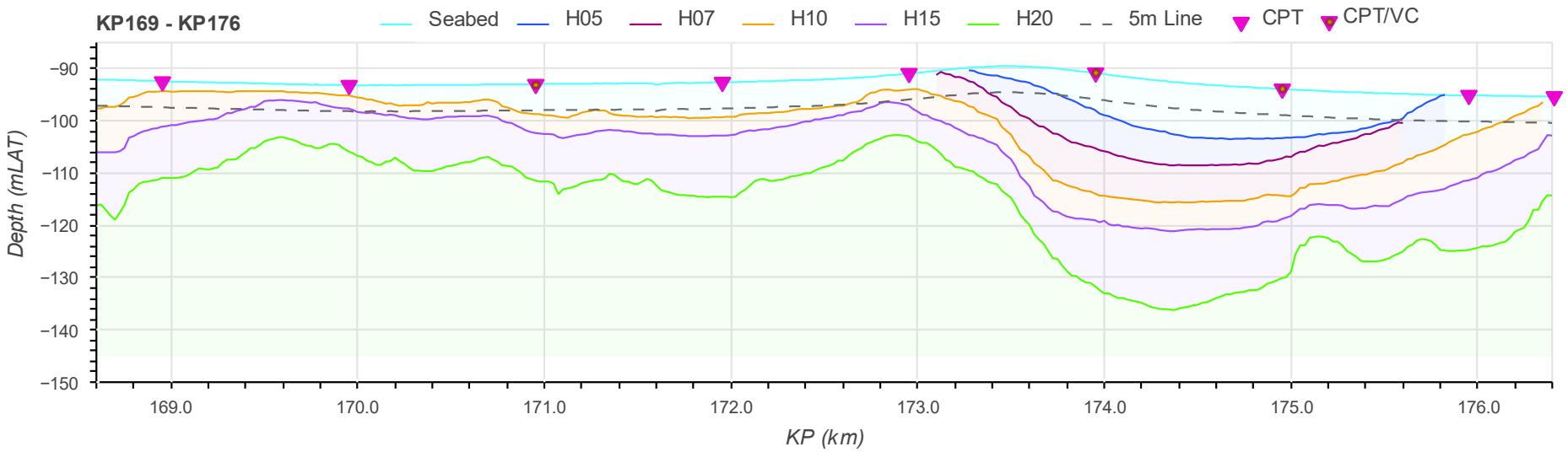


Python Data Viz

- Sampled data exported as CSV
- Within Anaconda / Jupyter Lab
- Used a python library called Bokeh.

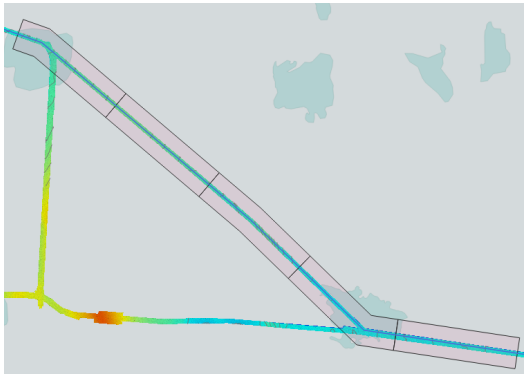
figure	kp	bathy	h05	h07	h10	h15	h20
KP169 - KP176	173.525	-89.5	-92.2	-98.1	-104.1	-108.7	-116.1
KP169 - KP176	173.55	-89.6	-92.4	-98.9	-105.5	-110.6	-117.9
KP169 - KP176	173.575	-89.6	-92.5	-99.2	-106.1	-111.5	-119
KP169 - KP176	173.6	-89.6	-92.7	-99.6	-106.8	-112.5	-119.9
KP169 - KP176	173.625	-89.7	-93.2	-100.4	-108.1	-114.3	-121.7
KP169 - KP176	173.65	-89.7	-93.4	-101	-108.7	-114.9	-122.7
KP169 - KP176	173.675	-89.8	-93.7	-101.1	-109.4	-115.6	-123.5
KP169 - KP176	173.7	-89.8	-94.2	-101.7	-110.4	-116.6	-124.9
KP169 - KP176	173.725	-89.9	-94.7	-102.4	-111.4	-117.3	-126.3
KP169 - KP176	173.75	-90	-94.8	-102.5	-111.5	-117.4	-126.4
KP169 - KP176	173.775	-90.1	-95.3	-103	-111.9	-117.9	-127.7
KP169 - KP176	173.8	-90.2	-95.7	-103.6	-112.3	-118.3	-128.7





Atlas Map Production

- Automating map production along the cable route



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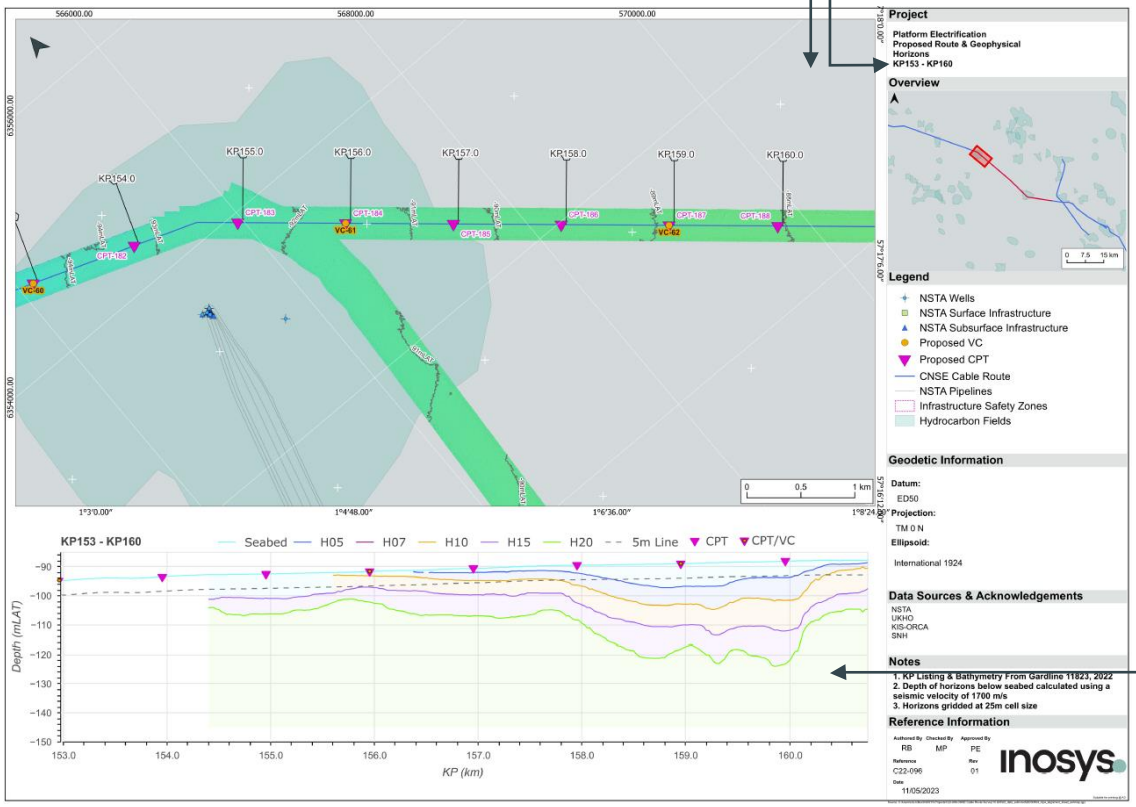
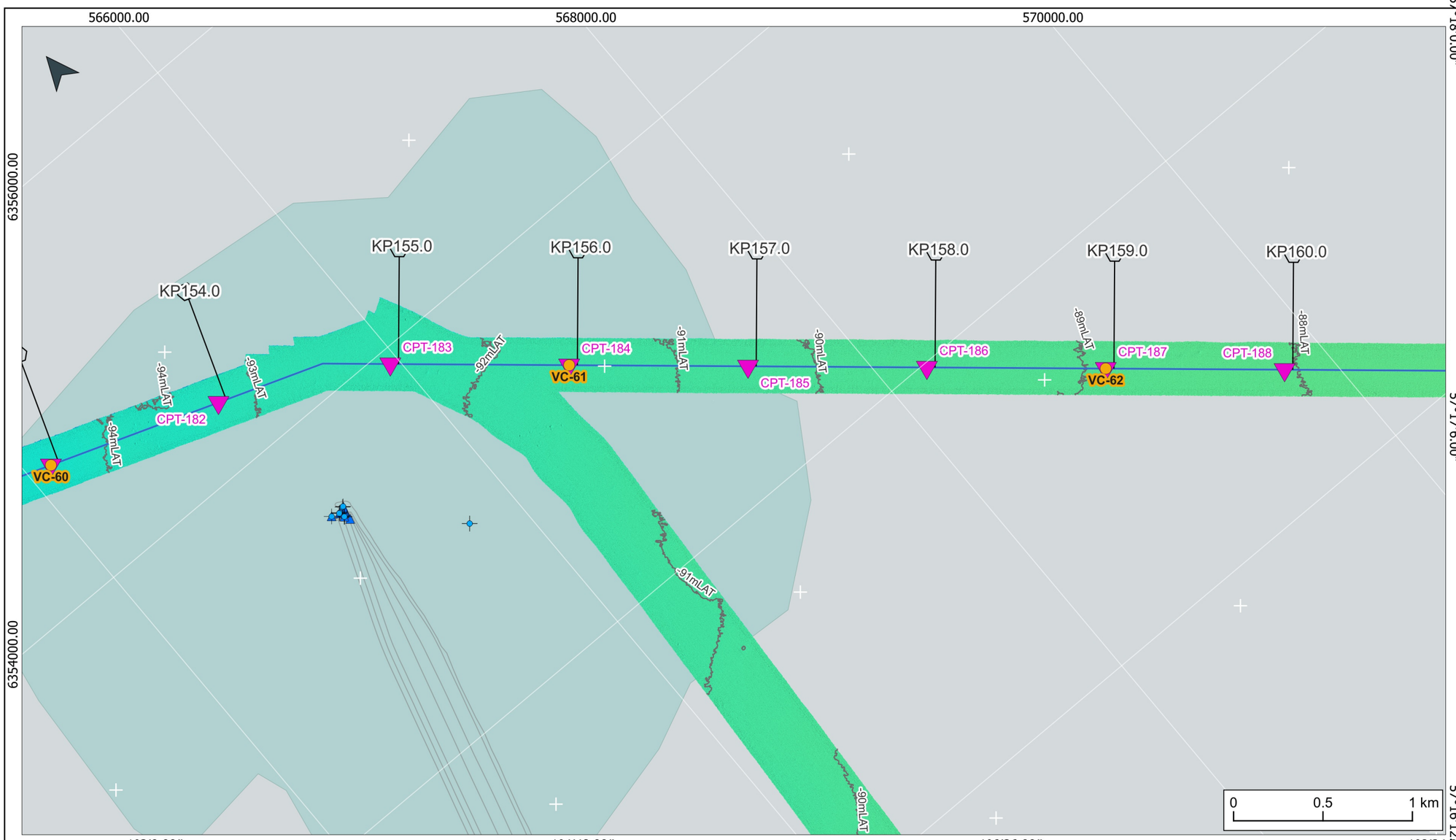
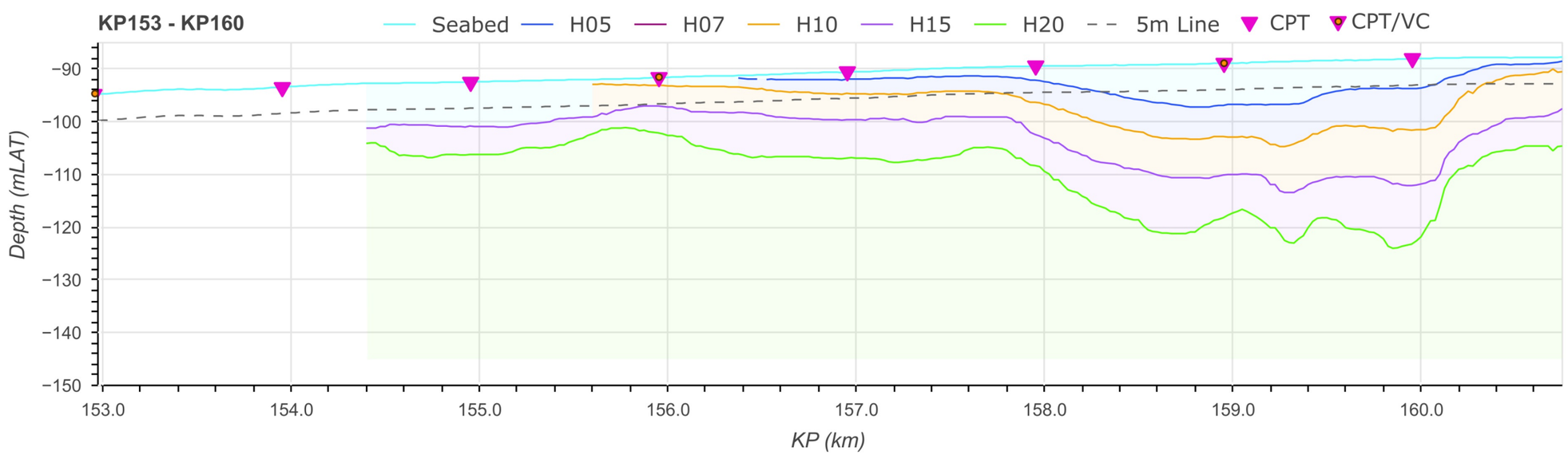
1	1	KP153 - KP160	-40	25000	KP153-KP160.svg
2	2	KP161 - KP168	-40	27000	KP161-KP168.svg
3	3	KP169 - KP176	-42.5	27500	KP169-KP176.svg
4	4	KP177 - KP184	-44	25000	KP177-KP184.svg
5	5	KP185 - KP192	-8.5	26000	KP185-KP192.svg



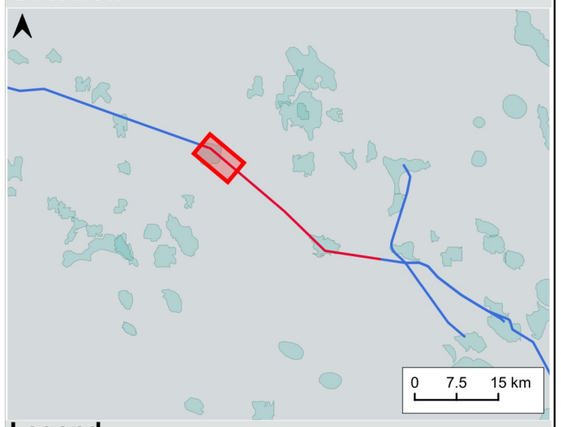




Project

Platform Electrification
Proposed Route & Geophysical Horizons
KP153 - KP160

Overview



Legend

- NSTA Wells
- NSTA Surface Infrastructure
- NSTA Subsurface Infrastructure
- Proposed VC
- Proposed CPT
- CNSE Cable Route
- NSTA Pipelines
- Infrastructure Safety Zones
- Hydrocarbon Fields

Geodetic Information

Datum:
ED50
Projection:
TM 0 N
Ellipsoid:
International 1924

Data Sources & Acknowledgements

NSTA
UKHO
KIS-ORCA
SNH

Notes

1. **KP Listing & Bathymetry From Gardline 11823, 2022**
2. **Depth of horizons below seabed calculated using a seismic velocity of 1700 m/s**
3. **Horizons gridded at 25m cell size**

Reference Information

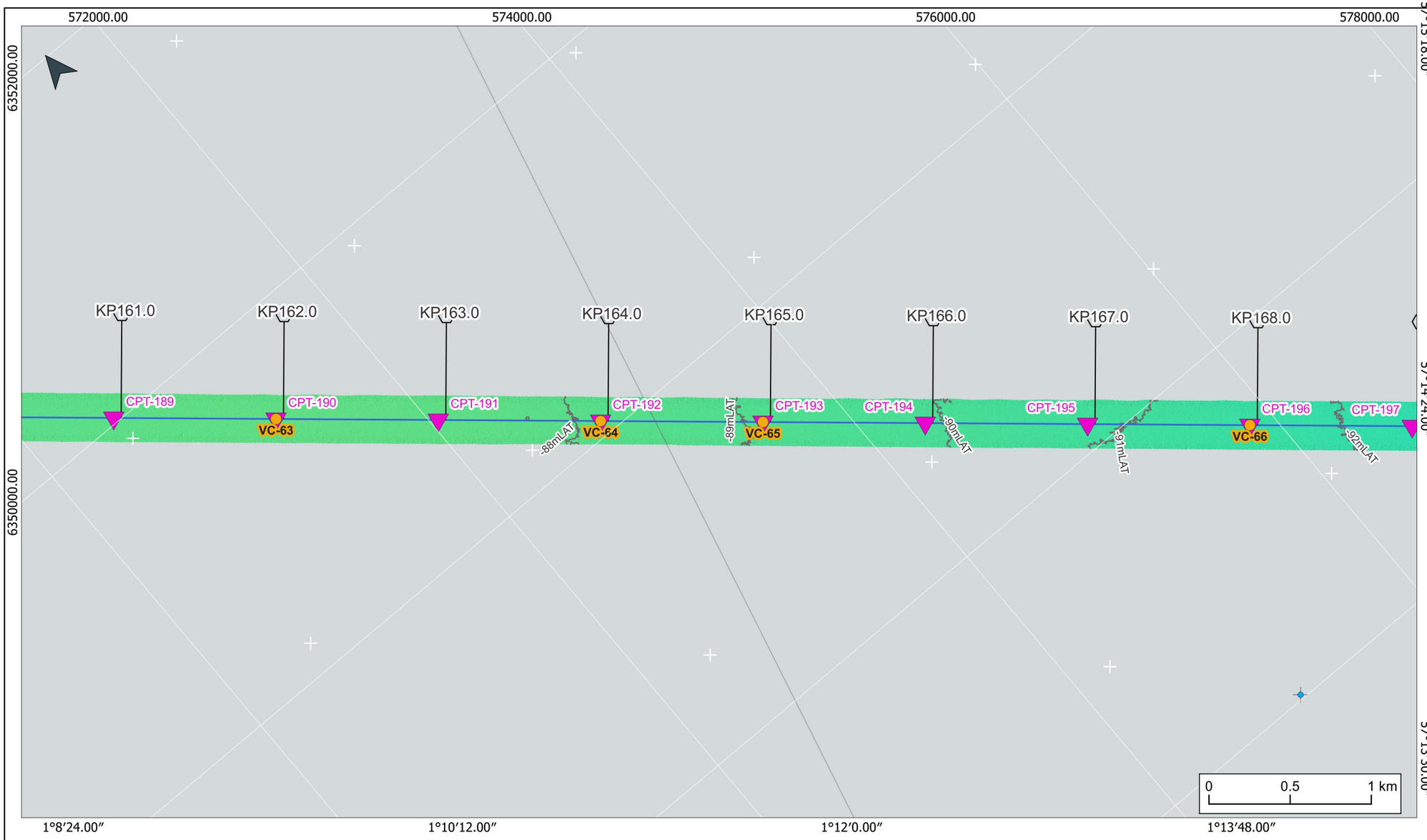
Authored By	Checked By	Approved By
RB	MP	PE

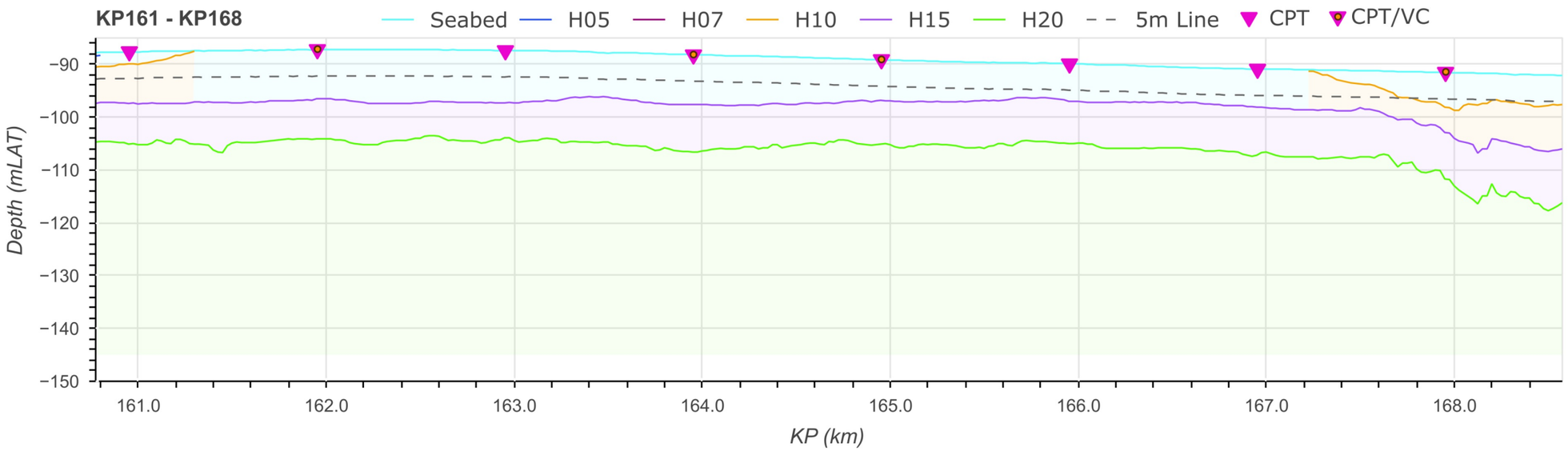
Reference C22-096
Rev 01
Date 11/05/2023

inosys

Suitable for printing @ A3

Source: C:\Users\rob-b\Box\INOSYS Projects\C22-096-CNSE Cable Route Survey\10 GIS\02_data_authored\20230504_mpa_alignment_sheet_aoi\map.qgz

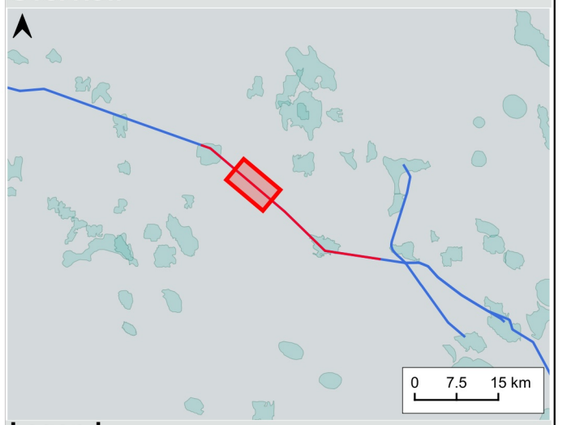




Project

Platform Electrification
Proposed Route & Geophysical Horizons
KP161 - KP168

Overview



Legend

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- NSTA Subsurface Infrastructure
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- Hydrocarbon Fields

Geodetic Information

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Projection:
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Ellipsoid:
International 1924

Data Sources & Acknowledgements

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KIS-ORCA
SNH

Notes

1. **KP Listing & Bathymetry From Gardline 11823, 2022**
2. **Depth of horizons below seabed calculated using a seismic velocity of 1700 m/s**
3. **Horizons gridded at 25m cell size**

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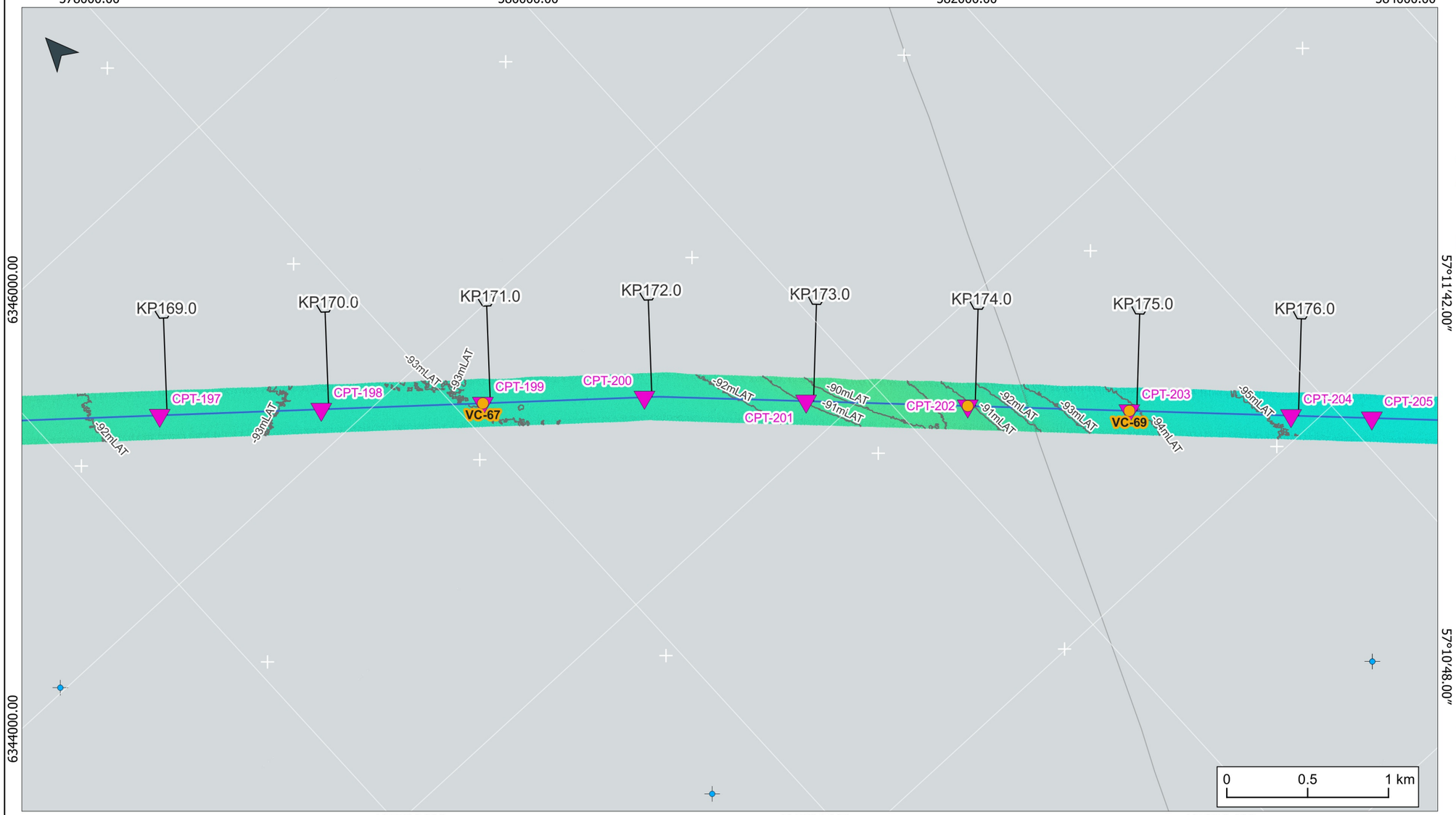
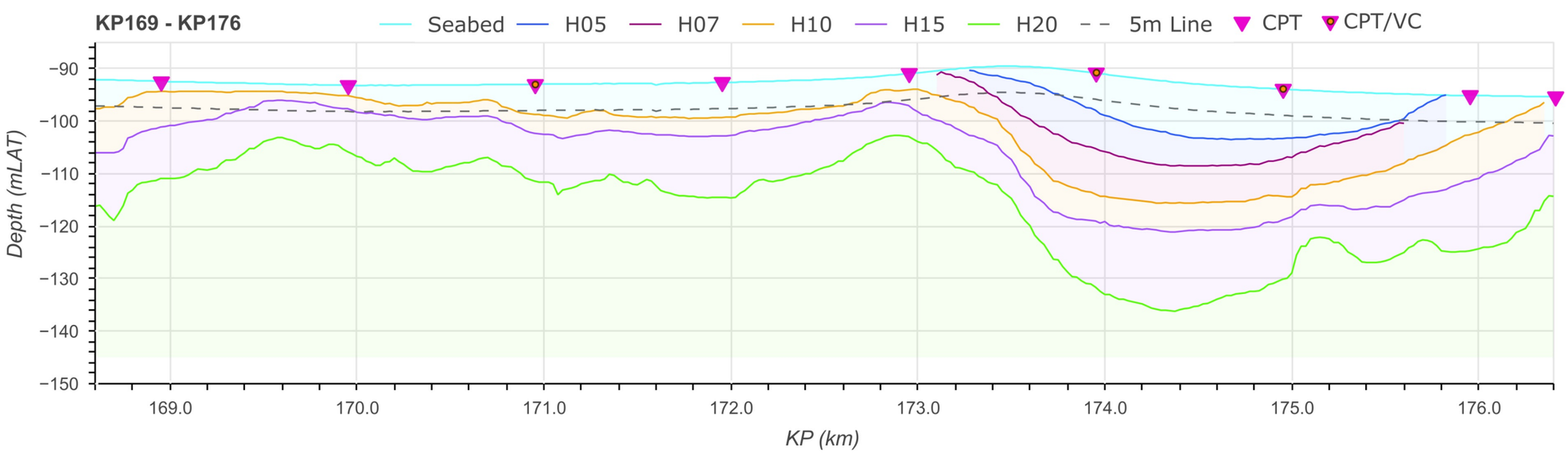
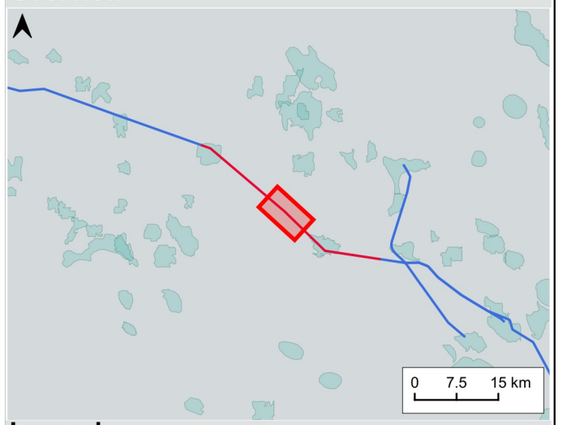




Project

Platform Electrification
Proposed Route & Geophysical Horizons
KP169 - KP176

Overview



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Geodetic Information

Datum:
ED50
Projection:
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Ellipsoid:
International 1924

Data Sources & Acknowledgements

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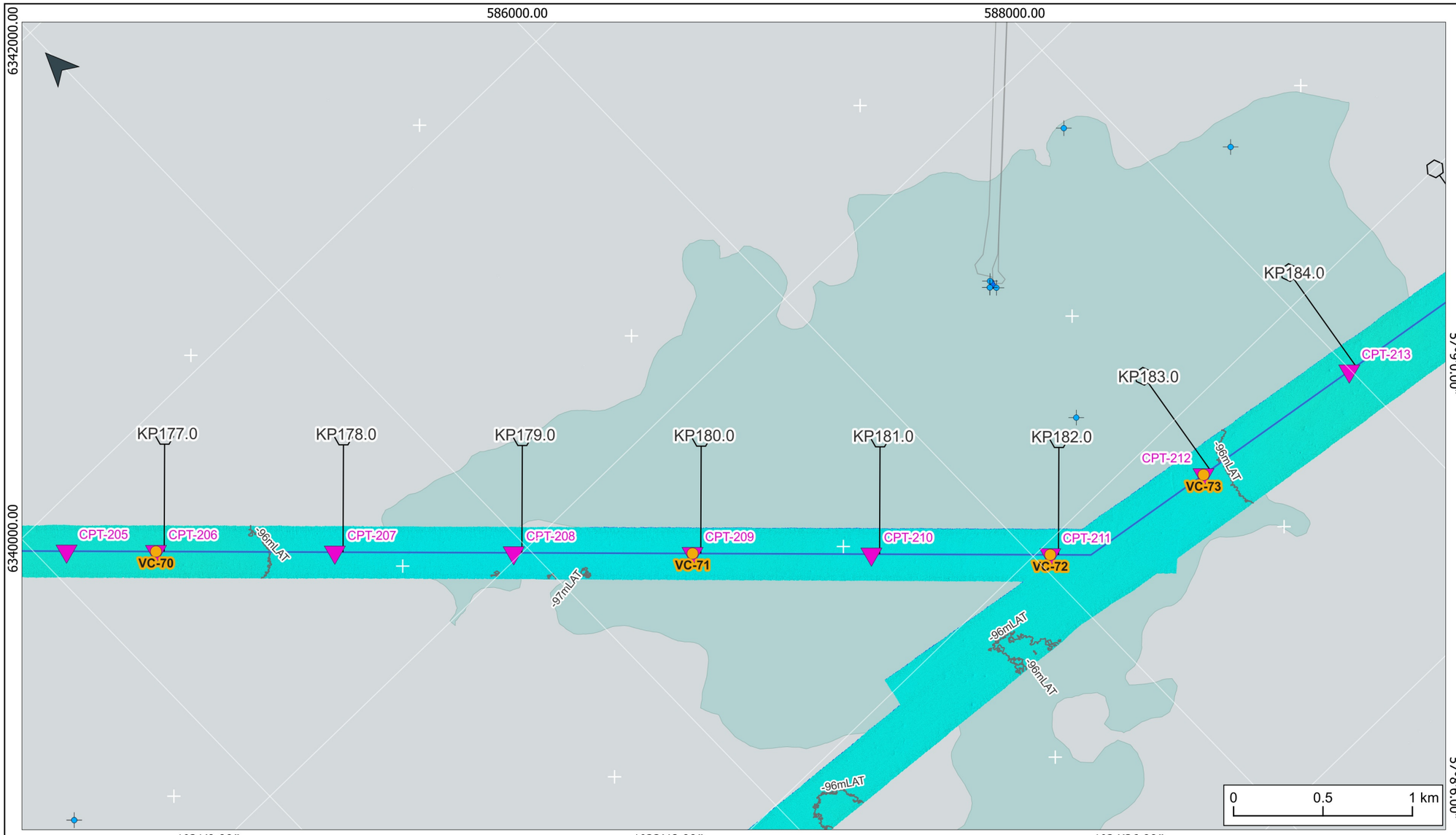
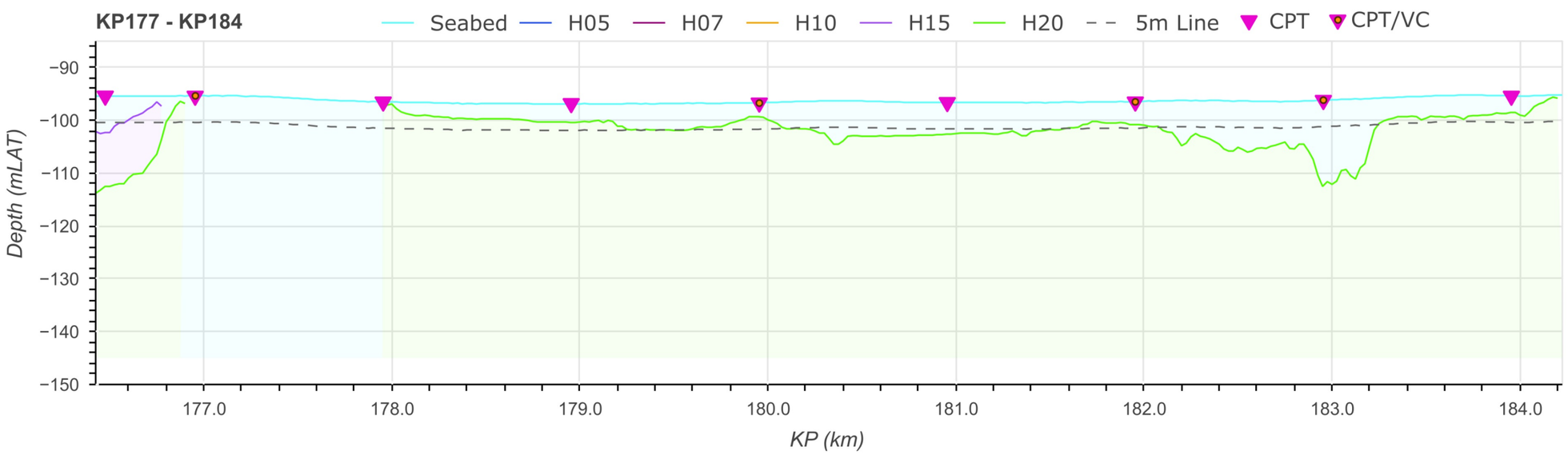
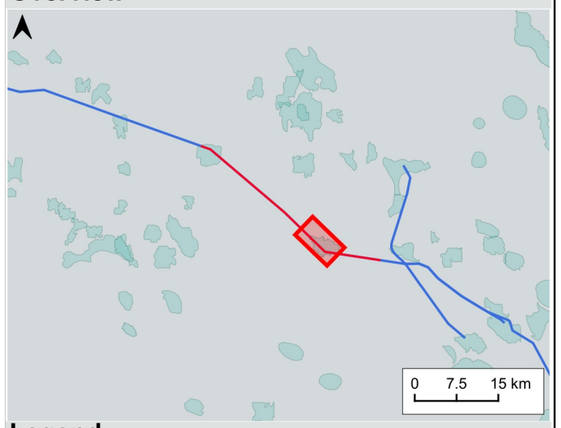




Project

Platform Electrification
Proposed Route & Geophysical Horizons
KP177 - KP184

Overview



Legend

- NSTA Wells
- NSTA Surface Infrastructure
- NSTA Subsurface Infrastructure
- Proposed VC
- Proposed CPT
- CNSE Cable Route
- NSTA Pipelines
- Infrastructure Safety Zones
- Hydrocarbon Fields

Geodetic Information

Datum:
ED50
Projection:
TM 0 N
Ellipsoid:
International 1924

Data Sources & Acknowledgements

NSTA
UKHO
KIS-ORCA
SNH

Notes

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3. Horizons gridded at 25m cell size

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Source: C:\Users\rob-b\Box\INOSYS Projects\C22-096-CNSE Cable Route Survey\10 GIS\02_data_authored\20230504_mpa_alignment_sheet_aoi\map.qgz

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6336000.00

6334000.00

57°9'0.00"

57°8'6.00"

57°7'12.00"

1°28'12.00" 1°30'0.00" 1°31'48.00" 1°33'36.00"

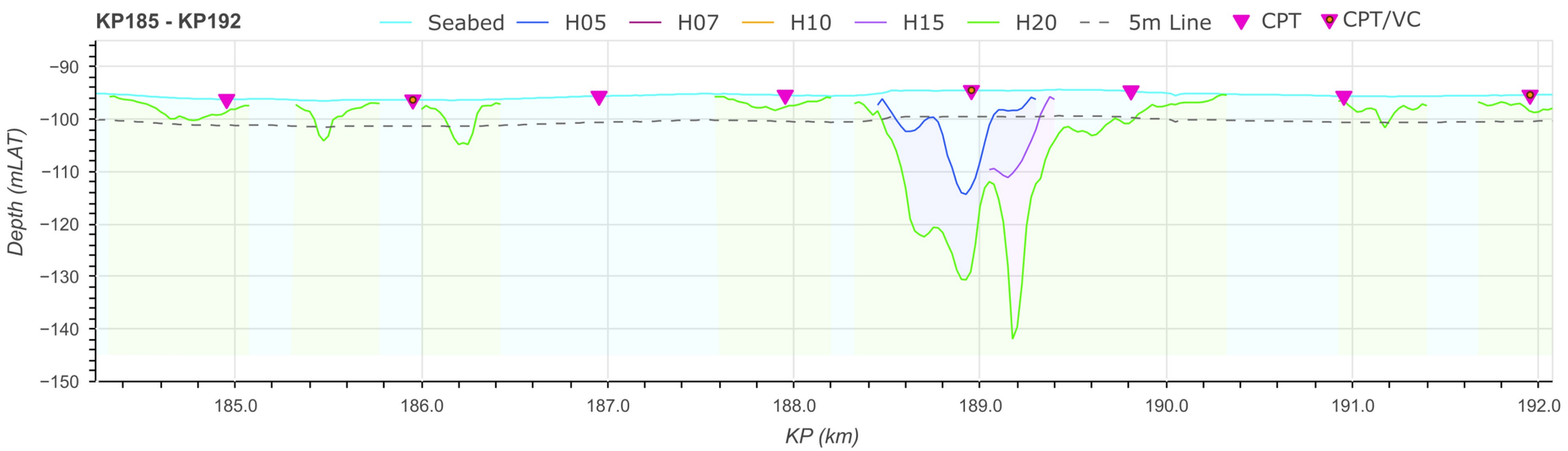
KP185.0 KP186.0 KP187.0 KP188.0 KP189.0 KP190.0 KP191.0 KP192.0

CPT-213 CPT-214 CPT-215 CPT-216 CPT-217 CPT-218 CPT-219 CPT-220 CPT-221

VC-74 VC-75 VC-76

-96mLAT -96mLAT -95mLAT -95mLAT

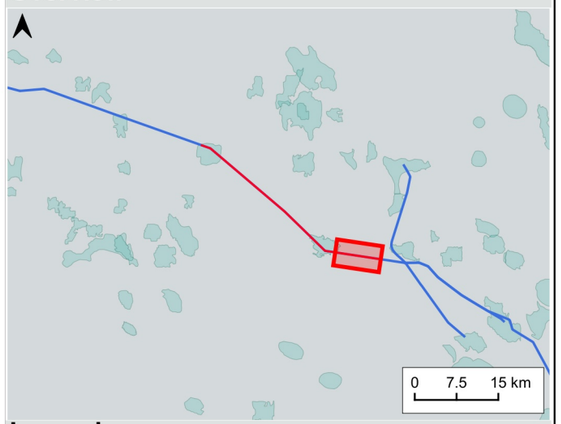
0 0.5 1 km



Project

Platform Electrification
Proposed Route & Geophysical Horizons
KP185 - KP192

Overview



Legend

- NSTA Wells
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Geodetic Information

Datum:
ED50
Projection:
TM 0 N
Ellipsoid:
International 1924

Data Sources & Acknowledgements

NSTA
UKHO
KIS-ORCA
SNH

Notes

1. KP Listing & Bathymetry From Gardline 11823, 2022
2. Depth of horizons below seabed calculated using a seismic velocity of 1700 m/s
3. Horizons gridded at 25m cell size

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Source: C:\Users\rob-b\Box\INOSYS Projects\C22-096-CNSE Cable Route Survey\10 GIS\02_data_authored\20230504_mpa_alignment_sheet_aoi\map.qgz

Conclusion

- An overview of FOSS4G tooling in support of an offshore platform electrification project:
  - GDAL & GMT to generate rasters
  - Python data visualization to map out horizons along a cross-section
  - Map automation using an QGIS Atlas
- An approach that is reproduceable over different sections of the route, longer route sections, or with newly available datasets