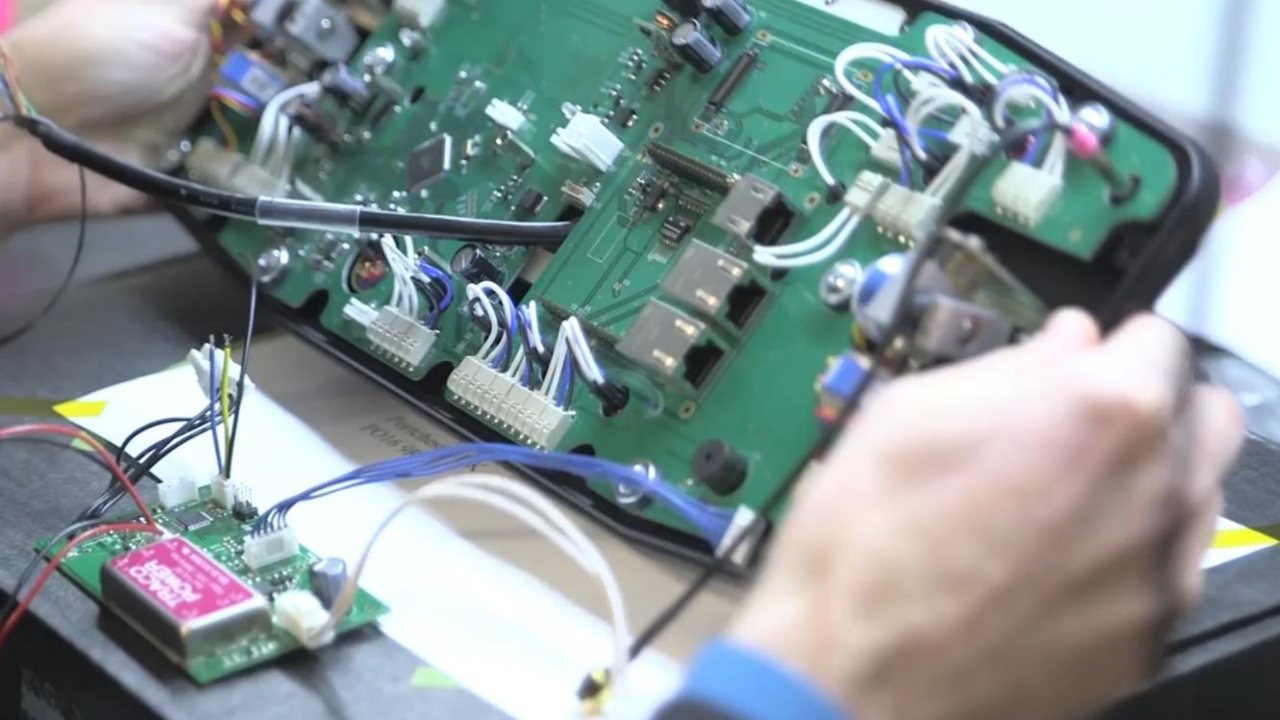
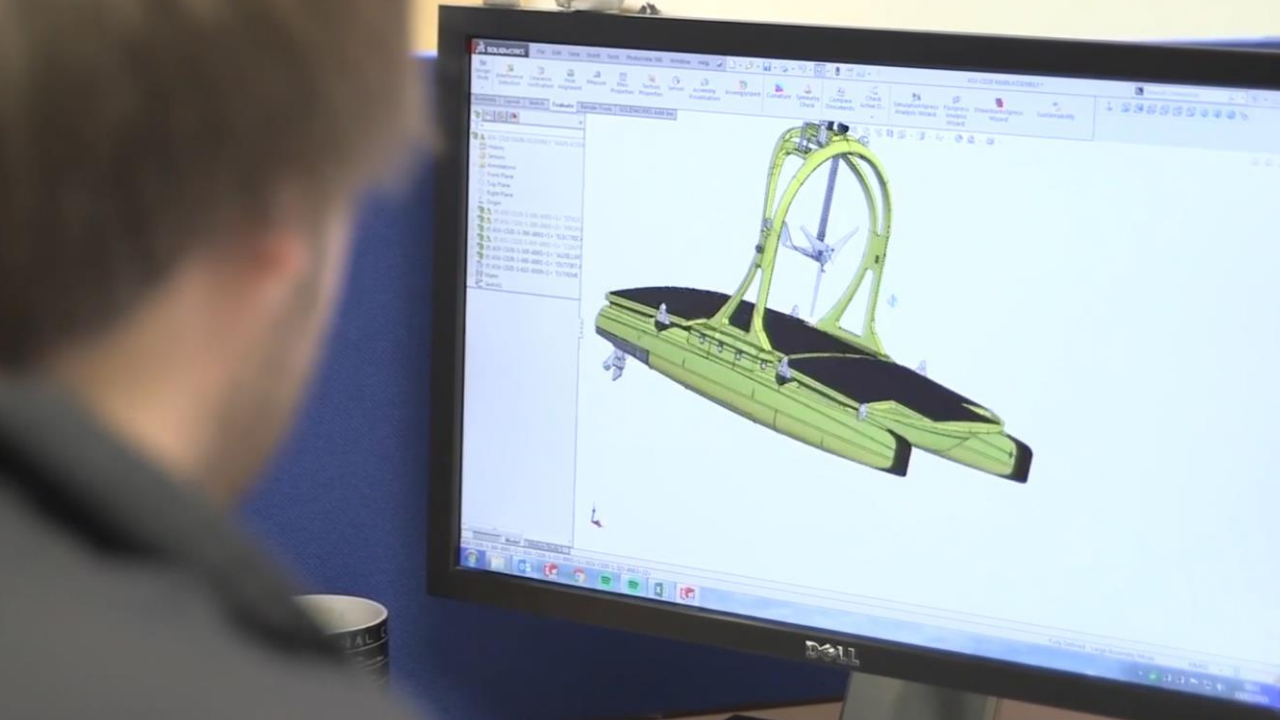


The Operational Relevance of Autonomous Surface Vessels







ASV Development path

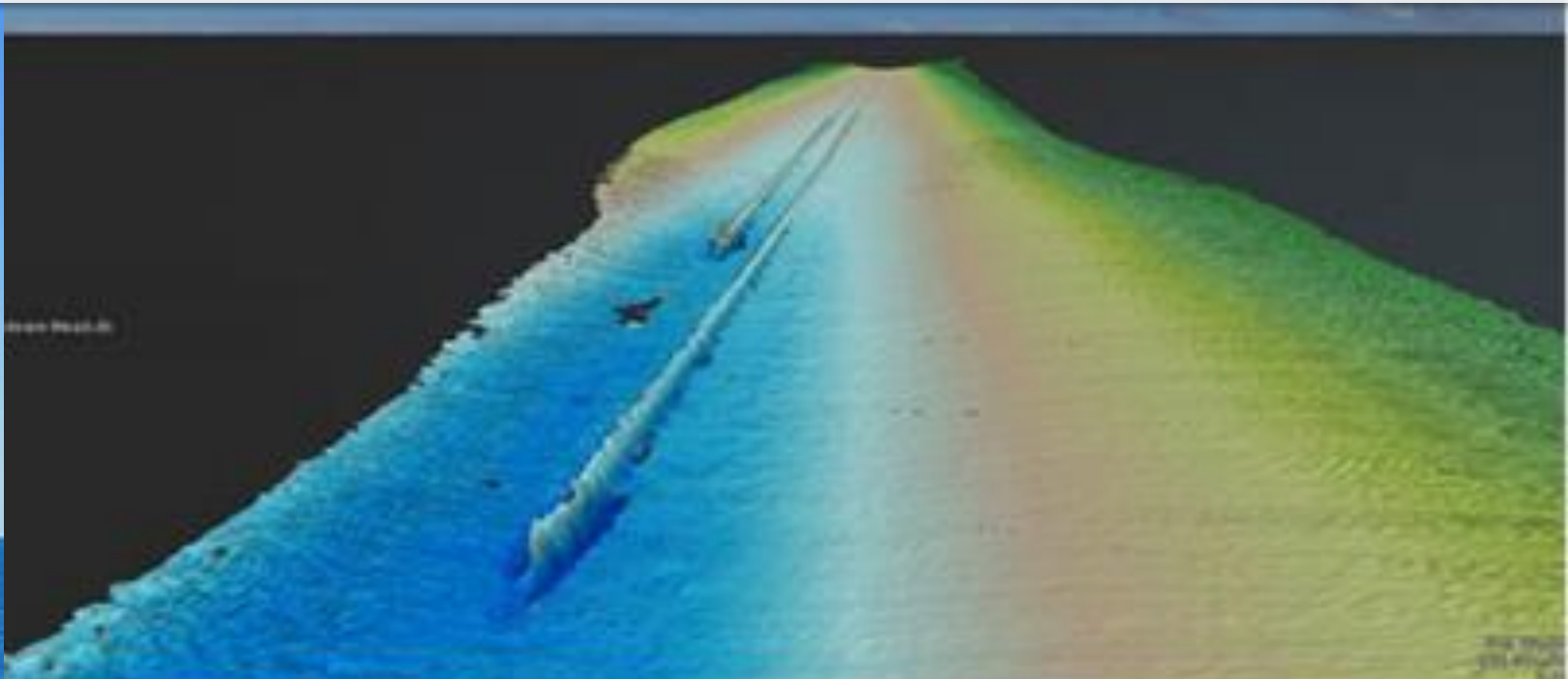


Applications to date:

- **Hydrography** – NOAA and other seabed charting operations
- **Marine construction survey support** - (USBL, TDM/ROV tracking, LBL array setup)
- **Environmental** – Passive acoustics, seep/leak detection, water quality, LiDAR
- **Data Conduit** – Low cost upload from seabed data loggers
- **Security** – Harbor security, 24/7 unmanned monitoring, cameras, IR, other
- **Metocean** – ADCPs, Loop Current monitoring
- **Seismic survey support** – USBL, CTD, PAM, ADCP
- **Military** – Targets, MCM, AUVs/ROVs, surveillance, scouting
- **Deep tow body tracking** (UXO, Geophysical)
- **Conversions** – RHIBs, FRC, Patrol Boats, Crew Boats, Survey Boats



Egypt – SS7 pipeline touchdown monitoring and as-laid surveys





ASV unmanned
marine systems

2005 – 2017

1275 days

of unmanned
operations

C-Worker 5



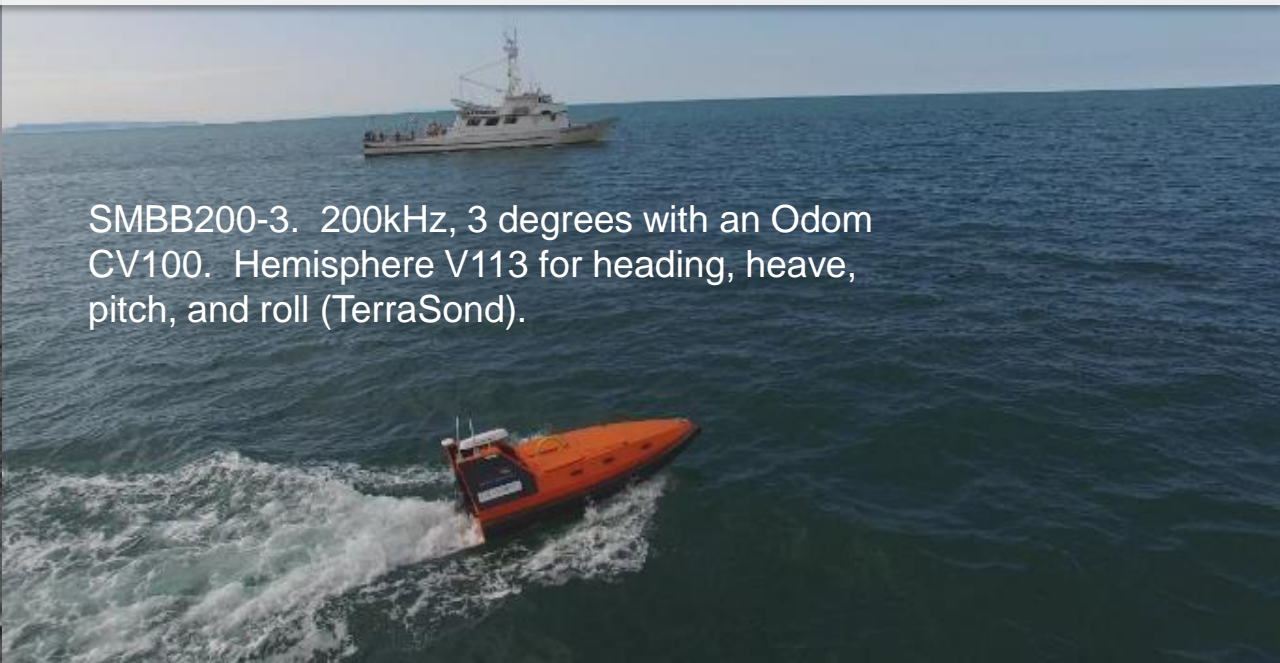


In parallel with DEA vessel
EdgeTech 6205 MPE & Sidescan

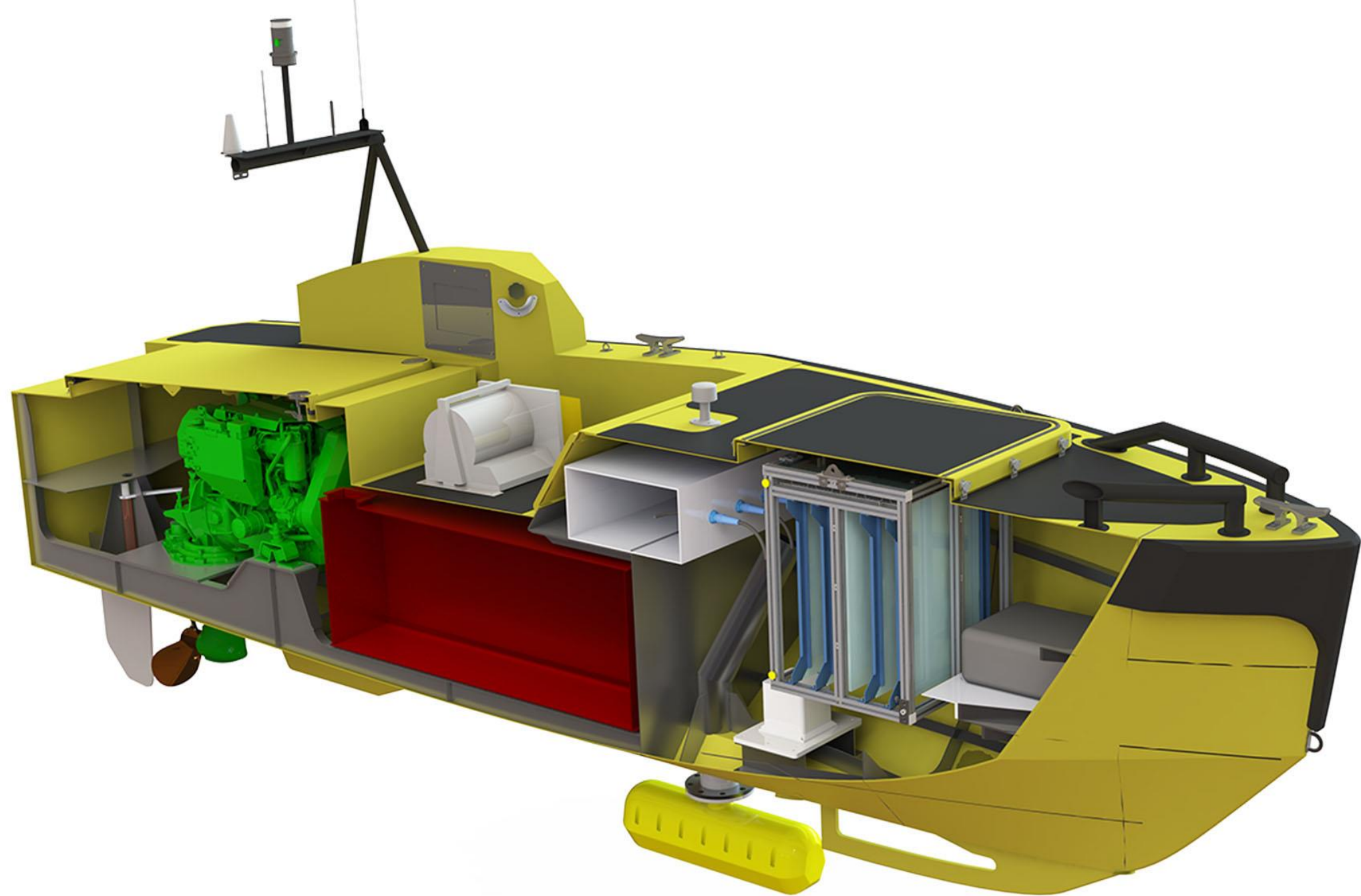
Initial Force multiplier missions



Kongsberg 2040C Multi Beam Bathymetry,
EdgeTech 4125 Sidescan with Tow Fish &
winch, IXSEA Octans 3000 TI IMU (C&C)



SMBB200-3. 200kHz, 3 degrees with an Odom
CV100. Hemisphere V113 for heading, heave,
pitch, and roll (TerraSond).

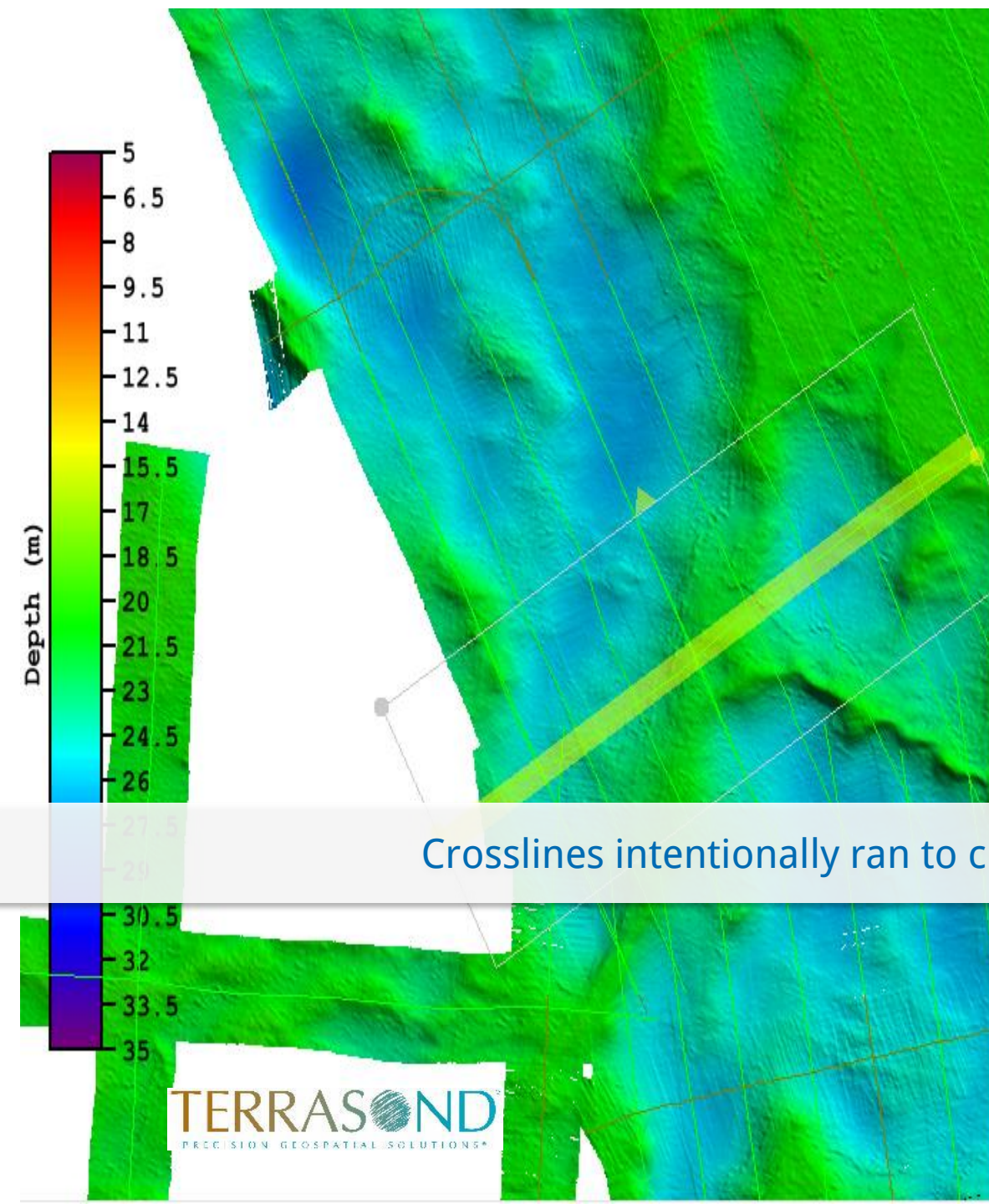




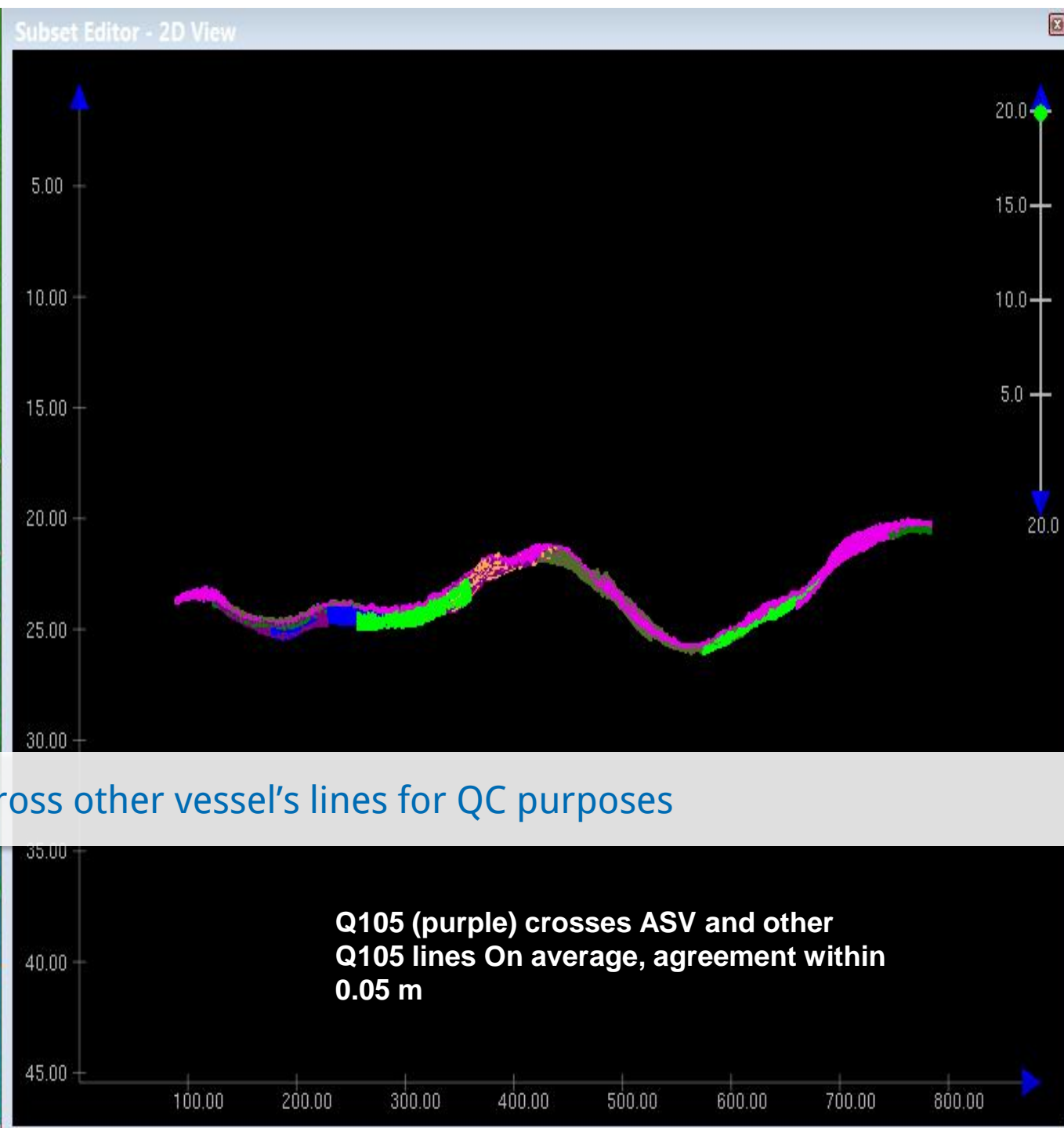
Alaska, MBES with towed side scan, certified LARs system, July 2016

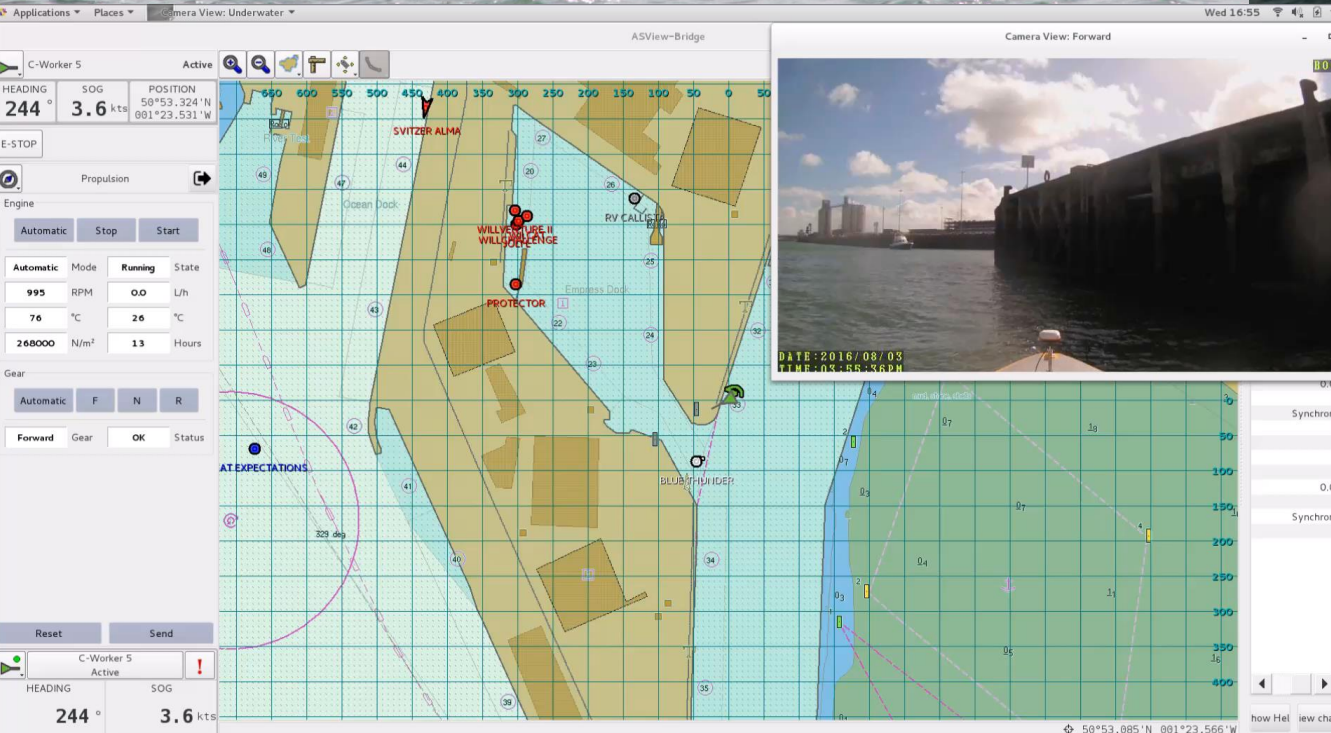


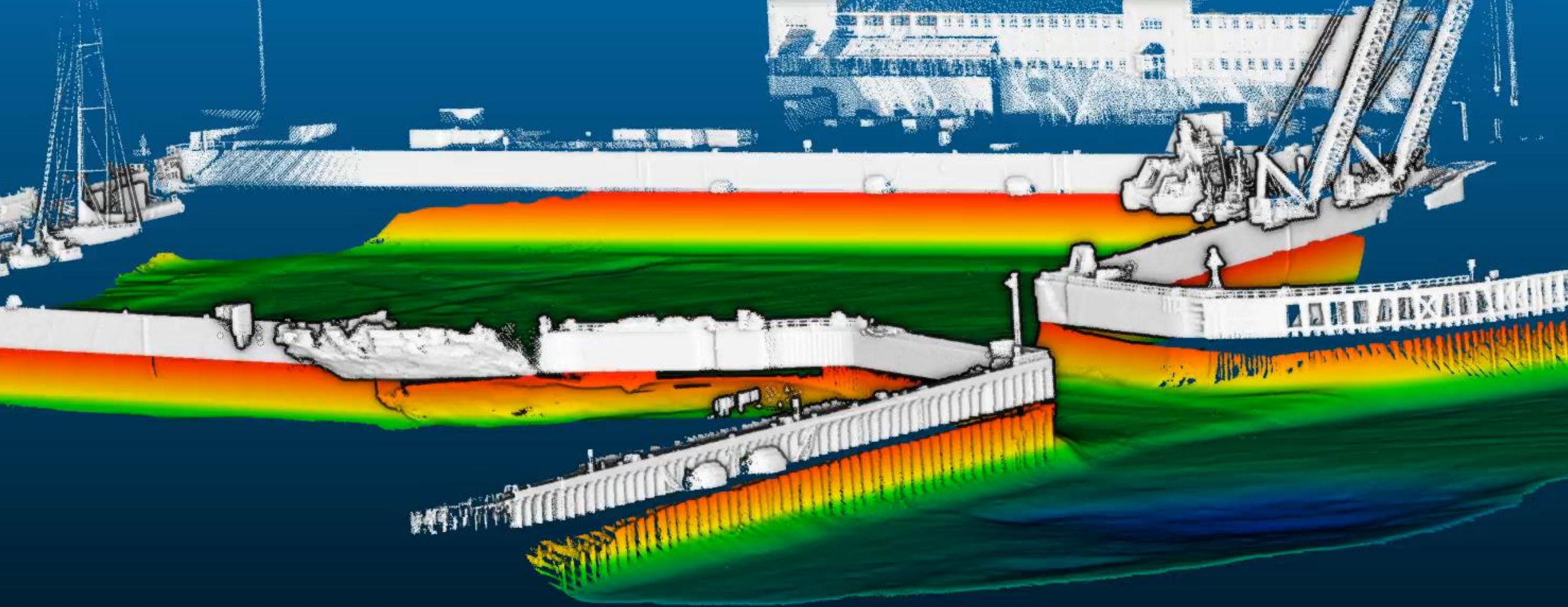




Crosslines intentionally ran to cross other vessel's lines for QC purposes







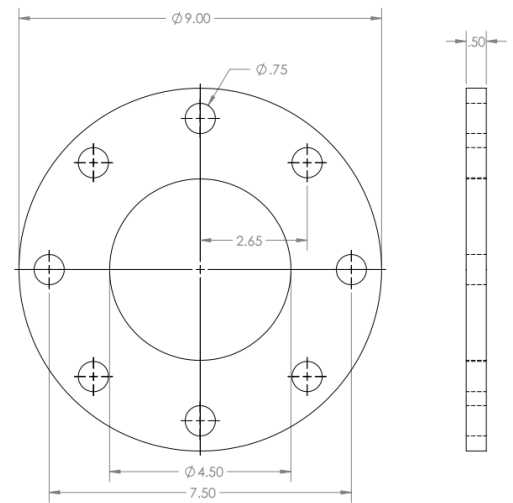
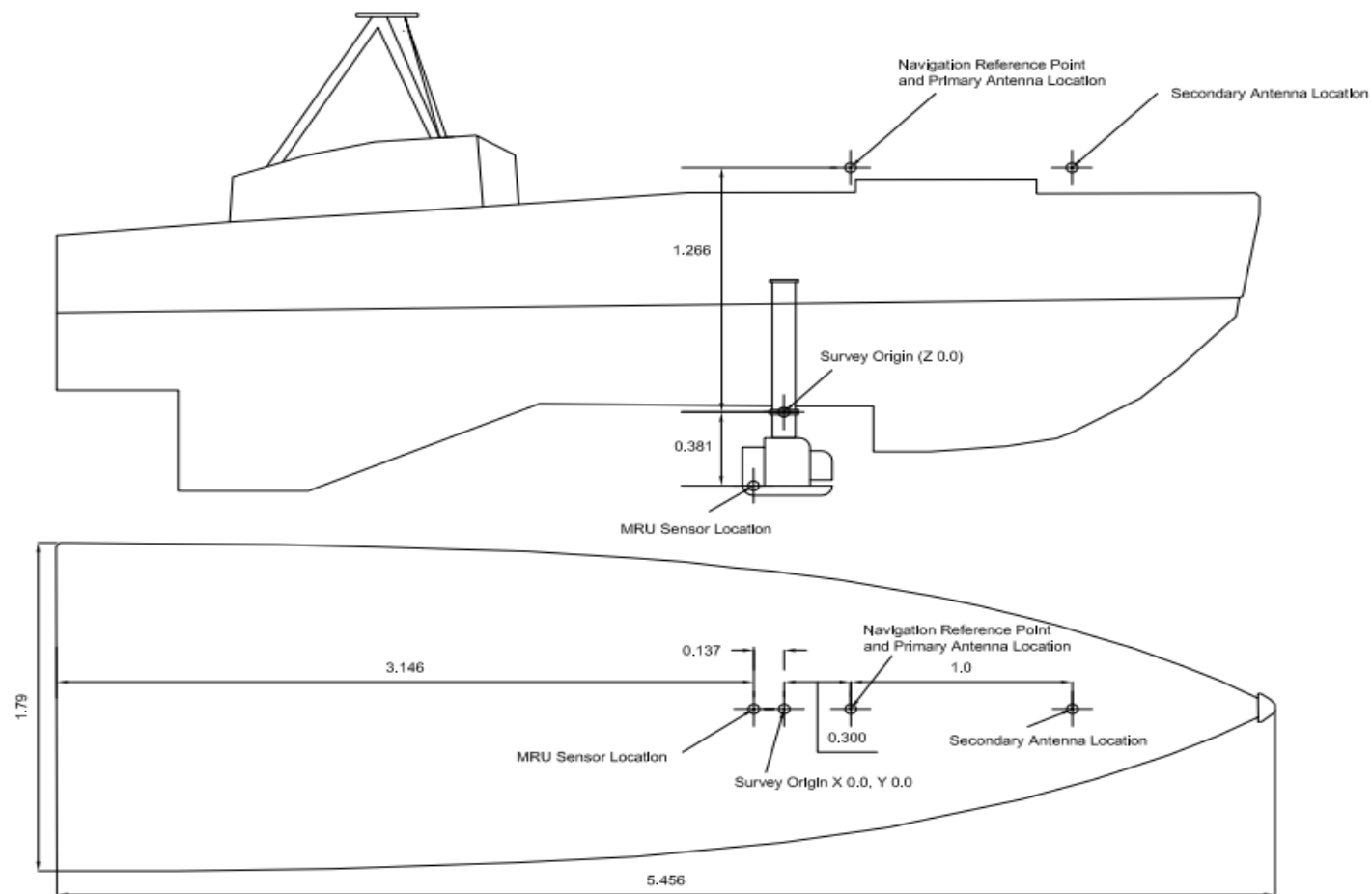


Challenges:

- Mobilisation - Logistics
- Operators and Operator Training
- Payload Integration
- Data Link is critical
- Escort Vessel
- COLREGS
- Full Autonomy
- Trust







DIMENSIONS ARE IN INCHES		NAME	DATE
FRONT VIEW	1	DESKIN	
ANGULAR MATCH	2	CHECKED	
TWO PLACE DECIMAL	3	ENG APPR	
THREE PLACE DECIMAL	4	WFO APPR	
MATERIAL		S.A.	
COMMENTS:			
REV	DWG. NO.	FLANGE	REV.
SCALE	1	SCALE	1
APPLICATION	DO NOT SCALE DRAWING		



Neptune Geomatics
 A Neptune Marine Services Company
 404 Orrong Rd Welshpool, W.A. 6106
 Phone +61 8 6242 2222
 Fax +61 8 6242 2211
 ABN 47 108 312 787

ASV OFFSET DIAGRAM GEOSWATHE SETUP

REV: 01
 0
 20 APRIL 2017





PORT

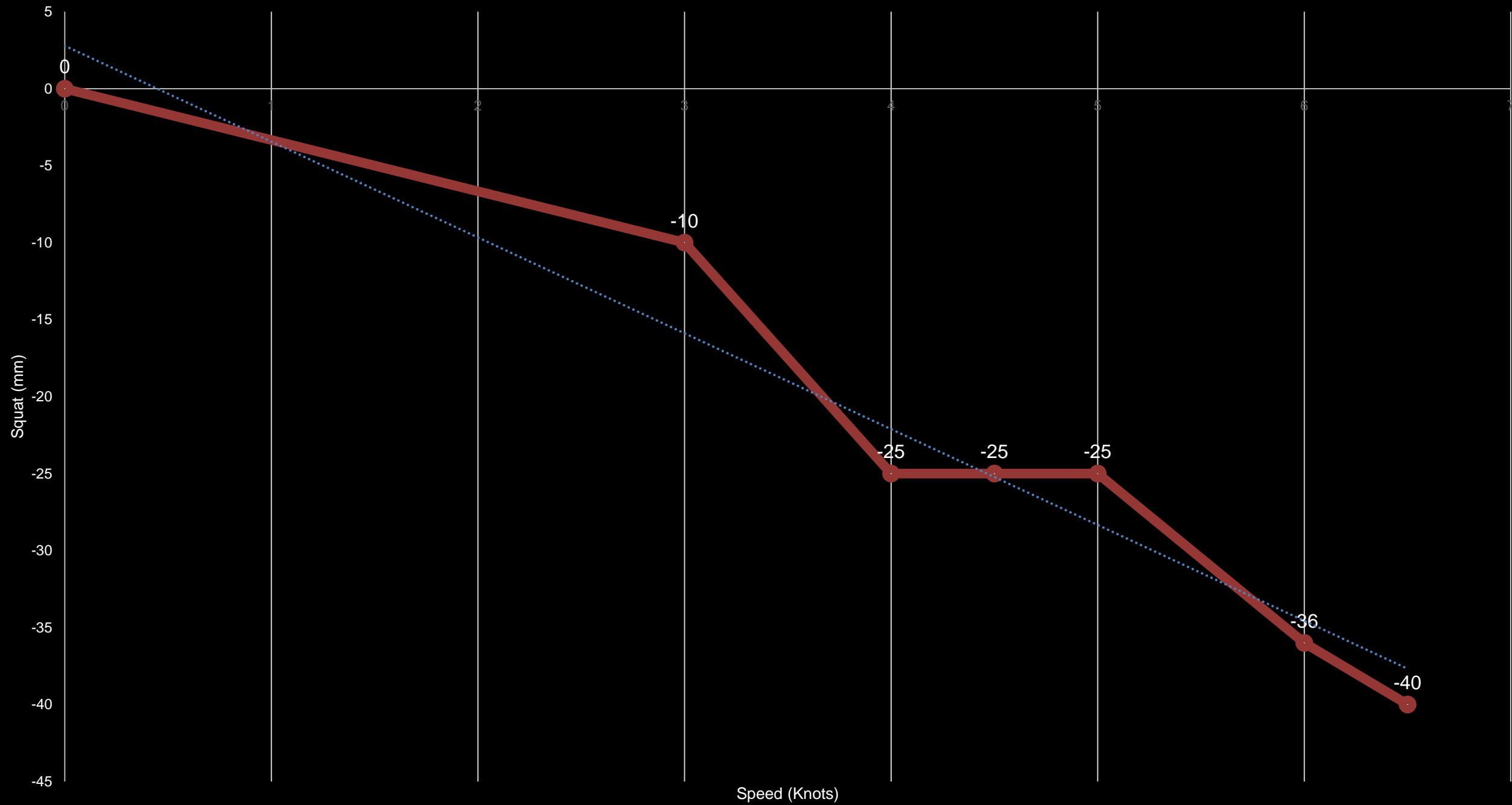
MRU-6-870-24411
KONGSBERG



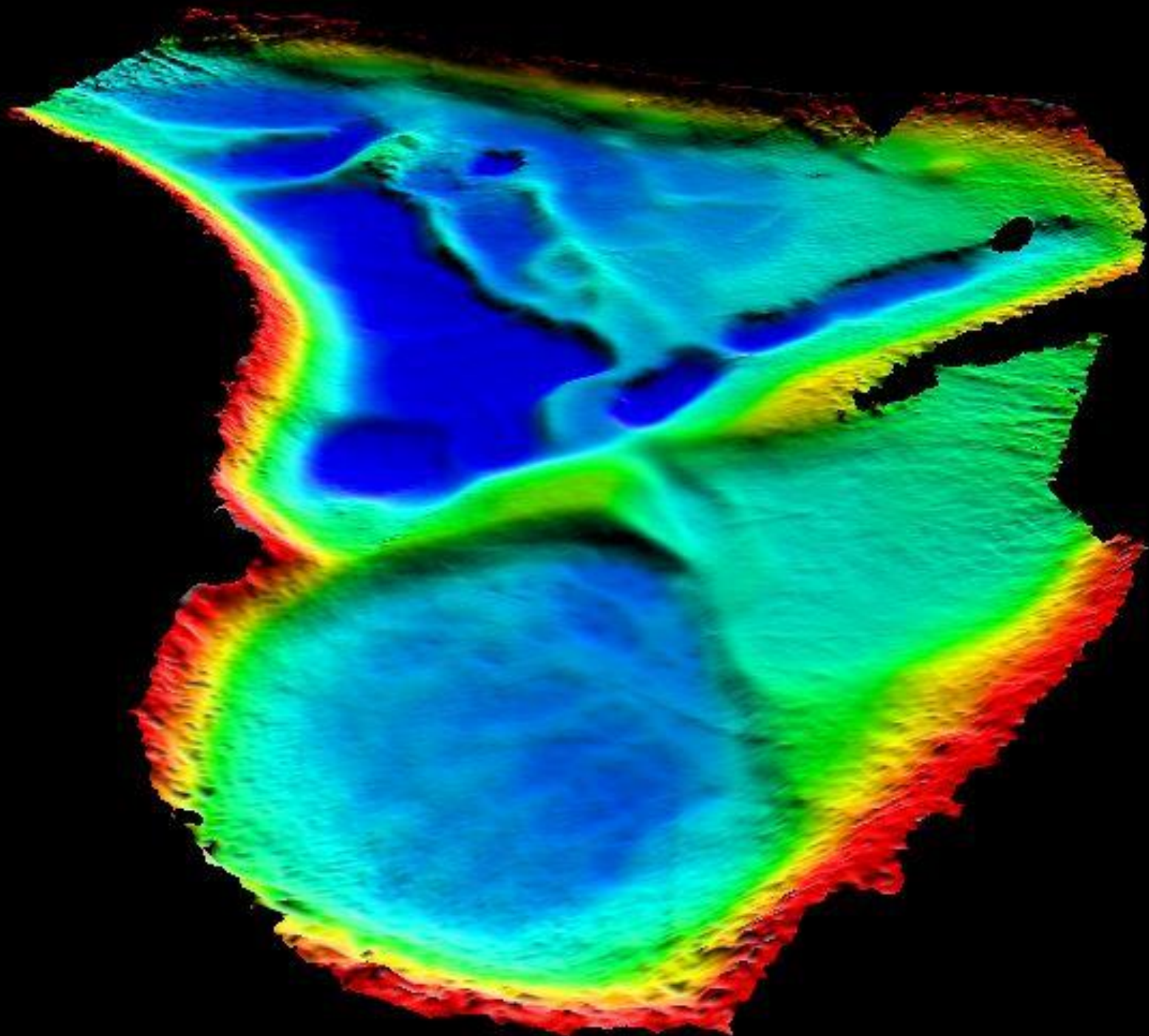
KONGSBERG SEATEX

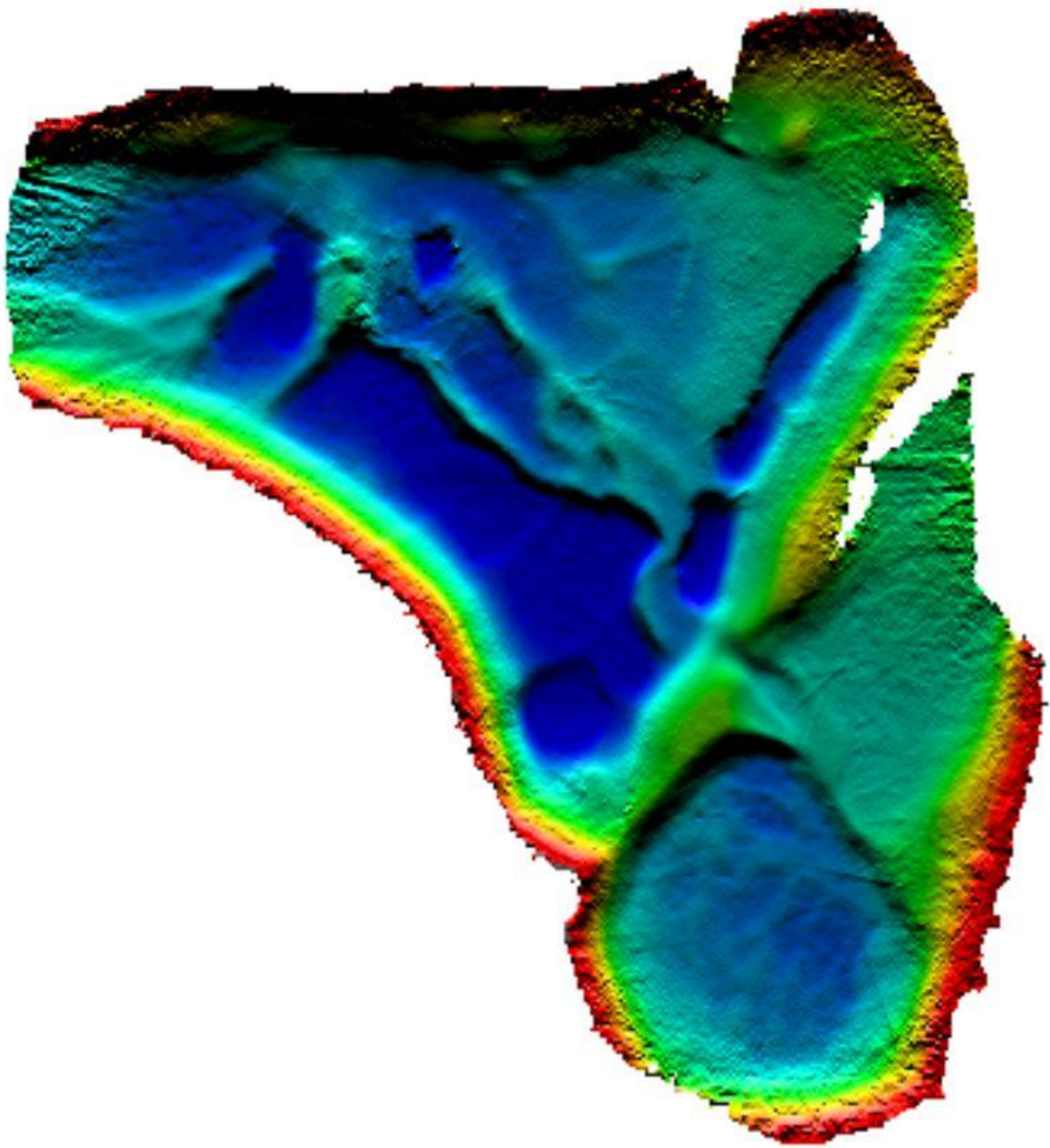


Squat(mm)/Speed(knots)









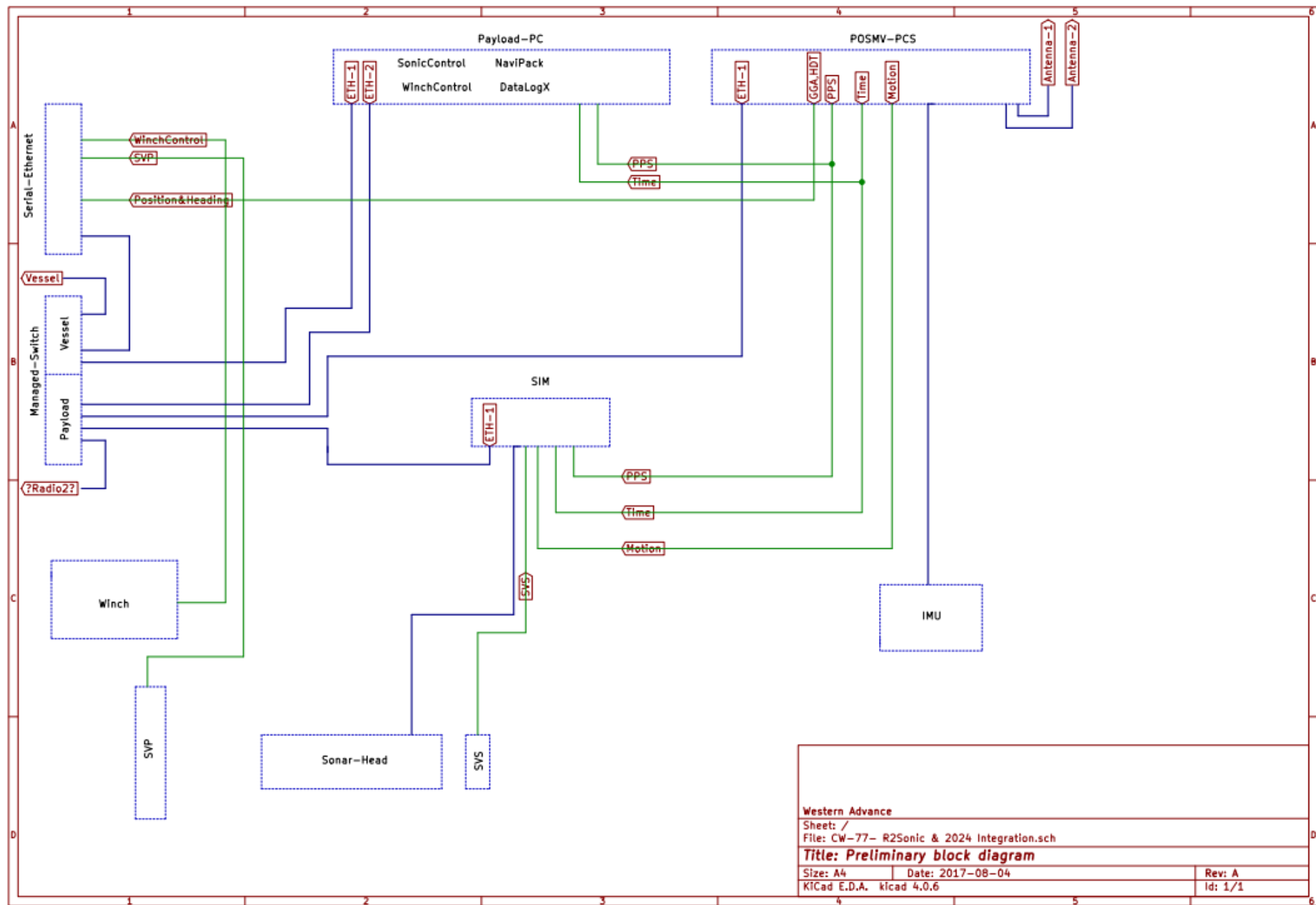












Western Advance

Sheet: /

File: CW-77- R2Sonic & 2024 Integration.sch

Title: Preliminary block diagram

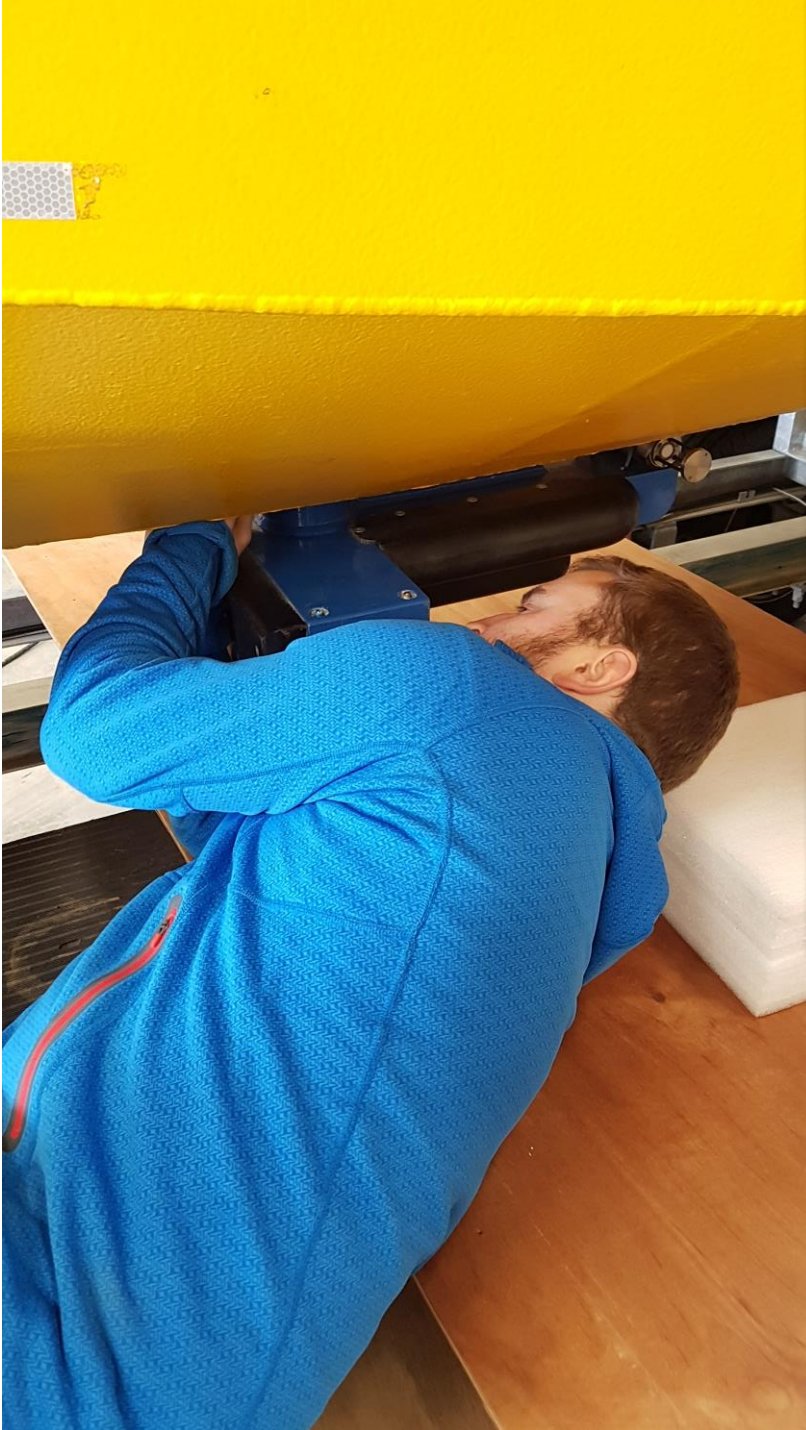
Size: A4

Date: 2017-08-04

Rev: A

KiCad E.D.A. kicad 4.0.6

Id: 1/1



Lever Arms & Mounting Angles

Lever Arms & Mounting Angles | Sensor Mounting | Tags, AutoStart

Ref. to IMU Target

X (m)	-0.004
Y (m)	-0.006
Z (m)	-0.120

IMU Frame w.r.t. Ref. Frame

X (deg)	0.000
Y (deg)	0.000
Z (deg)	0.000

Target to Sensing Centre

X (m)	0.000
Y (m)	0.000
Z (m)	0.066

Resulting Lever Arm

X (m)	-0.004
Y (m)	-0.006
Z (m)	-0.054

Ref. to Primary GNSS Level

X (m)	-0.395
Y (m)	-0.007
Z (m)	-0.921

Notes: 1. Ref. = Reference
2. w.r.t. = With Respect To
3. Reference Frame

Ok

In Navigation Mode

Communication Settings

Network | Sensor

	GPS	Motion	Heading	SVP
Interface	RS-232	RS-232	Off	RS-232
Baud	9600	115200	9600	19200
Data Bits	8	8	8	8
Parity	None	None	None	None
Stop Bits	1	1	1	1
IP	10.0.0.44	10.0.0.145		
Port	5606	22222		
PPS Edge	Falling			

Trigger In: Free Run

Trigger Out: Rising Edge

Cancel Apply

Range: 50 m

Pulse Width: 15 μ s

Power: 0 dB

Gain: 7

Gate Min: 11.6 m

Gate Max: 27.2 m

Brightness: 30 dB

Gate Slope: 3°

W: 129° f: 400 kHz

T: 0.0° c: 1300.0 m/s

BSM: ea1 PR: 2.0 Hz

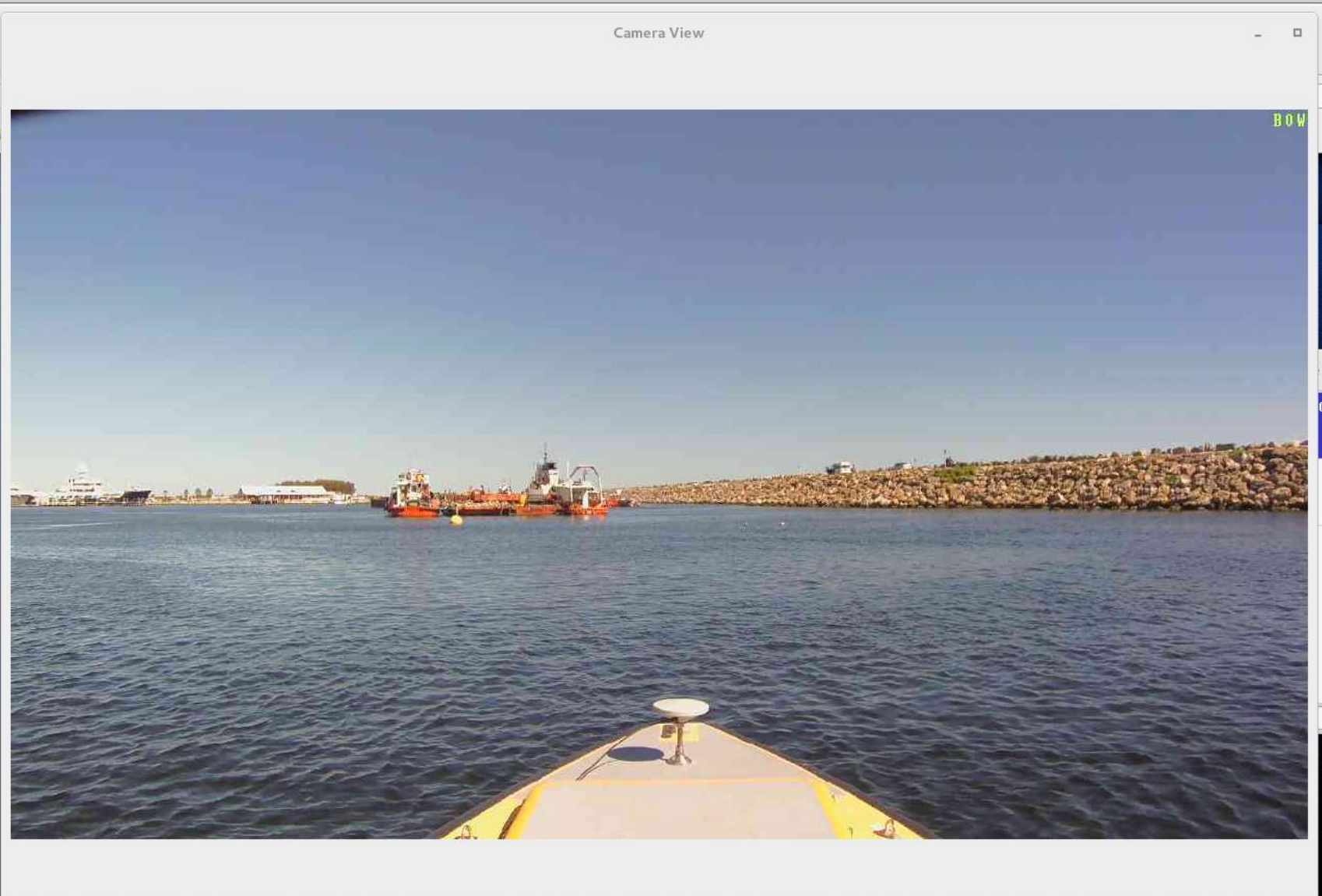
D: 25.82 m

PS PPS MRW SVP TRG Pwr 08/22/2017 07:06:46

ASV-RackModuleRela... x +

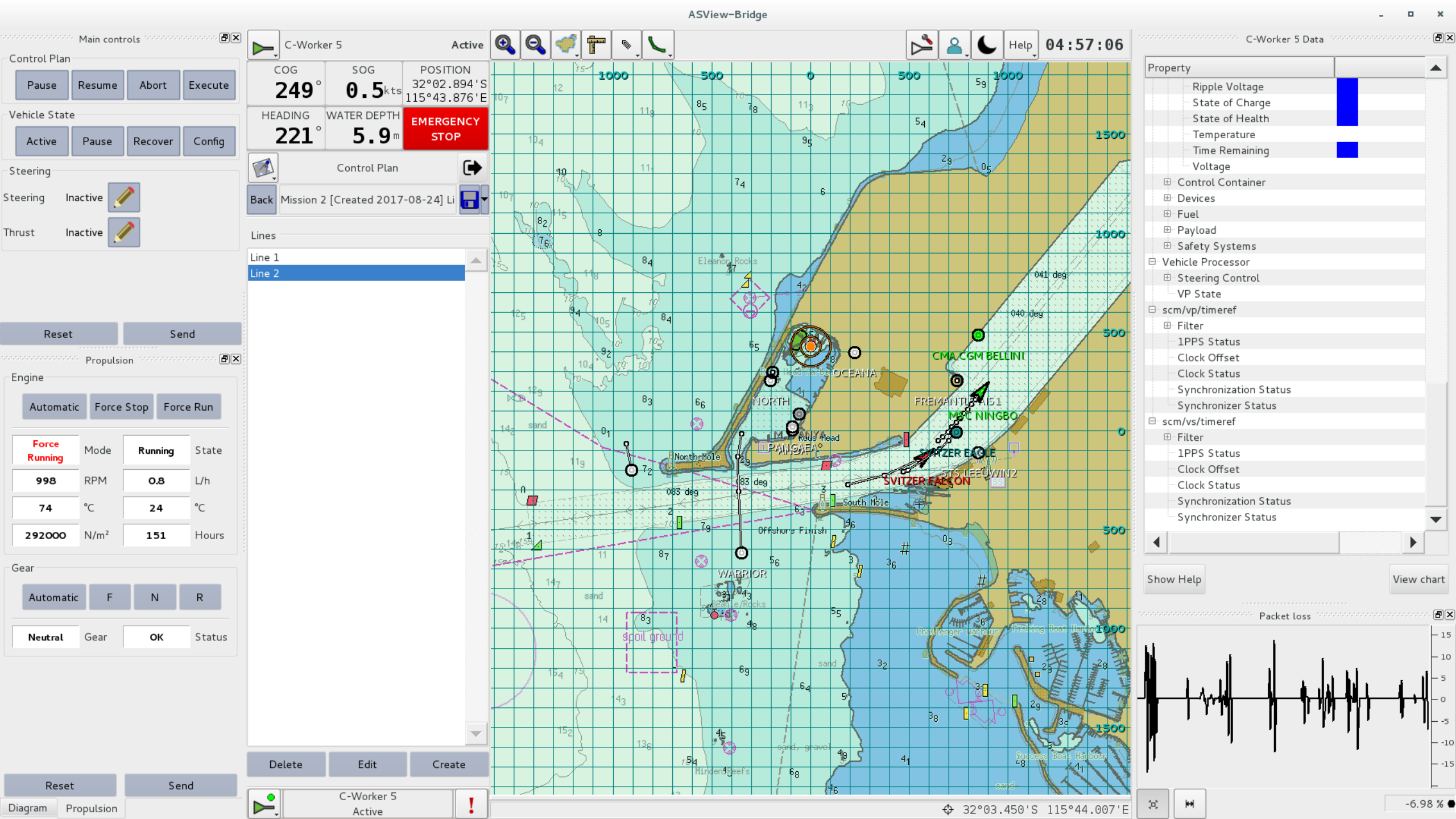
192.168.1.151/ProXR/Relays.html

C-Worker 5 Bookma... ▾ Most Visited ▾ Centos



Transfer

02.SBD, J236N003.SBD, J236N004.SBD,





Project Tree

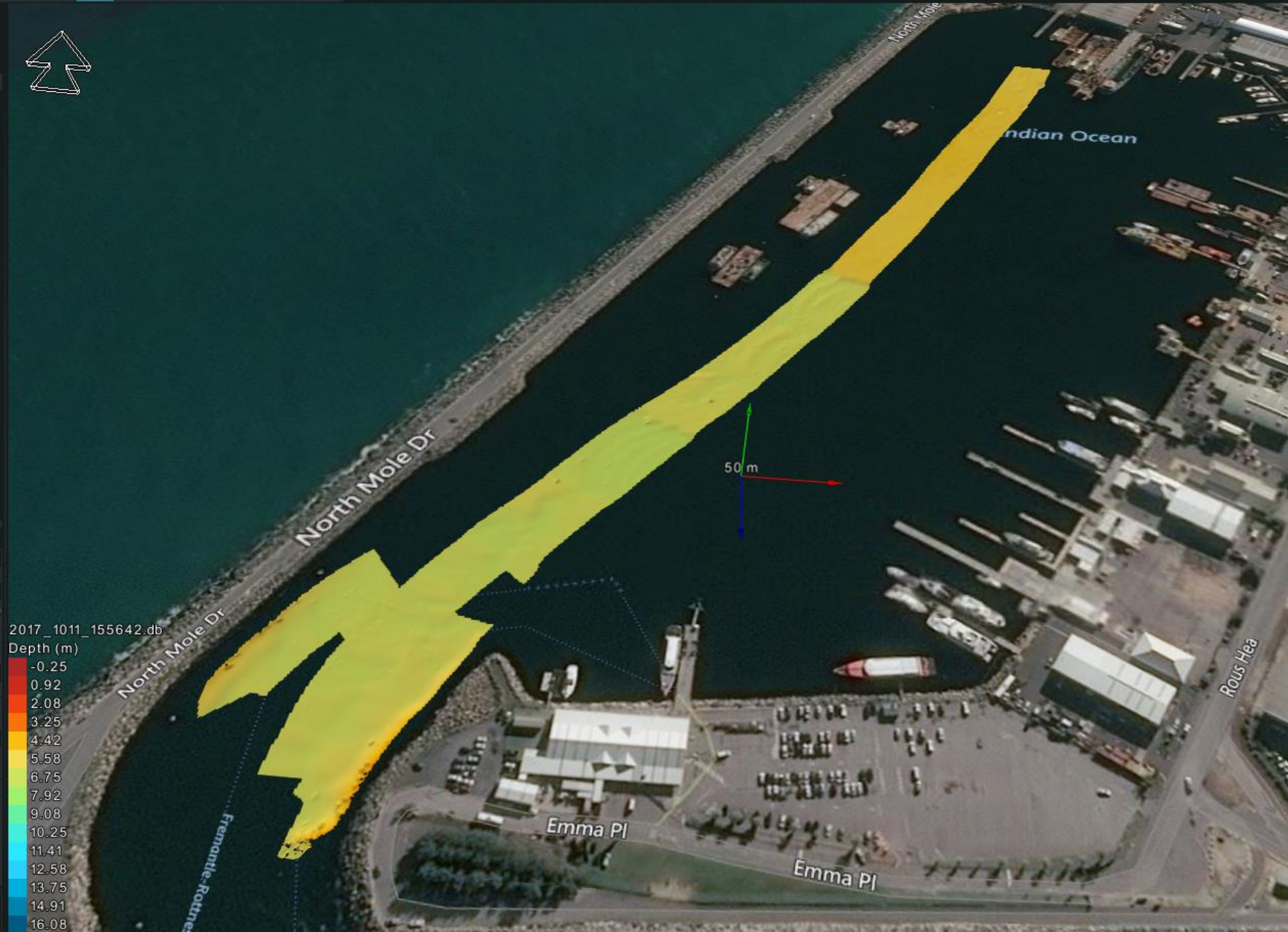
- Project
 - Maps
 - 2017_1011_155642.db
 - Surveys
 - Toppings
 - Pipes
 - Events
 - Waypoints
 - Online
 - Palettes
 - Color modes
 - Camera Path
 - Key frame 1
 - Views

Properties

- General
 - Name: 2017_1011_155642.db
- Database
 - Path: I:\12_Suppliers\ASV\CW5\Payload\Sensor Data\
 - Number of points: 6 809 600
 - Cell size: 0.20 m
 - External Saving/Loading: ☒ False
- Appearance
 - Surface Type: Average
 - Color Mode: Depth
 - Opacity: 100 %
- Profile View
 - Surface Color: 0, 175, 216
 - Pen Width: 1 pixels
 - Draw Mode: Line
 - Points Color: 0, 175, 216

Name

Name of object



APPLICATION FOR TEMPORARY OPERATIONS EXEMPTION



Australian Government
Australian Maritime Safety Authority

Marine Safety (Domestic Commercial Vessel) National Law Act 2012
EX07 Marine Safety (Temporary operations) Exemption 2016
This form is to be used to apply to the National Regulator for approval under section
EX07 Marine Safety (Temporary operations) Exemption 2016. Approval may only be
National Regulator where the relevant criteria stated in EX07 Marine Safety (Temporary
Exemption 2016 is met.

If you are unsure of any information, or it is not applicable, please leave blank. Please attach a separate sheet if you need additional information.

A. Applicant details

Title Mr	Surname McFarlane	Given names Craig Andrew
Company name Western Advance Pty Ltd		
ACN / ABN (if applicable) 008 879 767 60008879767	Vessel name C-Worker 5 (#77)	Unique Identifier GB ASV23

B. Provision of information

Are you seeking approval under EX07 Marine Safety (Temporary operations) Exemption 2016 to:

- Operate your vessel while waiting for a certificate of survey to be issued? ☐ Y
- Operate your vessel while waiting for a certificate of operation to be issued? ☒ Y
- Enable the building, disposing of, fitting out, relocation, removing or repair of the vessel, or for a sea trial? ☐ Y
- Operate your vessel in a way that is not authorised by the certificate of operation? ☐ Y
- Operate your vessel in a way for which the certificate of survey does not provide? ☐ Y

Explain how the permit sought will not jeopardise the safety of the vessel, or other vessels, or people on board (please provide supporting evidence).

Application for class registration is pending with AMSA. Specific exemptions have been requested and are currently under review. See attached explanatory notes.

C. Applicant's declaration and consent

I declare that:

- To the best of my knowledge the information provided by me in this application (and any attachments I have included) is true and correct.
- I consent to the Australian Maritime Safety Authority, as the National Regulator, making all reasonable enquiries in order that the information provided by me in this application (and any attachments I have included with this application) is correct.
- I understand and acknowledge that the Australian Maritime Safety Authority, as the National Regulator, may ask that I provide information or document that the National Regulator reasonably considers necessary for consideration of this application.
- I understand and acknowledge that the Australian Maritime Safety Authority, as the National Regulator, may ask another person to provide any information, document or agreement that the National Regulator reasonably considers necessary for consideration of this application.

Signature 	Name Craig McFarlane	Date 13 Feb 2017
---------------	--------------------------------	----------------------------

Where to lodge: Roads and Maritime Services NSW • Maritime Safety QLD • Transport Safety VIC • Marine and Safety TAS • Department of Planning, Transport and Infrastructure SA • Department of Transport WA • Marine Safety NT.

Privacy Statement

The collection of information requested in this form is required or authorised by Schedule 1 of the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (the Act). It will be used for purposes related to the Act and may be provided to Commonwealth or State / Territory governments for the purposes of marine safety. Failure to provide the information may result in the transaction not being processed. To contact us, or for more information on how to access or correct your personal information, how to make a privacy complaint, or how your information may be used or disclosed beyond those described in this statement, visit www.amsa.gov.au/privacy

AMSA777 (5)



Australian Government
Australian Maritime Safety Authority

Reference Number EX2017/A120

SPECIFIC EXEMPTION

Section 143, Marine Safety (Domestic Commercial Vessel) National Law Act 2012

Particulars of vessel

Name of Vessel	Unique Identifier	
CW-77	09529	
Measured Length	Service Category	Vessel Type
5.5 m	2C	AUTONOMOUS SURFACE VESSEL

- The Vessel is exempt from the application of sections 8, 10(2)(b) and 12(b) of Marine Order 503 (Certificates of survey-national law) 2013, to the extent that each requires the Vessel to comply with the following required outcome of the National Standard for Commercial Vessels (NSCV) Part C, Section 1:

2.4 Required Outcome – compliance with COLREGS

A vessel must be arranged to enable the person operating the vessel to comply at all times with the person's obligations under COLREGS

- The Vessel is exempt from the application of sections 8, 10(2)(b) and 12(b) of Marine Order 503 (Certificates of survey-national law) 2013, to the extent that each requires the Vessel to comply with a required outcome of the NSCV, and the following deemed to satisfy solutions, or an approved equivalent means of compliance, are not implemented:

- NSCV Section C1 Clause 6.12.2 for provision of fixed guardrails or bulwarks.
- NSCV Section C3 Clause 3.2.2 and Table 1, to the extent that the hull stiffener terminations and flange widths must comply with AS1799.5.
- NSCV Subsection C5A Clauses 6.7.3, 6.8.7.3 and 6.8.7.4, for the carriage of an emergency steering system, rudder neck bearing length, and rudder mainpiece length.
- NSCV Subsection C5B Clause 5.12 for the provision of an emergency power source for electronic navigational aids, navigation lights, and sound signals.
- NSCV Subsection C7A Clause 5.3 for the carriage of safety equipment.
- NSCV Subsection C7B Clause 4.3, for the provision of radiotelephone and satellite communications equipment.

OFFICE USE ONLY

Regulator

declaration? ☒ Yes ☐ No ☐ N/A
 issued? ☐ Yes ☐ No ☒ N/A
 be issued? ☐ Yes ☐ No ☒ N/A
 he conditions to which it is subject, will not jeopardise
 person on board a vessel? ☒ Yes ☐ No ☐ N/A
 if the vessel required? ☒ Yes ☐ No ☐ N/A
 d a report on the condition of the vessel been provided? ☒ Yes ☐ No ☐ N/A
 ? ☒ Yes ☐ No ☐ N/A
 unction E
 v

to operate the vessel listed below under Marine Safety (Temporary operations) conditions of the exemption, the conditions below, and any conditions attached to this

Approval under Section 6 or section 7 is granted ☒ Yes ☐ No

Unique identifier
9529

issued for the purposes of trialing the above mentioned autonomous vessel only.

vessel on the private waters of Lake Yakine in Ellenbrook only.

il operations. Any persons onboard the vessel are to wear PFD's.

nt of the operator at all times.

ake apart from those directly involved in the autonomous vessel trials.

qualified in accordance with NSCV Part D requirements.

Effective to
28 th February 2017

Signature	Date
	15 th Feb 2017



ASV Locations

