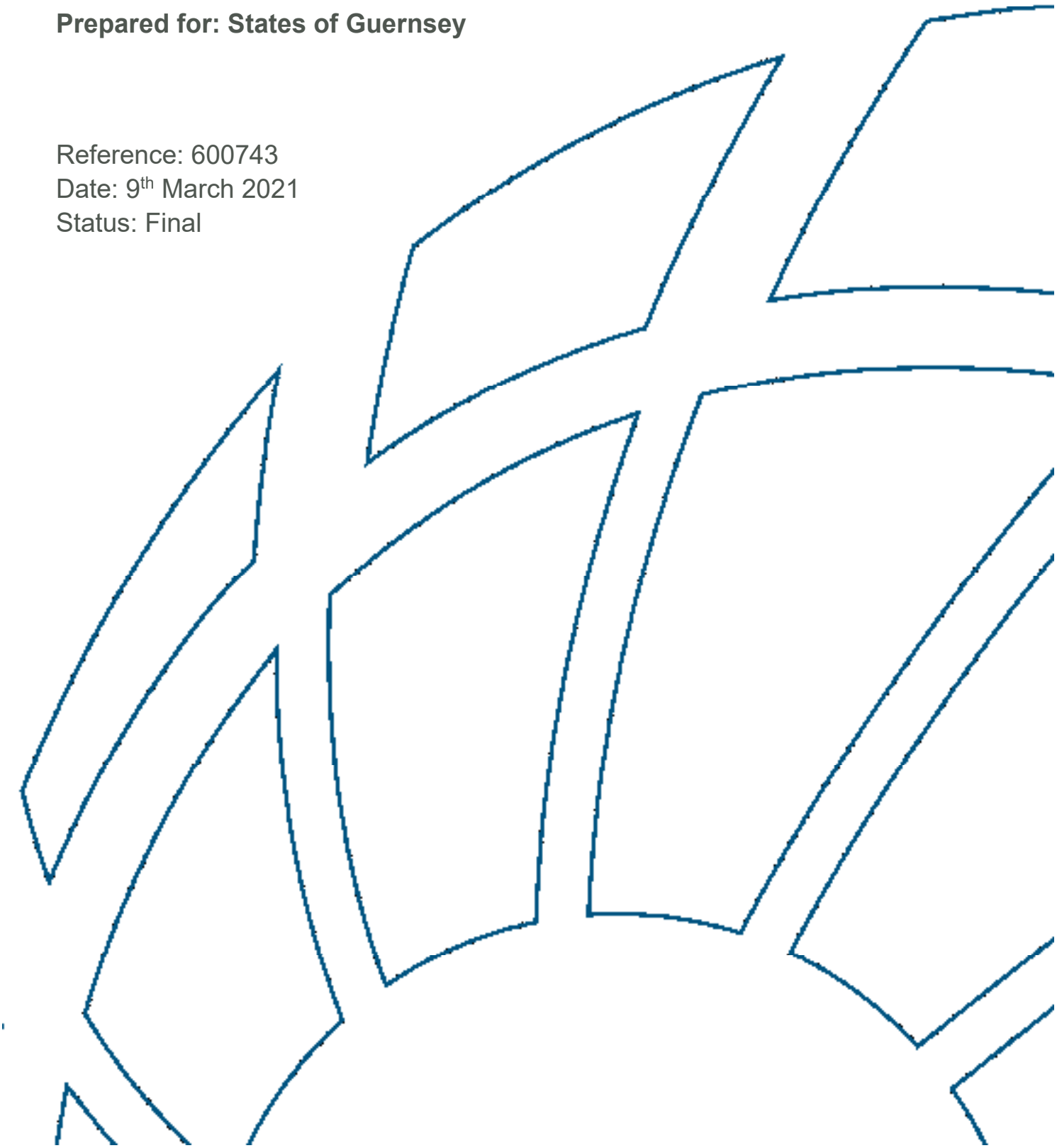
Guernsey Future Harbour Manoeuvring Simulation Study

Prepared for: States of Guernsey

Reference: 600743
Date: 9th March 2021
Status: Final



Document status sheet

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Author(s) : Mark Wilson (BMT)
:
Checked by : Hakan Sen (BMT)

Distribution : David Barker (States of Guernsey)

Revision	Status	Date	Reviewer	Comments
1	Draft	12/2/21	Hakan Sen	
2	Final	9/3/21		

If you have questions regarding the contents of this document please contact us by sending an email to info@bmtmail.com or contact the author directly.

Contents

1. Terms of Reference

BMT was instructed by the States of Guernsey to conduct a vessel manoeuvring simulation study to assess the potential options for harbour development on the east coast of Guernsey. Two of the options being evaluated involve construction of new harbour facilities to seaward of the current coastline. In order to assess the viability of these options BMT's REMBRANDT simulator was used to conduct ship berthing trials using digital simulations of the new port facilities, with updated bathymetric and tidal stream data obtained through recent surveys.

The main objectives of the navigation simulations work were:

- To determine the suitability of each harbour layout for the design vessels

The simulations were conducted using the REMBRANDT ship handling and manoeuvring simulator, developed by BMT. This report describes the methodology adopted for this project and includes a summary of results, full simulation results (including track-plots) and appropriate recommendations.

1.1.1. Location or Area of interest

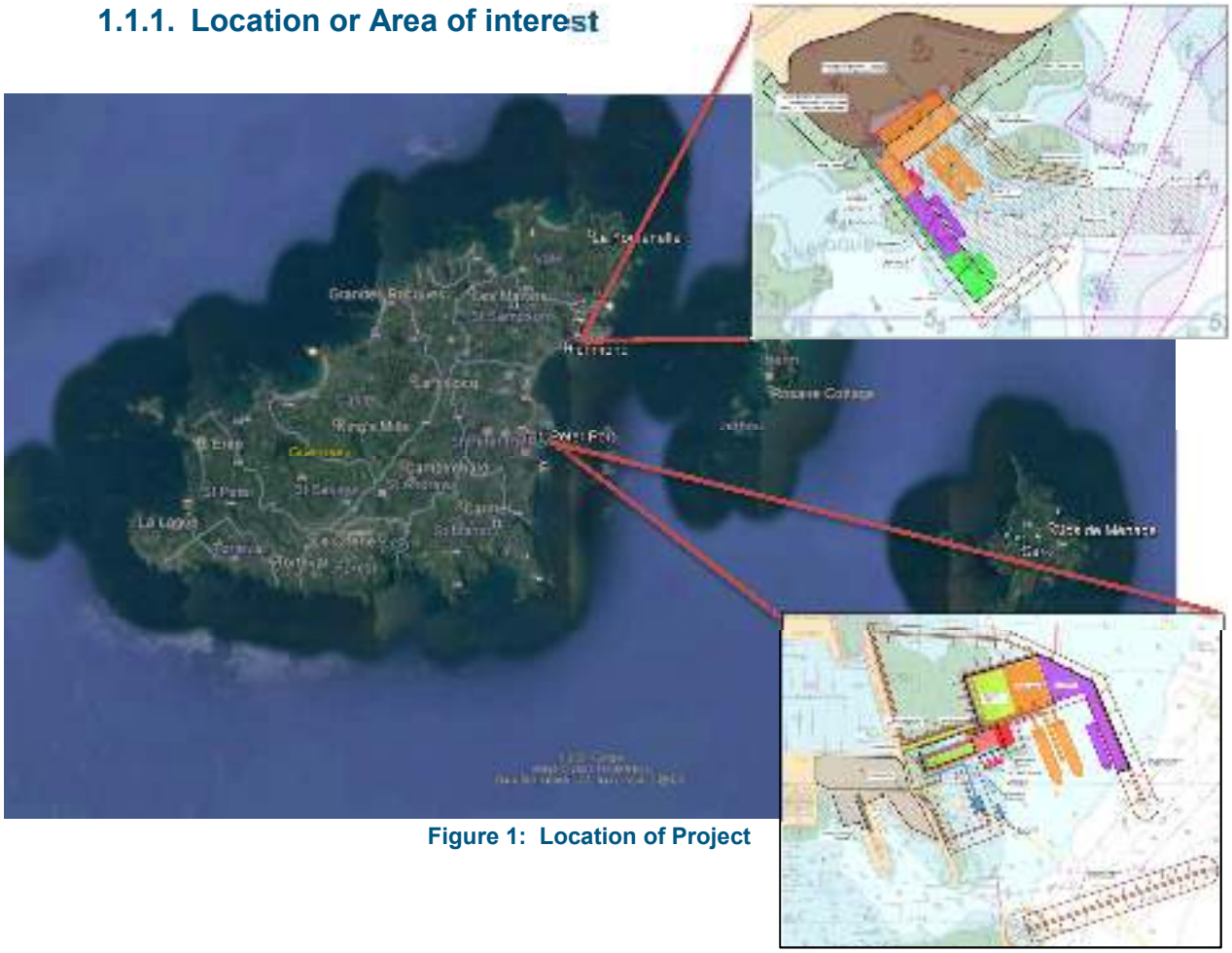


Figure 1: Location of Project

2. METHODOLOGY

The study was completed using BMT's ship-handling simulator, REMBRANDT. The REMBRANDT system allows real and fast time simulations to be conducted using either 'hands-on' control (man-in-the-loop) or automated control using an auto-pilot function.

REMBRANDT is a Windows based software application designed to run on any laptop or desktop computer of suitable specification that is using a Microsoft operating system. It can be configured in single or multiple screen modes with a variety of user control options. In BMT's Fareham office is a full bridge simulator setup configured to represent a ship's bridge.

The software is fully tested and has been Type Approved by DNV.

Figure 2: BMT's Full Bridge Simulator REMBRANDT

A wide range of user configurable controls allow for a variety of environmental conditions such as day/night, reduced visibility, gusting winds and complex current flows to be simulated.

A comprehensive range of hydrodynamically modelled ship types is offered from which customers can select addition types to complement the five models selected at time of original purchase.

Visual topography, including bathymetric representation is automatically generated from the ENC chart. Additional library or customer specified objects can be added to populate the visual scene. A ship model with no hydro-dynamic capability is classed as an object and can be a useful addition when scene setting in busy harbours and waterways.

A radar module is offered that replicates the Sperry Bridgemaster ARPA radar and the included software supports full ARPA functionality to allow for rule of the road and blind pilotage training.

The following sections describe the work undertaken in more detail.

2.1. Simulation Database and Electronic Chart

The official UK Hydrographic Office S-57 electronic chart was obtained for the simulations and edited to include the two proposed port developments as is shown in Figure 3 below.

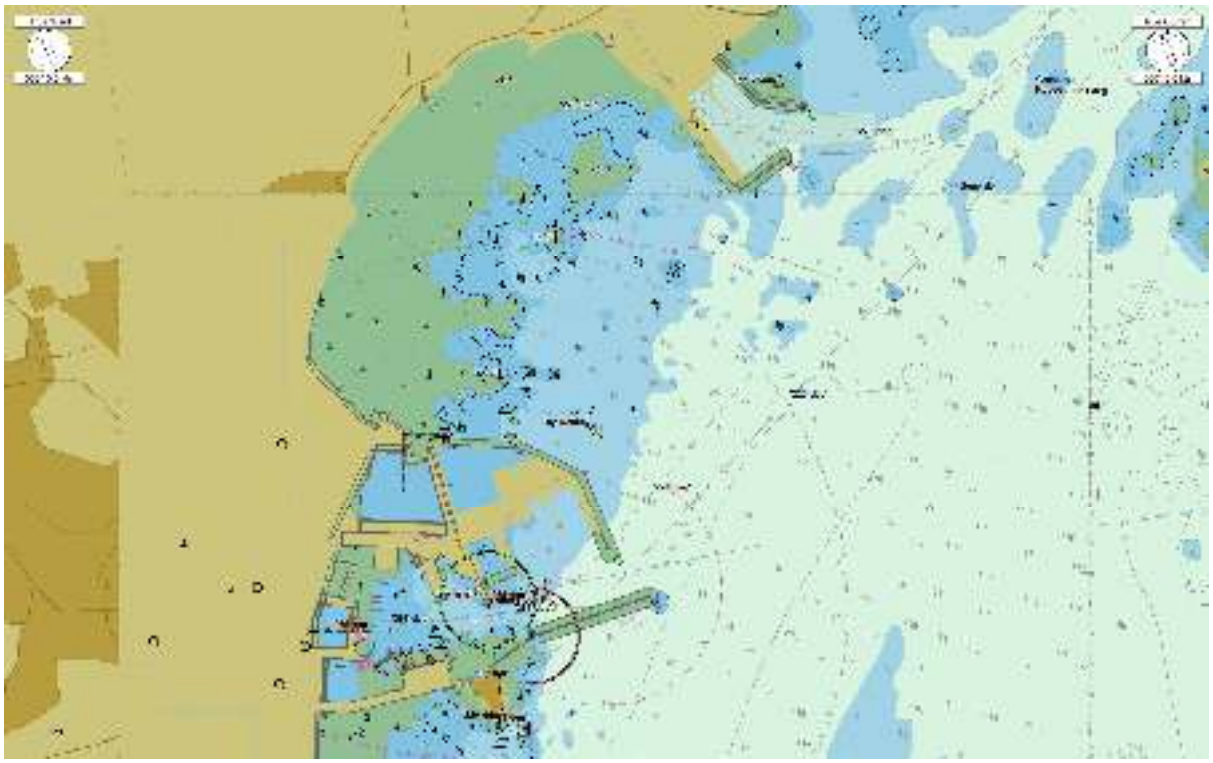


Figure 3: Guernsey ENC showing new berths

2.2. Vessel Mathematical Models

Three typical sizes of ship were used for the simulation study.

Vessel ID	LOA [m]	B [m]	Loading Condition	T Stern [m]	T Bow [m]	Control Devices
Condor Liberation	102.0	27.5	Design	4.2	4.2	3 x FPP 1 x BT
Containership 008b	136.1	18.4	Fully-Loaded	7.8	7.8	1 x FPP 1 x BT
Roro14	129.6	21.0	Fully-Loaded	4.7	4.7	2 x CPP 1 x BT

Table 1 - Vessel Particulars

2.3. Metocean Environment

Current data was provided by Haskoning for entry into the simulator, however a number if issues were noted with the data. The current model produced by Haskoning did not take account of the Northern Harbour development and used depth averaged currents, which resulted in current flows that may not be representative of those experienced by vessels approaching the planned breakwaters. For this reason a number of manually inputted currents were also used for various runs.

Various wind directions were investigated with speeds up to 30 knots used. All runs were carried out with gusting wind. In REMBRANDT the gust speed is randomly varied by 25% to 31% of the base wind speed. The wind speed is then either increased or decreased (50/50) by the gust speed. Furthermore, the direction is randomly adjusted between -9° and 9°. This occurs every 10 to 25 seconds.

Corresponding wave conditions were used.

2.4. The Simulation Matrix

The final simulation matrix as agreed with the customer was made up of 29 runs.

Table 2 below shows the simulation matrix and these are shown along with the key results in Section 3.

Run	Vessel	Arrival / Departure	Harbour Area	Wind (kts) (gusting)	Current (kts)
1	Condor Liberation	Arr	Southern	10 / 225°	Haskoning North flowing
2	Condor Liberation	Arr	Southern	20 / 225°	Haskoning North flowing
3	RoRo14	Arr	Southern	20 / 225°	Haskoning North flowing
4	RoRo14	Arr	Southern	20 / 225°	Manual North flowing 2.6kt
5	RoRo14	Arr	Southern	20 / 045°	Manual North flowing 2.6kt
6	RoRo14	Arr	Southern	20 / 225°	Manual South flowing 3kt
7	RoRo14	Arr	Southern	30 / 225°	Manual South flowing 3kt
8	RoRo14	Arr	Southern	30 / 045°	Manual South flowing 3kt
9	Containership008b	Arr	Southern	20 / 225°	Manual North flowing 2.6kt
10	Containership008b	Arr	Southern	30 / 225°	Manual North flowing 2.6kt
11	Containership008b	Arr	Southern	20 / 225°	Manual South flowing 3kt
12	Containership008b	Arr	Southern	30 / 225°	Manual South flowing 3kt
13	Containership008b	Arr	Southern	30 / 045°	Manual South flowing 3kt
14	Containership008b	Arr	Southern	30 / 045°	Haskoning South flowing
15	Condor Liberation	Arr	Northern	10 / 225°	Haskoning South flowing
16	Condor Liberation	Arr	Northern	-	Manual North flowing 5kt
17	Condor Liberation	Arr	Northern	20 / 225°	Manual North flowing 5kt
18	RoRo14	Arr	Northern	20 / 225°	Manual North flowing 5kt
19	RoRo14	Arr	Northern	30 / 225°	Manual North flowing 5kt
20	RoRo14	Arr	Northern	20 / 225°	Haskoning North flowing
21	RoRo14	Arr	Northern	20 / 225°	Manual South flowing 5kt
22	RoRo14	Arr	Northern	30 / 225°	Manual South flowing 5kt
23	RoRo14	Arr	Northern	20 / 225°	Manual South flowing 3.5kt
24	Containership008b	Arr	Northern	20 / 225°	Manual North flowing 3.5kt

Run	Vessel	Arrival / Departure	Harbour Area	Wind (kts) (gusting)	Current (kts)
25	Containership008b	Arr	Northern	20 / 225°	Manual North flowing 5kt
26	Containership008b	Arr	Northern	20 / 225°	Manual South flowing 3.5kt
27	Containership008b	Arr	Northern	20 / 225°	Haskoning South flowing
28	Containership008b	Dep	Northern	30 / 225°	Manual South flowing 1.5kt

Table 2: Simulation run matrix

2.5. Simulation Methodology

The simulations were conducted during a 2 day workshop held at BMT's offices in Fareham. The customer and other stakeholders attended by video conference.

All ship simulations were conducted by Captain Neil Dunn who controlled the simulator directly through a control console replicating actual ship controls. The pilots had the following information available in real-time:

- The electronic chart view (ECDIS) showing the position of the vessel on the chart and other information such as the turning circles and exclusion zones.
- An out-of-the-window 3D view from the ship's bridge (switched to the bridge wings when required).
- Run information such as the vessel speed over the ground (ahead/astern and lateral), rate of turn, heading and course over the ground. Also, depth profile and engine/rudder values (actual and demanded).
- Position and percentage of power use for each tug.

The run information screen which is available to the pilot during the simulation is shown in Figure 4 below:

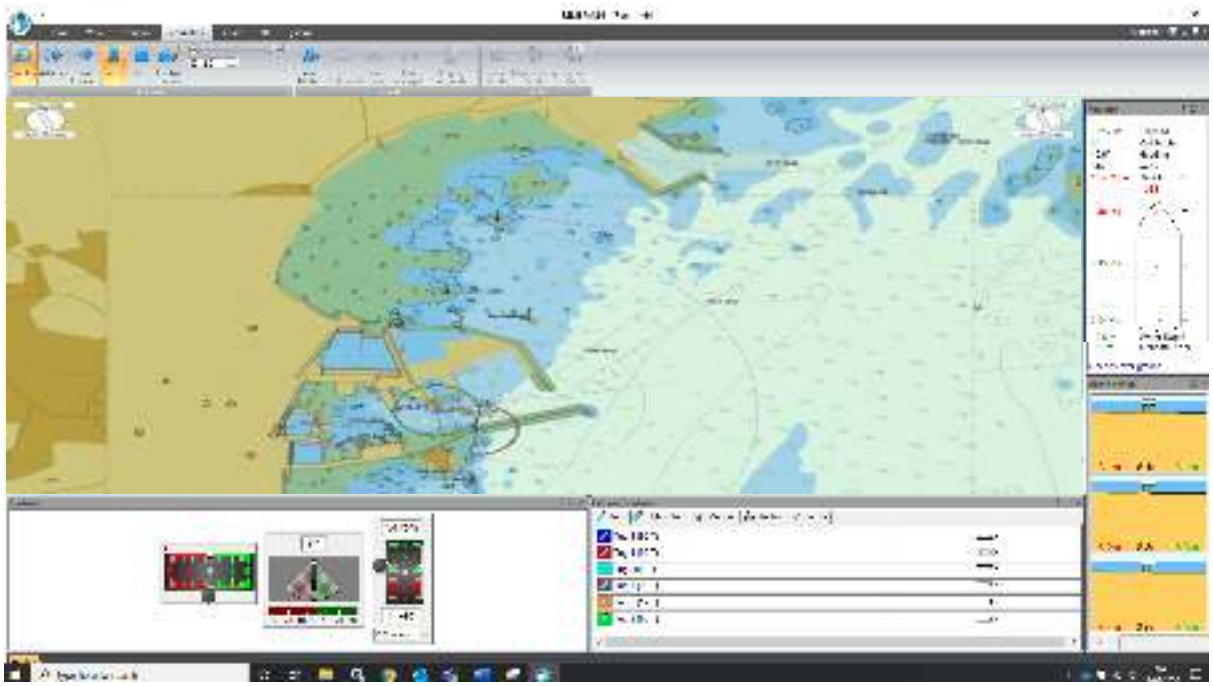


Figure 4: Simulator Screen

Each run was set up with the met-ocean conditions and the ship's initial position, speed and course. At the end of each run, a run report form was completed. The run report forms are included in Annex A. They include a qualitative grading (see Figure 5) as to the difficulty of performing each manoeuvre as a means of comparison for the study. The contents of the report forms and the grading were completed upon the conclusion of each manoeuvre.

Run difficulty up to and including "Not Demanding" is suggested as being standard operation in reality with runs rated as Not Easy and above requiring additional thought and preparation from the team performing them.

1	2	3	4	5	6	7	8
Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

Figure 5: Simulation Grading Method

3. Simulation Results

The run report forms for each run from the workshop are presented in Annex A.

Run	Vessel	Arrival / Departure	Harbour Area	Wind (kts) (gusting)	Current (kts)	Rating
1	Condor Liberation	Arr	Southern	10 / 225°	Haskoning North flowing	Comfortable
2	Condor Liberation	Arr	Southern	20 / 225°	Haskoning North flowing	Not Demanding
3	RoRo14	Arr	Southern	20 / 225°	Haskoning North flowing	Not Easy
4	RoRo14	Arr	Southern	20 / 225°	Manual North flowing 2.6kt	Not Easy
5	RoRo14	Arr	Southern	20 / 045°	Manual North flowing 2.6kt	Challenging
6	RoRo14	Arr	Southern	20 / 225°	Manual South flowing 3kt	Not Demanding
7	RoRo14	Arr	Southern	30 / 225°	Manual South flowing 3kt	Not Easy
8	RoRo14	Arr	Southern	30 / 045°	Manual South flowing 3kt	Challenging
9	Containership008b	Arr	Southern	20 / 225°	Manual North flowing 2.6kt	Not Easy
10	Containership008b	Arr	Southern	30 / 225°	Manual North flowing 2.6kt	Challenging
11	Containership008b	Arr	Southern	20 / 225°	Manual South flowing 3kt	Challenging
12	Containership008b	Arr	Southern	30 / 225°	Manual South flowing 3kt	Difficult
13	Containership008b	Arr	Southern	30 / 045°	Manual South flowing 3kt	Impossible
14	Containership008b	Arr	Southern	30 / 045°	Haskoning South flowing	Difficult
15	Condor Liberation	Arr	Northern	10 / 225°	Haskoning South flowing	Not Easy
16	Condor Liberation	Arr	Northern	-	Manual North flowing 5kt	Not Easy
17	Condor Liberation	Arr	Northern	20 / 225°	Manual North flowing 5kt	Not Easy
18	RoRo14	Arr	Northern	20 / 225°	Manual North flowing 5kt	Not Easy
19	RoRo14	Arr	Northern	30 / 225°	Manual North flowing 5kt	Not Easy
20	RoRo14	Arr	Northern	20 / 225°	Haskoning North flowing	Not Demanding
21	RoRo14	Arr	Northern	20 / 225°	Manual South flowing 5kt	Not Easy
22	RoRo14	Arr	Northern	30 / 225°	Manual South flowing 5kt	Difficult
23	RoRo14	Arr	Northern	20 / 225°	Manual South flowing 3.5kt	Not Easy
24	Containership008b	Arr	Northern	20 / 225°	Manual North flowing 3.5kt	Not Demanding
25	Containership008b	Arr	Northern	20 / 225°	Manual North flowing 5kt	Not Easy
26	Containership008b	Arr	Northern	20 / 225°	Manual South flowing 3.5kt	Impossible

Run	Vessel	Arrival / Departure	Harbour Area	Wind (kts) (gusting)	Current (kts)	Rating
27	Containership008b	Arr	Northern	20 / 225°	Haskoning South flowing	Not Demanding
28	Containership008b	Dep	Northern	30 / 225°	Manual South flowing 1.5kt	Not Easy

4. KEY CONCLUSIONS AND OBSERVATIONS

4.1. Conclusions from Simulations

In general manoeuvring of all the vessel models in and around the planned berths in the conditions tried was above average difficulty, however it was achievable in the conditions tested. In particular the port arrangement for the southerly port development are suitable for all vessel types in all states of tide, up to a maximum wind of 30 knots. Entries at a maximum ebb (southerly) tidal flow are likely to be challenging but would be within safety margins with practice.

For the northern port facility maximum flood (northerly) tidal flows of up to 5 knots across the harbour entrance were acceptable for all vessel types in all wind conditions. However, maximum ebb (southerly) tidal flows of 3.5 knots or above made harbour entry very difficult. At all states of tide 30 knots winds from the north east presented berthing challenges. Due to these factors it is very likely that entries to the harbour would not be practicable during spring ebb tides thus rendering the harbour more tidally constrained than the current St Peter Port harbour for all vessels. This would present increased challenges to the operation of a scheduled ferry service to this facility.

Some level of challenge was posed by the lack of detailed current flows for both designs. This was worked around by the use of manual currents, created using the feedback of a local pilot however it is recommended that future studies use the output from a validated current model as this will significantly improve the fidelity of the subsequent manoeuvring simulations. It is also suggested that further simulations are carried out once the design has been matured in order to investigate the comparative ease of use of the suggested different berth alignments.

The vast majority of the manoeuvring difficulties identified were due to the very strong cross currents at the mouth of both harbours. Future design efforts should be focused on mitigating this.

A number of observations on the proposed designs were made and are detailed below.

4.1.1. Suggested berth alignment images

The first suggested change was at the southern harbour and involved removal of the proposed finger jetty and instead having a bi-directional ramp in the north west corner pas per Figure 6. This would provide both more area in which to manoeuvre the ferries as well as ensuring the berthing manoeuvre was more likely to be aligned with the prevailing wind conditions.

Figure 6: Suggested RoRo Ramp Locations (South)

The same comment was applied to the northern port option (see Figure 7) with the same potential benefits.

Figure 7: Suggested RoRo Ramp Locations (North)

4.1.2. Suggested breakwater changes

The third proposed change involved a combination of potential options. The northern-most breakwater could be shortened to only include the berth area and / or the southern breakwater could dogleg to the south slightly as shown in Figure 8. Alternatively the angle of the proposed extension could be changed to achieve the same end result. This would provide considerably more space for the vessels entering the harbour which would make the manoeuvre much safer and easier in times of strong cross currents.

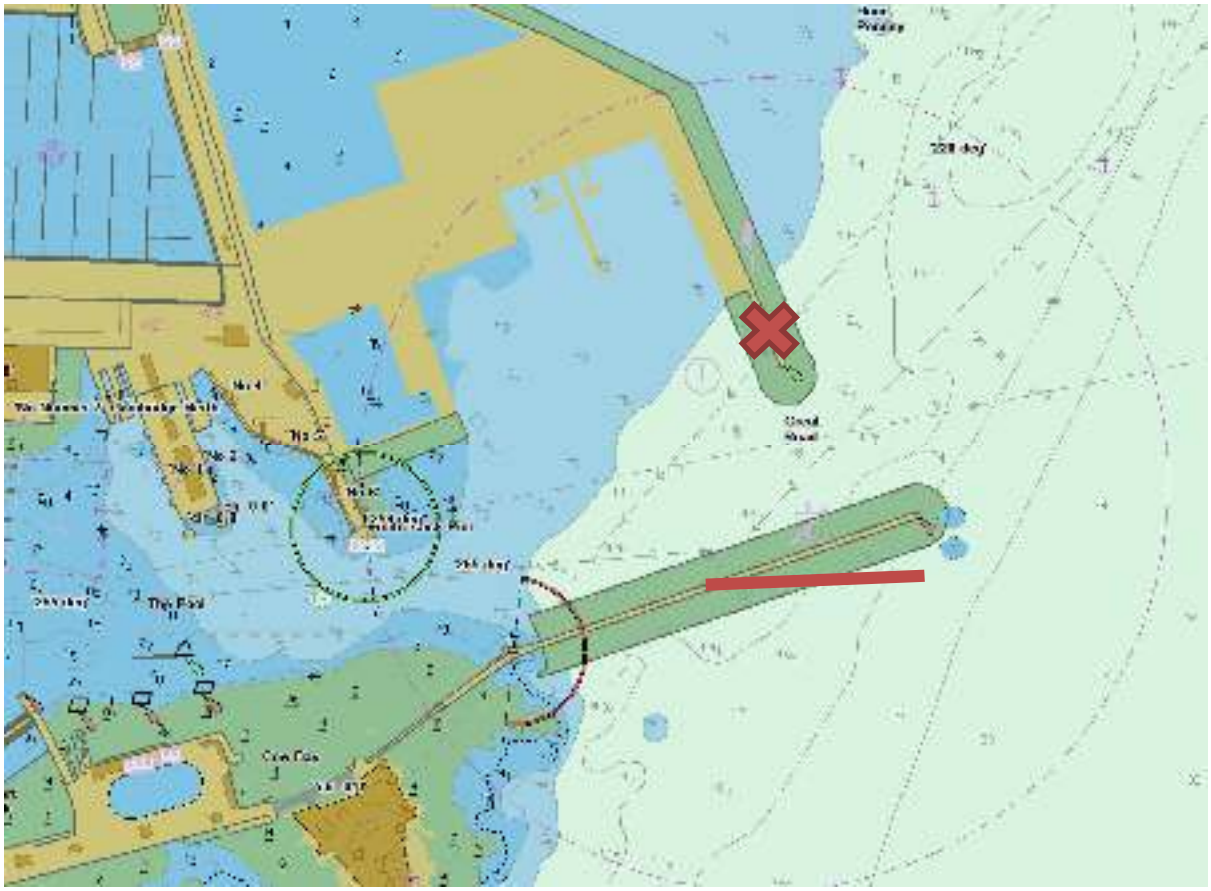


Figure 8: Suggested Breakwater Changes

Annex A
Simulation Run Reports

1 RUN 1:

Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
1	Condor Liberation	Arrival	Southern	Haskoning North Flowing	10kt / 225°	0.3 / 2.9 / 225°

The first run was conducted as a warm up exercise for the pilot using the Condor Liberation model and mild south westerly winds. The ferry was brought through the break waters and swung onto the berth without any difficulty.

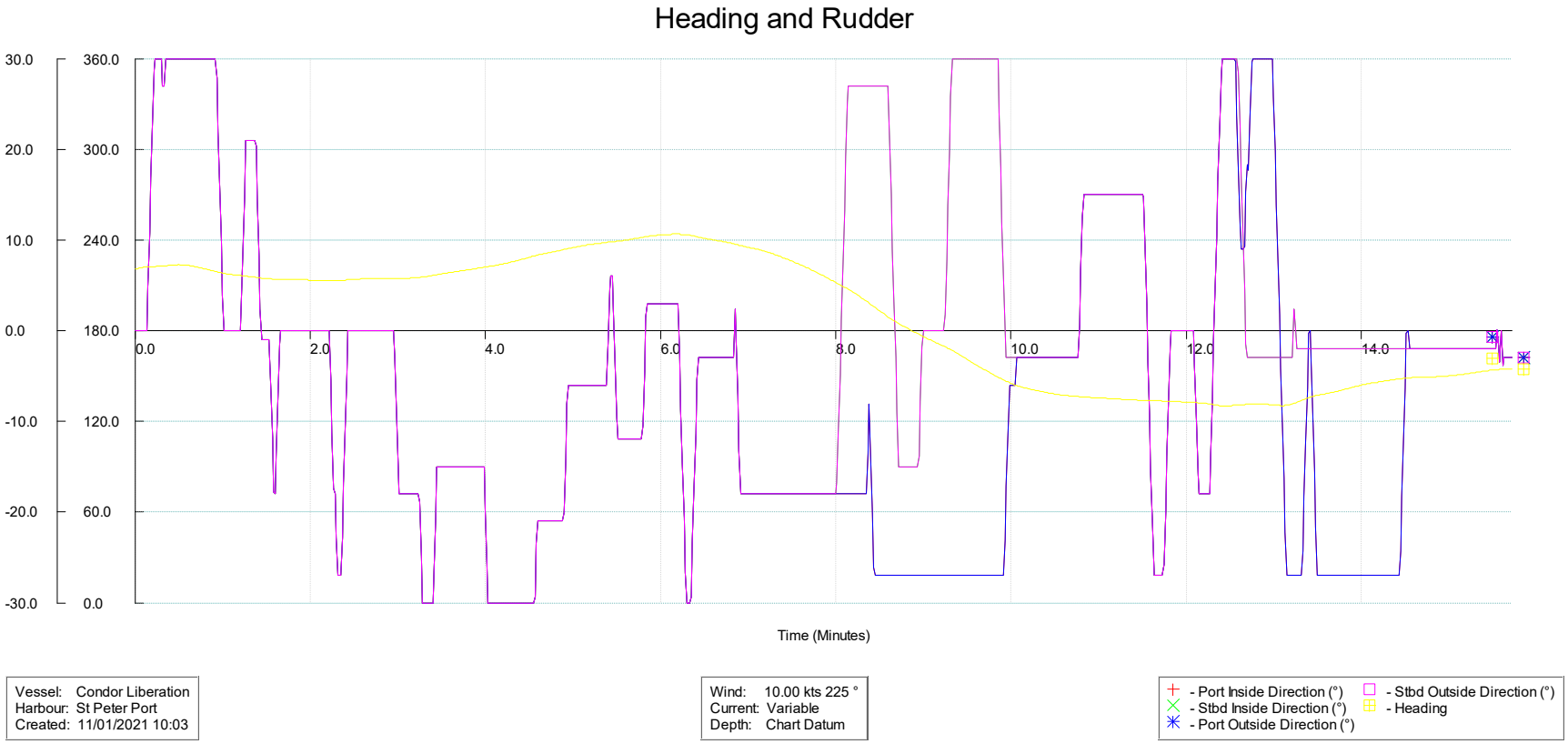
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	**Comfortable**	Not demanding	Not easy	Challenging	Difficult	Impossible

.

Vessel Track

Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:03

Wind: 10.00 kts 225 °
Current: Variable
Depth: Chart Datum


Heading and Rudder
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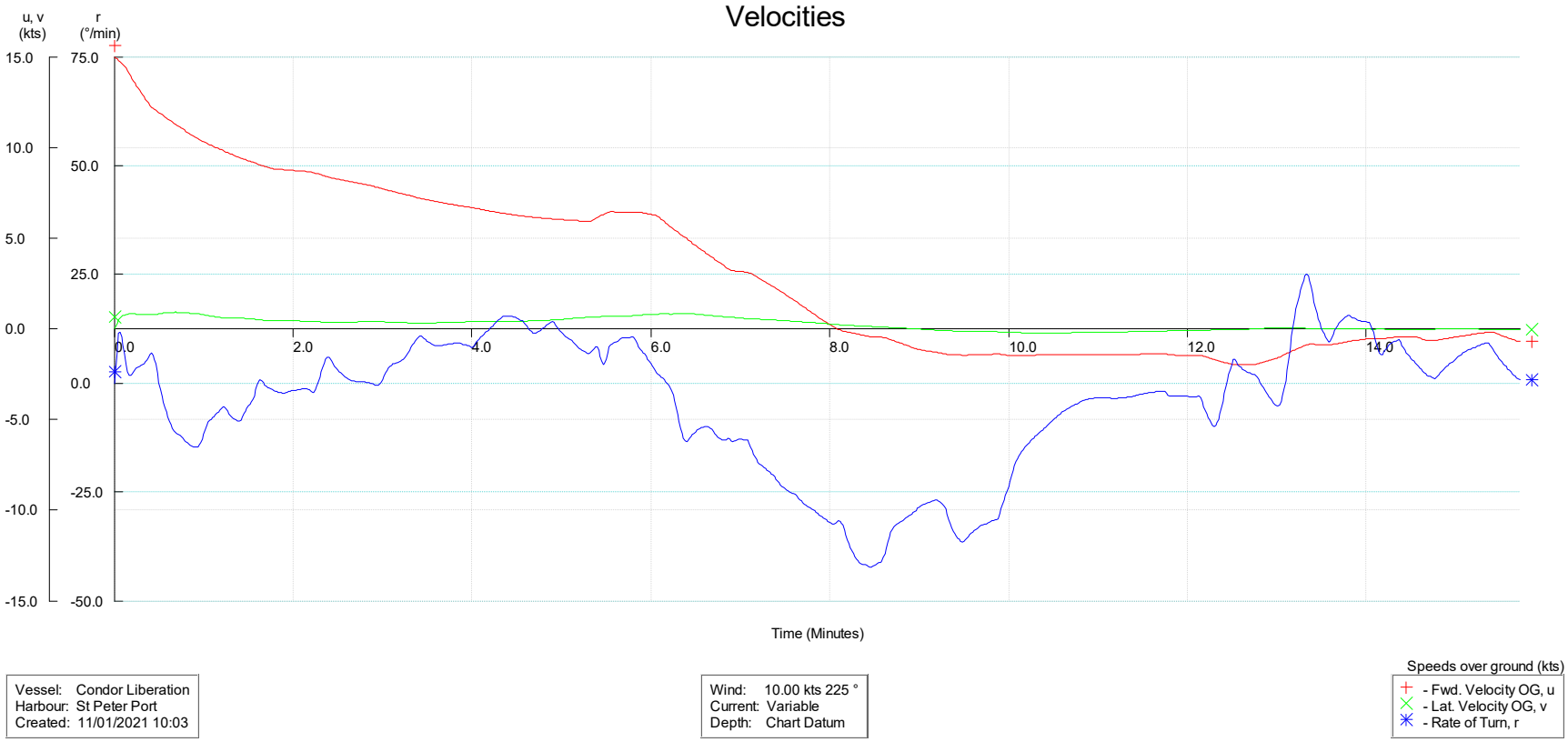
20.0
10.0
0.0
-10.0
-20.0
-30.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:03
Wind: 10.00 kts 225 °
Current: Variable
Depth: Chart Datum
- Port Inside Direction (°)
- Stbd Inside Direction (°)
- Port Outside Direction (°)
- Stbd Outside Direction (°)
- Heading


Velocities
u, v (kts)
r (°/min)
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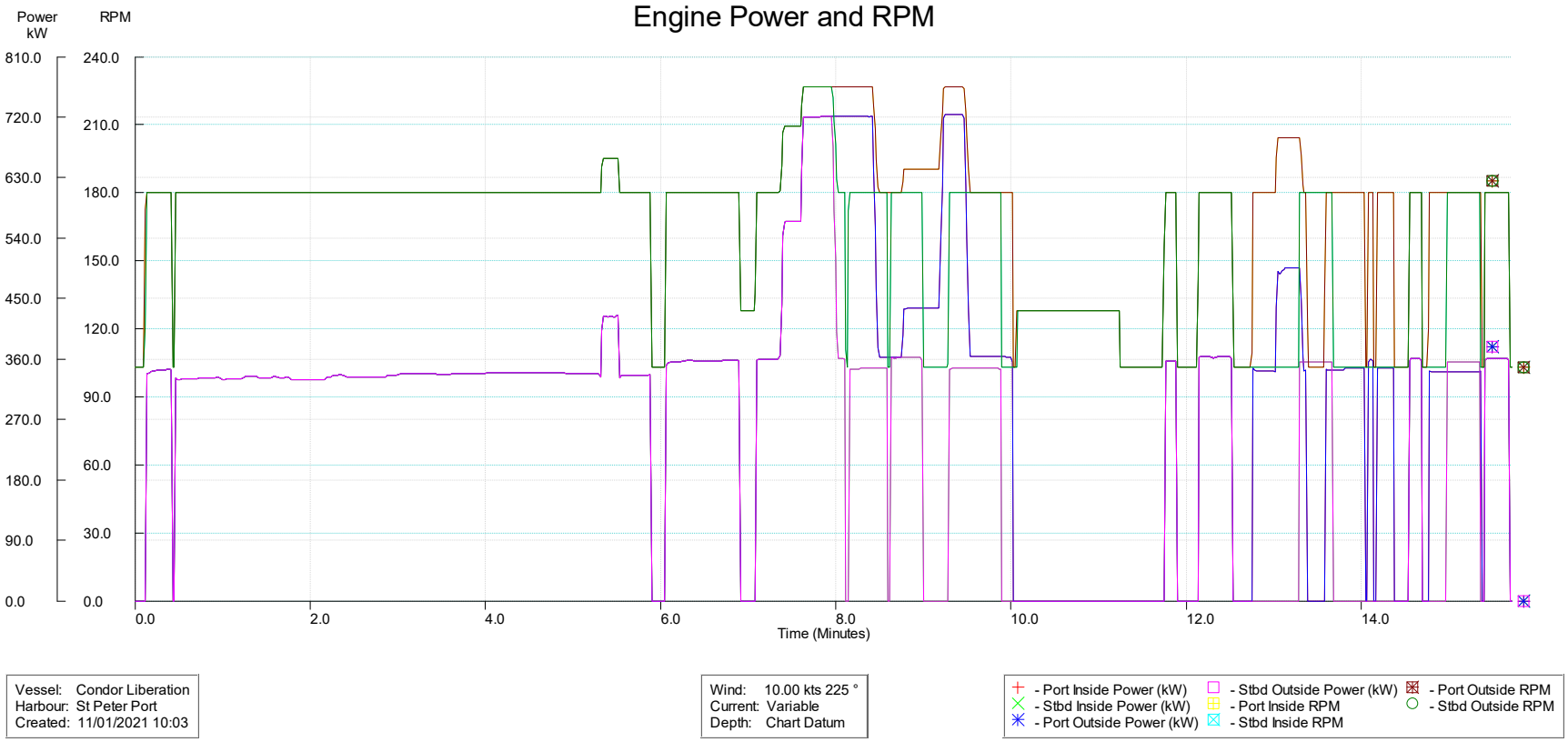
10.0
5.0
0.0
-5.0
-10.0
-15.0
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:03
Wind: 10.00 kts 225 °
Current: Variable
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
810.0
720.0
630.0
540.0
450.0
360.0
270.0
180.0
90.0
0.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:03
Wind: 10.00 kts 225 °
Current: Variable
Depth: Chart Datum
- Port Inside Power (kW)
- Stbd Inside Power (kW)
- Port Outside Power (kW)
- Stbd Outside Power (kW)
- Port Inside RPM
- Stbd Inside RPM
- Port Outside RPM
- Stbd Outside RPM

2 RUN 2:

Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
2	Condor Liberation	Arrival	Southern	Haskoning North Flowing	20kt / 225°	0.9 / 4.6 / 225°

Run 2 repeated Run 1 but with the wind increased to 20 knots. It was at this point that the pilot pointed out that the Condor Liberation model was missing the real ship's bow thruster. This was added for subsequent runs. The same approach as before was used and the ship was safely berthed with only a small increase in difficulty.

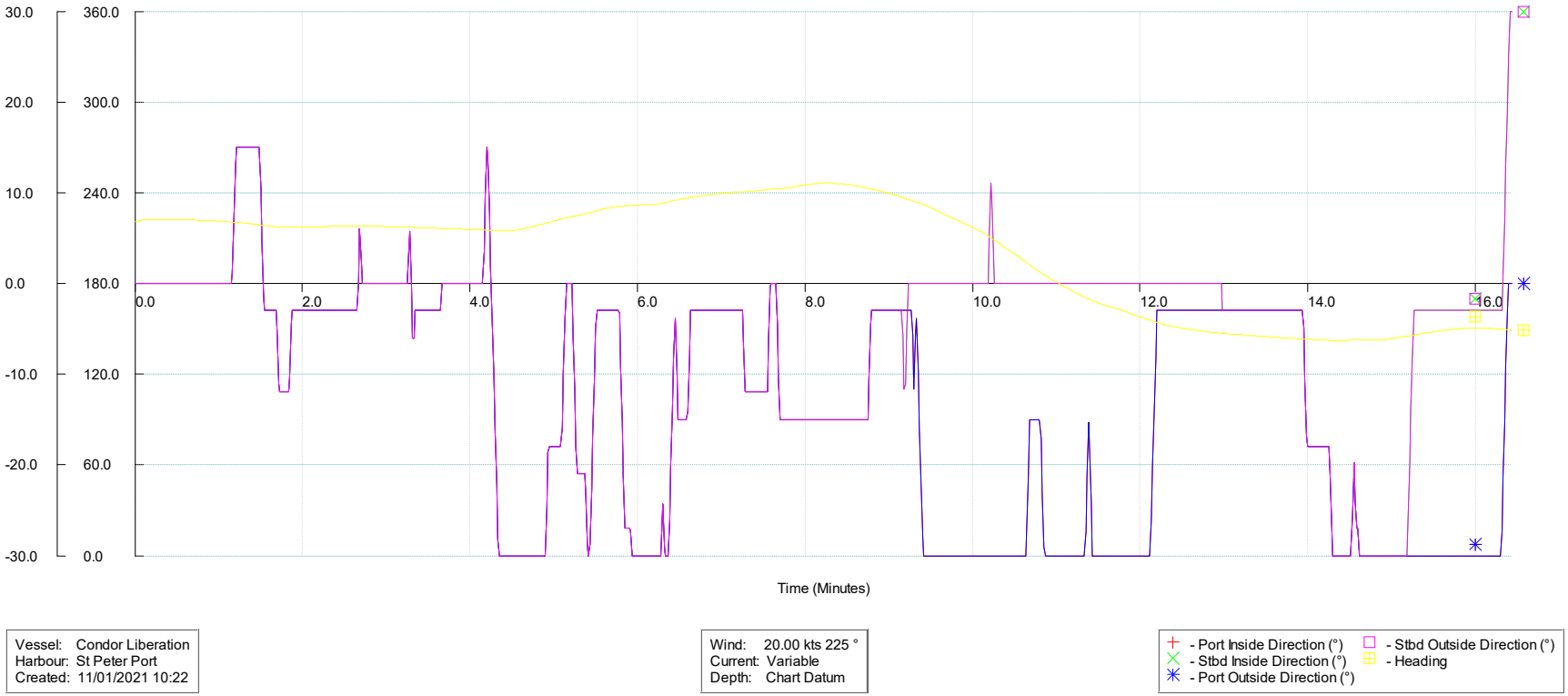
Ratings	1	2	3	**4**	5	6	7	8
	Easy	Straight-forward	Comfortable	**Not demanding**	Not easy	Challenging	Difficult	Impossible

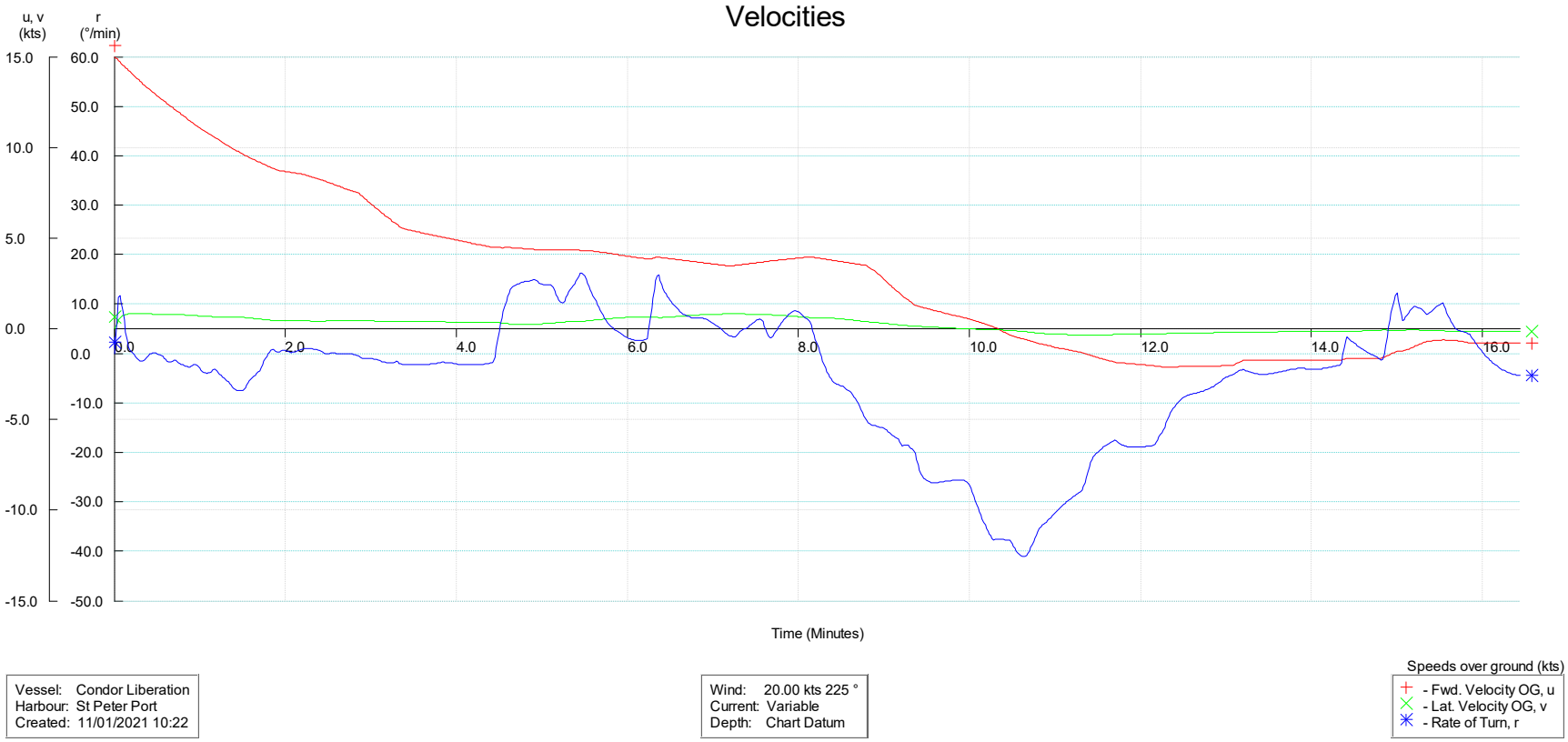
Vessel Track

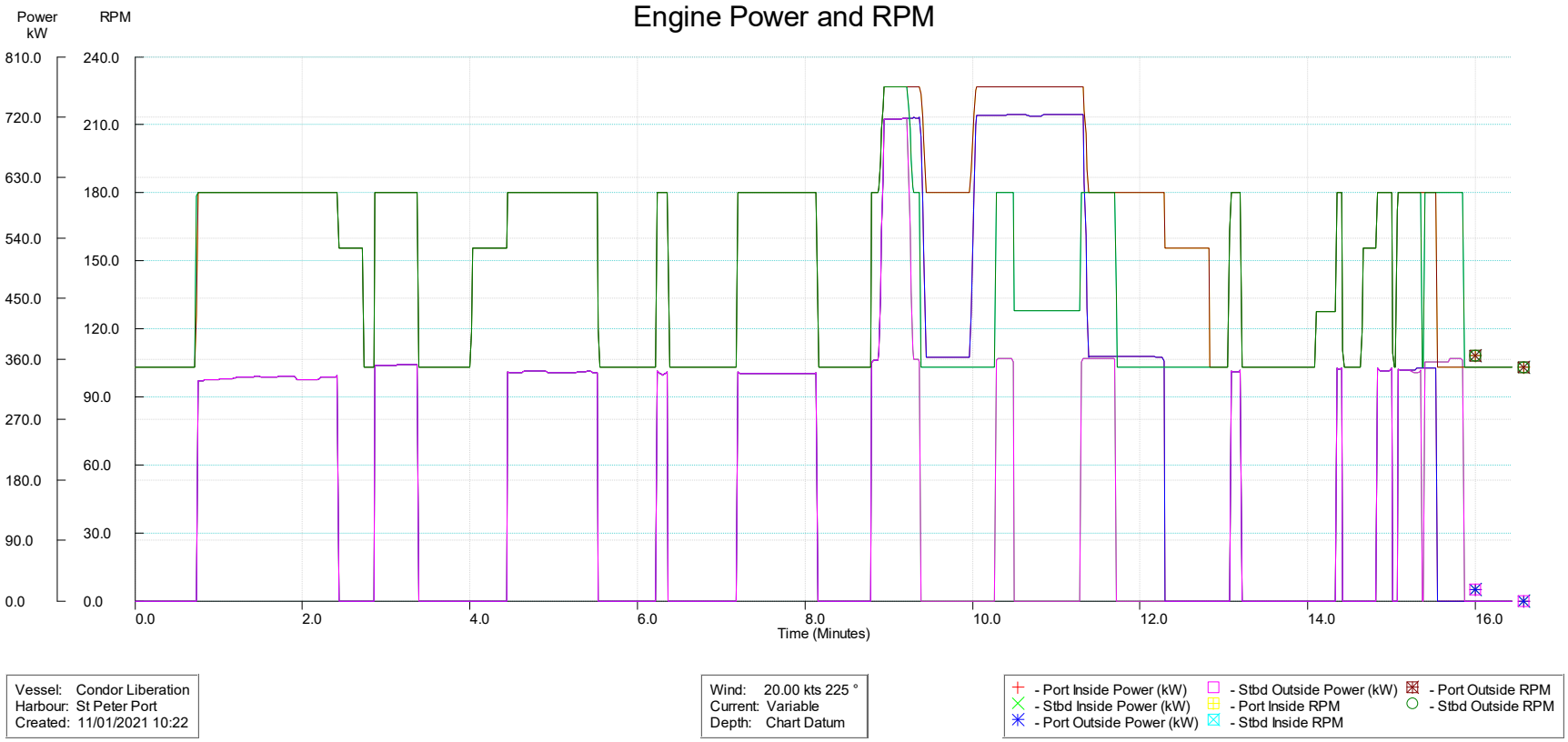
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:22

Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum

Heading and Rudder




Velocities
u, v (kts)
r (°/min)
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:22
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
810.0
720.0
630.0
540.0
450.0
360.0
270.0
180.0
90.0
0.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 10:22
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
- Port Inside Power (kW)
- Stbd Inside Power (kW)
- Port Outside Power (kW)
- Stbd Outside Power (kW)
- Port Inside RPM
- Stbd Inside RPM
- Port Outside RPM
- Stbd Outside RPM

3 RUN 3:

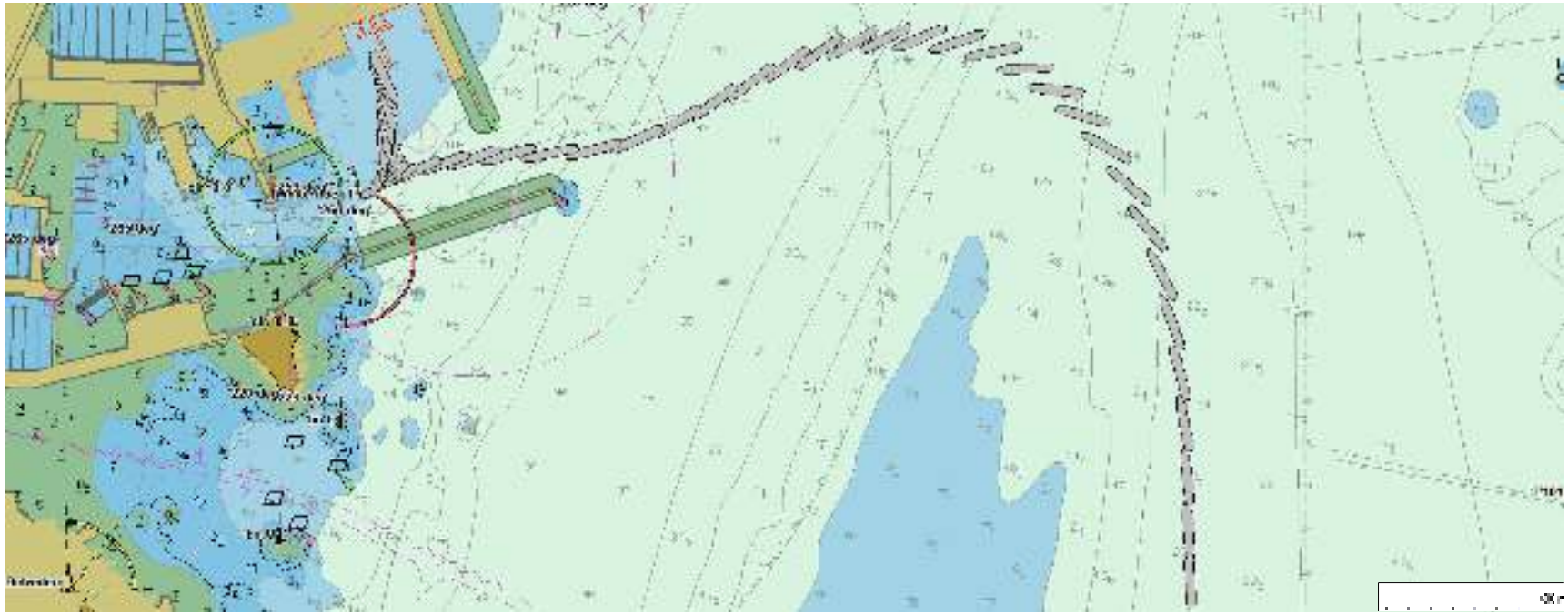
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
3	RoRo14	Arrival	Southern	Haskoning North Flowing	20kt / 225°	0.9 / 4.6 / 225°

Run 3 was used to simulate the RoRo ferry model approaching the berth from the south. It was observed that the shape of the southern breakwater makes this a more difficult manoeuvre that strictly necessary and the approach would be aided by having a dog leg in the breakwater to allow more room for swinging the vessel.

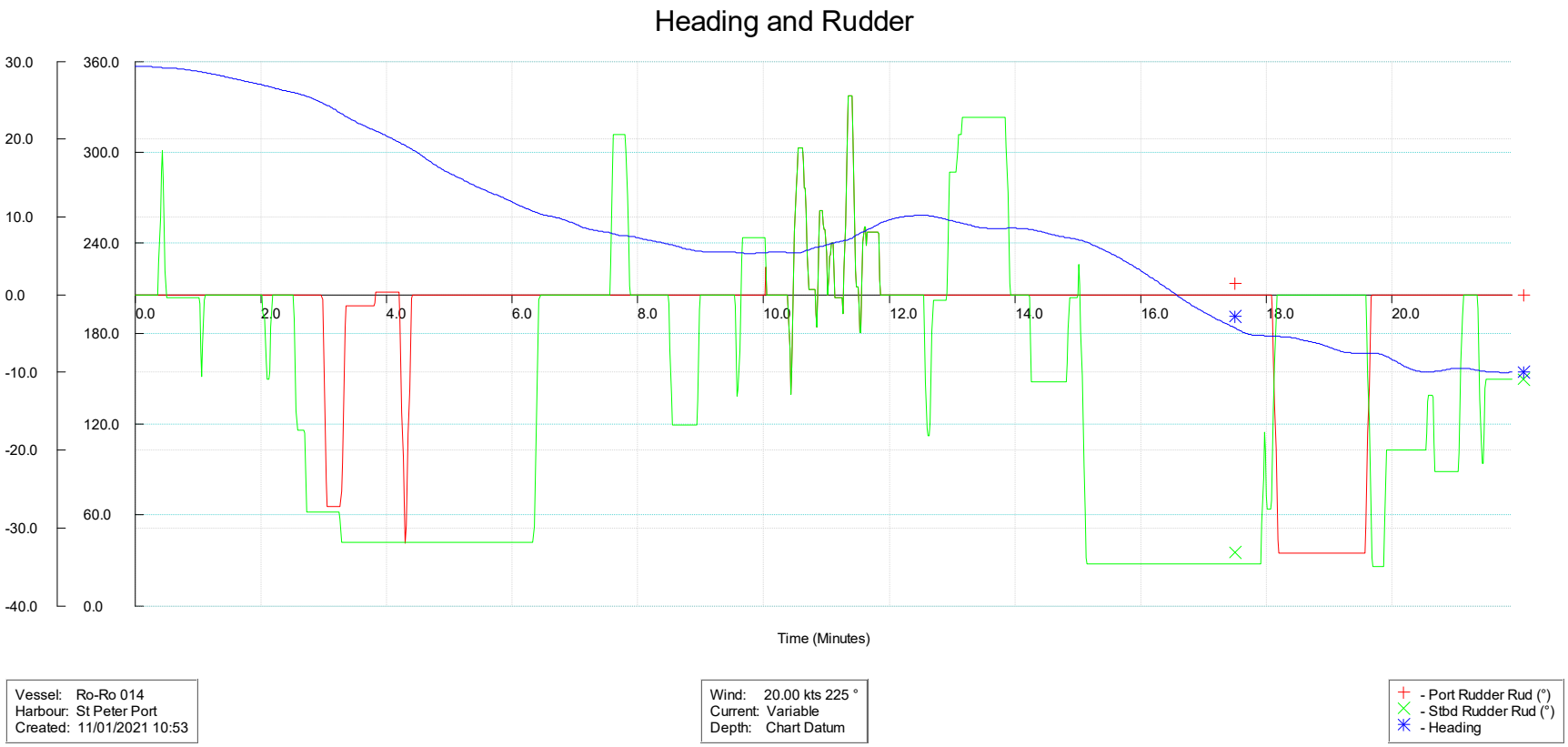
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

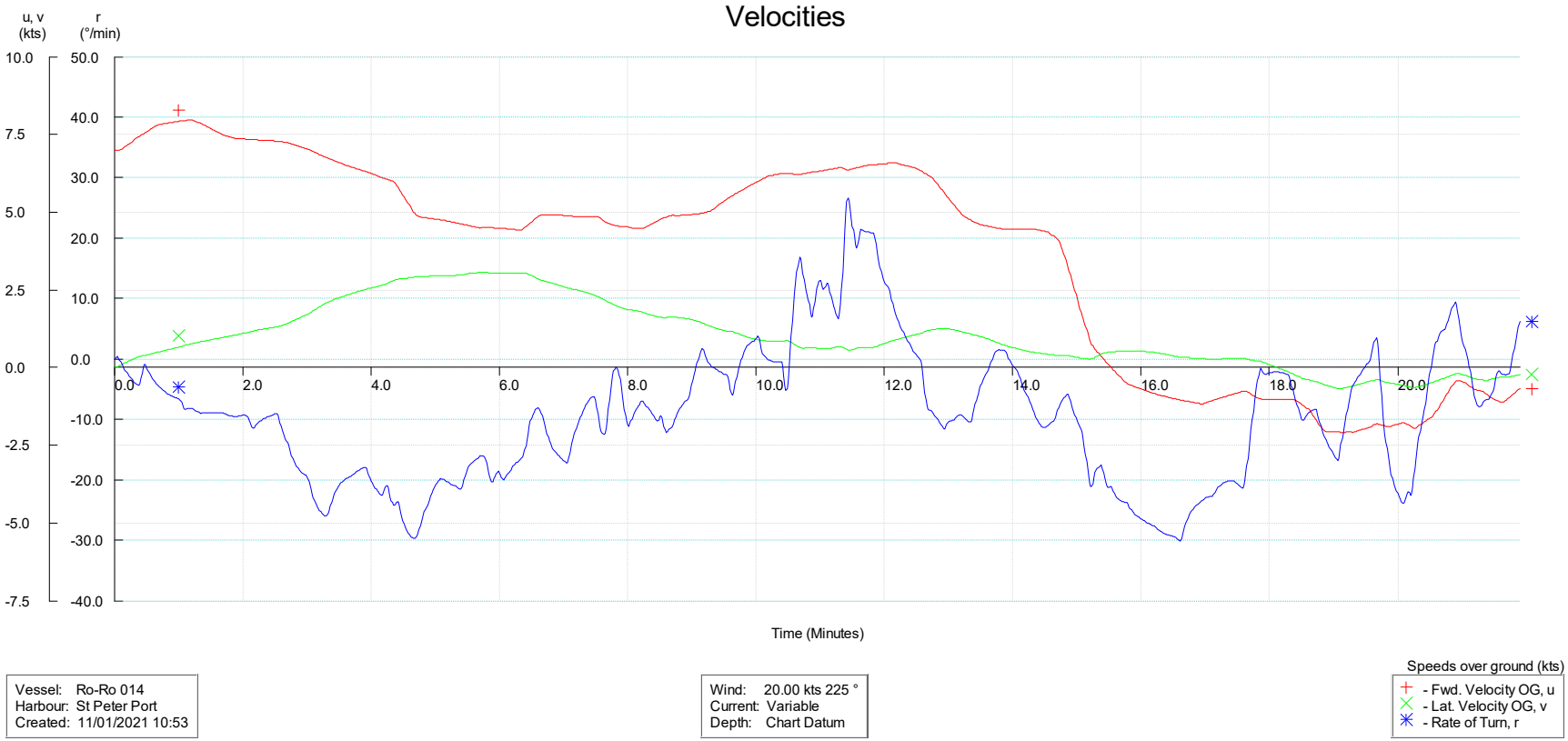
Vessel Track

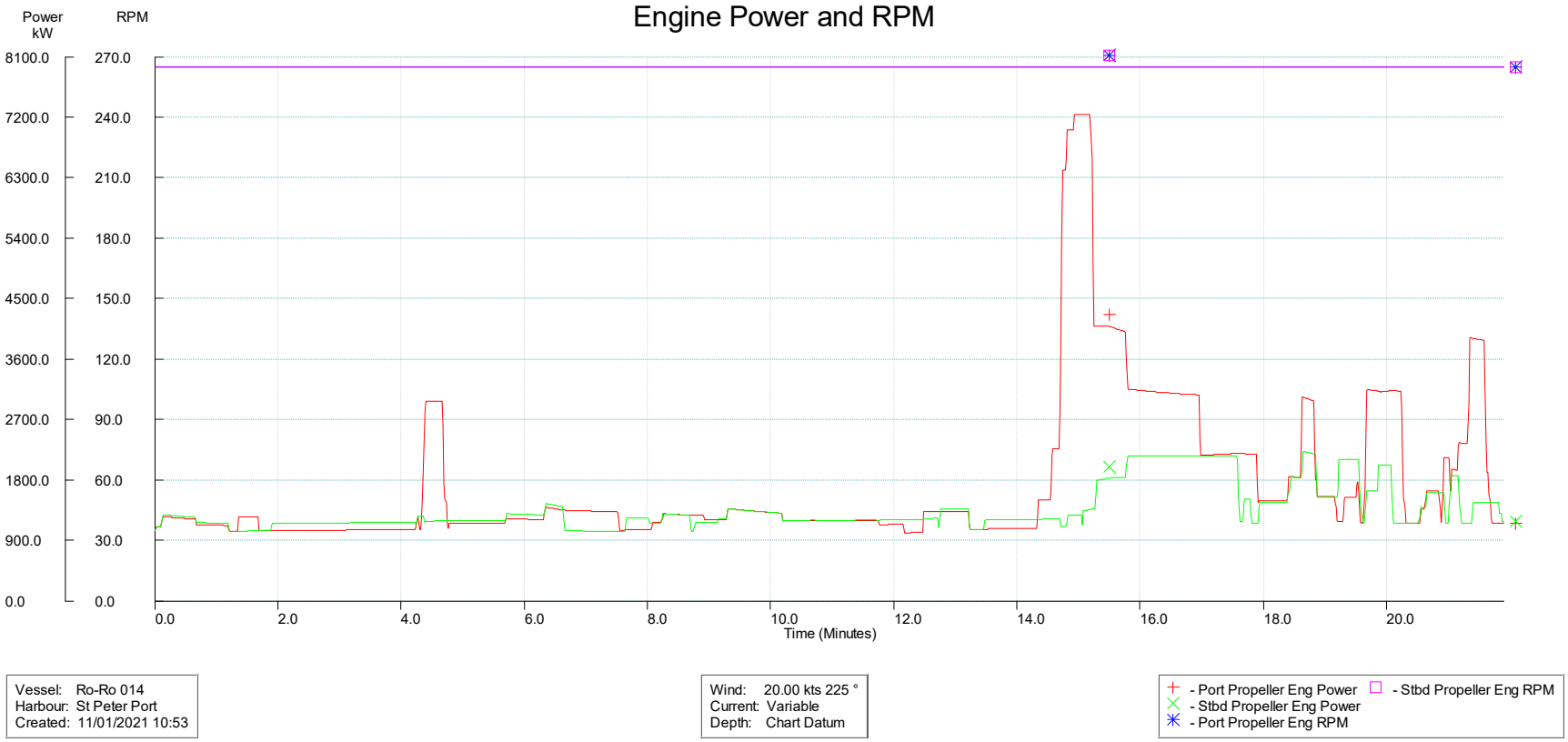


Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 10:53

Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum


Heading and Rudder
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 10:53
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 10:53
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
8100.0
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 10:53
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM

4 RUN 4:

Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
4	RoRo14	Arrival	Southern	Manual North-flowing currents 2.6kt peak	20kt / 225°	0.9 / 4.6 / 225°

Run 4 repeated the activity of Run 3 but manual currents were used to hopefully better take account of the new breakwaters. These peaked at 2.6 knots northerly and reduced to zero as the ship entered the harbour area.

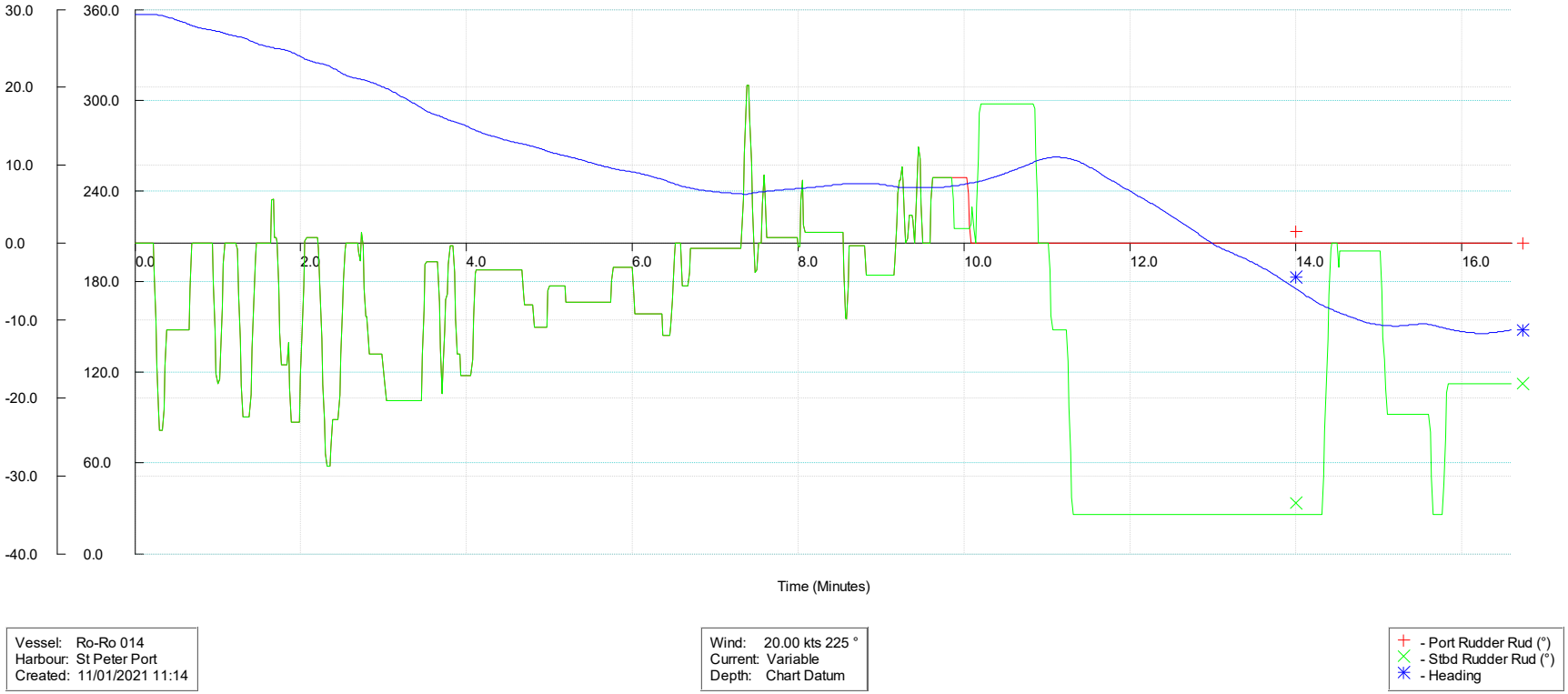
Ratings	1	2	3	4	**5**	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

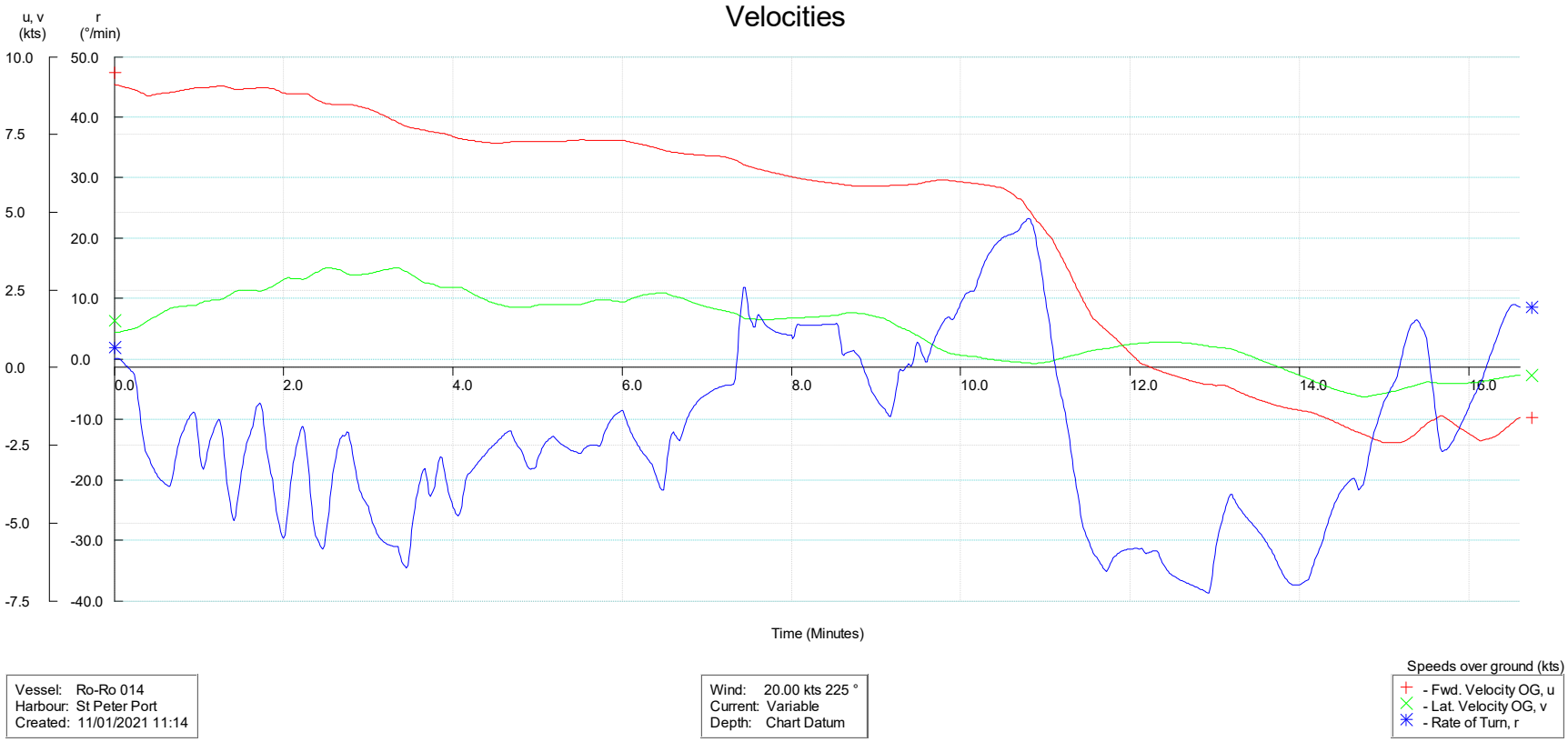
Vessel Track

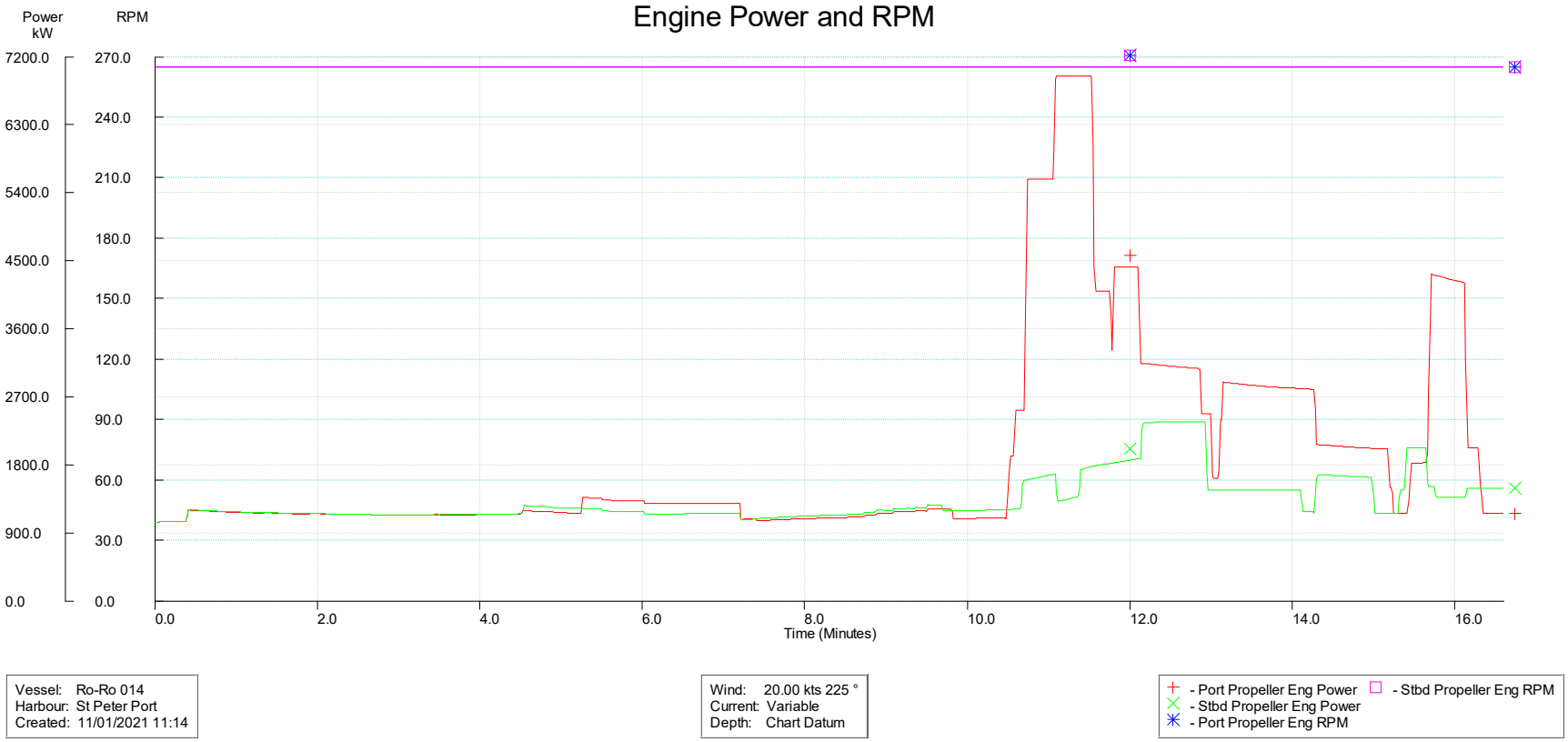
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:14

Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum

Heading and Rudder




Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:14
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:14
Wind: 20.00 kts 225 °
Current: Variable
Depth: Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng Power
- Port Propeller Eng RPM
- Stbd Propeller Eng RPM

5 RUN 5:

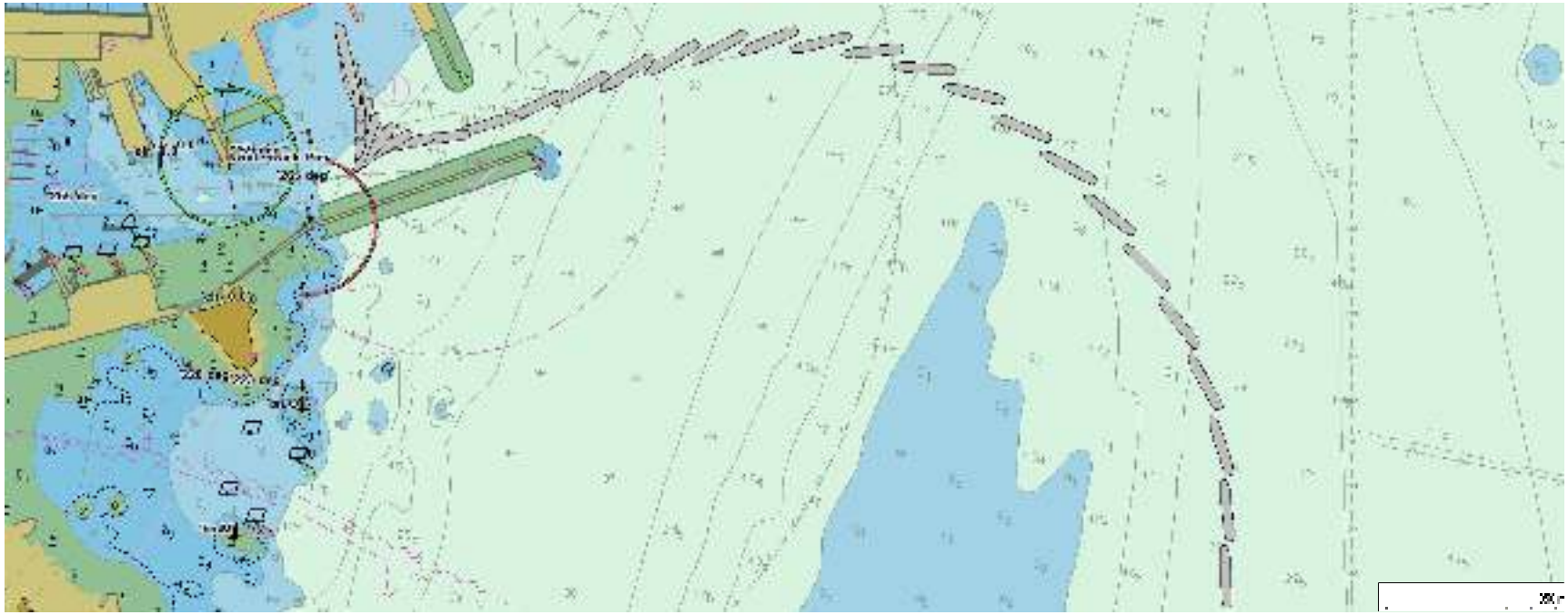
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
5	RoRo14	Arrival	Southern	Haskoning North Flowing	20kt / 045°	0.3 / 2.9 / 225°

Run 5 simulated the same approach and currents as Run 4, but with the wind moved round to the north east. This significantly increased the challenge of swinging the ship as it was constantly blown towards the southern breakwater.

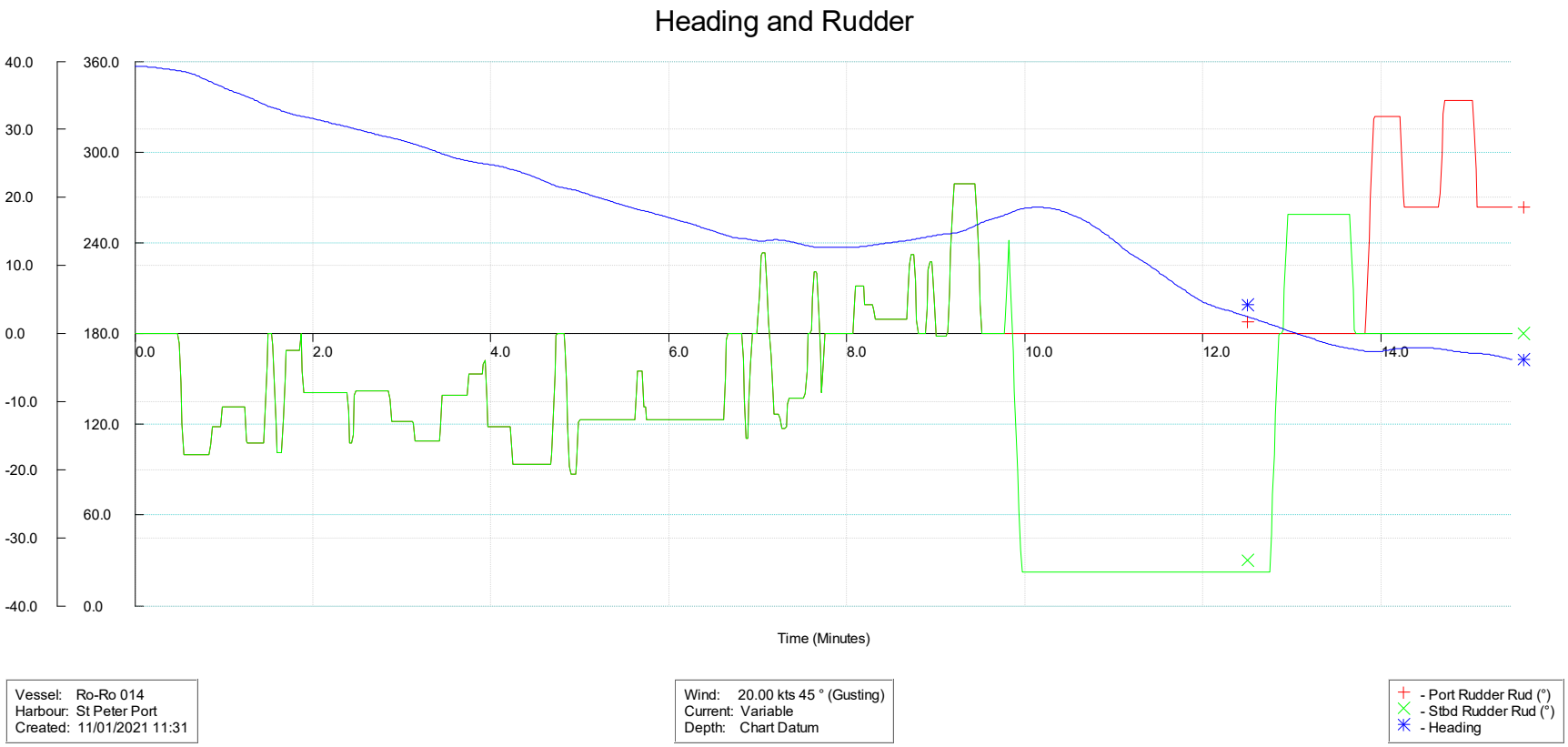
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	**Challenging**	Difficult	Impossible

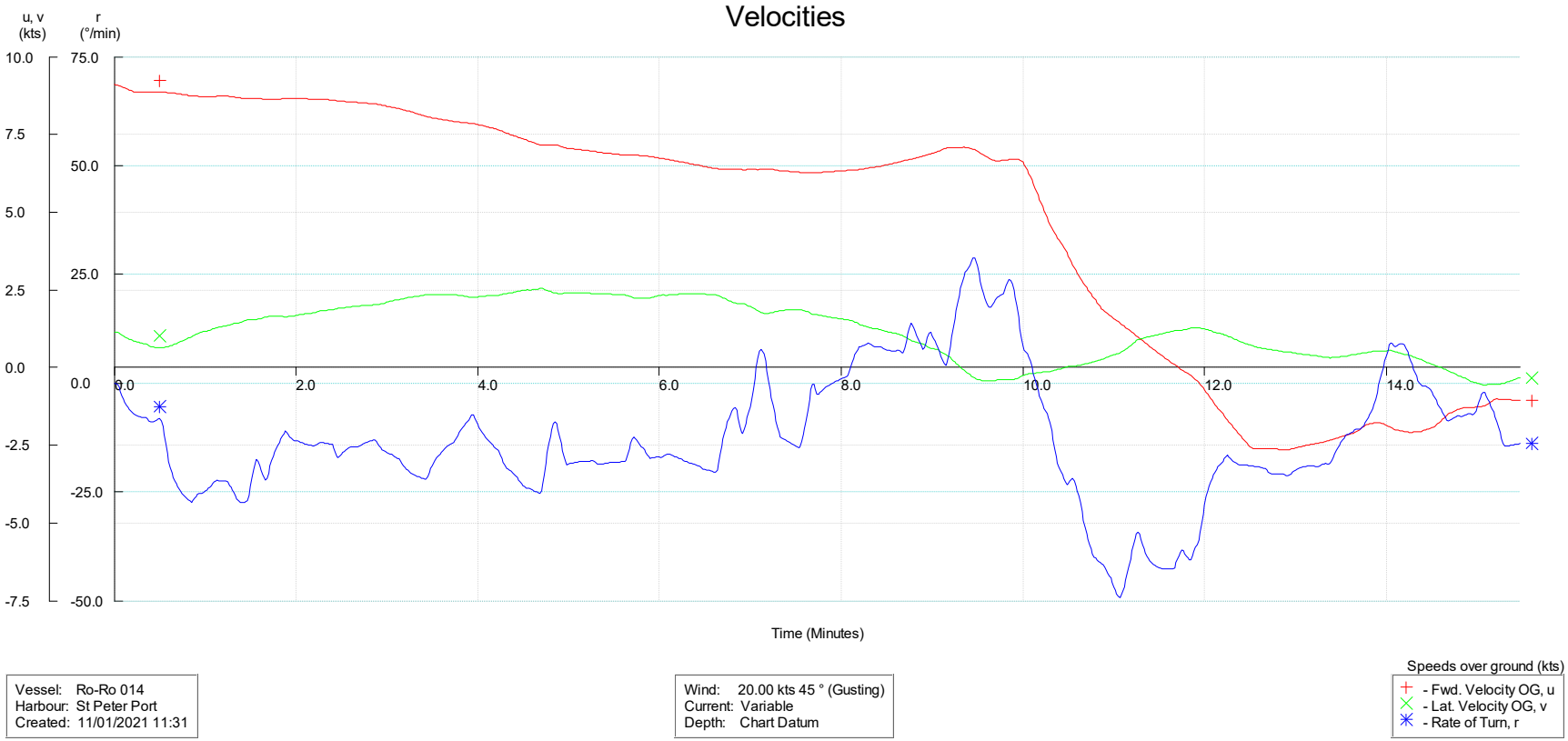
Vessel Track

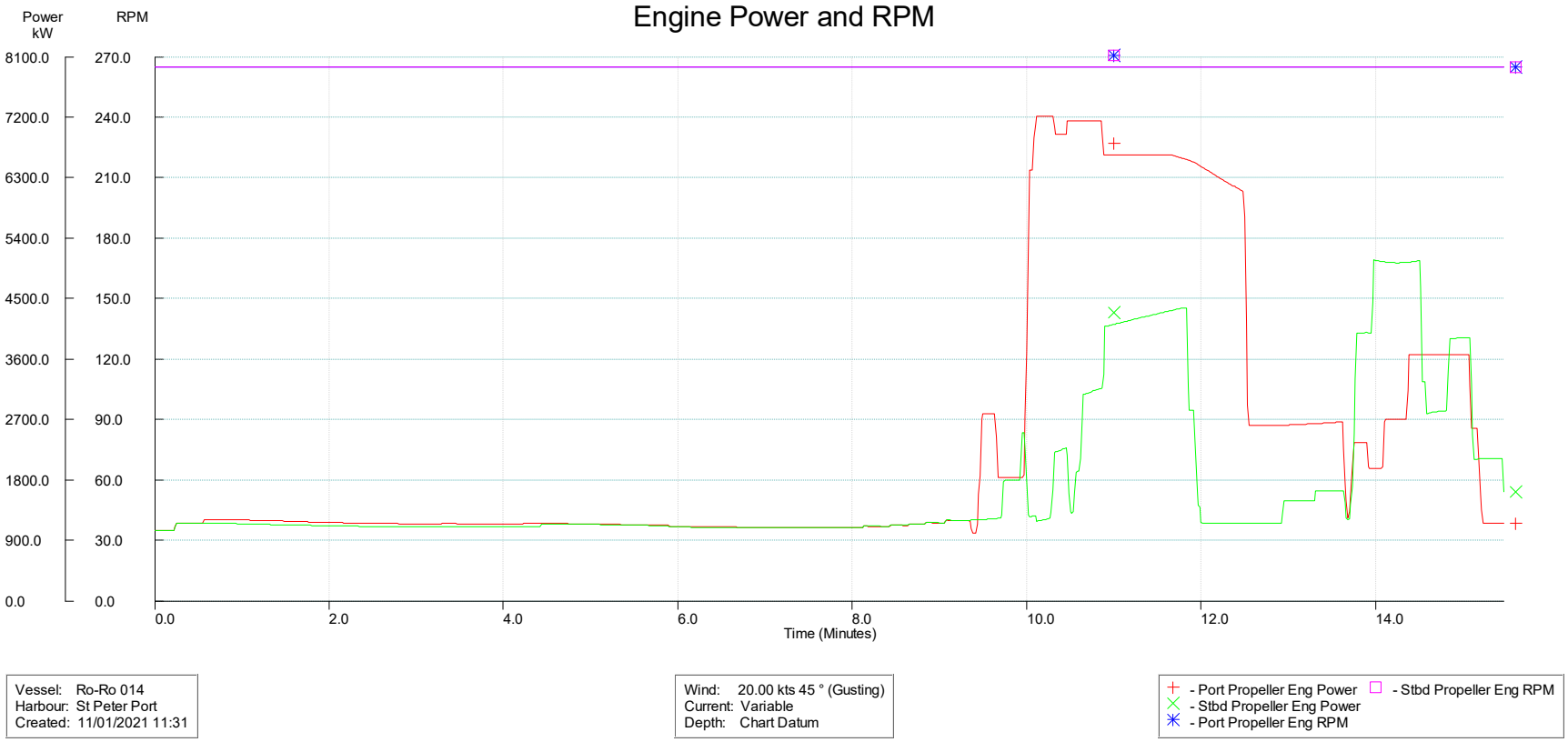


Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:31

Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:31
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:31
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
8100.0
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 11:31
Wind: 20.00 kts 45 ° (Gusting)
Current: Variable
Depth: Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng Power
- Port Propeller Eng RPM
- Stbd Propeller Eng RPM

6 RUN 6:

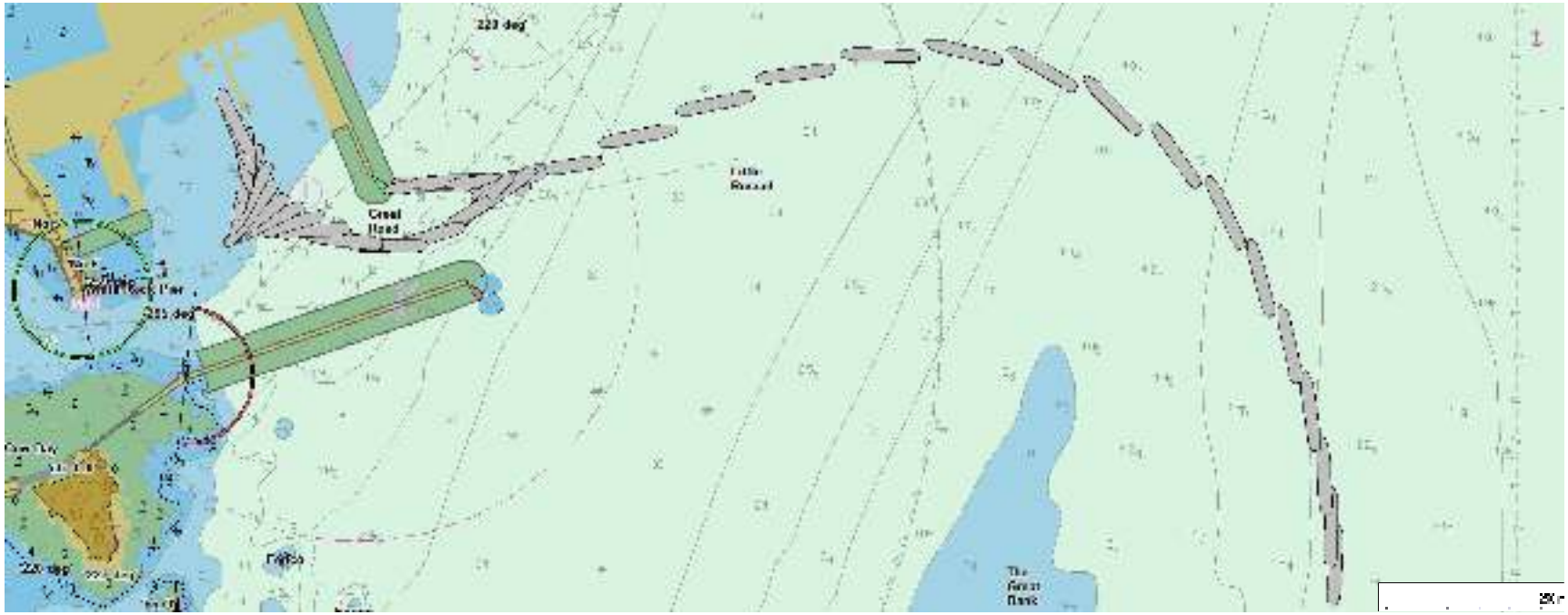
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
6	RoRo14	Arrival	Southern	Manual Southerly Flowing	20kt / 225°	0.3 / 2.9 / 225°

Run 6 attempted an approach with the wind from the south west again, but with a southerly current flow (with a peak velocity of 3 knots). This did not prove too difficult.

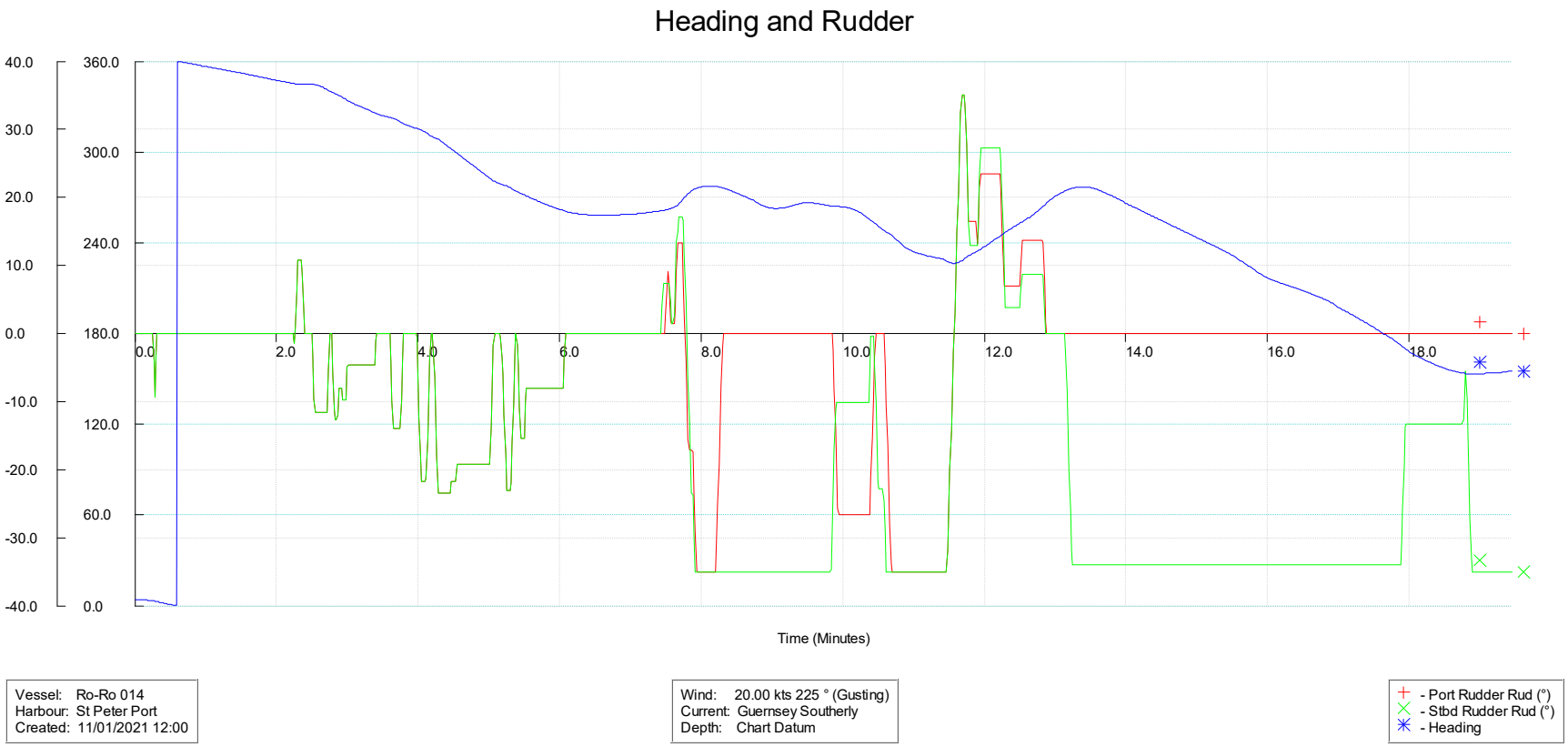
Ratings	1	2	3	**4**	5	6	7	8
	Easy	Straight-forward	Comfortable	**Not demanding**	Not easy	Challenging	Difficult	Impossible

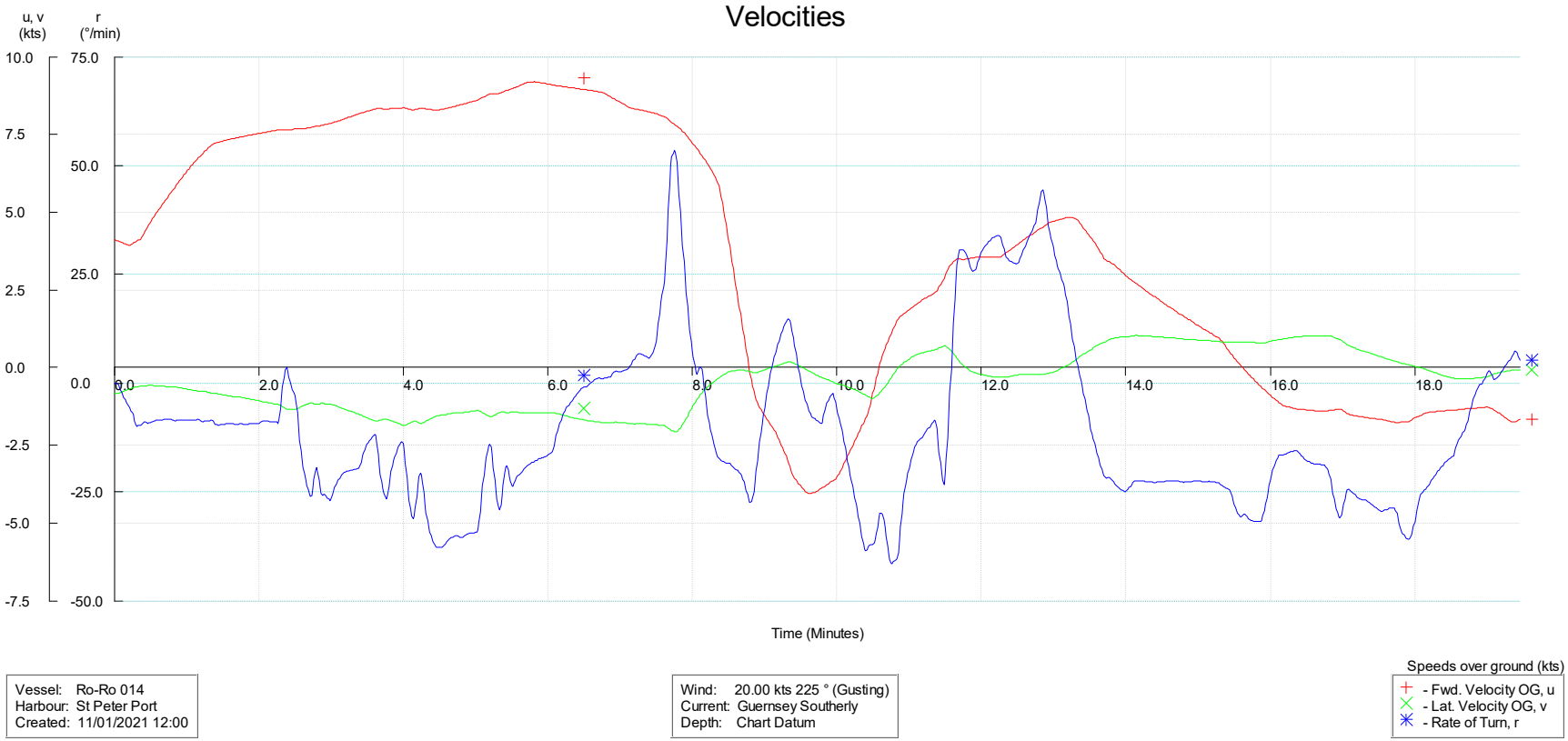
Vessel Track

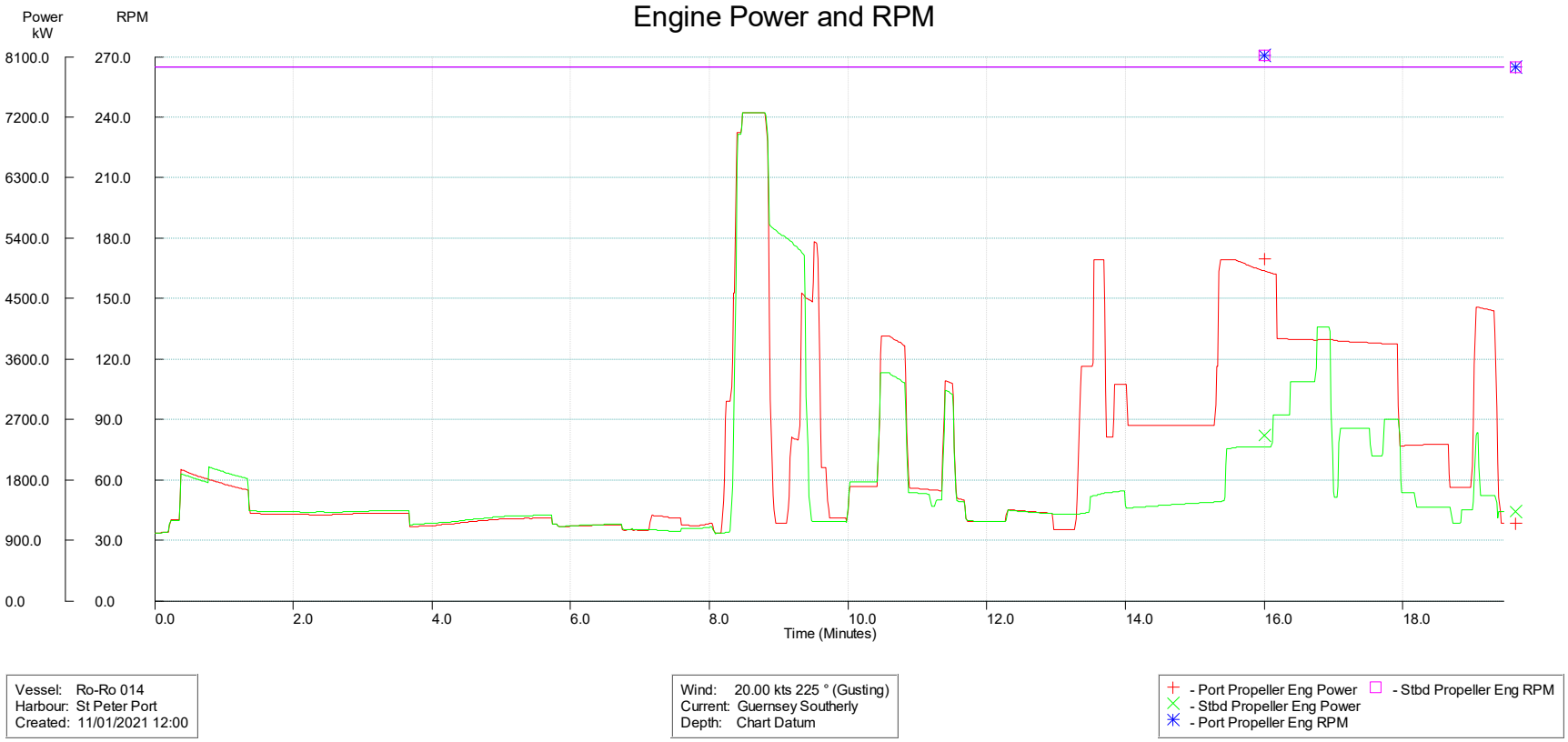


Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:00

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
8100.0
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM

7 RUN 7:

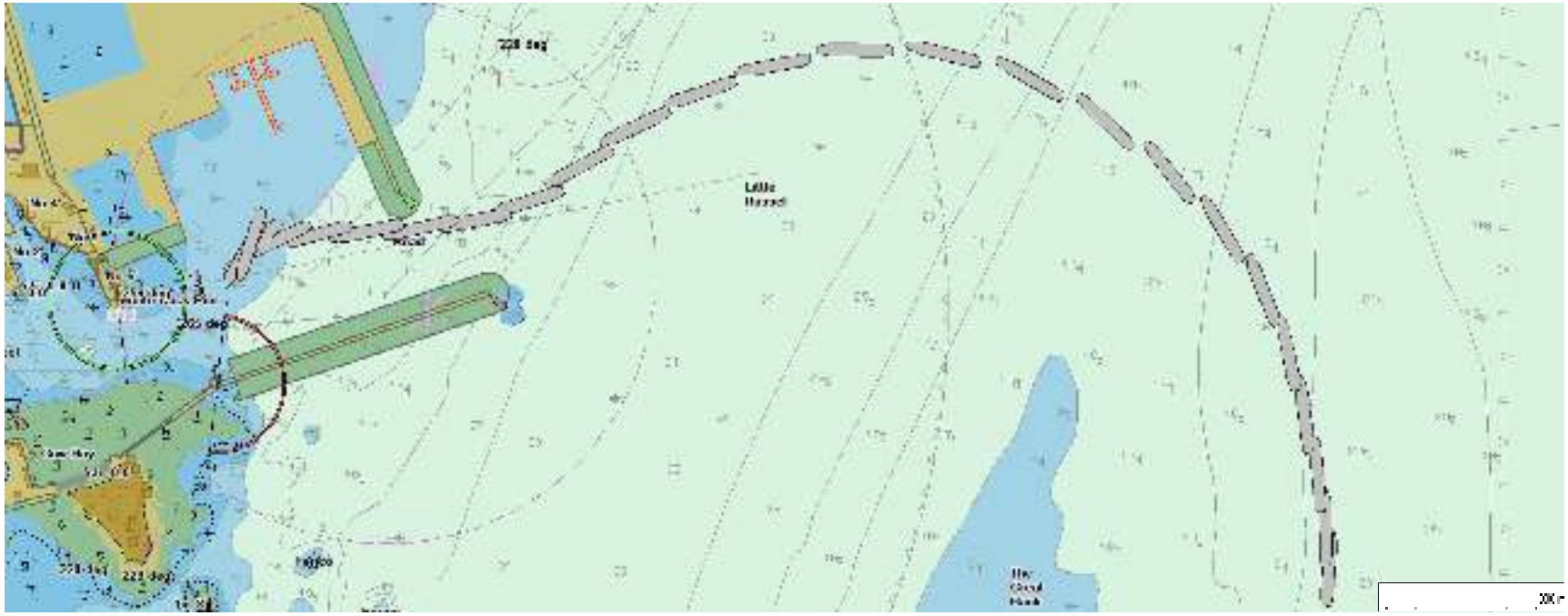
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
7	RoRo14	Arrival	Southern	Manual Southerly Flowing	30kt / 225°	0.9 / 4.6 / 225°

Run 7 repeated Run 6 but with the wind increased to 30 knots. Again it was observed that a wider entrance to the harbour would make the approach significantly easier. This could be achieved by either changing the alignment of the southern breakwater, or shortening the northern breakwater.

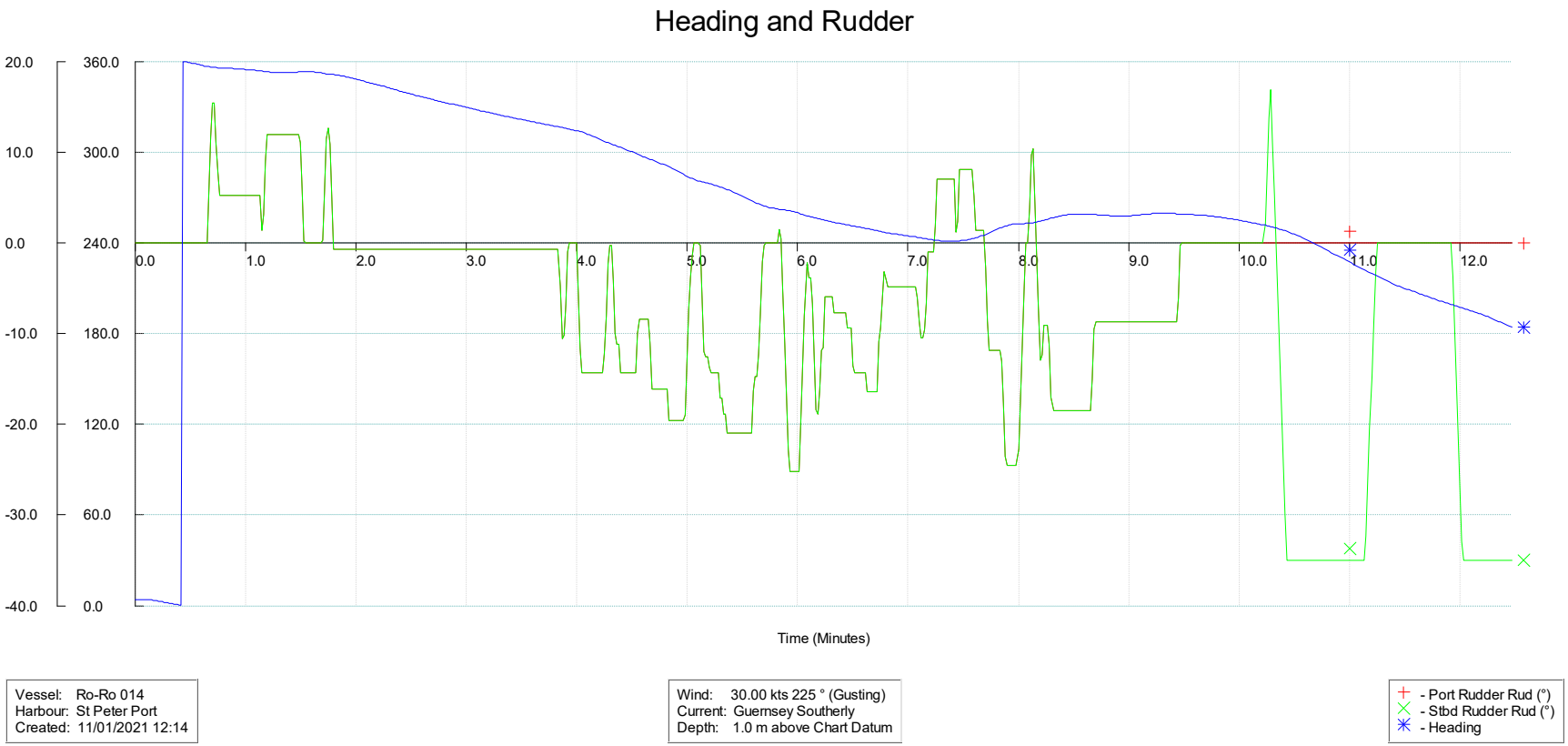
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

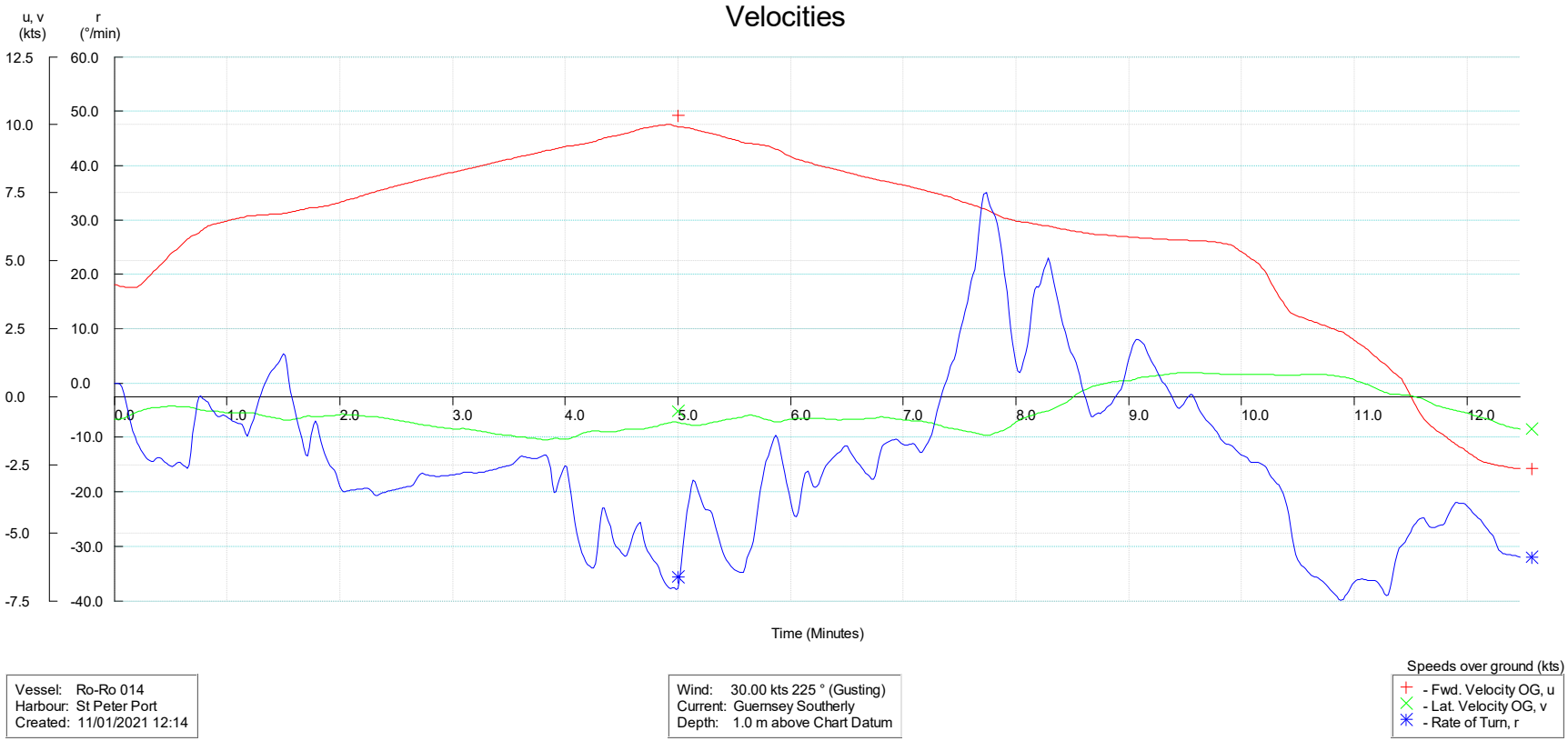
Vessel Track

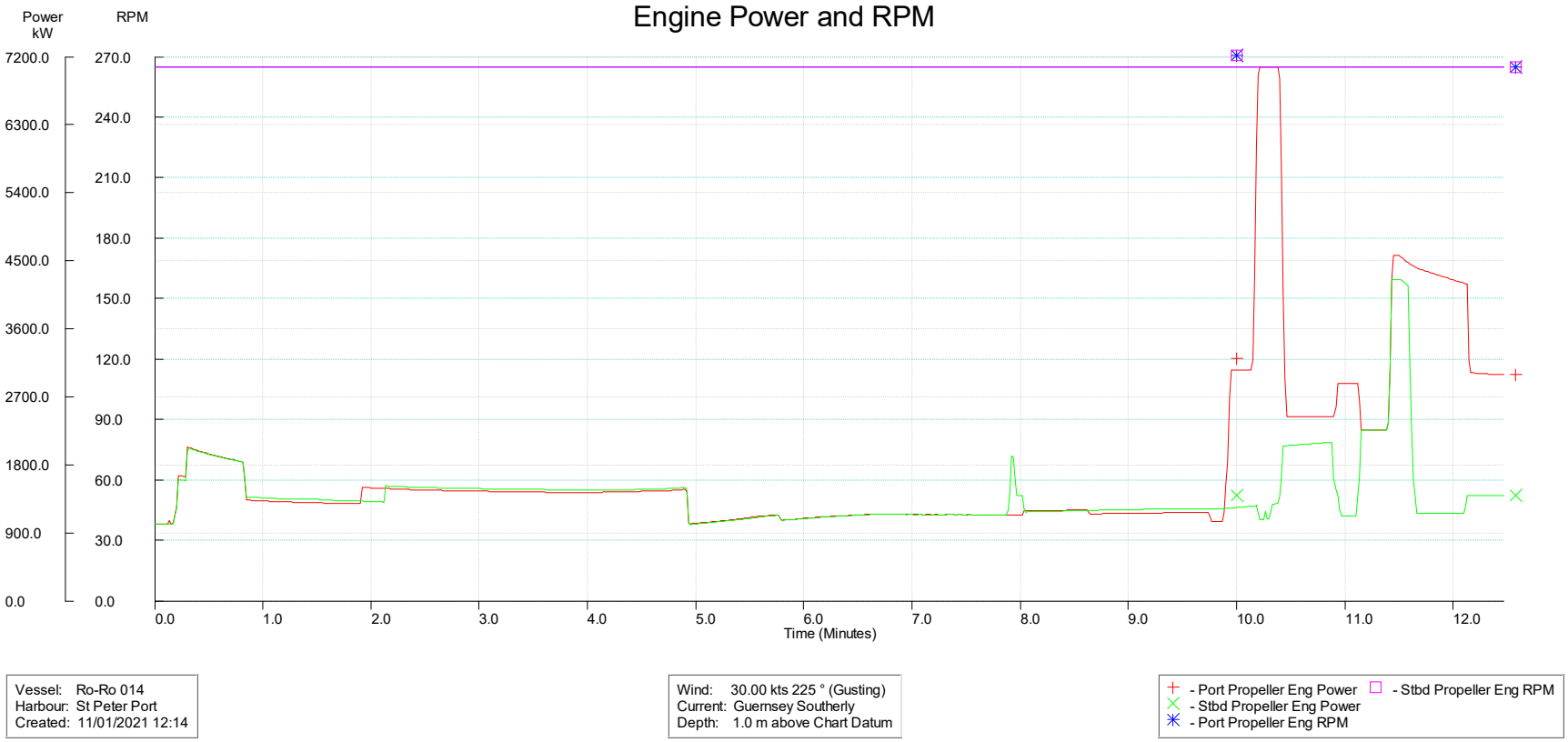


Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:14

Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:14
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:14
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:14
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM

8 RUN 8:

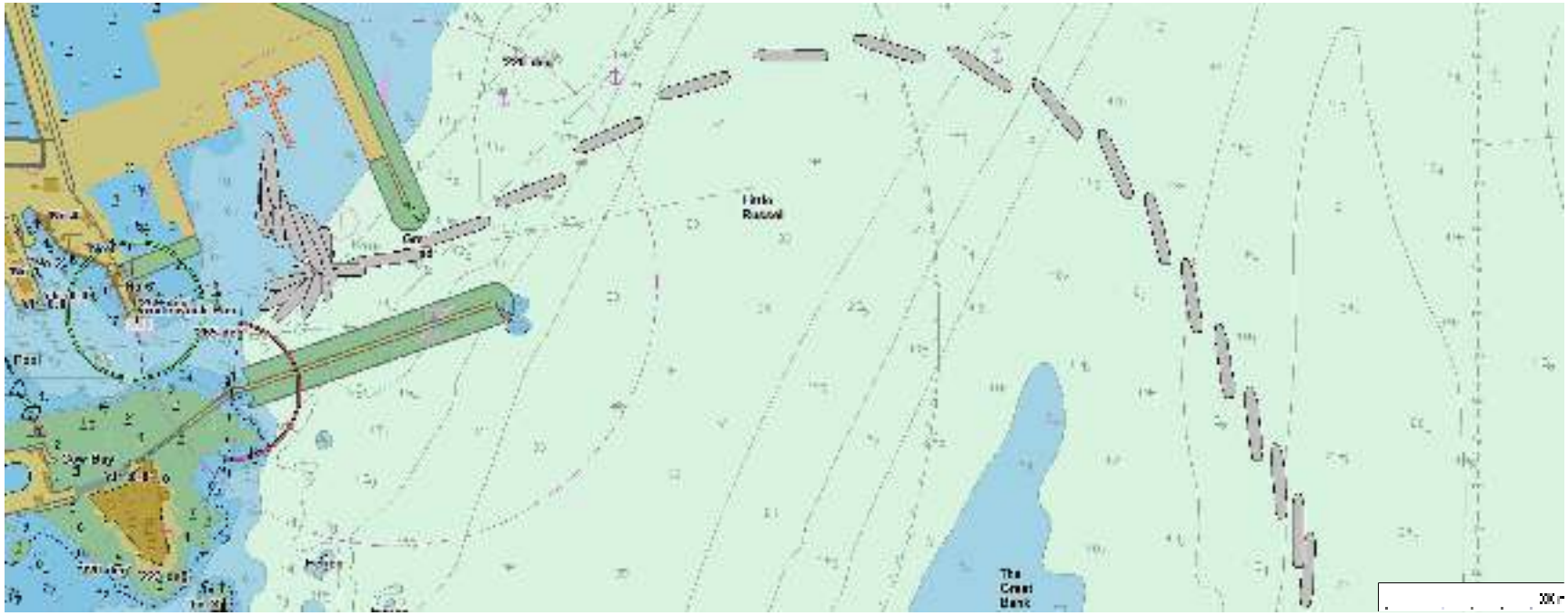
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

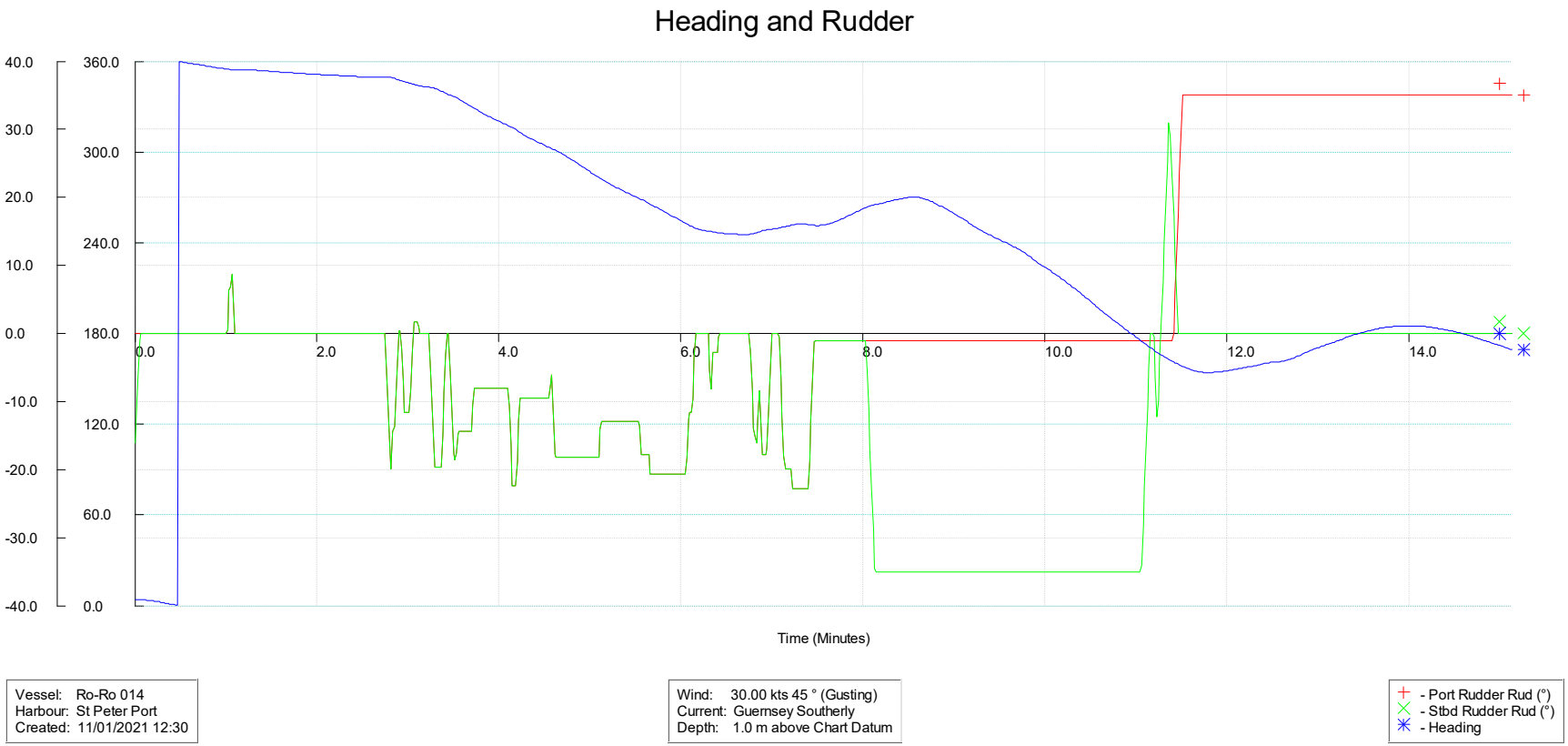
Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
8	RoRo14	Arrival	Southern	Manual Southerly Flowing	30kt / 045°	0.9 / 4.6 / 225°

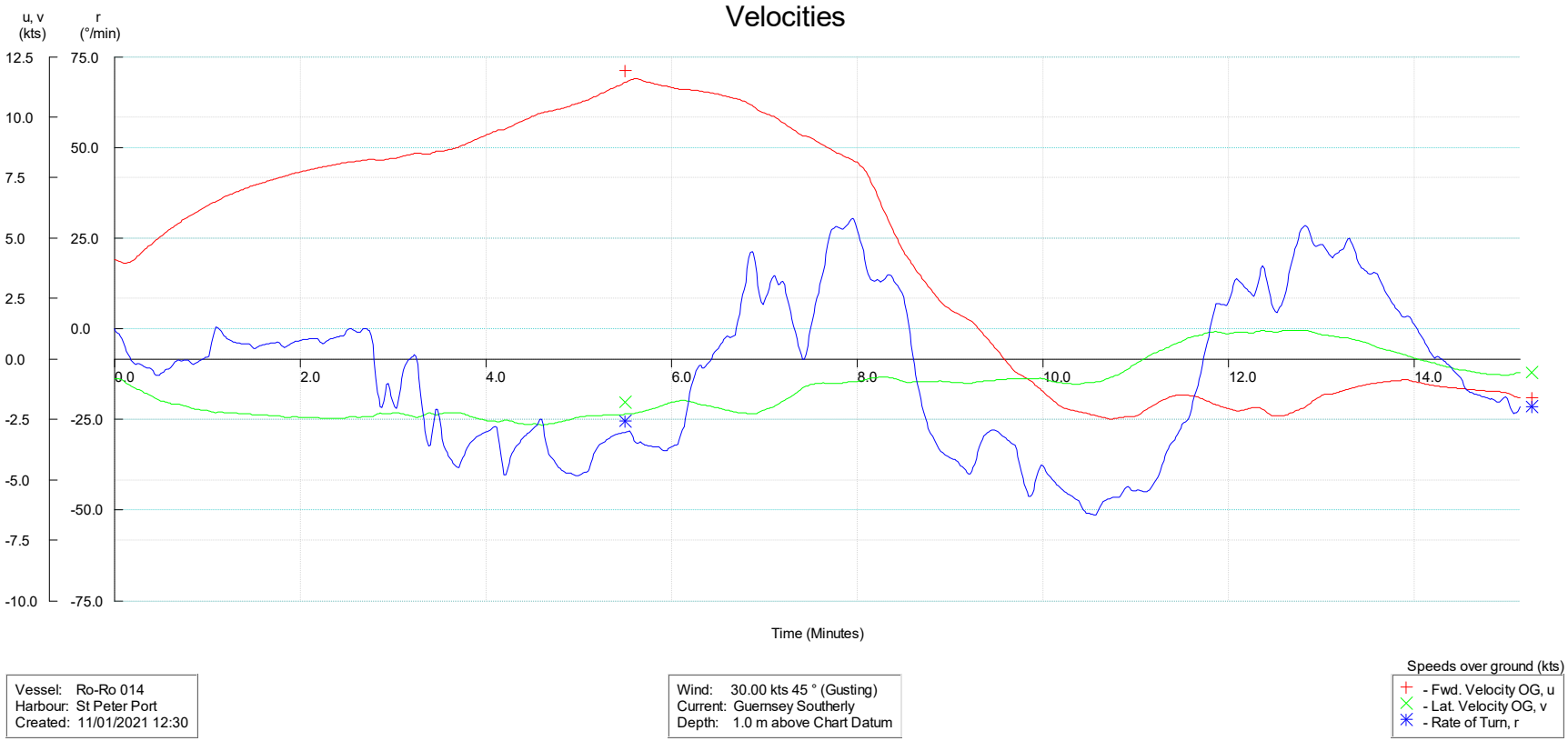
Run 8 simulated a 30 knot north easterly wind. The ship was eventually successfully brought through the harbour entrance but only with severe difficulty.

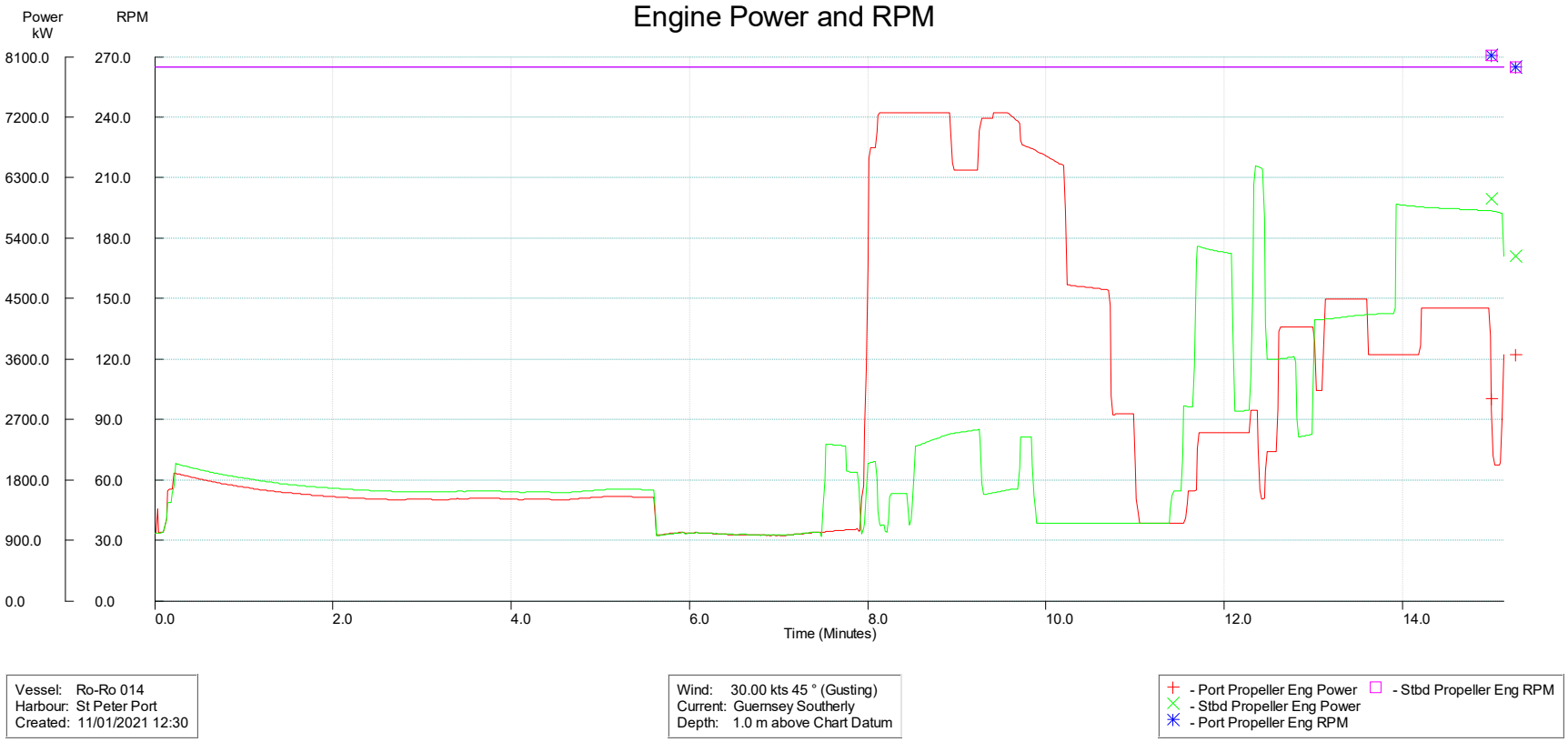
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	**Challenging**	Difficult	Impossible

Vessel Track




Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:30
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:30
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
8100.0
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 11/01/2021 12:30
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM

9 RUN 9:

Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
9	Containership 008b	Arrival	Southern	Manual North Flowing	20kt / 225°	0.9 / 2.9 / 225°

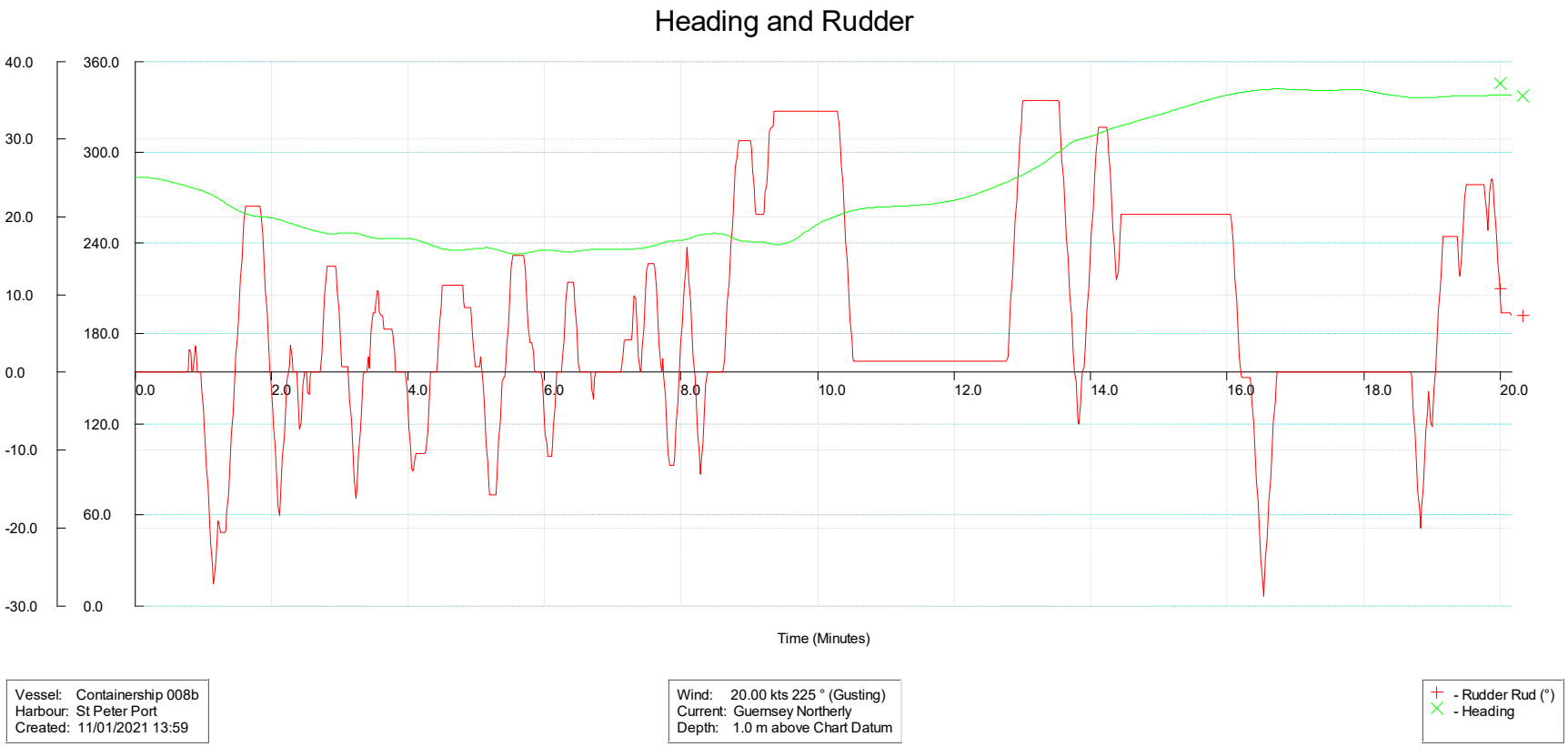
Run 9 was the first run conducted with the container ship model. The ship was successfully brought onto the berth in the 20 knot wind, however the whole swinging area was required. With a ferry on the ferry berth the manoeuvre would have been significantly more difficult.

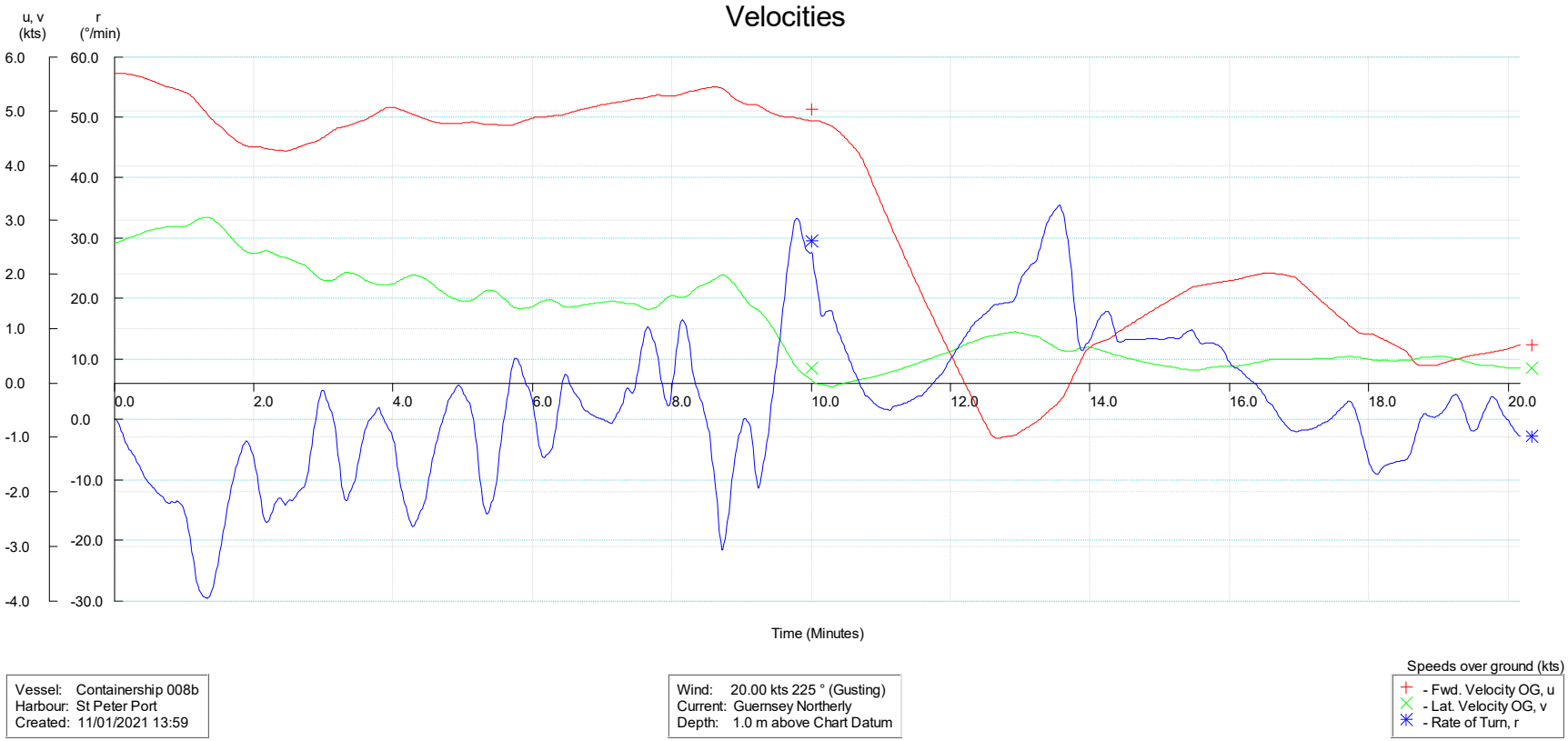
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

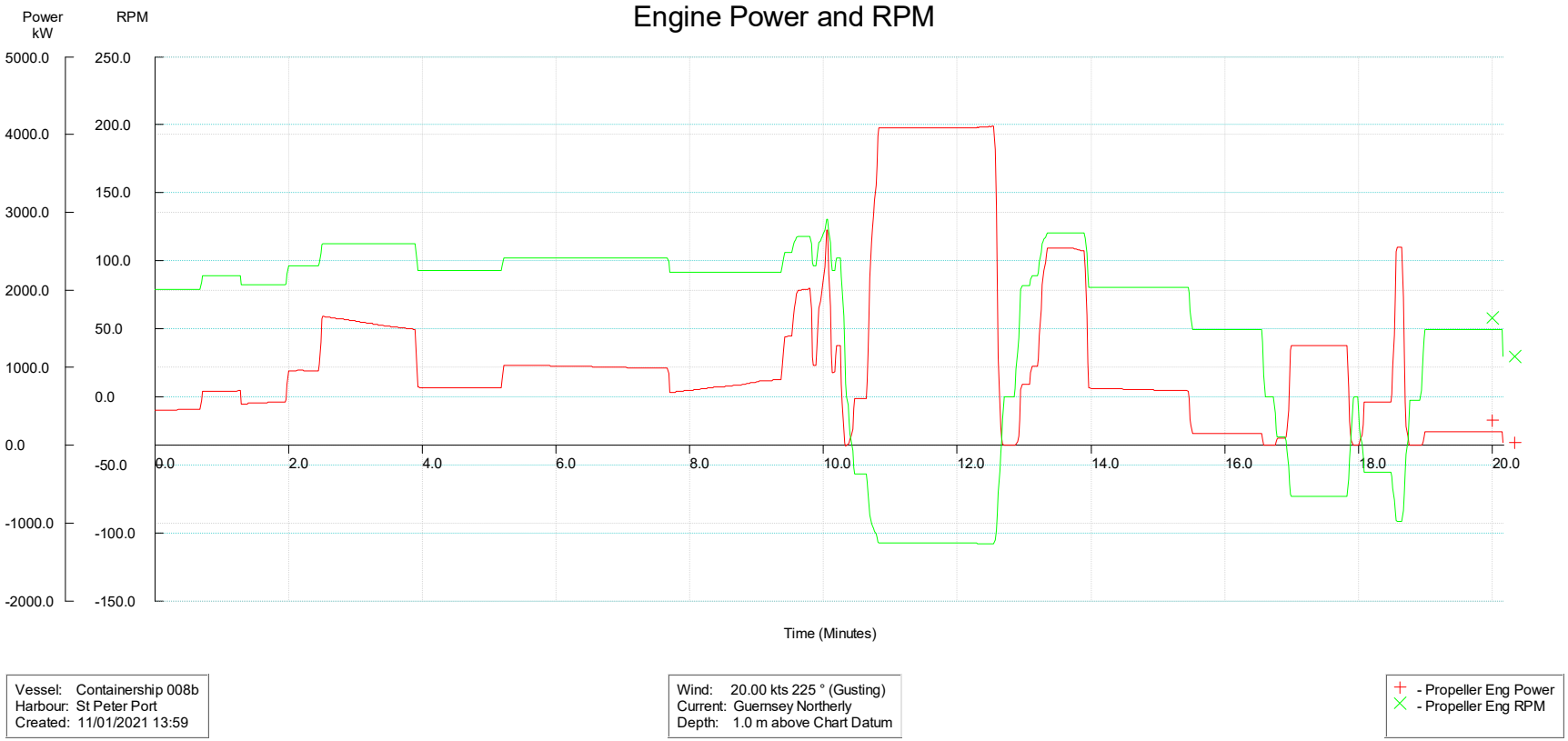
Vessel Track

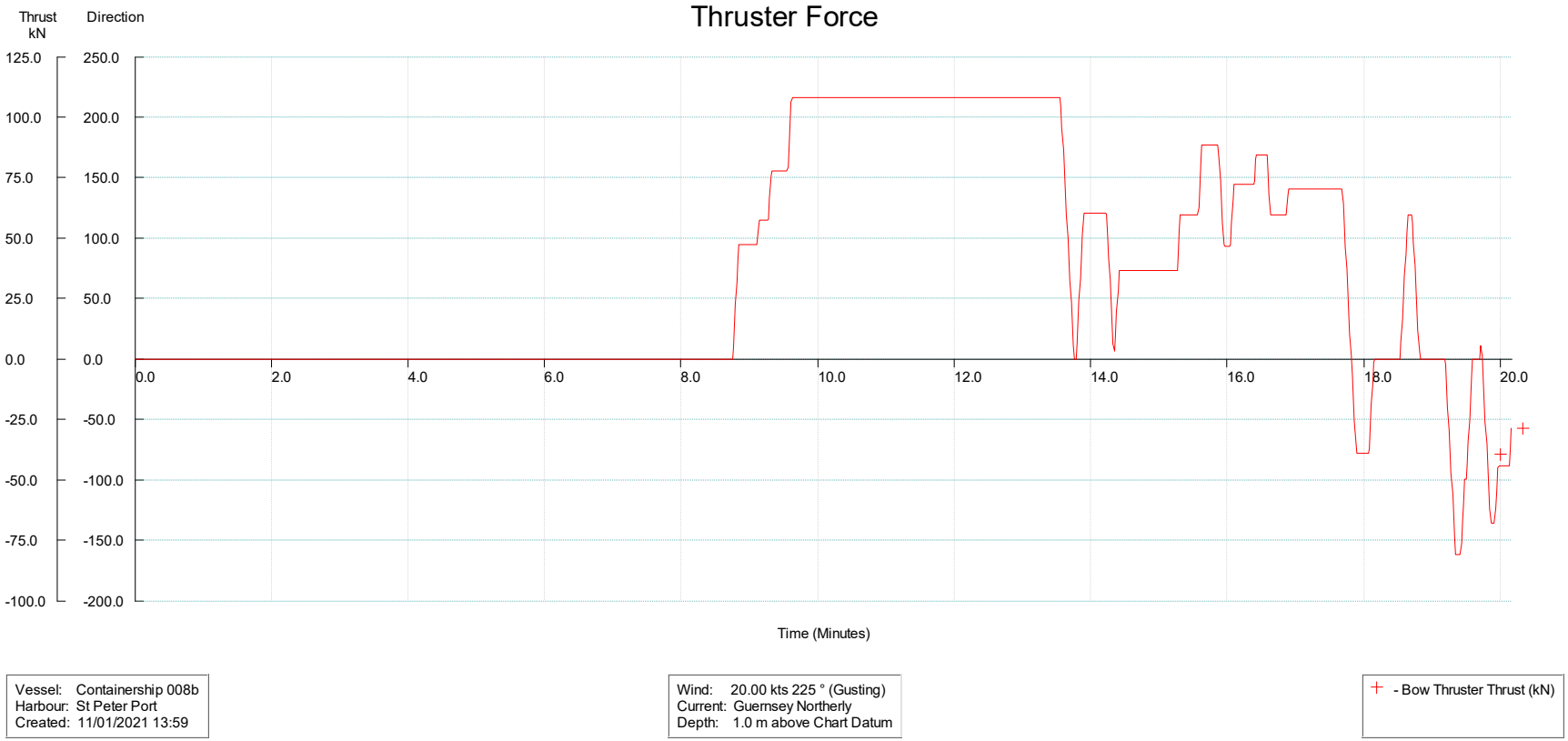
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 13:59

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 13:59
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: 1.0 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 13:59
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 13:59
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: 1.0 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 13:59
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

10 RUN 10:

Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
10	Containership 008b	Arrival	Southern	Manual North Flowing	30kt / 225°	0.9 / 2.9 / 225°

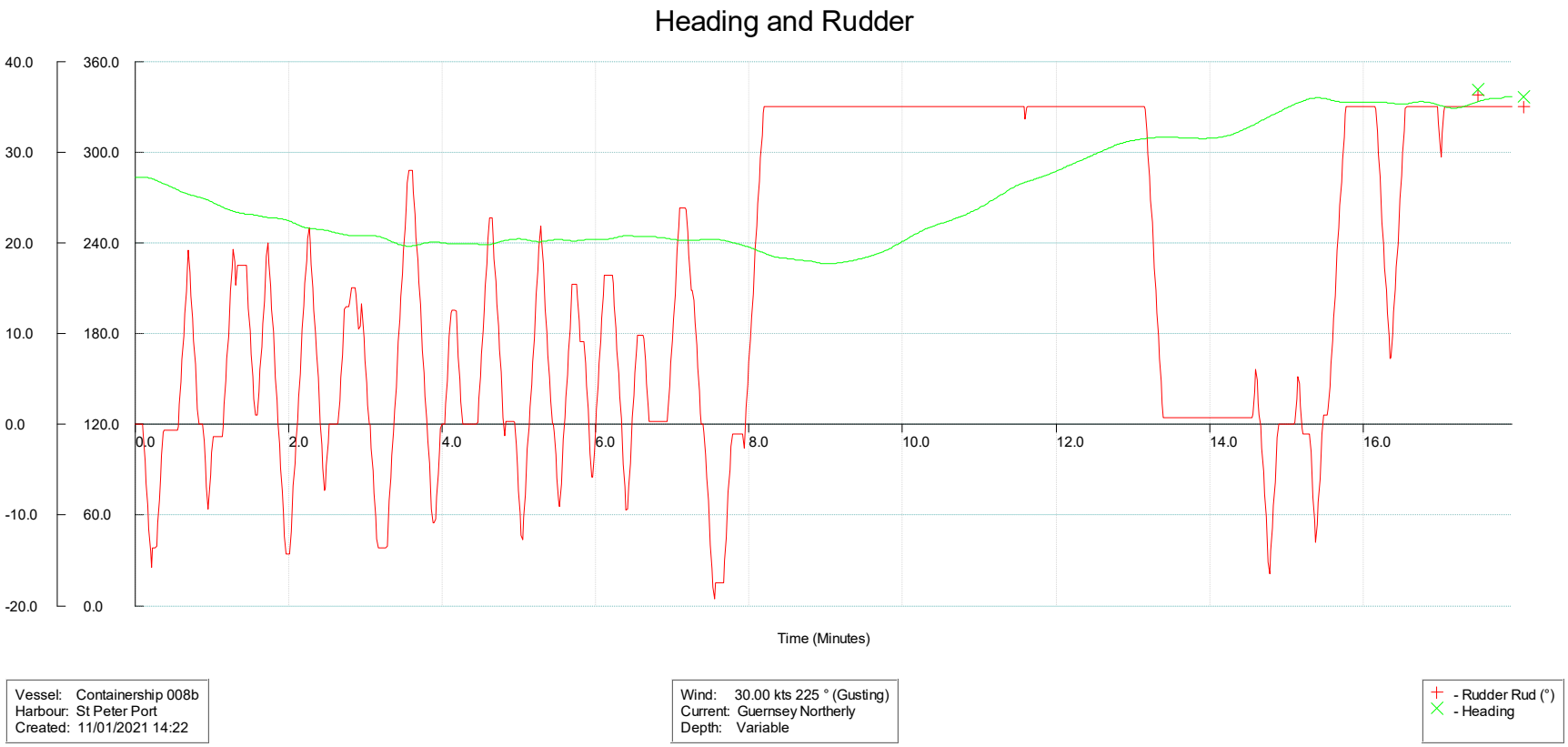
Conditions as per the previous run, but with the wind increased to 30 knots. Again the run was a success but with zero margin for error. In reality this manoeuvre would probably not be attempted.

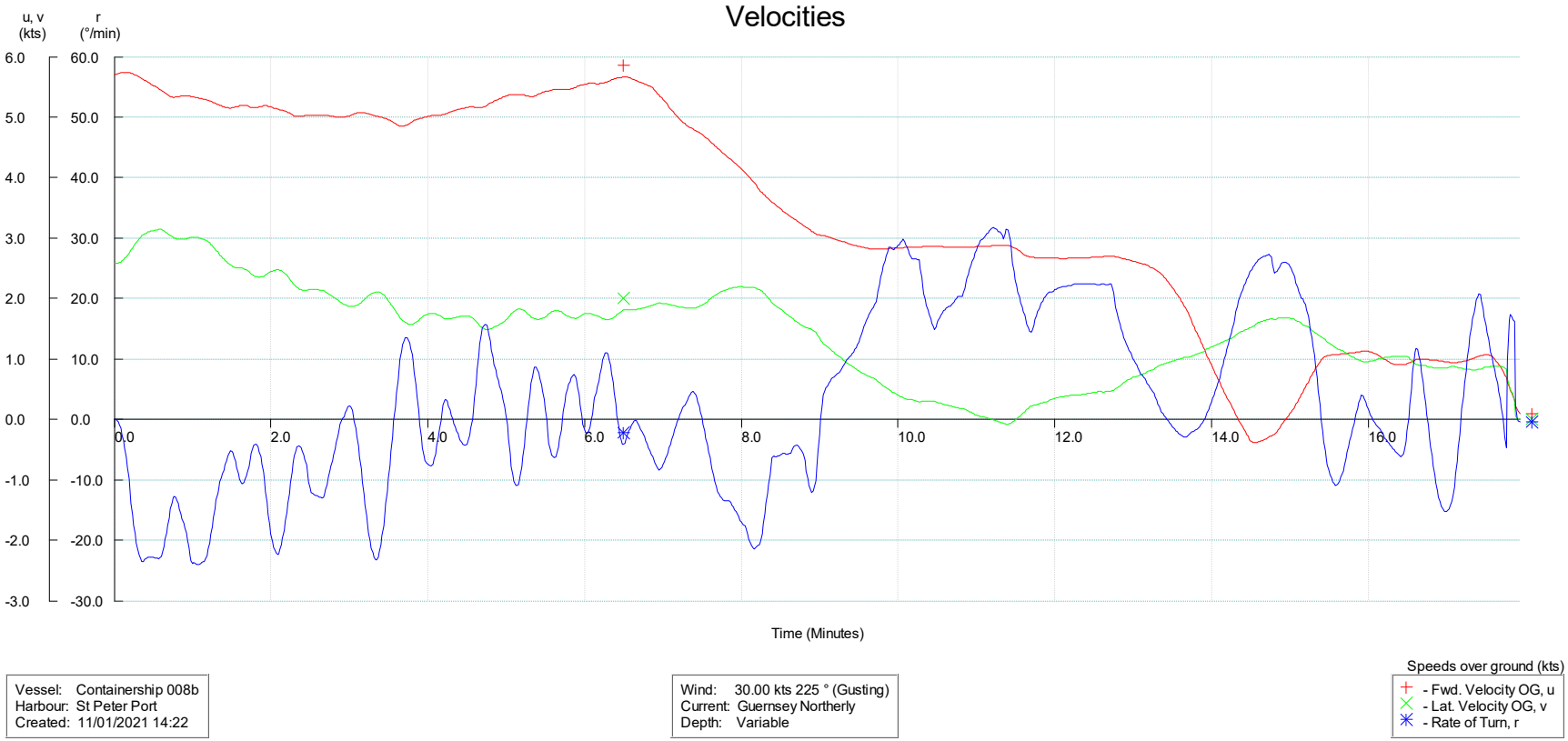
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	**Challenging**	Difficult	Impossible

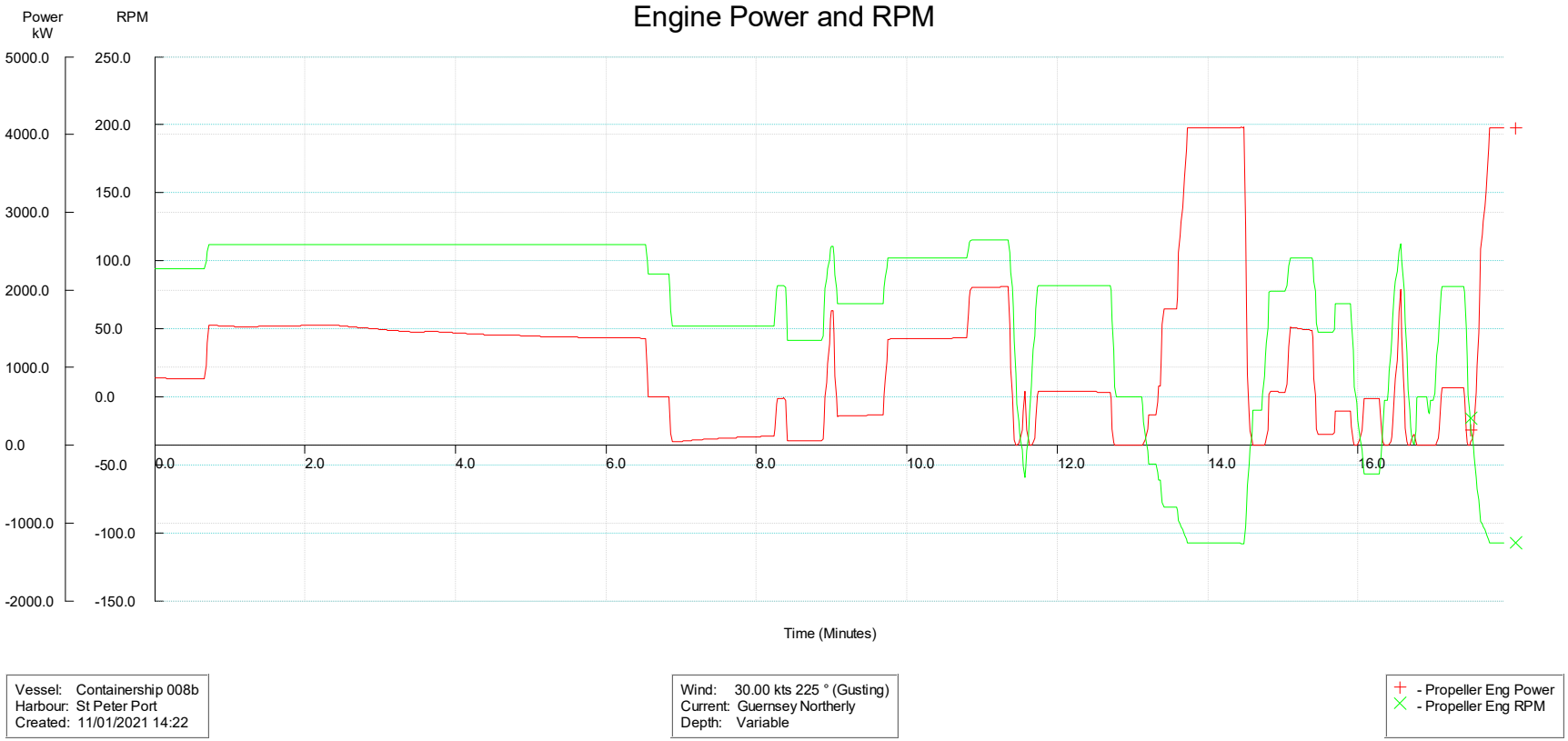
Vessel Track

Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:22

Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: Variable


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: Variable
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: Variable
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: Variable
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey Northerly
Depth: Variable
- Bow Thruster Thrust (kN)

11 RUN 11:

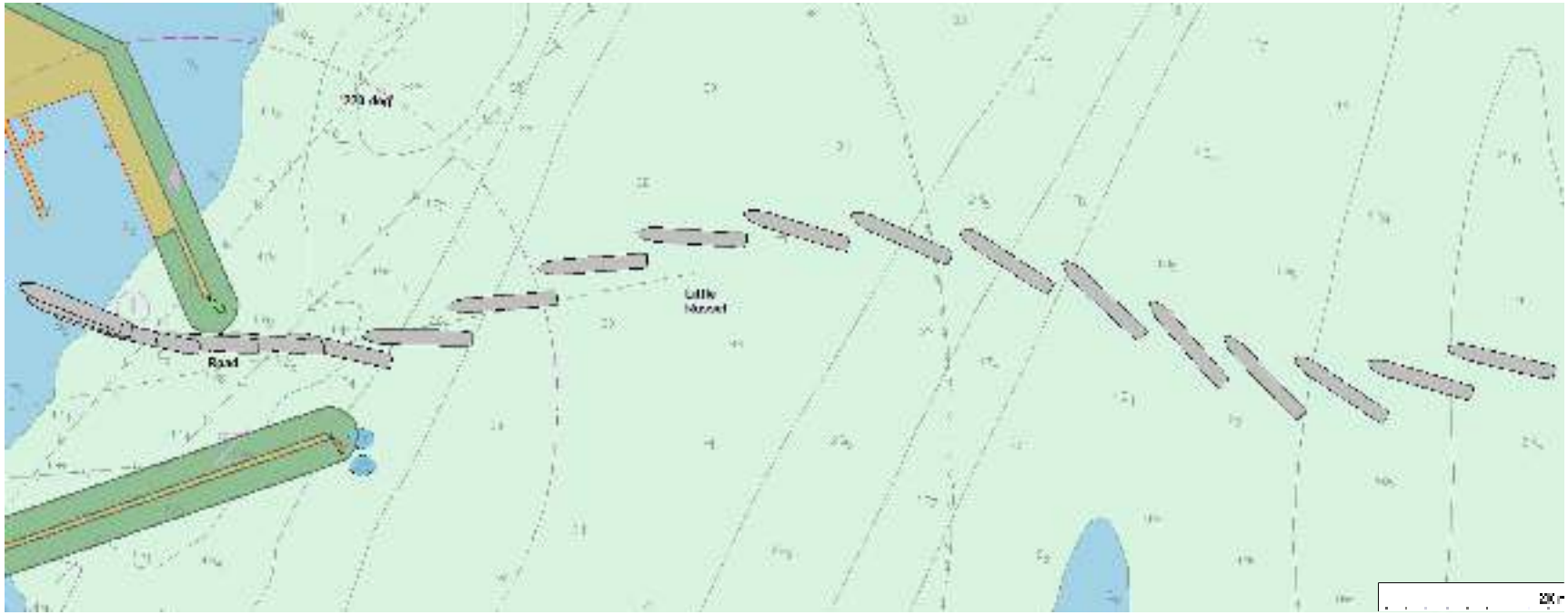
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
11	Containership 008b	Arrival	Southern	Manual South Flowing	20kt / 225°	0.3 / 2.9 / 225°

Run 11 investigated the combination of southerly current with a 20 knot south westerly wind. Once again with these conditions the most challenging task was navigating through the breakwater. Part of this was due to the simplified nature of the currents used, however it was observed that this would still be an issue in real life.

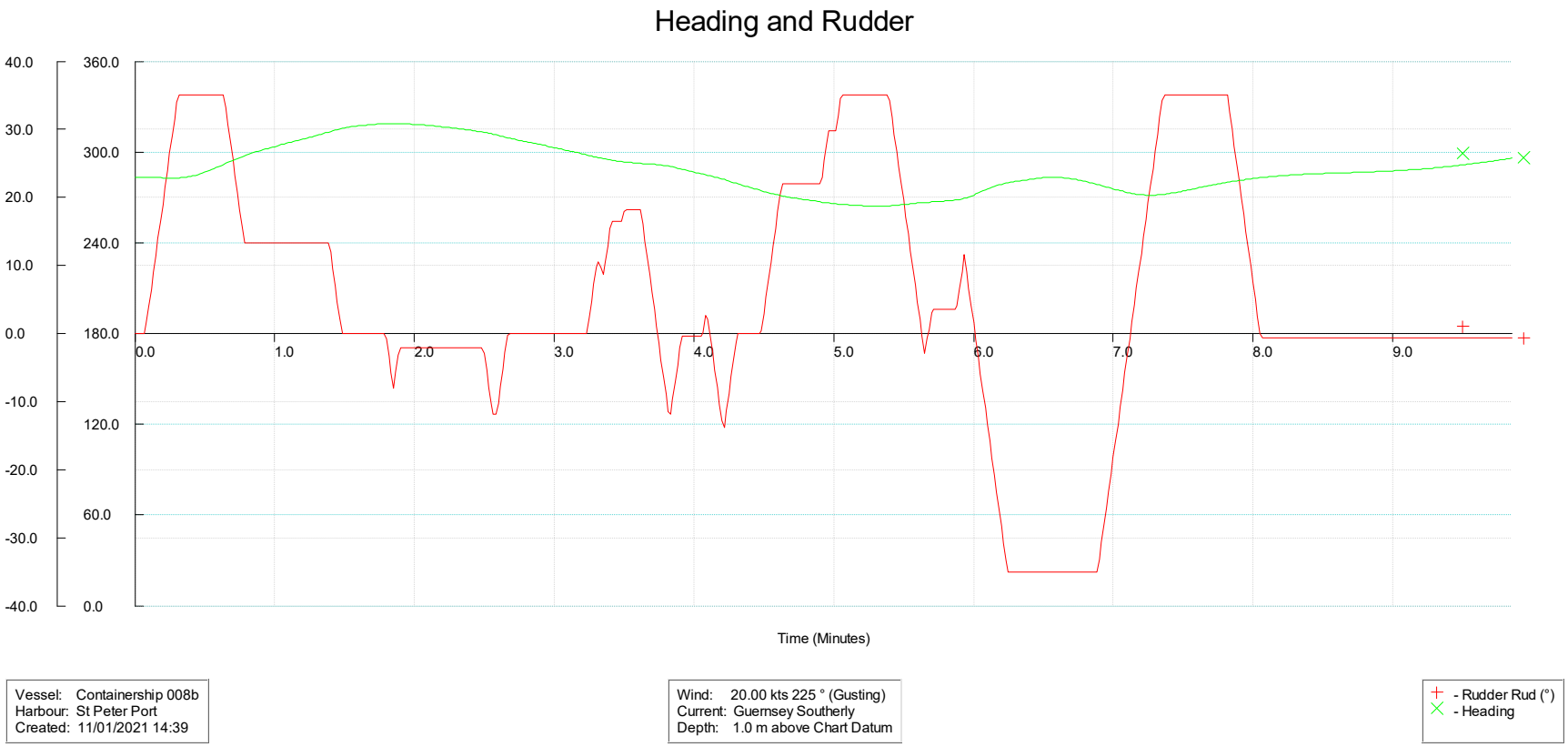
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	**Challenging**	Difficult	Impossible

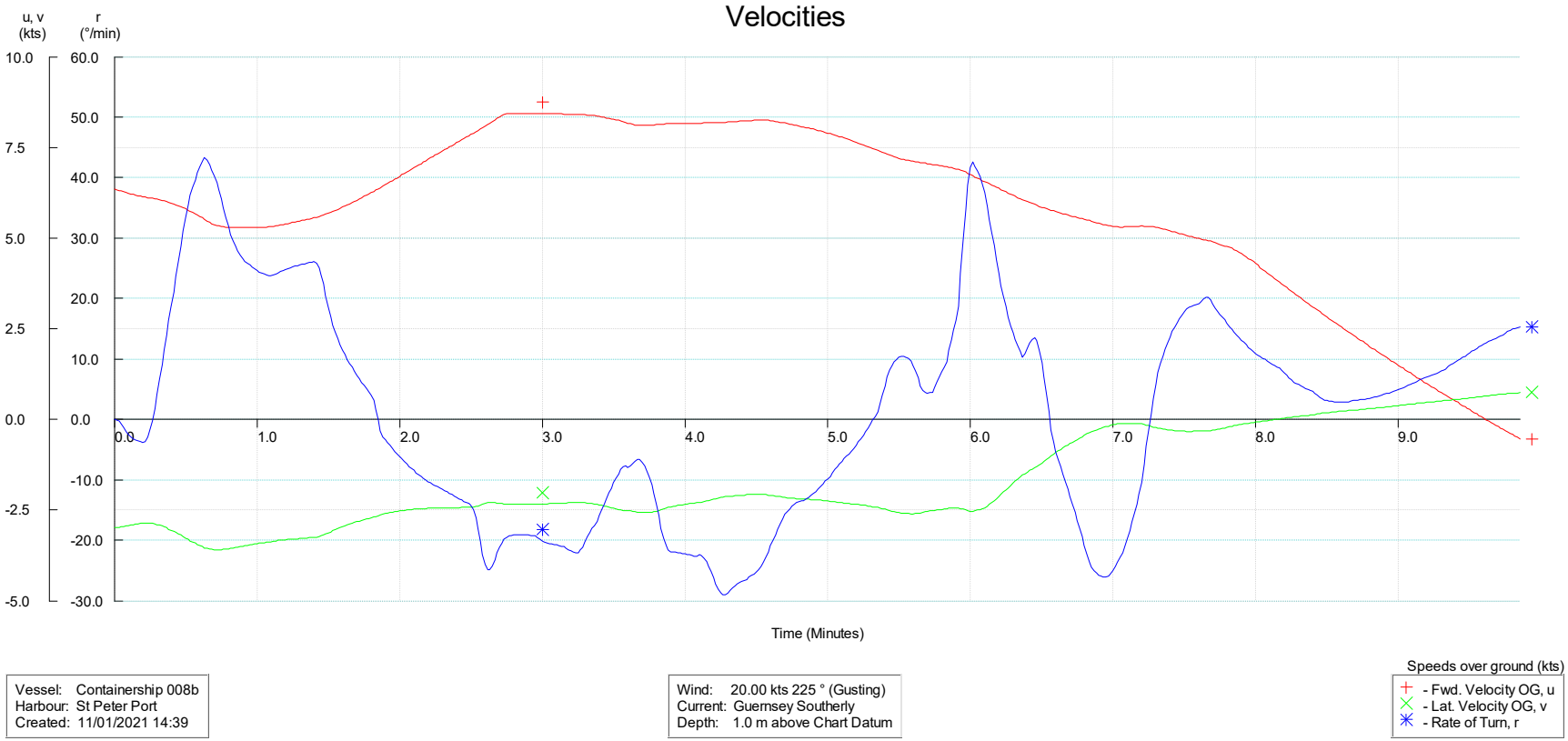
Vessel Track

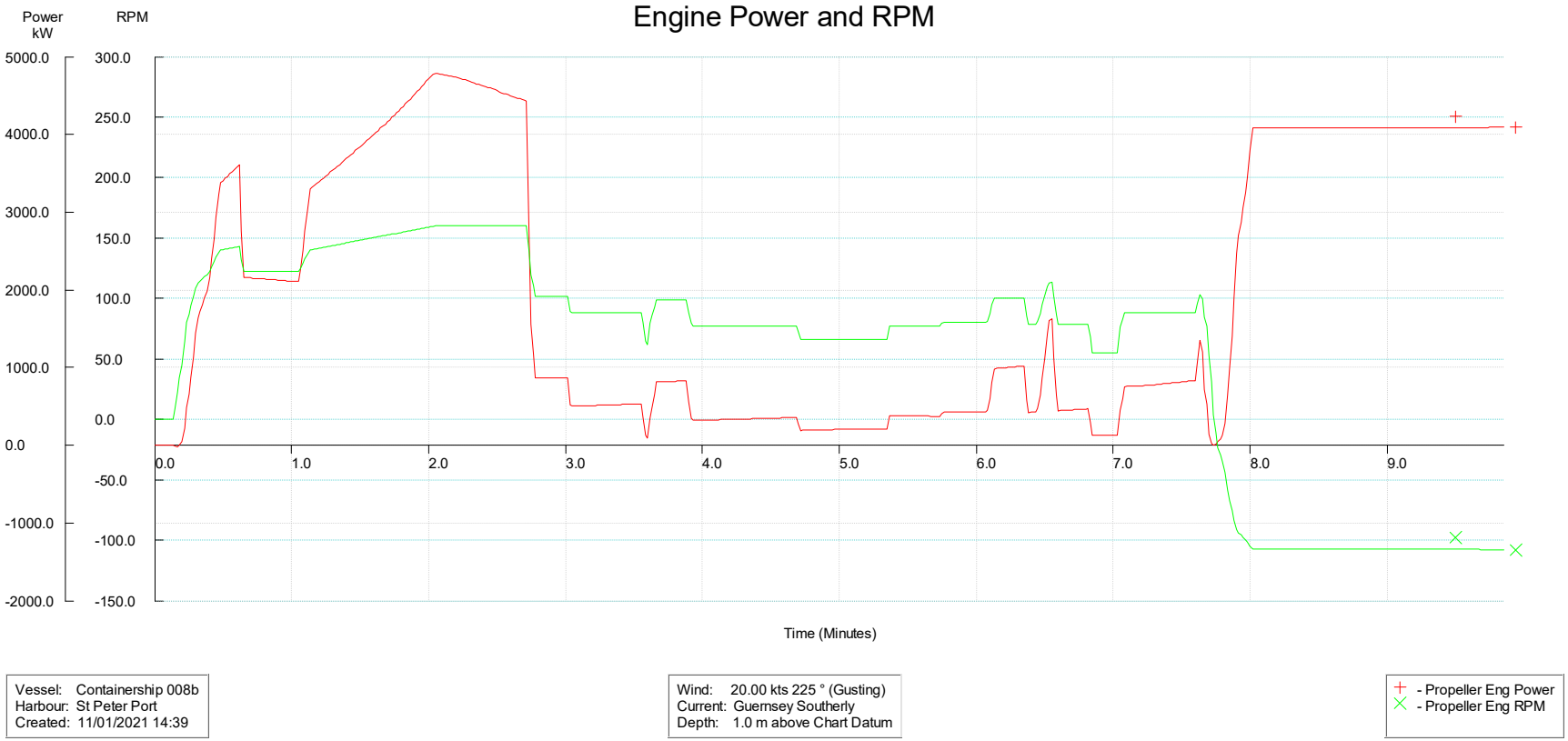


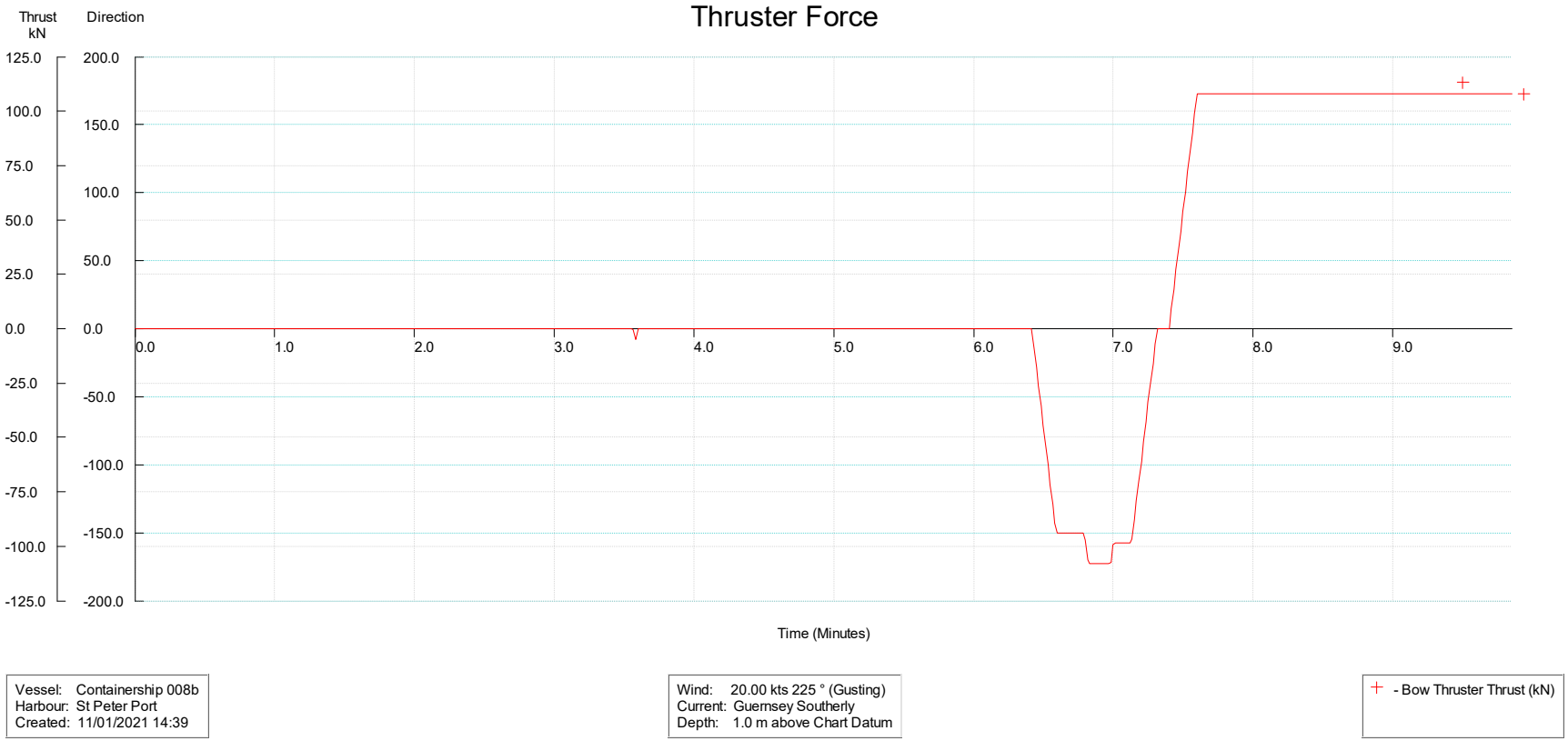
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:39

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:39
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:39
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:39
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:39
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

12 RUN 12:

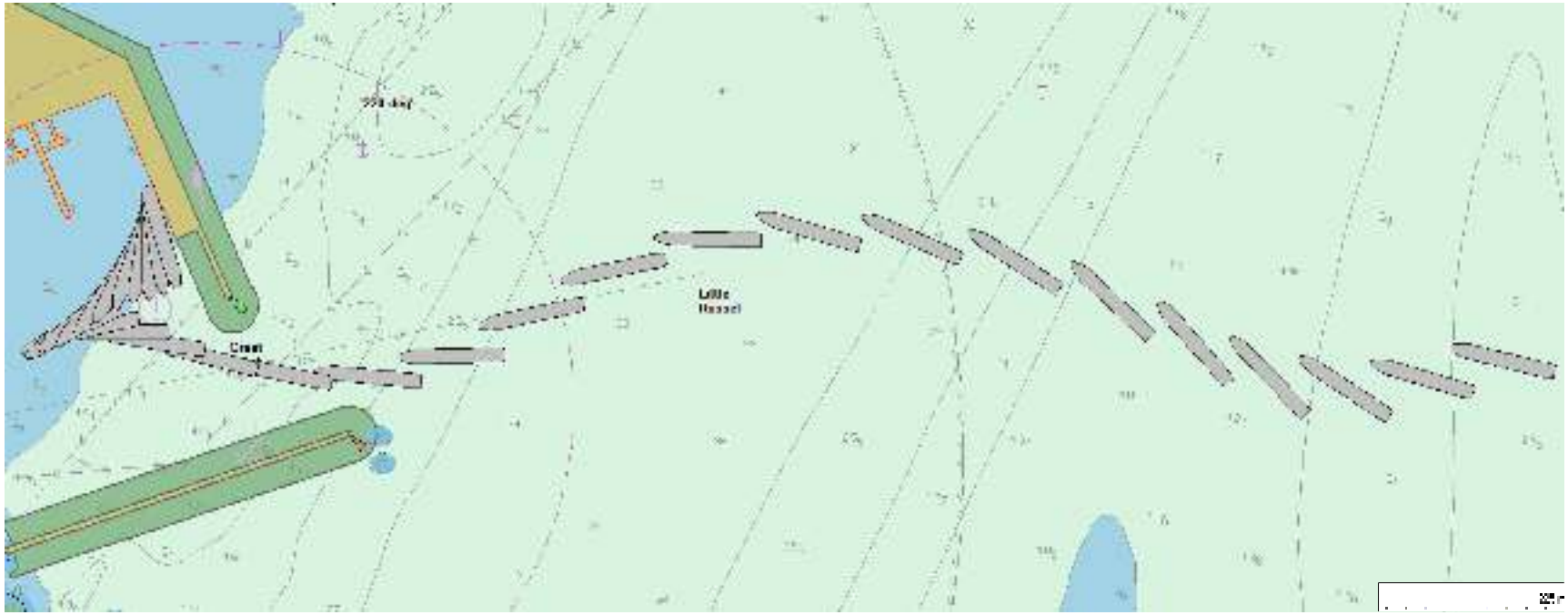
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
12	Containership 008b	Arrival	Southern	Manual South Flowing	30kt / 225°	0.3 / 2.9 / 225°

Run 12 took the first part of Run 11 (crossing the strait) and then increased the wind to 30 knots prior to entering the harbour. The ship was successfully brought alongside but with zero margin for error and the Pilot commented that they would not have been happy conducting the manoeuvre in real life.

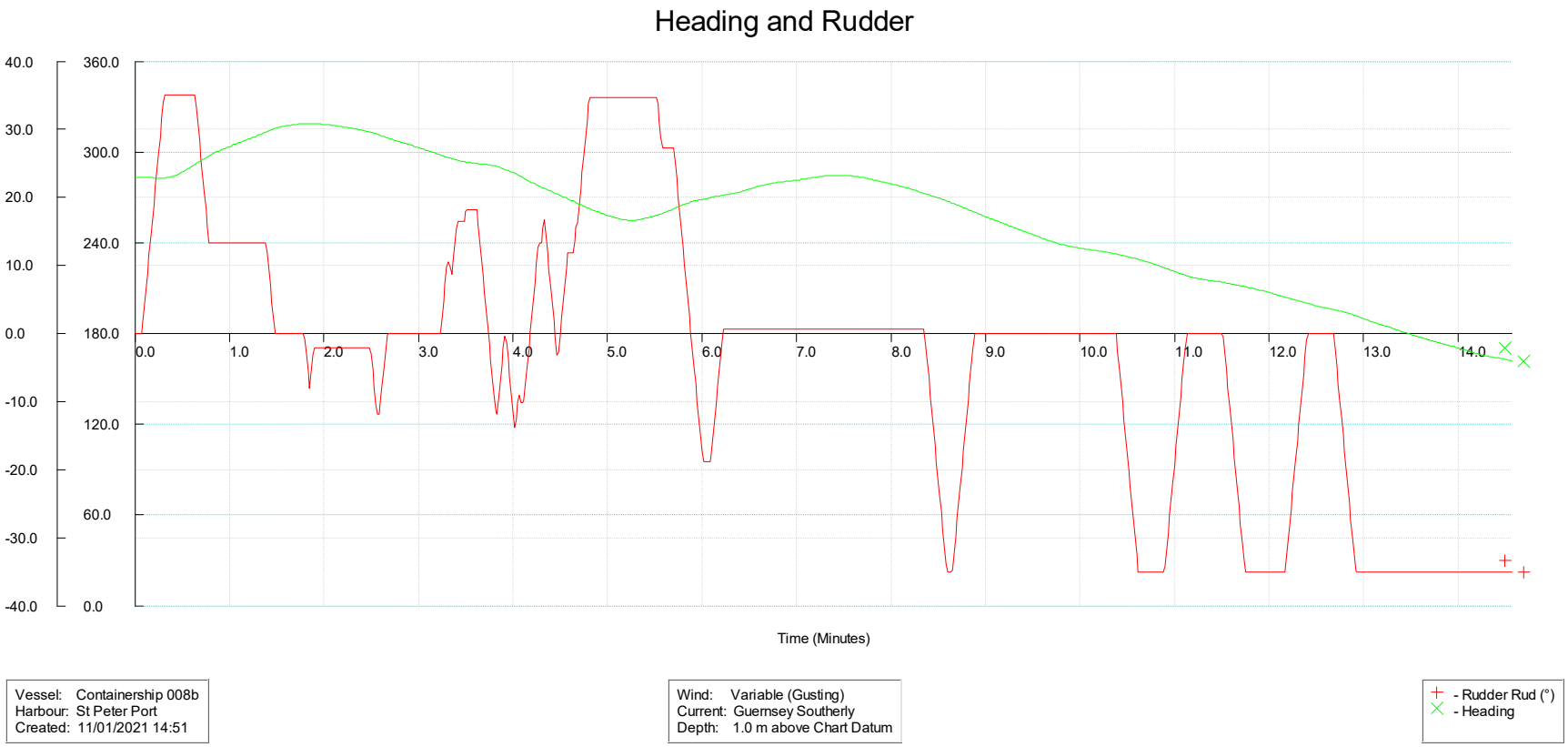
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	**Difficult**	Impossible

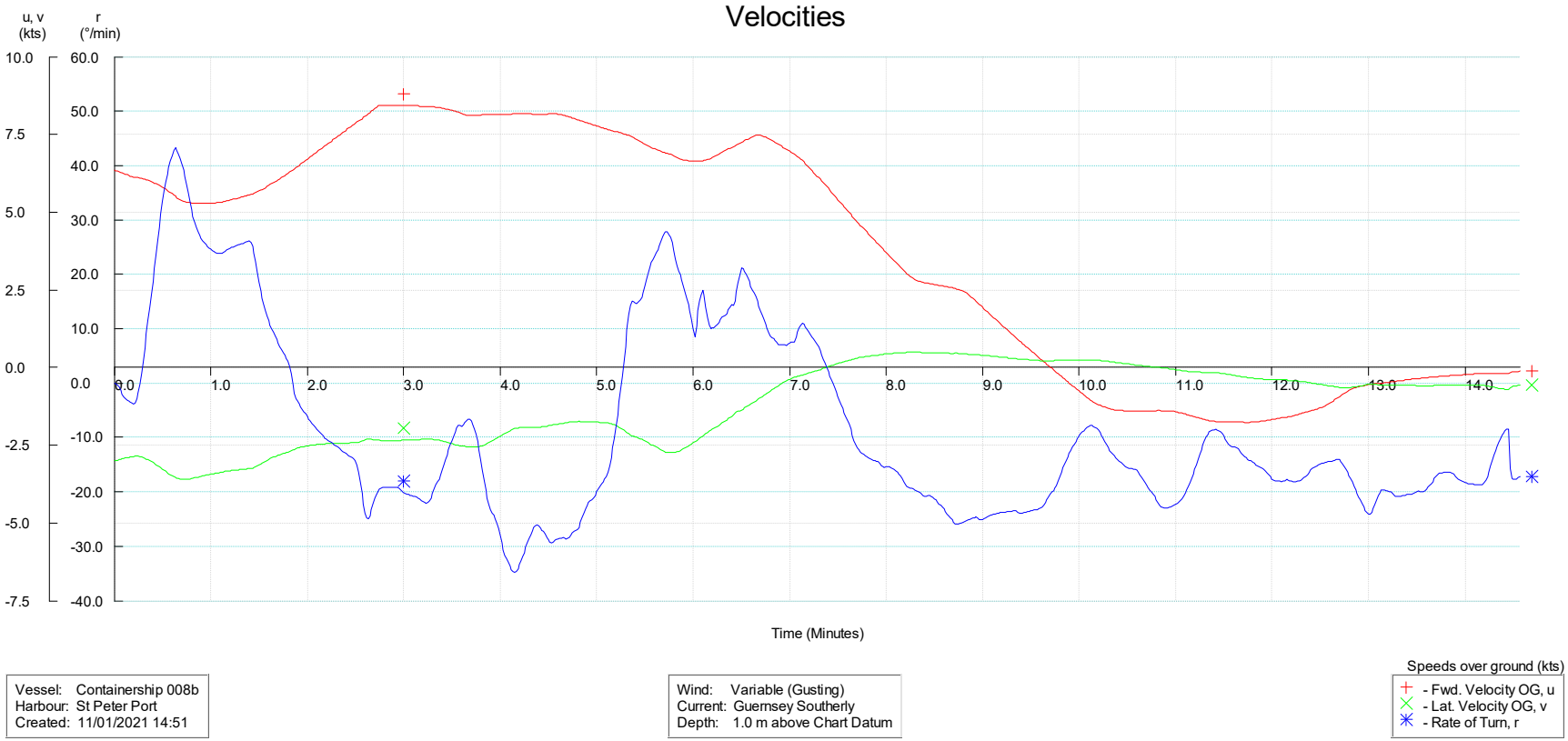
Vessel Track

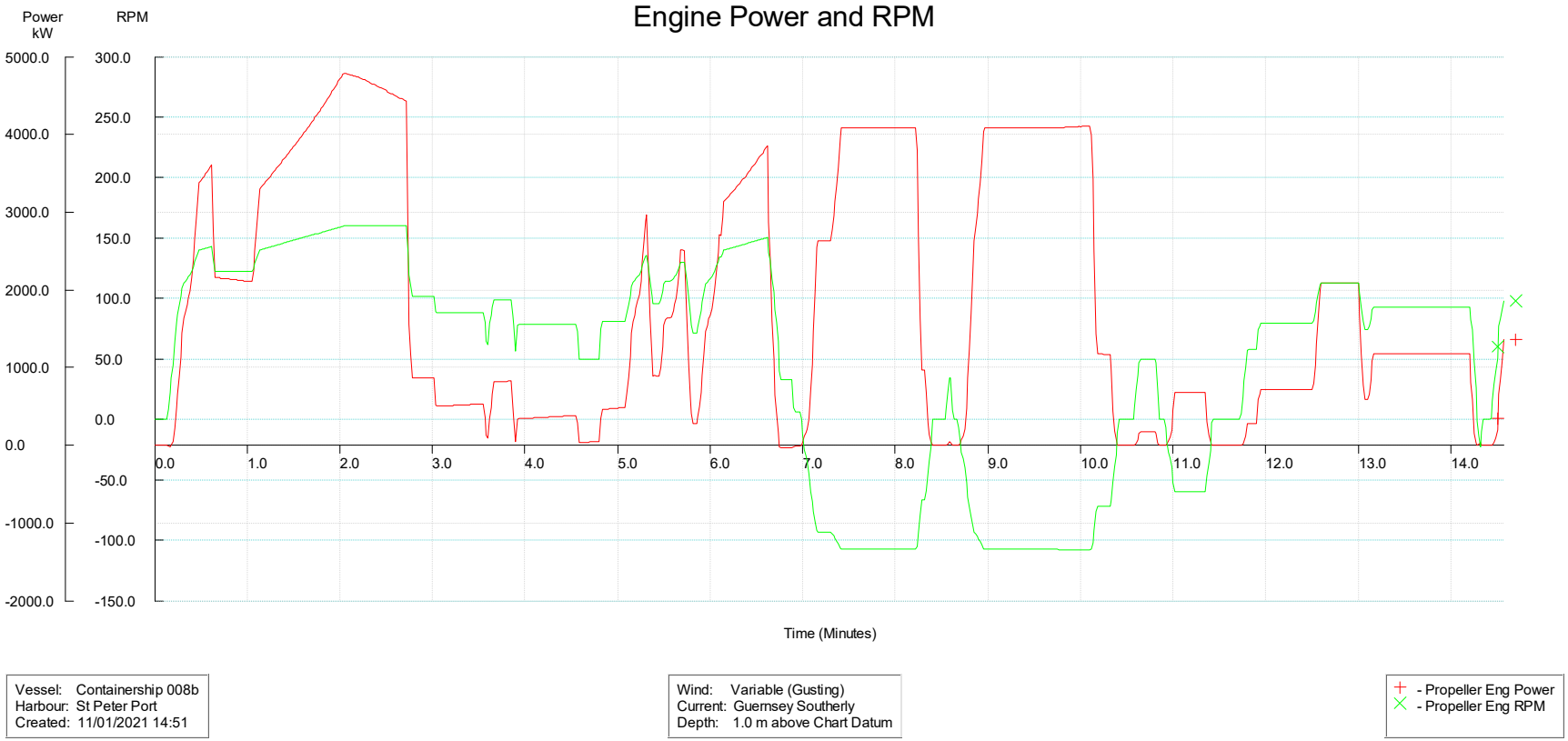


Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:51

Wind: Variable (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:51
Wind: Variable (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:51
Wind: Variable (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:51
Wind: Variable (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 14:51
Wind: Variable (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

13 RUN 13:

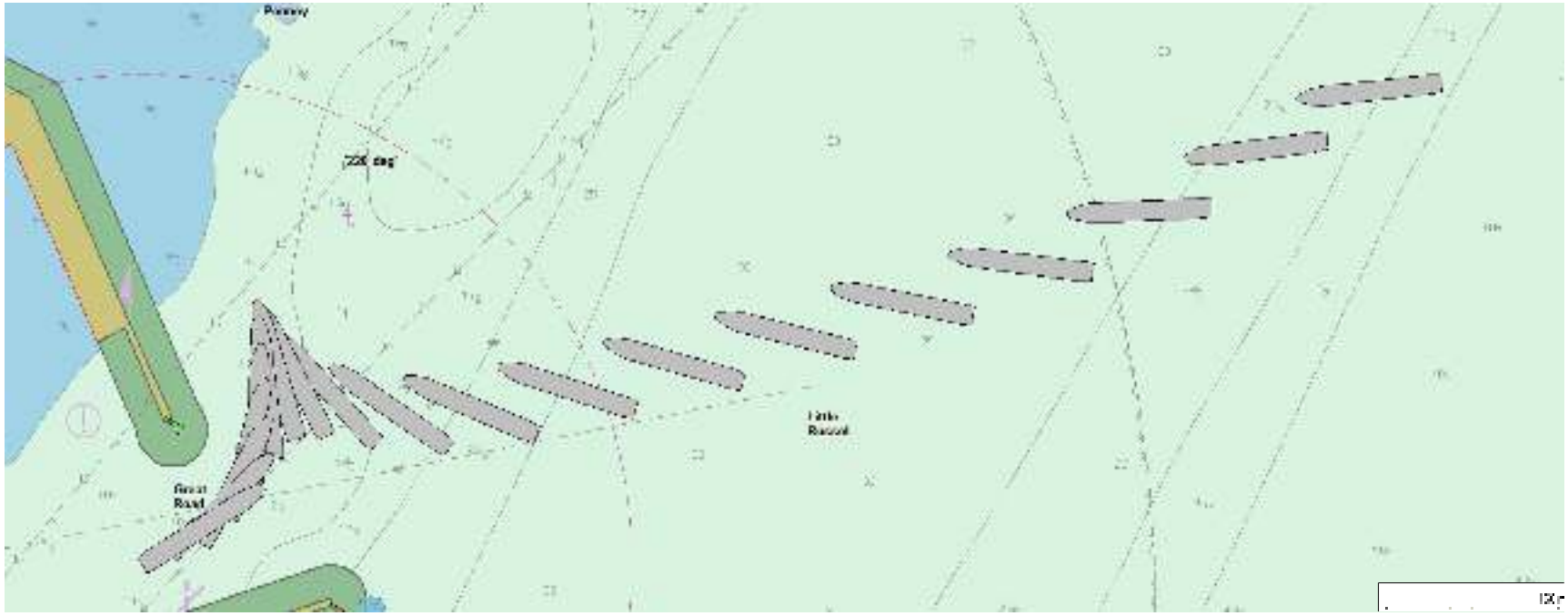
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
13	Containership 008b	Arrival	Southern	Manual South Flowing	30kt / 045°	0.9 / 4.6 / 045°

Run 13 investigated the combination of a 30 knot NE wind with southerly current flows. The pilot tried a number of alternative manoeuvres but in these conditions it proved impossible to get the ship safely thought the breakwaters.

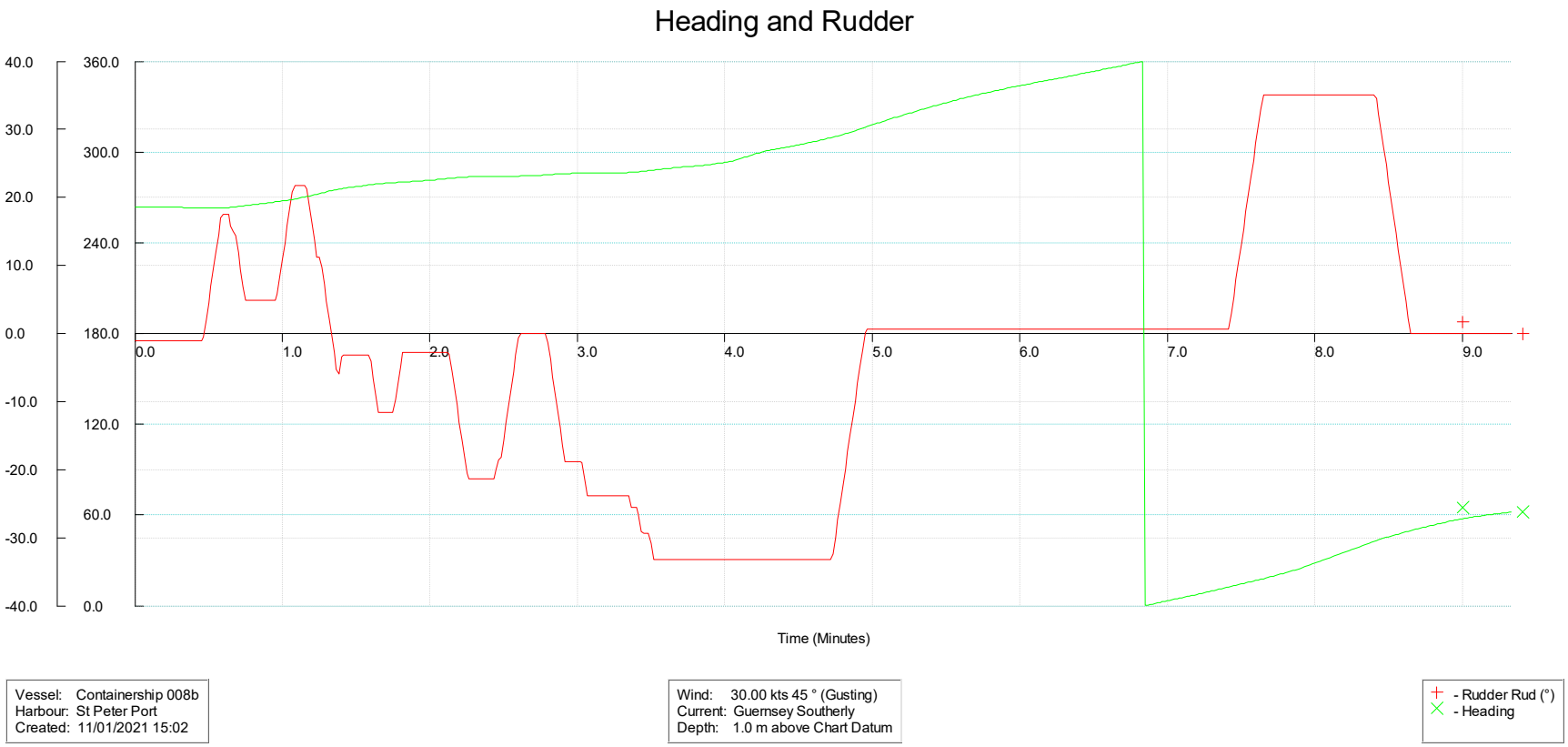
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

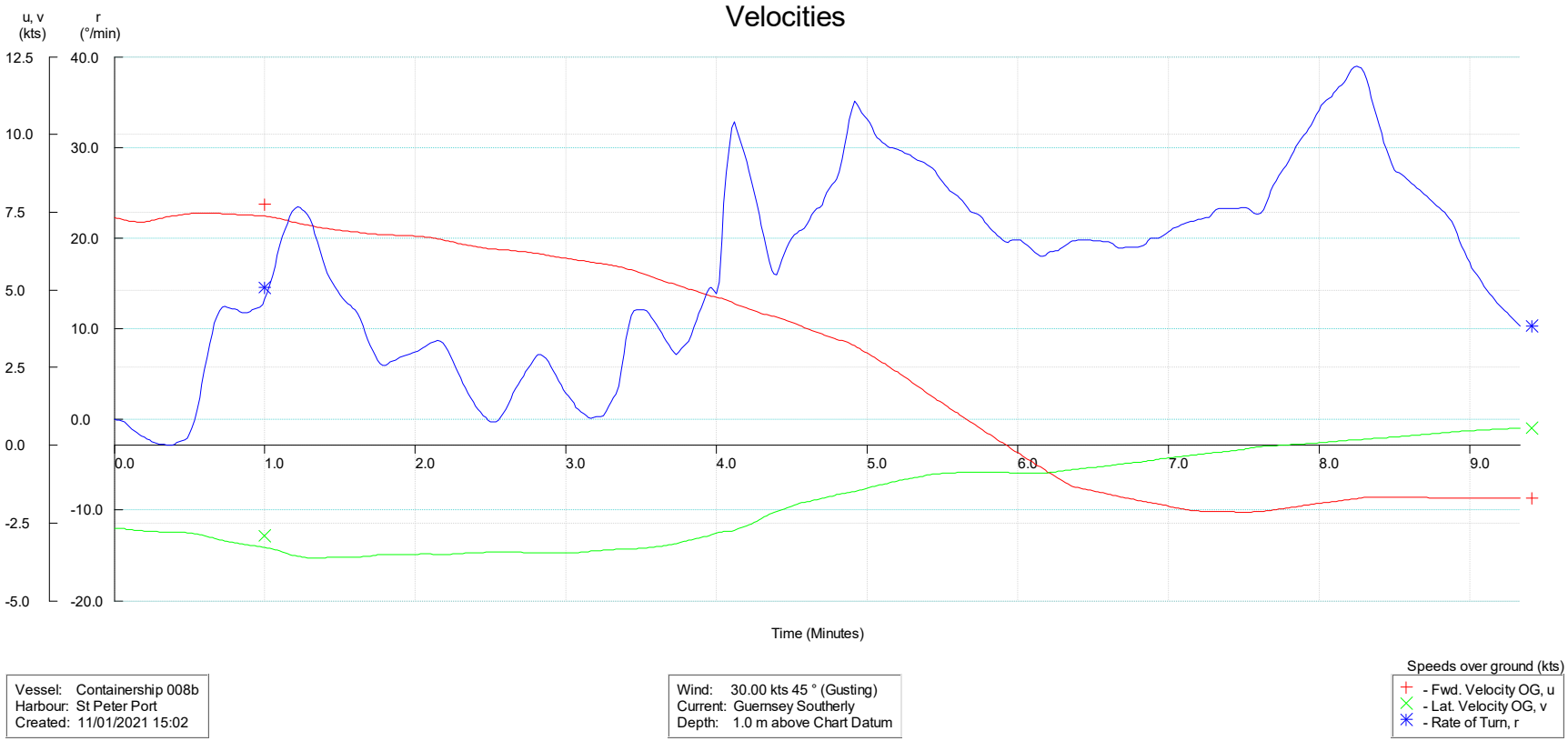
Vessel Track

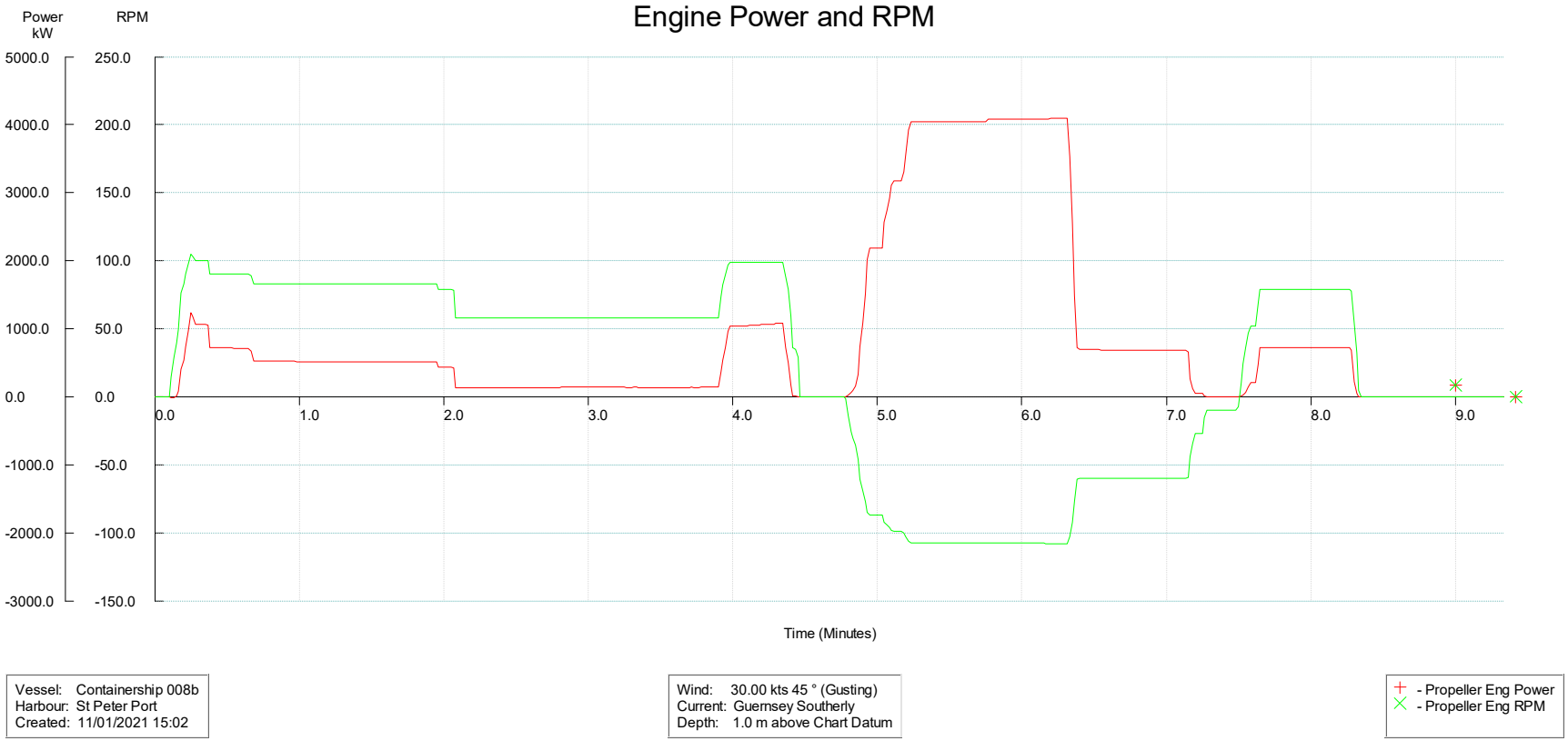


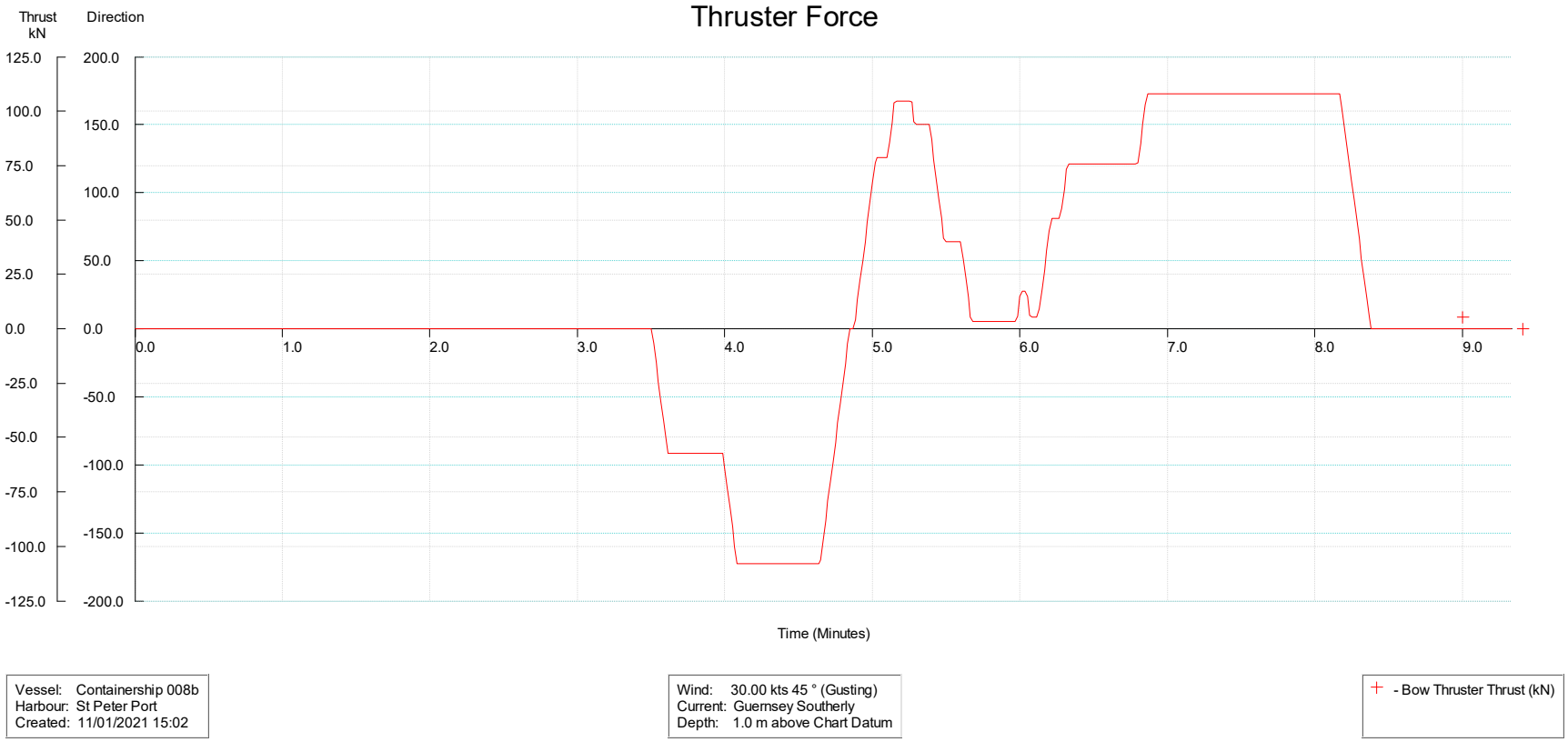
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:02

Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:02
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:02
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
-3000.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:02
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:02
Wind: 30.00 kts 45 ° (Gusting)
Current: Guernsey Southerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

14 RUN 14:

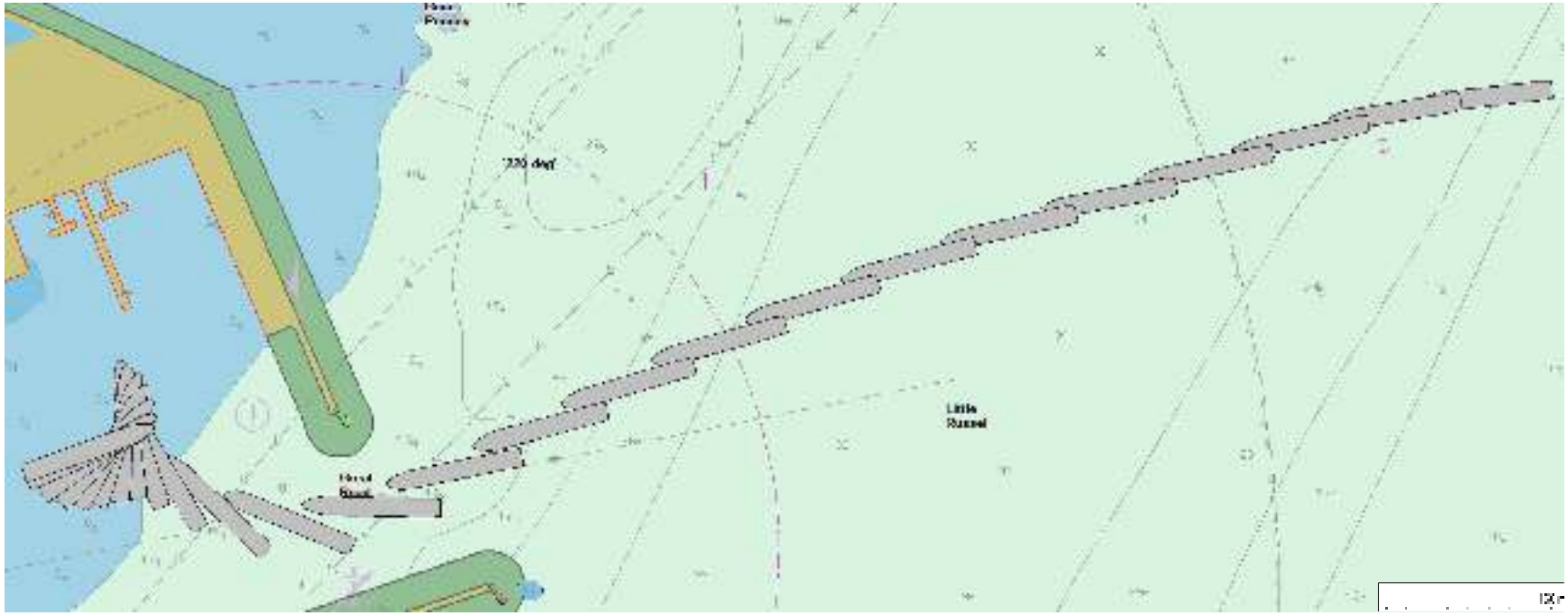
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
14	Containership 008b	Arrival	Southern	Haskoning South Flowing	30kt / 045°	0.9 / 4.6 / 045°

Run 14 was a repeat of the Run 13 but with the Haskoning-produce current flows. This proved marginally easier however the run was still classed as Difficult. It was also observed that, particularly for the container vessels, they are able to pick which state of the tide to make their approach and consequently should not need to berth in strong current conditions.

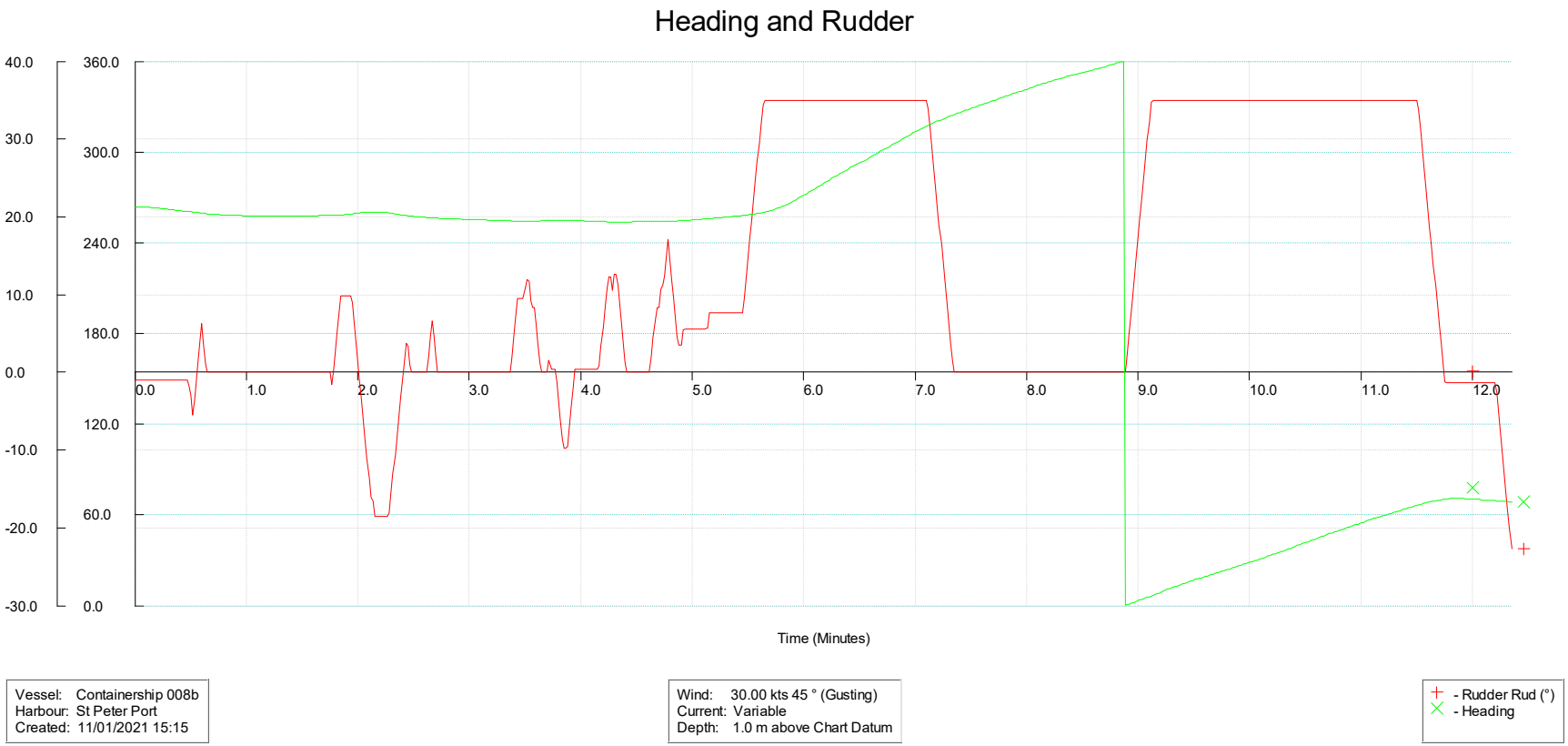
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	**Difficult**	Impossible

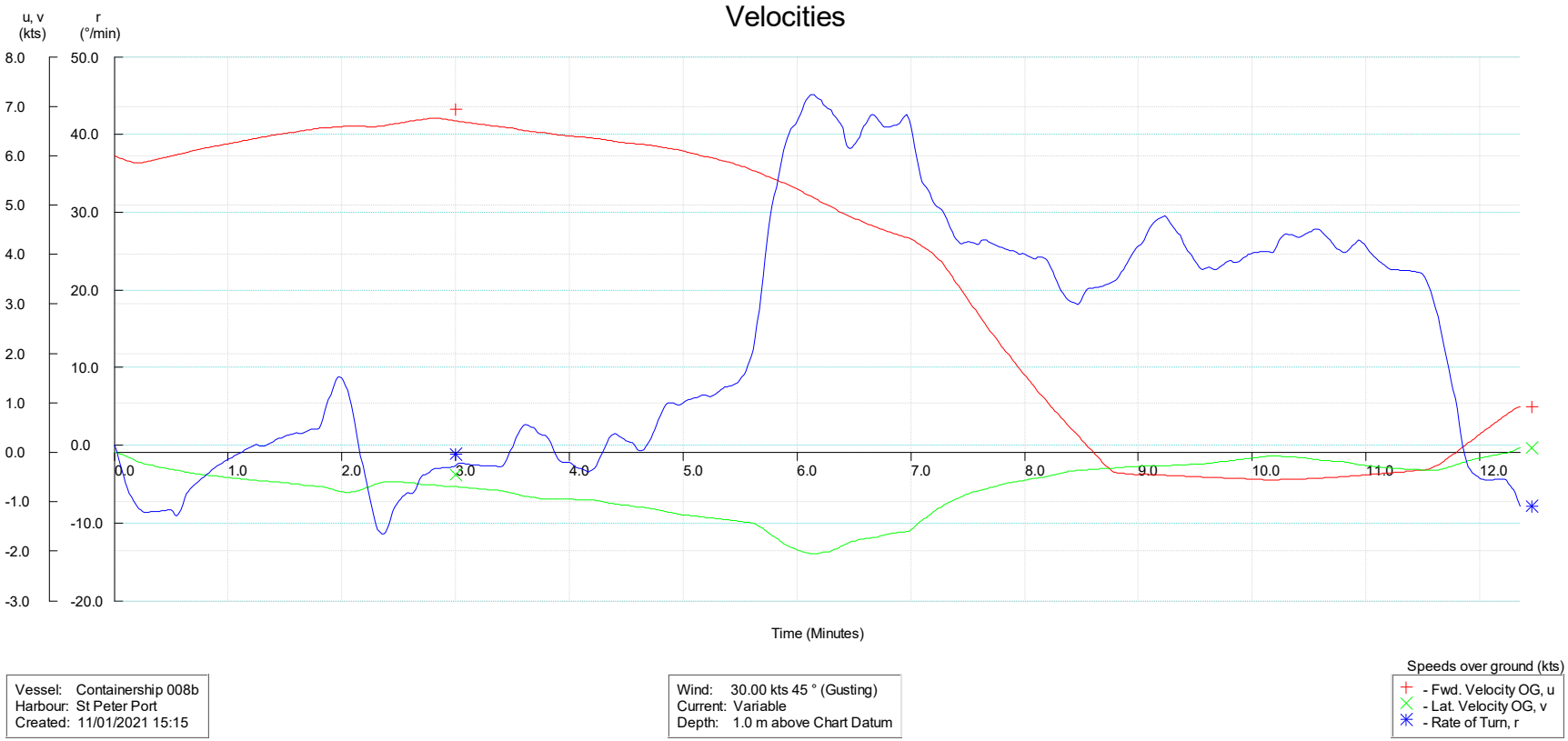
Vessel Track

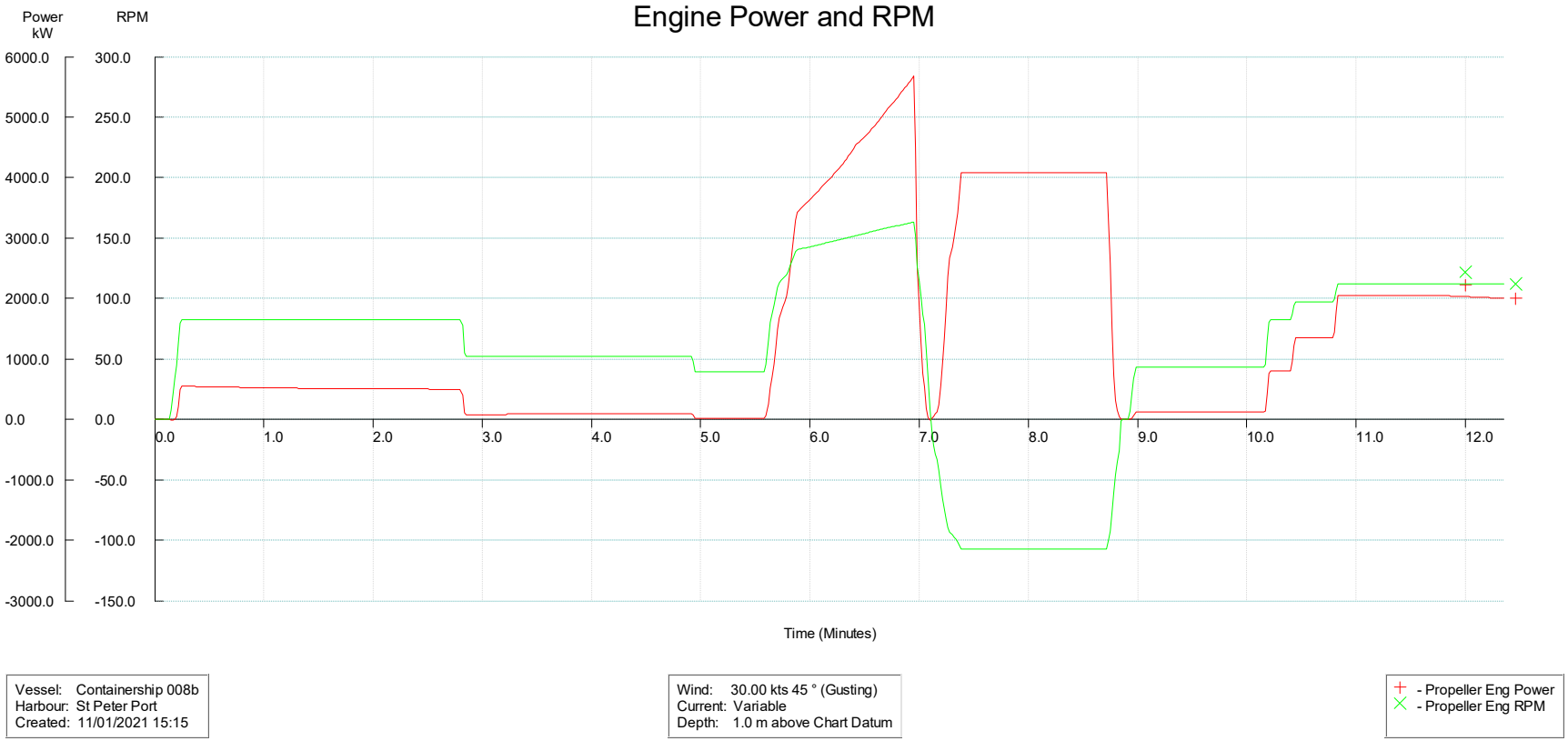


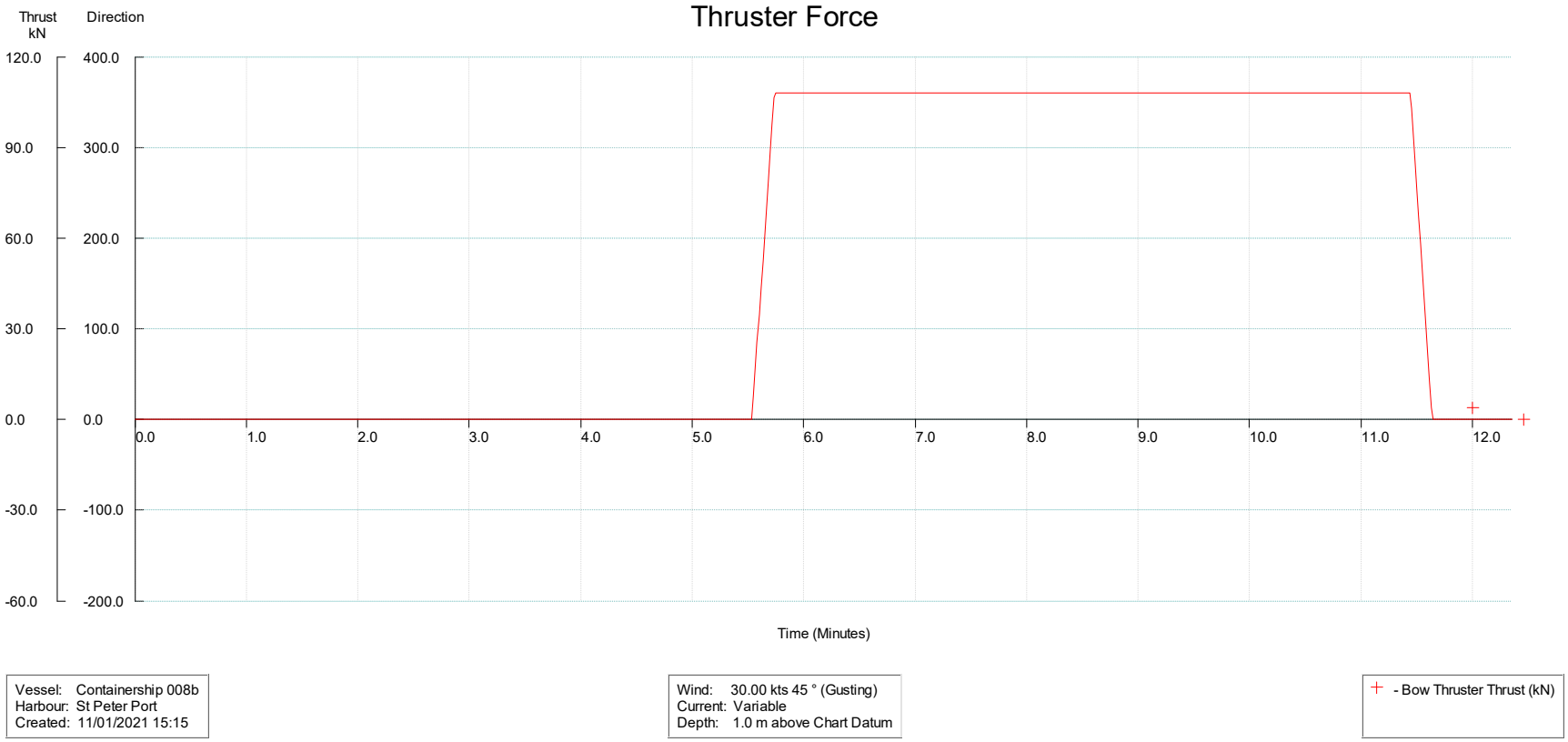
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:15

Wind: 30.00 kts 45 ° (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:15
Wind: 30.00 kts 45 ° (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:15
Wind: 30.00 kts 45 ° (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
-3000.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:15
Wind: 30.00 kts 45 ° (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
120.0
90.0
60.0
30.0
0.0
-30.0
-60.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 11/01/2021 15:15
Wind: 30.00 kts 45 ° (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

15 RUN 15:

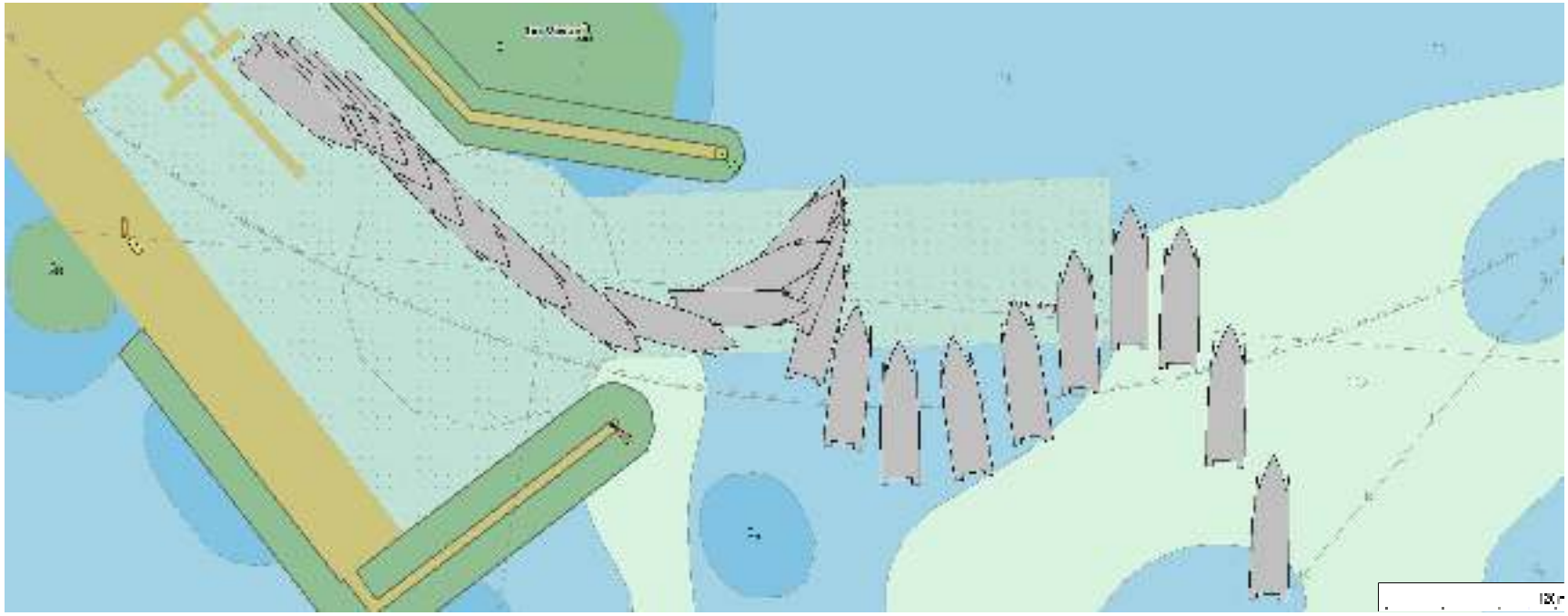
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
15	Condor Liberation	Arrival	Northern	Haskoning Southerly Flowing	10kt / 225°	0.3 / 2.9 / 225°

Run 15 was the first run performed at the northern of the 2 proposed harbour developments. With the southerly flowing current the ship had to be walked sideways in between the breakwaters.

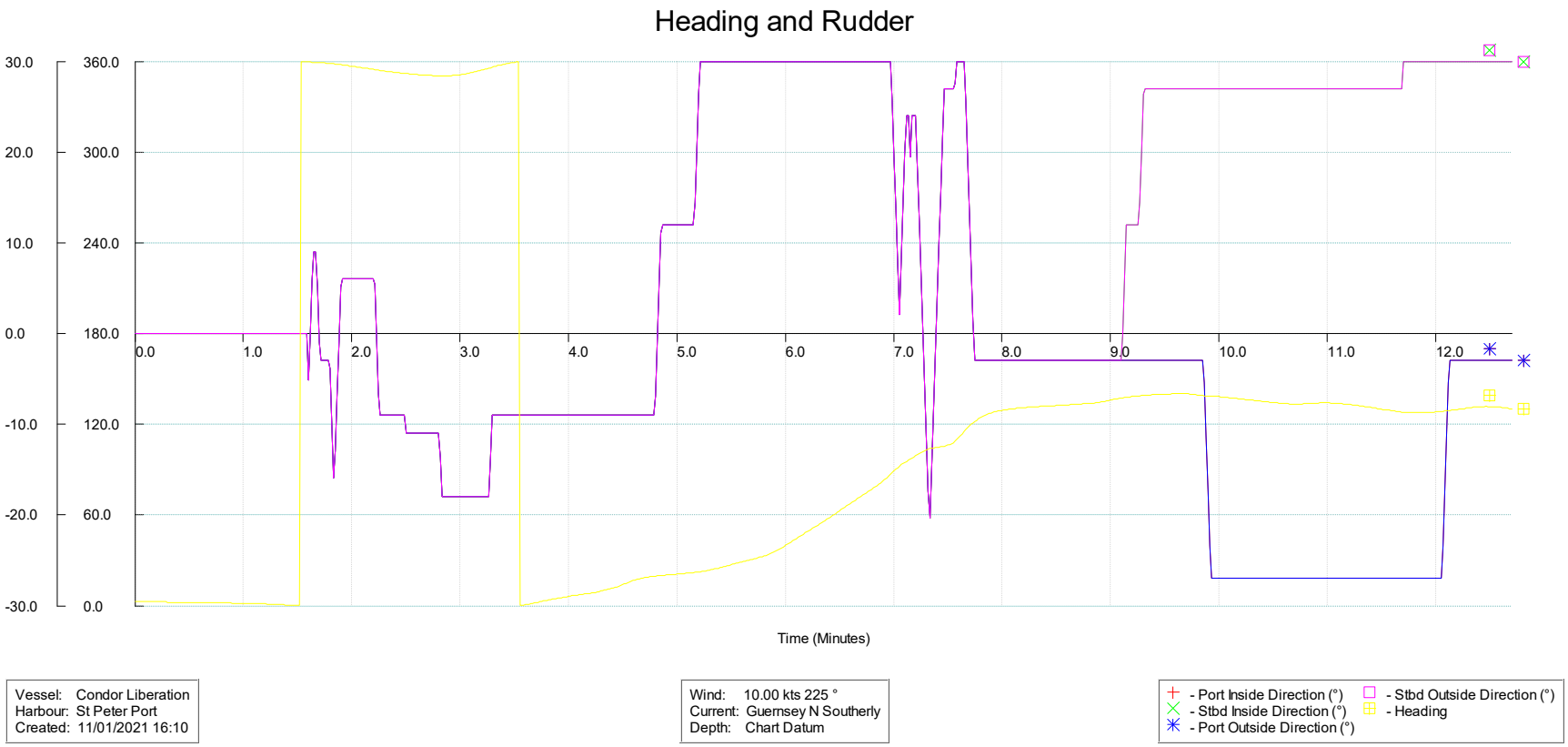
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

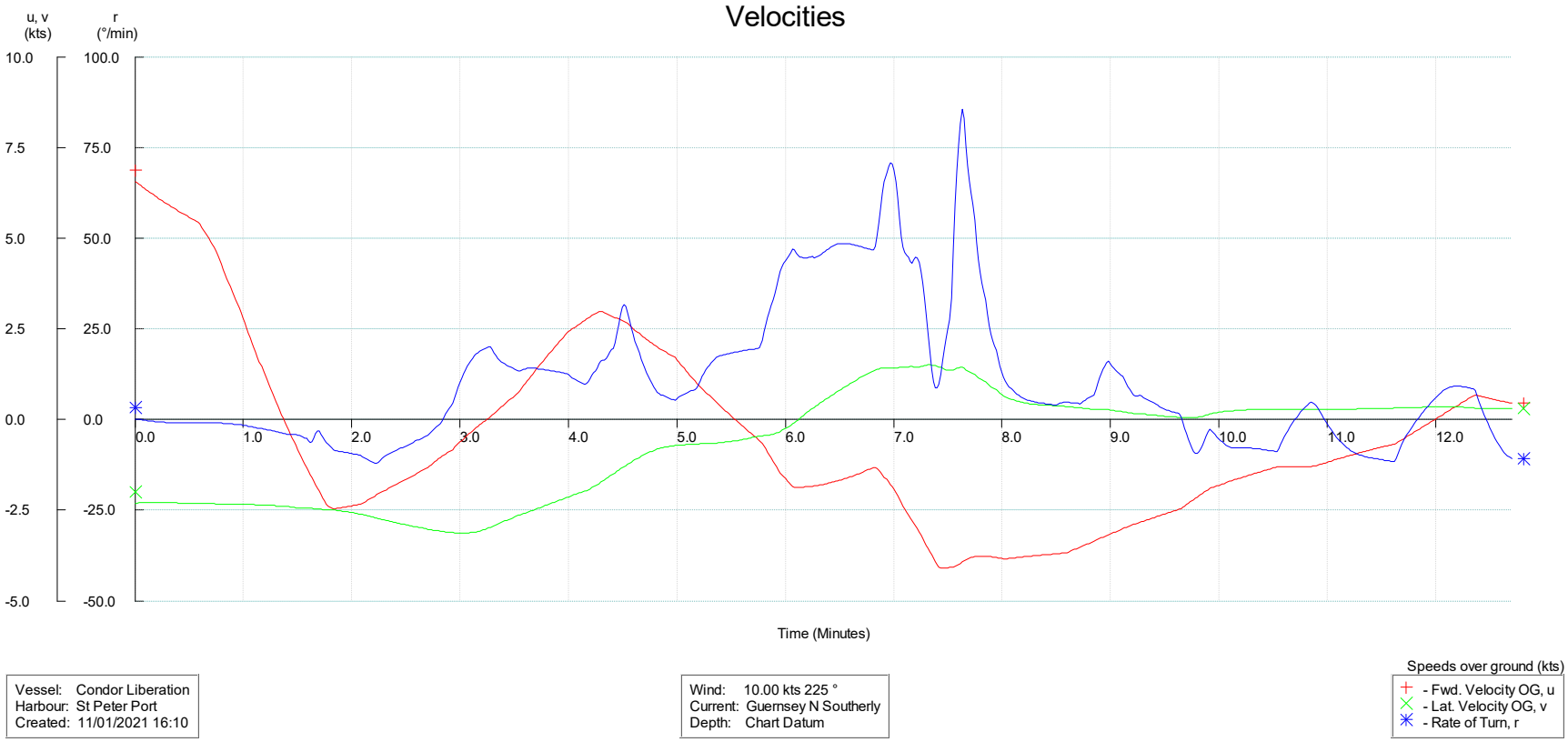
Vessel Track

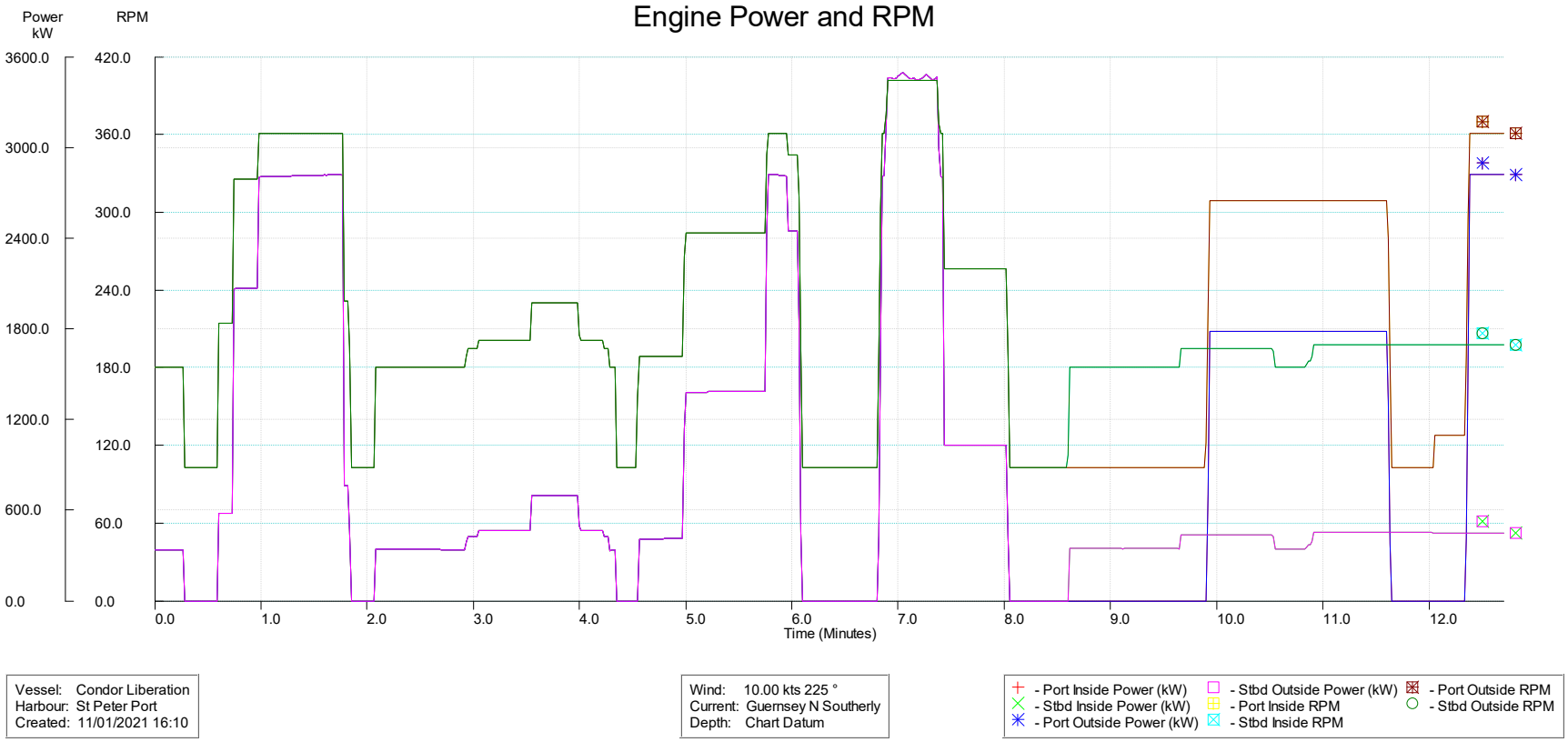


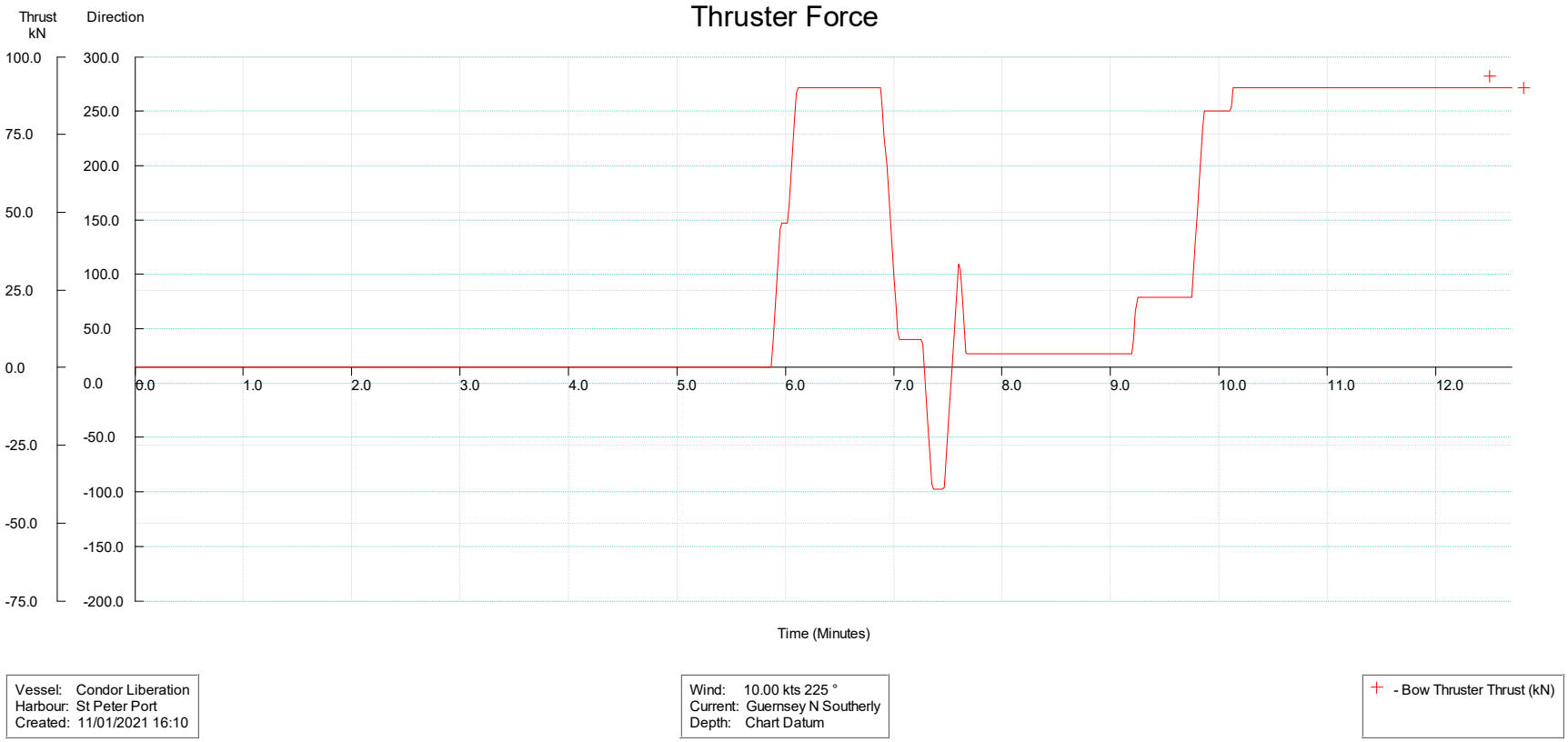
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:10

Wind: 10.00 kts 225 °
Current: Guernsey N Southerly
Depth: Chart Datum


Heading and Rudder
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:10
Wind: 10.00 kts 225 °
Current: Guernsey N Southerly
Depth: Chart Datum
- Port Inside Direction (°)
- Stbd Inside Direction (°)
- Port Outside Direction (°)
- Stbd Outside Direction (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:10
Wind: 10.00 kts 225 °
Current: Guernsey N Southerly
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
3600.0
3000.0
2400.0
1800.0
1200.0
600.0
0.0
420.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:10
Wind: 10.00 kts 225 °
Current: Guernsey N Southerly
Depth: Chart Datum
- Port Inside Power (kW)
- Stbd Inside Power (kW)
- Port Outside Power (kW)
- Stbd Outside Power (kW)
- Port Inside RPM
- Stbd Inside RPM
- Port Outside RPM
- Stbd Outside RPM


Thruster Force
Thrust kN
Direction
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:10
Wind: 10.00 kts 225 °
Current: Guernsey N Southerly
Depth: Chart Datum
- Bow Thruster Thrust (kN)

16 RUN 16:

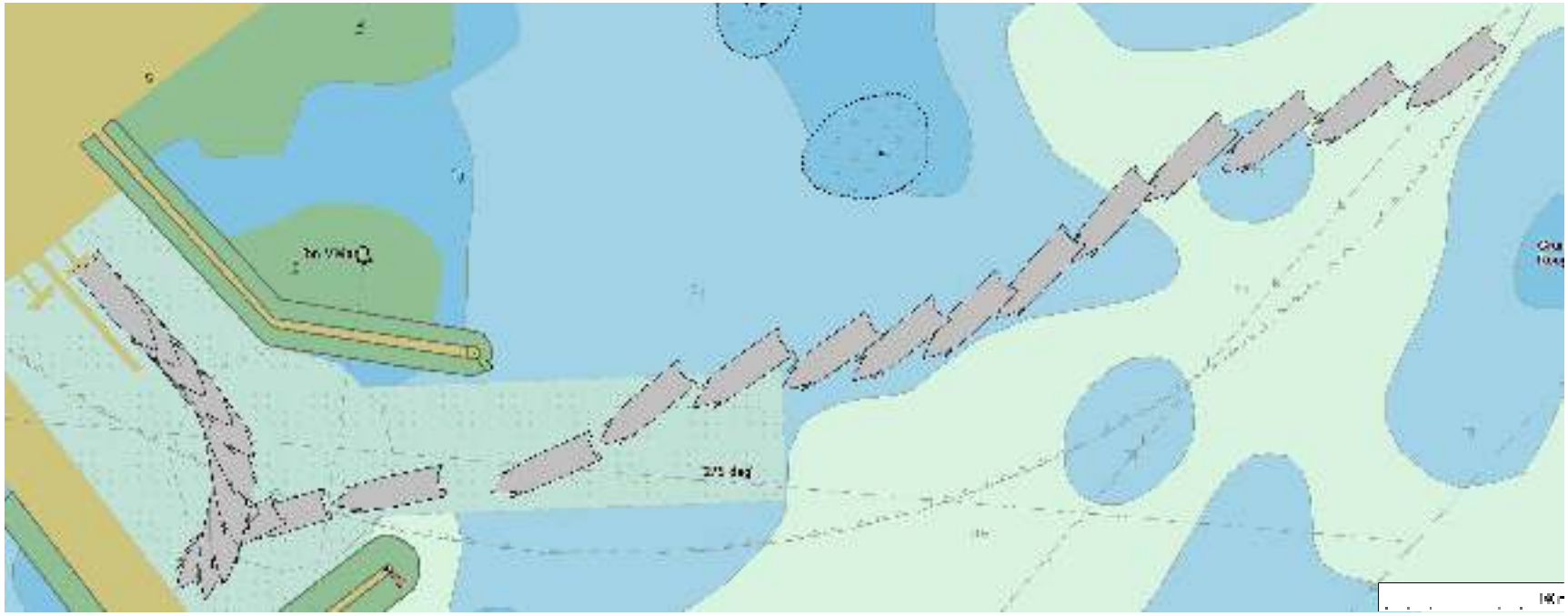
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
16	Condor Liberation	Arrival	Northern	Manual Northerly Flowing	0kt / 225°	0.3 / 2.9 / 225°

Run 16 check the northerly flowing current with a peak of 5 knots. This allowed a more straight in approach but then the difficulty came with trying to slow the ship in the limited space available.

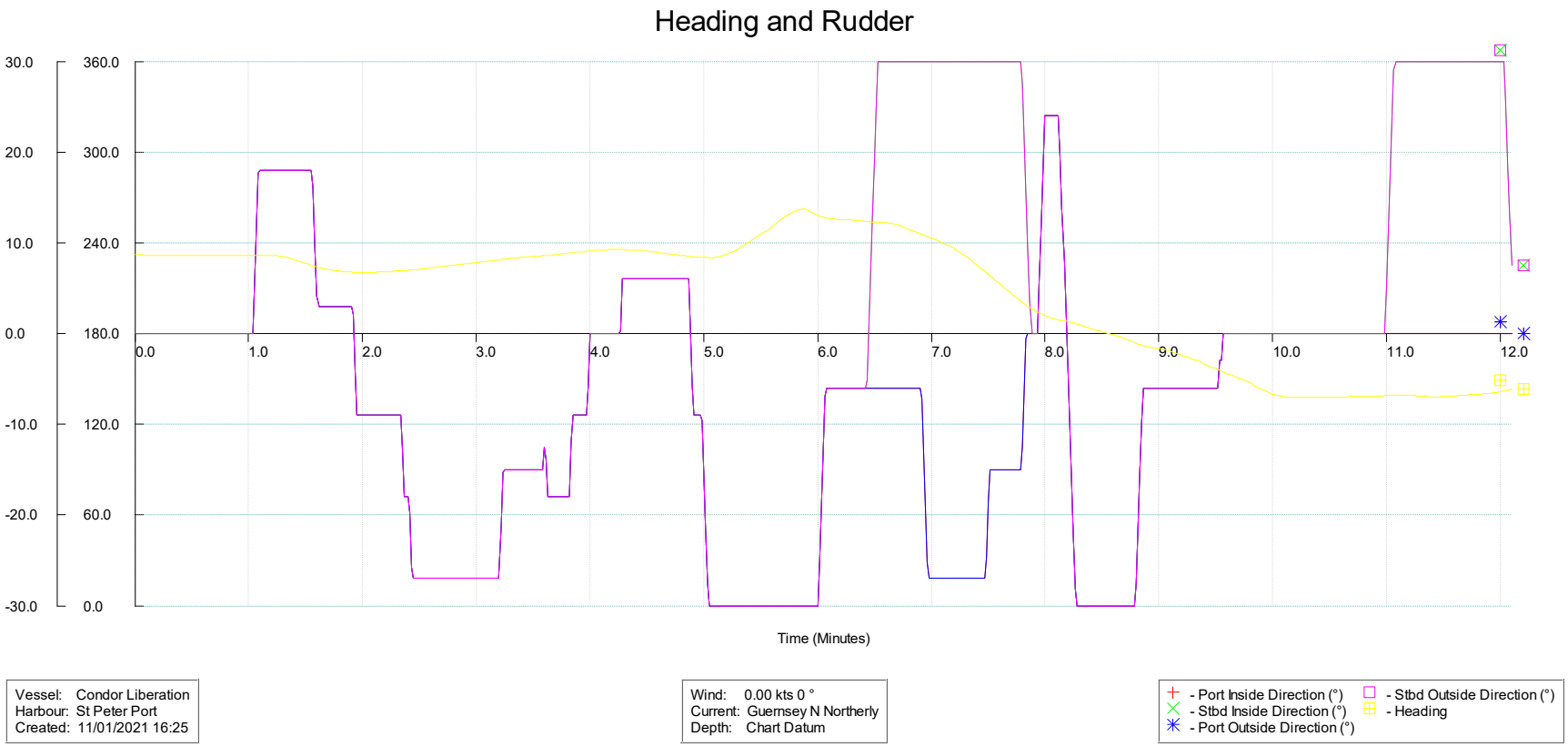
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

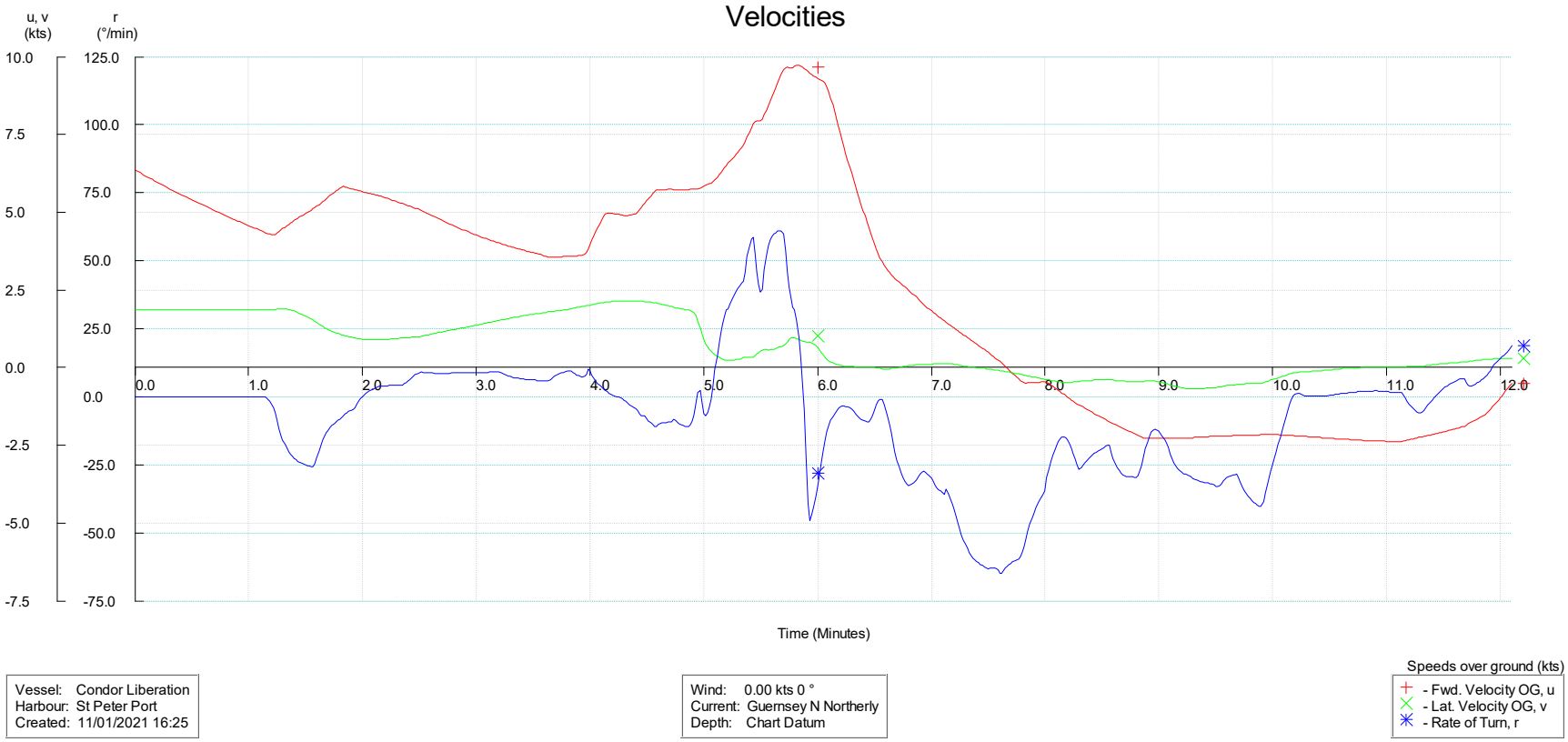
Vessel Track

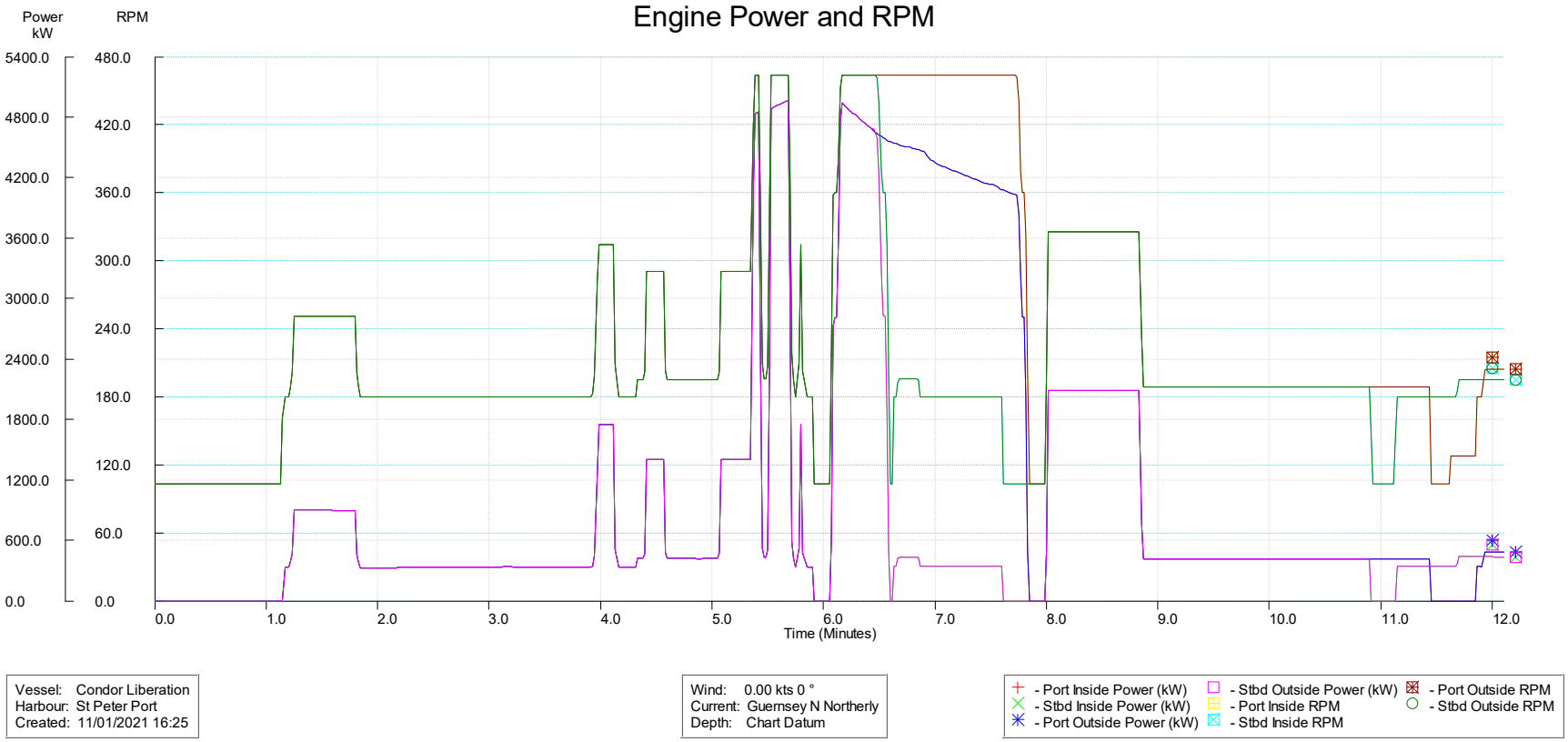


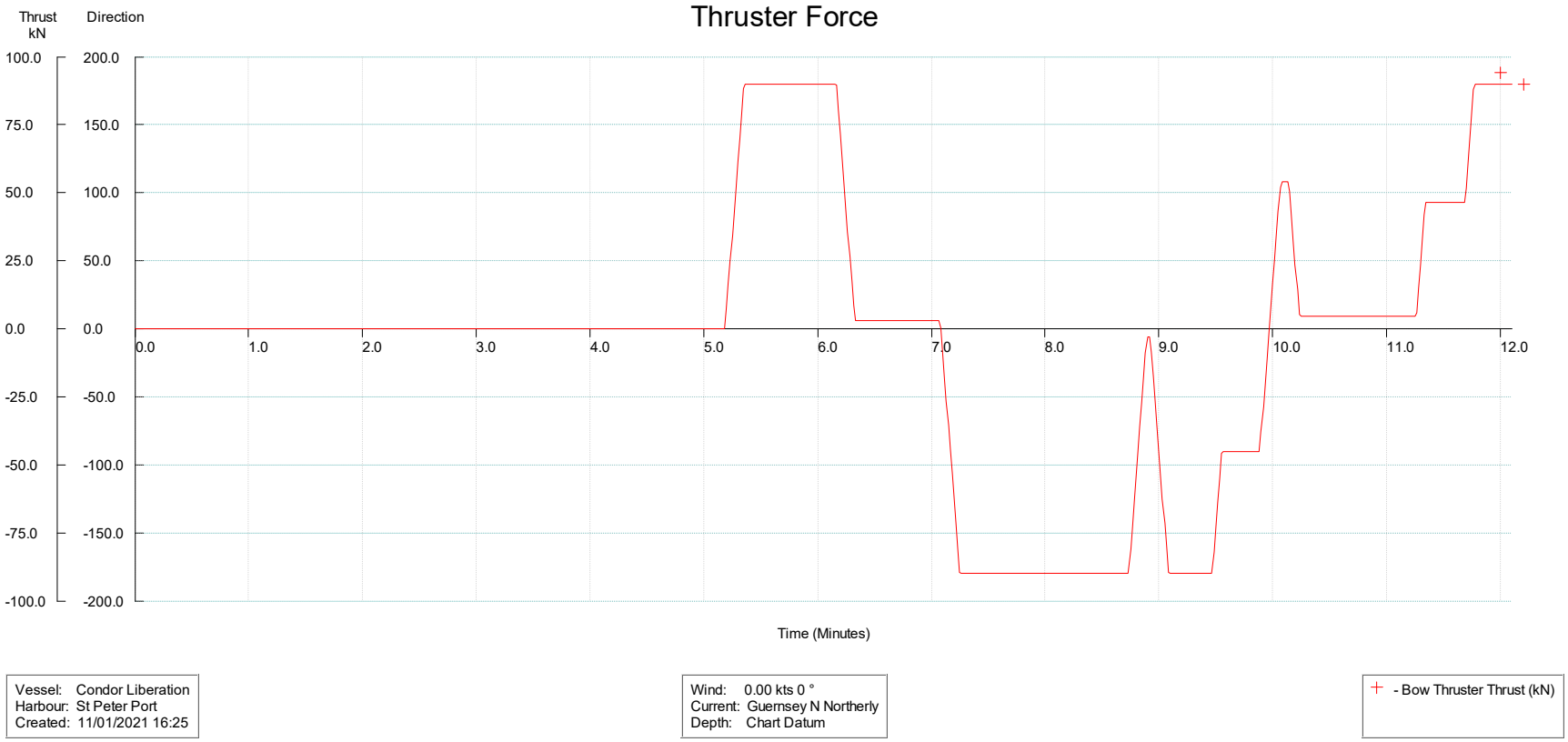
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:25

Wind: 0.00 kts 0 °
Current: Guernsey N Northerly
Depth: Chart Datum


Heading and Rudder
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:25
Wind: 0.00 kts 0 °
Current: Guernsey N Northerly
Depth: Chart Datum
- Port Inside Direction (°)
- Stbd Inside Direction (°)
- Port Outside Direction (°)
- Stbd Outside Direction (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:25
Wind: 0.00 kts 0 °
Current: Guernsey N Northerly
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5400.0
4800.0
4200.0
3600.0
3000.0
2400.0
1800.0
1200.0
600.0
0.0
480.0
420.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:25
Wind: 0.00 kts 0 °
Current: Guernsey N Northerly
Depth: Chart Datum
- Port Inside Power (kW)
- Stbd Inside Power (kW)
- Port Outside Power (kW)
- Stbd Outside Power (kW)
- Port Inside RPM
- Stbd Inside RPM
- Port Outside RPM
- Stbd Outside RPM


Thruster Force
Thrust kN
Direction
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:25
Wind: 0.00 kts 0 °
Current: Guernsey N Northerly
Depth: Chart Datum
- Bow Thruster Thrust (kN)

17 RUN 17:

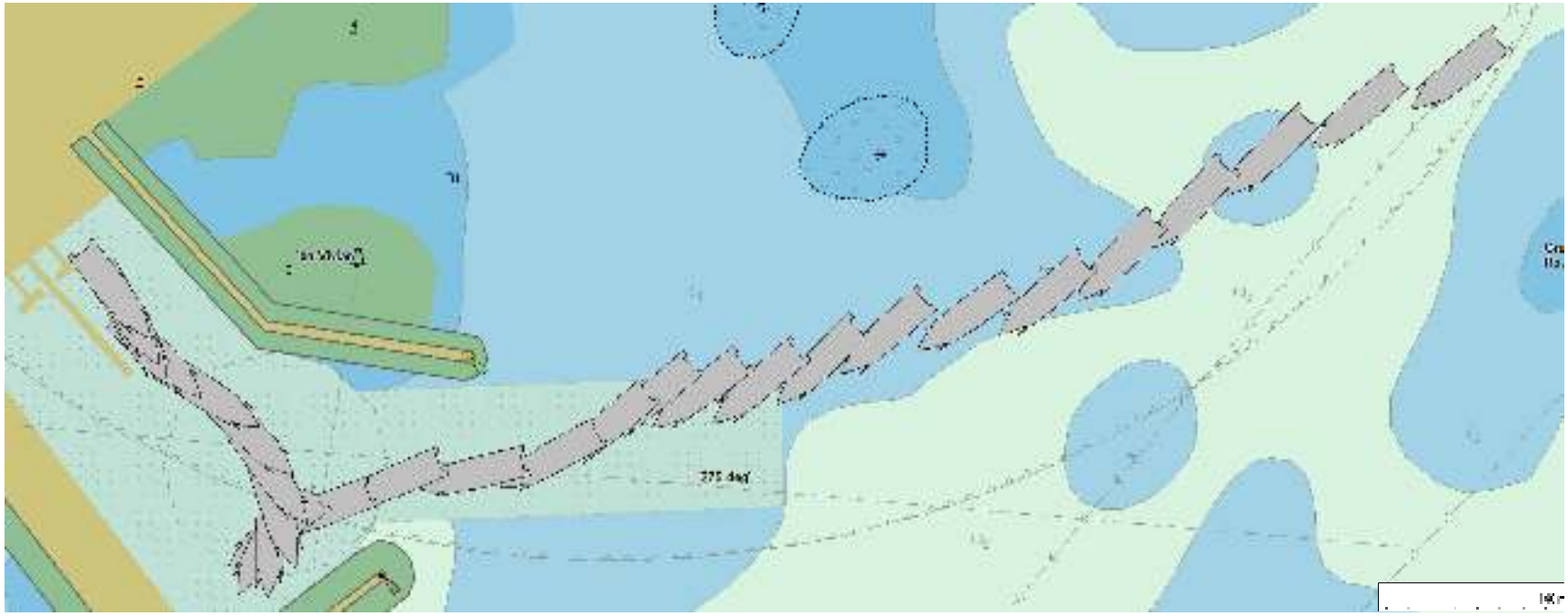
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
17	Condor Liberation	Arrival	Northern	Manual North Flowing	20kt / 225°	0.3 / 2.9 / 225°

Run 17 followed on from 16 by increasing the wind to 20 knots from the south west. The wind from this direction actually aided the pilot in slowing the vessel as he passed out of the area of strong current into the more sheltered harbour, however the run was still rated as Not Easy.

Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

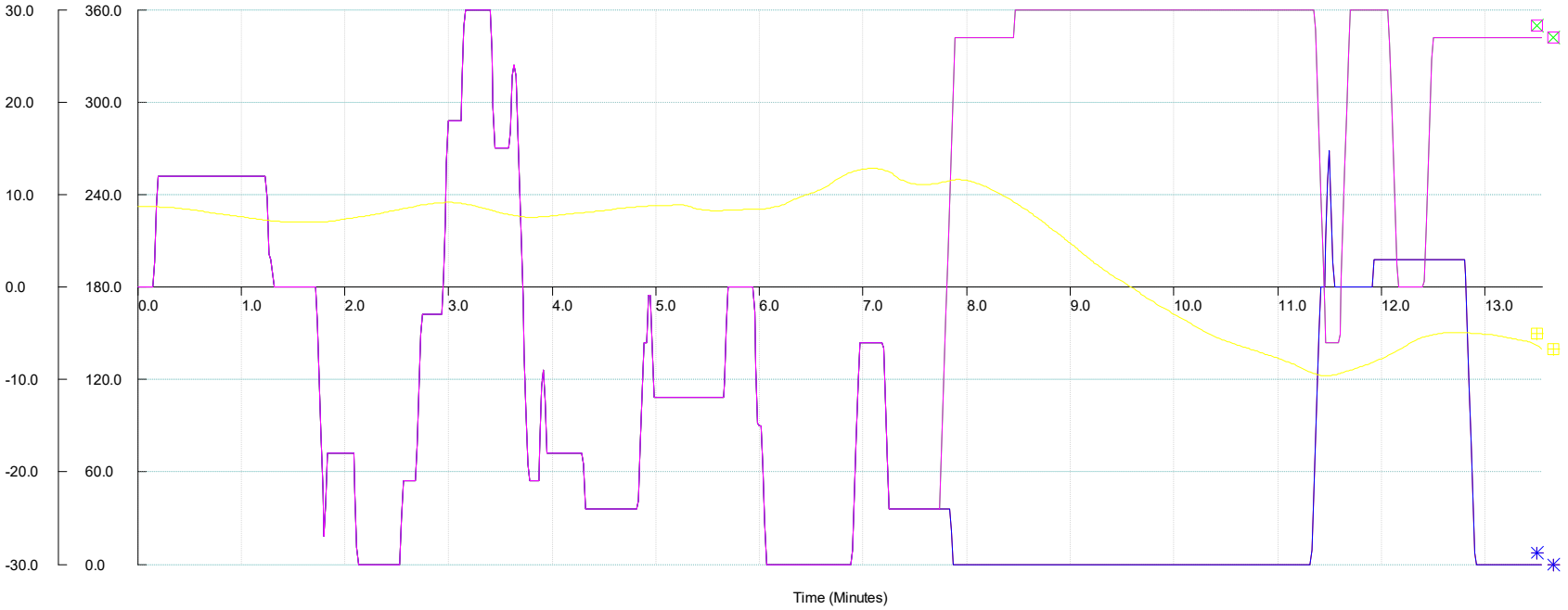
Vessel Track



Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:40

Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Chart Datum

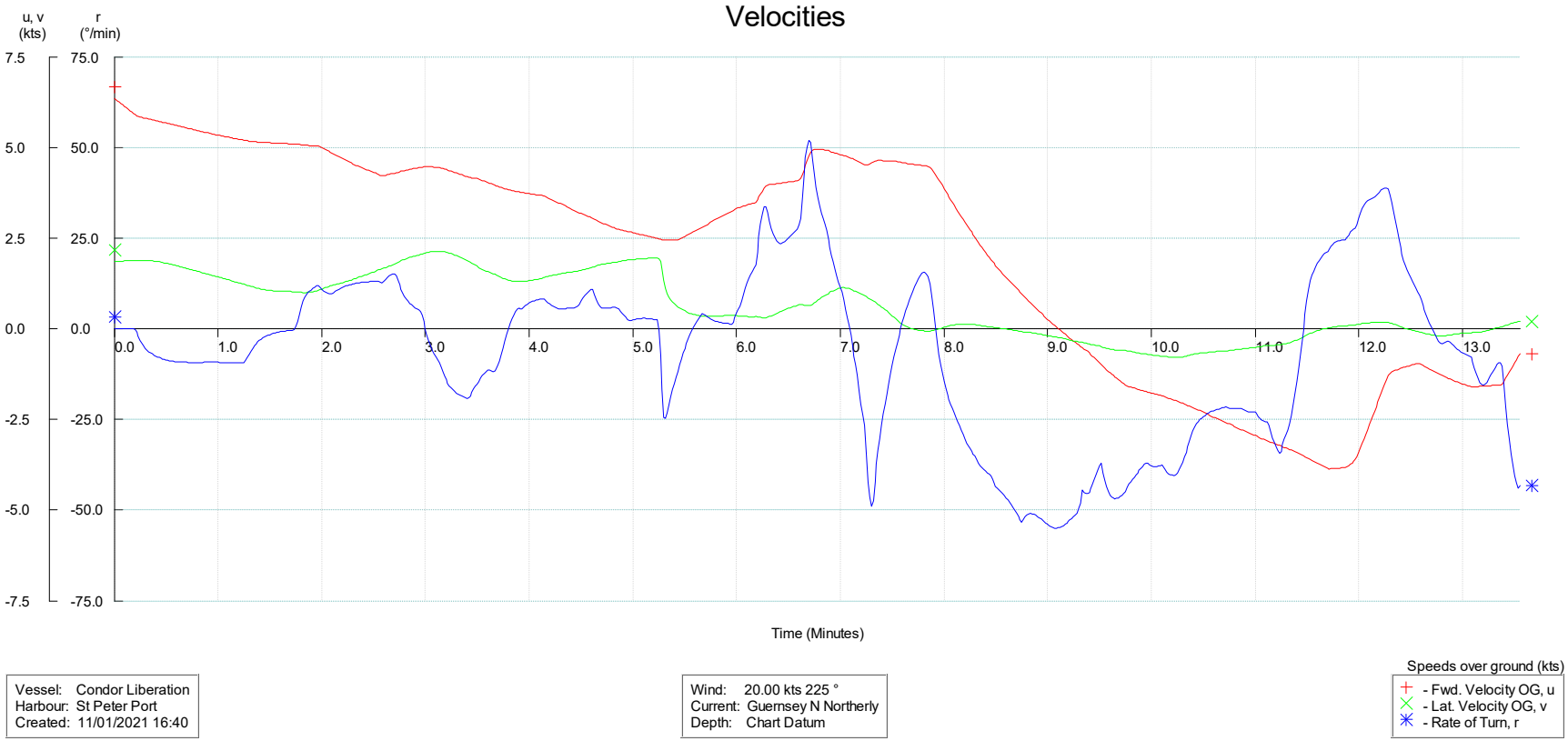
Heading and Rudder

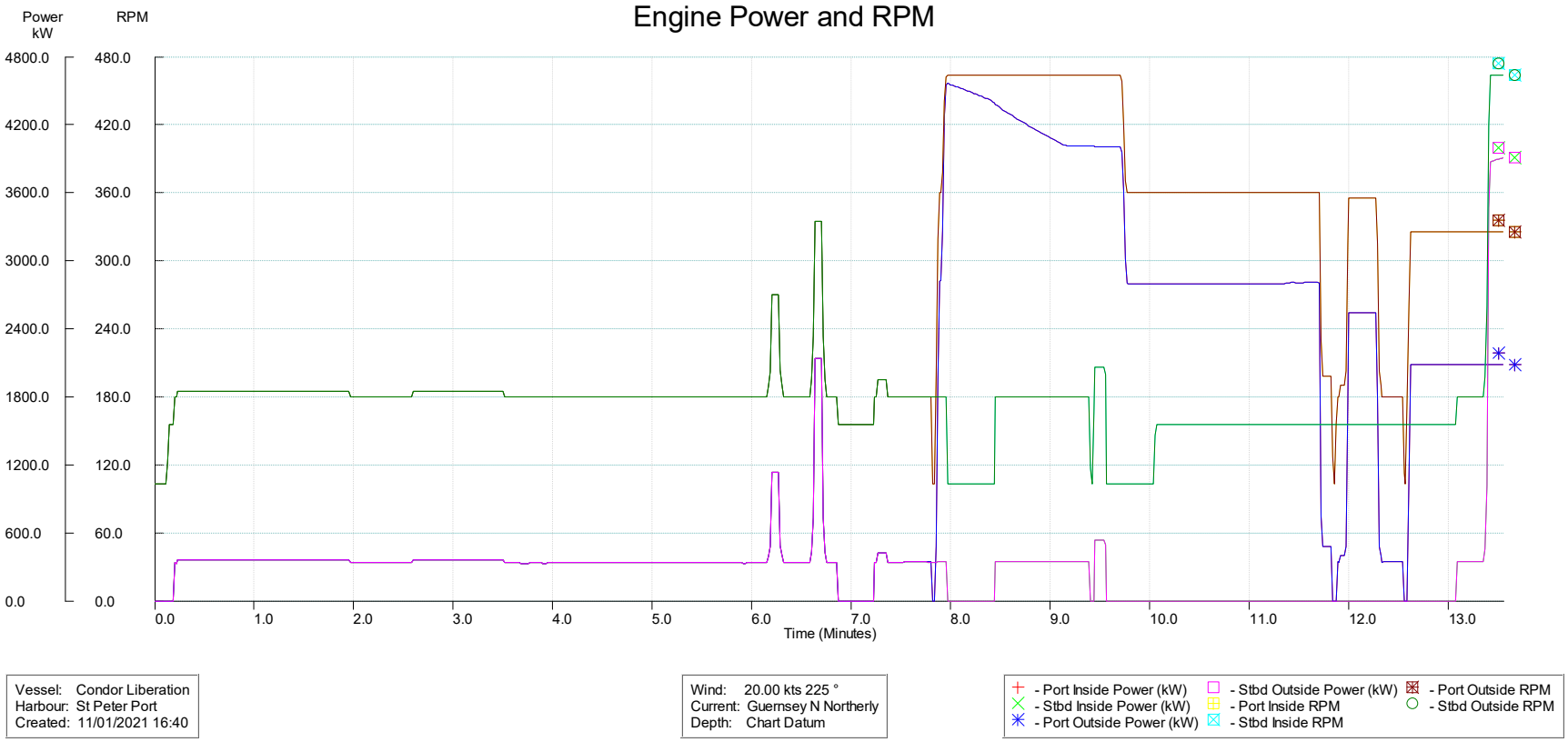


Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:40

Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Chart Datum

- Port Inside Direction (°)
- Stbd Inside Direction (°)
- Port Outside Direction (°)
- Stbd Outside Direction (°)
- Heading


Velocities
u, v (kts)
r (°/min)
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:40
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
4800.0
4200.0
3600.0
3000.0
2400.0
1800.0
1200.0
600.0
0.0
480.0
420.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:40
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Chart Datum
- Port Inside Power (kW)
- Stbd Inside Power (kW)
- Port Outside Power (kW)
- Stbd Outside Power (kW)
- Port Inside RPM
- Stbd Inside RPM
- Port Outside RPM
- Stbd Outside RPM


Thruster Force
Thrust kN
Direction
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Condor Liberation
Harbour: St Peter Port
Created: 11/01/2021 16:40
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Chart Datum
- Bow Thruster Thrust (kN)

18 RUN 18:

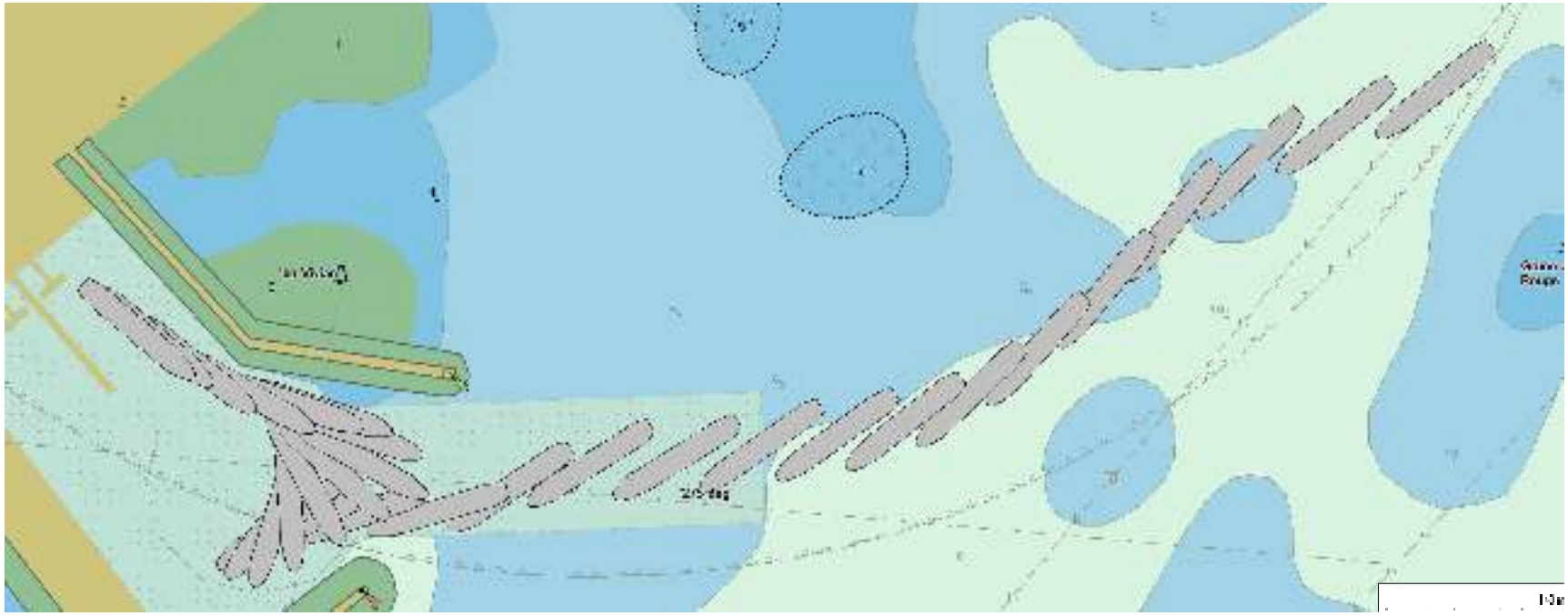
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
18	RoRo14	Arrival	Northern	Manual North Flowing	20kt / 225°	0.9 / 4.6 / 225°

For Run 18 the RoRo ferry was used with a north flowing current and the 20 knot SW wind. This model had similar issues the Condor Liberation in terms of maintaining enough speed to cross the current at the breakwaters whilst still being able to stop in time once inside the harbour.

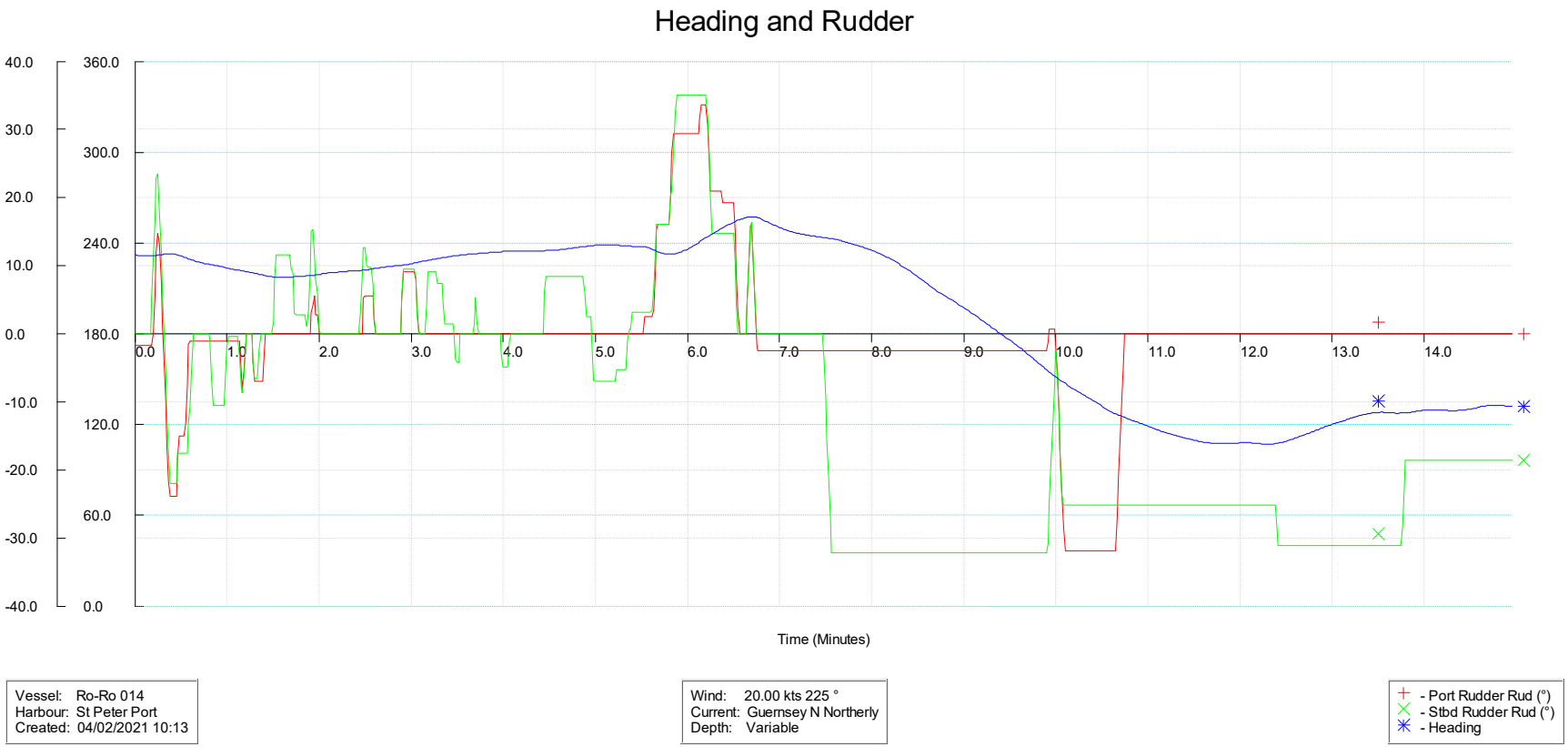
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

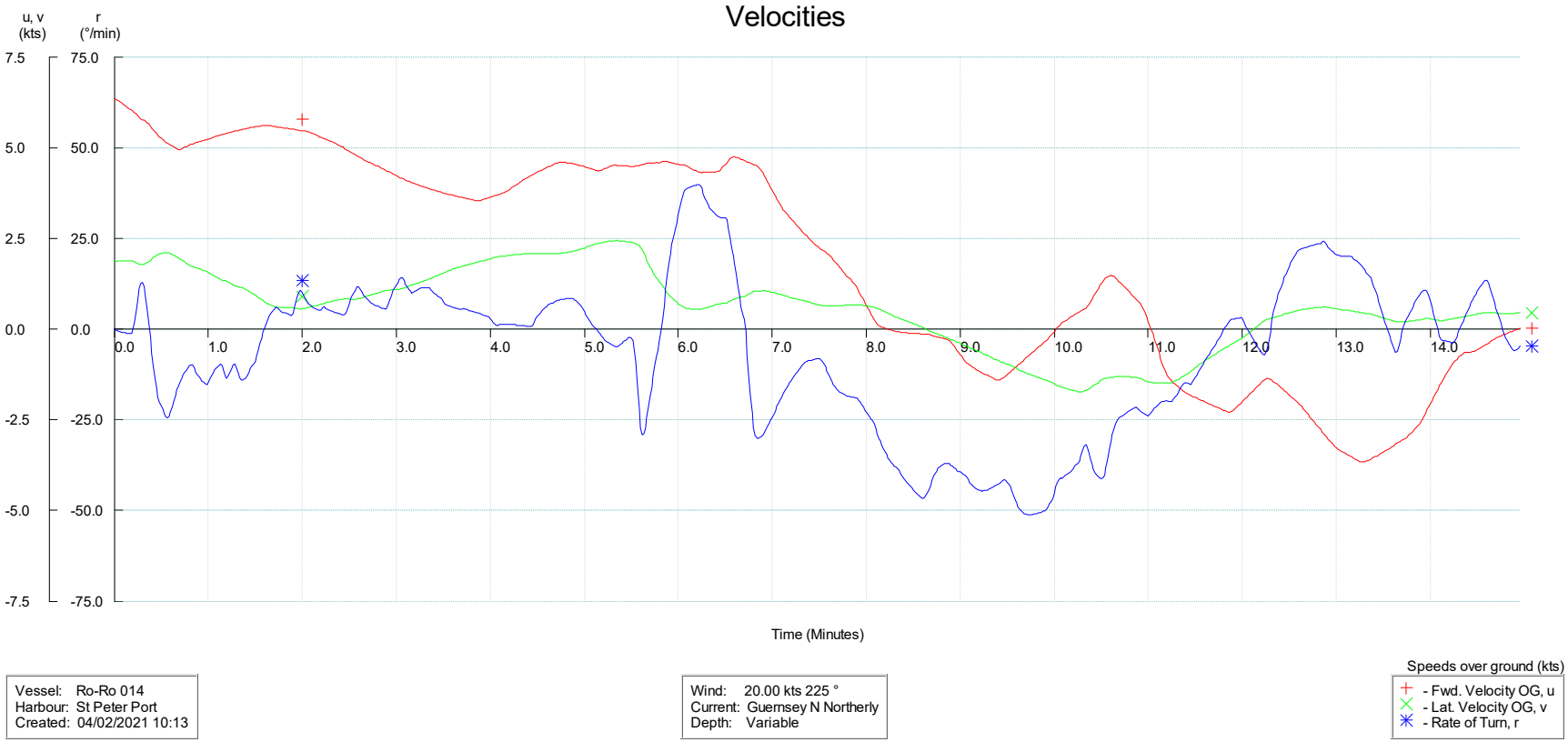
Vessel Track

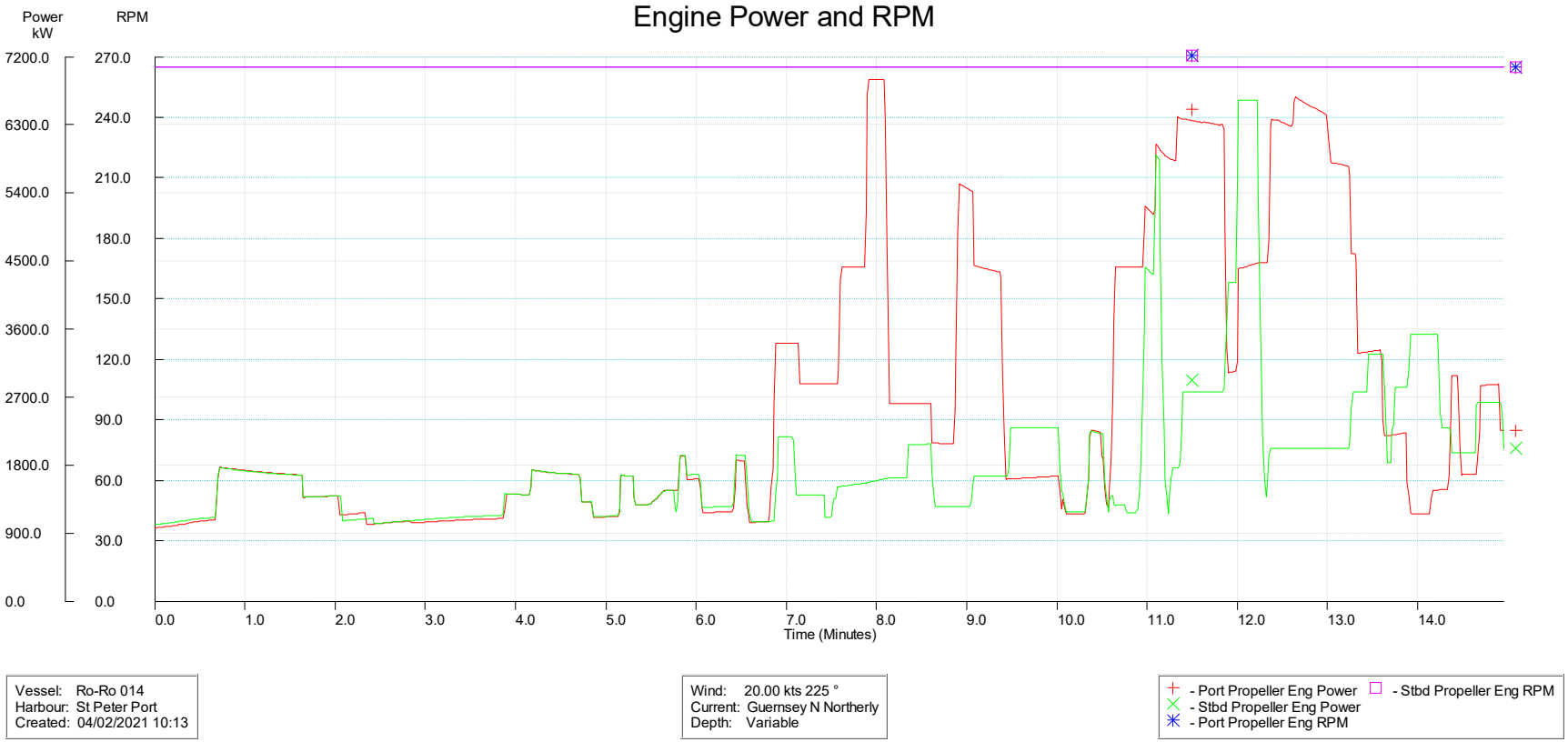


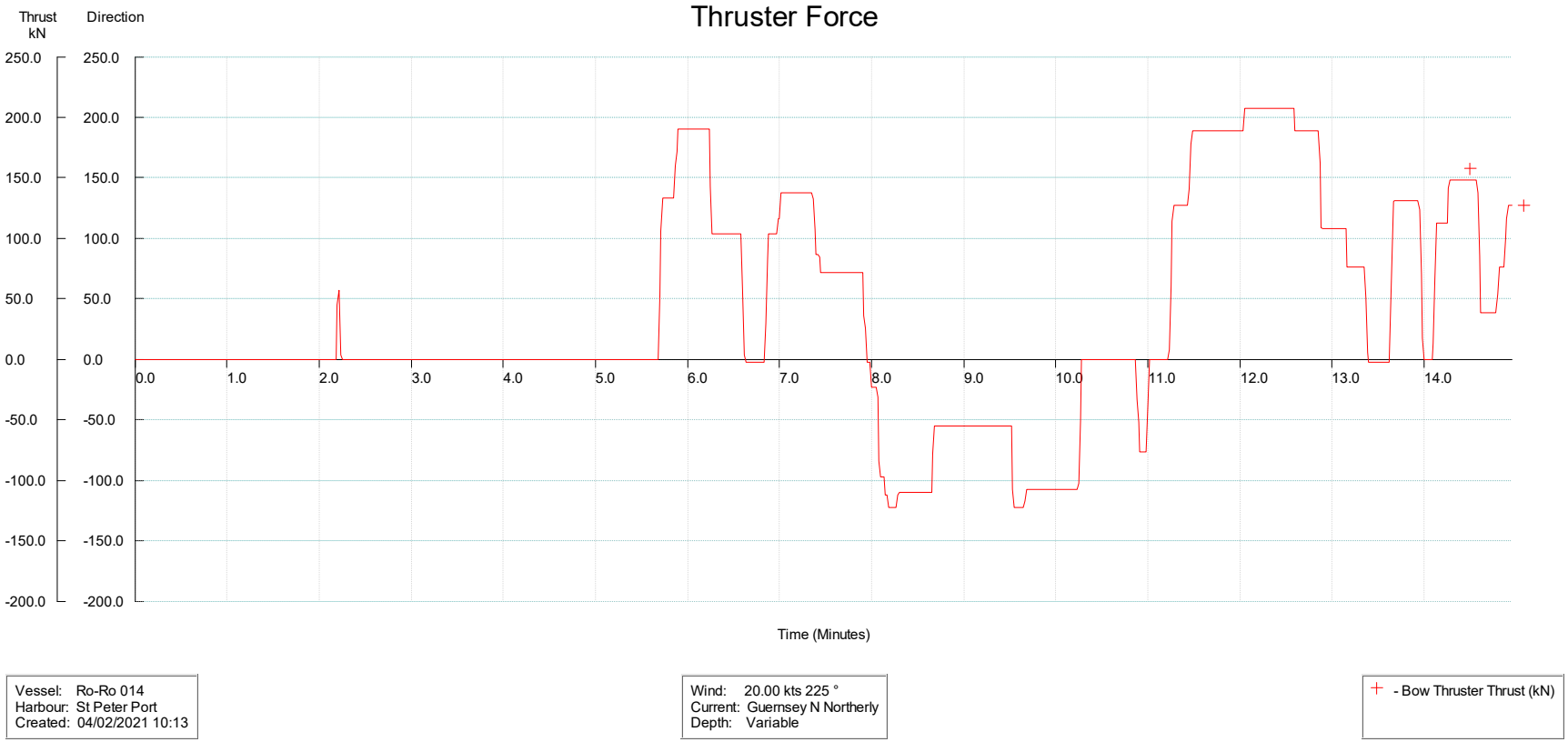
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:13

Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Variable


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:13
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Variable
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:13
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Variable
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:13
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Variable
- Port Propeller Eng Power
- Stbd Propeller Eng Power
- Port Propeller Eng RPM
- Stbd Propeller Eng RPM


Thruster Force
Thrust kN
Direction
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:13
Wind: 20.00 kts 225 °
Current: Guernsey N Northerly
Depth: Variable
- Bow Thruster Thrust (kN)

19 RUN 19:

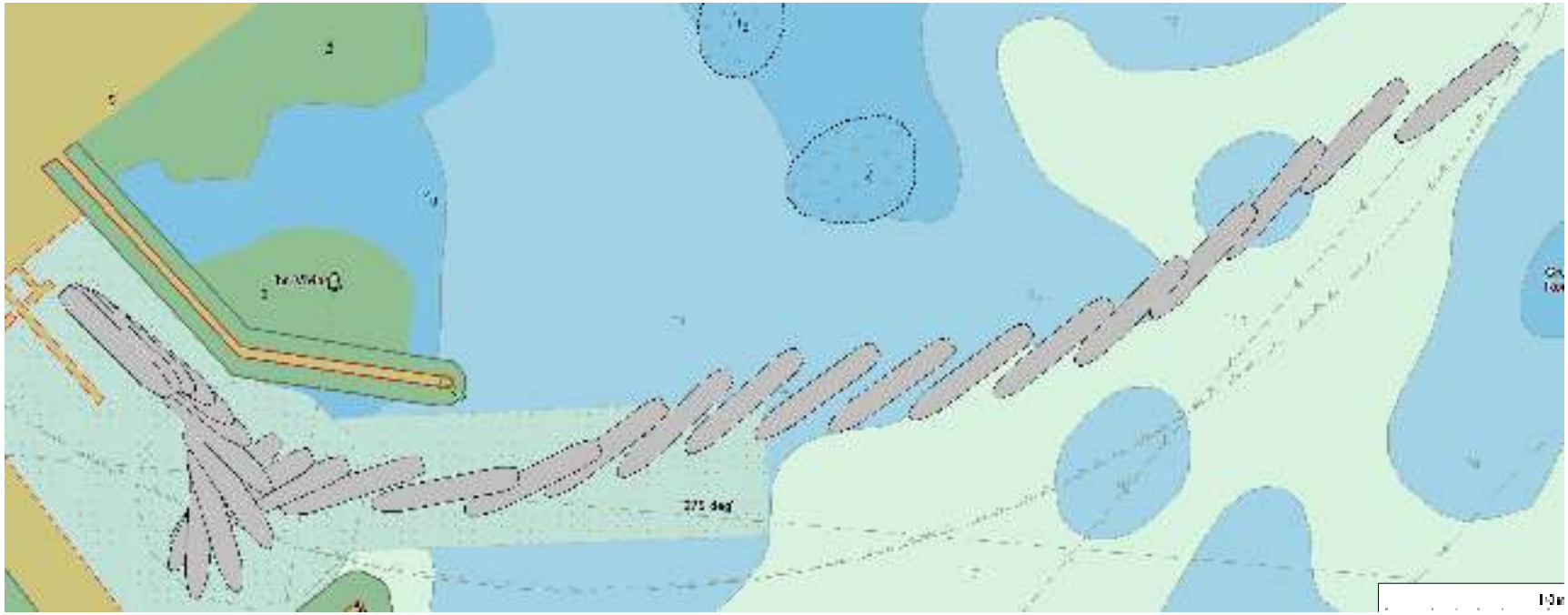
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
19	RoRo14	Arrival	Northern	Manual North Flowing	30kt / 225°	0.9 / 4.6 / 225°

A repeat of Run 18 but with the wind increased to 30 knots. The pilot was able to berth the ship with some difficulty. It was observed that moving the berthing ramps would make the harbour far more usable. One ramp in the south west corner and one ramp in the north east corner would allow more swinging room and make the ramps easier to align the ship to in the prevailing conditions.

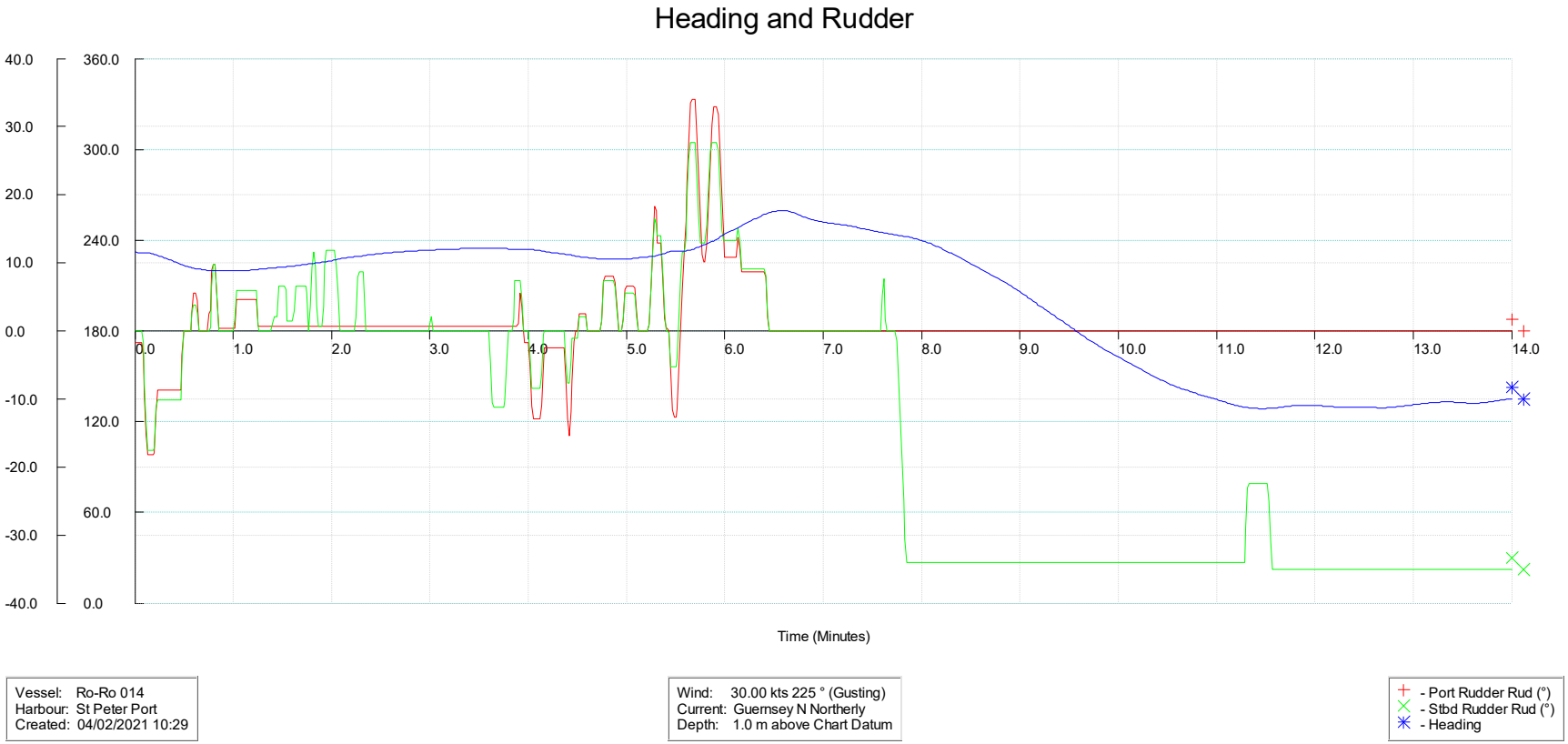
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

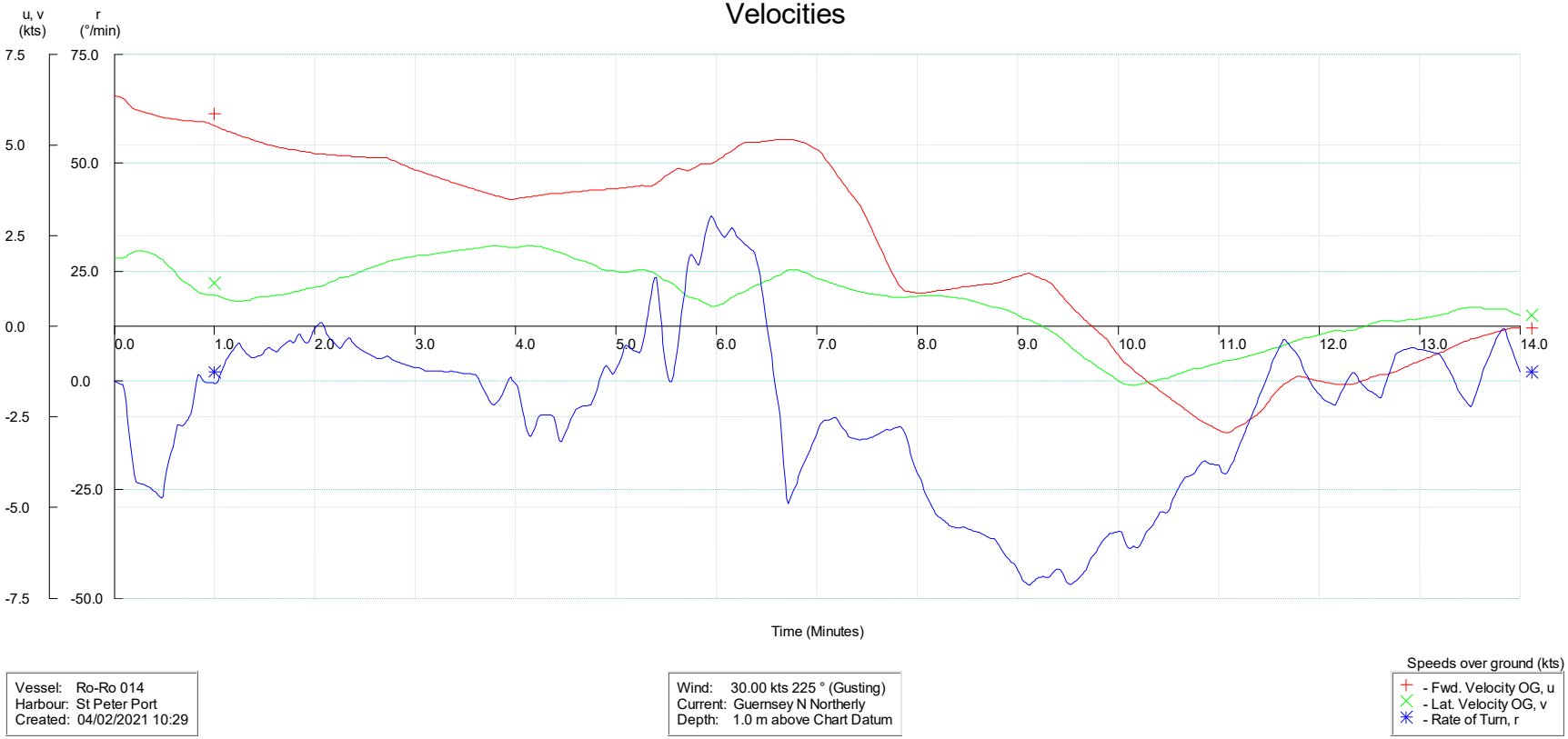
Vessel Track

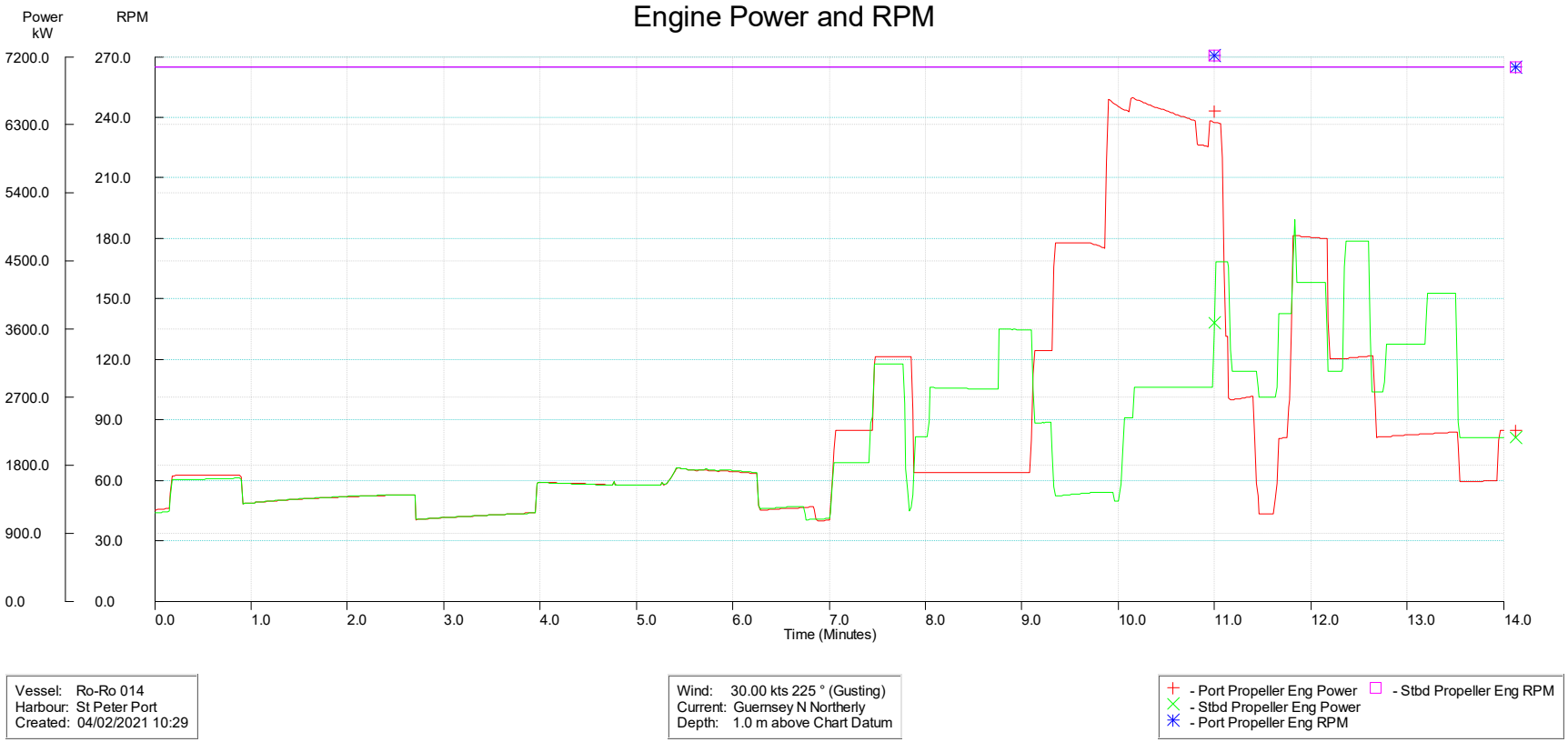


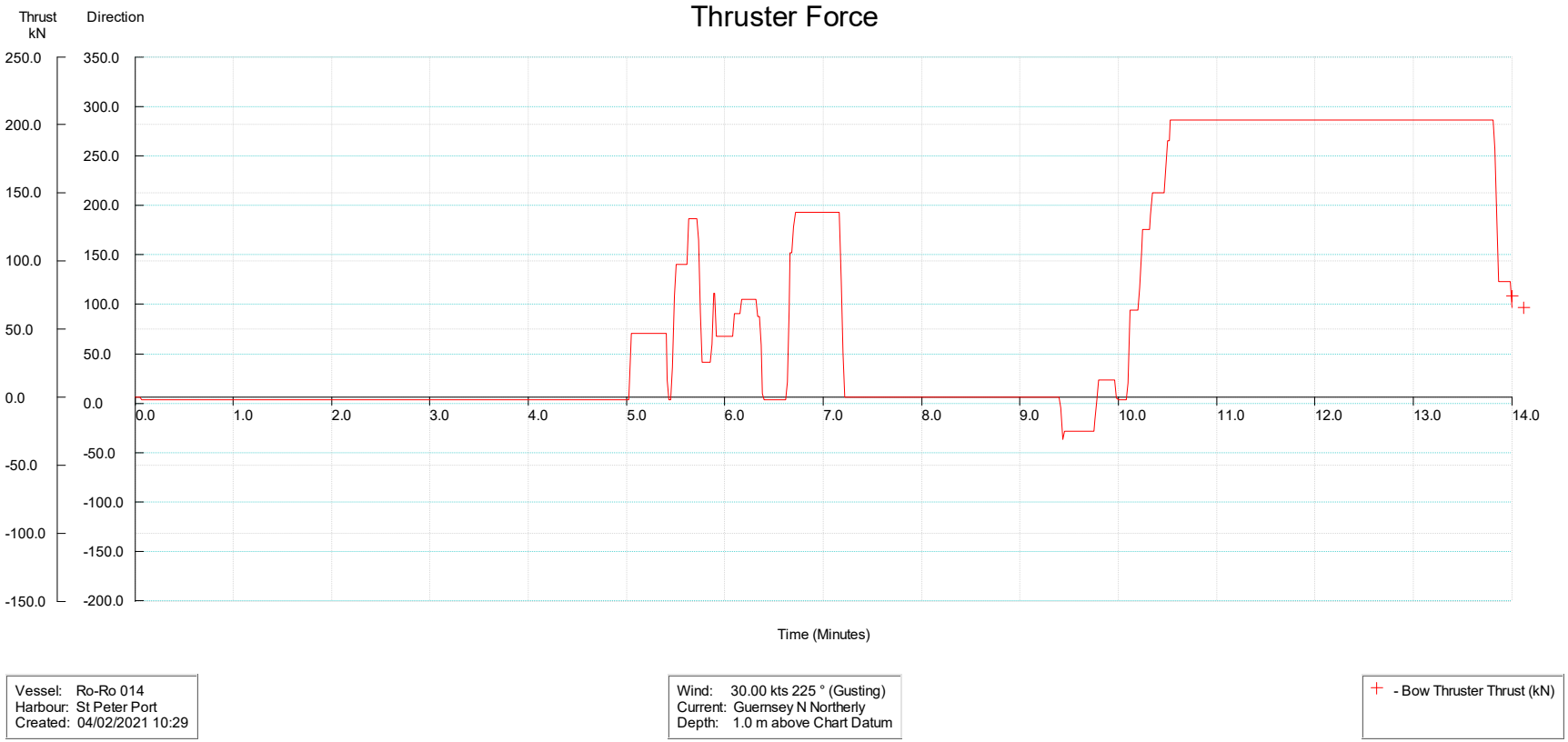
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:29

Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:29
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 1.0 m above Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:29
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:29
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM


Thruster Force
Thrust kN
Direction
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:29
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

20 RUN 20:

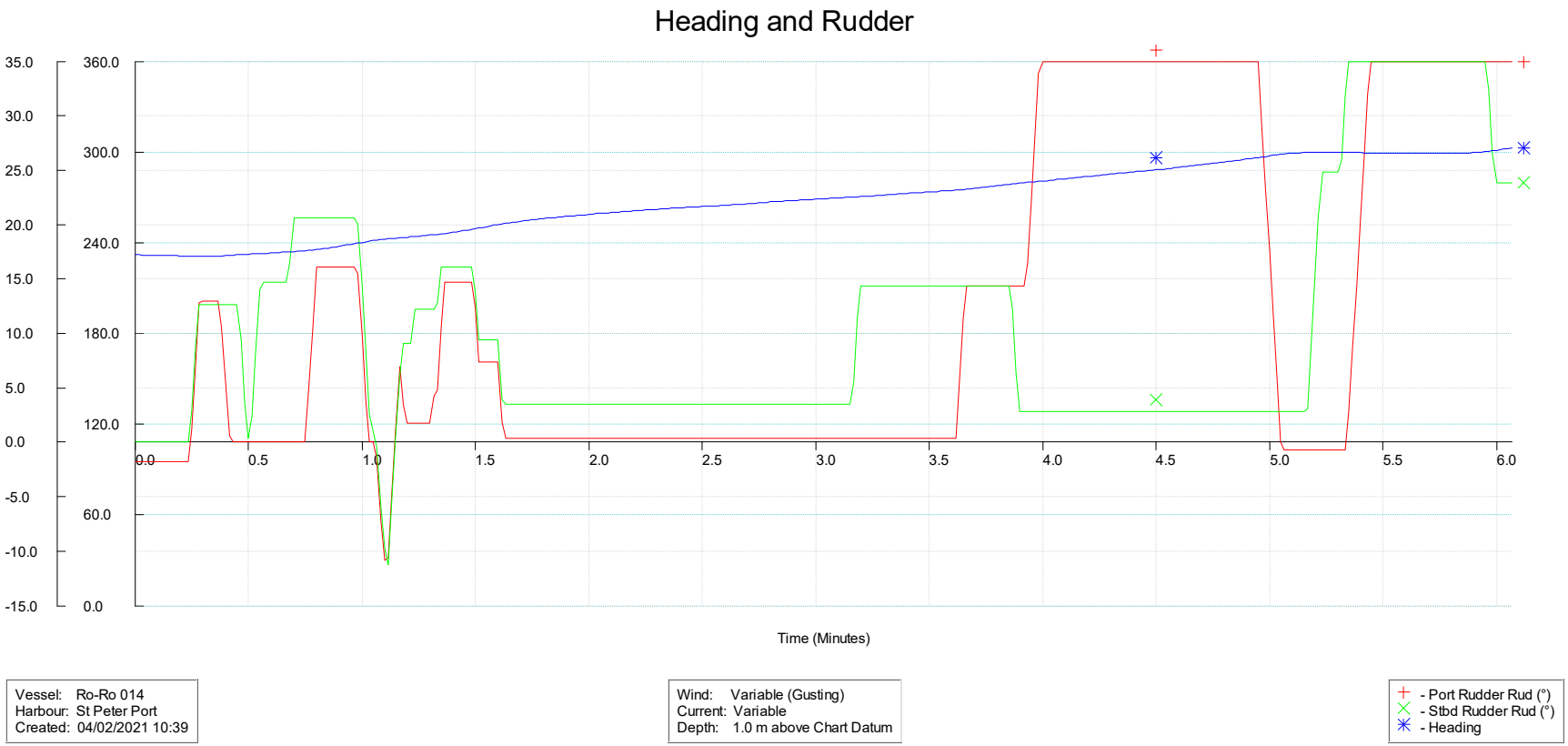
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

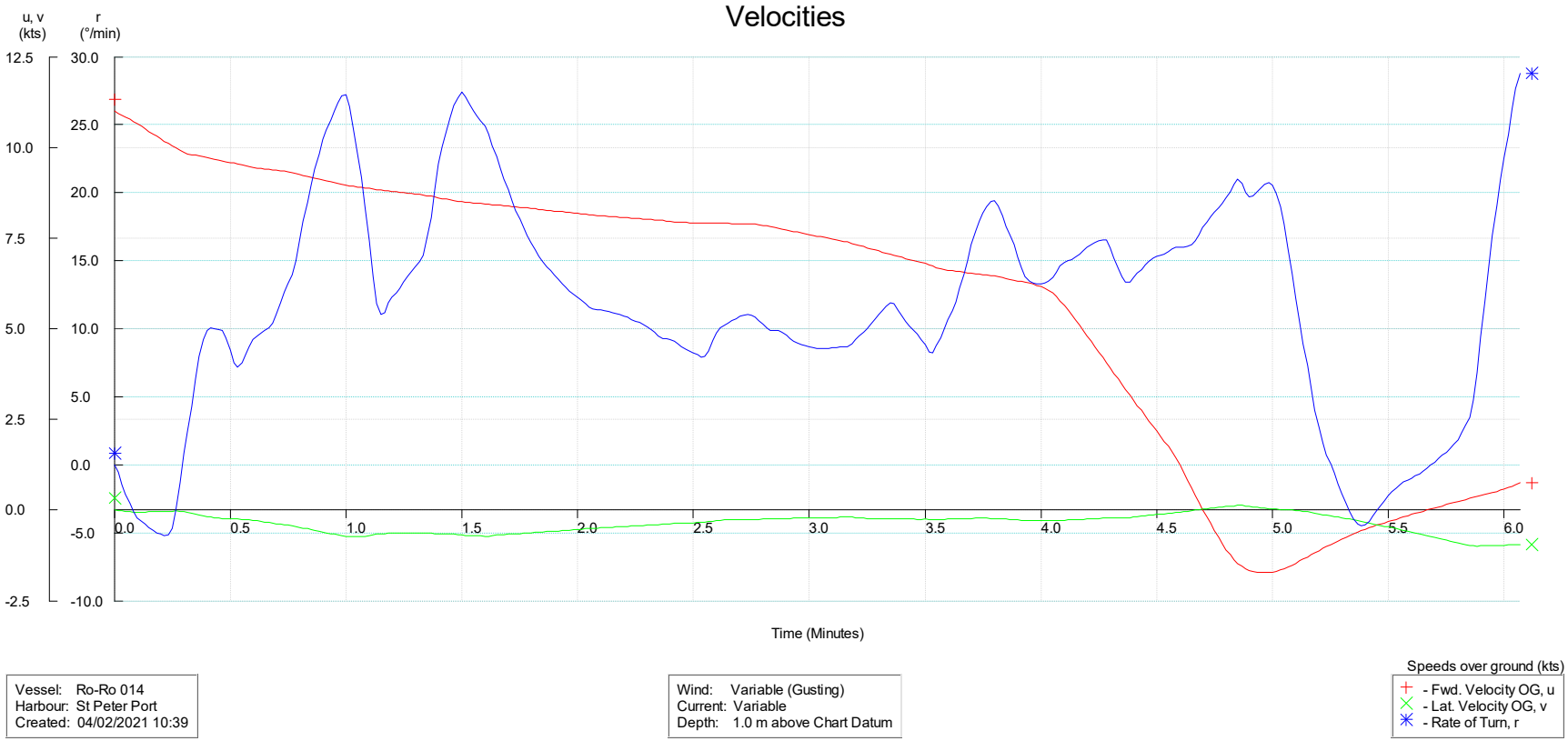
Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
20	RoRo14	Arrival	Northern	Haskoning North Flowing	20kt / 225°	0.9 / 4.6 / 225°

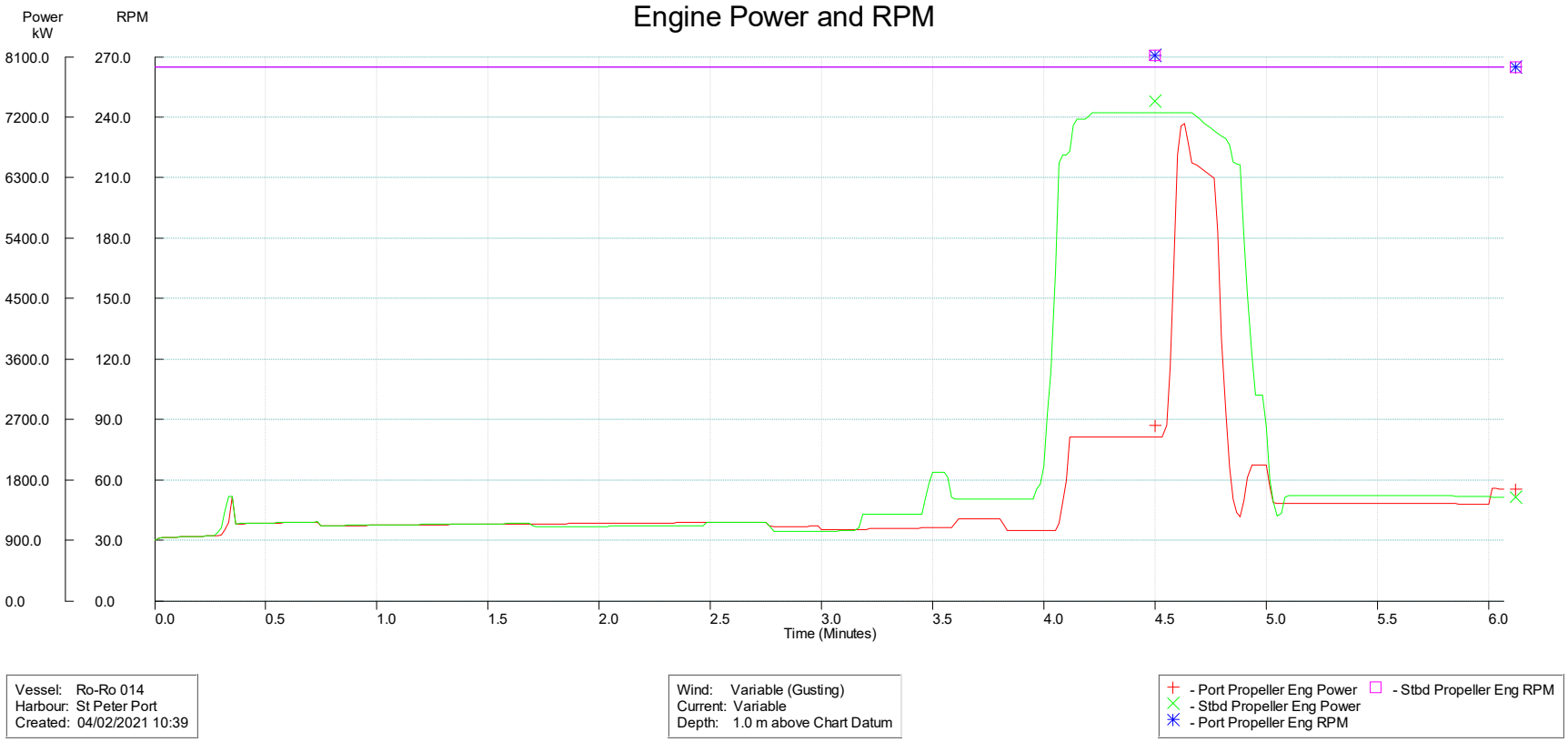
Run 20 used the Haskoning-produced south-flowing currents. This model did not take account of the breakwaters so had limited realism once the ship was inside the harbour. The relatively low speed of the currents allowed the ship to be brought into the harbour with comparative ease.

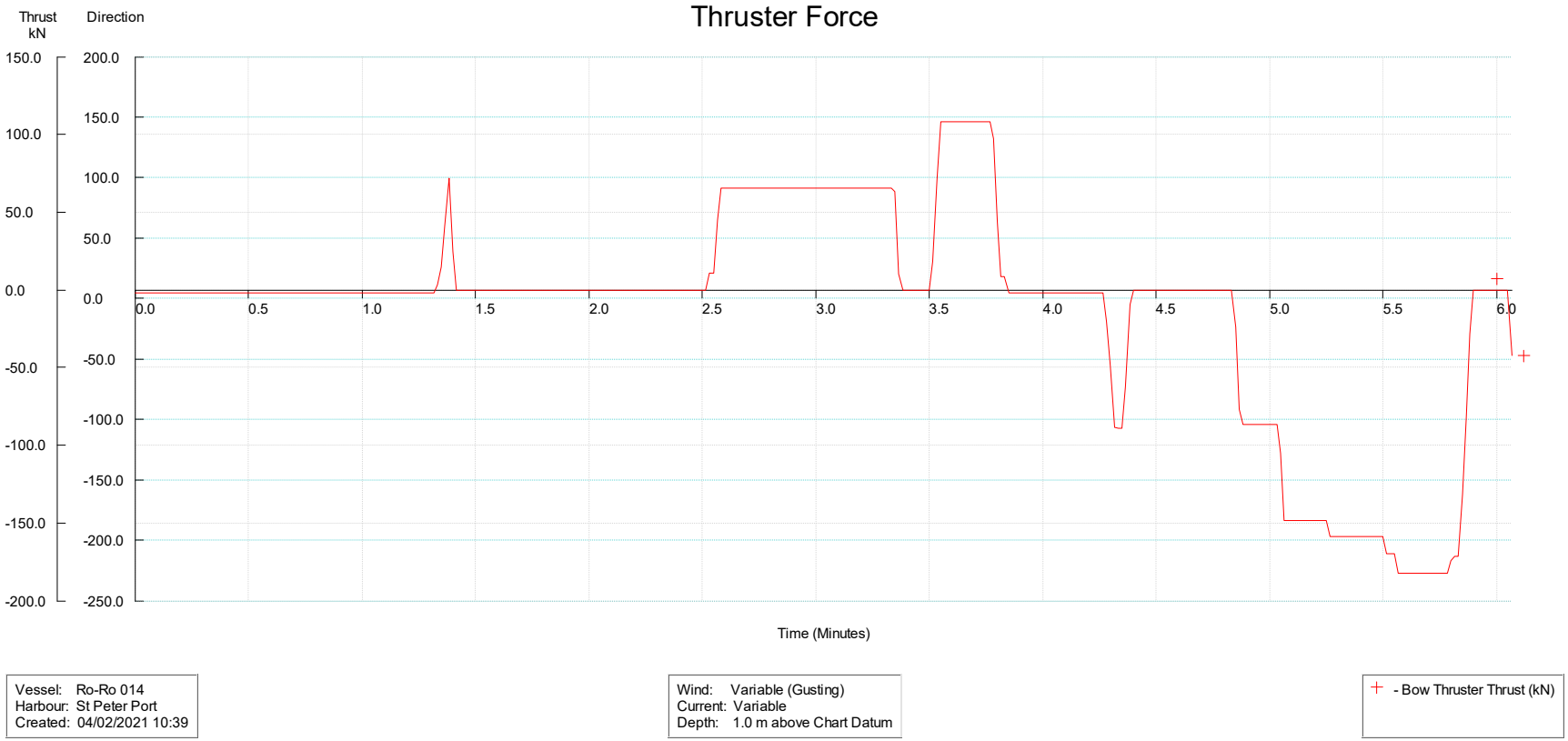
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

Vessel Track


Heading and Rudder
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:39
Wind: Variable (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:39
Wind: Variable (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
8100.0
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:39
Wind: Variable (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng Power
- Port Propeller Eng RPM
- Stbd Propeller Eng RPM


Thruster Force
Thrust kN
Direction
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 10:39
Wind: Variable (Gusting)
Current: Variable
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

21 RUN 21:

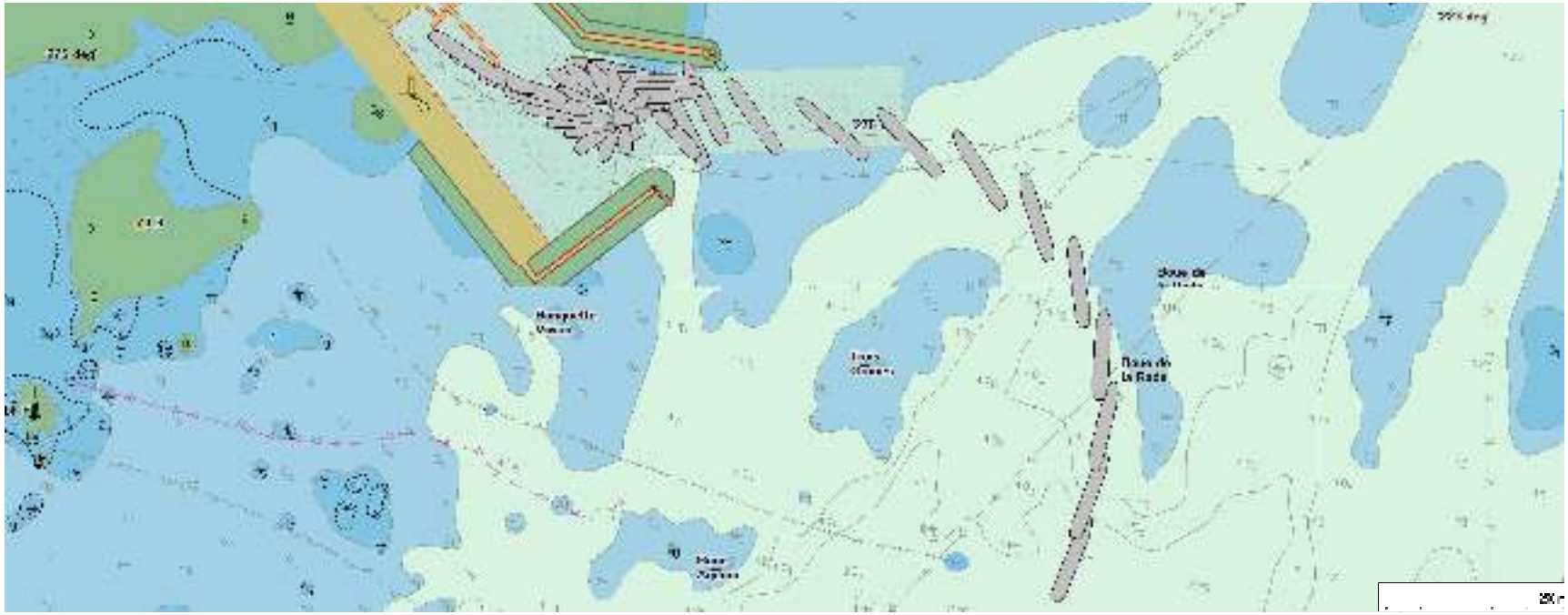
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
21	RoRo14	Arrival	Northern	Manual South Flowing	20kt / 225°	0.3 / 2.9 / 225°

Run 21 was used to investigate a stronger, 5 knot southerly current in combination with a 20 know SW wind. The manual currents were reduced to zero in the harbour area but with a strong shear across the breakwater mouths. In these conditions it proved possible to berth but not easy.

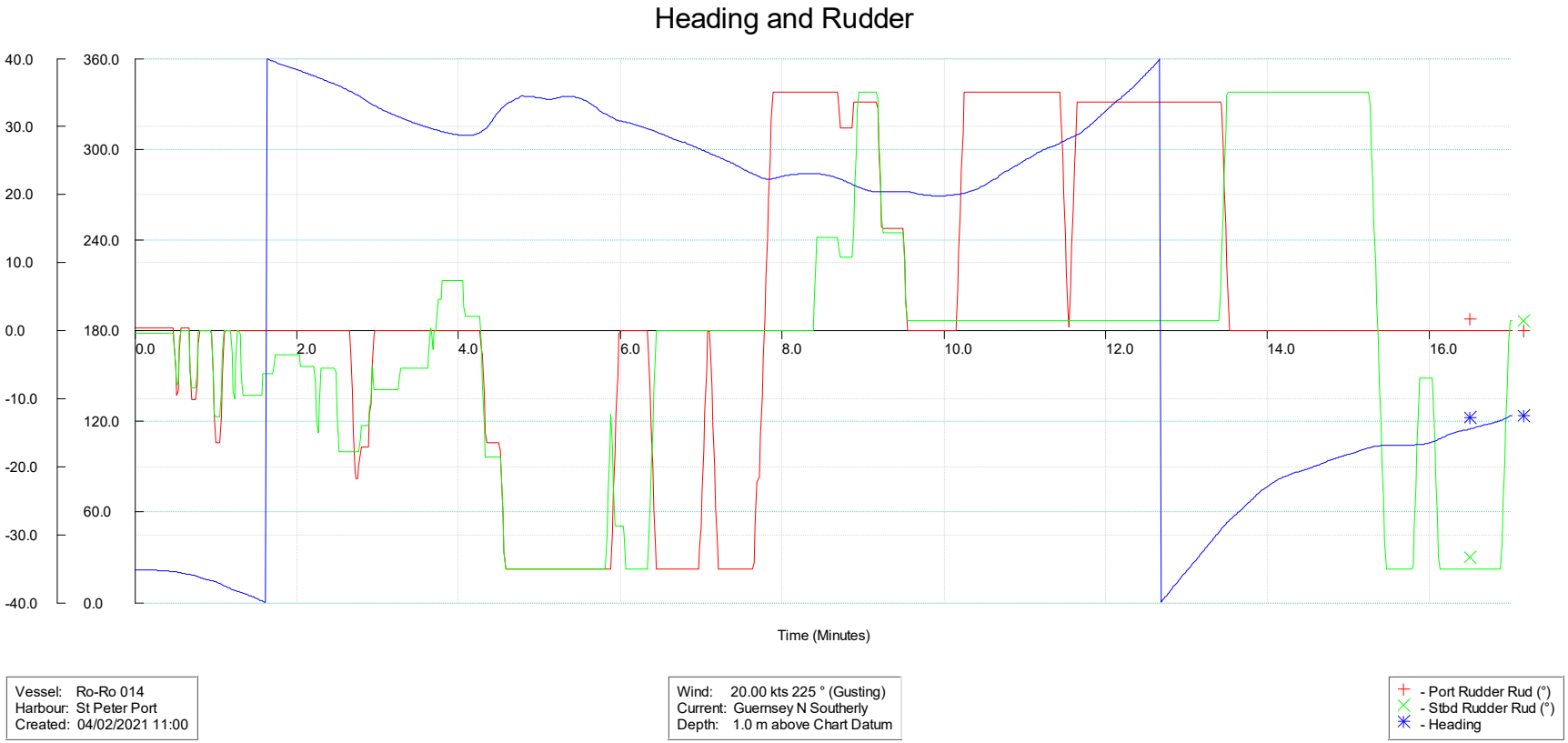
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

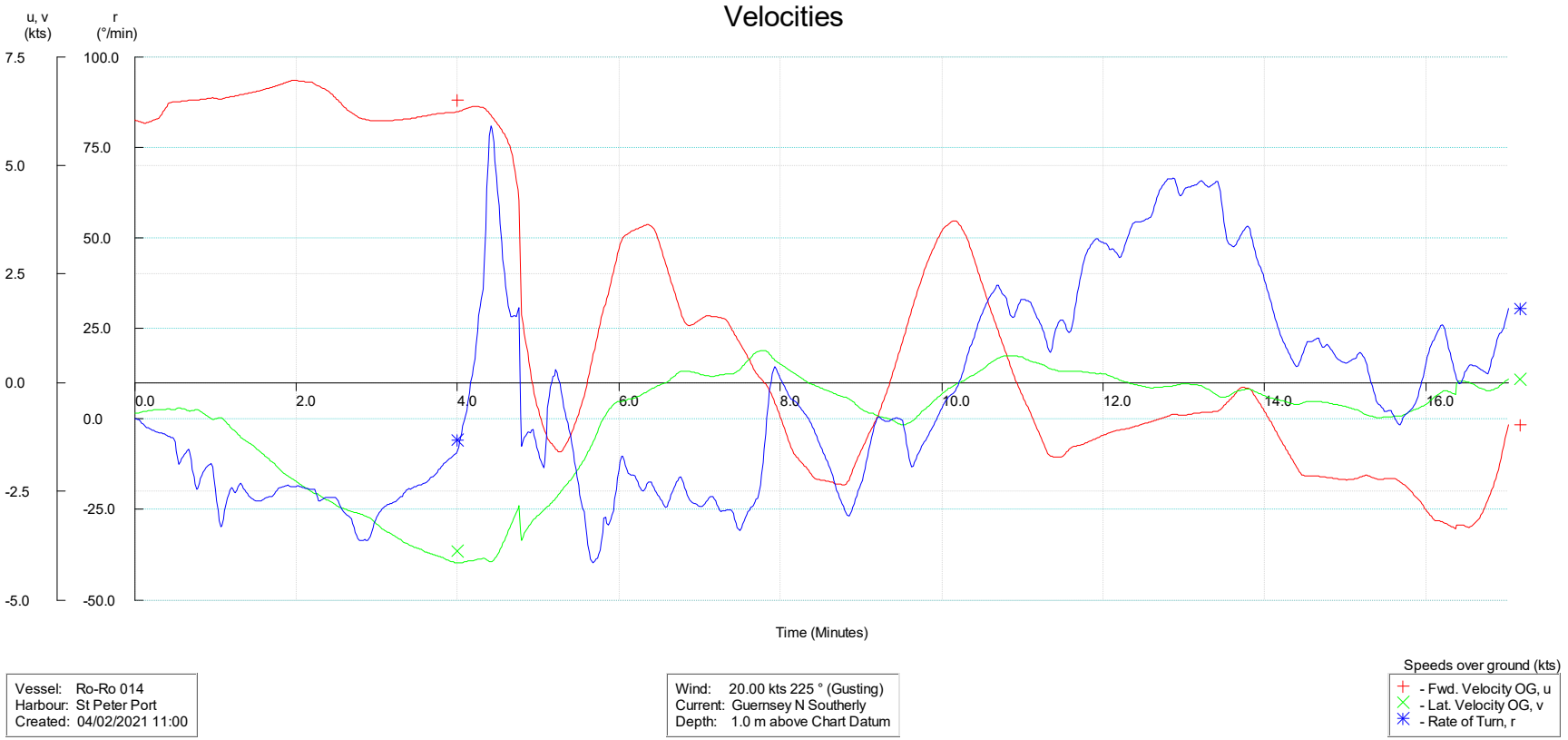
Vessel Track

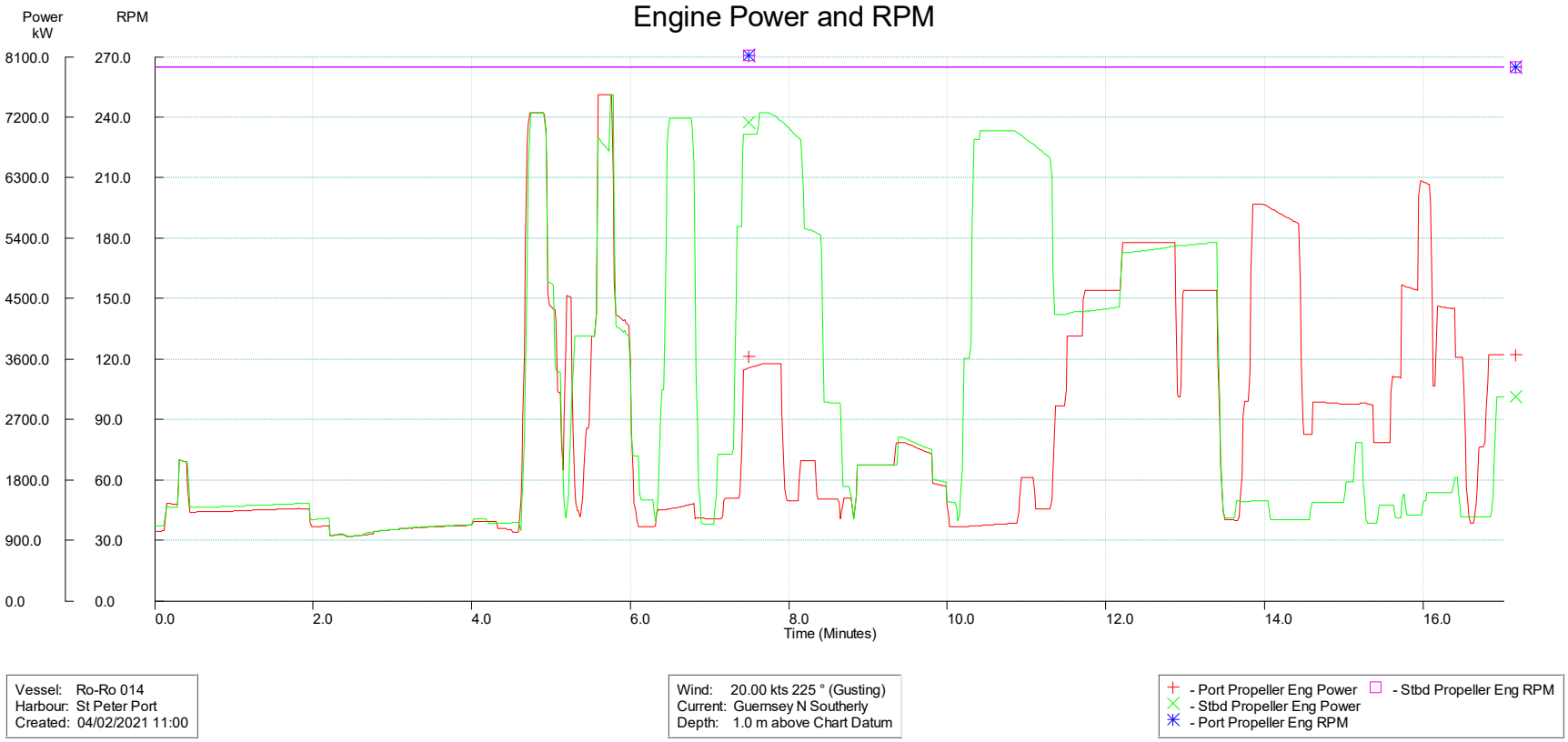


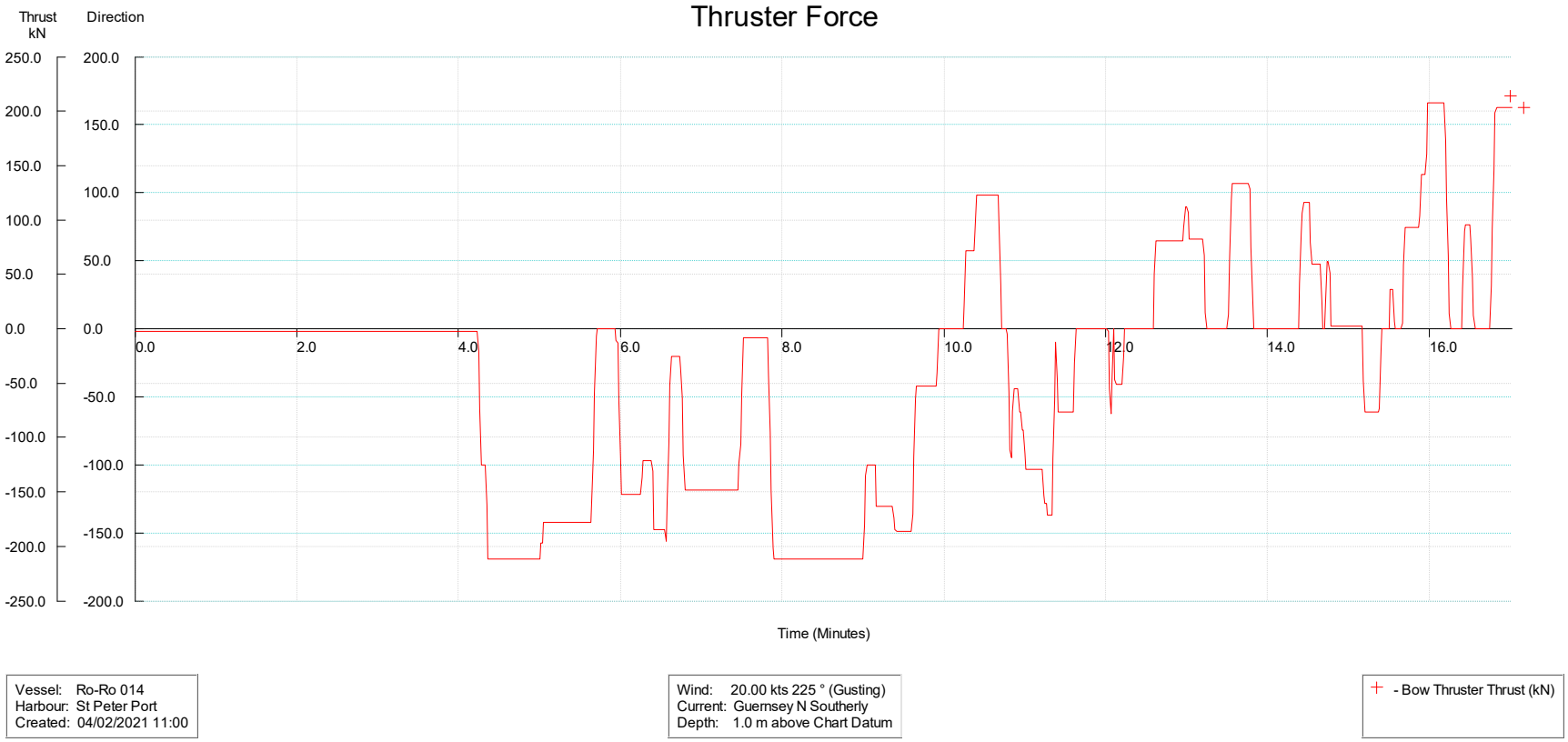
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:00

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
7.5
5.0
2.5
0.0
-2.5
-5.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
8100.0
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM


Thruster Force
Thrust kN
Direction
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:00
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

22 RUN 22:

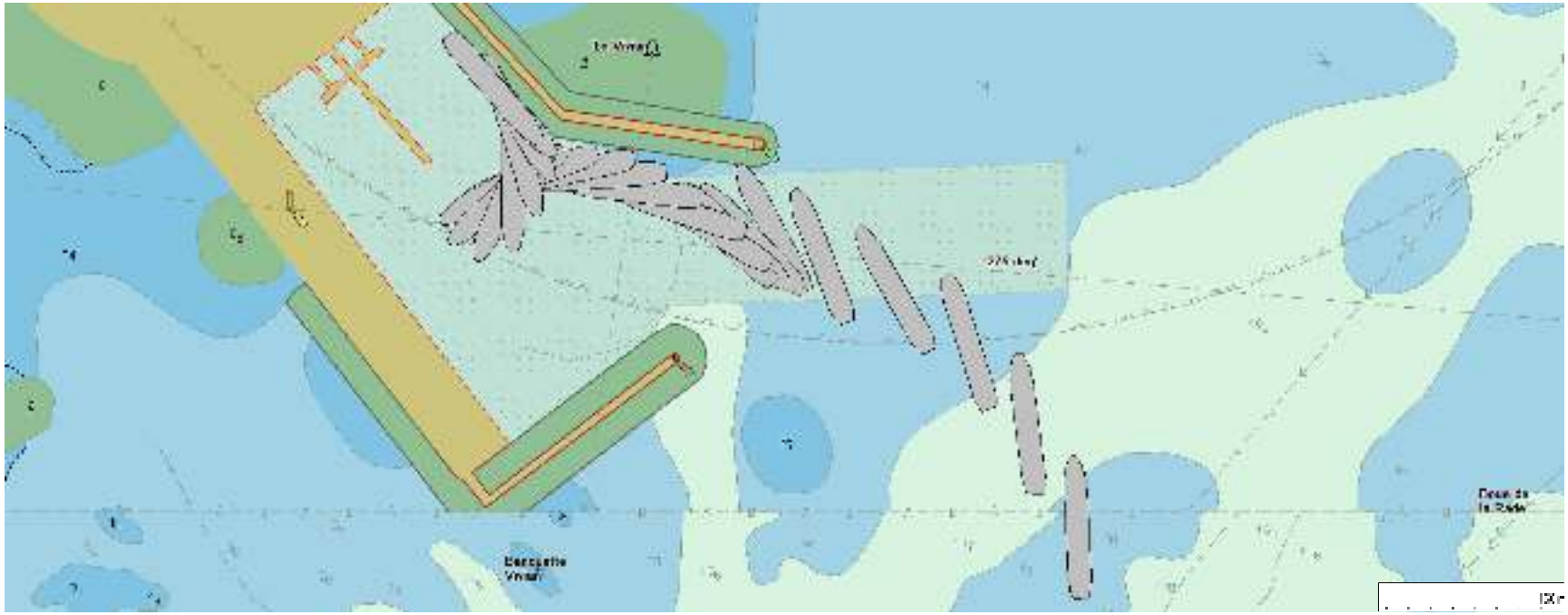
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
22	RoRo14	Arrival	Northern	Manual South Flowing	30kt / 225°	0.3 / 2.9 / 225°

Run 22 repeated Run 21 but with the wind increased to 30 knots. This proved almost impossible to do safely and would not be attempted in reality.

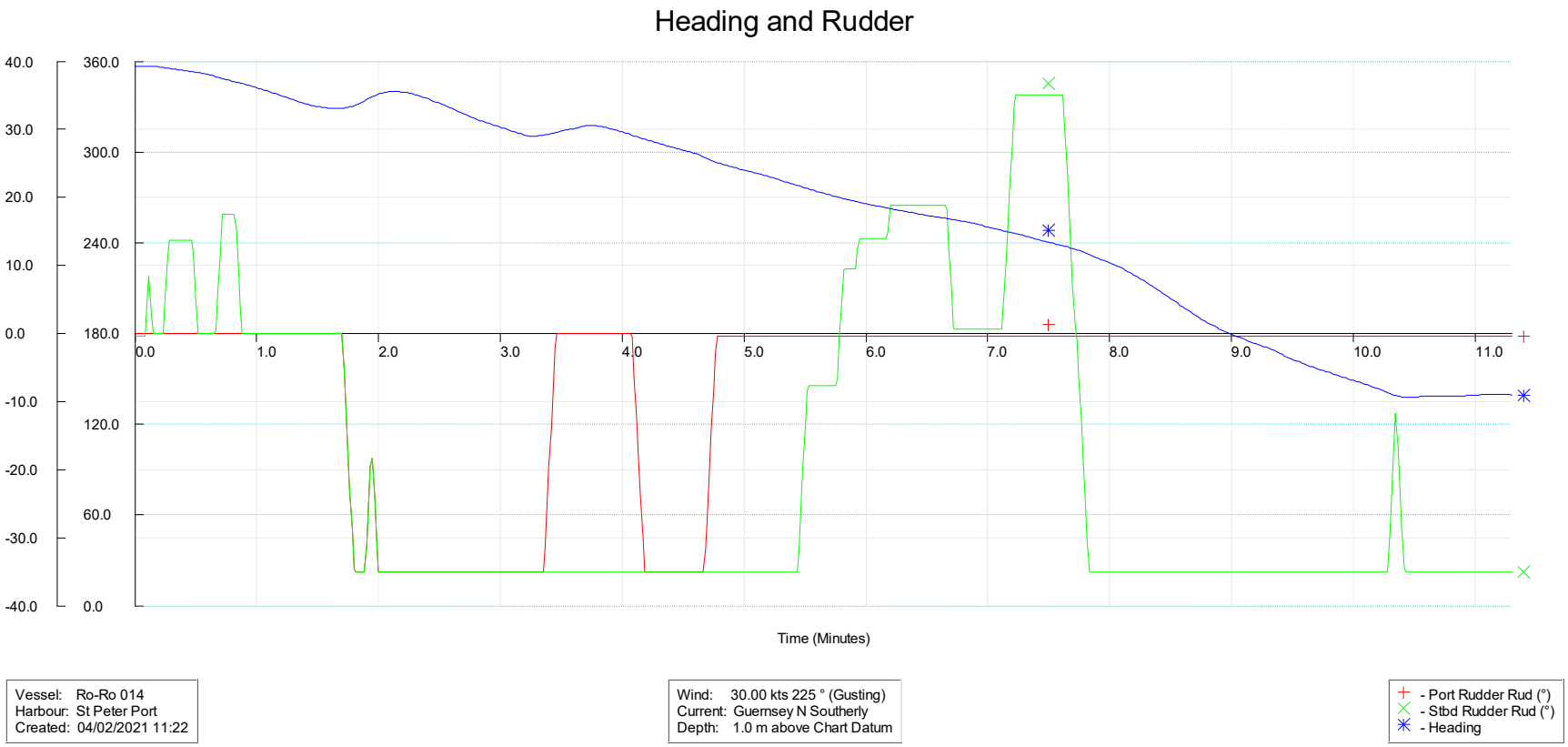
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

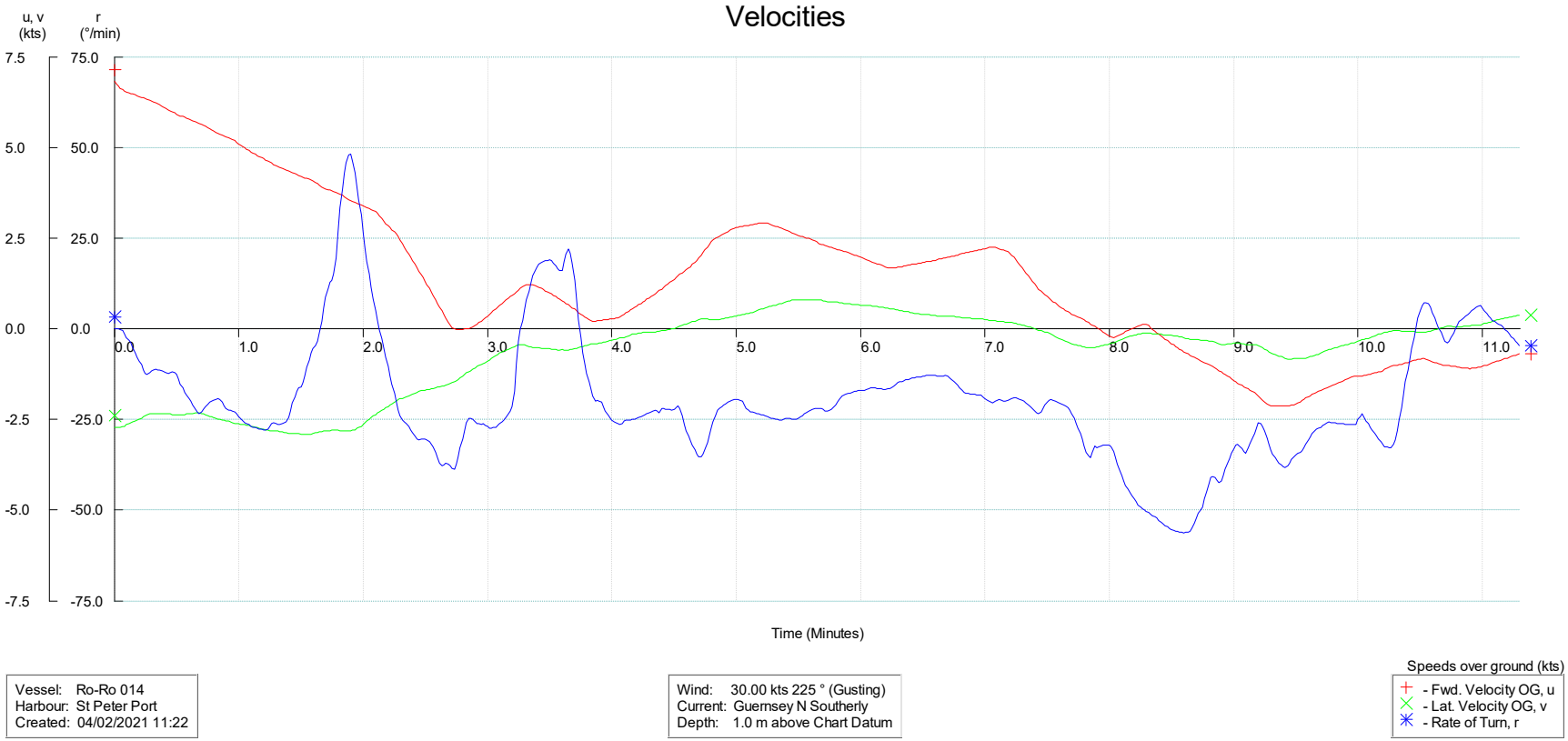
Vessel Track

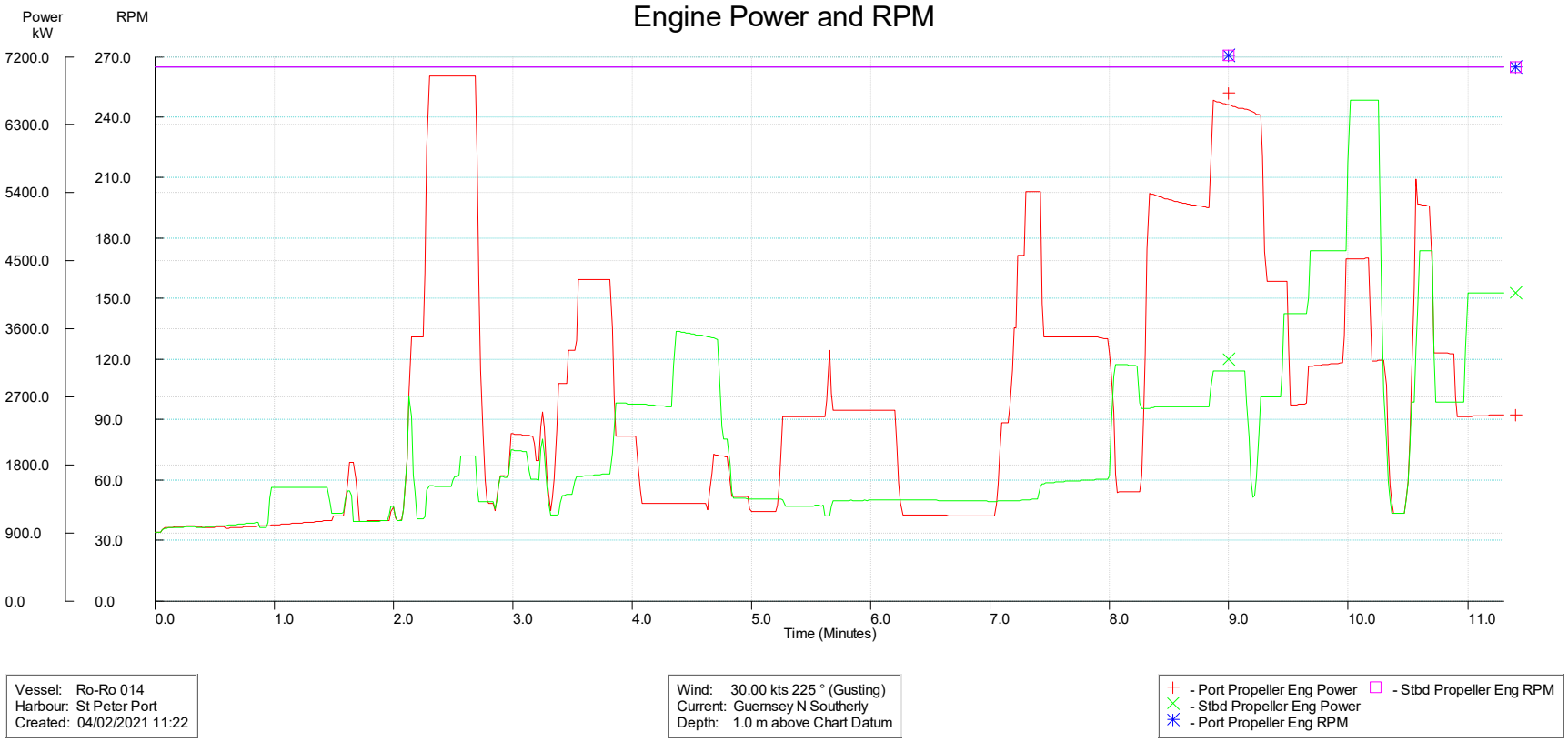


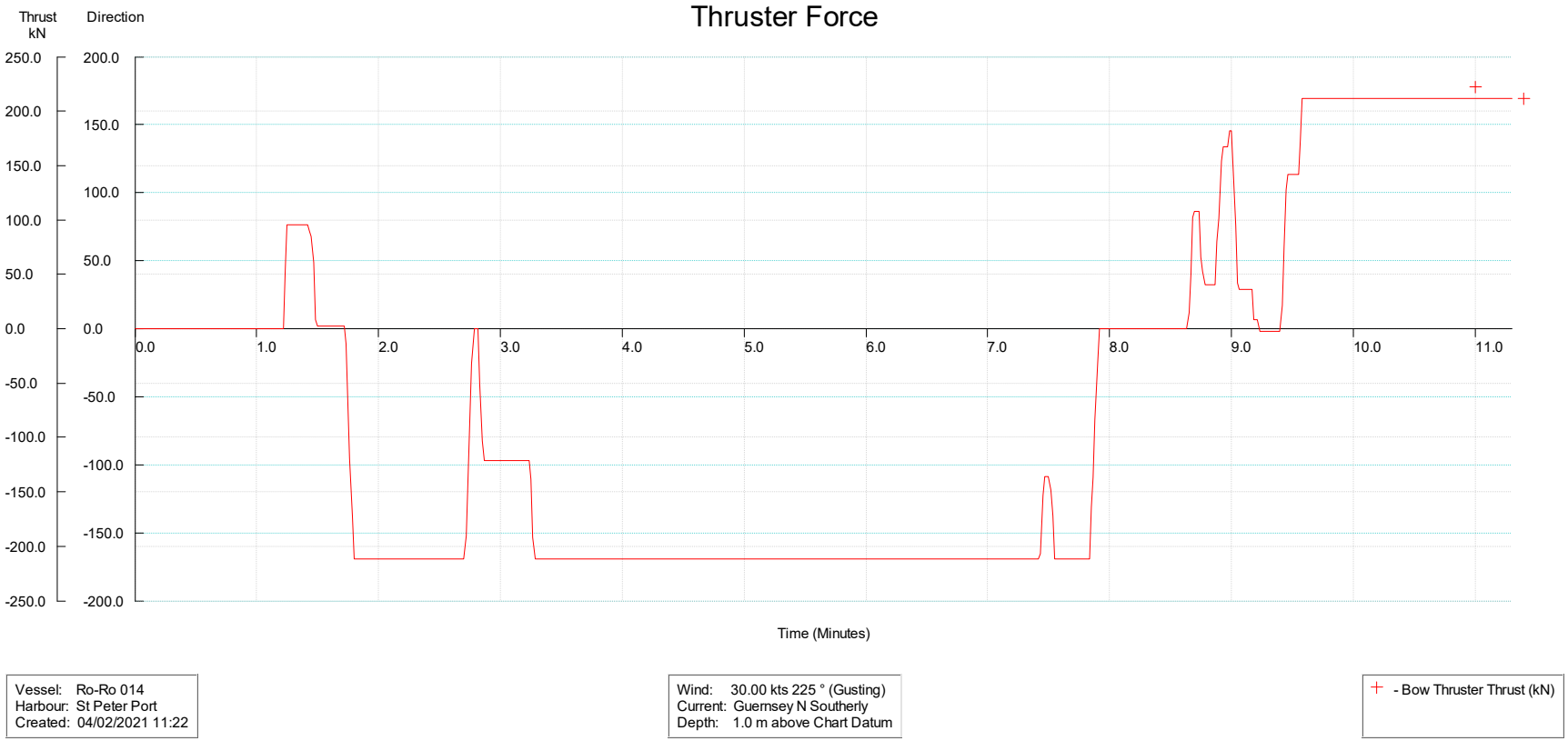
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:22

Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
- Port Rudder Rud (°)
- Stbd Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng Power
- Port Propeller Eng RPM
- Stbd Propeller Eng RPM


Thruster Force
Thrust kN
Direction
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:22
Wind: 30.00 kts 225 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

23 RUN 23:

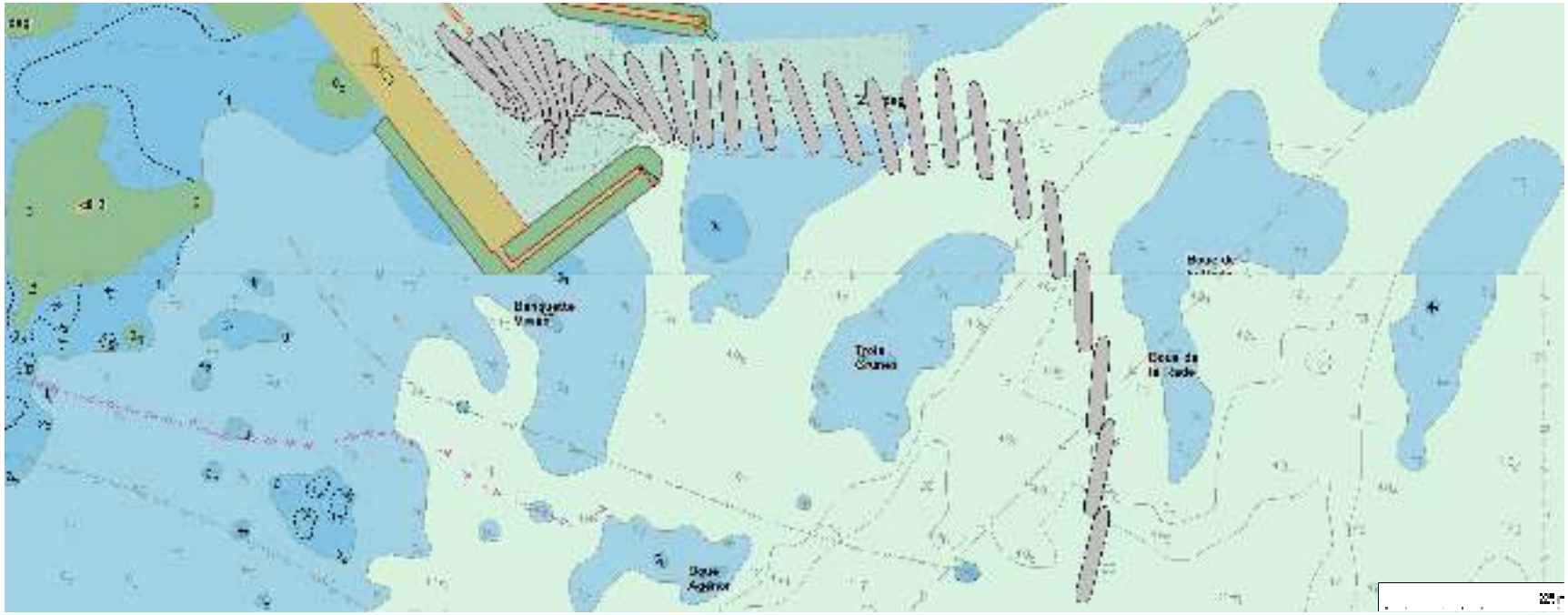
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
23	RoRo14	Arrival	Northern	Manual South Flowing (3.5kt peak)	20kt / 225°	0.3 / 2.9 / 225°

For Run 23 manual current fields were again used, but this time the peak flow velocity was reduced to 3.5 knots with all other rates reduced accordingly. A 20 knot wind was used and the ship was brought through the breakwater with some difficulty. Although the flow velocity in open water was significantly lower, the percentage difference close in to the breakwaters resulted in relatively similar flow rates to the 5 knot current so the felt difference was minimal.

Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

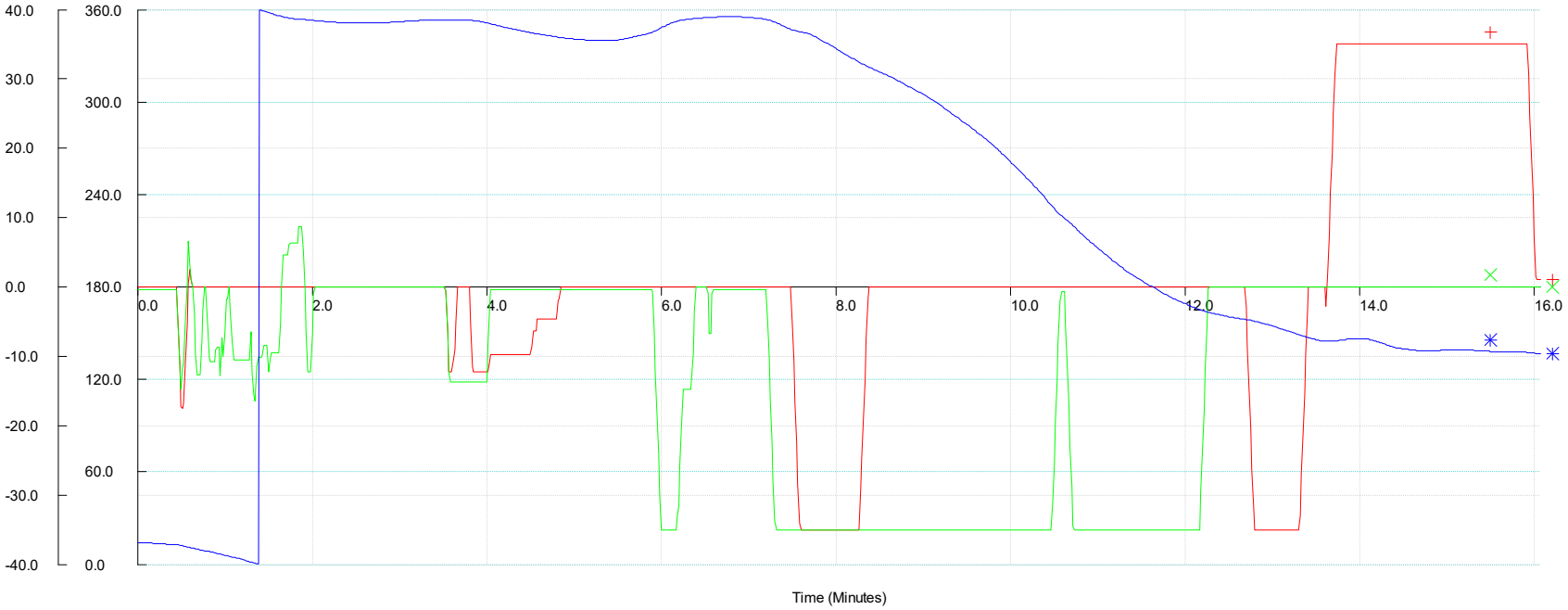
Vessel Track

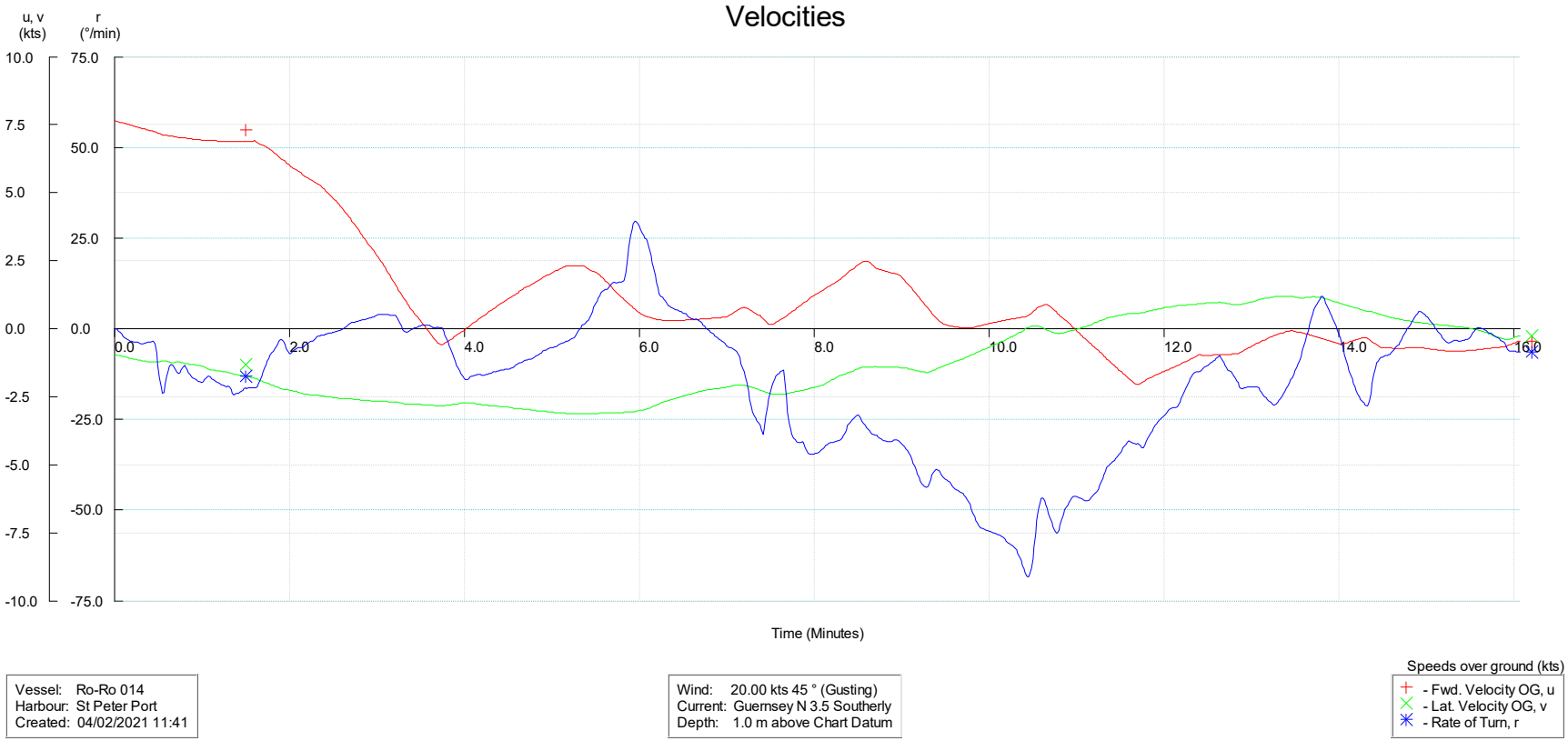


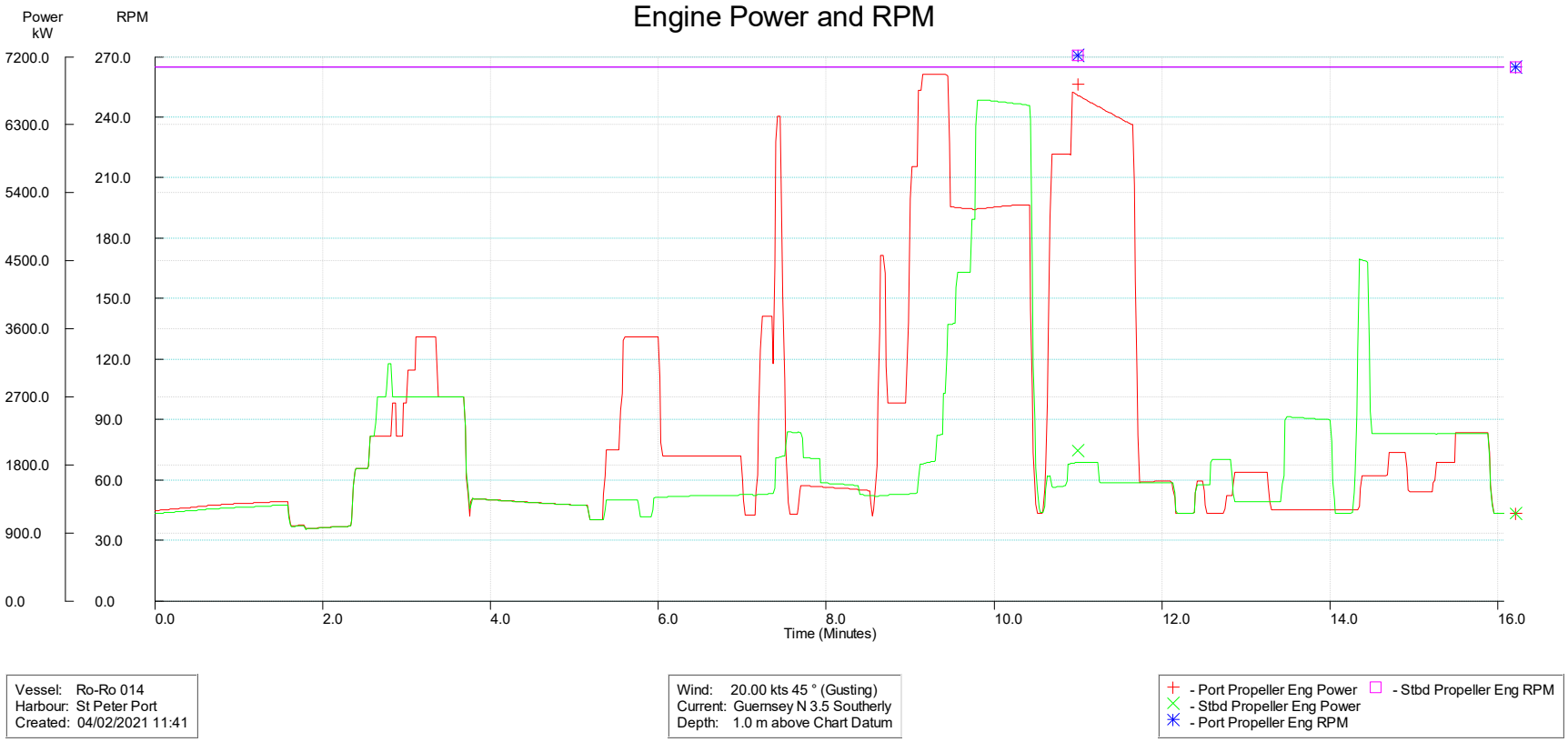
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:41

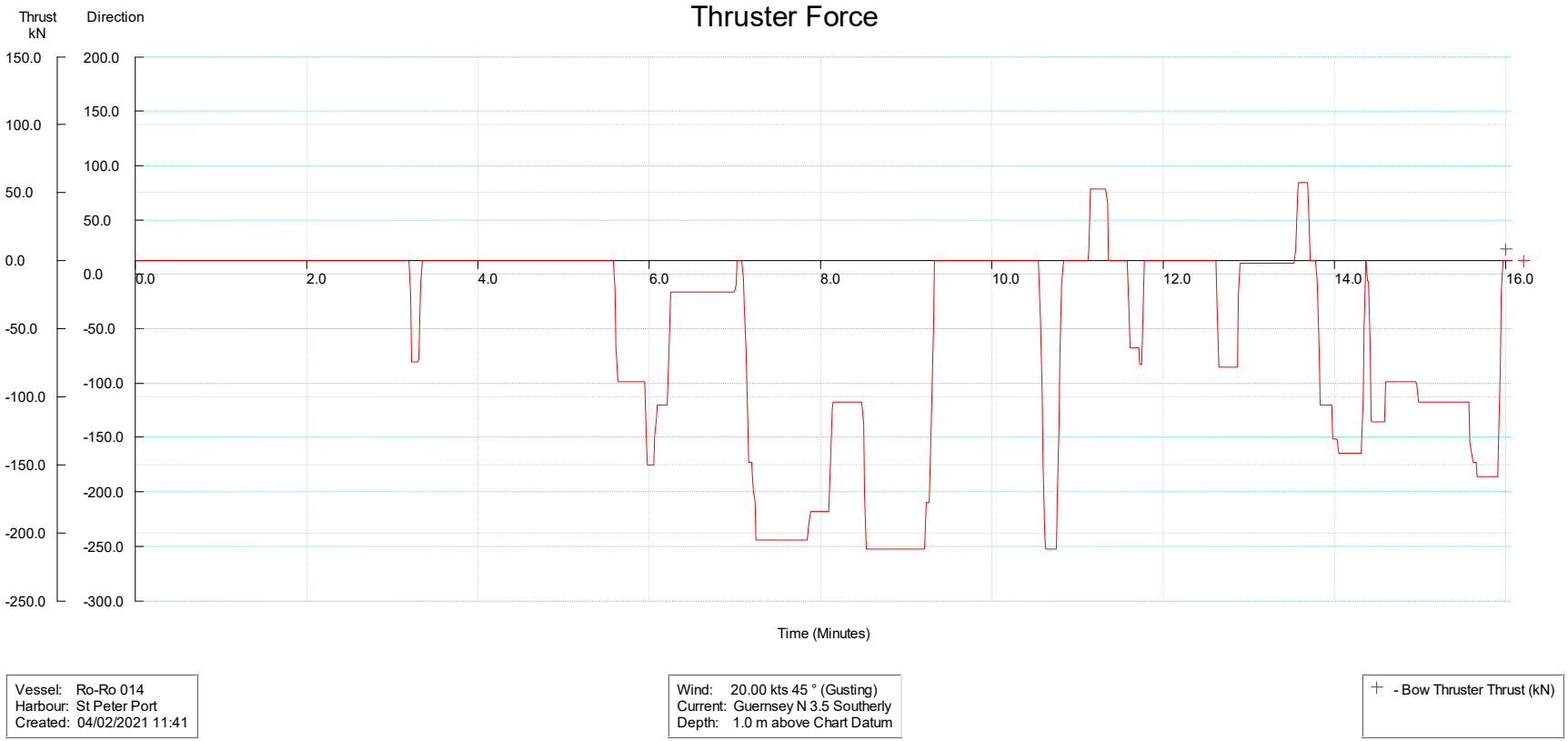
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.0 m above Chart Datum

Heading and Rudder




Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:41
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
7200.0
6300.0
5400.0
4500.0
3600.0
2700.0
1800.0
900.0
0.0
270.0
240.0
210.0
180.0
150.0
120.0
90.0
60.0
30.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:41
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.0 m above Chart Datum
- Port Propeller Eng Power
- Stbd Propeller Eng RPM
- Stbd Propeller Eng Power
- Port Propeller Eng RPM


Thruster Force
Thrust kN
Direction
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
-300.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
Time (Minutes)
Vessel: Ro-Ro 014
Harbour: St Peter Port
Created: 04/02/2021 11:41
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.0 m above Chart Datum
- Bow Thruster Thrust (kN)

24 RUN 24:

Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
24	Containership 008b	Arrival	Northern	Manual North Flowing (3.5kt peak)	20kt / 225°	0.3 / 2.9 / 225°

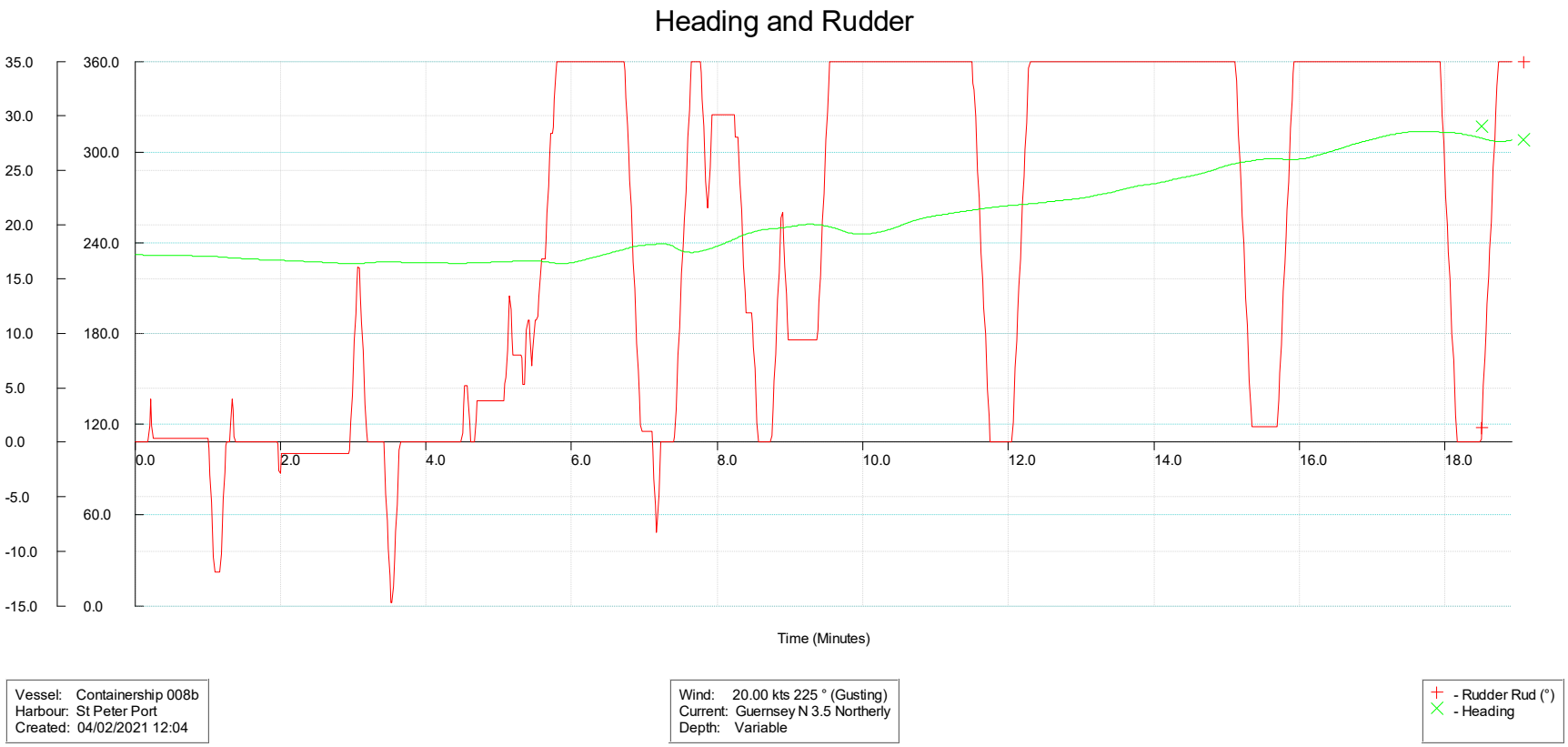
Run 24 used manual north flowing currents with a peak flow rate of 3.5 knots and the containership model. The combination of northerly currents and SW wind proved to be easier than the south flowing currents.

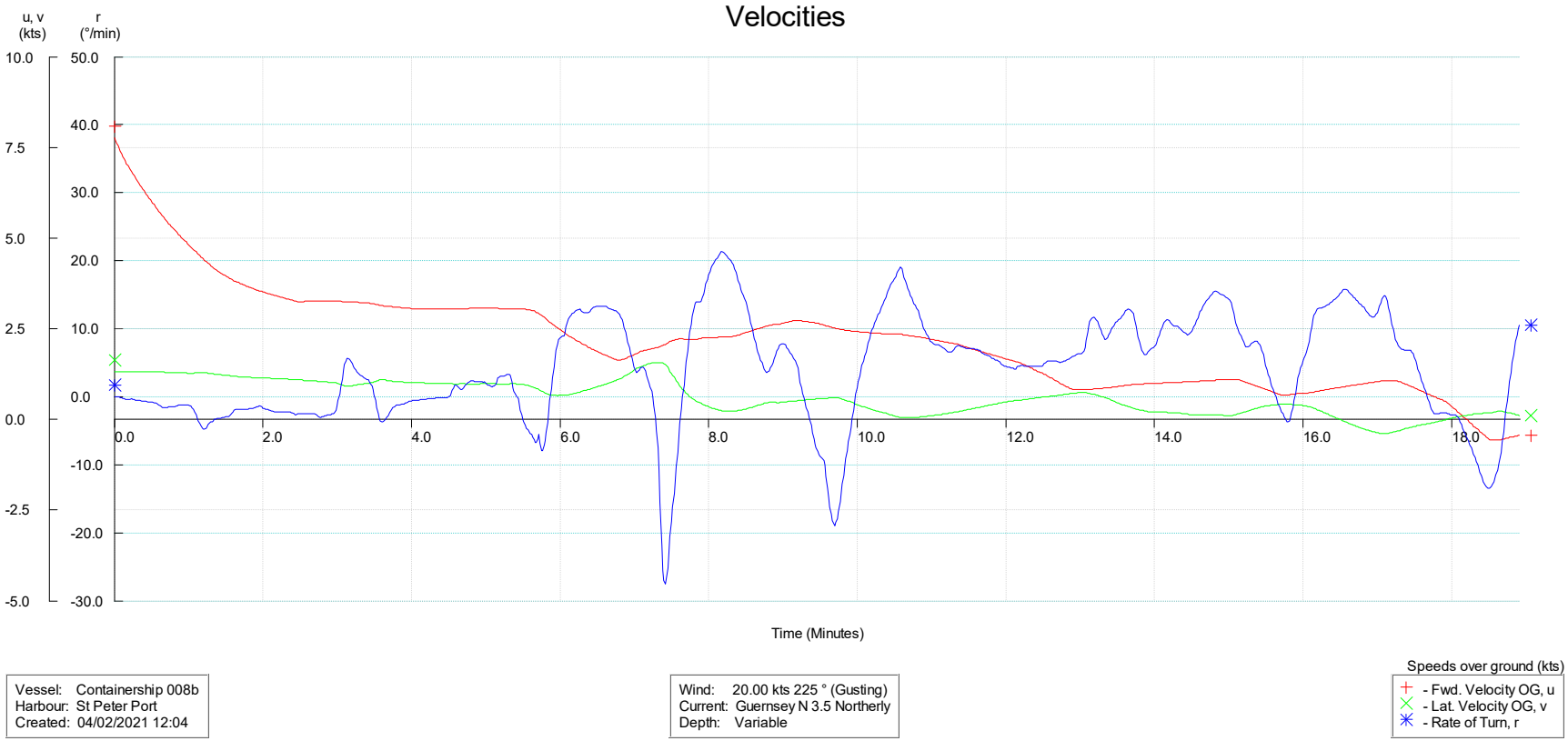
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

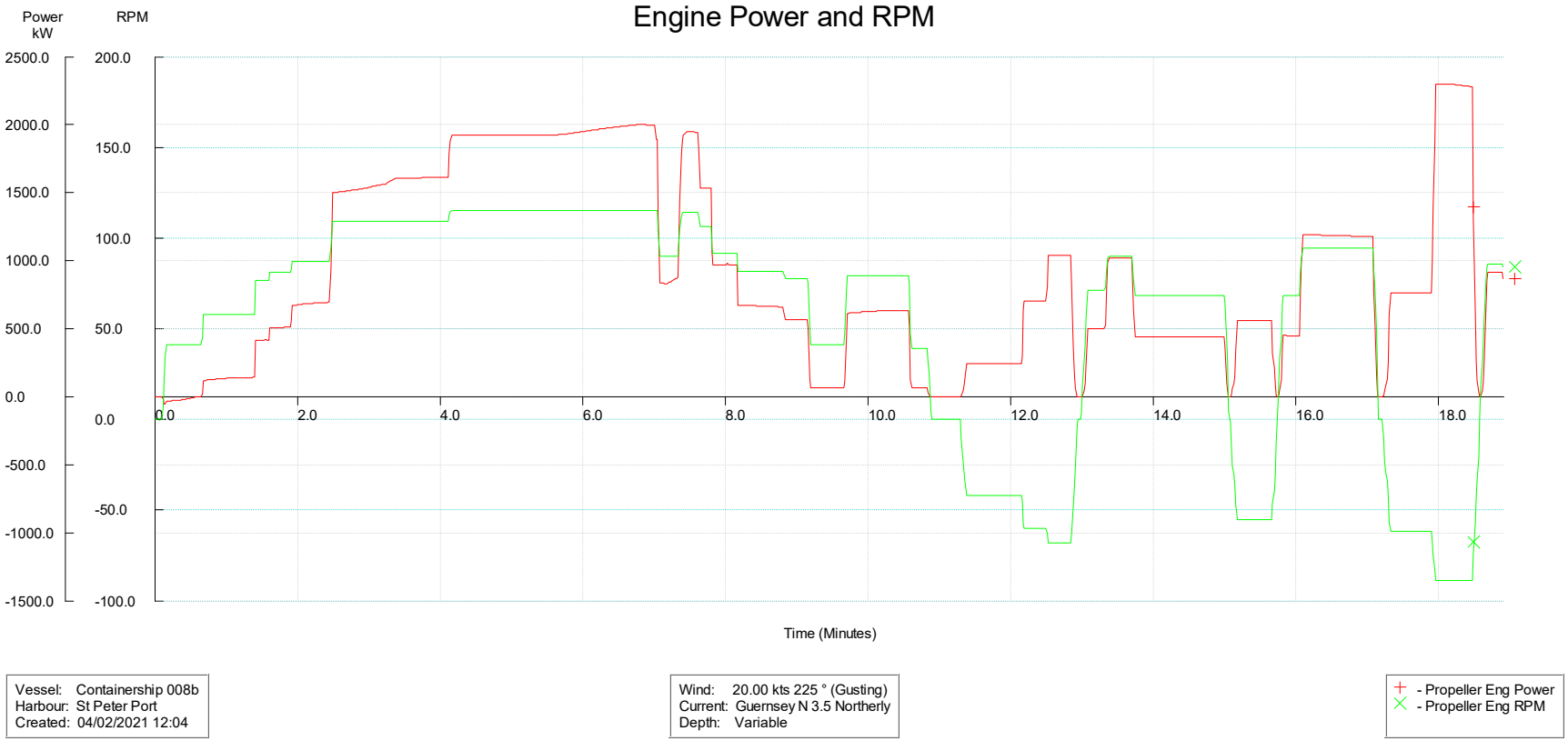
Vessel Track

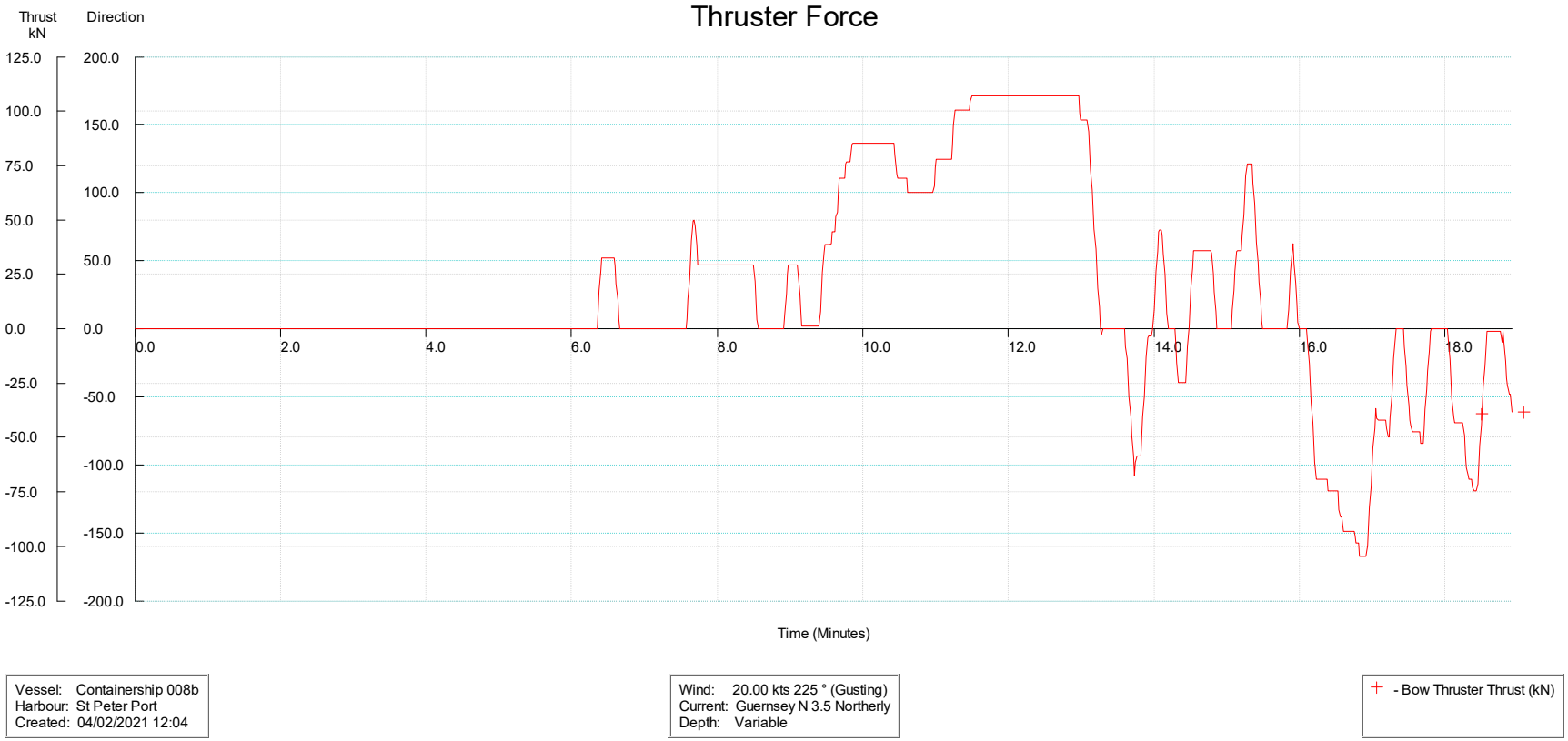
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:04

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Northerly
Depth: Variable


Heading and Rudder
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:04
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Northerly
Depth: Variable
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:04
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Northerly
Depth: Variable
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
2500.0
2000.0
1500.0
1000.0
500.0
0.0
-500.0
-1000.0
-1500.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:04
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Northerly
Depth: Variable
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:04
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Northerly
Depth: Variable
- Bow Thruster Thrust (kN)

25 RUN 25:

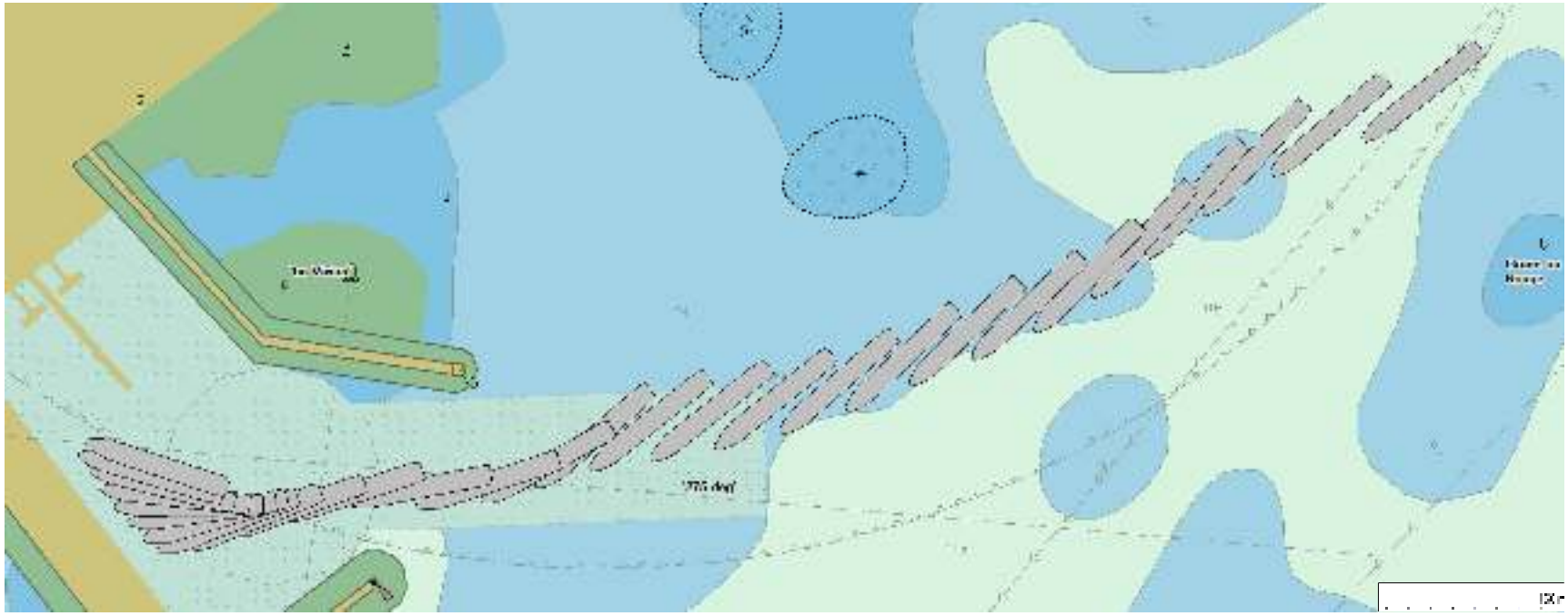
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
25	Containership 008b	Arrival	Northern	Manual North Flowing (5kt peak)	20kt / 225°	0.3 / 2.9 / 225°

Run 25 used the same conditions as Run 24 but with the peak current flow increased to 5 knots. This increased the difficulty but it was still possible to safely berth the ship.

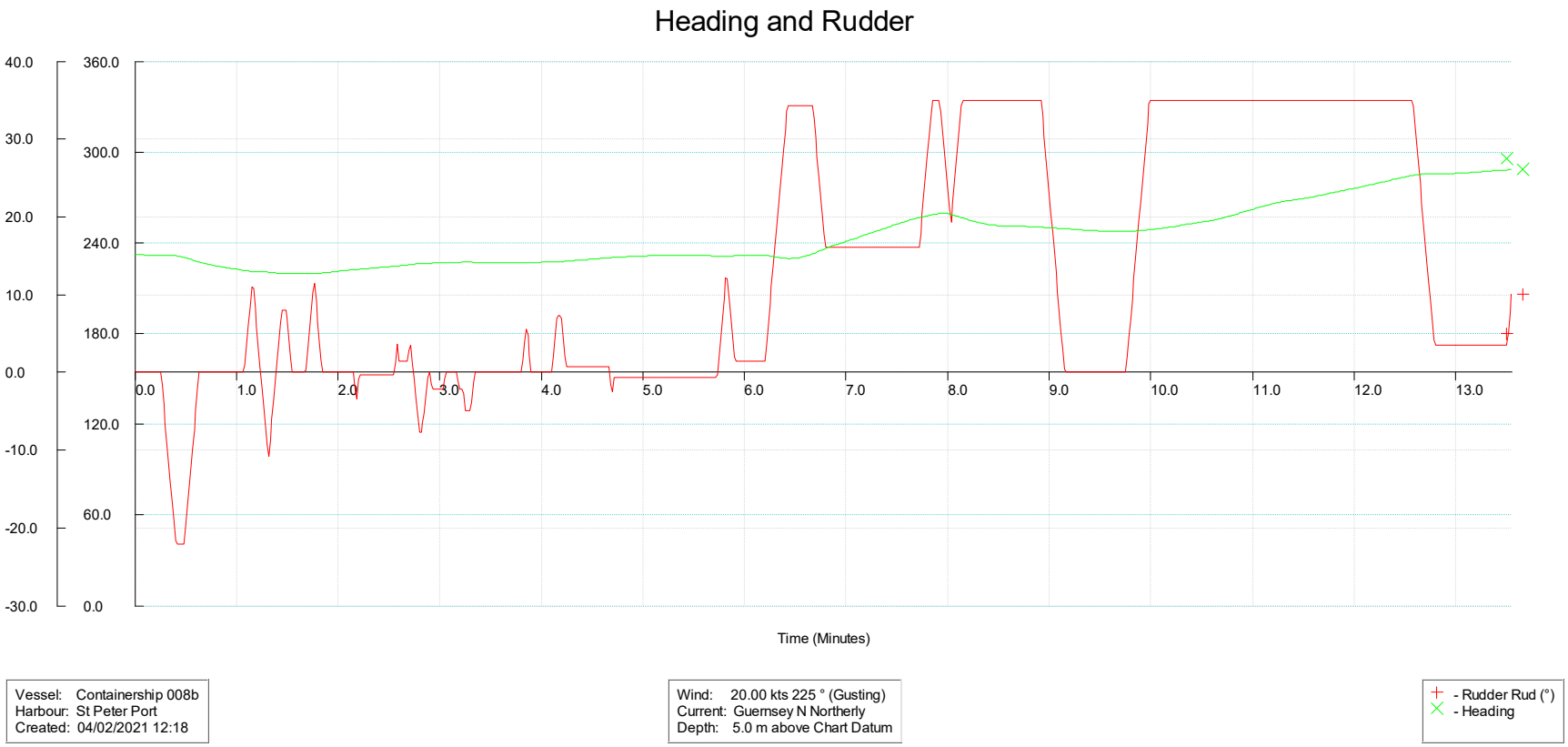
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

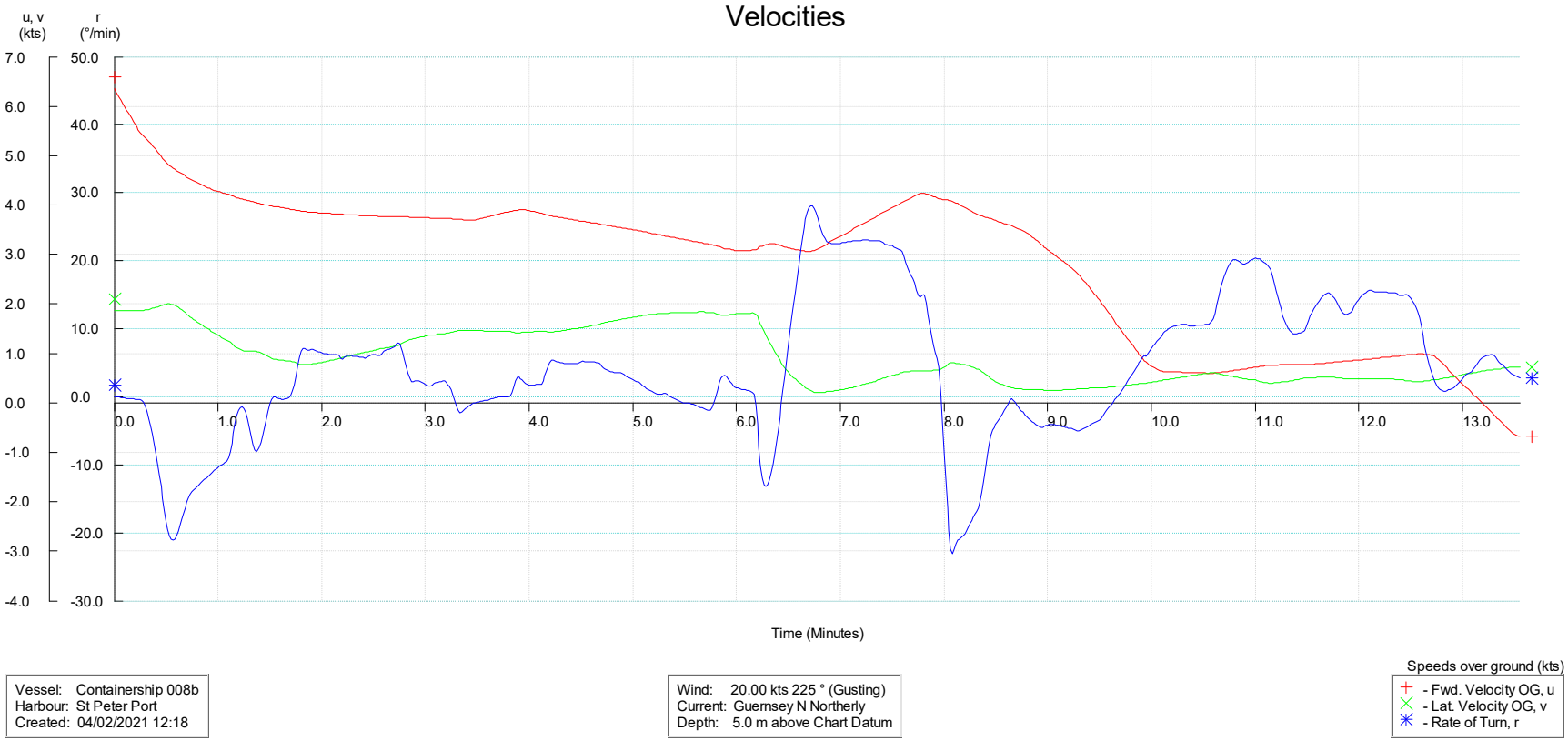
Vessel Track

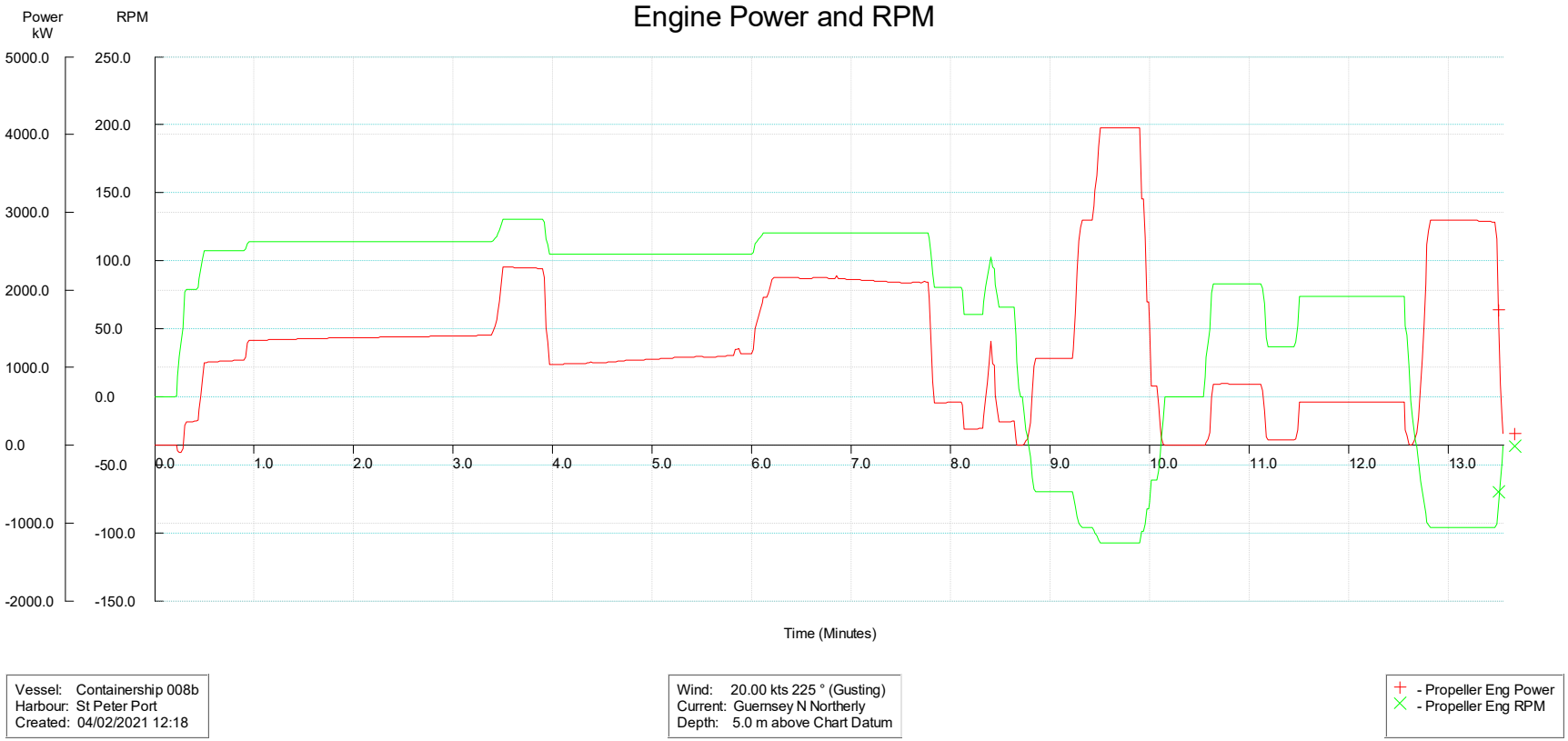


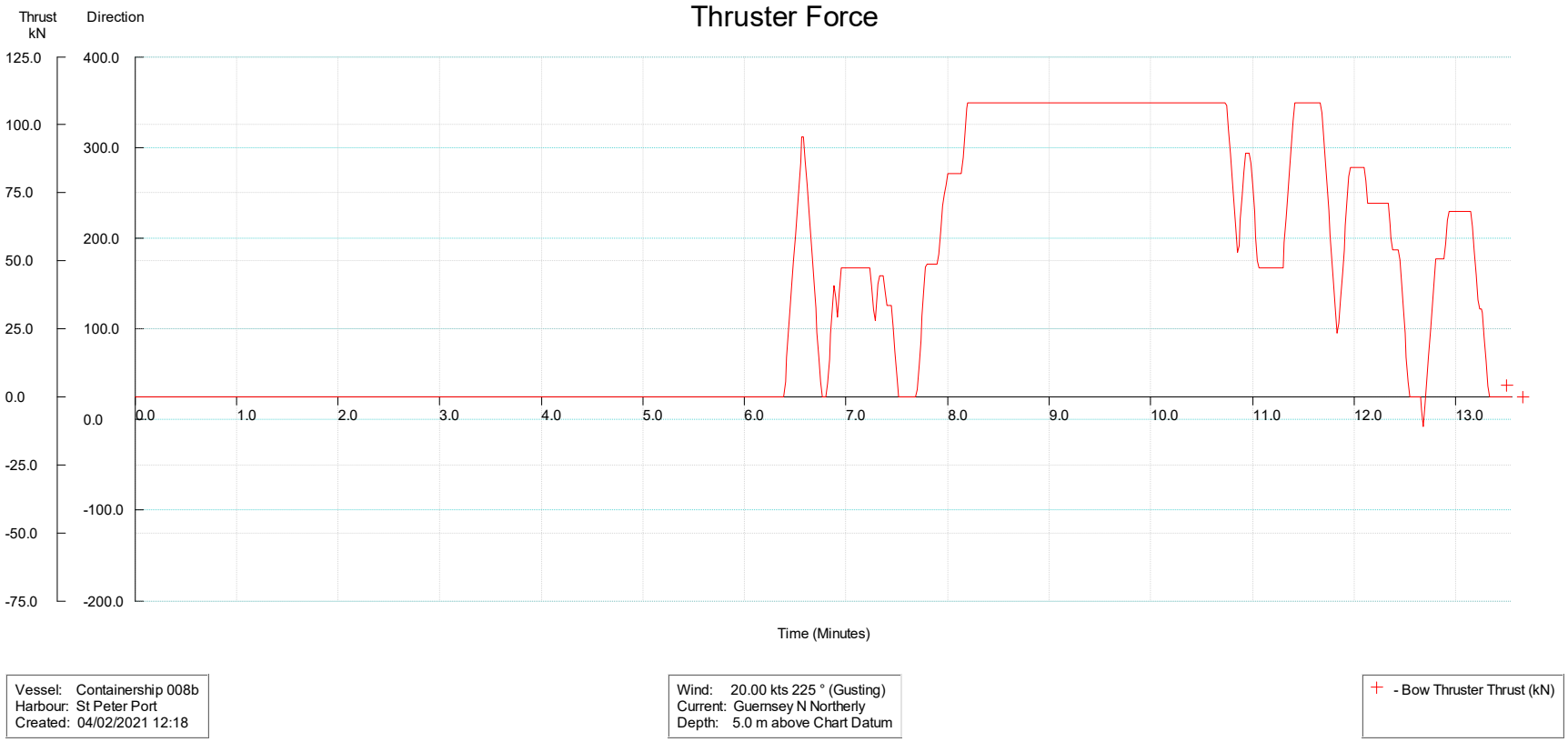
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:18

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 5.0 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:18
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 5.0 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:18
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 5.0 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:18
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 5.0 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
400.0
300.0
200.0
100.0
0.0
-100.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 12:18
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N Northerly
Depth: 5.0 m above Chart Datum
- Bow Thruster Thrust (kN)

26 RUN 26:

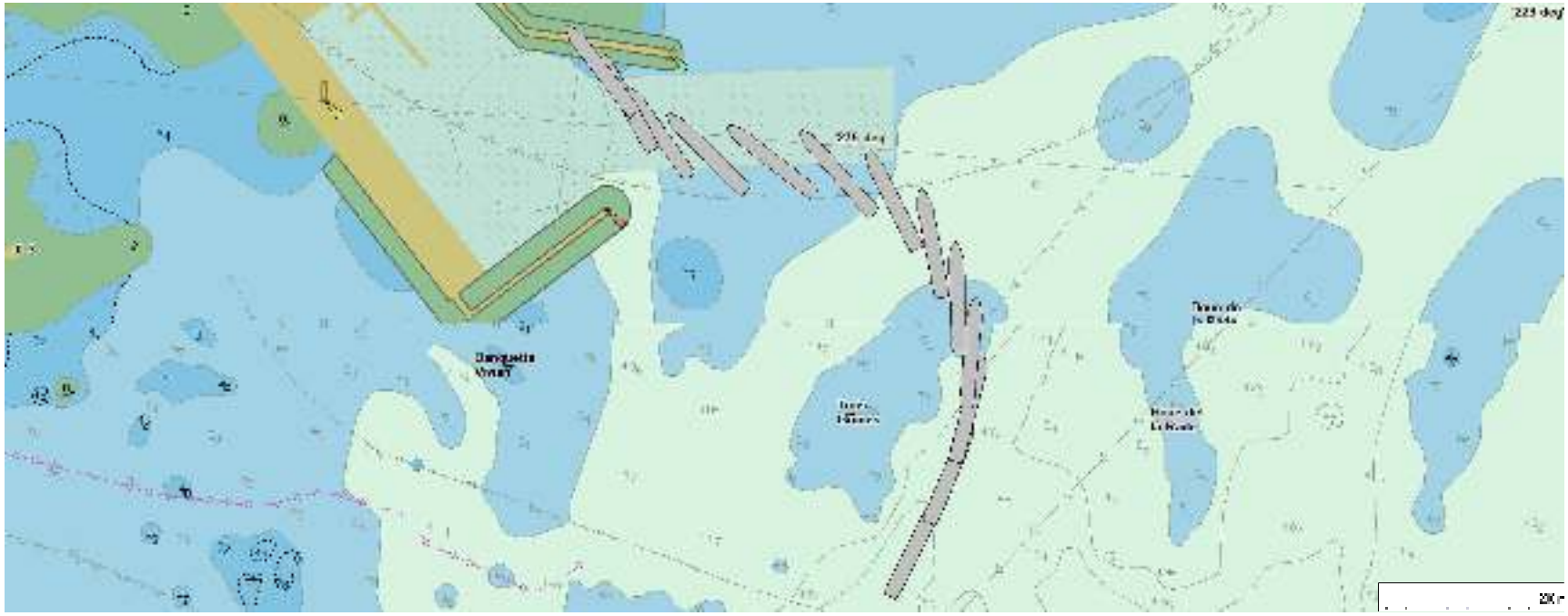
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
26	Containership 008b	Arrival	Northern	Manual South Flowing (3.5kt)	20kt / 225°	0.3 / 2.9 / 225°

Run 26 repeated Run 23 but with the containership model. Although the RoRo was just able to berth with the south flowing current and a SW wind this did not prove the case with the containership. The pilot was unable to maintain enough speed to cross the breakwater entrance and still stop the vessel in time. However, again it was mentioned that in reality the containerships will be able to time their arrival to slack water as they are not forced to run to a timetable like the ferries.

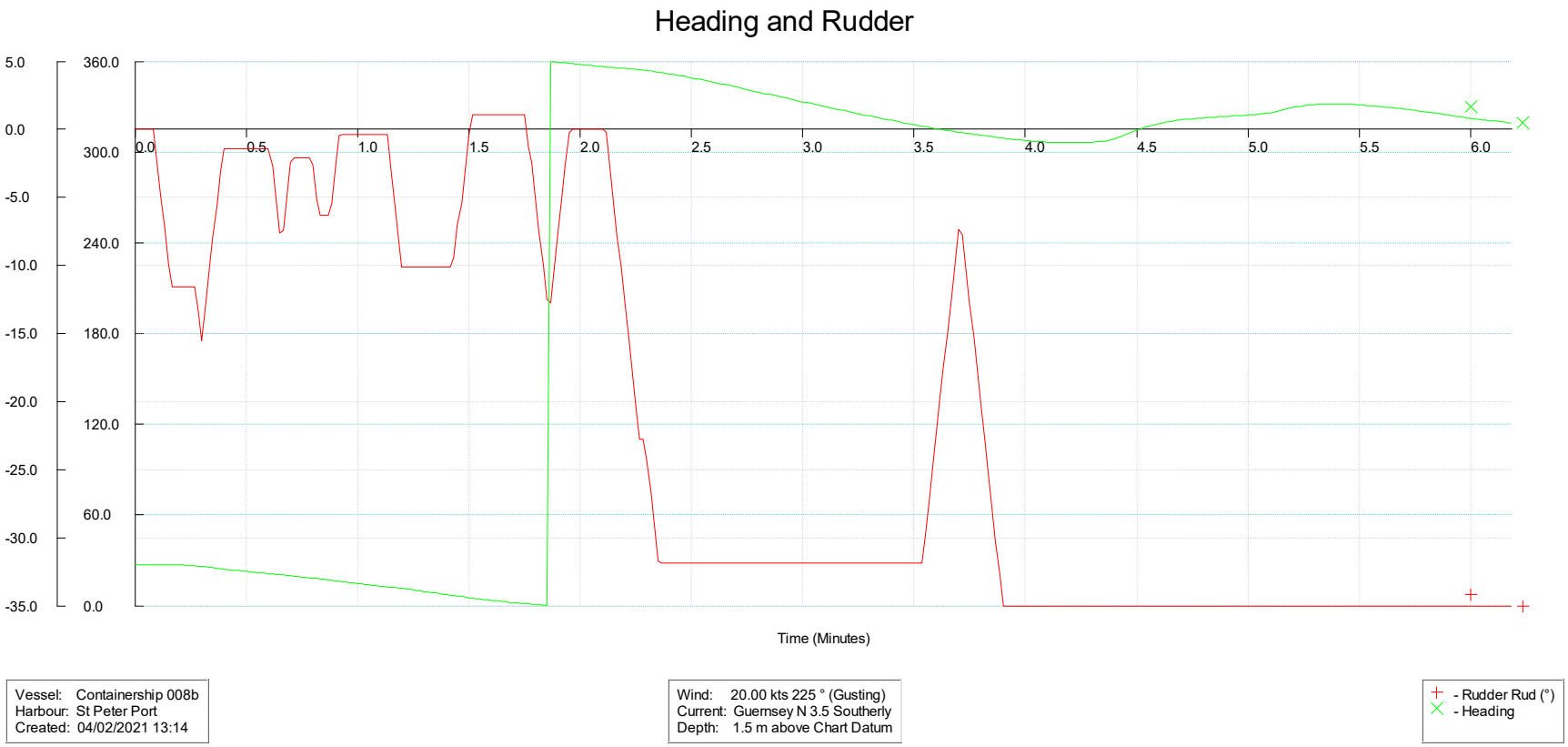
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

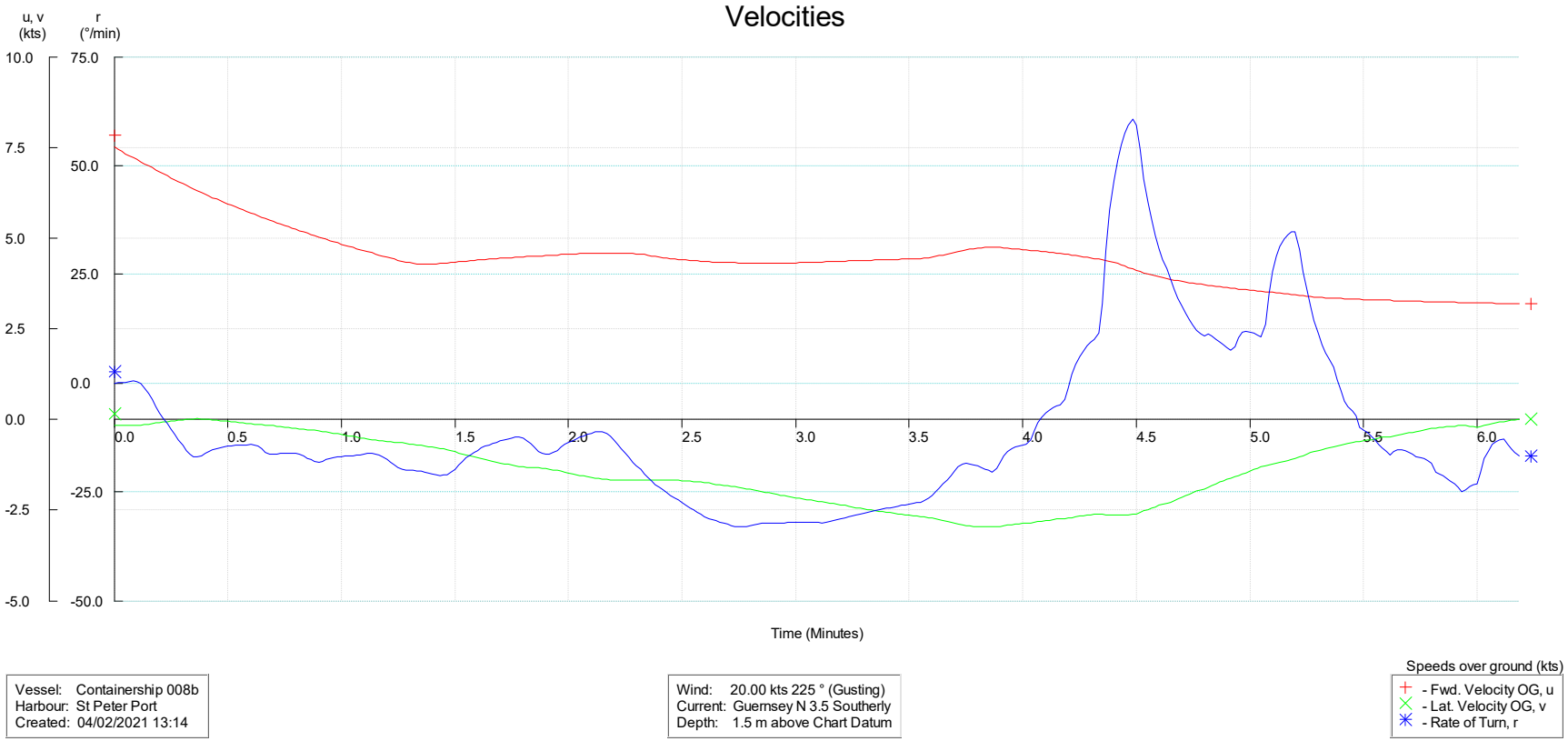
Vessel Track

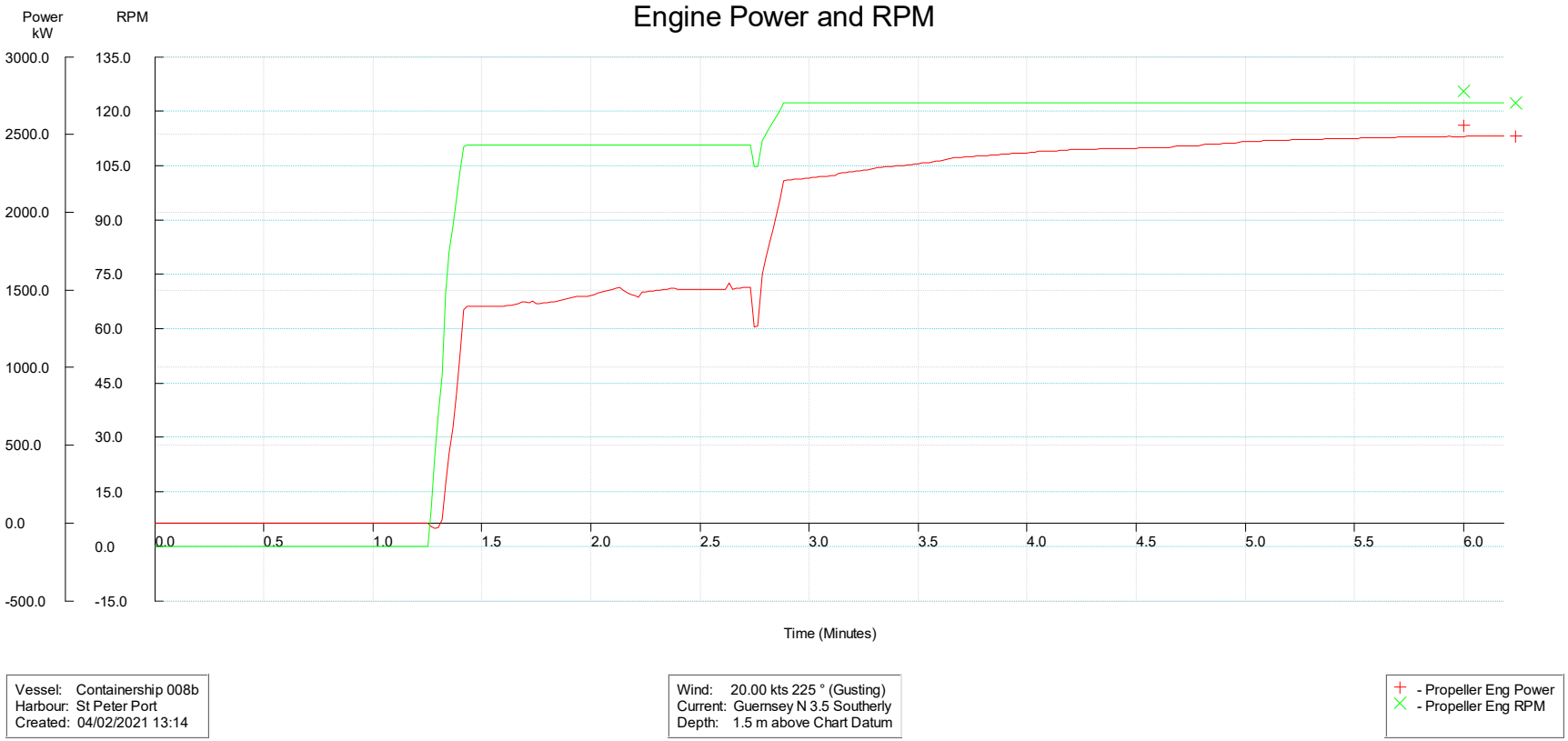


Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:14

Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.5 m above Chart Datum


Heading and Rudder
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:14
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.5 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:14
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.5 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
-500.0
135.0
120.0
105.0
90.0
75.0
60.0
45.0
30.0
15.0
0.0
-15.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:14
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.5 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
-125.0
200.0
100.0
0.0
-100.0
-200.0
-300.0
-400.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:14
Wind: 20.00 kts 225 ° (Gusting)
Current: Guernsey N 3.5 Southerly
Depth: 1.5 m above Chart Datum
- Bow Thruster Thrust (kN)

27 RUN 27:

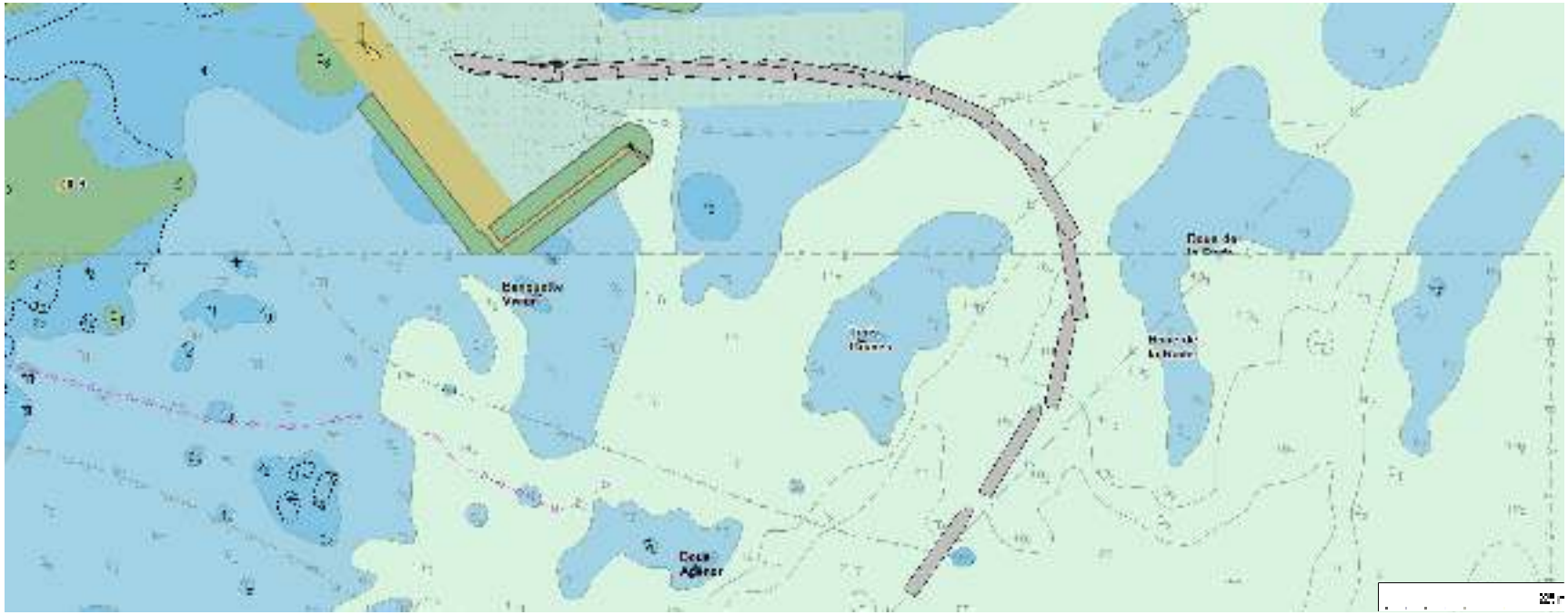
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
27	Containership 008b	Arrival	Northern	Haskoning South Flowing	20kt / 225°	0.3 / 2.9 / 225°

Run 27 used the Haskoning south flowing currents (that did not take account of the proposed breakwaters). With these conditions the ship was brought into the harbour without difficulty. The complete berthing manoeuvre was not attempted due to the inaccurate flows inside the harbour.

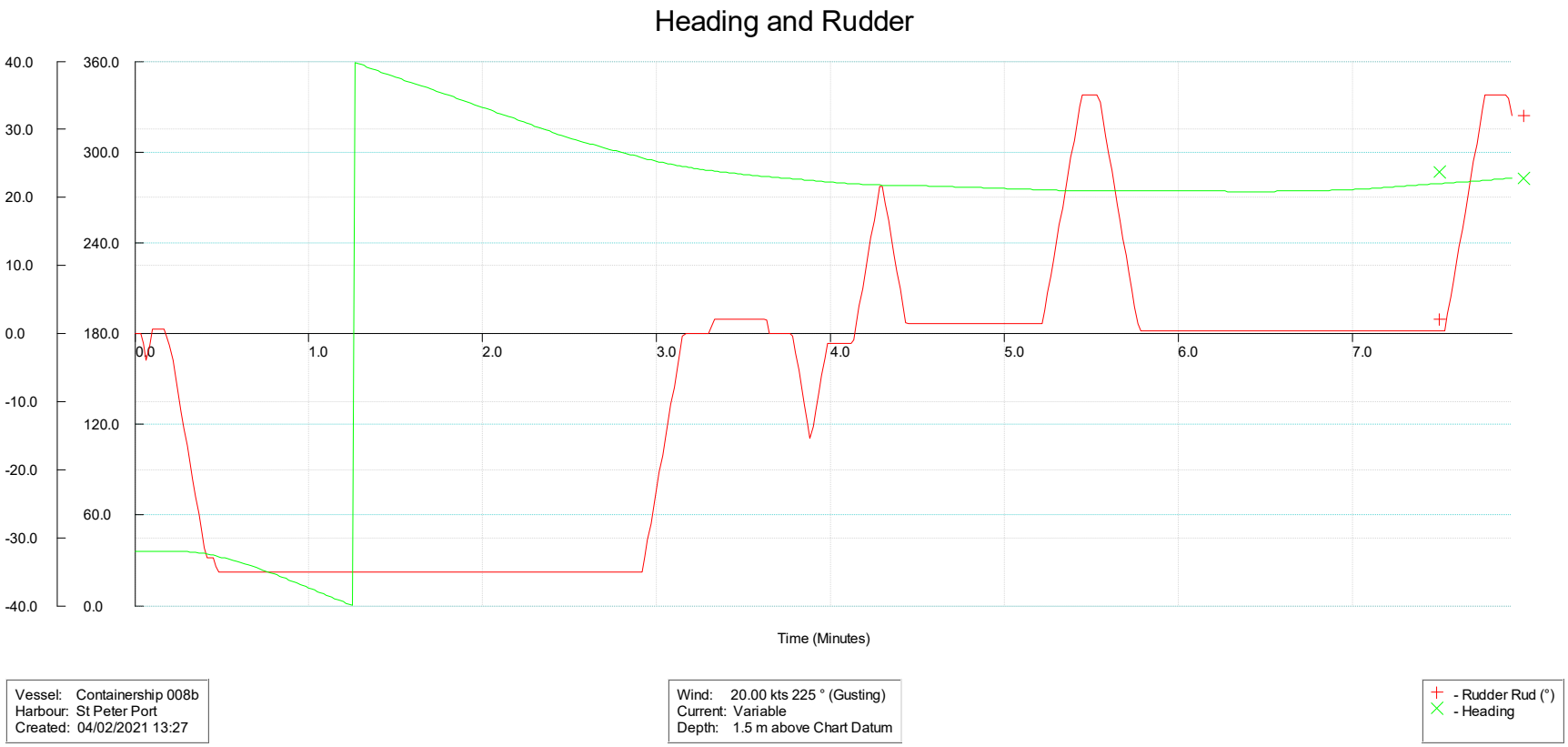
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	Not easy	Challenging	Difficult	Impossible

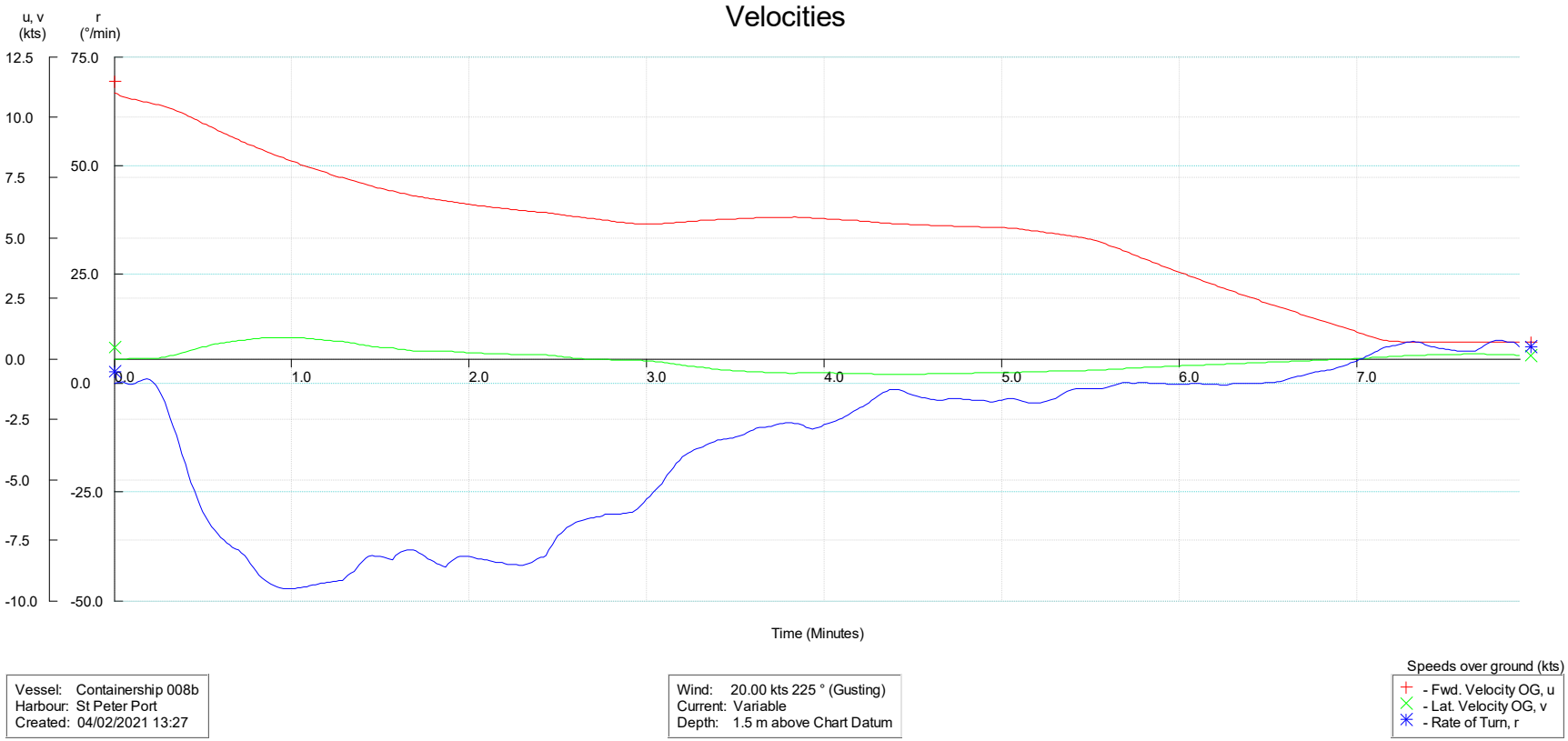
Vessel Track

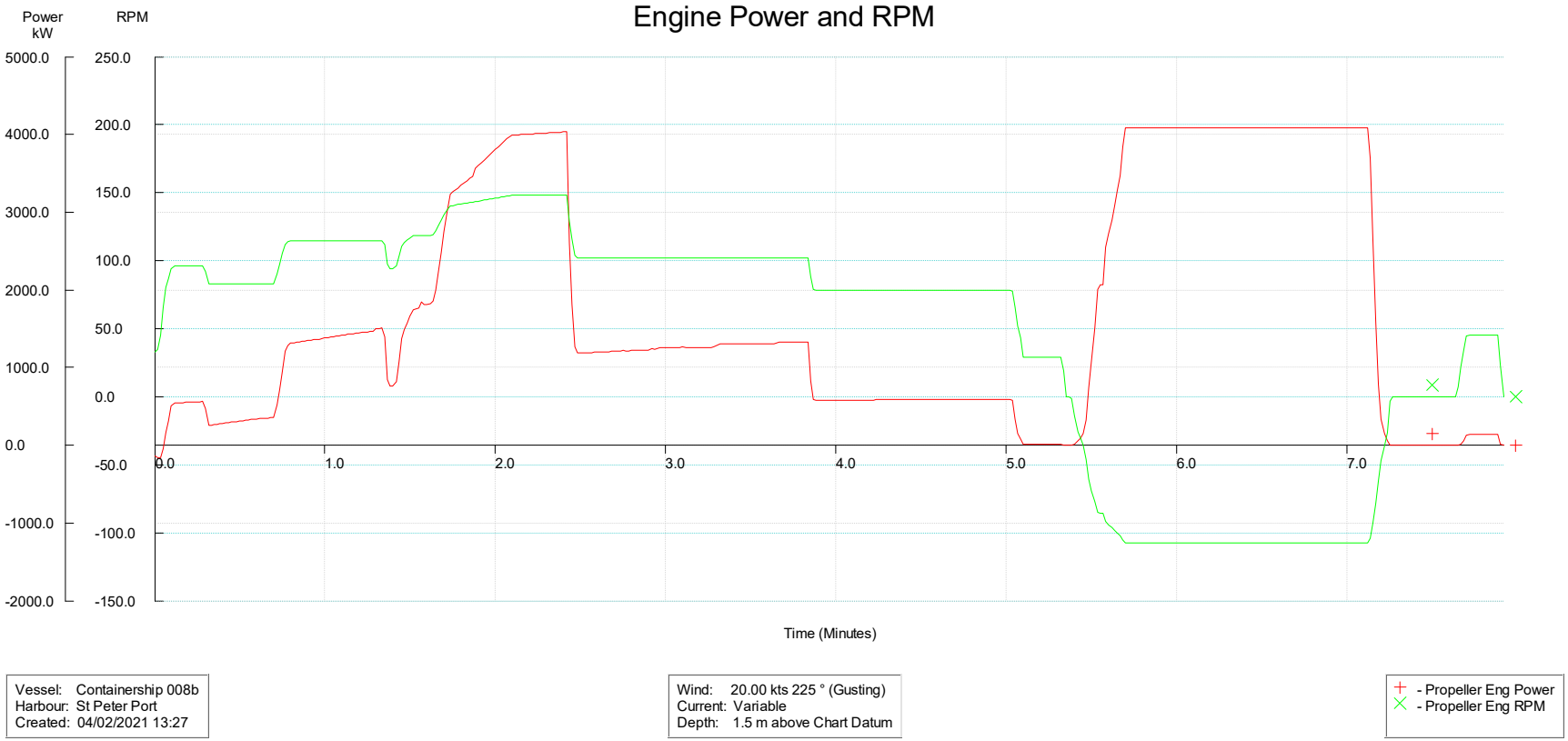


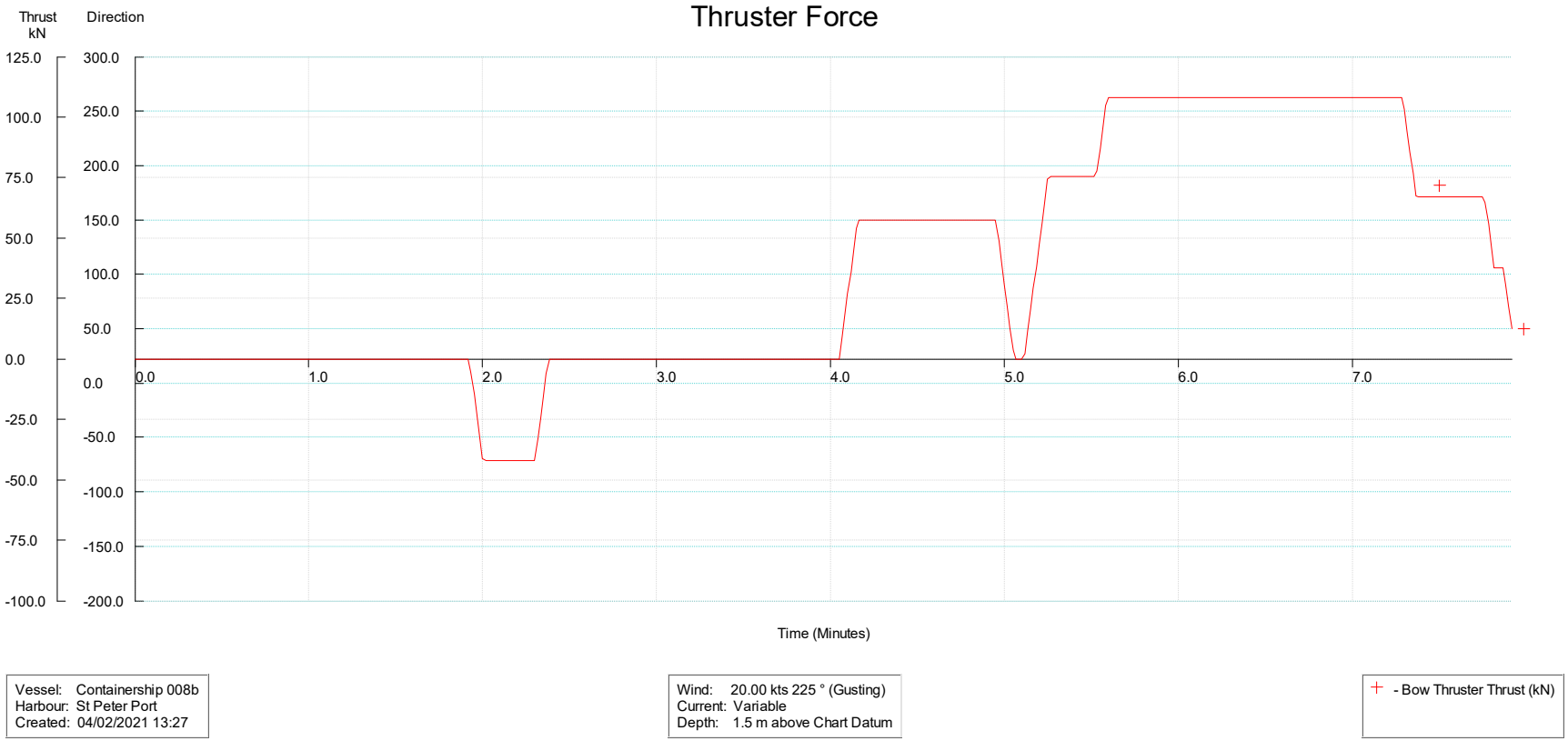
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:27

Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:27
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:27
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:27
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:27
Wind: 20.00 kts 225 ° (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
- Bow Thruster Thrust (kN)

28 RUN 28:

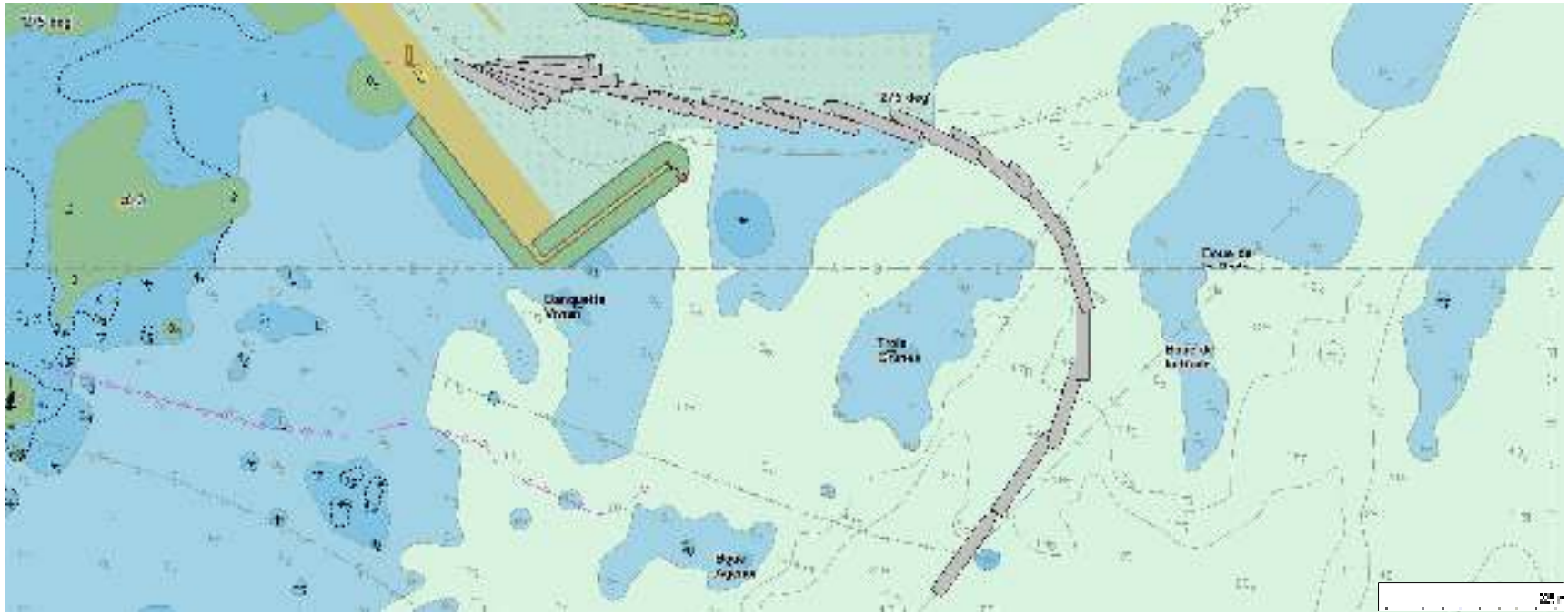
Project:	Guernsey Nav Study	Job No.:	600743	Captain/Pilot:	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			Site:	Fareham, UK

Run No.	Vessel	Access Condition		Environmental Conditions		
	Ship	Type	Harbour	Current (Speed/Dir)	Wind (Speed/Dir)	Waves (Hs, T, Dir)
28	Containership 008b	Departure	Northern	1.5kt / 215°	30kt / 225°	0.9 / 4.6 / 225°

Run 28 investigated berthing the containership in a relatively low 1.5knot southerly current, but with 30 knots of wind. The proved achievable but not easy.

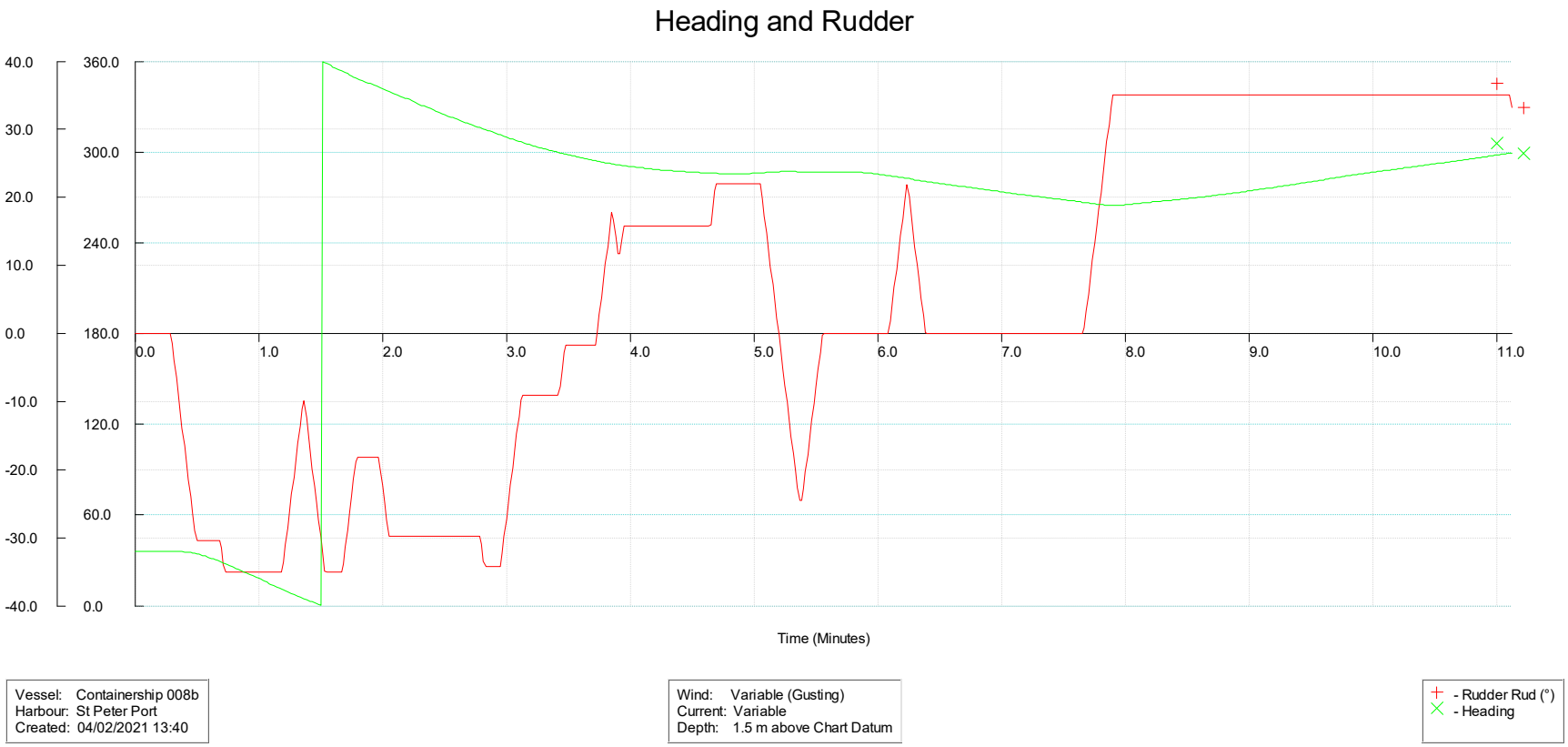
Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

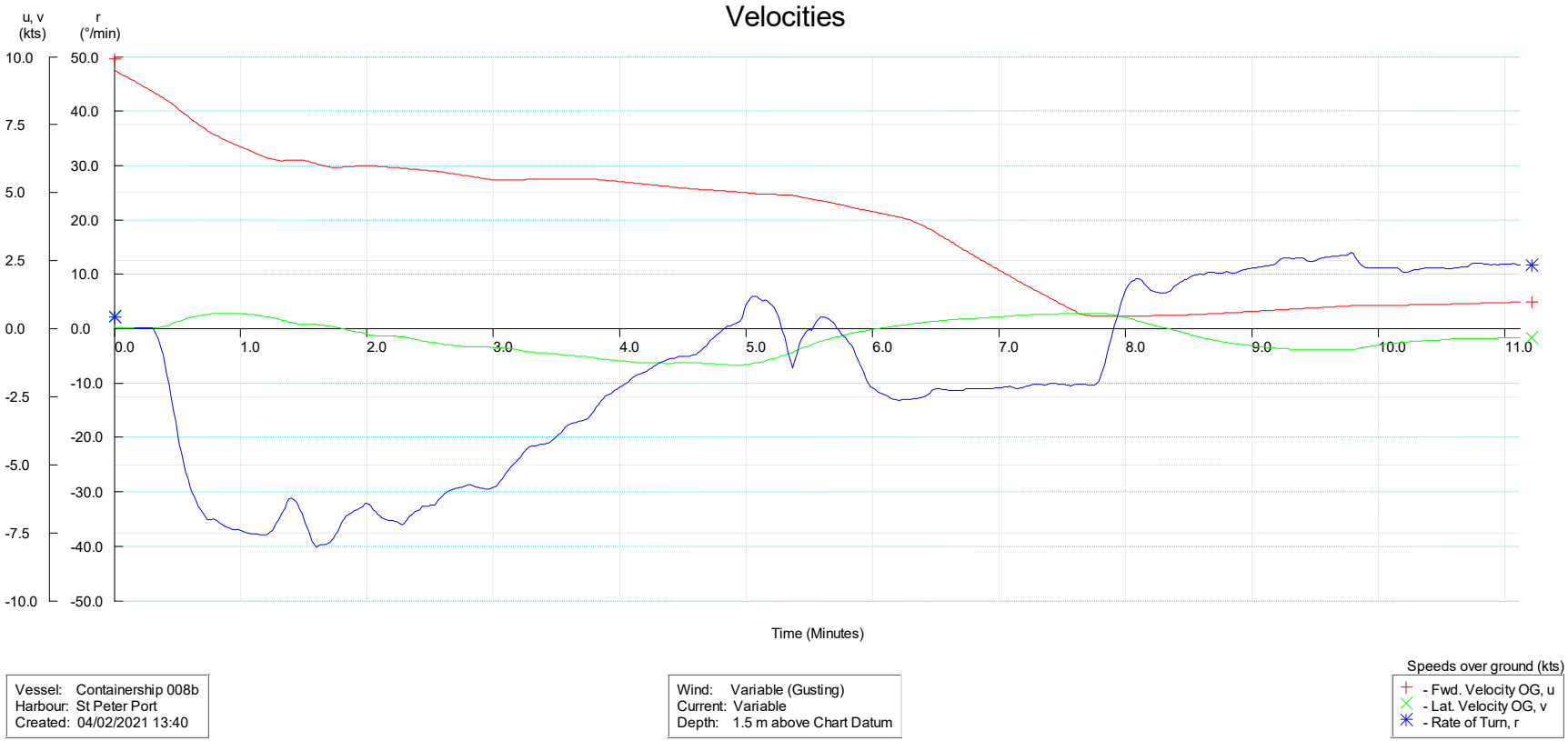
Vessel Track

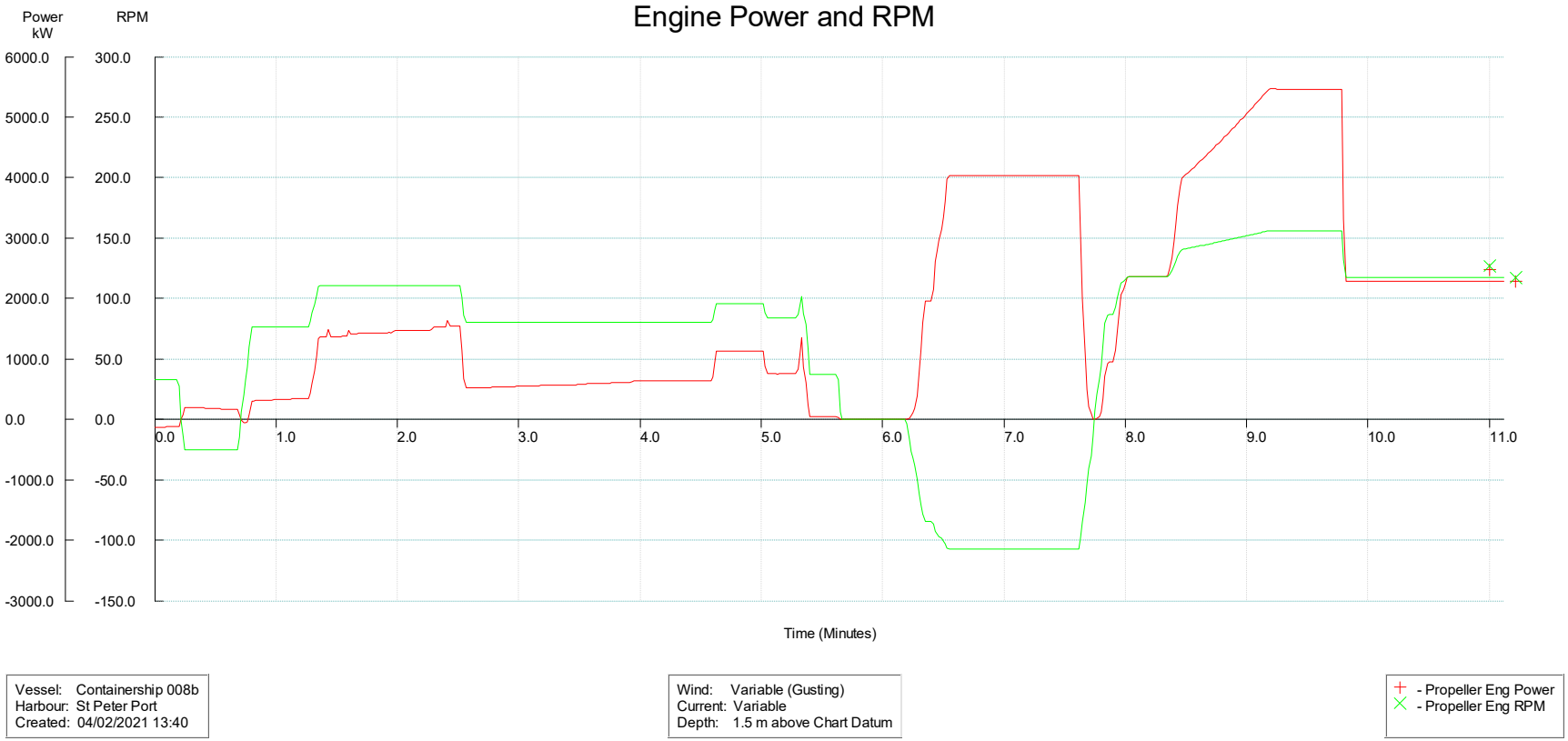


Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:40

Wind: Variable (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum


Heading and Rudder
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
360.0
300.0
240.0
180.0
120.0
60.0
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:40
Wind: Variable (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
- Rudder Rud (°)
- Heading


Velocities
u, v (kts)
r (°/min)
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:40
Wind: Variable (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
-1000.0
-2000.0
-3000.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:40
Wind: Variable (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 13:40
Wind: Variable (Gusting)
Current: Variable
Depth: 1.5 m above Chart Datum
- Bow Thruster Thrust (kN)

29 RUN 29:

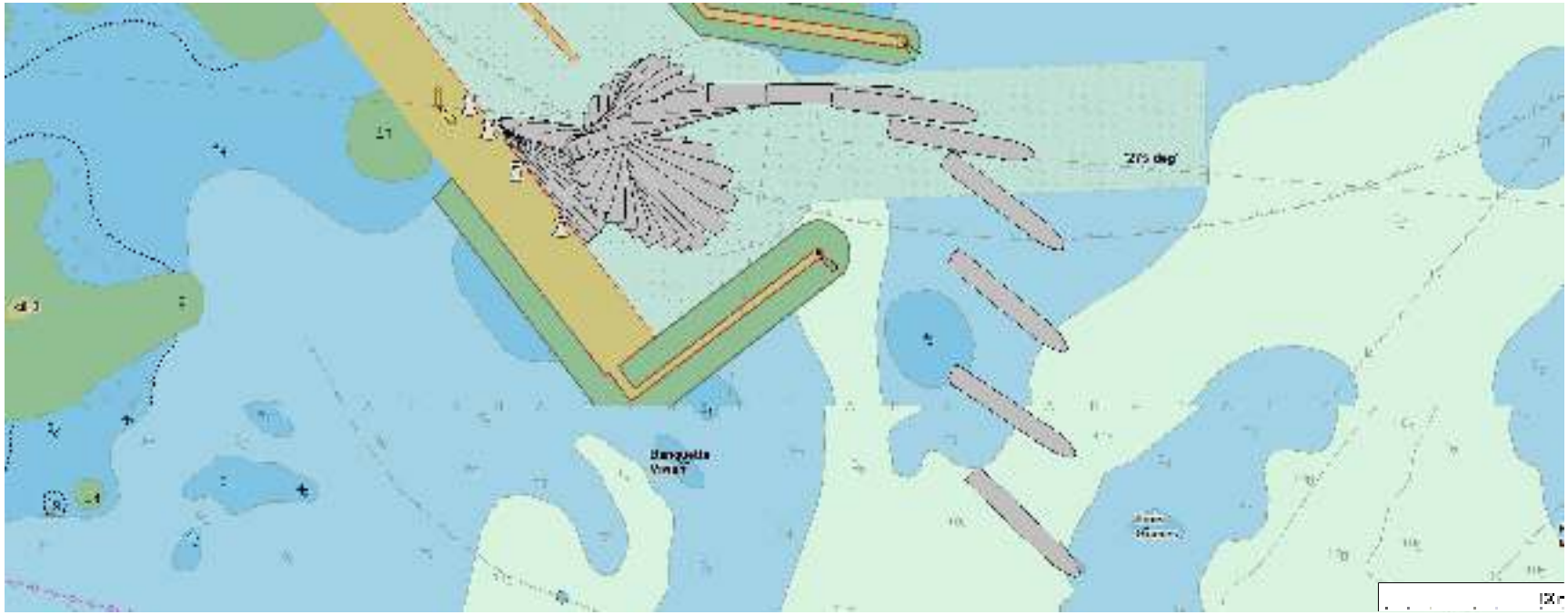
Project:	Guernsey Nav Study	**Job No.:**	600743	**Captain/Pilot:**	Dunn
Subject:	Guernsey Manoeuvring Simulation Study				
Date:	February 2021			**Site:**	Fareham, UK

Run No.	**Vessel**	**Access Condition**		**Environmental Conditions**		
	Ship	**Type**	**Harbour**	**Current (Speed/Dir)**	**Wind (Speed/Dir)**	**Waves (Hs, T, Dir)**
29	Containership 008b	Departure	Northern	Manual South Flow (5kt)	20kt / 045°	0.3 / 2.9 / 225°

A departure with a 20 knot NE wind. The ship was sprung off the berth against the wind with some difficulty and successfully brought out into the channel. Here excessive current was experienced as expected.

Ratings	1	2	3	4	5	6	7	8
	Easy	Straight-forward	Comfortable	Not demanding	**Not easy**	Challenging	Difficult	Impossible

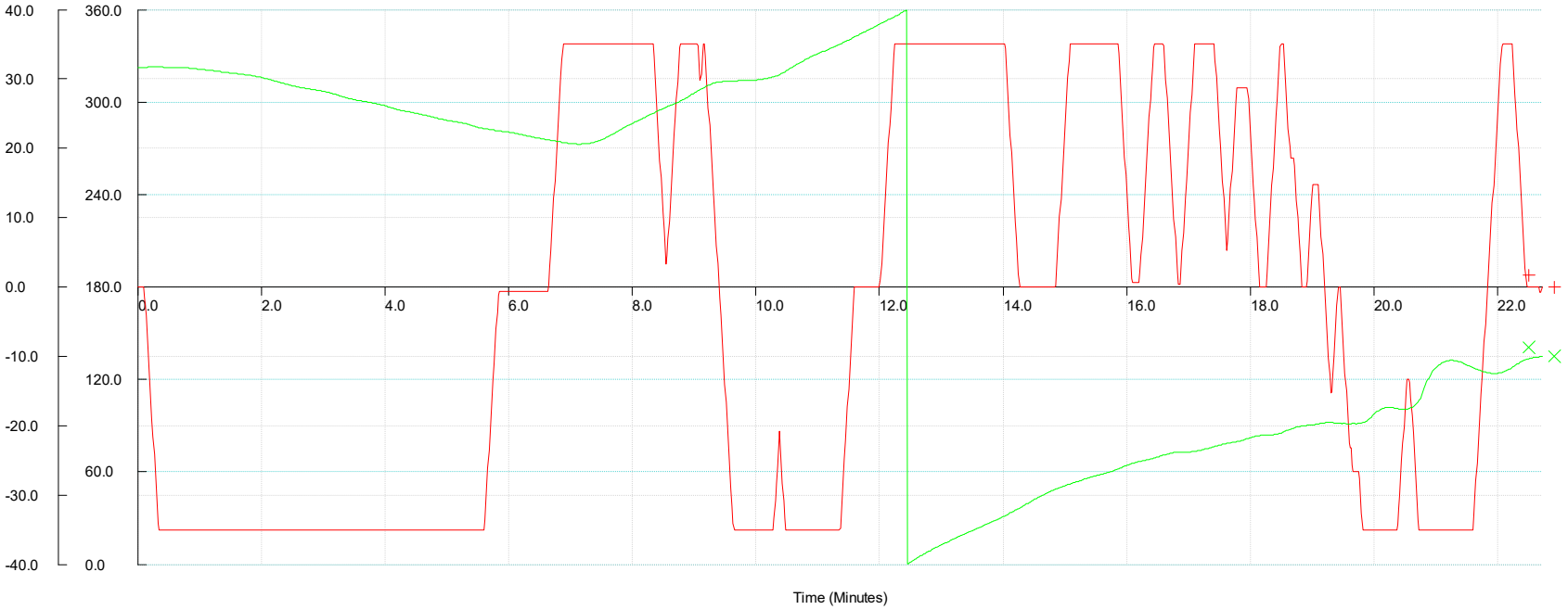
Vessel Track



Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 14:05

Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.5 m above Chart Datum

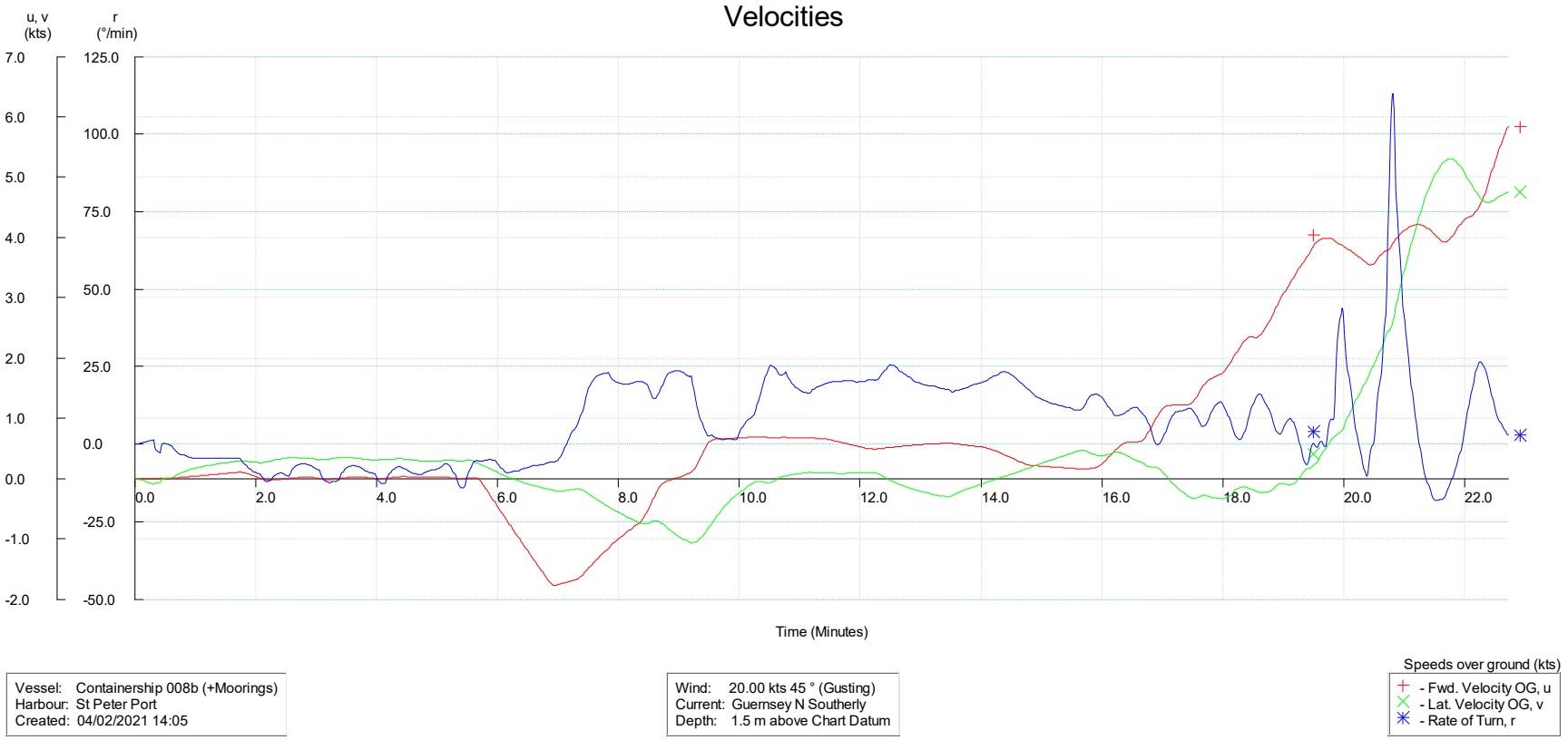
Heading and Rudder

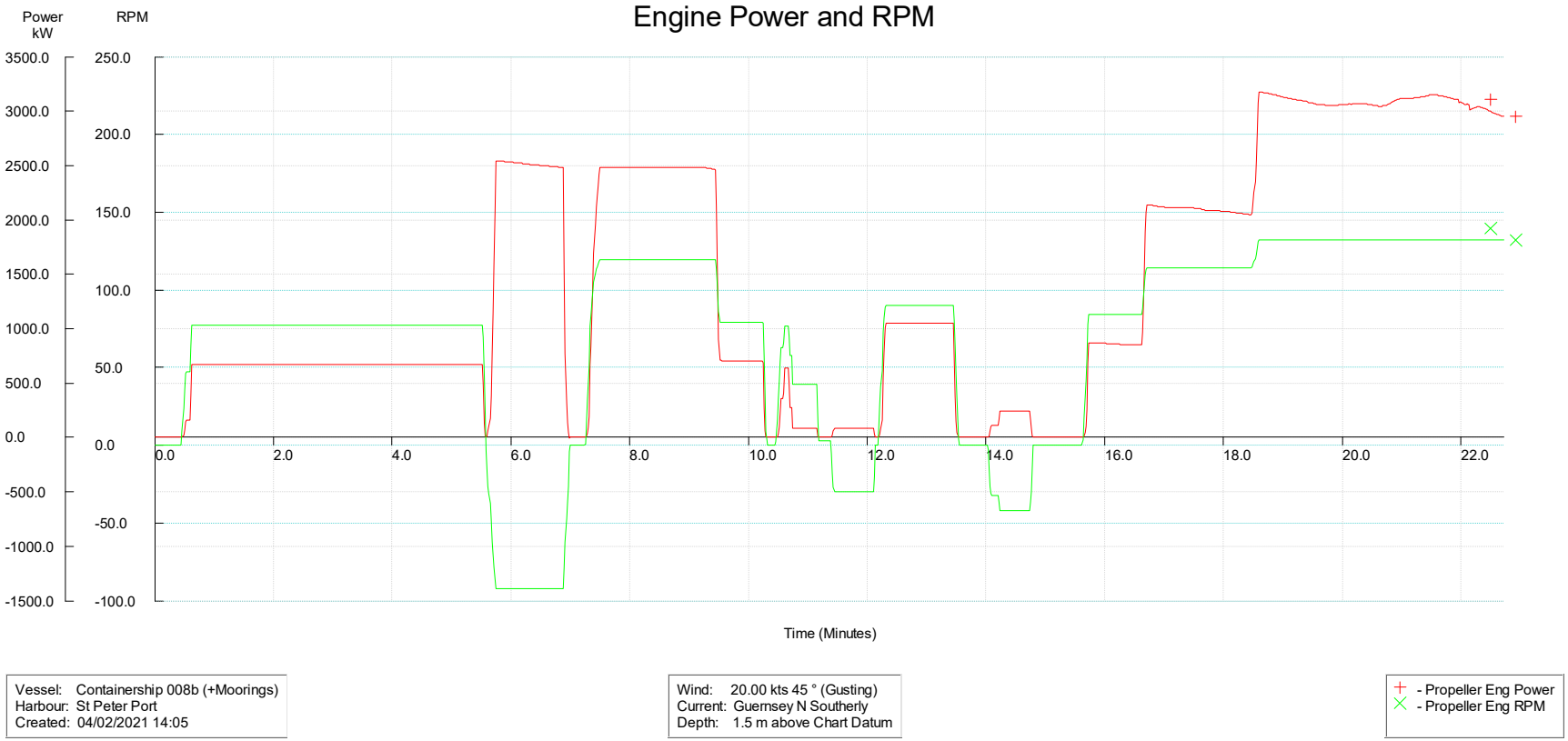


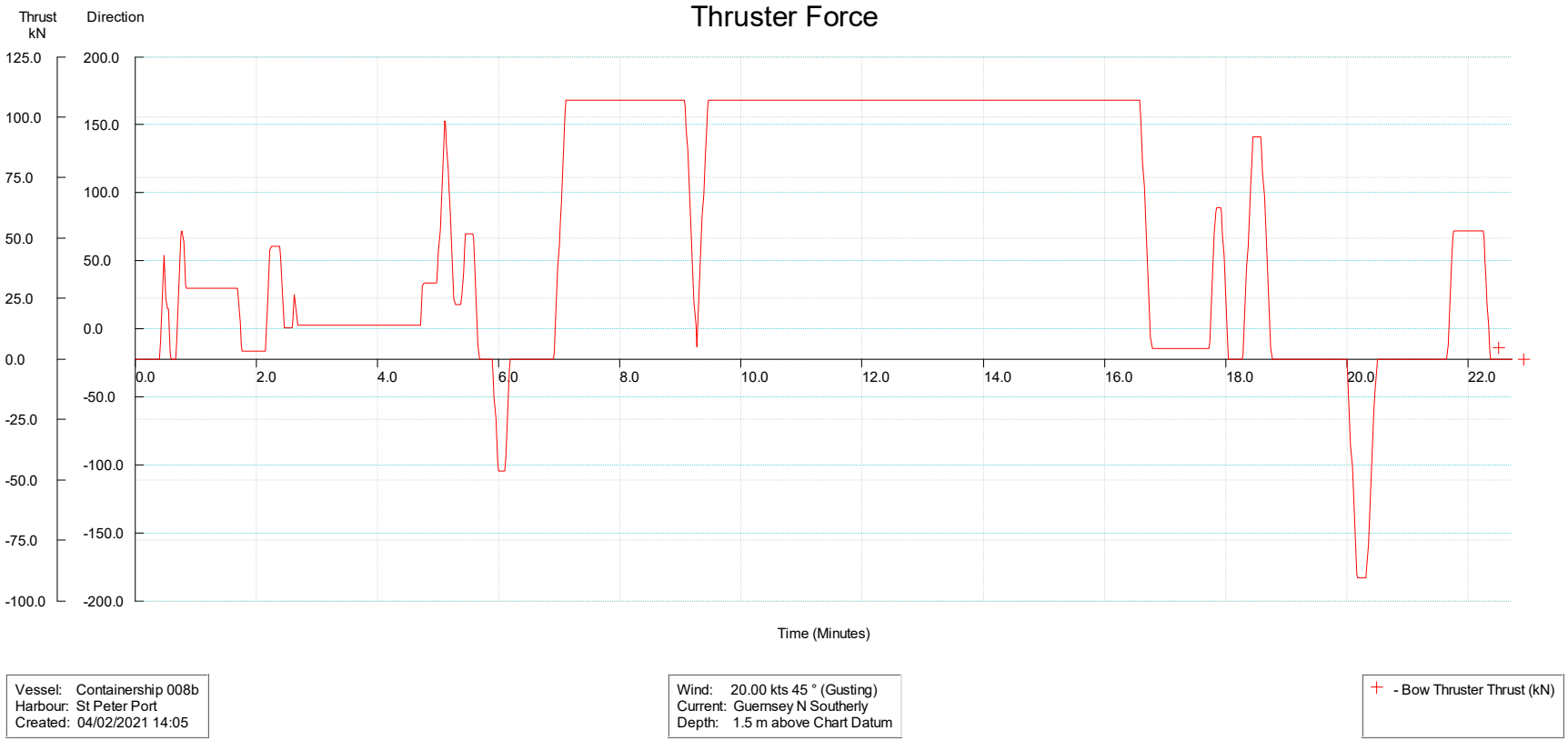
Vessel: Containership 008b (+Moorings)
Harbour: St Peter Port
Created: 04/02/2021 14:05

Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.5 m above Chart Datum

+ - Rudder Rud (°)
× - Heading


Velocities
u, v (kts)
r (°/min)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
Time (Minutes)
Vessel: Containership 008b (+Moorings)
Harbour: St Peter Port
Created: 04/02/2021 14:05
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.5 m above Chart Datum
Speeds over ground (kts)
- Fwd. Velocity OG, u
- Lat. Velocity OG, v
- Rate of Turn, r


Engine Power and RPM
Power kW
RPM
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
-500.0
-1000.0
-1500.0
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
Time (Minutes)
Vessel: Containership 008b (+Moorings)
Harbour: St Peter Port
Created: 04/02/2021 14:05
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.5 m above Chart Datum
- Propeller Eng Power
- Propeller Eng RPM


Thruster Force
Thrust kN
Direction
125.0
100.0
75.0
50.0
25.0
0.0
-25.0
-50.0
-75.0
-100.0
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
22.0
Time (Minutes)
Vessel: Containership 008b
Harbour: St Peter Port
Created: 04/02/2021 14:05
Wind: 20.00 kts 45 ° (Gusting)
Current: Guernsey N Southerly
Depth: 1.5 m above Chart Datum
- Bow Thruster Thrust (kN)

Annex B
Vessel Pilot Cards

BMT

Jan-21

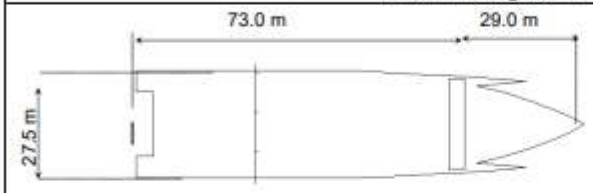
PILOT CARD

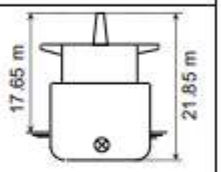
Ship Name: **Condor Liberation3**	Loading Cond. : **Design**
	Type: **Fast Ferry**

Ship's Particulars

L_{OA}:	102.0	m			
L_{BP}:	86.2	m			
Beam:	27.5	m	Block Coeff:	0.57	-
Draught (Aft):	4.2	m	Bulbous Bow:	N	-
Draught (Fwd):	4.2	m	Frontal Windage Area:	260	m^2
			Lateral Windage Area:	1,140	m^2

General Arrangement





Propulsion Particulars

			Telegraph	RPM	Speed (kts)
Engine Type:	Diesel Electric	-	Full Sea Ahead	1110	33.0
MCR:	27,300	kW	Full Ahead	900	26.0
Min. RPM:	120	-	Half Ahead	650	14.0
	2.1	kts	Slow Ahead	550	9.9
Full ahead - Full Astern:	00:32	min:sec	D. Slow Ahead	330	5.9
			D. Slow Astern	-330	
Propulsion Type:	3x FPP		Slow Astern	-550	
Propeller Diameter:	1.7	m	Half Astern	-650	
Pitch Ratio (P/D):	0.78	-	Full Astern	-900	
Direction of Rotation:	Inward				

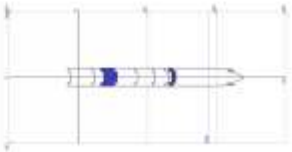
Steering Particulars

Rudder Type:	Full Spade		Midships to Hardover:	8	sec
Rudder Area:	12.4	m^2	Bow Thruster:	630	kW
Max. Angle:	35	Deg	Stern Thruster:	None	kW

Manoeuvring Performance (Deep Water)

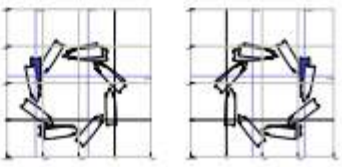
Crash Stop (Half Ahead - Full Astern)

Head Reach	188	m
Transfer	0	m
Time to Stop:	00:39	min:sec
Time to Zero RPM:	00:12	min:sec
Time to Max. Astern RPM:	00:28	min:sec



Turning Circle (Half Ahead)

	Port/Starboard	
Advance:	176/176	m
Transfer:	73/73	m
Tactical Diameter (TD):	219/219	m
Speed Loss at 90 deg:	41%	
Time to 90 deg:	00:35	min:sec



BMT

Nov-18

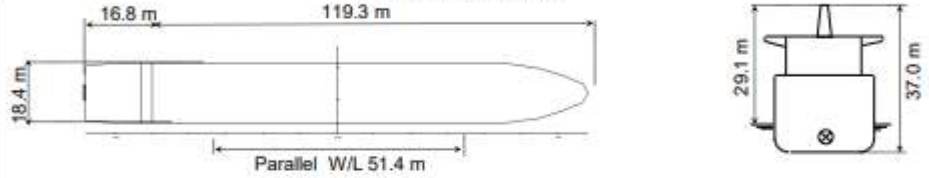
PILOT CARD

Ship Name: **Containership 008b**	Loading Cond. : **Fully-Loaded**
	Type: **Containership (Feeder)**

Ship's Particulars

L_{OA}:	136.1	m	TEU (loaded) :	750	teu
L_{BP}:	126.2	m		at design draft= 7.85m	
Beam:	18.4	m	Block Coeff:	0.75	-
Draught (Aft):	7.8	m	Bulbous Bow:	Y	-
Draught (Fwd):	7.8	m	Frontal Windage Area:	414	m^2
			Lateral Windage Area:	1,858	m^2

General Arrangement



Propulsion Particulars

			Telegraph	RPM	Speed (kts)
Engine Type:	Diesel	-	Full Sea Ahead	220	17.5
MCR:	8,800	kW	Full Ahead	140	11.5
Min. RPM:	28.8	-	Half Ahead	112	9.2
	2.3	kts	Slow Ahead	82.8	6.7
Full ahead - Full Astern:	00:16	min:sec	D. Slow Ahead	49.6	4.0
			D. Slow Astern	-35	
Propulsion Type:	Single Screw FPP		Slow Astern	-60	
Propeller Diameter:	4.3	m	Half Astern	-92	
Pitch Ratio (P/D):	0.7566	-	Full Astern	-120	
Direction of Rotation:	Right-handed (Clockwise)				

Steering Particulars

Rudder Type:	Semi-Balanced		Midships to Hardover:	14	sec
Rudder Area:	19	m^2	Bow Thruster:	756	kW
Max. Angle:	35	Deg	Stern Thruster:	None	kW

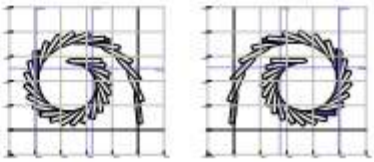
Manoeuvring Performance (Deep Water)

Crash Stop (Half Ahead - Full Astern)

Head Reach	410	m
Transfer	7	m
Time to Stop:	02:57	min:sec
Time to Zero RPM:	00:09	min:sec
Time to Max. Astern RPM:	00:28	min:sec

Turning Circle (Half Ahead)

	Port/Starboard	
Advance:	361/363	m
Transfer:	177/175	m
Tactical Diameter (TD):	396/398	m
Speed Loss at 90 deg:	39%	
Time to 90 deg:	01:54	min:sec



BMT ARGOSS

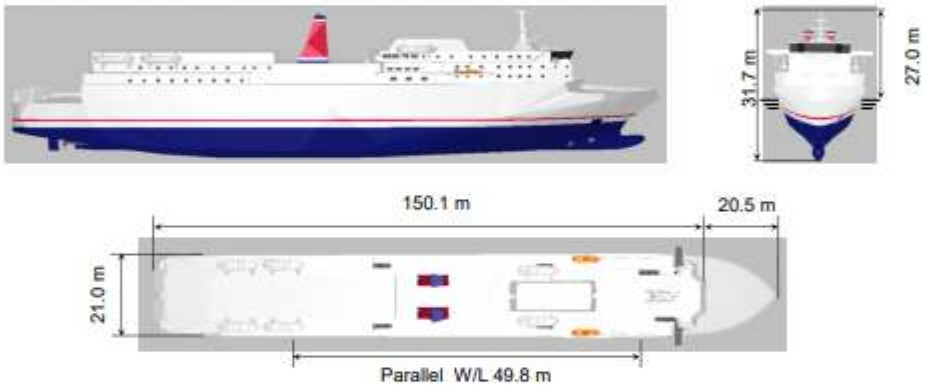
PILOT CARD

Ship Name: **Ro-Ro 014**

Ship's Particulars

L_{OA}:	129.6	m			
L_{BP}:	120.7	m	Block Coeff:	0.61	-
Beam:	21.0	m	Bulbous Bow:	Y	-
Draught (Aft):	4.7	m	Frontal Windage Area:	480	m^2
Draught (Fwd)	4.7	m	Lateral Windage Area:	2,200	m^2
Displacement:	7,449	tonnes	Air Draft:	27.0	m

General Arrangement



Propulsion Particulars

Propulsion Type:	Twin Screw (CPP)	
Engine Type:	2 x Diesel	
MCR:	15,350	kW
Min.Pitch:	3.0	Deg
	7.1	kts
Full Ahead - Full Astern:	00:16	min:sec
Propeller Diameter:	3.0	m
Propeller RPM:	265	-
Direction of Rotation:	Inward	

Telegraph	Pitch (Deg)	Speed (kts)
Full Sea Ahead	32.0	23.5
Full Ahead	27.0	20.7
Half Ahead	18.0	16.0
Slow Ahead	12.0	12.4
D. Slow Ahead	6.0	8.9
D. Slow Astern	-6.0	-3.4
Slow Astern	-12.0	-9.0
Half Astern	-18.0	-13.3
Full Astern	-22.0	-15.6

Steering Particulars

Rudder Type:	2 x Semi-Balanced				
Rudder Area:	8.6	m^2	Bow Thruster:	2 x 750	kW
Max. Angle:	35	deg	Stern Thruster:	None	kW
Midships to Hardover:	6.0	sec			