Iarnród Éireann
Irish Rail

Rosslare ORE Hub

EIAR Technical Appendices

Technical Appendix 20:

Navigation Risk Assessment

venterra | GDG GAVIN & DOHERTY GEOSOLUTIONS | NICHOLAS O'DWYER an RSK company

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NASH MARITIME

ROSSLARE EUROPORT ORE HUB PROJECT

Navigation Risk Assessment

Iarnród Éireann - Irish Rail

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ACRONYMS

Abbreviation	Detail
AHT	Anchor Handling Tug
ALARP	As Low As Reasonably Practicable
AIS	Automatic Identification System
AtoN	Aid to Navigation
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea,
CLV	Cable Laying Vessel
CSO	Central Statistics Office
CTV	Crew Transfer Vessel
ETA	Estimated Time of Arrival
FSA	Formal Safety Assessment
GDG	Gavin & Doherty Geosolutions
HNS	Hazardous and Noxious Substances
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organisation
IRCG	Irish Coastguard
LPS	Local Port Services
MCA	Maritime and Coastguard Agency
MCIB	Marine Casualty Investigation Board
MSO	Marine Survey Office
NMPF	National Marine Planning Framework
NRA	Navigation Risk Assessment
NtM	Notice to Mariners
MARPOL	International Convention for the Prevention of Pollution from Ships
MCIB	Marine Casualty Investigation Branch
OCV	Offshore Construction Vessel
ORE	Offshore Renewable Energy
OWF	Offshore Wind Farm
PEC	Pilotage Exemption Certificate
PPE	Personal Protective Equipment
RNLI	Royal National Lifeboat Institute
SAR	Search and Rescue
SOLAS	Safety of Life at Sea
SOV	Service Operation Vessel

Abbreviation	Detail
Tp	Peak wave period
TSS	Traffic Separation Scheme
WTG	Wind Turbine Generator
WTIV	Wind Turbine Installation Vessel
VHF	Very High Frequency
VTS	Vessel Traffic Services

1. INTRODUCTION

Rosslare Europort, supported by Port Authority, the applicant Iarnród Éireann (IÉ), is seeking to develop Rosslare Europort Offshore Renewable Energy (ORE) Hub for Ireland's South-East ("The Proposed Development"). The Proposed Development will deliver an ORE purpose-built quay and berth, ORE quayside storage and pre-construction areas and dredging of the navigable channel to support deep draught vessels (see **Section 4**). The hub will service the emerging offshore wind industry and help support the government's offshore wind target of seven gigawatts of power from ORE by 2030.

NASH Maritime has been commissioned to undertake a Navigation Risk Assessment (NRA) for the construction, operation and decommissioning of the Proposed Development. The objective of the NRA is to identify impacts and hazards on shipping and navigation associated with the Project, assess the level of risk and determine whether appropriate mitigation is in place.

1.1 STRUCTURE

This NRA is structured as follows:

- **Section 1** – Introduction
- **Section 2** – Policy, Guidance and Legislation.
- **Section 3** – Methodology.
- **Section 4** – Project Description.
- **Section 5** – Description of the Marine Environment.
- **Section 6** – Existing Maritime Activities.
- **Section 7** – Future Traffic Baseline.
- **Section 8** – Impact Assessment.
- **Section 9** – Navigation Risk Assessment.
- **Section 10** – Conclusions.

2. POLICY, GUIDANCE AND LEGISLATION

2.1 LEGISLATION AND NATIONAL POLICY

National Marine Planning Framework (NMPF) (Department of Housing, Planning and Local Government, 2021) sets out the Irish Government's vision, objectives and marine planning policies for each marine activity. The NMPF sets out a clear direction for managing the seas, clarifies objectives and priorities, and directs decision makers, users and stakeholders towards strategic, plan-led and efficient use of marine resources. Relevant sections are:

- Section 4 – Overarching Marine Planning Policies.
- Section 10 – Defence and Security: Any proposal that has the potential to interfere with the performance by the Defence Forces of their security and non-security related tasks must be subject to consultation with the Defence Organisation. This includes potential interference with:
    - Safety of navigation and access to naval facilities.
    - Firing, test or exercise areas.
    - Communication, and surveillance systems.
    - Fishery protection functions.
- Section 18 – Ports, Harbours and Shipping, including:
    - Safeguarding operation of ports.
    - Facilitate maritime transport services.
    - Sustainable development of ports sector.
    - Avoidance of significant adverse impacts on marine activities or uses of the maritime area.
    - Requirements for NRA and analysis of maritime traffic.
- Requirements for consultation with the Department of Transport, Marine Survey Office (MSO) and Commissioner of Irish Lights.
- Section 19 – Safety at Sea, including:
    - Ensure that safety at sea and navigational safety are key considerations in the assessment of proposals for the development or expansion of port facilities, or the development of infrastructure in or adjacent to the maritime area.
    - Safeguard the Marine Emergency Response (Search and Rescue, Maritime Casualty and Pollution Response) capacity of the State.
    - Proposals for infrastructure that have the potential to significantly reduce under-keel clearance must be avoided, minimised or mitigated.
    - All proposals for temporary or permanent fixed infrastructure in the maritime area must ensure navigational marking in accordance with appropriate international standards and ensure inclusion in relevant charts where applicable.
    - Establishing, changing or disestablishing Aids to Navigation (AtoN) must be sanctioned, in advance of works, by the Commissioners of Irish Lights.

The National Ports Policy (Department of Transport, Tourism and Sport, 2019) was issued to facilitate a competitive and effective market for maritime transport services. It recognises the challenges and opportunities facing Irish Ports. Within the National Ports Policy, Rosslare Europort is categorised as a Tier 2 port given it is responsible for at least 2.5% of overall tonnage through Irish ports, has clear, demonstrable potential to handle higher volumes of unitised traffic and has existing transport links to serve a wider, national marketplace.

The Proposed Development will progress in accordance with the Maritime Area Planning Act 2021 the Department of Housing, Local Government and Heritage, 2021) and the Planning and Development Act 2000, as amended (the Department of Housing, Local Government and Heritage, 2000). Rosslare Europort falls outside of the Harbours Act 1996-2009.

In addition, the assessment considers that vessels are navigating in adherence to the requirements under the Safety of Life at Sea (SOLAS), International Convention for the Prevention of Pollution from Ships (MARPOL) and Standards of Training, Certification and Watchkeeping for Seafarers conventions. Furthermore, vessels will navigate in accordance with the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs).

2.2 GUIDANCE

The International Maritime Organisation (IMO) Formal Safety Assessment (FSA) process has been applied within this NRA. The guidelines for FSA were approved in 2002 and were most recently amended in 2018 by MSC-MEPC.2/Circ.12/Rev.2. This NRA has been conducted utilising this methodology, as per recommendations from MGN654.

The FSA is a structured and systematic methodology, aimed at enhancing maritime safety, including the protection of life, health, the marine environment and property, by using risk analysis and, if appropriate, cost-benefit assessment. The IMO FSA guidance defines a hazard as “a potential to threaten human life, health, property or the environment”, the realisation of which results in an incident or accident. The potential for a hazard to be realised (i.e. likelihood) can be combined with an estimated or known consequence of outcome and this combination is termed ‘risk’. There are five steps within the FSA process.

- Step 1: Identification of hazards
- Step 2: Risk analysis
- Step 3: Risk control options
- Step 4: Cost-benefit assessment (if applicable)
- Step 5: Recommendations for decision making.

The NRA methodology based on the FSA is described in **Figure 1** and further described in **Section 9**.

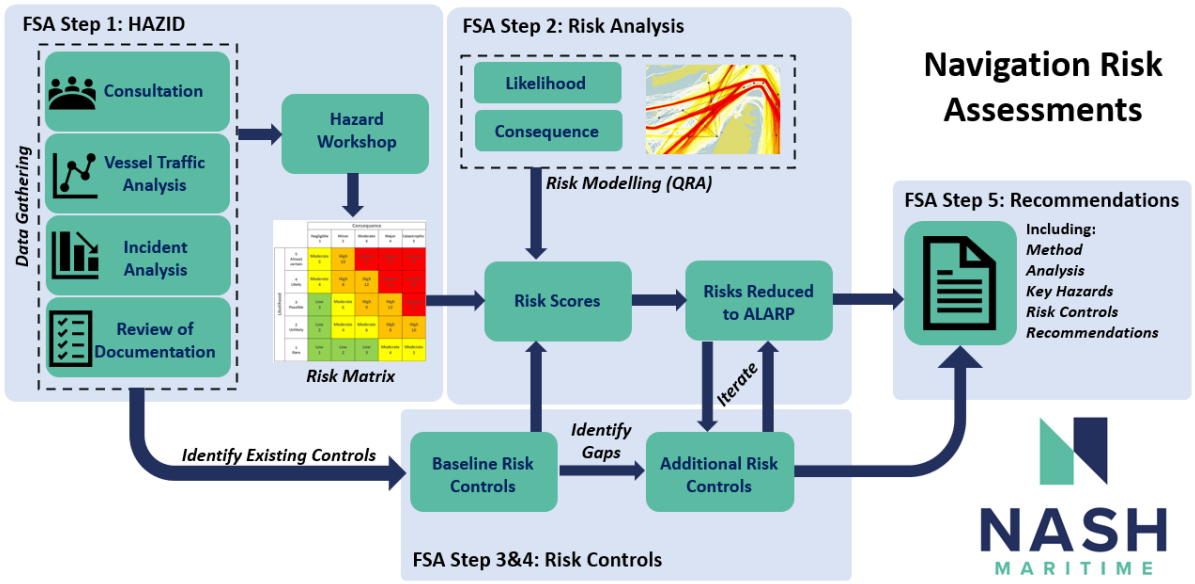

Figure 1: NRA Methodology.

3. METHODOLOGY

3.1 STUDY AREA

The Study Area for this assessment focuses on activity within a 1 km radius from the perimeter of the proposed development area composed of reclaimed land and dredge area (**Figure 2**).

Navigational features immediately outside of that radius such as the West Holdens Buoy and any relevant traffic activity up to 5 km from the development area are also considered in the vessel traffic analysis covering approaches of ship routes from the South Shear Channel as well as anchoring and loitering behaviour towards the North Shear Channel upon preparation to enter port. A description of the marine environment is presented in **Section 5**.

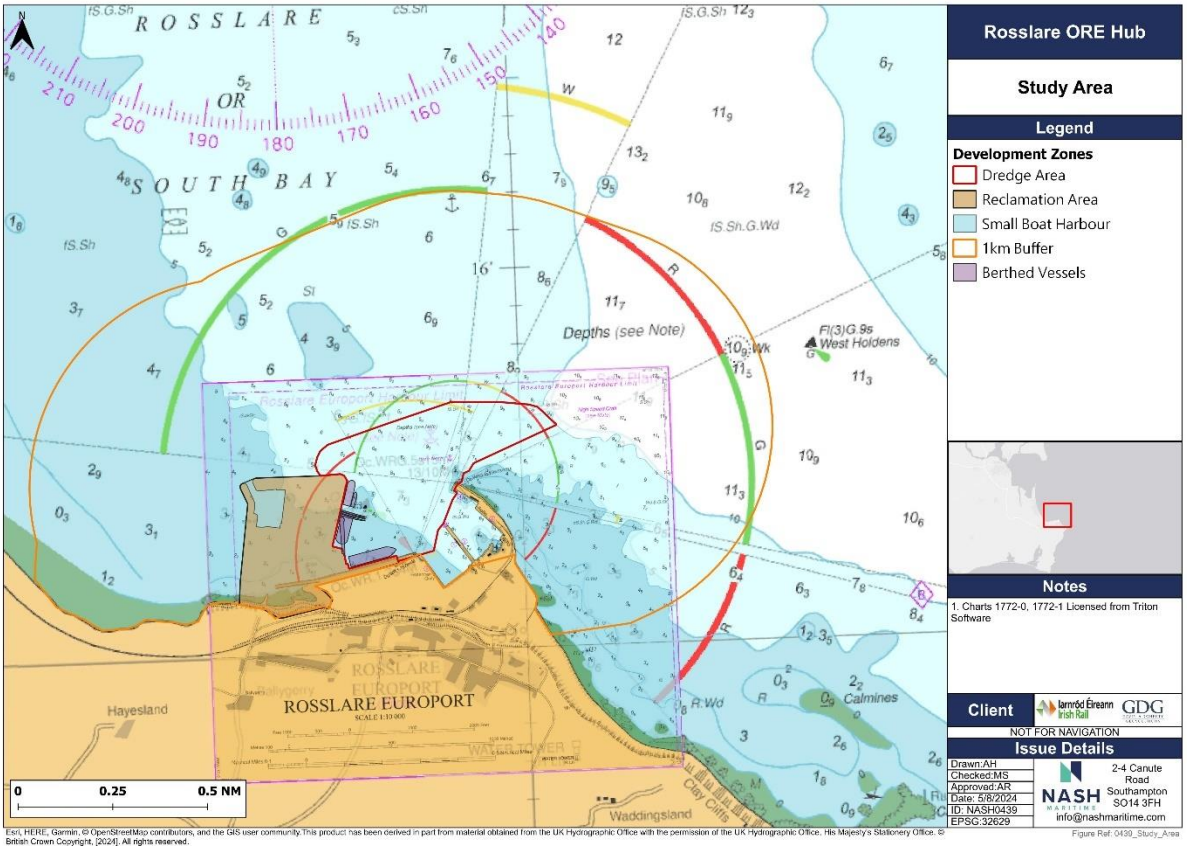

Figure 2: Rosslare Harbour Study Area with Mapped Proposed Developments.

3.2 DATA SOURCES

Table 1 summarises the primary datasets used within this NRA.

Table 1: Primary Datasets Used in Assessment.

Dataset	Description
Automatic Identification System (AIS) data for 2023 purchased from a commercial supplier.	AIS data for the Study Area was purchased for use within this NRA. The information contains the positional, speed, course, name and description of all commercial vessels over 500 gross tonnes, all passenger vessels, fishing vessels over 15 m and voluntarily carried by other small craft.
Marine Casualty Investigation Board (MCIB) Reports	Incident data published on the MCIB website.
Royal National Lifeboat Institute (RNLI) Incident Data	Incident data for 2008-2023 provided by RNLI across all UK waters.
Admiralty Nautical Charts	Relevant nautical charts were licensed from Triton
Admiralty Total Tide	Tidal data
Rosslare Port Statistics from the Central Statistics Office (CSO)	Port arrivals and gross tonnage for commercial traffic between 2017-2023

3.3 CONSULTATION

Table 2 summarises the consultation activities undertaken as part of this Project. The Meeting minutes are contained in **Appendix B**. A consultation letter was prepared and issued to a wide range of stakeholder groups inviting feedback. The following stakeholder groups were contacted:

- Rosslare Harbour Master.
- Stena Line.
- Irish Ferries.
- Brittany Ferries.
- DFDS.
- Neptune Lines.
- Finnlines.
- RNLI.
- Small Boat Owner Association.
- Commissioner of Irish Lights.
- Marine Safety Office.
- Irish Coastguard.

Table 2: Consultee Summary Table.

Date	Consultee	Key Issues Raised	Where Addressed Within This NRA
5th July 2024 Meeting	Irish Coastguard	Impacts on search and rescue.	**Section 8.9**
19th July 2024 Meeting	Irish Lights	Had the South Shear Channel been considered regarding previous close quarters incidents near the West Holdens Buoy.	**Section 8.5.1**
		Would a strong NE wind push commercial vessels towards the quay development during their manoeuvres.	**Section 8.38.5.1**
		Would additional vessels present a problem with conflicting ferry operations.	**Section 8.2.2**
24th July 2024 Email	Stena Line	Safe distance for vessels approaching Berth 1 and Berth 2.	**Section 8.5 / 9.5**
		Suitability of risk controls.	**Section 9.6**
30th July 2024 Hazard Workshop	Harbour Master Stena Line DFDS Irish Ferries Finnlines	In regards, to the existing passenger tracks, does the blade overhang create a collision risk depending on the carrier's location along the quay, especially with proposed longer ferry vessels. With the history of close quarters situations, is hazard 1 'Ferry Commercial Vessel ICW Project Vessel' scored too low.	**Section 8.5 / 9.5**
		Is remote pilotage and LPS sufficient management with additional vessels unfamiliar with the harbour. Would additional risk controls be required.	**Section 9.6**
		Is there likely to be an increase in recreational craft when facilitated by the new Small Boat Harbour infrastructure.	**Section 7.2**
		Would strong swell from the NE, unable to dissipate due to the confines of the quayside, cause a surge and increase the risk of breakout.	**Section 9.5**

3.4 SHIP SIMULATIONS

Full mission bridge, real time, navigation simulations were undertaken for ship arrivals and departures from both the Project and Rosslare Harbour. The simulations were conducted at the National Maritime College of Ireland in Ringaskiddy, County Cork on 29th and 30th May 2024. Attendees at the simulations were:

- Clive Hotham (CRHSimulation/GTSS) – Simulator operator.
- Ivan Walsh (Port of Cork) – Pilot.
- Tom Curran (Rosslare Europort) – Harbour Master.

- Billy Hoey (Irish Rail) – Project Manager.
- William Brown (GDG) – Consultant Team Project Manager.
- Andrew Rawson (NASH Maritime) – Navigation Risk Expert.

In total 15 runs were undertaken, a summary of which is provided below in **Table 3**. The runs tested a number of different vessel types, including the largest anticipated wind farm construction vessels, existing RoRo ferries and general cargo ships in what was considered the worst credible conditions. The navigation simulation report is contained in **Appendix C**.

Table 3: Simulation Summary.

Run ID	Vessel	Weather Conditions	Summary
1	216 m Length overall (LOA), 68,500 displacement loaded Module Carrier.	15 kts SW	Arrival and berthing port side to on 300 m Main Quay. Swing to starboard conducted northwest of breakwater.
2	216 m LOA, 68,500 displacement loaded Module Carrier.	25 kts SW	Arrival and berthing port side to on 300 m Main Quay. Swing to starboard conducted northeast of Main Quay.
3	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts NE	Arrival and berthing port side to on 300 m Main Quay. Swing to port conducted northwest of breakwater. Close approach to vessel berthed on new RoRo berth.
4	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts NE	Arrival and berthing port side to on 300 m Main Quay. First approach aborted due to positioning at simulation start up. Swing to starboard conducted northwest of breakwater. 17 m offset of bow from edge of dredged area.
5	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts NW	Arrival and berthing port side to on 300 m Main Quay. Swing to starboard conducted northwest of breakwater.
6	151 m LOA, 8,344 displacement RoRo ferry.	30 kts NE	Arrival and berthing starboard side to on new RoRo berth. Swing to starboard conducted north of breakwater, with close pass.
7	209 m LOA, 28,280 displacement RoRo ferry.	40 kts SW	Arrival and berthing starboard side to on new RoRo berth. Swing to starboard conducted north of breakwater.
8	209 m LOA, 28,280 displacement RoRo ferry.	40 kts SW	Arrival and berthing starboard side to on existing RoRo Berth 1. Swing to starboard conducted north of breakwater.
9	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts NE	Arrival and berthing port side to on 300 m Main Quay. Swing to starboard conducted west of breakwater.
10	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts SE	Arrival and berthing port side to on 300 m Main Quay. Swing to port conducted west of breakwater.

Run ID	Vessel	Weather Conditions	Summary
11	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts SW	Departure off 300 m Main Quay when berthed port side to.
12	216 m LOA, 68,500 displacement loaded Module Carrier.	30 kts NE	Departure off 300 m Main Quay when berthed starboard side to with swing to starboard west of the breakwater.
13	136 m LOA, 18,555 displacement general cargo ship.	30 kts SW	Arrival at new RoRo berth – run aborted due to high speed of approach.
14	136 m LOA, 18,555 displacement general cargo ship.	30 kts SW	Arrival and berthing port side to at new RoRo berth.
15	151 m LOA, 8,344 displacement RoRo ferry.	30 kts NE	Arrival and berthing starboard side to on existing RoRo Berth 1 whilst a 216 m Module Carrier is berthed stern to (Med-Moor) off 300 m Main Quay.

3.5 CUMULATIVE ASSESSMENT

The assessment also considered the impact of other proposed projects in the vicinity of the Proposed Development. Existing navigational features and activities, such as anchorages and vessel routes, are included within the baseline assessment. The Proposed Development falls within the Rosslare Europort Masterplan within which there are further relevant developments, namely:

- Extension to Berth 3 and upgrades/replacements of associated infrastructure (linkspan/bollards etc.). This is anticipated to be completed before the construction of the Proposed Development. This will enable the port to accommodate wider vessels and therefore more cars and freight capacity.
- Shoreside developments including roads, roundabouts, kiosks and terminals. This will facilitate improved shoreside logistics and operations. Construction has already commenced and is due to be completed before the construction of the Proposed Development.

Following consultation and screening, no further proposed developments were anticipated to have a significant cumulative impact with regards to shipping and navigation on this Proposed Development. Whilst it is noted that there are a number of proposed offshore wind farms on the east and southeast coast of Ireland, the role that Rosslare might play in their construction and operations and maintenance is already considered within the activities of the Proposed Development, such as increased vessel movements. Therefore, no further cumulative assessment of shipping and navigation impacts was undertaken.

4. PROJECT DESCRIPTION

Irish Rail intends to develop and extend port infrastructure at Rosslare Europort, County Wexford in southeast Ireland with the aim to facilitate the development of offshore wind farms in the Irish and Celtic seas. The marine development of Rosslare Europort Hub will include a crica 21-hectare reclamation area and dredge area adjacent to and north of the existing port infrastructure.

Project developments are outlined in the Project Environmental Impact Assessment (EIA) by Gavin & Doherty Geosolutions (2024) and include the following:

- 330 m purpose-built heavy lift berth with a 12 m berth pocket.
- 240 m purpose-built RoRo berth designed for loading/unloading of components.
- ORE quayside storage and pre-construction areas.
- Navigable channel dredged to -10 m below chart datum.
- Small Boat Harbour with purpose-built pontoons, power and water.
- Rock armour revetments partially surrounding the reclaimed area and providing protection to the Small Boat Harbour.
- Management control centre, offices, facilities and additional onshore developments.

4.1 CONSTRUCTION

The expected construction span is from 18-24 months from commencement to completion, with a desired commencement date in 2026. Marine construction requirements include the following:

- Temporary site establishment.
- Piling and blasting.
- Dredging of approach channels and berth pockets.
- Reclamation, including reusing dredged material and import of additional rock by barges.
- Formation of solid quay walls.
- Rock armour revetments construction and placement of breakwater armour units.
- Concrete works.

4.2 ACTIVITIES WHILST OPERATIONAL

Operations in Rosslare Europort will migrate towards a focus on Offshore Wind Farm (OWF) energy support but will remain a hub for cargo and ferry movements as well as occasional fishing and recreational activity facilitated by the Small Boat Harbour. Operational activities are listed as such:

- Unloading of renewables components with laydown and storage.
- Loading of renewables components to barges or specialist heavy lift vessels (HLVs).

- Freight ferry movements.
- General cargo handling.
- Ongoing maintenance dredging.

The anticipated number of project vessels using the main berths is relatively low, with peak traffic numbers during an OWF lifecycle of up to one large vessel every two days to the Main Quay and multiple movements per day to the Small Boat Harbour. In off-peak periods this could be as low as one large vessel every two weeks.

4.3 EMBEDDED MITIGATIONS

Table 4 describes the risk control measures existing within Rosslare Europort and those proposed by the Project. These are assumed to be in place for the purposes of this NRA.

Table 4: Embedded Mitigations.

ID	Risk Control	Description
Existing Port Risk Controls		
1	Local Port Services (LPS)	Rosslare Europort operate an LPS which is manned 30 minutes prior to the arrival or departure of any cargo ship or RoRo. The LPS offers three key risk controls: • Monitoring of vessel movements. • Provision of clearance for vessel movements. • Remote pilotage assistance. • MetOcean Monitoring. Further details are provided in the Local Port Services Manual (Rosslare Europort, 2023).
2	Clear Channel Policy	No vessels may move within the harbour unless given clearance by the Harbour Master or delegated to the Duty LPS Controller. In particular, vessels are required to wait west of the West Holdens Green Lateral until both their berth is vacant and the approaches are clear of other manoeuvring vessels.
3	Port Emergency Plan	The Emergency Plan provides guidance for all staff that may be involved in dealing with a marine or terminal incident that occurs within the Port of Rosslare Europort, its approaches, or on passage to or from the port (Rosslare Europort, 2022).
4	Oil Spill Response Plan	The Oil Spill Response Plan is designed to guide response personnel at Rosslare Europort through the process required to manage an oil/Hazardous and Noxious Substances (HNS) spill originating from operations within the Harbour Limits (Rosslare Europort, 2018).
5	Incident Investigation and Reporting	All incidents that occur within the harbour are investigated and lessons learnt are disseminated to relevant parties.
6	Notice to Mariners (NtM)	NtM will be issued for any major activities within the harbour.
7	Weather Limits	Arrival and departure weather limits are set within the Local Port Services Manual (Rosslare Europort, 2023).

ID	Risk Control	Description
8	Hydrographic Surveys	The harbour and approach channels are regularly surveyed.
9	Health and Safety Policy	Activities within the harbour, including the use of Personal Protection Equipment (PPE), are followed as per the Health and Safety Policy (Rosslare Europort, 2021).
10	Training	Staff are appropriately trained for the types of activities they are required to undertake.
Embedded Project Risk Controls		
11	Marking and Charting	Relevant nautical charts and publications will be updated with the extent of the Project.
12	Construction Method Statement	Development and adherence to a construction method statement.
13	Marine Operating Guidelines	Development and adherence to a marine operating guideline, including wind limits for vessel arrivals at the Project.
14	Maintenance Dredging	Regular hydrographic surveys and maintenance dredging of the approach channel to ensure declared depths are maintained.
15	Fendering/Impact Protection	Installation of appropriate fendering and impact protection for the types and sizes of vessels operating at the Project.
16	Inspection and Maintenance	Undertake regular inspection and maintenance to identify any signs of wear and tear and correct any defects.
17	Vessel Standards	Compliance with relevant vessel standards, international/national conventions (such as COLREGs) and use of appropriate lights, navigation aids and equipment onboard project vessels.

5. DESCRIPTION OF THE MARINE ENVIRONMENT

5.1 ROSSLARE PORT

5.1.1 Pilotage

Pilotage for Rosslare Harbour is not compulsory, but a pilot can be obtained locally. Vessels should request pilot services 24 hours in advance. There is no marked pilot boarding station.

LPS pilotage assistance is compulsory for the initial six visits, monitored from the LPS tower or on board.

5.1.2 Vessel Traffic Services

Rosslare operates a manned LPS station to manage and coordinate arrivals or departures at the port. Upon arrival, ships are obliged to send an estimated time of arrival (ETA) for passing the Breakwater Light to Rosslare Harbor on Very High Frequency (VHF) channel 12 about 1.5 hours prior to arrival. Vessels are instructed not to approach within 0.5 nm of the breakwater light when awaiting clearance to proceed to the berth.

5.1.3 Aids to Navigation

On the approaches to the port South Shear channel is marked by a lateral marker buoy beginning at the Long Shear Buoy until the West Holdens buoy 1 nm east of the breakwater. There is a directional sector light (Oc WRG.5s15m13/10M) mounted on the Breakwater to aid the approach.

5.1.4 Anchorages

Vessels are not permitted to anchor within the breakwater or within an area bounded by a 0.4- nm-wide line from the breakwater to about 0.45 nm stretching in northwest and southeast directions to avoid interruption with commercial vessel traffic which has priority. A designated anchorage is located 0.5nm north of the harbour in depths between 5-8 m.

5.2 METOCEAN CONDITIONS

5.2.1 Tidal Regime

Rosslare experiences a semi-diurnal tidal regime with two highs and two lows each day. Recently, the immediate area around the northwest point of Berth 4, as well as Fisherman's Quay at Berth 5, can become exposed or <0.5 m of water depth on a spring low tide.

Rosslare is subject to strong tidal flow rates. The charted tidal diamond B (1772), located east of the Calmines lateral marker in the South Shear Channel, states the three hours after high tide see the fastest flow rates and can exceed three knots. This can make the approach complicated when arriving from the east, as crossing perpendicular to the Traffic Separation Scheme (TSS) in St Georges Channel means also crossing perpendicular to a strong tide.

5.2.2 Wind/Wave

The prominent wind directions are between WSW and S with the wind speed exceeding 14 m/s (38 kts) less than 3% of the time.

The prominent wave direction is E ranging between ENE and ESE. The maximum significant wave height (Hs) is approximately 1.5-2 m and is associated with a probability of non-exceedance of 99.2%. Peak wave period (Tp) is the same as or less than 10s associated with a probability of non-exceedance of 90%.

5.3 SEARCH AND RESCUE

Search and Rescue in and around Rosslare harbour is supplied by the RNLI and the Irish Coastguard (IRCG).

Three RNLI stations respond to distress calls in and around Rosslare Harbour. The primary station at Rosslare Harbour houses one Severn class lifeboat. Wexford lifeboat station is equipped with two D-class lifeboats which are situated approximately 14 km by sea from Rosslare. Another lifeboat station is located in the fishing village of Kilmore Quay to the southwest of Rosslare housing a Tamar class lifeboat approximately 30 km by sea from Rosslare harbour.

The IRCG have several lifeguard units in Country Wexford including Carnsore, Fethard, Courtown, Kilmore Quay, and Rosslare and conduct coastal search operations, cliff rescue and other call outs requiring assistance. The IRCG's closest helicopter base is in the neighbouring county Waterford just 52 km away by air. By 2025, a complete transition from the existing Search and Rescue (SAR) provider CHC Ireland, to Bristow will take place. This will result in six new AW189helicopters allocated to four bases in Sligo, Shannon, Waterford and Dublin. It is estimated the average flight time for an AW189 helicopter to travel 52 km from Waterford to Rosslare Harbour is approximately 11 minutes. Two additional fixed-wing aircraft will also be on hand to support SAR from Shannon airport.

6. EXISTING MARITIME ACTIVITIES

6.1 VESSEL TRAFFIC ANALYSIS

6.1.1 Overview of Vessel Activity

Figure 3 displays one years worth of vessel transits within and around Rosslare port using AIS data collected between May of 2023 to April 2024. The tracks are distinguished by vessel category:

- **Cargo** – Commercial vessels carrying dry cargo such as containers or bulk cargo.
- **Tanker** – Commercial vessels carrying liquid or gas bulk cargo such as oil or chemicals.
- **Fishing** – Commercial fishing boats including long-liners, trawlers etc.
- **Passenger** - Passenger vessels including ferries and cruise liners.
- **Recreational** – Recreational vessels with sails or engines used for pleasure such as sailing yachts and pleasure cruisers.
- **Tug & service** - Small commercial vessels including pilot vessels, tugs, dredgers, service vessels, SAR etc.

A major commercial passenger route can be distinguished travelling to and from the west coast of Wales. Vessels approach from the southeast in the South Shear Channel and exhibit a dense/tight distribution when entering the port. **Figure 4** helps to define this route through a density map. The immediate area around the five primary berths contains over 1,000 tracks per year. These vessels typically use Berths 1, 2 and 3, with fishing vessels and occasionally recreational vessels berthing at Fisherman's Quay at Berth 5. Rosslare is primarily a commercial port with passenger being the most abundant vessel type and given priority over available berths. An anchorage zone is apparent north-northeast of the port for passenger, cargo and tanker vessels waiting to enter.

The most common destination was Pembrokeshire in Wales. Approximately 964 (16% of the total transits) were to Pembroke Port in Milford Haven in the south of Pembrokeshire and 838 (14%) to Fishguard in the north of Pembrokeshire. Other destinations include Ireland (Dublin), Northern Ireland, England, Wales, France, Spain, Belgium, and the Netherlands.

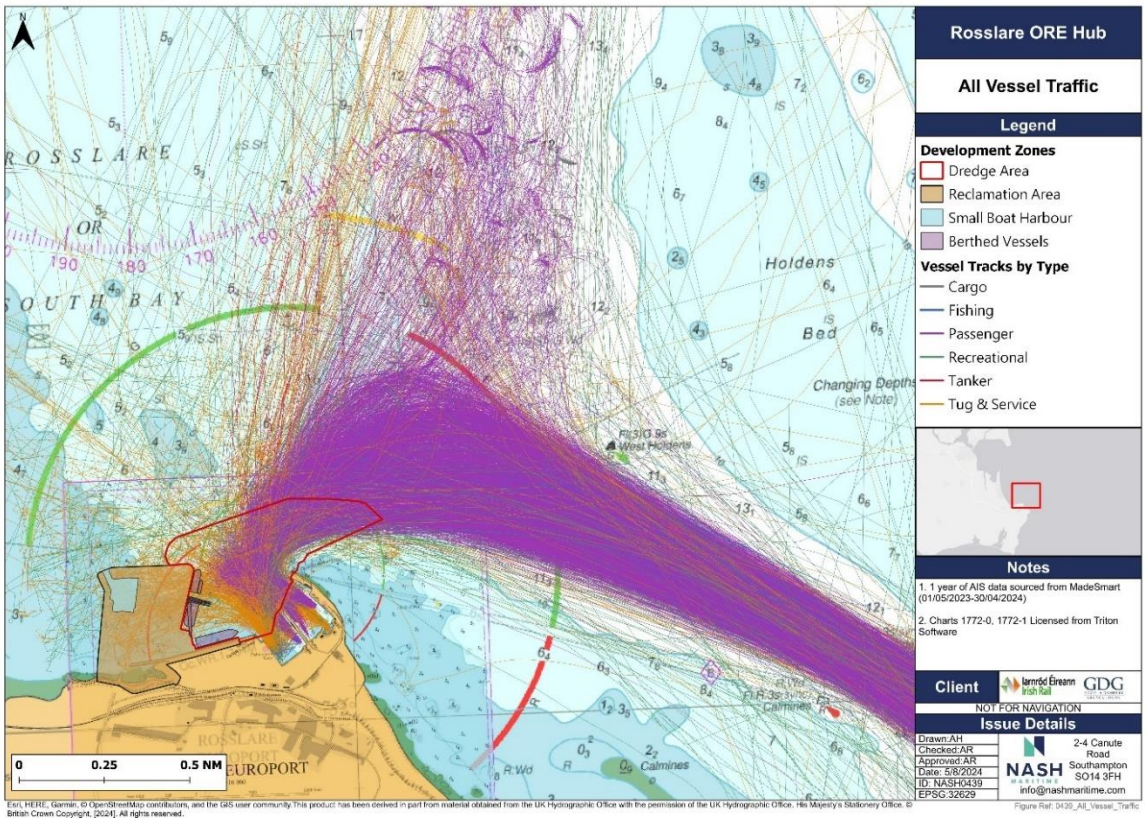

Figure 3: All Vessel Traffic Within and Around the Study Area Between 1st May 2023 and 30th April 2024.

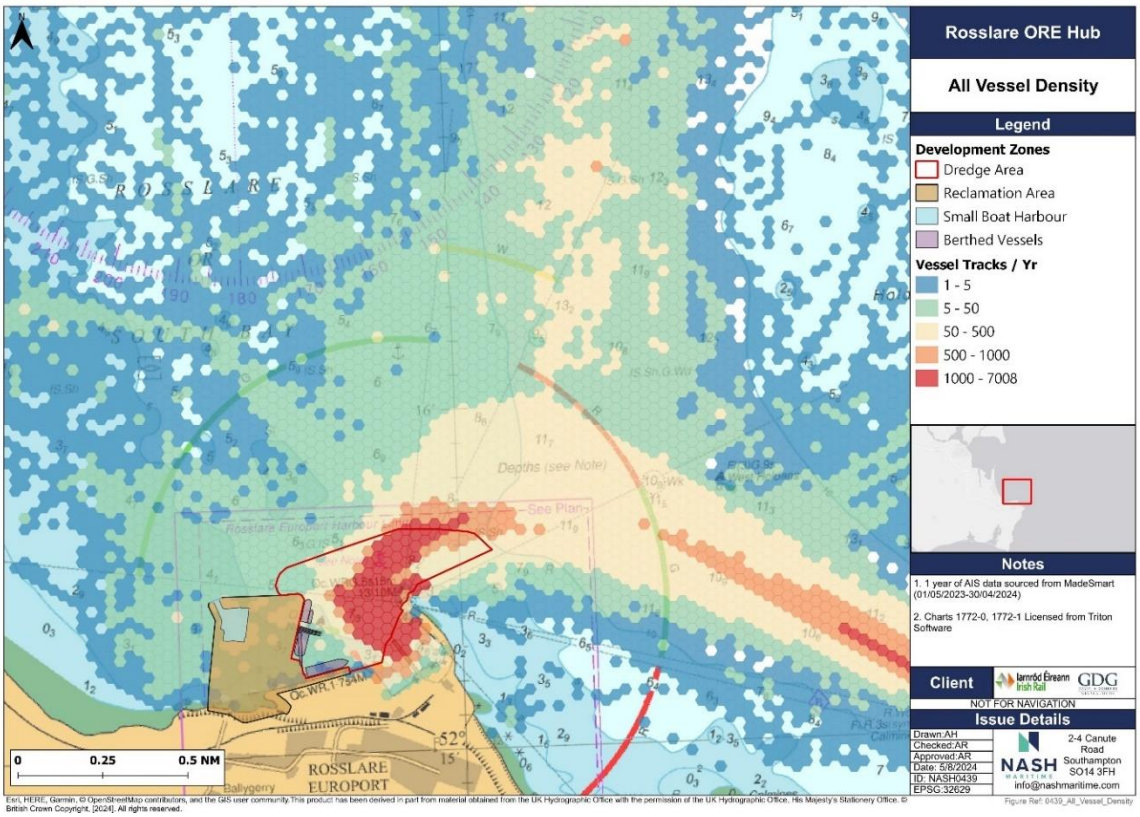

Figure 4: All Vessel Density (tracks per year) Between 1st May 2023 – 30th April 2024.

6.1.2 Vessel Sizes

Vessel tracks were separated by length and by draught to distinguish spatial trends in vessel activities and determine the spread of different size groups shown in **Figure 5** and **Figure 6** respectively.

The average vessel length was 145 m. 59% of vessels are in the category 150-200 m accounting for the majority of passenger ferries. The most common vessel length was 186 m due to the high frequency of transits made by the passenger ferry Oscar Wilde accounting for 1,060 transits in a single year. The second largest size category was 0-50 m at 19% which includes most recreational, tug & service and fishing vessels. Some passenger, and cargo vessels exceed 200 m LOA which accounted for 9% of tracks such as the Brittany Ferry 'Santona'. All tanker vessels are between 50-100 m which was the smallest size category accounting for just 4% of the total tracks.

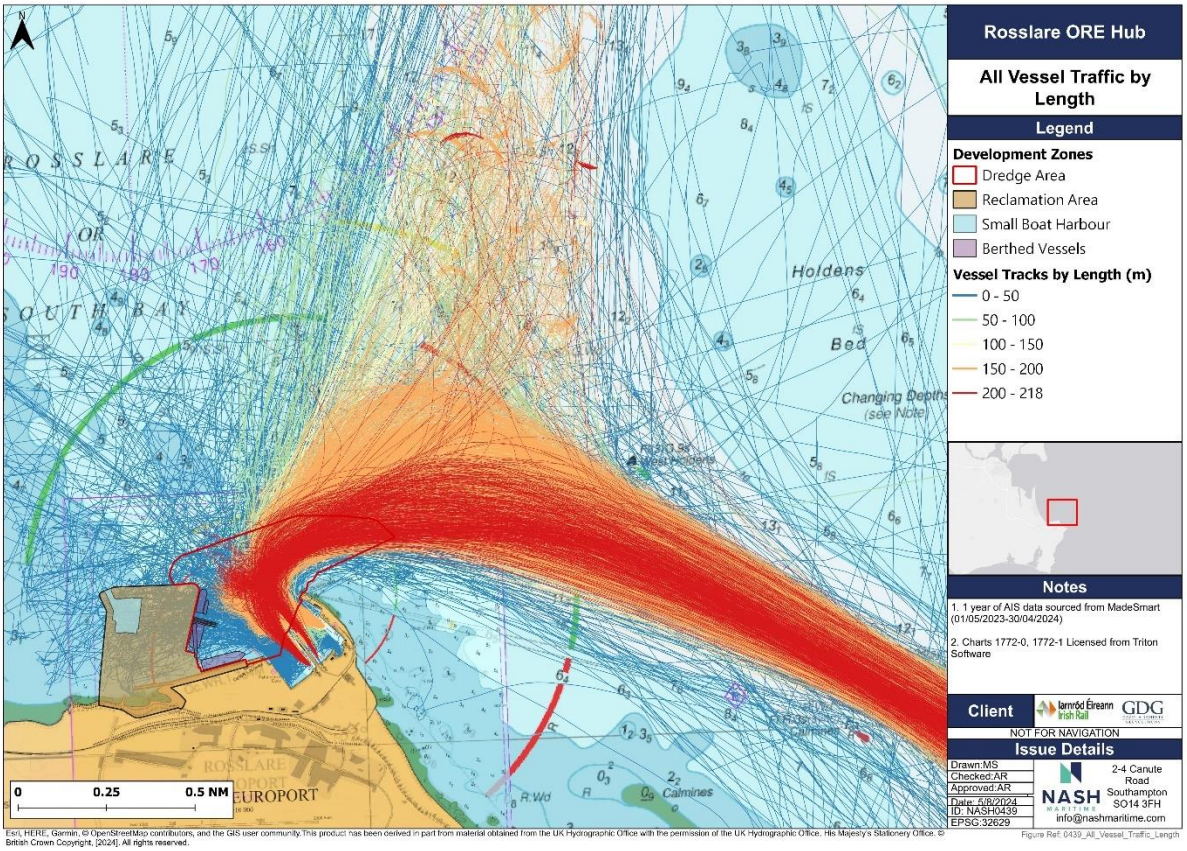

Figure 5: All Vessel Tracks Separated by Length (m) Between 1st May 2023 – 30th April 2024.

51% of transits were from vessels with draughts in the deepest category between 6-7.5 m and 38% were between 4.5-6 m (**Figure 6**). Collectively this includes over 90% of all passenger and cargo vessels. As Rosslare is a commercial port focusing on passenger and ferry services, the main channels must be maintained to an adequate depth to accommodate these vessel sizes.

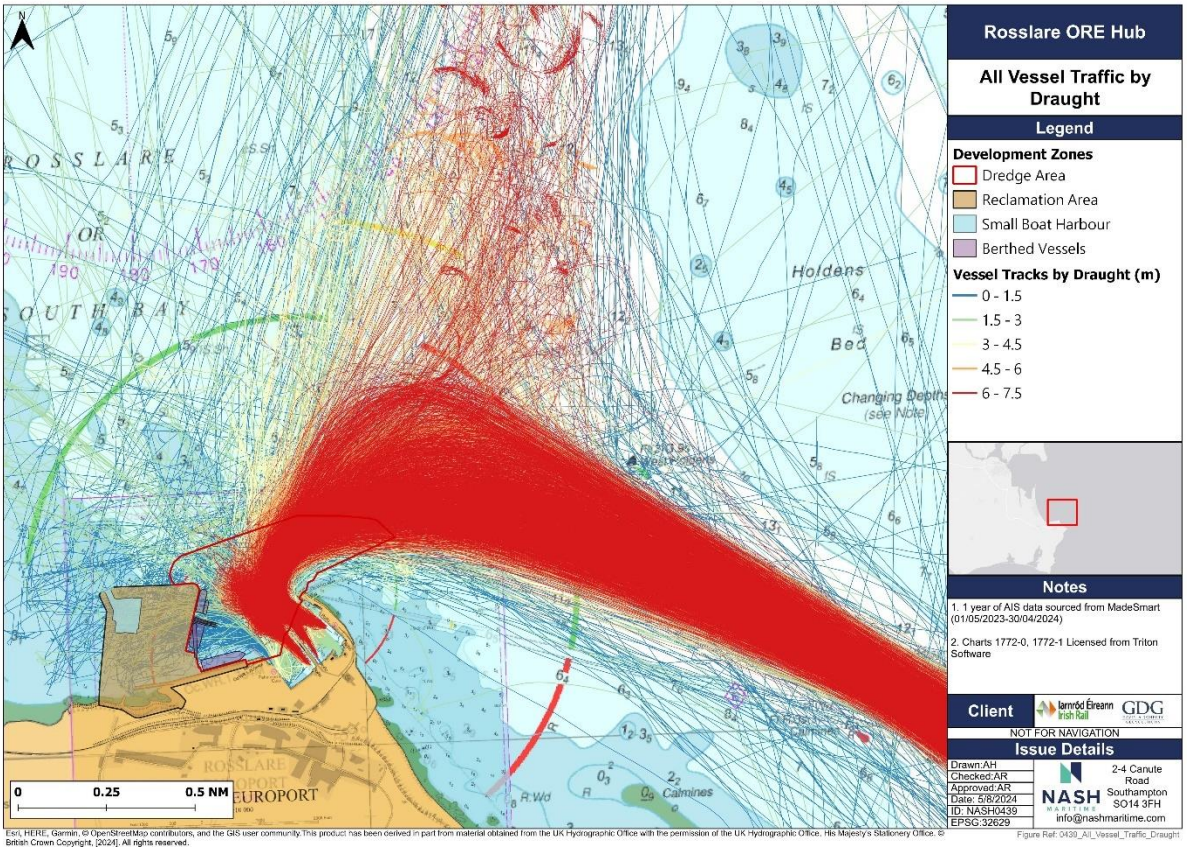

Figure 6: All Vessel Tracks Separated by Draught (m) Between 1st May 2023 – 30th April 2024.

6.1.3 Vessel Count Analysis

A total of 5,910 transits took place between 1st May 2023 and 30th April 2024 by 383 unique vessels. The spread of vessel categories is outlined in **Table 5**. Transits are displayed by month and vessel type in **Figure 7** to portray seasonal variability and particularly highlight a summer increase in recreational craft and additional ferry services.

Table 5: Frequency and Distribution of Transits by Vessel Type.

Vessel Type	Count of Unique Vessels	Transits per Year	Avg. Transits per Day	Max Transits per Day	Percentage of Total Transits
Cargo	13	455	1.25	7	7.70%
Fishing	24	115	0.31	4	1.95%
Passenger	22	4127	11.31	22	69.83%
Recreational	286	468	1.28	22	7.92%
Tanker	2	126	0.35	7	2.13%
Tug & service	30	609	1.67	15	10.30%

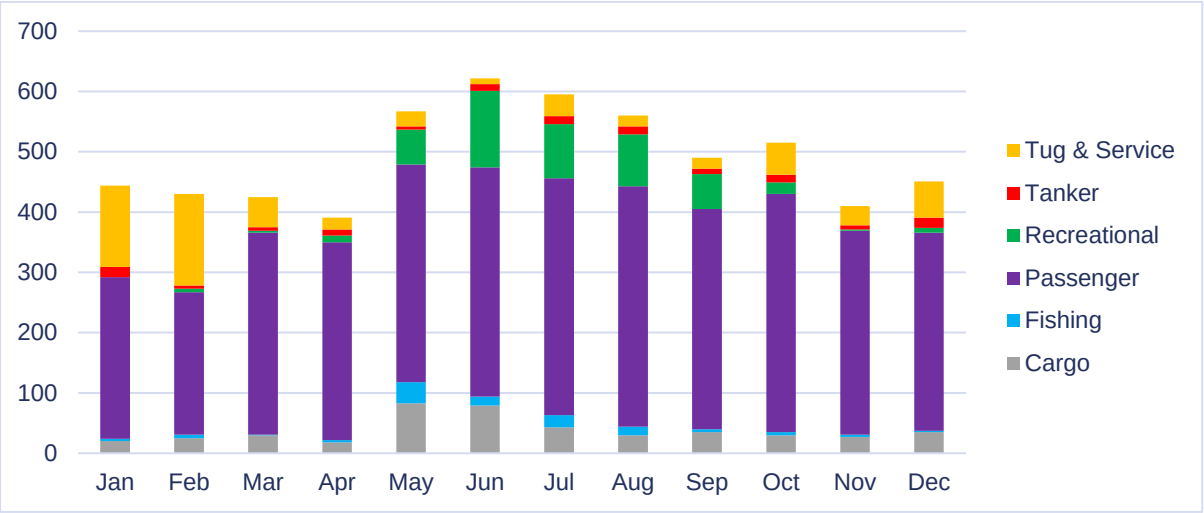

Figure 7: Transits per Month and the Relative Proportion of Vessel Traffic Types.

6.1.4 Vessel Types

6.1.4.1 Cargo

There are 455 cargo vessel transits made within the years' worth of collected AIS data (**Figure 8**). A total of 13 unique cargo ships frequent the route, the majority of which transport wheeled cargo but also include general cargo vessels. 45% of transits were made by the Finnlines vessel 'FINNWAVE', a 218 m long Ro-Ro cargo ship transporting vehicles regularly travelling between Zeebrugge, Belgium and Rosslare, Ireland. 20% of transits were made by the Ro-Ro vessel SEATRUCK PANORAMA destined for Cherbourg, France. All vessels approach from the South Shear channel heading southeast. The most common destinations transited between are Zeebrugge and Cherbourg, but other locations include ports in Wales and Ireland. Vessels arriving straight to port approach from a narrow angle to the breakwater where traffic condenses, whilst vessels waiting to enter utilise a large anchorage area between South Bay and Holdens Bed to ease congestion. Vessels use the centre of the port to manoeuvre astern into Berths 1, 2 or 3.

6.1.4.2 Tanker

There are 126 tanker transits made within the years' worth of collected AIS data, entirely made by bunker tankers providing fuel to vessels operating out of Rosslare (**Figure 9**). Only 2 unique vessels frequent this route. CORALWATER, a 94 m long chemical products tanker makes up 88.1% of transits and travels between 5 other ports based in Ireland, Scotland, England and Wales. KEEWHIT, a 77 m long oil tanker, makes up the remaining 11.9% travelling to Larne, Ireland and Liverpool, England. Like cargo vessels, tankers approach from the southeast and wait in the anchorage zone to the north between South Bay and Holden's Bed before docking at Berths 1, 2 or 3.

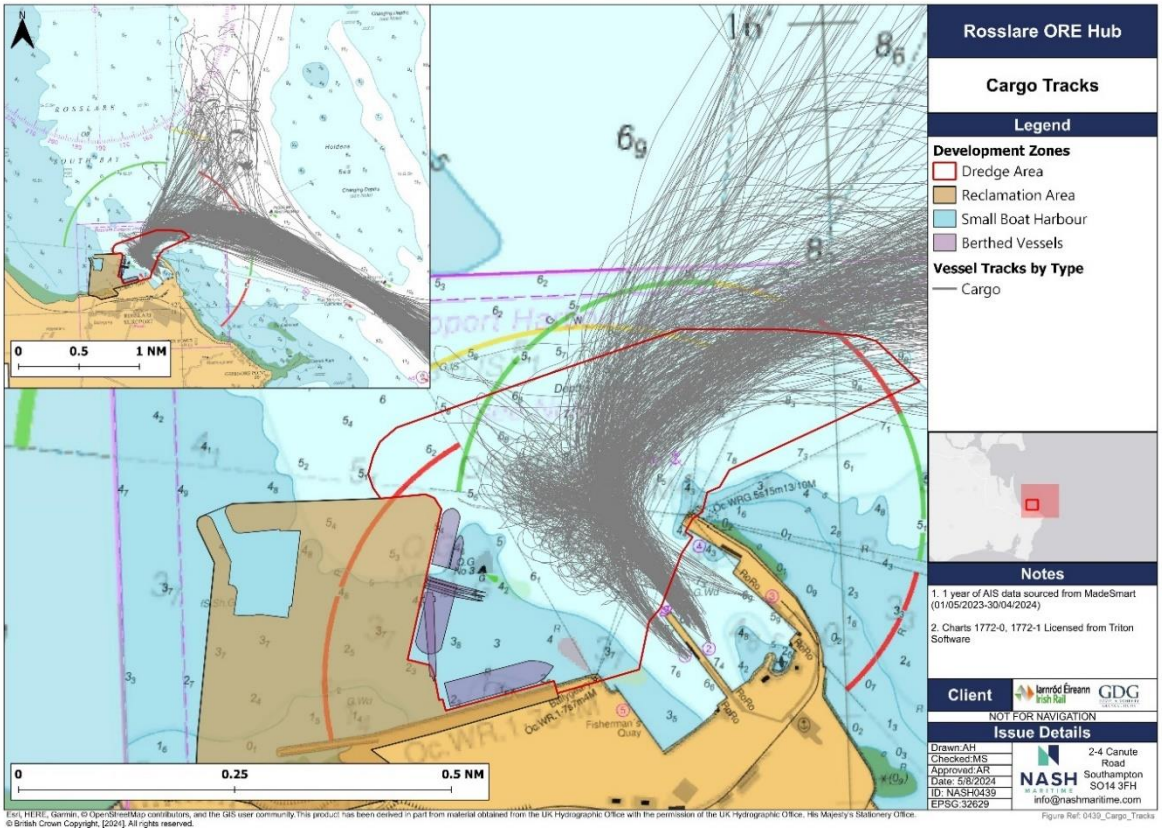

Figure 8: Cargo Tracks Between 1st May 2023 – 30th April 2024.

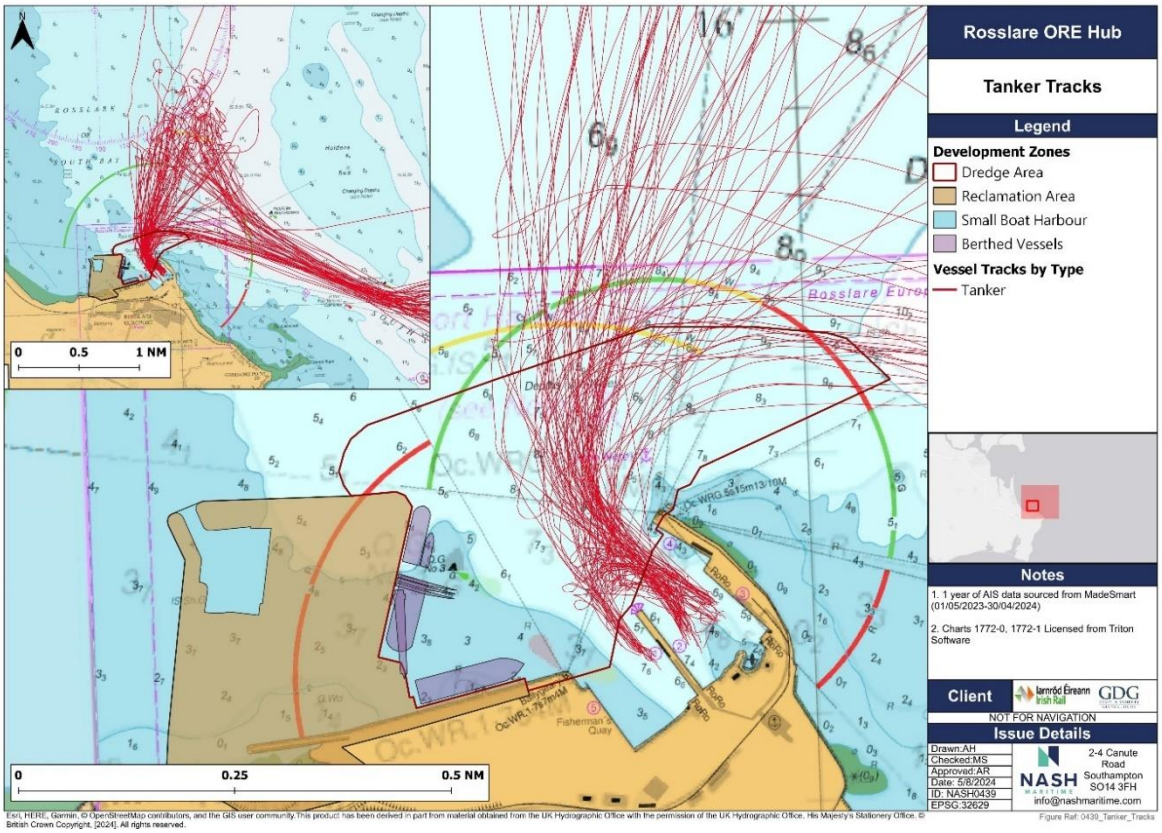

Figure 9: Tanker Tracks Between 1st May 2023 – 30th April 2024.

6.1.4.3 Tug & service

A total of 609 tug & service transits were collated from the years' worth of AIS data in the study by 30 unique vessels. The majority are classified as tugs making up 64% of transits and dredgers making up 15%. Other vessels included mooring vessels, offshore support vessels, patrol vessels, four RNLI lifeboats research vessels, buoy and lighthouse tenders and crane vessels. **Figure 10** represents typical tug & service operations and excludes vessels known to be involved in the ORE Hub development.

Figure 11 differentiates vessels involved in the ground investigation works for the ORE Hub development. These include the survey works conducted by the tender vessel ROS AINE on the 27th and 28th of October and the tug BARNACLE later on the 7th of November and 12th of December 2023. Dredging works commenced on the 11th of January until the 18th of January 2024 when works were halted due to the weather conditions (Rosslare Europort, 2024). Dredging works began around Berth 4 where sand had gradually built-up. Fine sand was exported to a beach nourishment site in South Bay and coarser materials were exported to an offshore dump site.

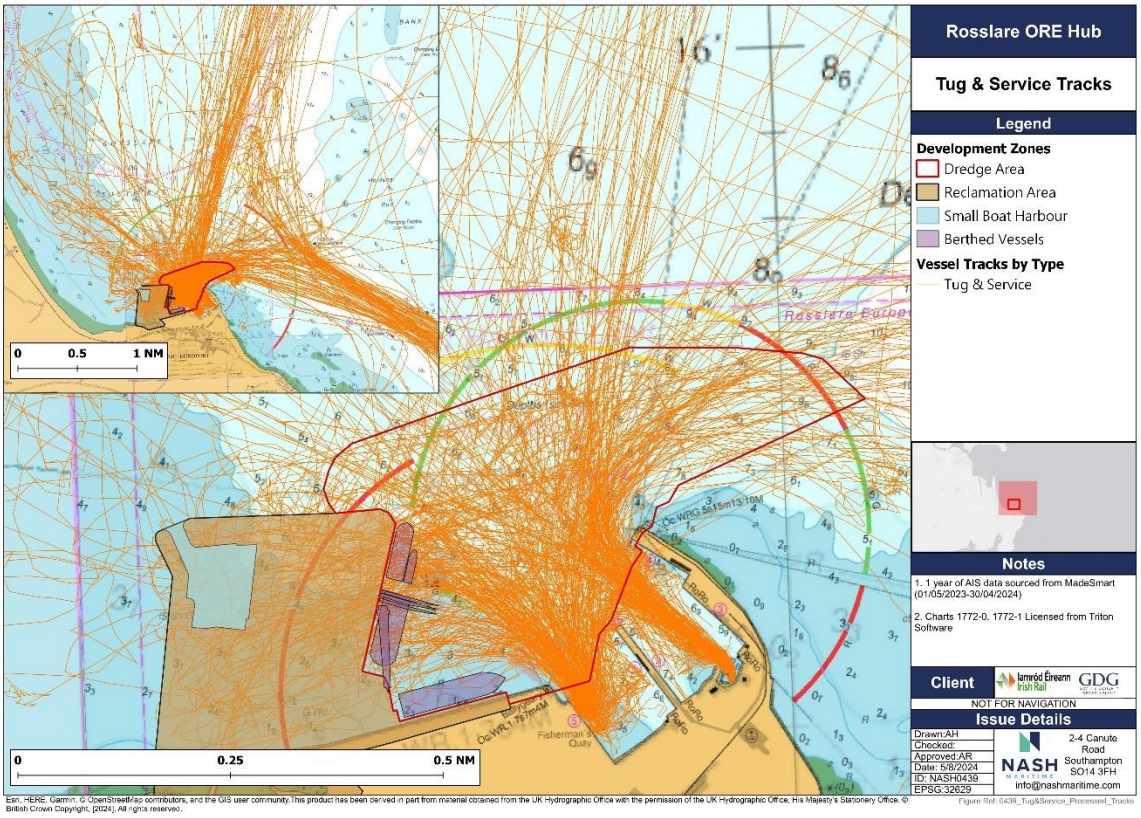

Figure 10: Tug & Service Tracks Between 1st May 2023 – 30th April 2024.

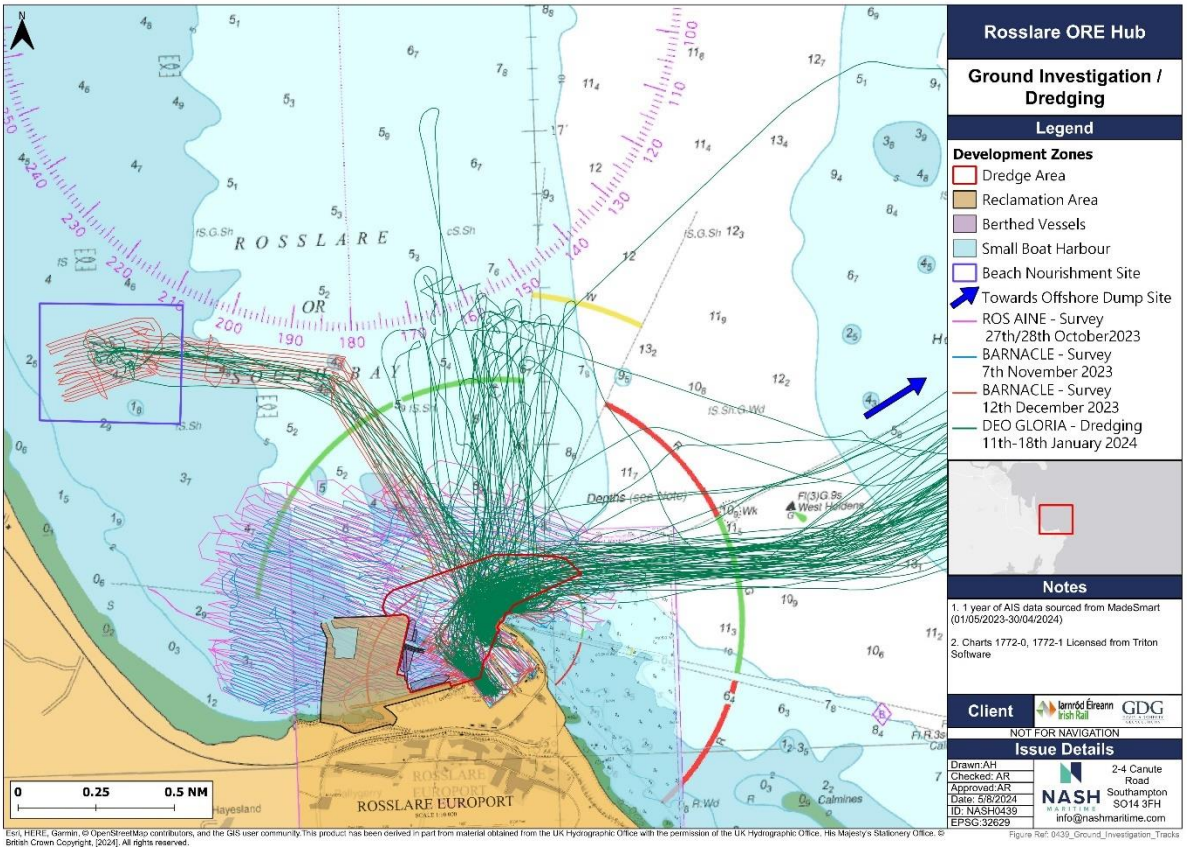

Figure 11: Tug & Service Tracks of Vessels Engaged in Ground Investigation for ORE Hub Development Between 1st May 2023 – 30th April 2024.

6.1.4.4 Passenger

There were 4,127 passenger vessel transits made in the years' worth of AIS data conducted by 20 unique vessels (**Figure 12**). The most frequent vessel is the Irish Ferries vessel 'OSCAR WILDE' a 186 m long ferry which travels between Rosslare, Ireland and Pembrokeshire, Wales which makes two, 4-hour crossings daily making up 25% of the total yearly transits. 44% of transits are conducted by four Stena Line ferries which travel to Fishguard, Wales twice a day and Cherbourg, France six times a week. The largest vessel to enter Rosslare is the GALICIA, a 215 m long, 28 m wide Brittany Ferries travelling from Rosslare to Bilbao. Three additional Brittany ferries SANTONA, SALAMANCA and NORMANDIE also operate from Rosslare, equating to two sailings per week to Bilbao and two to Santander. Brittany Ferries makes up 7% of total yearly transits. DFDS Seaways operates routes to Dunkirk, France six times a week constituting 11% of total yearly transits.

There were no cruise ship calls to Rosslare during the data analysis period.

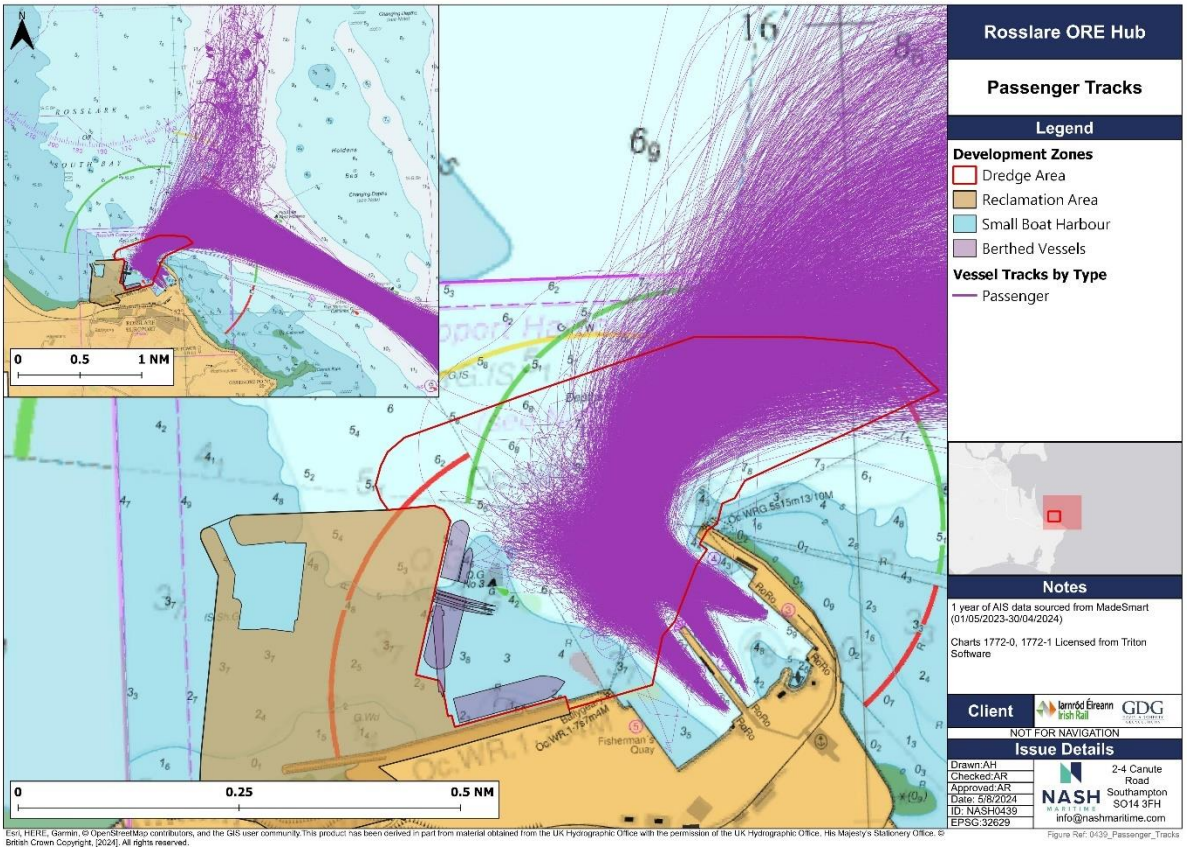

Figure 12: Passenger Tracks Between 1st May 2023 – 30th April 2024.

6.1.4.5 Recreational

There is minimal recreational activity at Rosslare port due to the lack of infrastructure targeted to leisure. In total, there were 468 transits conducted by 285 unique vessels from destinations in Ireland, the UK and mainland Europe. Within the study period, vessels frequenting the port were between 7-50 m LOA and between 2-12 m wide. In general, recreational tracks were largely irregular and sparse, however in the port vessels typically docked at Berth 5, Fisherman's Quay, as Berths 1, 2, 3 and 4 are allocated to commercial vessels as a priority. It is important to note that many small recreational craft do not carry AIS which likely means that recreational vessel activity is underrepresented in the data. Estimates nationally are that approximately half of all offshore cruising yachts may choose to carry AIS voluntarily to aid collision avoidance. It is likely that some recreational vessels, that are not transmitting AIS, are also utilising the existing small boat harbour.

6.1.4.6 Fishing

A total of 115 fishing transits were collated from the years' worth of AIS data in the study by were conducted by 24 unique fishing vessels ranging between 7-48 m LOA and 4-10 m wide (**Figure 14**). Fishing operates from Berth 5, Fisherman's Quay, with vessels heading southeast towards Kilmore quay and local popular fishing spots around Hook peninsula. Similarly to recreational vessels, many fishing vessels may not carry AIS and could be underrepresented in the data. It is likely that the small craft operating from the existing small boat harbour are small, open day-boats and would not carry AIS.

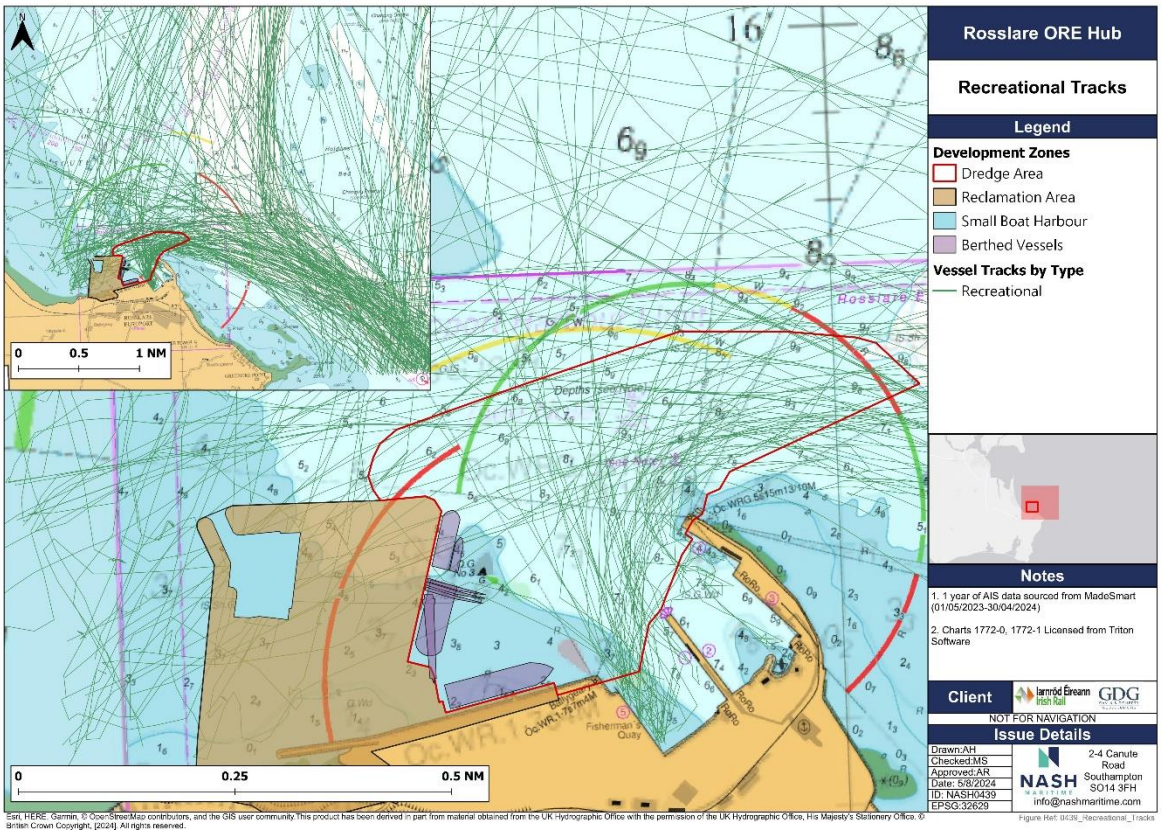

Figure 13: Recreational Tracks Between 1st May 2023 – 30th April 2024.

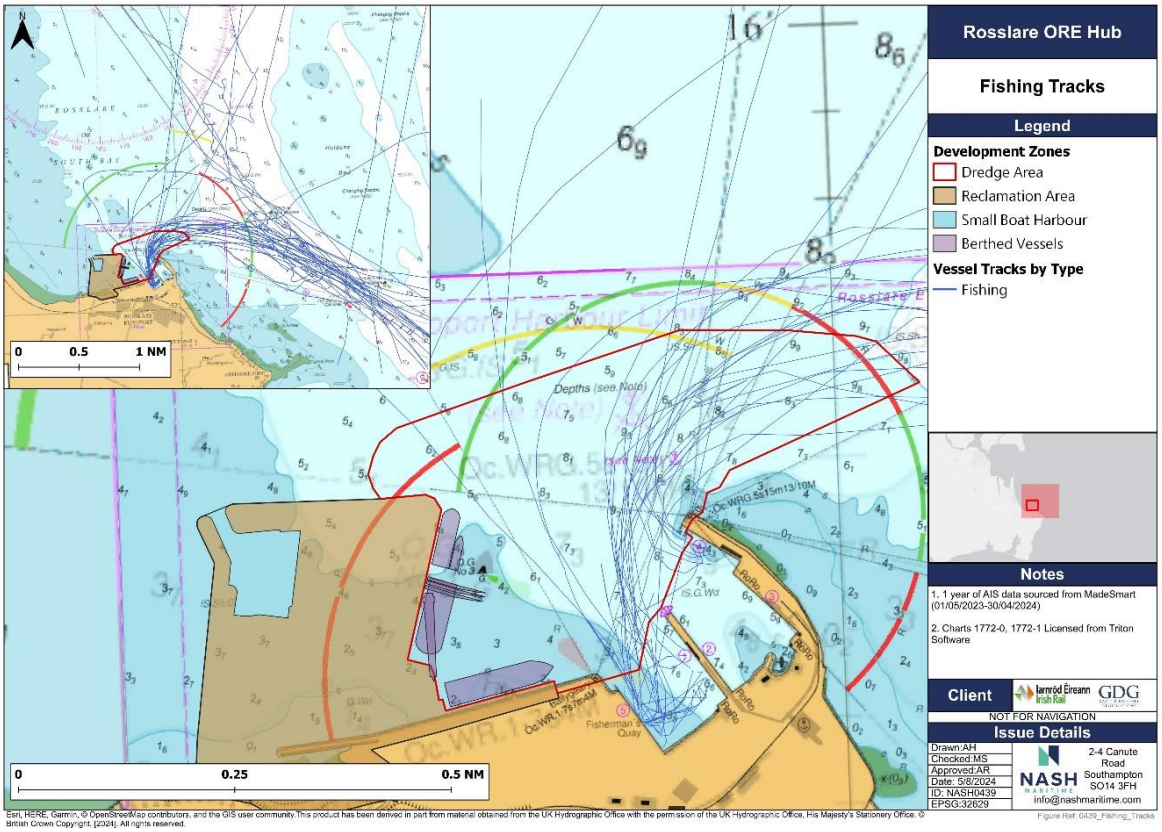

Figure 14: Fishing Tracks Between 1st May 2023 – 30th April 2024.

6.2 SWEPT PATHS

Swept paths were generated for each vessel track which depicts their passage by representing both velocity and vessel dimensions to scale. By visualising swept paths, the effect of weather conditions and their positioning or proximity to surrounding infrastructure can be established. **Figure 15** and **Figure 16** depict two examples of ferries manoeuvring into Berth 1. Ferries typically slow their approach and conduct their manoeuvre to come astern into the berth in the centre of the harbour. Aligning with Berth 1 brings vessels close to the current depth limit, marked by a green lateral buoy, which is occasionally exacerbated by strong NE winds (see **Section 8.5**).

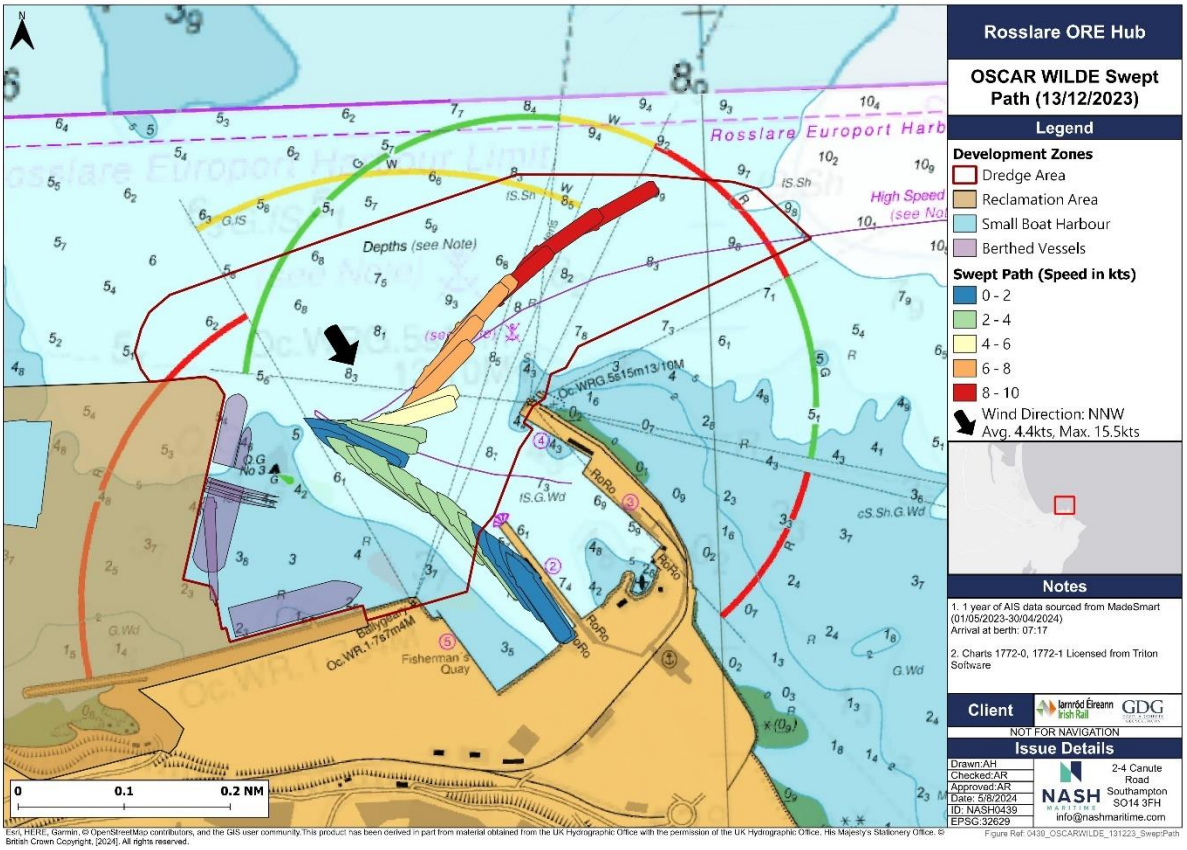

Figure 15: Arrival of Oscar Wilde to Berth 1 (13/12/2023).

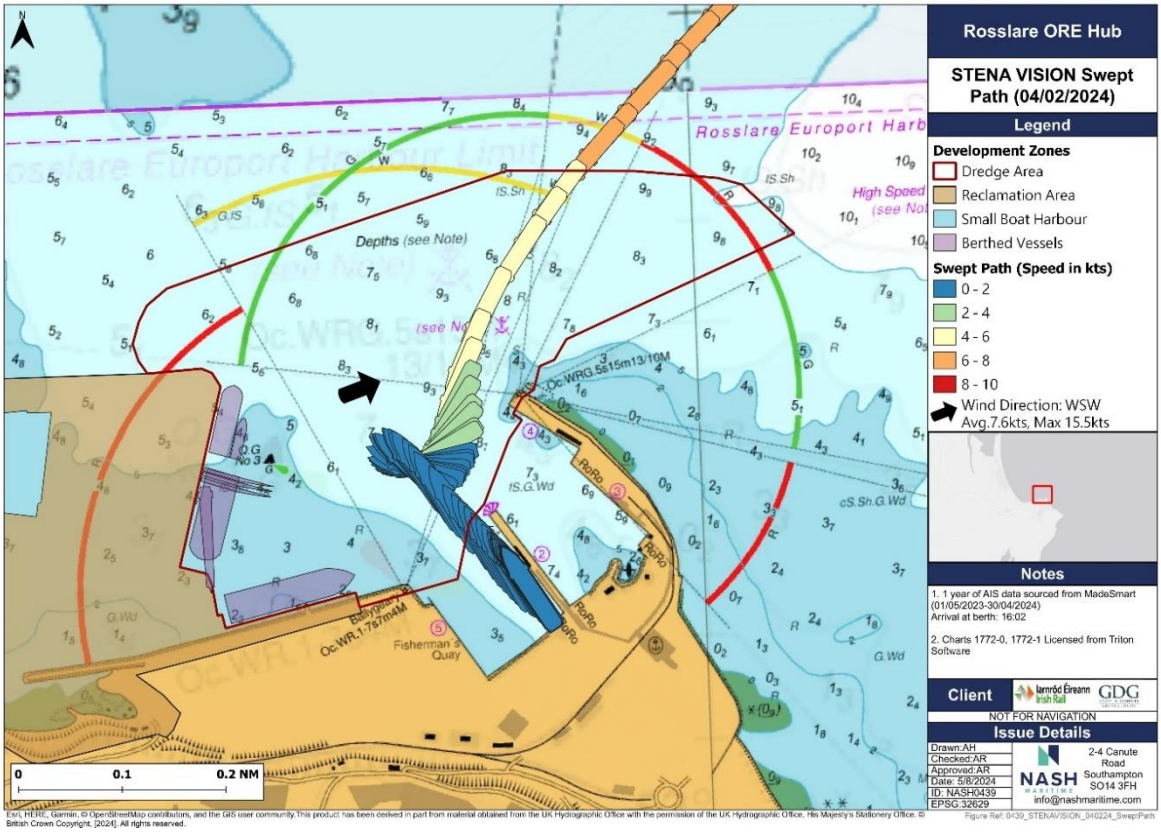

Figure 16: Arrival of Stena Vision Berth 1 (04/02/2024).

A density heatmap generated from all 5,910 swept paths is depicted in **Figure 17**. Predictably, the areas alongside the berths show the greatest density represented by the deepest red hue. There are also various pockets of activity dotted throughout the harbour area, predominantly by anchored tug and service vessels. The orange and red grid rid cells making up the centre of the approach channel and central harbour are between 10 and 50 times denser than that of the surrounding yellow grid cells, emphasising the area of harbour used most frequently by manoeuvring ferries. This central hotspot is a minimum of 80 m away from the worst case berthed project vessels.

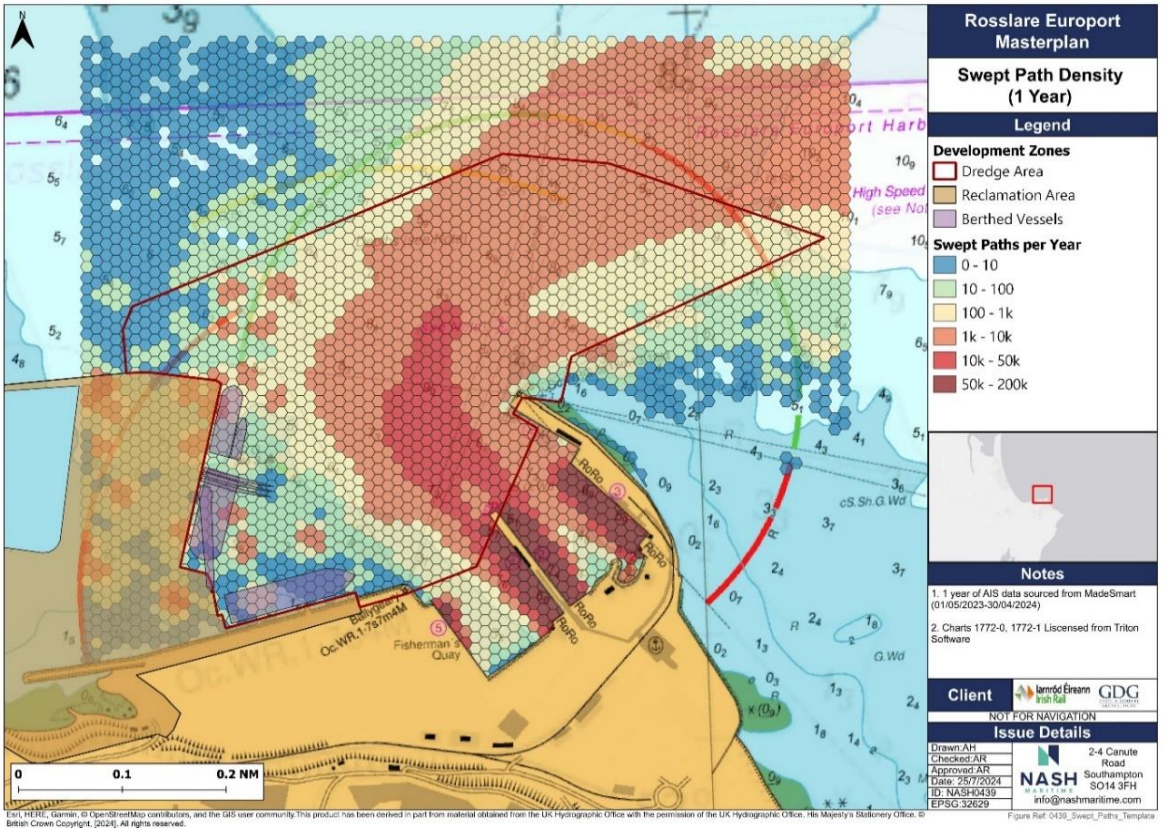

Figure 17: Swept Path Density Plot (1 Year).

6.3 INCIDENT ANALYSIS

Incident analysis into the type and frequency of incidents in and around Rosslare harbour was carried out using data sourced from RNLI (2008-2023), MCIB and directly from Harbour Master reports (2015-2022) which contributed 74%, 11% and 15% of the data respectively. A total of 54 incidents within 5 km were consolidated and displayed in **Figure 18**. **Table 6** describes incidents occurring within the main harbour.

The most common incident type was mechanical failure accounting for 40% of all incidents. The second most common incident type was contact (17%) with other incidents involving close quarters situations, persons in the water, adverse weather, grounding, capsize/foundering and sinking. Some contacts were a result of strong winds, but the majority were minor miscalculations in port during berthing resulting in some damage to fenders / ship hulls. Another repeated incident is the flooding/sinking of fishing vessels on the approaches to port. All incidents resulted from mechanical problems on board as opposed to other external factors. One instance of mechanical damage took place within the proposed reclamation area. The close quarters situation took place as a result of a misunderstanding between an inbound vessel and an outbound vessel. The inbound ferry was not aware it was instructed to wait at the West Holdens buoy before arrival, and the two vessels passed stern to stern with a minimal passing distance (MCIB, 2022).

It should be noted that not all possible incidents that occurred may be recorded here. Minor incidents that may have occurred during the management of a different harbour master have not been provided. It is also likely there are some unreported incidents, and it is also important to note that the time-frames of the RNLI and MAIB datasets are different.

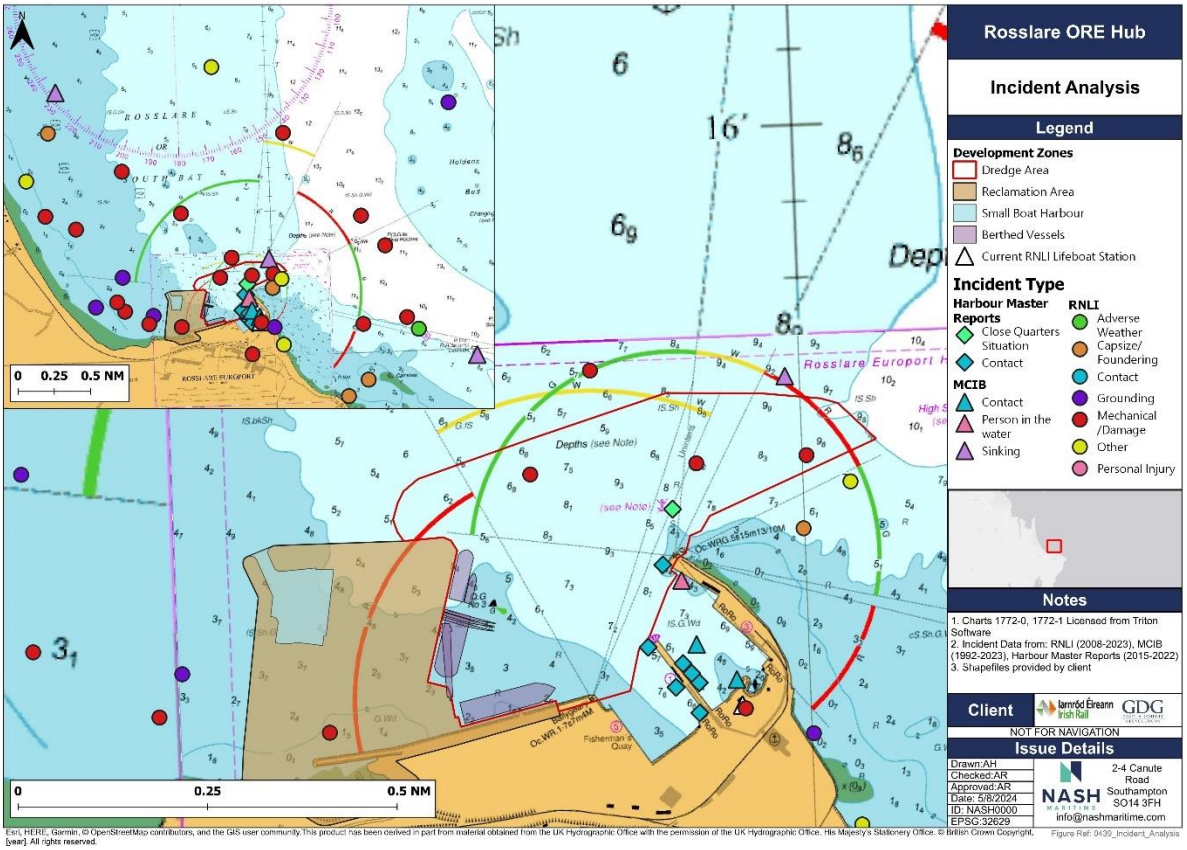

Figure 18: Incident Analysis of RNLI, MCIB and Harbour Master Reports.

Table 6: Incident Log for Incidents Occurring at Rosslare Harbour.

Date	Vessel	Location	Type	Description	Weather	Response
RNLI (Within harbour/development areas only)						
15th February 2009	Motorboat	500 m NW of main harbour	Mechanical Failure	Machinery failure of a fishing boat	W winds, slight sea conditions	Rosslare Harbour lifeboat Station responded
28th July 2009	Yacht with Engine	400 m NE of breakwater	Mechanical Failure	Machinery failure of a jet ski	SW Winds, choppy sea conditions	Rosslare Harbour lifeboat Station responded
6th February 2013	Fishing Vessel	60 m from shore, W of main harbour	Mechanical Failure	Machinery failure of a sailing boat	NNW winds, rough sea conditions	Rosslare Harbour lifeboat Station responded
22nd June 2018	Motorboat	200 m N of breakwater	Mechanical Failure	Machinery failure of a fishing boat whilst at anchor	SE winds, calm sea conditions	Rosslare Harbour lifeboat Station responded
Harbour Master Reports						
19th February 2021	Stena Foreteller, Stena Line	Berth 1, Rosslare Harbour	Contact	Contact with a Yokohama fender and loose bracket punctured the fender bladder	20 knots gusting 35 knots	No response necessary
11th April 2021	Stena Foreteller, Stena Line	Berth 2, Rosslare Harbour	Contact	Contact with fender – minimal damage		No response necessary
5th May 2021	MV Connemara, Brittany ferries	Beth 2, Rosslare Harbour	Contact	Contact and entanglement between vessels “cow catcher” and fender, chain netting causing damage to the fender	NW up to 20 knots	No response necessary
9th September 2021	Stena Horizon, Stena Line	No. 4 quay, Rosslare Harbour	Contact	Drift and contact with NW corner of no.4 quay causing minimal damage to quay		Damage assessment of the hull carried out to proceed to berth

Date	Vessel	Location	Type	Description	Weather	Response
12th November 2021	Bluestar 1, Irish ferries	Berth 1, Rosslare Harbour	Contact	Allision upon departure with NW corner of Berth 1 significantly damaging ship hull and fenders.	Strong winds of 38 gusting 45 knots (within limits)	Ship returned to berth and damage was assessed
3rd February 2022	MV Stena Horizon, Stena Line	Berth 2, Rosslare Harbour	Contact	Contact and entanglement between vessels “cow catcher” and fender, chain netting causing damage to the fender	Strong winds NNE 30-36knots	Free-floating fender bladder recovered from water
22nd November 2022	Bluestar 1, Irish ferries	Berth 1, Rosslare Harbour	Contact	Contact with the lower tier of linkspan 1 due to overshooting final berth position causing damage to bow doors		No response necessary
16th March 2022	Stena Europe / MV Connemara	Rosslare Harbour	Close quarters situation	Close quarters situation as result of ignored instructions from MC Connemara and miscommunication between the two ships as Stena Europe departs and passes port-to-port with MV Connemara which had proceeded past the agreed holding area (West Holden Buoy).	N winds 10knots	No response necessary
MCIB						
19th May 2019	MFV Ellie Adhamh	Rosslare Harbour	Person in the water	A man, expected to be intoxicated was on his way to spend the night in his boat when he was found 10 minutes by crew members of the MV Stena Nordica to be face down in the water between his vessel and the quay wall. Despite rescue attempts, he did not survive.		MV Stena Nordica’s rescue boat, and the casualty was attended to by lifeboat crew and local Emergency First Responders (EFR)
11th February 2015	FV Quo Vadis	Rosslare Harbour	Sinking	The fishing vessel was dredging for razor clams when the dredge appeared heavy. When winched up by the crew a large boulder was discovered in the net. Large swell caused the vessel which was significantly trimmed to capsize throwing the 3 crew members overboard. The vessel	Light W winds (Force 2-4) with sea state: slight from south east direction	Rosslare Harbour Lifeboat station observed and raised the alarm, two fishing vessels in the facility rendered assistance and crew members

Date	Vessel	Location	Type	Description	Weather	Response
				quickly sank but all 3 crew members were unharmed		were brought ashore by the lifeboat service
15th April 2014	MFV Molly's Quest	Rosslare Harbour	Sinking	The fishing vessel experienced a mechanical failure of the main engine gear control cable. It heeled significantly to port and subsequently sank. The 3 crew members abandoned ship and were recovered unharmed.	Light W winds (Force 2-3) with sea state: slight	Two nearby fishing vessels responded and recovered the crew from the water.
26th October 2012	M/V Stena Europe and M/V Oscar Wilde	Berth 3 Rosslare Harbour	Contact	During the berthing operation the wind increased to 36 knots gusting 45, MV Stena Europe lost control and collided with the M/V Oscar Wilde berthed at Berth 2. Minor damage was sustained by both vessels, but no injuries were incurred.	Strong NE winds with local funnelling effect meaning wind became force 6-7 with moderate to rough seastate	No response necessary
15th May 2010	Duggies Pride	Rosslare Harbour	Sinking / Person in the water	On the way back to port the fishing vessel began taking on water, after dropping one crew member off at the beach the remaining two crew attempted to reach port however the vessel took on water and the crew jumped overboard. One made it back and raised the alarm, the other was later found and recovered from the water deceased	Force 3, possibly gusting force 5 from the NW. seastate: wavelets with good visibility (10 km)	Rosslare RNLI lifeboat, local coast guard unit, SAR helicopter from Waterford, Irish naval vessel 'Ciara', Kilmore quay RNLI lifeboat, fishing boats, and persons on the shore were involved
28th January 2003	Sea Hamex	Rosslare Harbour	Contact	Due to strong winds whilst attempting to berth the vessel was blown onto the piers of Berths 1 and 2 causing damage to the starboard side, vessel was then grounded between berths 2 and 3. No injuries occurred, the vessel was later refloated	Gale force 8 occasionally force 9 from the west	No response necessary

Date	Vessel	Location	Type	Description	Weather	Response
30th January 2003	Stena Europe	Rosslare Harbour	Mechanical Failure	Vessel suffered a loss of propulsion, drifting onto and passed tuskar rock lighthouse. 1.5 hours later the vessel regained propulsion.	North Force 7 wind and rough seas	Emergency services were alerted.

7. FUTURE TRAFFIC BASELINE

7.1 PROJECT TRAFFIC

Table 7 lists the anticipated types and numbers of vessels calling at Rosslare associated with the Project.

Table 7: Vessels Likely to be Associated with ORE Support.

Vessel Types	Subtypes	Estimated Frequency	
		Off-peak	Peak
Large Project Vessels	Cable-Laying Vessels (CLV)	One per week	One per two days
	Wind Turbine Installation Vessel (WTIV)		
	Anchor Handling Tug Vessel (AHT)		
	Crane Barge		
	Tug		
	Module Carrier		
	Semi-Submersible Vessel		
	Offshore Construction Vessel (OCV)		
	Jack-up Barge		
Small Project Vessels	Crew Transfer Vessel (CTV)	Multiple arrivals per day (depending on volume of ORE activity)	
	Service Operation Vessel (SOV)		
	Guard Vessels		
	Survey Vessel		

7.2 COMMERCIAL PORT TRAFFIC

To get an overview of the yearly commercial port activity and future projections, statistics extracted from four datasets for commercial traffic arrivals at Rosslare between 2017 and 2023 has been sourced from the CSO (2024), summarised in **Figure 19**.

The top two graphs refer to vehicle arrivals which are divided into two categories: loaded freight vehicles and passenger cars. This helps to distinguish the seasonal trend which sees more passenger vehicles arriving in the summer months or ‘Q3’ as depicted in ‘No. Vehicle Arrivals by Type / Season’. The bottom two graphs refer to vessel arrivals by both the number of arrivals and the tonnage.

‘No. Vehicle Arrivals by Type / Year’ shows a reduction in arrivals between 2019 and 2021 as a result of the COVID-19 pandemic. Only in 2023 does the number of vehicle arrivals exceed that of 2017 which is also reflected in ‘Commercial Vessel no. Arrivals / Year’ featuring the same dip around 2020 and finally sees a combined increase beyond pre-covid arrivals in 2023 where commercial vessel arrivals attained 2,000 in a year with a steady projected increase.

'Commercial Vessels Gross Tonnage / Year' shows a similar albeit exaggerated pattern to that of 'Commercial Vessel no. Arrivals / Year'. This may be a result of the shifting balance between the quantity of lighter passenger cargo versus heavier freight cargo. As is shown in 'No. Vehicle Arrivals by Type / Year', despite a net increase in vehicle arrivals, that increase is weighted by the larger increase in freight type vehicles with passenger vehicles alone still below pre-Covid levels.

As a result, it suggests that there could be an increase in commercial vessel movements over the next decade. In additional, the berths at Rosslare could cater for larger capacity RoRos, up to 240 m in length.

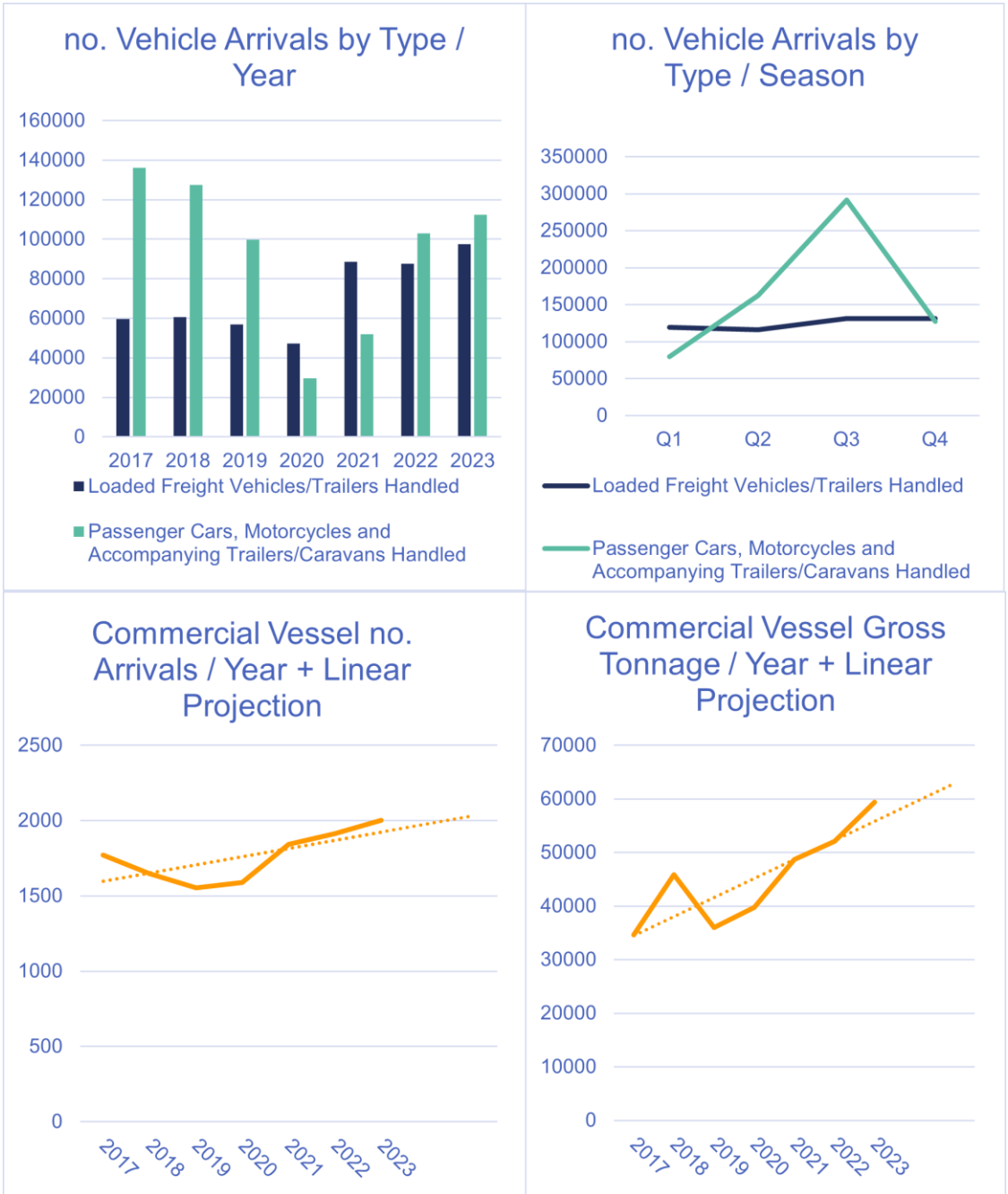

Figure 19: Vessel and Vehicle Statistics at Rosslare (CSO 2024).

7.3 SMALL CRAFT

The development of a Small Boat Harbour may increase the number of recreational, fishing and other small boat movements in the Study Area. No projections have been produced as to what this increase would be, but it is likely to be more due to the greater capacity and facilities (such as shore power and water) than the existing small boat harbour. It is not the intention of the port to advertise Rosslare as a destination for recreational users, with the Small Boat Harbour catering more towards existing users of the small boat harbour and the Project small boats.

8. IMPACT ASSESSMENT

8.1 IMPACT IDENTIFICATION

Based on a review of the Project description and analysis of existing marine activities, the following key impacts were identified:

- Impact on port operations.
    - Deviation around Project infrastructure.
    - Congestion due to movements of project vessels.
    - Disruption during construction including dredging.
    - Impact on anchorage.
- Impact on navigation safety in the South Shear Channel.
- Impact on risk of collision.
- Impact on risk of allision:
    - Existing port traffic.
    - Project traffic.
- Impact on risk of grounding.
- Impact on small craft safety.
- Impact on risk of swamping.
- Impact on search and rescue.

8.2 IMPACT ON PORT OPERATIONS

The Proposed Development could restrict access to Rosslare Europort for existing vessel trafficor cause either additional transit distances to avoid Proposed Development infrastructure, or delays for existing operators.

8.2.1 Deviation around Project Infrastructure

As described in **Section 6.1**, the vast majority of existing vessel movements into Rosslare Europort are RoRo ferries or freight vessels bound to the existing main berths within the harbour. Analysis of the tracks and manoeuvring areas used by these ferries demonstrates that the overwhelming majority (>99.9%) already pass clear of the Project's reclaimed area. At present, this area has depths of less than five metres chart datum and therefore ferries, with a draught of approximately 6 m, navigating too far west are at risk of running aground. Therefore, it is not considered that the physical reclamation area would have any impact on existing port operations. The potential risk of allision is considered separately in **Section 8.5**.

8.2.2 Congestion due to Movements of Project Vessels

The Project will necessitate the movements of large and small vessels from the Small Boat Harbour and Main Quay. It is anticipated there would be typically one large project vessel movement per week or up to one large project vessel movement per day during peak OWF activity (see **Section 7.1**). Small vessel traffic transiting to and from the Small Boat Harbour is likely to be multiple transits per day. The large project vessels will be bound by the same requirements as other large commercial vessels within Rosslare Europort, including the clear channel policy (see **Section 4.3**). A multitude of such movements could result in congestion and delays to existing operators.

Figure 20 shows the average large commercial vessels arriving at Rosslare on an hourly basis throughout the day. The average was taken for the summer months (June, July and August) to account for seasonal influxes of passenger vessels and portray the most conservative data. It highlights two peaks in daily activity, five hours between 03:00 - 08:00 and five hours between 16:00 – 21:00. The results of the Navigation Simulations reveal that an arrival at Rosslare takes a commercial vessel approximately 15 minutes to berth. This means that in the morning peak, there would be on average 4.1 commercial vessels within that five-hour window occupying a total of 1 hour, 2 minutes (or 21% of the time) to manoeuvre in port, leaving three hours 58 minutes available. During the afternoon/evening peak, there would be an average of 5.4 vessels in a five-hour window occupying 1 hour 28 minutes (or 27% of the time) leaving 3 hours, 32 minutes available. Whilst there is sufficient capacity during both peak times for additional ORE support vessels to arrive at Rosslare, there is ample capacity for additional vessels during the six hours around mid-day where traffic is quieter between 09:00 and 15:00. During this window, there are on average 1.4 vessels which occupy a total of 21 minutes (6% of the time). Equally, between 22:00 – 02:00, where there are on average 0.8 vessels in the four-hour window occupying 12 minutes (or 5% of the time).

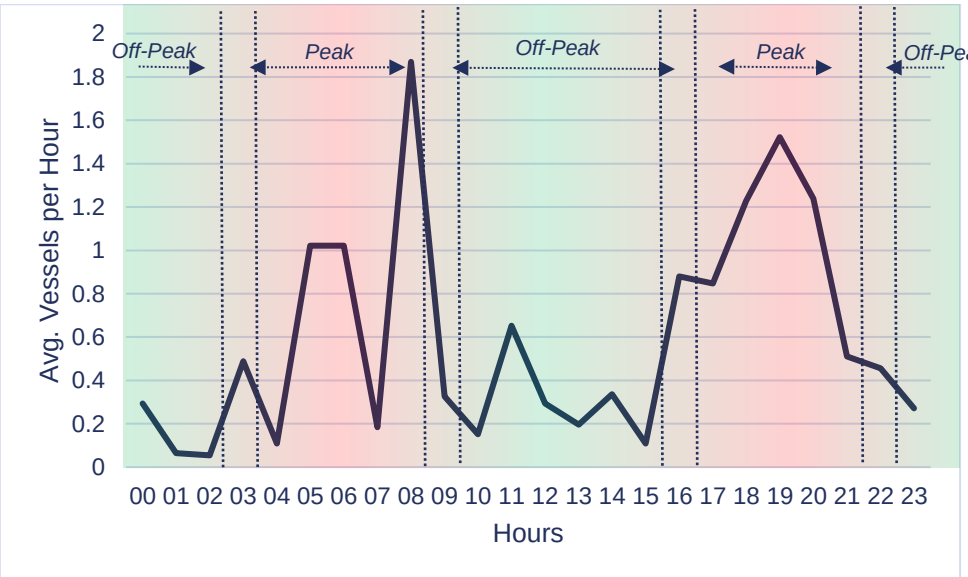

Figure 20: Commercial Vessel Arrivals per Hour (Summer Average).

As shown in **Figure 20**, there are large periods of the day where the channel is clear within Rosslare Europort, such as six hours around mid-day and four hours around midnight, therefore there is the capacity to accommodate additional vessel movements without

interfering with scheduled passenger operations. Furthermore, during peak hours of existing operations, with on average two vessel movements per hour, there would be sufficient time for an additional vessel to arrive or depart if required with minimal impact on scheduled operations.

Given the low number of additional vessel movements (**Section 7.1**), it is not considered that project vessel movements would have a substantial effect on port capacity. Smaller vessel movements can continue to and from the Small Boat Harbour without disrupting existing port movements by passing clear to the north.

8.2.3 Disruption during Construction including Dredging

The full methodology of dredging operations is not known at this time, however, the Project description (see **Section 4**) identifies that the construction phase could take up to 24 months during which time a significant quantity of dredging will be required. It is likely that the dredging activities will include the use of a dredger and barge, shuttling material between the dredger and the reclamation area. The area to be dredged will include the approaches into Rosslare Europort and therefore have the potential to obstruct other vessels inbound or outbound from the port, particularly in combination with the clear channel policy (see **Section 4.3**).

To mitigate this impact, it is proposed that RoRo vessels can come and go where the dredger is operating west of the required berths, subject to confirmation by the LPS controller or Harbour Master. This is similar to how current maintenance dredging is operating within the harbour. Where the dredger is operating within the approaches to required berths, the dredger will be asked to move clear prior to the RoRo vessel reaching the West Holdens green lateral and the LPS controller will monitor this before providing clearance. As a result, the disruption to existing port movements will be minimised.

During the operations and maintenance phase, further maintenance dredging will be required to maintain the declared channel depths, but this will be infrequent and therefore impacts are anticipated to be minor.

8.2.4 Impact on Anchorage

The primary anchorage area, utilised by passenger, cargo, tanker and tug & service vessels waiting to enter the harbour, lies approximately 0.6 nm northeast of the harbour breakwater in the North Shear channel (0.8 nm from the proposed reclamation area). **Figure 21** shows the relative anchoring density of vessels in the north anchorage. From this plot it's apparent an extensive area approximately 2 nm^2 is utilised to anchor as far north up the North Shear channel as 2.7 nm from the harbour breakwater, offering ample space to avoid conflicting with traffic transiting to and from the harbour. There would also be sufficient space for additional vessels associated with the Project to anchor if required. However, the depths of the anchorage are such that it is unlikely that large project vessels would be able to use this anchorage.

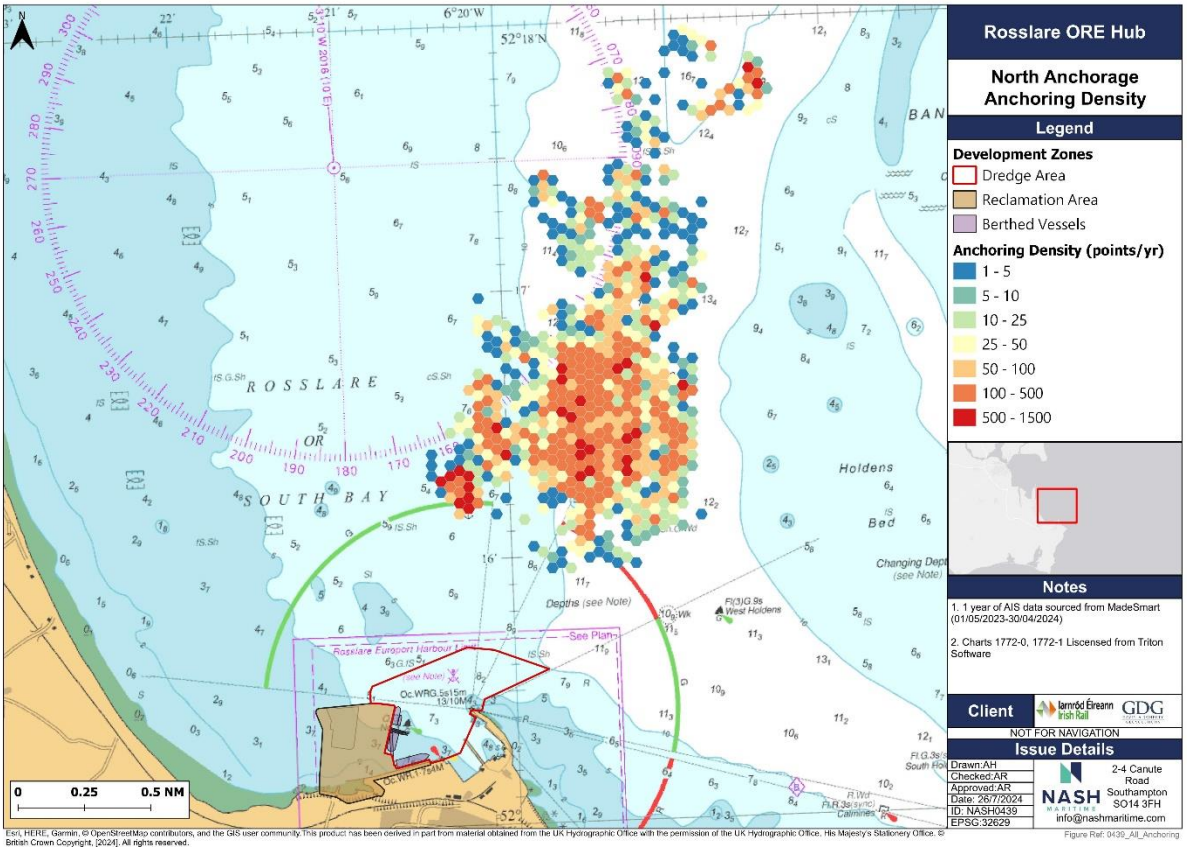

Figure 21: Anchoring Density in the North Shear Channel Anchorage.

8.3 IMPACT ON NAVIGATION SAFETY IN SOUTH SHEAR CHANNEL

A typical passage plan for a commercial vessel from the South Shear channel is depicted in **Figure 22** marked by waypoints as described below:

1. Entrance to South Shear channel between Splough and South Long lateral markers.
2. Narrowest section of approach channel (432 m) marked by Calmines and South Holdens lateral markers.
3. Approach to West Holdens buoy, initiating contact with Vessel Traffic Services (VTS) to time arrival into harbour.
4. Initiation of turn to port, passing the widest portion of approach channel between the breakwater and anchorage area, decreasing speed.
5. Entrance to harbour and initiation of berthing manoeuvre, swinging to starboard and coming astern.
6. Continued manoeuvre astern into designated berth.
7. Arrival at berth.

Vessels currently utilise the space available to them dictated by the depth of water and AtoNs marking the navigable channel as is clear in **Figure 3**. Where more space is available, such

as the turn into the harbour between the West Holdens buoy and harbour breakwater, vessels use a wider area to initiate their turn. Equally, where the channel's width is reduced, between the Calmines and South Holdens buoys, vessel tracks condense (**Figure 22**). The existing AtoNs and channel widths are appropriate for the types of vessels proposed to be operating out of the Project as they are not significantly larger than the existing regular runners.

It is not believed that increased vessel activity resulting from the ORE Hub development will influence the risk of collision within the South Shear Channel approach as there is sufficient space to facilitate the anticipated number of additional vessels (**Section 4**). As described in **Section 8.2.2** there is sufficient capacity within the port and given the relatively short length of the pilotage passage in the South Shear channel, the likelihood of a project vessel meeting another vessel is low. Vessels would be able to pass one another, maintaining suitable separation to reduce the risk of collision.

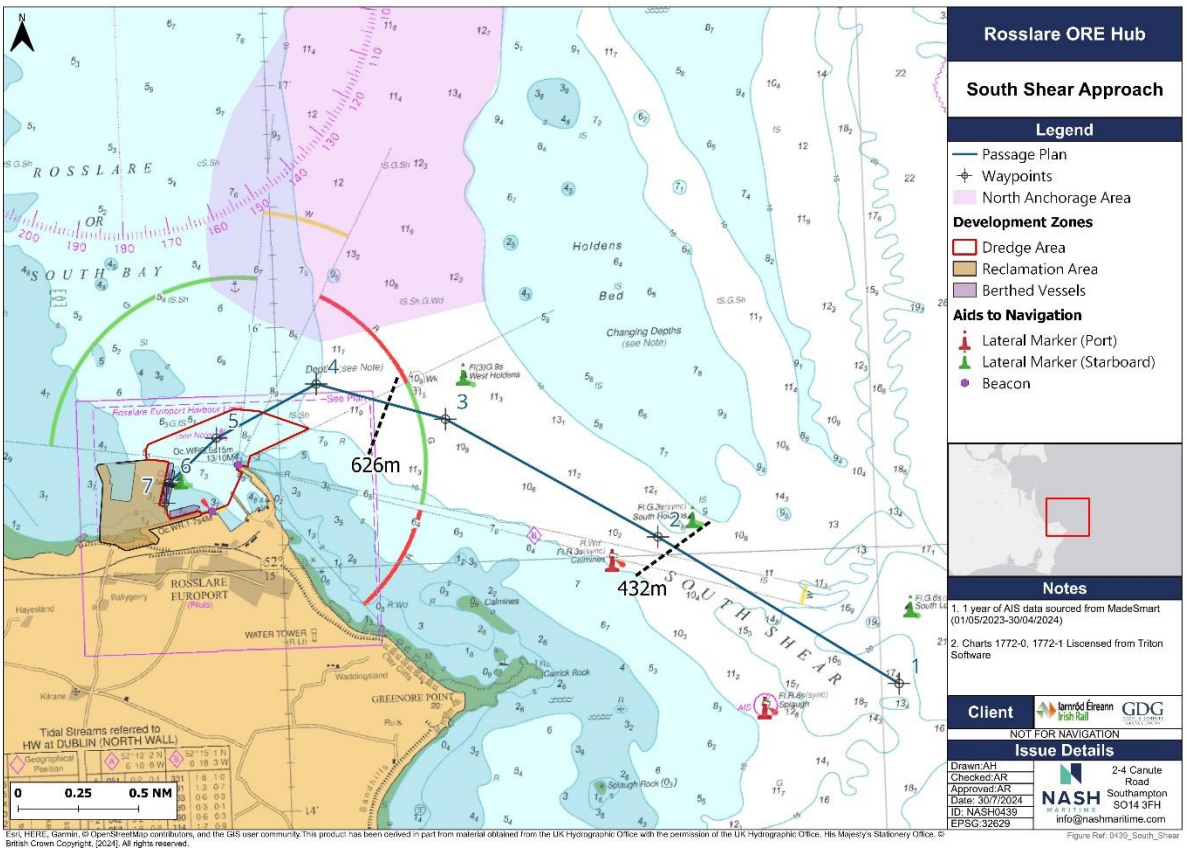

Figure 22: South Shear Approach Passage Plan for a Project Vessel.

8.4 IMPACT ON RISK OF COLLISION

The presence of the Proposed Development can increase the risk of collision by acting as an obstacle that constricts vessel movements, increasing interactions and collisions, or through introducing new traffic which could collide with existing traffic. As shown through the vessel traffic analysis in **Section6.1.4.3 and 6.1.4.5**, few existing vessel movements would be impacted by the positioning of the reclamation area as it is west and clear of the main harbour and its approaches. Only tug & service vessels or recreational vessels transit through the designated area. Furthermore, the use of a clear channel policy already significantly reduces

the likelihood of vessels meeting within the confines of the harbour. Therefore, a negligible increase in collision risk is anticipated due to the presence of the infrastructure and compression of traffic.

The additional vessel movements associated with the Project are described in **Section 7.1** and would include large project vessels (>200 m), general cargo ships and smaller craft (survey vessels and CTVs). As noted in **Section 8.2.2**, there is sufficient capacity such that conflicts between project vessels and existing traffic are unlikely and this hazard is being already well mitigated by the use of a clear channel policy.

Furthermore, as described in **Section 8.2.3**, a dredger will be required to operate within the main harbour during construction, operations and maintenance. Whilst this poses a risk of collision with inbound and departing RoRo ferries, the above section describes how this is planned to be minimised.

8.5 IMPACT ON RISK OF ALLISION

8.5.1 Existing Port Traffic

The presence of the project infrastructure could be an obstacle to existing port traffic which might result in an allision. As described in **Section 6.1** and **Section 6.2**, it is clear that the vast majority of existing vessel movements into Rosslare Europort are RoRo ferries or freight vessels bound to the existing main berths within the harbour. Analysis of the tracks and manoeuvring areas used by these ferries demonstrates that the vast majority (>99.9%) already pass clear of the project infrastructure's reclaimed area.

Figure 23 shows one of the very isolated examples during 2023 where an arriving RoRo intersected the footprint of the Proposed Development (when counting example vessels alongside) and this occurred in benign weather conditions. **Figure 24** shows an example of a vessel arrival with a strong northeasterly where the master attempts to turn to starboard but is unable to get the bow through the wind and therefore aborts the manoeuvre. It is notable that even in this exceptional circumstance the ship clears the footprint of the Proposed Development.

At present, this area has depths of less than 5 m chart datum and therefore ferries (with draughts of approximately 6 m) navigating too far west are at risk of running aground. During the hazard workshop, it was noted that dredging the existing 5 m shoal, may provide the opportunity for ferry masters to undertake an alternative manoeuvre to access Berth 1, closer to the reclamation area. Masters would need to perform a dynamic risk assessment to judge the benefits this might offer against the additional risks of proximity to infrastructure.

During the navigation simulations, it was demonstrated that there was sufficient searoom for RoRo vessels to manoeuvre with the project infrastructure in place and representative vessels berthed along the quay within a range of extreme conditions (see **Section 3.4**).

In the unlikely event that a vessel was to experience a blackout whilst manoeuvring within the main harbour, they could be swept onto the quay due to northeasterly winds. Were such a situation to occur today, the vessel would run aground given the depths of water and therefore the presence of the project infrastructure does not make this situation any more or less likely. An allision could also be caused were a RoRo to breakout from its berth and be swept onto

adjacent vessels or infrastructure. Subject to suitable mooring arrangements, this risk is unlikely.

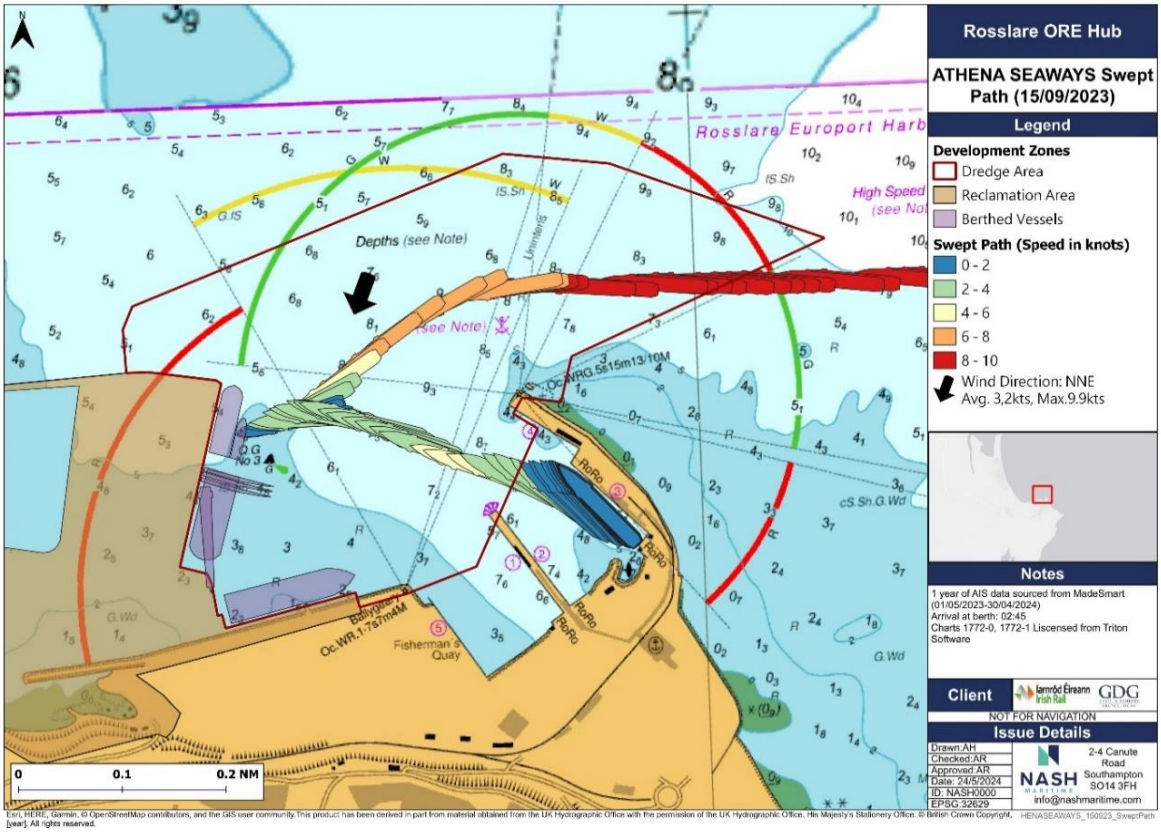

Figure 23: Example Swept Path Intersecting Project Footprint.

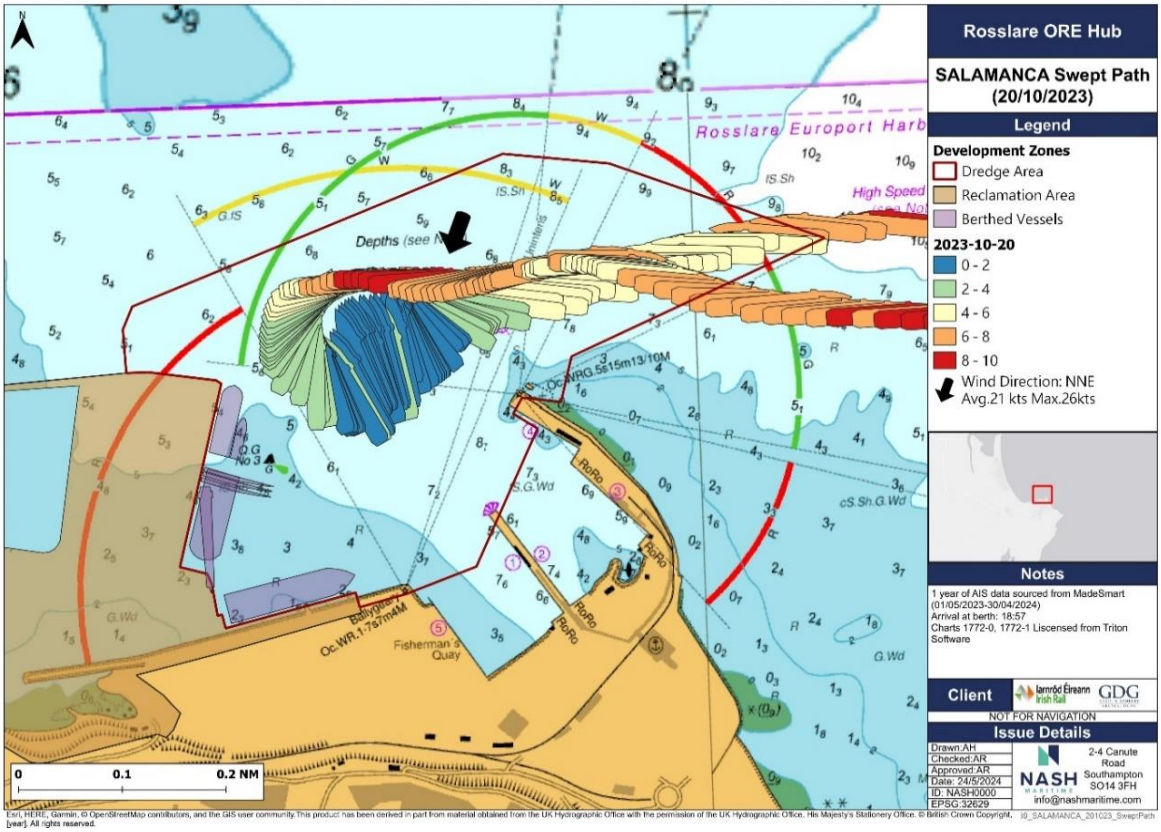

Figure 24: Example Swept Path During Adverse Weather.

During the hazard workshop, it was noted that some of the largest wind farm installation vessels may require wind turbine blades to be laid perpendicular to the vessel's deck (see **Figure 25**). As a result, a vessel alongside the Main Quay may have obstructions protruding from the vessel that are a hazard to arriving and departing RoRo vessels. By way of example, the vessel in **Figure 25** has a beam of 60 m but modern Wind Turbine Generator (WTG) blades are more than 130 m, leaving potentially a 70 m overhang. This is shown in all figures within this report and was used within the navigation simulations. For RoRo arrivals and departures, particularly during strong winds from the southerly sectors, masters could need to keep the bow to the west for alignment into Berth 1 which could bring it close to any overhang.

Figure 25: Voltaire Wind Farm Installation Vessel.

It should be noted that it is likely that only a small percentage of the time would a wind farm installation vessel be berthed on the Main Quay in such a configuration, and it would be even less likely that this would be during periods of adverse weather. For a vessel berthed centrally on the Main Quay of the reclamation area, such a protrusion would still not extend further than the existing green lateral buoy and therefore would pose no greater impact on ferry operations than the existing aid to navigation would. Were the vessel to be berthed to the far north of the Main Quay, it would protrude into an area of >5 m depth and overlap with an existing area where a minority of RoRo ferry tracks intersect (**Section 6.1** and **Section 6.2**). This would pose a potential risk of allision or force ferries to make a less optimal approach into Berth 1.

An example swept path of a typical manoeuvre into Berth 1 is depicted in **Figure 26**. A minimum distance of 54 m is maintained between the approach RoRo ferry and the contour line representing the maximum potential overhang of blades depending on where the blade carrier is moored along the quay. Ensuring that blade carriers berth as far south as possible on the Main Quay would greatly reduce the risks to ferries. Furthermore, as this hazard is greatest during adverse weather conditions, a dynamic risk assessment of berthing arrangements that takes into account the forecast conditions would also manage this risk. An advisory safety distance from a berthed vessel, monitored by LPS, would also provide some assurance.

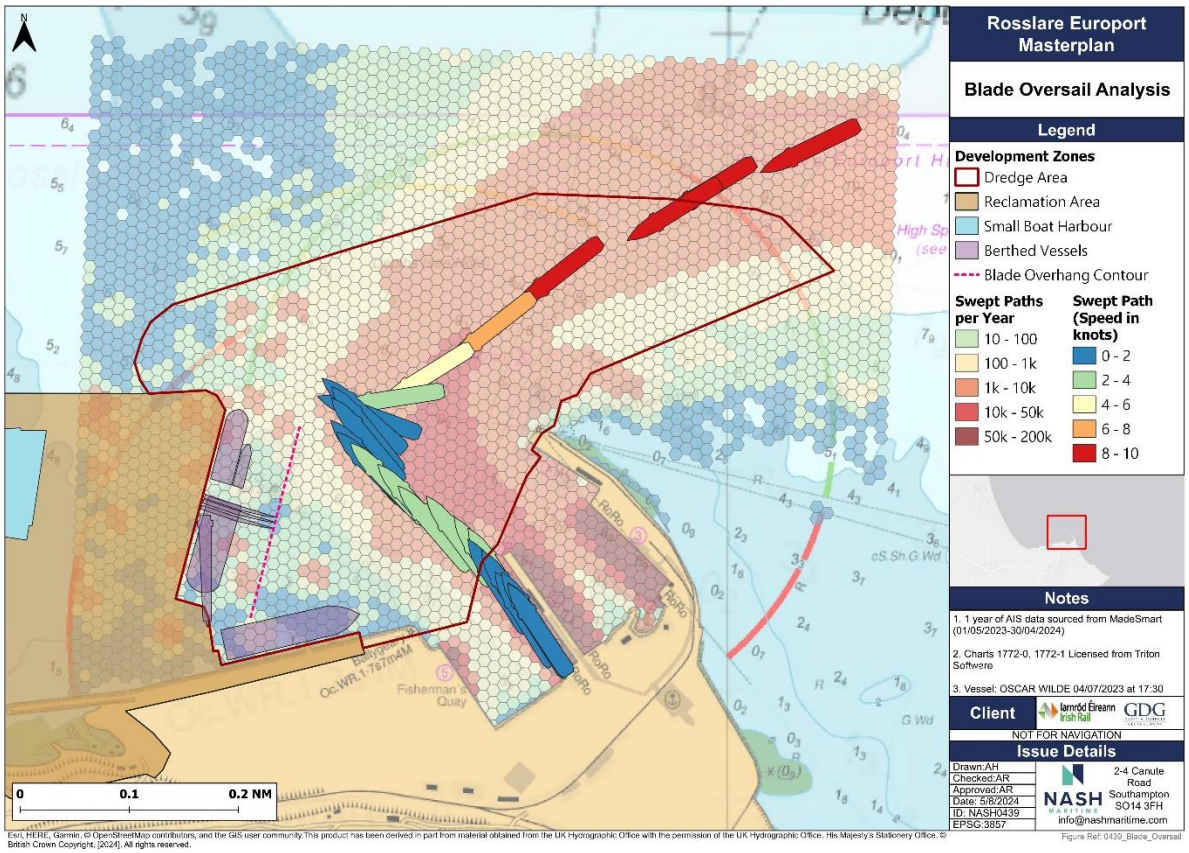

Figure 26: Swept Path Example in Relation to Blade Overhang Contour.

8.5.2 Project Traffic

The additional vessel movements, particularly large project vessels, may allide with either the existing Rosslare Europort facilities or the Project quays due to human error or mechanical failure.

The risk of allision in extreme conditions was tested as part of the navigation simulations (see **Section 3.4**). 30 knot wind speeds were tested from a range of directions with a fully loaded maximum design vessel category, a conservative worst-case situation. In particular, it is considered highly unlikely that project vessels will be berthing in such conditions. **Figure 27** shows a series of different simulation runs, all of which required the most onerous manoeuvre where a port side to berthing was required, necessitating a 180 degree turn within the confines of the harbour. Each of these runs tried different turning locations, both within the north of the dredged area, or further south within the main harbour. In all cases, sufficient safe separation of the vessel from the breakwater was achieved.

In one case, a relatively close passing distance from a RoRo vessel on the Project RoRo berth was seen. During the debrief it was concluded that given the north-easterly 30 knot wind conditions, the vessel would not have attempted to turn in the harbour and would have berthed starboard side to, a direct entry. It was agreed that berthing limits should be imposed for project vessels in high wind conditions, as is the current practice with ferries.

Following the navigation simulations, it was concluded that there was sufficient sea room within the harbour for the largest project vessels to manoeuvre safely. An allision could also result in a vessel breakout from its berth and being swept onto adjacent vessels or infrastructure. Subject to suitable mooring arrangements, this risk is also unlikely.

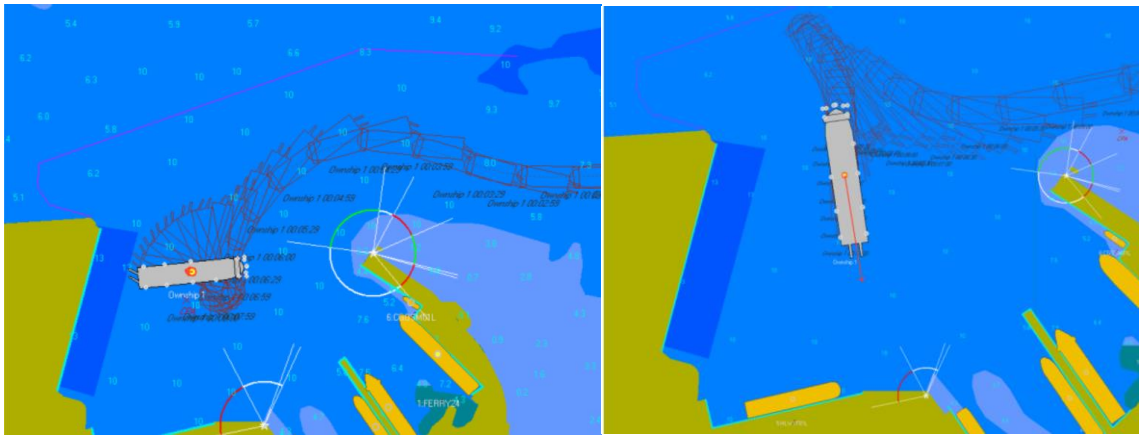

Figure 27: Navigation Simulation Examples.

8.6 IMPACT ON RISK OF GROUNDING

Given the inclusion of a dredged approach channel within this Project, far in excess of existing depths, the grounding of existing port traffic is not considered a relevant impact. Groundings could occur of project vessels inbound to the port through human error or mechanical failure. Given the geometry of the port, this is more likely to happen on the northern boundary of the dredged approach channel. The remainder of the approach channel from the east is of sufficient width for a deep draught vessel approach without concern and is marked by multiple AtoNs. A blackout event aboard the project vessel could occur but is highly unlikely and would have risks that would be independent of the Project or location.

The risk of grounding in extreme conditions was tested as part of the navigation simulations (see **Section 3.4**). It was noted that in some runs with vessels inbound to the Main Quay where port side to was required, the turn was undertaken well to the north, with the bow passing near the perimeter of the dredged area (**Figure 28**). Given the low likelihood of such conditions, the optionality to come starboard side to, and that all simulations were achieved without a grounding, it is concluded there is sufficient searoom to minimise the risk of grounding. It was agreed that weather limits for berthing in high wind conditions would be prudent mitigation.

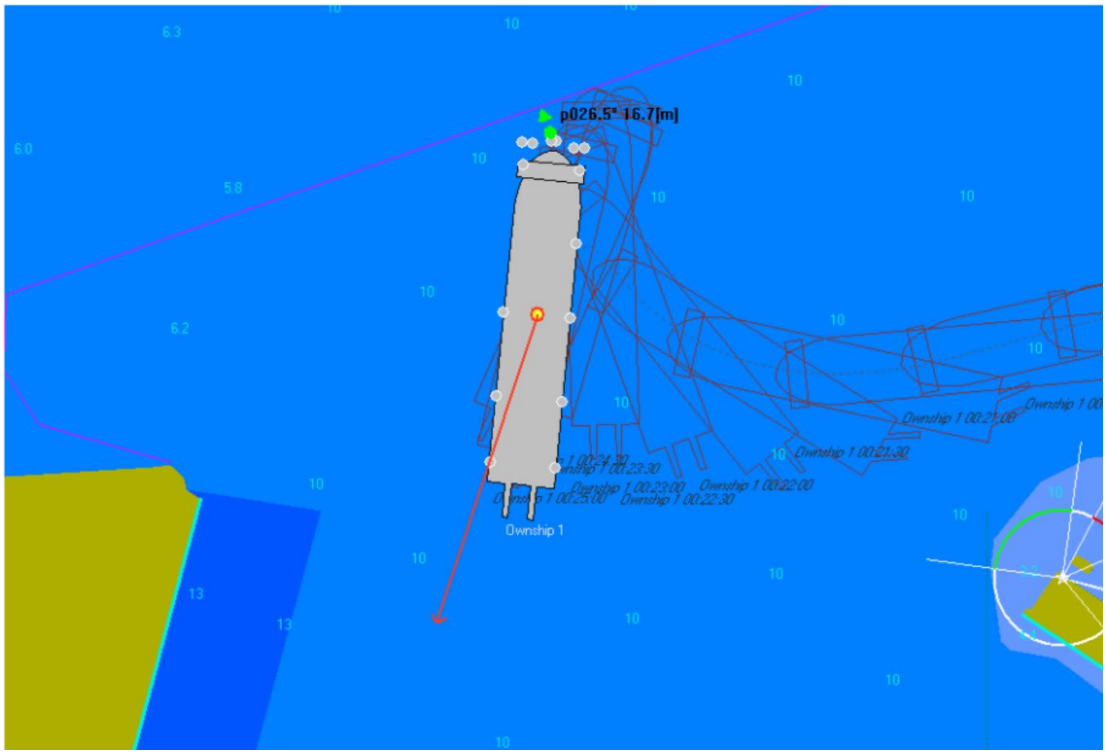

Figure 28: Navigation Simulations Run 9.

8.7 IMPACT ON SMALL CRAFT SAFETY

At present, there is a small boat harbour located along the coast west of the commercial port. The harbour completely dries out at low tide and contains slipways and a single pontoon, with a rock breakwater. Small day boats and fishing vessels less than 10 m are known to use this harbour. The Project would replace this with a purpose-built Small Boat Harbour to the northwest of the reclamation area, including slipways, berths and quays, protected by a breakwater. The new Small Boat Harbour includes multiple berths for CTV vessels, larger fishing boats, tugs and finger pontoons for small boats.

Therefore, it is anticipated that there would be a greater mixture of craft interacting within the Small Boat Harbour than is presently the case. This carries a greater risk of collision but is not anticipated to be greater than would be expected at any other marina with the application of good seamanship. Notably, the design spatially separates commercial vessel berths (CTVs and fishing boats) from other small craft such that the Small Boat Harbour is clearly demarcated. Visibility is achieved from the Small Boat Harbour into the open water, particularly to avoid larger commercial vessels meeting within the entrance to the Small Boat Harbour.

The dimensions of the Small Boat Harbour, including a 25 m entrance are deemed sufficient for safe navigation and comparable to other equivalent harbours around the world. It is also accessible throughout all tidal states compared to the existing harbour, therefore the risk is substantially reduced.

8.8 IMPACT ON RISK OF SWAMPING

Small craft such as recreational and fishing boats are susceptible to being swamped by large waves, including those caused by the wake of passing vessels. Such a risk already exists between RoRo vessels and small craft within the approaches to Rosslare Europort, and it is likely that any additional large project vessel movements would share the same risk profile.

The relocation of the small boat harbour to the northwest of the reclamation area may change the routes taken by small vessels across the harbour, offsetting them further north and away from the wash of large commercial vessels.

In addition, a risk of swamping may occur due to the addition of small project vessels such as CTVs which would also operate from the Small Boat Harbour with other small craft. CTVs are high speed, capable of up to 25 knots, and if navigating at speed near to small boat traffic could result in risks of swamping. This hazard has been experienced at other ports and harbours servicing the offshore wind industry. Mandatory or voluntary speed limits could be introduced to minimise this risk.

8.9 IMPACT ON SEARCH AND RESCUE

The Project includes a relocation of the existing RNLI station from between Berth 2 and Berth 3 into the new Small Boat Harbour. **Figure 29** shows that by moving the RNLI station, the response time to the majority of nearby incidents is not anticipated to change. On average Rosslare Harbour lifeboat station received approximately 13.9 call outs per year between 2008 and 2023. In addition, it is anticipated that access to the lifeboat station would be easier for crew members as they would have direct access without needing to cross the port. Furthermore, at its current position, launching the lifeboat in an emergency would need to be balanced against not obstructing the berthing/manoeuvring of any RoRo vessel onto Berths 2 and 3. As a result, there is anticipated to be a net benefit on search and rescue as a result of this Project.

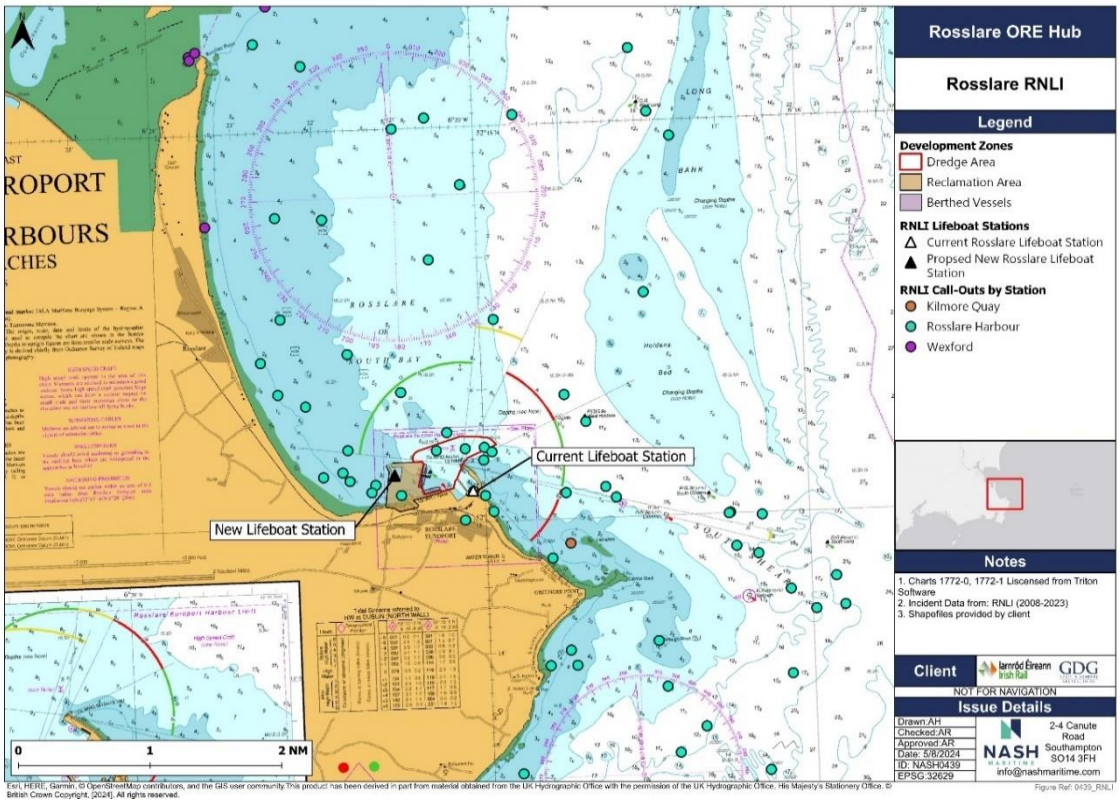

Figure 29: Comparison of SAR Response Before and After RNLI Station Relocation.

9. NAVIGATION RISK ASSESSMENT

9.1 INTRODUCTION

The NRA has been produced in accordance with the IMO's FSA (see **Section 2.2**). The development of the NRA, hazard log and associated risk scoring process is based on the following data, analysis, modelling and expertise of the project team:

- Project description (see **Section 4**).
- Overview of baseline environment (see **Section 5**).
- Description of existing marine activities (see **Section 6**).
- Future case vessel traffic profiles (see **Section 7**).
- Potential impact assessment (see **Section 8**).

In addition to the above, a key component of the NRA is engagement with regulators and local stakeholders to confirm baseline shipping and navigation characteristics and elicit judgement on the levels of navigation risk with the Project in place.

The risk assessment methodology follows the IMO FSA and is based on the principles set out in the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidelines 1018 and 1138 which are endorsed by the IMO in SN.1/Circ.296 and the IMO's FSA. Navigation hazards are identified through, consultation and data analysis, before being assessed in terms of their likelihood and consequence. A risk matrix is then utilised to identify the significance of each hazard with possible additional risk controls identified based on the resultant risk score to reduce the risks to acceptable levels.

A description of the FSA process is as follows:

1. FSA Step 1: HAZID: The project team identifies navigation hazards related to defined and agreed assessment parameters, such as geographic areas, marine operation, or vessel type. This is achieved using a suite of quantitative (e.g. statistical vessel traffic analysis) and qualitative (e.g. consultation with stakeholders) techniques which enables an evidentially robust identification of navigation hazards.
2. FSA Step 2: Risk Analysis: A detailed investigation of the causes, including the initiating events, and consequences of the hazards identified in Step 1 is undertaken. This is completed using a risk matrix and enables ranking of hazards based on navigation risk, and a determination of hazard acceptability tolerability. This process allows attention to be focused upon higher-risk hazards enabling identification and evaluation of factors which influence the level of risk.
3. FSA Step 3 & 4: Risk Controls: The identification of existing risk control measures (which are assumed to be included in the assessment of navigation risk), and the identification of possible additional risk controls, not currently in place for the assessment parameters is undertaken. Possible additional risk control measures are identified based on prioritising the mitigation of higher-risk hazards. During this stage risk control measures may be grouped into a defined and thought-out risk mitigation strategy.

4. FSA Step 5: Findings: The assessment findings are developed and documented into a technical report and then presented to the relevant decision makers in an auditable and traceable manner. The findings are based upon a comparison and a ranking of all hazards and their underlying causes; the comparison and ranking of possible additional risk control options as a function of associated costs and benefits; and the identification of those options which mitigate hazards to acceptable or 'As Low As Reasonably Practicable' (ALARP).

9.2 METHODOLOGY

Having identified all relevant impacts and hazards as a result of the Project, a hazard log is constructed. Whilst there is no generally accepted standard for risk matrices, the following is proposed as suitable for the Project as it meets IMO and IALA guidance and is consistent with industry best practice.

Each hazard is scored based on its predicted frequency of occurrence (**Table 8**) and consequence (**Table 9**) for two scenarios, the 'most likely' and 'worst credible. The severity of consequence with each hazard under both scenarios is considered in terms of damage to:

- People – hazards may result in injuries or fatalities.
- Property – hazards may result in damage or loss of vessels or structures.
- Environment – hazards may result in environmental pollution such as oil spills.
- Commercial and reputation – hazards may result in loss of economic output, impact on vessel routes, interruption of port operations and adverse media coverage.

This NRA assumes that vessels will be compliant with international (e.g. COLREGS and Standards of Training, Certification and Watchkeeping for Seafarers), and national regulations and guidance.

Table 8: Frequency of Occurrence Criteria.

Rank	Title	Description	Definition
1	Remote	Remote probability of occurrence at Project site and few examples in wider industry.	<1 occurrence per 10,000 years
2	Extremely unlikely	Extremely unlikely to occur at Project site and has rarely occurred at other ports/harbours.	1 per 100 – 10,000 years
3	Unlikely	Unlikely to occur at Project site but has occured at other ports/harbours.	1 per 10 – 100 years
4	Reasonably probable	May occur occasionally.	1 per 1 – 10 years
5	Frequent	Likely to occur multiple times.	Yearly

Table 9: Severity of Consequence Categories and Criteria.

Rank	Description	People	Property	Environment	Business
1	Negligible	Minor injury.	Less than €10,0000	Minor spill no assistance required.	Minimal impact on activities.
2	Minor	Multiple minor injuries.	€10,000-€100,000	Tier 1 Local assistance required	Local negative publicity. Short term loss of revenue or interruption of services to ports/offshore wind farm/O&G/ferries and other marine users.
3	Moderate	Multiple major injuries.	€100,000-€1 million	Tier 2 Limited external assistance required	Widespread negative publicity. Temporary suspension of activities to ports/offshore wind farm/O&G/ferries and other marine users.
4	Serious	Fatality.	€1 million-€10 million	Tier 2 Regional assistance required	National negative publicity. Prolonged closure or restrictions to ports/offshore wind farm/O&G/ferries and other marine users.
5	Major	Multiple fatalities.	>€10 million	Tier 3 National assistance required	International negative publicity. Serious and long-term disruption to ports/offshore wind farm/O&G/ferries and other marine users.

The combination of frequency and consequence scores for each scenario are then combined to produce an overall risk score, which is used to assign hazard risk ratings in the risk matrix (**Table 10**). The methodology utilised was discussed with stakeholders during the hazard workshop.

The assessment of risk is calculated eight times for each identified hazard; four times for the 'realistic most likely' occurrence for each consequence category and four times for the 'realistic worst credible' outcome for each consequence category. An overall risk score is then calculated using an averaging function weighted to the highest risk score for the 'realistic most likely' and the highest risk score for the 'realistic worst credible'. The weighted averaging calculation is an average of:

- Average of all the 'realistic most likely' risk scores.
- Average all the 'realistic worst credible' risk scores.
- Highest individual score from the 'realistic most likely' scores.
- Highest individual score from the 'realistic worst credible' scores.

The tolerability of these hazard risk scores with regard to significance and acceptability with or without further action are shown in **Table 11**. This scale makes reference to Intolerable/ALARP/Negligible bandings defined in IMO FSA studies, such as the FSA for RoPax Vessels (MSC 85 INF3). For example, a fatality every 10 years, or multiple fatalities every 100 years within the RoPax FSA was defined as the threshold between Unacceptable and ALARP, this translates to a score between 12 to 16 and 10 to 15 respectively on the risk matrix. Similarly, the same study determined that a fatality every 1,000 years, or multiple fatalities every 10,000 years was defined as the threshold between ALARP and Negligible, this translates to a score between 4 to 8 and 5 to 10 respectively on the risk matrix. The risk matrix presented in **Table 10** is therefore consistent with the FSA for RoPax Vessels (MSC 85 INF3).

Hazards are then defined as either Broadly Acceptable, with existing mitigation, or Unacceptable. Risks which are scored as Medium Risk are only Tolerable if ALARP. ALARP is met if the costs of further risk mitigation are disproportionate to the reduction in risk which would be achieved.

Table 10: Risk Matrix.

Risk Matrix							
Severity of consequences	Major	5	5	10	15	20	25
	Serious	4	4	8	12	16	20
	Moderate	3	3	6	9	12	15
	Minor	2	2	4	6	8	10
	Negligible	1	1	2	3	4	5
			1	2	3	4	5
			Remote	Extremely unlikely	Unlikely	Reasonably probable	Frequent
			Likelihood of Occurrence				

Table 11: Tolerability and Risk Ratings.

Hazard Score	Tolerability	Description
Negligible Risk (1 to 4)	Broadly Acceptable	Generally regarded as not significant and adequately mitigated. Additional risk reduction should be implemented if reasonably practicable and proportionate
Low Risk (4.1 to 6)		
Medium Risk (6.1 to 12)	Tolerable if ALARP	Generally regarded as within a zone where the risk may be tolerable in consideration of the Project. Requirement to properly assess risks, regularly review and implement risk controls to maintain risks to within ALARP where possible.
High Risk (12.1 to 20)	Unacceptable	

Hazard Score	Tolerability	Description
Extreme Risk (20.1 to 25)		Generally regarded as significant and unacceptable for Project to proceed without further risk controls.

9.3 HAZARD WORKSHOP

A hazard workshop was held on 30th July 2024 via MS Teams. The objectives of the workshop were as follows:

- Ensure all relevant potential impacts have been identified.
- Ensure all hazards have been identified.
- Ensure the risks have been appropriately assessed.
- Review risk control options and discuss requirements for additional mitigation

As described in **Section 3.3**, invitations were issued to a wide range of stakeholders requesting feedback on the Project and inviting attendance at the hazard workshop. The workshop was attended by the following organisations:

- NASH Maritime (Chair).
- GDG (Project Design Team).
- Irish Rail.
- Rosslare Europort Harbour Master Team.
- Stena Line.
- Irish Ferries.
- DFDS.
- Finnlines.

Key concerns highlighted in the meeting are listed and addressed in **Table 2** of **Section 3.3**. These primarily involved concerns around the risk of ferries in allision with moored project vessels, especially when loaded with blades that stick out significantly further. Other comments included reference to the adequacy of current pilotage, tug assistance and LPS to deal with additional vessels unfamiliar with the harbour.

The minutes of the hazard workshop are contained in **Appendix B**.

9.4 HAZARD IDENTIFICATION

An NRA should consider all identified hazards of the Project on shipping and navigation receptors. In developing the hazard log, consideration was given to project phases, areas, hazard types and vessel types.

Six hazard types were assessed:

- **Collision** – Collision between two vessels underway or with an anchored vessel.

- **Contact/Allision** – Vessel makes contact with Fixed or Floating Object or moored vessel (e.g. quay, pile, shoreline, buoy).
- **Grounding** – Vessel makes contact with the seabed/shoreline.
- **Mooring Failure/Breakout** – Vessel breaks away from securely moored position and may result in damage to non-vessel objects.
- **Foundering/Swamping** – Vessel wash overtops small craft resulting in foundering or swamping.
- **Girting** - When a tug's towline under extreme tension heels the vessel, overcoming its righting lever resulting in capsize.

Three phases were considered, construction, operation and maintenance, and decommissioning. Due to uncertainties in the decommissioning process, such impacts are assumed to be similar as those during construction.

Vessel categories were combined where they shared similar risk profiles. Four vessel types were identified:

- Ferries and other large commercial ships.
- Small craft including fishing, recreational, RNLI lifeboats and small commercial vessels.
- Large project Vessels including wind farm installation vessels, Project RoRos, general cargo vessels, dredgers and SOVs.
- Small project Vessels including tugs, survey vessels and CTVs.

Four areas within the risk assessment were identified:

- Approach Channel – the South Shear Channel up to the existing breakwater.
- Main Harbour – between the existing breakwater and the Project Main Quay.
- Small Boat Harbour – approaches to and within the new Small Boat Harbour.
- Anchorages – vessels anchoring or manoeuvring within the existing anchorage to the north of the Project.

9.5 RESULTS

The results of the NRA, based on the approach as identified above shows that in total:

- 8 hazards were assessed as Medium Risk – Tolerable (if ALARP).
- 13 hazards were assessed as Low Risk – Broadly Acceptable.
- 2 hazards were assessed as Negligible Risk – Broadly Acceptable.

The scores are provided in **Table 12** and the full hazard log is contained in **Appendix A**.

Table 12: Identified Hazards in Order of Risk Score.

ID	Rank	Phase	Hazard Title	Risk	
				Score	Rating
1	1	C/O/D	Ferry/Commercial ICW Large Project Vessel	6.7	Medium Risk - Tolerable (if ALARP)
10	1	C/O/D	Ferry/Commercial Allision	6.7	Medium Risk - Tolerable (if ALARP)
11	3	C/O/D	Small Craft Allision	6.6	Medium Risk - Tolerable (if ALARP)
13	3	C/O/D	Small Project Vessel Allision	6.6	Medium Risk - Tolerable (if ALARP)
5	3	C/O/D	Small Project Vessel ICW Small Craft	6.6	Medium Risk - Tolerable (if ALARP)
12	6	C/O/D	Large Project Vessel Allision	6.4	Medium Risk - Tolerable (if ALARP)
22	7	C/O/D	Foundering/Swamping Small Craft	6.4	Medium Risk - Tolerable (if ALARP)
16	8	C/O/D	Large Project Vessel Grounding	6.3	Medium Risk - Tolerable (if ALARP)
20	9	C/O/D	Breakout/ Mooring Incident Large Project Vessel	6.0	Low Risk - Broadly Acceptable
2	9	C/O/D	Ferry/Commercial ICW Small Craft	6.0	Low Risk - Broadly Acceptable
3	9	C/O/D	Ferry/Commercial ICW Small Project Vessel	6.0	Low Risk - Broadly Acceptable
6	9	C/O/D	Large Project Vessel ICW Small Project Vessel	6.0	Low Risk - Broadly Acceptable
8	13	C/O/D	Small Project Vessel ICW Small Project Vessel	5.6	Low Risk - Broadly Acceptable
23	13	C/O/D	Girting Small Project Vessel	5.6	Low Risk - Broadly Acceptable
18	13	C/O/D	Breakout/Mooring Incident Ferry/Commercial	5.6	Low Risk - Broadly Acceptable
14	16	C/O/D	Ferry/Commercial Grounding	5.1	Low Risk - Broadly Acceptable
7	17	C/O/D	Large Project Vessel ICW Large Project Vessel	5.1	Low Risk - Broadly Acceptable
9	18	C/O/D	Small Craft ICW Small Craft	4.7	Low Risk - Broadly Acceptable
19	18	C/O/D	Breakout/ Mooring Incident Small Craft	4.7	Low Risk - Broadly Acceptable
21	18	C/O/D	Breakout/ Mooring Incident Small Project Vessel	4.7	Low Risk - Broadly Acceptable
4	21	C/O/D	Large Project Vessel ICW Small Craft	4.6	Low Risk - Broadly Acceptable
15	22	C/O/D	Small Craft Grounding	3.8	Negligible Risk - Broadly Acceptable
17	22	C/O/D	Small Project Vessel Grounding	3.8	Negligible Risk - Broadly Acceptable

The top hazard relates to a ferry/commercial vessel in collision with a large project vessel and was scored as Medium Risk (Tolerable if ALARP). On average there are 13 ferry/commercial vessel transits per day. With the ORE Hub development, there could be an additional project Vessel every two days to two weeks, with bridge teams who are less familiar with the harbour. With no tugs, physical pilotage or VTS available, and a history of close quarters situations taking place on the approaches (**Section 6.3**), a collision scenario is deemed possible. The involvement of two large vessels in the collision, one of which is a passenger ferry, make the consequences of a collision severe. Multiple major injuries are most likely to occur and in the worst case, the loss of two vessels and the loss of lives. However, the existing clear channel policy combined with the infrequency of large project vessel transits and available capacity (**Section 8.2**) lessens the likelihood of a collision event occurring thus preventing the hazard from scoring as high risk (see **Section 8.4**).

The second top hazard relates to a ferry/commercial vessel involved in an allision (including an allision with a moored project vessel). During consultation, ferry operators raised concerns with the proximity of manoeuvring ferries to where project vessels would be berthed alongside the ORE quay, particularly in adverse weather and where turbine blades are stored on deck. The vessel tracks and swept path density suggested that >99.9% of existing ferry tracks already avoid the area where berthed project vessels would be (**Section 8.5.1**) and the Navigation Simulations confirmed safe manoeuvres possible in those conditions (**Section 3.4**). It should also be noted that blades would be stored in this configuration relatively infrequently, and where the vessel is berthed to the south of the Main Quay, they are well clear of existing traffic and would be within an area of shallows marked by a green lateral buoy. The consequences would include extensive property damage of expensive ORE equipment and

vessels, as well as the potential loss of life in the event of a passenger ferry forcefully contacting solid infrastructure. As a result, a medium risk score was given.

The third, fourth and fifth hazards regarding an allision involving small craft or small Project craft or a collision between the two, were deemed to have similar risk profiles and were scored the same. Due to the regular activity of multiple project vessels per day mixing with recreational and fishing boats within the approaches to the Small Boat Harbour, there is a possible risk of collision, with a relatively low risk of collision elsewhere in the Study Area. Similarly, the operation of small boats in and out of any harbour carries a potential risk of allision. Collisions and allisions involving small boats typically result in minor damage or minor injuries, however, the worst-case event could see the loss of a vessel and multiple fatalities attributed due to the vulnerability of small vessels.

An allision of a large project vessel, likely with the Main Quay, was scored as the sixth highest hazard. The most likely scenario would be an error whilst berthing and some minor damage caused by a hard landing on the fendered berth. A more serious outcome could result in extensive property and business damage in the worst-case scenario however this was judged to be rare due to a general lack of obstacles to navigate on the approach (**Section 8.3**) and high manoeuvrability and redundancy of the proposed project vessels. Project vessels are expensive and likely carrying expensive cargo making any allision costly.

Also scored as medium risk was the foundering/swamping of small craft. This event is possible when large commercial vessels or project vessels are regularly operating in the harbour and in their approaches generating sufficient wash to cause a hazard to small craft. Additionally, in the event of swamping the likelihood of a worse-case scenario involving the loss of the vessel is relatively high and may result in a fatality. However, a most-likely case of minor foundering and/or water intake as a result of a large vessel wash, would have very minimal consequences. In addition, the allocation of a separate Small Boat Harbour offers increased protection from large vessels in comparison to the current Berth 5 or fisherman's quay currently utilised. So far, no swampings have been recorded, and no foundering/sinking events have been reported that relate to external factors such as other vessels (**Section 6.3**).

The last medium risk hazard relates to large project vessels grounding which could occur either within the South Shear Channel or at the northern limits of the dredged area dredged area during a manoeuvre into berth. As shown in **Section 8.3**, the South Shear Channel is well marked and sufficiently wide for these types of vessels and therefore a grounding here is likely limited to mechanical failures and unlikely. **Section 8.6** and the Navigation Simulations showed that there was sufficient searoom for the largest project vessels anticipated to manoeuvre on and off the Project berths without grounding (**Section 3.4**). The consequences could include the loss of the vessel, and major disruption to port operations and even blocking of the channel for other RoRo vessels.

Low risk hazards which included collisions, allisions, groundings, breakouts and girtings were either scored as rare or unlikely or had less severe consequences in the event of a most-likely scenario. During the hazard workshop, the risk of breakout was questioned caused by the design of the harbour preventing the occasional northerly swell from dissipating and causing vessels to surge on their berth and snapping moorings. It is understood that modelling undertaken by the Project suggests this is unlikely. All of these other hazards were believed to be adequately mitigated by existing risk controls and were not significantly increased to unacceptable levels by the ORE Hub developments.

9.6 ADDITIONAL RISK CONTROL OPTIONS

Throughout the NRA and hazard workshop, additional risk control measures were identified which could further reduce the risk. These are summarised in **Table 13**. Consideration should be given to implementing these where it is practical and feasible to do so.

Table 13: Additional Risk Control Options.

ID	Description
1	**Deconfliction of project vessel movements with existing port traffic.** In conjunction with the existing clear channel policy, arrivals to Project berths should be timed to avoid planned ferry arrivals/departures. As shown in **Section 8.2**, there is sufficient capacity within Rosslare to accommodate the anticipated number of large vessel movements. However, it is recommended that within the LPS Manual, priority should be given to scheduled RoRo services above other commercial traffic.
2	**Pilotage**. Pilotage is not compulsory in Rosslare however remote pilotage assistance is typically given to the first six arrivals or departures of a Master under the supervision of the Harbour Master. The risk assessment has demonstrated that the risk of an incident during pilotage within the South Shear Channel is relatively low given the available searoom and existing AtoNs (see **Section 8.3**). However, once within the confines of the harbour and dredged area, the manoeuvre and berthing introduces its own risks, particularly given the size of project vessels, high windage and poor visibility when loaded. There is limited benefit that remote pilotage can offer to assist with this manoeuvre and berthing. In addition, were tugs requested by the Master, many ports expect that safe and effective towage is achieved through a pilot or Pilotage Exemption Certificate (PEC) holder being on the bridge. In addition, wind farm installation vessels are relatively unique and therefore were a pilot requested by the Master, they need suitable experience in handling such vessels. Therefore, there are clear benefits in risk management justifying the use of pilots aboard the infrequent calling of large project vessels. Given the complexities and practicalities of how this could be delivered, and the relatively infrequent demand, the NRA encourages that further investigation of the need for enhanced pilotage is undertaken.
3	**Towage**. As described above, large project vessels can suffer from high windage and poor visibility which makes manoeuvring them on and off the berth challenging in strong winds. Whilst it was shown with the vessel models selected in the navigation simulations (**Section 3.4**) that these manoeuvres can be done in strong winds, the availability of suitable harbour towage is recommended. Given the distance of adjacent ports and the high demands on their existing towage requirements, it may not be practical to request tugs at short notice for individual vessel movements. Locally available towage would also serve to provide additional redundancy not only to project vessel movements but also to RoRo operations during marginal wind conditions or in the event of mechanical constraints. It is recommended that a business case is therefore developed to provide suitable harbour towage within Rosslare harbour.
4	**VTS**. Rosslare currently operates an LPS with a periodically manned control tower. Given the additional vessel movements and greater mix of vessels, consideration should be given to upgrading from an LPS to a VTS. This is not uncommon in ferry ports around the UK in Ireland which have limited large commercial users. It is understood that Rosslare Port Control already have the necessary equipment and that staff are being trained or will be trained to internationally recognised VTS standards. By upgrading, there would be enhanced monitoring and management of vessel movements

ID	Description
	within Rosslare Europort. This was recognised within the 2022 MCIB investigation into the near miss between the Stena Europe and Connemara. For the movement of project vessels, the risks posed to existing traffic within Rosslare Harbour are assessed to be Medium Risk or Low Risk (see **Section 9**) and therefore VTS would not be entirely justified from the Project alone. However, recognising that there would also be significant benefit to other operators within Rosslare, a credible argument for establishing VTS could be made. SOLAS Chapter V states that VTS should be established where the volume of traffic and degree of risk justifies such services. Both IMO (Resolution A.857(20)) and IALA have developed guidelines for determining the requirement for establishing VTS within a port or harbour. It is recommended that such a study is undertaken to determine whether VTS is needed in Rosslare.
5	**Monitoring Small Boat Harbour**. Whilst the establishment of the new Small Boat Harbour offers greater visibility of vessel movements from the Rosslare Port Control, introducing CCTV monitoring and periodic patrols by port personnel is recommended to ensure compliance with other risk controls, police safe navigation and address any issues as they arise.
6	**Speed Limits**. It is noted that CTVs which may be operating from the Small Boat Harbour have speeds up to 25 knots. Consideration should be given to introducing an advisory speed limit within a certain distance of the Small Boat Harbour (for example 0.5 nm or due west of the breakwater) in the region of 10 knots to minimise the risk of collision with other vessels. Such a distance would therefore not cause undue disruption to vessel transits. It is recommended that a speed limit is introduced within the Small Boat Harbour of between four and six knots to reduce the risk of serious collision and allision. This is typical of marinas and small harbours around the world.
7	**Aids to navigation**: The green lateral channel marker located to the northwest of the existing ferry berths will need to be relocated or removed. Consideration should be given to relocating this on the edge of the proposed dredged area, in alignment to the north of the edge of the yellow sector light. Relocating this any further east may pose a hazard to arriving RoRo vessels. Such a buoy may also encourage small craft to keep clear to the north of the main harbour when navigating to/from the Small Boat Harbour. Introducing leading lights installed on the reclaimed area of the Project, aligned with the dredged area, was discussed with consultees, but it was agreed that these would offer little benefit and may confuse other vessels operating further offshore.
8	**Advisory safety zone:** To minimise the risk of collision/allision, introducing an advisory safety zone from the Main Quay of the reclamation area could be considered. This could be established within existing port procedures or included as a chart/sailing directions note.
9	**Managing blade overhang:** Concerns were raised in **Section 8.5** of blades loaded on large project vessels protruding into the area where ferries wished to manoeuvre. Where at all possible, such vessels should be berthed to the south of the Main Quay, particularly during periods when strong winds are forecast. This could be included in berthing plans, operational plans and the LPS manual and would reduce the risk of allision with berthing RoRo vessels.

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 CONCLUSIONS

1. An NRA has been conducted to assess the impact of the Proposed Development on shipping and navigation in the area in compliance with all relevant legislation, policy and guidance (**Section 2**).
2. The development includes a dredged area, reclaimed purpose-built quay, Small Boat Harbour and ORE servicing facilities. The Study Area focuses on activity within a 1 km buffer of the main harbour, but analysis also considered activity in the north anchorage and South Shear approach channel as far as 5 km from the harbour entrance.
3. To supplement the risk assessment, consultations with stakeholders were conducted and Navigation Simulations were held to test manoeuvres alongside the new proposed developments (**Sections 3.3** and **3.4**).
4. The Project would include a construction phase lasting between 18-24 months and an operational phase where, in tandem with continued cargo and ferry operations, the port will serve as a hub for OWF support, facilitating between one and seven large project vessels every two weeks and multiple small project vessels a day (**Section 4**).
5. Existing port risk controls include remote pilotage, LPS control, lateral markers aiding the South Shear approach which also serve as a holding buoy prior to arrival, sector lights in port and on the breakwater, and a large anchorage in the north channel (**Section 5.1**).
6. MetOcean analysis concluded the prominent wind direction to be S and SWS with maximum sustained wind speeds of up to 28 knots. The prominent wave direction was from the E, with occasional strong tides up to 3 knots flowing N or S (**Section 5.2**).
7. Local search and rescue is facilitated by the IRCG and RNLI, primarily the Rosslare Harbour Station. The current RNLI station, situated amongst the ferry terminal berths, will be moved to the Small Boat Harbour (**Section 5.3**).
8. Analysis of historical vessel traffic data (**Section 6**) identified:
    a. The main approach channel from the South Shear consists of between 1.4 and 19.2 transits a day primarily by regular commercial vessels
    b. 59% of activity is carried out by large commercial vessels between 150-200 m LOA. 70% of transits were by passenger vessels, while every other vessel type constituted a proportion less than 11%. Fishing and recreational activity is especially minimal.
    c. There were 4,127 passenger vessels transits in the year which ranges between 1 -22 per day and averages at 11 per day.
    d. There is a slight seasonal increase in recreational and passenger vessel activity in the summer months.

9. Swept path analysis demonstrated the majority (>99%) of commercial vessel manoeuvring into Berths 1, 2 and 3 occupied a condensed area in the main harbour, maintaining a minimum distance of 80 m to potential project vessels moored along the quay (**Section 6.2**).
10. The incident analysis revealed the most common incident type to be mechanical failure accounting for 40% of all incidents, followed by contact (17%) typically involving ferries making minor contacts with their berths. A close quarters situation occurred in the approaches to port after an inbound ferry failed to wait as instructed at the West Holdens Buoy to maintain the clear channel policy (**Section 6.3**).
11. 12 specific impacts were identified in the impacts assessment and were concluded as follows:
    a. There are no expected impacts to ferry operations by the physical presence of the reclamation area as >99% of existing ferry activities avoid the proposed area already due to current depth limitations (**Section 8.2.1**).
    b. There are no expected impacts to congestion as a result of increased project vessel activity as there is sufficient time in both peak and off-peak times to accommodate the anticipated additional vessels (**Section 8.2.2**).
    c. Construction activities are expected to have a minor impact on ferry operations. Disruption will be minimised by the requirement that dredgers make way for inbound ferries which have priority (**Section 8.2.3**).
    d. There are no expected impacts on anchoring as the 2 nm^2 of usable space is ample to facilitate additional vessels and mitigate conflicts between in and outbound vessel movements (**Section 8.2.4**).
    e. There is likely a gradual increase in commercial vessel operations at Rosslare along with the possibility of longer ferries (**Section 7.2**), however, there is sufficient space for the expected additional vessels to be accommodated.
    f. The assessment of the impact on navigation safety in the South Shear Channel determined that there is sufficient width to accommodate passing vessels through the whole length of the approach channel. In addition, with the likelihood of a vessel meeting another low, it is not anticipated that increased vessel activity resulting from the ORE Hub development will have a substantial impact (**Section 8.3**).
    g. Whilst the presence of infrastructure and increased Project traffic could increase the risk of collision, the ample space within and in the approaches to harbour combined with existing low traffic levels provide sufficient space such that the risk of a collision is low and is already mitigated by the clear channel policy (**Section 8.4**).
    h. The assessment of the impact on the risk of allision determined that the moored project vessels along the quayside, in particular, a blade carrier with overhanging blades could increase the risk of allision with a ferry manoeuvring into Berth 1. However, as the risk is greatest during adverse weather

conditions, a dynamic risk assessment and control from LPS would be sufficient to manage this risk (**Section 8.5**).

i. The risk of grounding is not anticipated to be high given the planned additional dredging providing ample depth in the areas utilised by deep drafted vessels (**Section 8.6**).

j. While there is an anticipated increase in small project vessels, the risk on small craft safety is not believed to be higher than in regular marinas. In addition, the purpose-built Small Boat Harbour is structured with ample space and separation and does not experience tidal drying as in the current allocated small boat berths (**Section 8.7**).

k. The assessment of the impact on the risk of swamping determined that whilst the risk to small vessels from large vessels may be mitigated by the separation of the Small Boat Harbour, the presence of high-speed Project craft could pose a risk of swamping (**Section 8.8**).

l. The movement of the RNLI Rosslare Harbour station to the Small Boat Harbour is expected to have a positive impact on the Search and Rescue capabilities by offering separate access from the main harbour and a more direct route offshore (**Section 8.9**)

12. A risk assessment was undertaken, supported through a hazard workshop attended by representatives from the project team, Harbour Master and ferry operators (**Section 9**). The risk assessment, with embedded risk controls, concluded that:

    a. 8 hazards were assessed as Medium Risk – Tolerable (if ALARP). The top two scoring risks are the collision between a project vessel and a commercial vessel, and the allision of a commercial vessel. These were scored to the low end of the Medium Risk category.

    b. 13 hazards were assessed as Low Risk, and 2 hazards were assessed as Negligible Risk.

    c. The main concerns raised were how the position of a blade carrier vessel further north on the quay poses a risk of collision and reduces the space for manoeuvres into Berth 1. Additionally, whether LPS and remote pilotage would be sufficient management for additional project vessel movements unfamiliar with the harbour.

10.2 RECOMMENDATIONS

The following recommendations are made:

1. Amendments are made to the LPS manual to give priority to scheduled RoRo movements over project vessels, and that arrivals/departures are focused during off-peak periods of the day.
2. Consideration is given to providing formal pilotage at Rosslare for large project vessel movements.

3. Consideration is given to stationing a harbour tug at Rosslare to assist with manoeuvring and berthing of both project vessels and RoRo vessels.
4. Consideration is given to upgrading Rosslare's LPS to a full VTS to better manage the movements of all vessels within the harbour.
5. CCTV is installed to monitor vessel movements within the Small Boat Harbour.
6. Consideration is given to speed limits both within the harbour and Small Boat Harbour.
7. Consideration is given to relocating the green lateral mark to the northern limit of the dredged channel.
8. Consideration is given to an advisory safety zone off of any berthed vessel along the Main Quay.
9. Any vessels with blade overhang should be berthed as far south as possible along the Main Quay to minimise the impact on RoRo operations at Berth 1.

10.3 SUMMARY RISK STATEMENT

In summary, it is concluded that with the proposed risk controls in place, the risks posed by the ORE Hub development would not be unacceptable and there would be a minor impact on existing port operations. Some of the identified hazards, particularly the risk of allision for RoRo operations, can be managed effectively through dynamic risk assessments, and other hazards would be managed to As Low As Reasonably Practicable with embedded risk controls. However, it is recommended that additional risk mitigation identified above is considered to provide further risk reduction, given its benefit both to the Proposed Development and existing RoRo operations.

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Appendix A
Hazard Log

ID	Baseline Haz. Rank	Phase	Area	Hazard Title	Embedded / Existing Mitigation	Possible causes	Realistic Most Likely Scenario	Realistic Most Likely Scores					Realistic Worst Credible scenario	Realistic Worst Credible Scores					Baseline Risk Score	Baseline Risk Rating
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency		
1	1	C/O/D	Approaches / Main Harbour	Ferry/ Commercial ICW Large Project Vessel	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple major injuries; Moderate damage; Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	3	2	3	3	Multiple fatalities; Catastrophic damage; Moderate pollution incident (Tier 2); Major adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	5	5	3	5	1	6.7	Medium Risk - Tolerable (if ALARP)
2	9	C/O/D	Approaches / Main Harbour	Ferry/ Commercial ICW Small Craft	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple major injuries; Moderate damage; No pollution; Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	3	1	3	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	6.0	Low Risk - Broadly Acceptable
3	9	C/O/D	Approaches / Main Harbour	Ferry/ Commercial ICW Small Project Vessel	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple major injuries; Moderate damage; No pollution; Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	3	1	3	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	6.0	Low Risk - Broadly Acceptable
4	21	C/O/D	Approaches / Main Harbour	Large Project Vessel ICW Small Craft	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple major injuries; Moderate damage; No pollution; Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	3	1	3	2	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	4.6	Low Risk - Broadly Acceptable
5	3	C/O/D	Approaches / Main Harbour / Small Boat Harbour	Small Project Vessel ICW Small Craft	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	2	6.6	Medium Risk - Tolerable (if ALARP)
6	9	C/O/D	Approaches / Main Harbour	Large Project Vessel ICW Small Project Vessel	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple major injuries; Moderate damage; No pollution; Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	3	1	3	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	6.0	Low Risk - Broadly Acceptable

ID	Baseline Haz. Rank	Phase	Area	Hazard Title	Embedded / Existing Mitigation	Possible causes	Realistic Most Likely Scenario	Realistic Most Likely Scores					Realistic Worst Credible scenario	Realistic Worst Credible Scores					Baseline Risk Score	Baseline Risk Rating
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency		
7	17	C/O/D	Approaches / Main Harbour	Large Project Vessel ICW Large Project Vessel	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Moderate damage; Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	3	2	3	2	Single fatality; Catastrophic damage; Moderate pollution incident (Tier 2); Major adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	5	3	5	1	5.1	Low Risk - Broadly Acceptable
8	13	C/O/D	Approaches / Main Harbour / Small Boat Harbour	Small Project Vessel ICW Small Project Vessel	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Moderate damage; No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	3	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	5.6	Low Risk - Broadly Acceptable
9	18	C/O/D	Approaches / Main Harbour / Small Boat Harbour	Small Craft ICW Small Craft	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	4.7	Low Risk - Broadly Acceptable
10	1	C/O/D	Main Harbour	Ferry/ Commercial Allision	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits; Marking and Charting; Fendering/Impact Protection; Inspection and Maintenance;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple major injuries; Moderate damage; Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	3	2	3	3	Multiple fatalities; Catastrophic damage; Moderate pollution incident (Tier 2); Major adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	5	5	3	5	1	6.7	Medium Risk - Tolerable (if ALARP)
11	3	C/O/D	Main Harbour / Small Boat Harbour	Small Craft Allision	Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Marking and Charting; Fendering/Impact Protection; Inspection and Maintenance;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	2	6.6	Medium Risk - Tolerable (if ALARP)

ID	Baseline Haz. Rank	Phase	Area	Hazard Title	Embedded / Existing Mitigation	Possible causes	Realistic Most Likely Scenario	Realistic Most Likely Scores					Realistic Worst Credible scenario	Realistic Worst Credible Scores					Baseline Risk Score	Baseline Risk Rating
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency		
12	6	C/O/D	Main Harbour	Large Project Vessel Allision	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits; Marking and Charting; Fendering/Impact Protection; Inspection and Maintenance;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Moderate damage; Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	3	2	3	3	Single fatality; Catastrophic damage; Moderate pollution incident (Tier 2); Major adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	5	3	5	1	6.4	Medium Risk - Tolerable (if ALARP)
13	3	C/O/D	Main Harbour / Small Boat Harbour	Small Project Vessel Allision	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits; Marking and Charting; Fendering/Impact Protection; Inspection and Maintenance;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	2	6.6	Medium Risk - Tolerable (if ALARP)
14	16	C/O/D	Approaches	Ferry/ Commercial Grounding	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits; Marking and Charting; Hydrographic Surveys; Maintenance Dredging;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Siltation; Avoidance of Other Vessels;	Multiple major injuries; Minor damage: Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	3	2	2	3	2	Multiple fatalities; Catastrophic damage; Moderate pollution incident (Tier 2); Major adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	5	5	3	5	1	5.1	Low Risk - Broadly Acceptable
15	22	C/O/D	Approaches	Small Craft Grounding	Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Marking and Charting;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Siltation; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	2	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	3.8	Negligible Risk - Broadly Acceptable

ID	Baseline Haz. Rank	Phase	Area	Hazard Title	Embedded / Existing Mitigation	Possible causes	Realistic Most Likely Scenario	Realistic Most Likely Scores					Realistic Worst Credible scenario	Realistic Worst Credible Scores					Baseline Risk Score	Baseline Risk Rating
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency		
16	8	C/O/D	Approaches	Large Project Vessel Grounding	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits; Marking and Charting; Hydrographic Surveys; Maintenance Dredging;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Siltation; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	2	3	3	Single fatality; Catastrophic damage; Moderate pollution incident (Tier 2); Major adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	5	3	5	1	6.3	Medium Risk - Tolerable (if ALARP)
17	22	C/O/D	Approaches	Small Project Vessel Grounding	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Notice to Mariners; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits; Marking and Charting; Hydrographic Surveys; Maintenance Dredging;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Siltation; Avoidance of Other Vessels;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	2	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	3.8	Negligible Risk - Broadly Acceptable
18	13	C/O/D	Main Harbour	Breakout/ Mooring Incident Ferry/ Commercial	Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility; Avoidance of Other Vessels;	Multiple minor injuries; Moderate damage; No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	3	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	5.6	Low Risk - Broadly Acceptable
19	18	C/O/D	Main Harbour / Small Boat Harbour	Breakout/ Mooring Incident Small Craft	Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting;	Mechanical Failure; Adverse Weather;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	4.7	Low Risk - Broadly Acceptable
20	9	C/O/D	Main Harbour	Breakout/ Mooring Incident Large Project Vessel	Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits	Mechanical Failure; Adverse Weather;	Multiple minor injuries; Moderate damage; Minor pollution (Tier 1); Moderate adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	3	2	3	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	6.0	Low Risk - Broadly Acceptable
21	18	C/O/D	Main Harbour / Small Boat Harbour	Breakout/ Mooring Incident Small Project Vessel	Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Construction Method Statement; Marine Operating Guidelines; Vessel Standards; Weather Limits	Mechanical Failure; Adverse Weather;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	1	4.7	Low Risk - Broadly Acceptable

ID	Baseline Haz. Rank	Phase	Area	Hazard Title	Embedded / Existing Mitigation	Possible causes	Realistic Most Likely Scenario	Realistic Most Likely Scores					Realistic Worst Credible scenario	Realistic Worst Credible Scores					Baseline Risk Score	Baseline Risk Rating
								People	Property	Environment	Business	Frequency		People	Property	Environment	Business	Frequency		
22	7	C/O/D	Approaches / Main Harbour / Small Boat Harbour	Foundering/ Swamping Small Craft	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Failure to Comply with COLREGs; Failure to Comply with Port Controls; Adverse Weather;	Multiple minor injuries; Negligible damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	1	1	2	3	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	2	6.4	Medium Risk - Tolerable (if ALARP)
23	13	C/O/D	Main Harbour	Girting Small Project Vessel	Local Port Services; Clear Channel Policy; Port Emergency Plan; Oil Spill Response Plan; Incident Investigation and Reporting; Construction Method Statement; Marine Operating Guidelines; Vessel Standards;	Human Error/Poor Seamanship; Fatigue; Mechanical Failure; Adverse Weather; Reduced Visibility;	Multiple minor injuries; Minor damage: No pollution; Minor adverse publicity / short term interruption to Rosslare Europort/ORE Hub.	2	2	1	2	2	Single fatality; Major damage; Minor pollution (Tier 1); Moderate adverse publicity / long term interruption to Rosslare Europort/ORE Hub.	4	4	2	4	2	5.6	Low Risk - Broadly Acceptable

Appendix B
Meeting Minutes

Project Title	Rosslare ORE Hub: NRA
Project Number	0439
Meeting subject / purpose	Navigation Risk Assessment
Revision	R01-00
Date of meeting	30-Jul-2024
Start time	10:00 GMT
Finish time	12:00 GMT
Client	G&D Geosolutions, Irish Rail
Location	Teams

DOCUMENT CONTROL

Revision	Date of Issue	Description	Approved
R01-00	01-August-2024	Issued to attendees for comment	AR

ATTENDEES

Organisation	Attendee	Role	Initial
NASH Maritime		Associate Director Principle Consultant Graduate Consultant	AR NB AH
G&D Geosolutions		Principal Marine Environmental Scientist Graduate Environmental Consultant Environmental Consultant	JC SG JM
Irish Rail		Senior Project Manager Harbour Master Head of Operations	BH TC JM
Stena Lines		DPA & CSO	MP
Irish Ferries		Route Manager Ship management	RS SM
DFDS		Route Director for the Rosslare-Dunkirk Route	CP
Finnlines		Superintendent and Safety Manager	KJ

AGENDA

1. Introductions
2. Description of Project
3. Data Gathering and Analysis
4. NRA Methodology
5. Hazard Identification
6. Existing/Embedded Risk Controls
7. Risk Assessment
8. Identification of Additional Risk Controls

NOTES OF MEETING

1	Project Description – G&D Geosolutions	Action
1.1	JC provided an overview of Project description slides.	
1.2	AR clarified some details on the expected number of additional Project vessels and welcomed any questions on the Project design.	
2	**NASH Slides – Project Description, Vessel Traffic Analysis**	**Action**
2.1	AH described baseline vessel traffic analysis.	
2.2	AR explained the navigation simulations (NavSims).	
2.3	JM queried the dimensions of the largest simulated vessels. AR provided the dimensions of the 215 m loaded module carrier used in the NavSims and explained the desire to capture the largest Project vessels anticipated to utilise the harbour with considerations to extreme weather conditions. In addition, the NavSims included existing RoRo operations into the existing Berth 1 with the Project in place.	
2.4	MP raised the point of the close proximity of some passenger vessel tracks to the overhang of blade carrier and questioned if any future proofing has been considered with regard to potential increase to 240 m vessel sizes. AR posed the question if future proposed larger vessels have the same draught limits as existing operations and therefore more constrained by the existing shallower water to the west of Berth 1. MP confirmed they would be the same draught as existing vessels and likely to be deployed on Rosslare routes (c.6.1 m). AR directed the question to JC whether blades can be positioned further south along the quay. JC explained that the feasibility of employing this measure will be looked at. BH mentioned the NavSims berthing at Berths 1 or 2 in extreme weather conditions and no concerns were raised against the safety of those manoeuvres with blade overhang. TC confirmed extreme wind conditions were tested and the simulation results proved safe distances could be maintained.	NASH to analyse the impact of where a blade carrier is positioned on the quay.

	AR agreed that there was a potential impact on ferry operations in certain weather conditions were the blade overhang positions towards the north of the quay. An action was taken to consider this further.	
2.5	AH explained the analysis of commercial vessel arrivals per hour. AR emphasised the desire to ensure there will be no scheduling conflictions between the arrival of Project vessels and existing timetabled commercial vessels. MP queried if the Project vessels are subject to tidal restrictions. AR explained there would be adequate dredging to avoid restrictions to the deepest drafted vessels (9.6 m). JC confirmed they won't be tidally restricted.	
3	**NRA methodology**	**Action**
3.1	AR described NASH's approach to risk assessment methodology with attention to details on the risk matrix, scoring calibration, risk criteria and relevant examples.	
3.2	AR explained Hazard Identification methods including the hazard types, vessels type grouping, identified hazards and welcomed input of any missing identified hazards. TC agreed full scope of hazards has been identified. No further additional hazards were proposed.	
3.3	AR described the list of existing risk controls that will be continued to be implemented, as well as embedded risk controls implemented alongside the Project development by default. AR invited questions or inputs into any of the risk controls. MP questioned if a reassessment of current risk controls will be undertaken to ensure they are fit for purpose. AR noted that pilotage, towage and VTS considerations will be addressed in the later section on potential additional risk controls.	
4	**Risk Assessment**	**Action**
4.1	AR began the hazard log, describing key hazards and scoring rationale and reiterated invitation to comment.	
4.2	BH requested clarification on whether there is a risk of collision between the commercial vessels and Project vessels with the blade overhang, noting the findings of the NavSims. AR explained, whilst the NavSims are a tool for demonstrating whether issues exist, incidents may still occur as they cannot account for a possible infrequent and unpredictable breakdown event or error over many thousands of operations. MP, in reference to the first hazard, asked to clarify if the forementioned point regarding blade overhang on a Project vessel is captured under this hazard. AR confirmed yes. MP noted, based on two close quarters situations in the past two years (from experienced vessels), that the risk is likely scored too low. TC explained remote pilotage will be supplied to less experienced vessels to prevent those events, especially with those Project vessels being unfamiliar with the harbour. MP questioned whether remote pilotage is an appropriate control and if pilot boarding should also be considered. TC responded that remote pilotage is a sufficient starting point. BH noted the concern that moving the blade carrier further south may not be a sufficient mitigation and requested clarification on other mitigations.	

	TC reiterated that simulated runs were conducted under extreme weather parameters tested unlikely to occur in a real-life scenario. Limitations below the tested thresholds would likely be implemented. JO questioned whether it is worth considering weather restrictions resulting from the blade overhang concern specifically. TC agreed that in-situ risk assessments would be conducted prior to a vessels arrival in harbour considering weather conditions and the berthed vessels at that time. AR suggested splitting the hazard in two to capture the vessel blade overhang and its impact on available manoeuvring space. [*Post Meeting Note: Collision between a berthing vessel and overhanging blades has been moved to the hazard "Allision – Ferry/Passenger" as this would be a similar scenario*].	
4.3	TC raised the issue that unfamiliar recreational vessels, with no means of communications, presents a challenge to mitigate. However previous experience assures the existing problem is manageable. Local boats, currently using the small boat harbour, are familiar with the operations in Rosslare. AR noted the Small Boat Harbour location helps maintain separation from incoming vessels. TC added the additional benefit of increased visibility from arriving vessels and the LPS tower. SM questioned, with the enhanced facilities provided by the Small Boat Harbour development, whether there would be more recreational and fishing activity as a result. TC clarified that the port doesn't plan on advertising it as a marina specifically so do not anticipate a significant increase in small boat users.	
4.4	AR moved on to third hazard slide and mentioned the likelihood of frequently unoccupied berths alongside the quay reducing the likelihood of a collision.	
4.5	SM agreed 99% of manoeuvres would be fine but noted masters don't swing out due to current depth limitations, however the temptation to use available depth may be acted upon when berthing at Berth 1. SM suggested proximity restrictions to other vessels may be recommended to limit temptation to get close to align better with the berth. AR agreed this as a potential additional mitigation, noting that the master would dynamically risk assess the benefits of using the additional searoom against the risks of greater proximity to infrastructure. TC noted this could be included within the LPS manual.	
4.6	A question was raised on whether there may be issues of siltation and northerly swell within the harbour following the development. TC noted the event of a heavy northerly swell that has no room to dissipate can be funnelled into the harbour causing significant surge which may cause a vessel breakout to occur. JM noted accommodating consideration for swell should not be a problem. JO should have been captured from the wave modelling and may be able to share some of the outputs of this modelling.	JO to check whether wave modelling results can be shared.
4.7	AR described the summary of hazards slide with attention to medium risk categories involving mainly ferries and small boats in and out of the confined space of the Small Boat Harbour.	

	AR Invited comments on any other high-risk hazards for which no questions were raised.	
5	**Risk Controls**	**Action**
5.1	AR noted the effectiveness that deconfliction of Project vessel movements to ferry/arrival departures would have in managing risk levels.	
5.2	Regarding towage, TC noted that whilst all NavSim runs were completed without tugs, and completed successfully, it was agreed that unfamiliar offshore vessels may request tugs as back up. It was also likely that where barges were required, these may be unpropelled and require tugs. TC therefore noted that in practice, tugs may be stationed at Rosslare, but this would depend on how the new development operates.	
5.3	TC mentioned the upgrade of LPS to VTS will be considered with the decision driven by the department. TC noted that at present all relevant equipment is in place to operate as a VTS. AR emphasised the opinion that it would be beneficial, reducing risk to ferry operators and Project traffic. MP questioned whether there are plans for a LPS risk assessment review process. TC confirmed there are no plans but could be arranged. AR noted that there is an established process (through IALA) to determine the requirement for VTS. MP reinforced the large-scale development and increase in traffic which could make a formal risk assessment necessary. TC confirmed that in the LPS manual, the first 5 arrivals of a vessel would be conducted under remote pilotage be default.	
5.4	AR noted that CTVs can operate at 25 knots and therefore a speed limit could reduce the risk of collision. TC confirmed vessels have previously come through in excessive speeds. A speed limit was not believed to be necessary but would be considered to be added to LPS manual. AR suggested a nominal 5 knots within the Small Boat Harbour is common in many marinas around the world.	
5.5	AR noted two possible alterations to aids to navigation (the movement of the in-harbour lateral buoy to north of the dredged area, as well as installing a leading light on the reclamation area). Irish Lights noted that a leading light could cause confusion and is thus not recommended. JM agreed with the benefit of moving the lateral buoy to the NW to mark the edge of the dredged channel, as well as a sector light line limit along the edge of the usable area before the ORE quayside. JM asked whether the navigable channel will be marked with buoys. AR answered that there are no plans to. JM noted this could be looked at that.	
6	**AOB**	**Action**
6.1	None. AR thanked everyone for their attendance and drew the workshop to a close.	

MEETING ACTIONS

Number	Owner	Action	Status
1	NASH	Conduct further research into how the location of a blade carrier along the quayside may limit the available manoeuvring space for ferries berthing at Berth 1.	Ongoing
2	JO	Review which part of the modelling can be shared.	Ongoing

Project Title	Rosslare ORE Hub: NRA
Project Number	0439
Meeting subject / purpose	Navigation Risk Assessment
Revision	R01-00
Date of meeting	19-Jul-2024
Start time	15:00 GMT
Finish time	16:00 GMT
Client	G&D Geosolutions, Irish Rail
Location	Teams

DOCUMENT CONTROL

Revision	Date of Issue	Description	Approved
R01-00	22-July-2024	Issued to attendees for comment	AR

ATTENDEES

Organisation	Attendee	Role	Initial
NASH Maritime		Associate Director Graduate Consultant	AR AH
G&D Geosolutions		Principal Marine Environmental Scientist	JC
Irish Lights		Director of Navigation, Maritime and Consenting Navigation Support Officer Navigation Advisory Services	RB ML JD

AGENDA

1. Introductions.
2. Overview of ORE Hub Project.
3. Review of NRA.
4. AOB.

NOTES OF MEETING

1	Project Description – G&D Geosolutions	Action
1.1	AR summarised Rosslare ORE Hub (Project) Description	

1.2	RB questioned which Act will be used for the development. AR suggested to hold that question for JD when he joins [see Item 2.3].	
2	**Review of NRA**	
2.1	AR introduced NRA review and AH continued providing a narrative of the vessel traffic analysis slides.	
2.2	RB asked if the wider area towards the South Shear approaches had been considered due to previous known incidents with a close call between commercial vessels on the approaches. AH confirmed those areas, with attention to the West Holdens Buoy waiting area, had been covered including that particular incident as part of the incident analysis. In reference to the swept paths, RB mentioned the effect of a NE wind on vessel manoeuvres which would push the vessels towards the proposed development area. AR described how the depth limitations are the primary driver for vessels positioning regardless of weather conditions. This had been confirmed during consultation with the Harbour Master and ferry Masters.	
2.3	AR described the Nav Sim runs undertaken. RB noted it appeared the vessels have enough space to manoeuvre but queried how additional vessel movements might impact port capacity or disrupt ferry movements. AR assured the busiest expected scenario was modelled. There would be one large Project vessel movement a day, compared to the existing average of 11 passenger ferry movements per day. There would be sufficient capacity to accommodate these additional movements without adversely impacting ferry movements. RB noted this looks acceptable. RB questioned if the area would be used as wet storage in support of floating offshore wind (FLOW). AR explained that the ORE hub is designed as fixed offshore wind base. FLOW projects will likely be supported by ports on the west coast that are more suited. JC entered the meeting and confirmed the intention to use the ORE Hub for fixed wind. RB directed the previous question on which act was used for the Project JC confirmed it is the MAP Act (Marine Area Planning Act 2021).	
2.4	RB emphasised the need to consider the approaches further to the east and the CoIL have it under review. AR reviewed the incident analysis and iterated that few existing hazards are exacerbated by the Project itself within the approach channels, there was sufficient searoom and depth for Project vessels and that it is not believed the risk of close encounters in the approaches will be heightened given the sufficient capacity.	
2.5	AR discussed AtoN's and referenced the importance of the West Holdens buoy and its continued role. The in-port lateral marker however would be moved or removed. This would require Harbour Master consultation and would feature as a recommendation in the NRA. Its current purpose would be redundant after the planned dredging and perhaps a leading light would facilitate the turn around the breakwater.	

	RB suggested a leading light would have a very narrow benefit and may cause confusion to those further offshore and agreed this would need careful consideration.	
2.6	AR described the NRA methodology and offered attendance in the upcoming hazard workshop in two weeks.	
2.7	RB confirmed satisfaction with what has been presented and expressed desire to have continued open line of communication for future questions, and an update or 1-to-1 consultation before submission. RB also mentioned that sharing Project development shapefiles would be helpful. AR agreed in sharing the slides and take future questions and confirmed this with JC. JC confirmed willingness to share slides and that final drawings will be made and issued early next week. RB reaffirmed happiness to wait to receive updated shapefiles and mentioned future discussions of construction buoyage and turbidity marks which would all require consent from Irish Lights.	JC to send updated shapefiles to Irish Light (w/c 22nd July)

Project Title	Rosslare ORE Hub: NRA
Project Number	0439
Meeting subject / purpose	Navigation Risk Assessment
Revision	R01-00
Date of meeting	05-Jul-2024
Start time	15:00 GMT
Finish time	15:45 GMT
Client	G&D Geosolutions, Irish Rail
Location	Teams

DOCUMENT CONTROL

Revision	Date of Issue	Description	Approved
R01-00	05-July-2024	Issued to attendees for comment	AR

ATTENDEES

Organisation	Attendee	Role	Initial
NASH Maritime		Associate Director Graduate Consultant	AR AH
G&D Geosolutions		Principal Marine Environmental Scientist Associate Director (Ports & Harbours)	JC WB
IRCG		Coast Guard Units and Support Manager Operations & Training Officer	NF CK

AGENDA

5. Introductions.
6. Overview of ORE Hub Project.
7. Review of NRA.
8. AOB.

NOTES OF MEETING

1	Project Description – G&D Geosolutions	Action
1.1	JC talked through the Project description.	
1.2	AR mentioned the scheme has provision for relocation of the RNLI station into the Small Boat Harbour. WB added that the Project is working with RNLI, noting that the move improves their operations such as the access road and direct slipway out of the harbour. CK agreed it makes sense for the RNLI to reduce conflict with commercial vessel traffic.	
1.3	CK queried where the ferry terminal is in the Project drawings/renders. WB explains while not indicated on the rendering it will still be there and continue current operations. WB noted that there is the potential to extend length of Berth 3 but it is separate to this Project. CK questioned if there were plans for wet storage of ORE infrastructure. WB responded that fixed offshore wind on east coast is the primary focus which would not include wet storage. With more FLOW on the west coast there are other ports in closer proximity that would be more suitable for wet storage.	
1.4	NF queried if the Small Boat Harbour will be operated outside of ORE hub. JC and AR explain that the Rosslare harbour master will have oversight and responsibility for small boat harbour like it is currently operated.	
2	**Review of NRA**	
2.1	AH and AR talk through the vessel traffic analysis, incidents, NRA methodology consultee list, and impacts and hazards slides	
2.2	CK noted that there seem to be few concerns from the IRCG perspective. CK questioned whether the development affects the boundary for the port limits or falls outside of limits. AR confirmed the entire development (both dredged channel and reclamation area) is located within Rosslare's existing harbour limits. CK added that the impact of pollution would therefore fall to the harbour master. AR noted that there were existing plans in place to manage this.	
2.3	NF asked whether the risk assessment was to be completed and sent out to relevant parties. AR described how stakeholders will be included within the NRA and the process of holding hazard workshops. Preliminary scorings will be shared, and the opportunity provided for feedback during the workshop or separately. The NRA then gets packaged with the EIA CK explained the EIA will be distributed for consultation. In addition, public consultation has already taken place to supplement the initial Project phases. NF queried how the approval for the reclaimed area on the foreshore took place. CK responded that Irish rail owns the foreshore, and the seabed below MHWS is leased from the state following an application (MAC). NF/CK agreed that there appears to be little concern from a search and rescue perspective	

Appendix C
Navigation Simulation Report

On behalf of GTSS

Full Mission Navigation Study Report For Proposed ORE Facility at Rosslare – May 2024

Contents

Introduction

Purpose

Report on the undertaking of the real time (full mission bridge) navigation simulation study for the proposed ORE development at Rosslare Harbour on behalf of Gavin & Doherty Geosolutions – Belfast Office

The study was carried out on the Full Mission 360° Simulator, located at the National Maritime College of Ireland in Ringaskiddy, County Cork on 29th & 30th May 2024.

The Simulation Software is Kongsberg's Polaris version 8.1

The simulator was operated by Clive Hotham of CRHSimulation/GTSS and manoeuvres were performed by Ivan Walsh, Pilot from the Port of Cork and Capt. Tom Curran, Harbour Master Rosslare.on the 29th May and Clive Hotham on 30th May.

In attendance observing were - Billy Hoey, Irish Rail PM, William Brown, GDG PM, and Andrew Rawson, Nash Maritime

Vessels

Following discussions, it was decided to use 4 vessels for the study.

Details of the vessels are as follows:

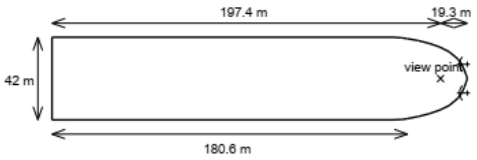
PILOT CARD

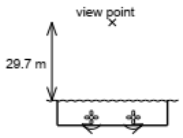
HLMOD01L
Version 0

Ship's name NMCI An Kou
Call Sign _____ **Deadweight** 48430 tonnes **Year built** _____
Draught aft 9.6 m / 31 ft 6 in **Forward** 9.6 m / 31 ft 6 in **Displacement** 68500 tonnes

SHIP'S PARTICULARS

Length overall 216.7 m **Anchor chain: Port** 12.0 shackles **Starboard** 12.0 shackles
Breadth 42 m
Bulbous bow Yes **(1 shackle = 27.432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 14900 kW (20258 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots)	
				Loaded	Ballast
Full sea speed	1	129.0	N/A	16.0	N/A
Full Ahead	0.8	116.0	N/A	14.4	N/A
Half Ahead	0.5	89.9	N/A	11.1	N/A
Slow Ahead	0.25	64.4	N/A	7.9	N/A
Dead Slow Ahead	0.125	45.0	N/A	5.4	N/A
Dead Slow Astern	-0.125	-45.0	N/A		
Slow Astern	-0.25	-64.4	N/A		
Half Astern	-0.5	-86.9	N/A		
Full Astern	-1	-103.0	N/A		

STEERING PARTICULARS

Type of rudder Normal **Maximum angle** 35 °
Hard-over to hard-over 28 s
Rudder angle for neutral effect 0 °

Thruster: **Bow** 3600 kW (4895 hp) **Stern** 3000 kW (4079 hp)

PILOT CARD

FERRY34
Version 9

Ship's name Northern Expedition Date

Call Sign CFN5364 Deadweight 5200 tonnes Year built 2009

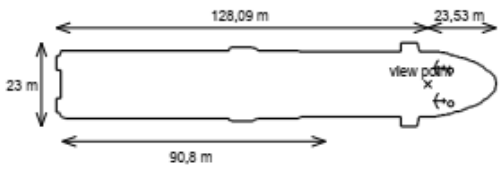
Draught aft 5.03 m / 16 ft 6 in Forward 5.03 m / 16 ft 6 in Displacement 8344 tonnes

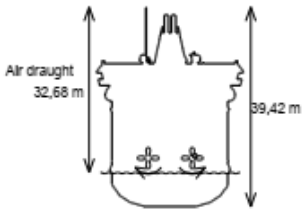
SHIP'S PARTICULARS

Length overall 151.8 m Anchor chain: Port 10.0 shackles Starboard 10.0 shackles

Breadth 23 m Stern shackles

Bulbous bow Yes (1 shackle = 27,432 m = 15 fathoms)





PROPULSION PARTICULARS

Type of engine Diesel Maximum power 9000 kW (12237 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots) Loaded	Speed (knots) Ballast
Full sea speed	1	135.7	100.0%		20.3
Full Ahead	0.8	125.0	98.4%		18.5
Half Ahead	0.5	125.0	62.3%		12.6
Slow Ahead	0.25	110.0	30.1%		5.7
Dead Slow Ahead	0.125	105.0	15.0%		2.8
Stop	0	45.0	0.0%		0.0
Dead Slow Astern	-0.125	46.0	-33.5%		
Slow Astern	-0.25	52.4	-56.7%		
Half Astern	-0.5	83.6	-67.4%		
Full Astern	-1	95.0	-80.0%		

Time limit astern min:sec

Full ahead to full astern min:sec

Max. No. of consecutive starts

Minimum RPM knots

Astern power % ahead

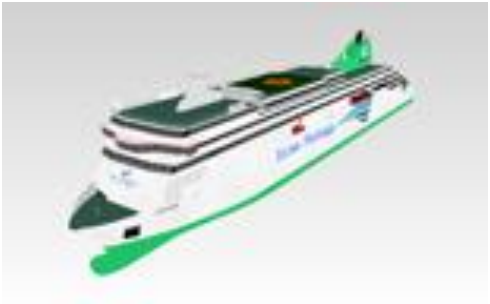
STEERING PARTICULARS

Type of rudder Normal Maximum angle 45 °

Hard-over to hard-over 14 s

Rudder angle for neutral effect 0 °

Thruster: Bow 2700 kW (3671 hp) Stern 900 kW (1224 hp)



PILOT CARD

FERRY24
Version 7

Ship's name M/S Ulysses

Call Sign _____ **Deadweight** 10000 tonnes **Year built** _____

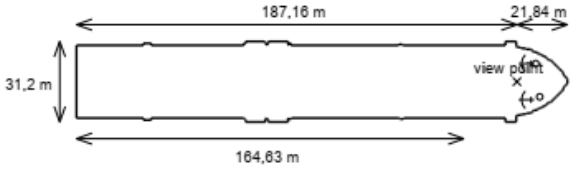
Draught aft 6.4 m / 20 ft 12 in **Forward** 6.4 m / 20 ft 12 in **Displacement** 28280 tonnes

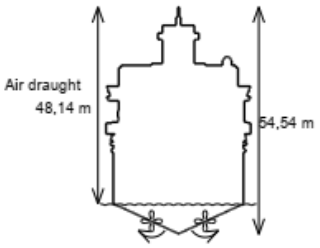
SHIP'S PARTICULARS

Length overall 209 m **Anchor chain:** **Port** 12.0 shackles **Starboard** 12.0 shackles

Breadth 31.2 m

Bulbous bow No **(1 shackle = 27,432 m = 15 fathoms)**





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 31195 kW (42413 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots)	
				Loaded	Ballast
Full sea speed	1	144.0	100.0%	22.0	N/A
Full Ahead	0.8	144.0	95.7%	21.6	N/A
Half Ahead	0.5	144.0	89.3%	21.1	N/A
Slow Ahead	0.25	124.8	68.1%	14.8	N/A
Dead Slow Ahead	0.125	102.0	41.0%	7.2	N/A
Stop	0	86.0	0.0%	0.0	N/A
Dead Slow Astern	-0.125	104.1	-17.1%		
Slow Astern	-0.25	120.6	-31.2%		
Half Astern	-0.5	143.0	-46.4%		

STEERING PARTICULARS

Type of rudder Becker **Maximum angle** 65 °

Hard-over to hard-over 23 s

Rudder angle for neutral effect 0 °

Thruster: **Bow** 7200 kW (9789 hp) **Stern** 2400 kW (3263 hp)

PILOT CARD

ARKM01L
Version 1

Ship's name ARKLOW MANOR

Call Sign EIHC3 **Deadweight** 14009 tonnes **Year built** 2009

Draught aft 9.198 m / 30 ft 2 in **Forward** 7.7 m / 25 ft 3 in **Displacement** 18555 tonnes

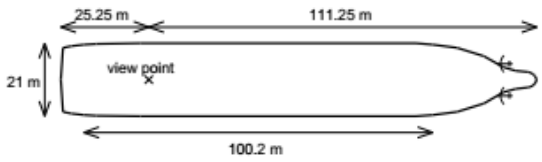
SHIP'S PARTICULARS

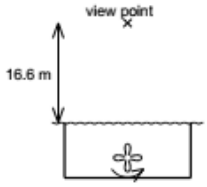
Length overall 136.5 m **Anchor chain:** **Port** 10.0 shackles **Starboard** 10.0 shackles

Breadth 21 m

Bulbous bow Yes

(1 shackle = 27.432 m = 15 fathoms)





PROPULSION PARTICULARS

Type of engine Diesel **Maximum power** 4850 kW (6594 hp)

Manoeuvring engine order		RPM	Pitch	Speed (knots)	
				Loaded	Ballast
Full sea speed	1	131.0	100.0%	14.6	N/A
Full Ahead	0.8	131.0	87.6%	13.4	N/A
Half Ahead	0.5	131.0	64.2%	10.5	N/A
Slow Ahead	0.25	131.0	43.7%	7.6	N/A
Dead Slow Ahead	0.125	131.0	28.6%	5.3	N/A
Stop	0	131.0	0.0%	0.0	N/A
Dead Slow Astern	-0.125	131.0	-18.9%		
Slow Astern	-0.25	131.0	-35.8%		
Half Astern	-0.5	131.0	-57.9%		

STEERING PARTICULARS

Type of rudder Schilling **Maximum angle** 70 °

Hard-over to hard-over 25 s

Rudder angle for neutral effect 0 °

Thruster: **Bow** 750 kW (1020 hp) **Stern** N/A kW (N/A hp)

HLMOD01L – This is a loaded Module Carrier scaled from details of a 165m vessel. The version used was the loaded model as this gave the greatest windage are of around 5700m^2

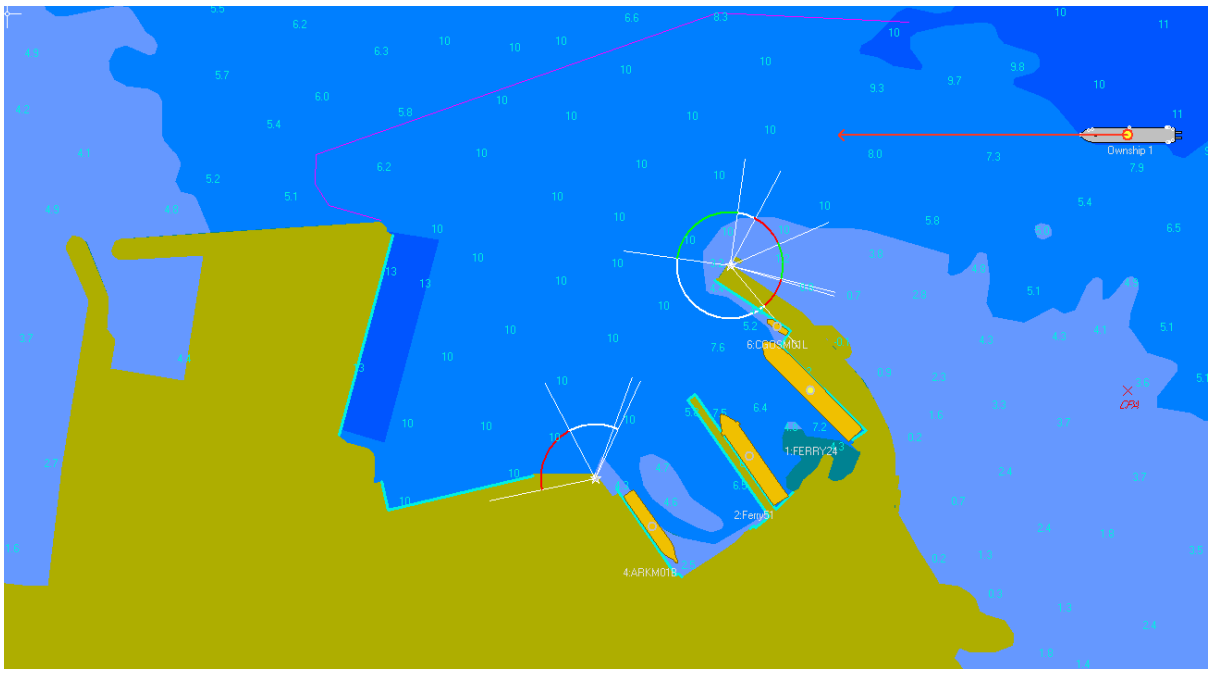
FERRY34 – this is a standard ferry boat for it's length

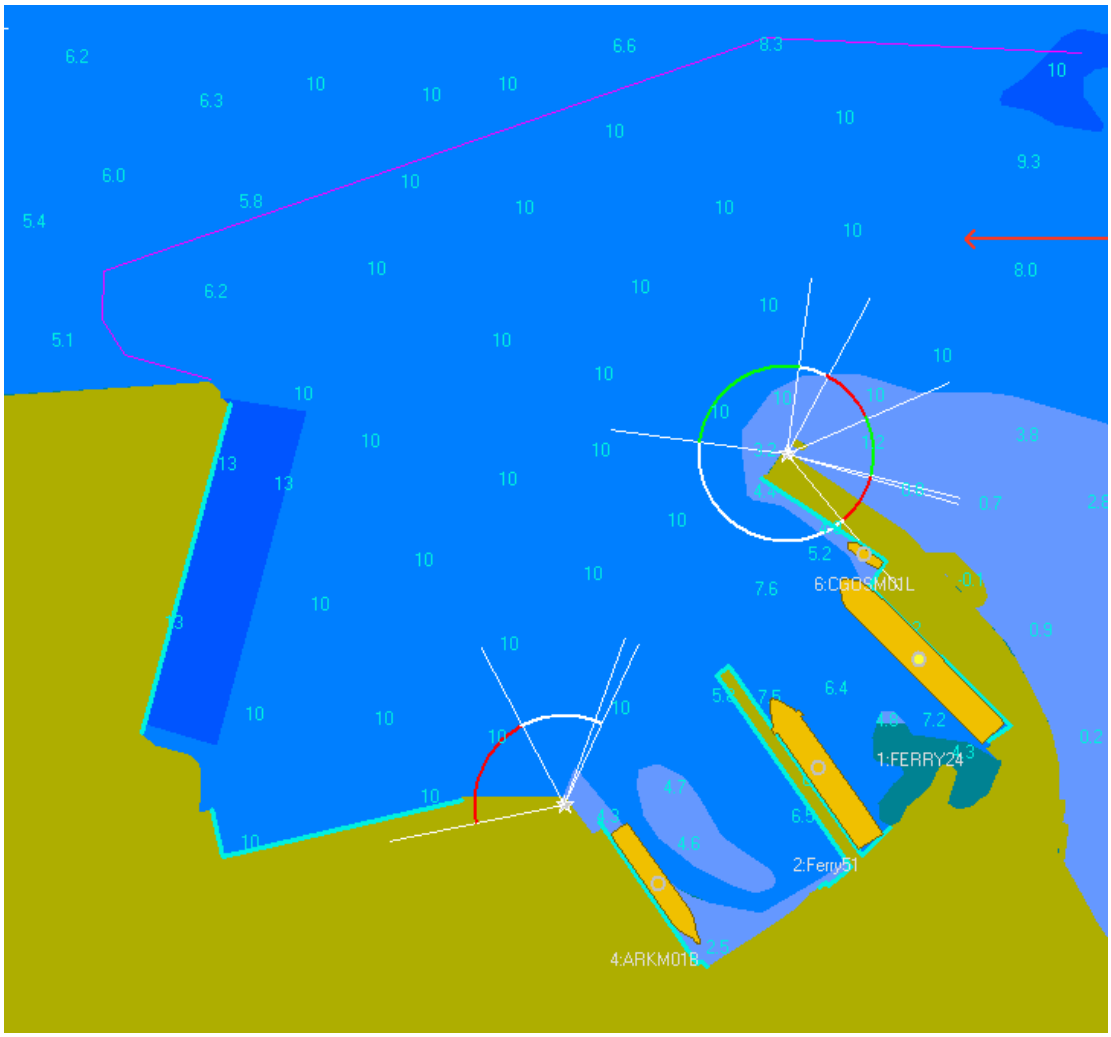
FERRY24 – this is a model of the Irish Ferries vessel Ulysses

ARKM01L – this is a model of the Arklow M Class bulk carrier in loaded condition

Simulator Area Database

The new ORE area was modelled according to drawings received from Gavin & Doherty Geosolutions:





Environmental Conditions

The specific environmental conditions for each run is tabulated in the run header. Below are the general comments.

Wind

The wind for all the simulations runs was from all 4 quadrants of the globe, predominantly using a 30-knot wind speed. Individual run wind speeds are given in the headers

Waves

The wave height was set at 1.2m with the 30 knot winds with the same direction as the wind

Current

No current was applied to any of the scenario's

Tide

A fixed tidal height of 2m was applied to all of the runs

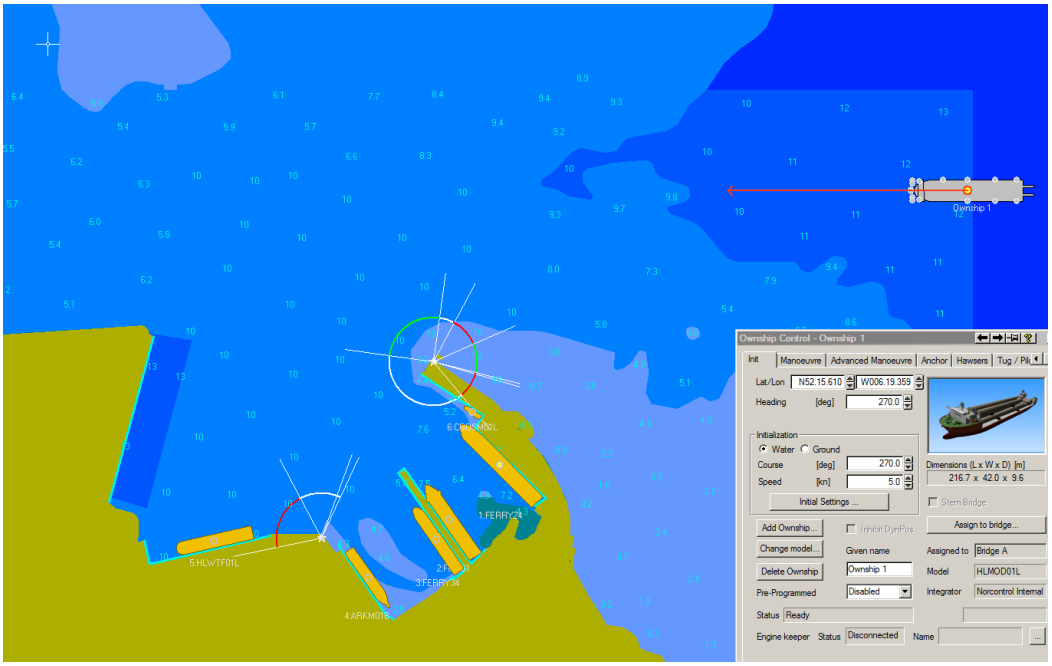
Simulation Runs

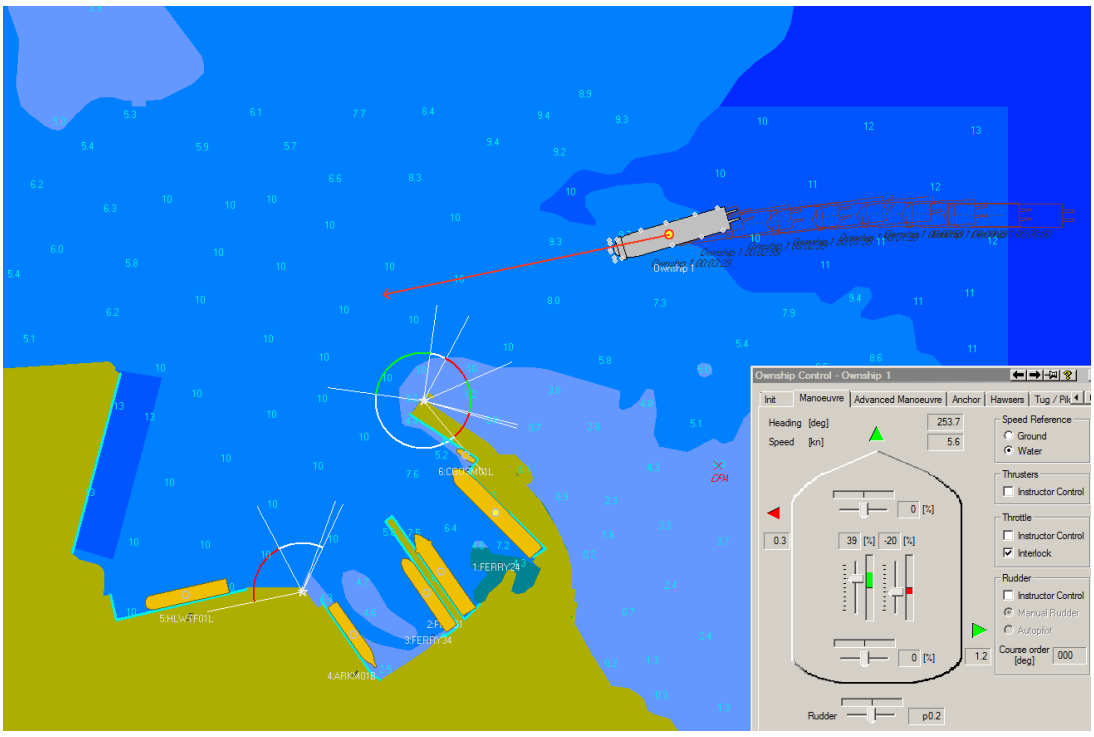
Day 1

Run 1 – Day 1

Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay**		
Wind Direction	**SW +/- 5°**	Wind Force	**15 kts +/-3 kts**

Manoeuvre Plots

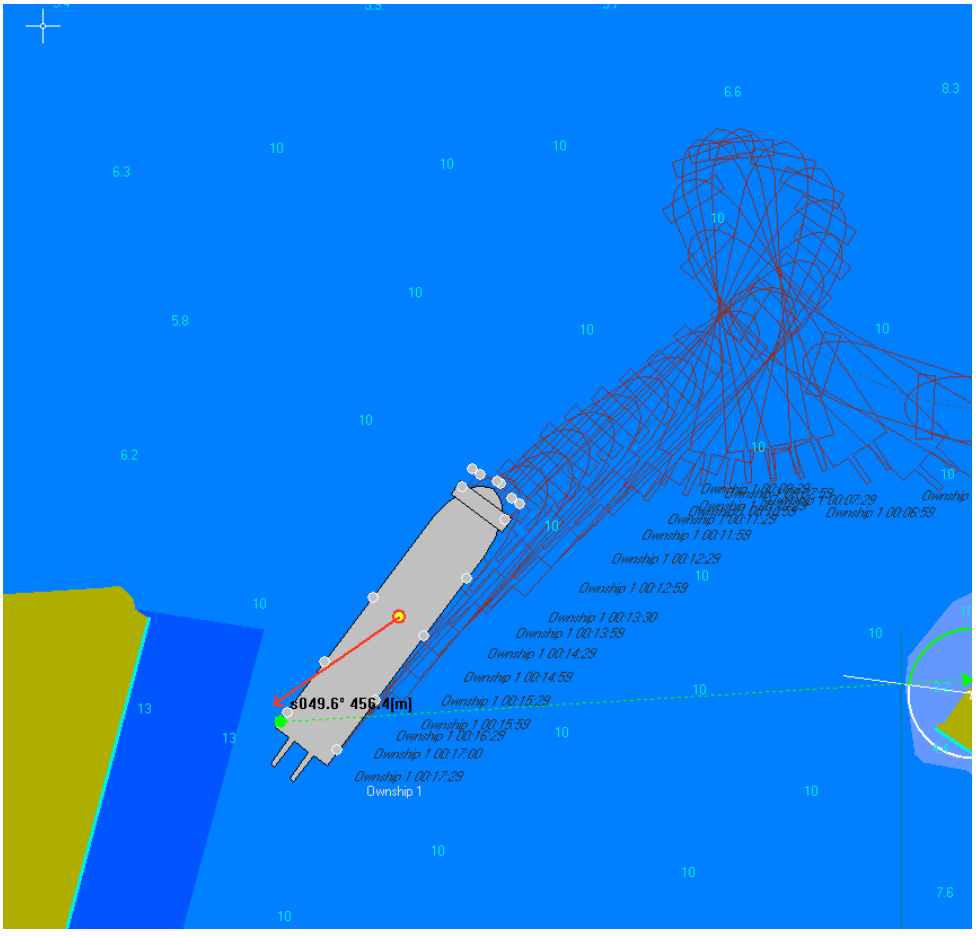


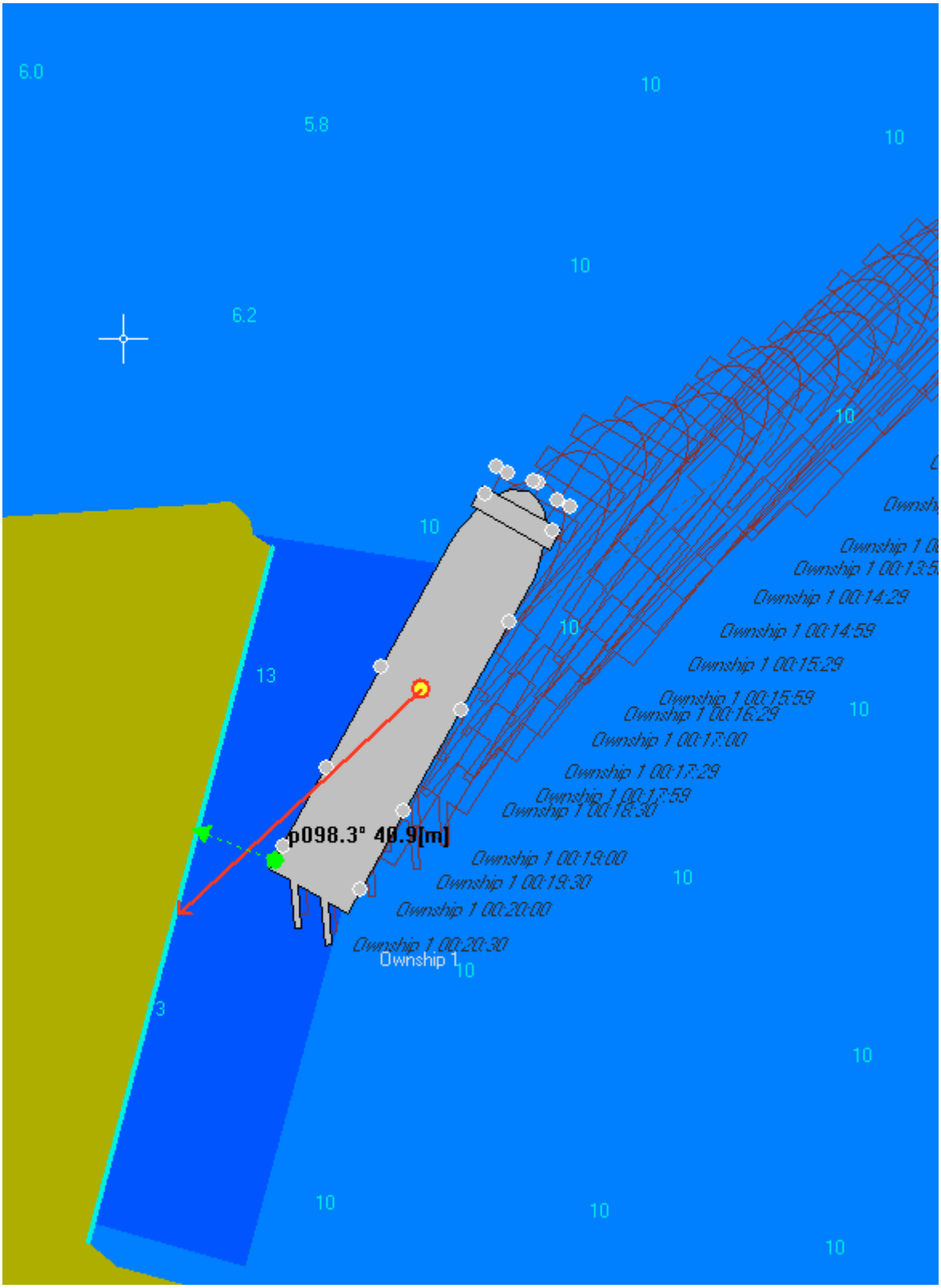



Ownship 1 00:05:00
Ownship 1 00:05:29
6:CGDSM01L


s110.9° 249.4[m]
Ownship 1
6:CGDSM01L


s057.8° 354.0[m]
Ownship 1

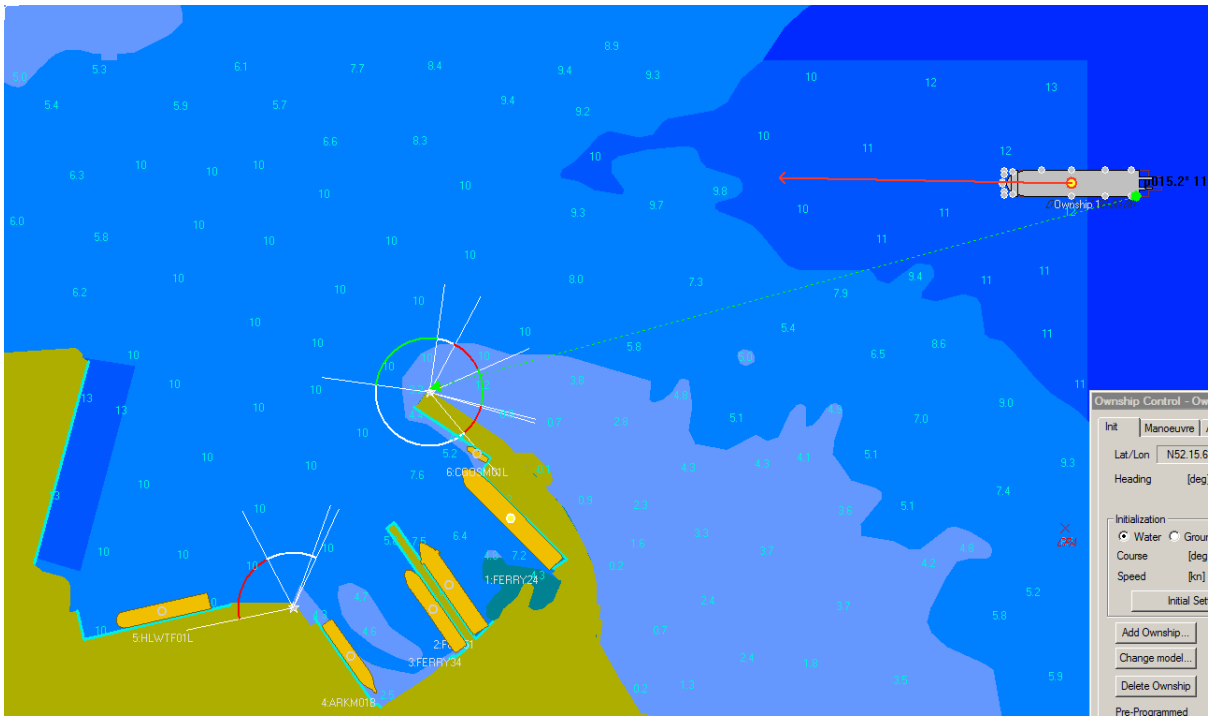

s049.6° 456.4[m]
Ownship 1

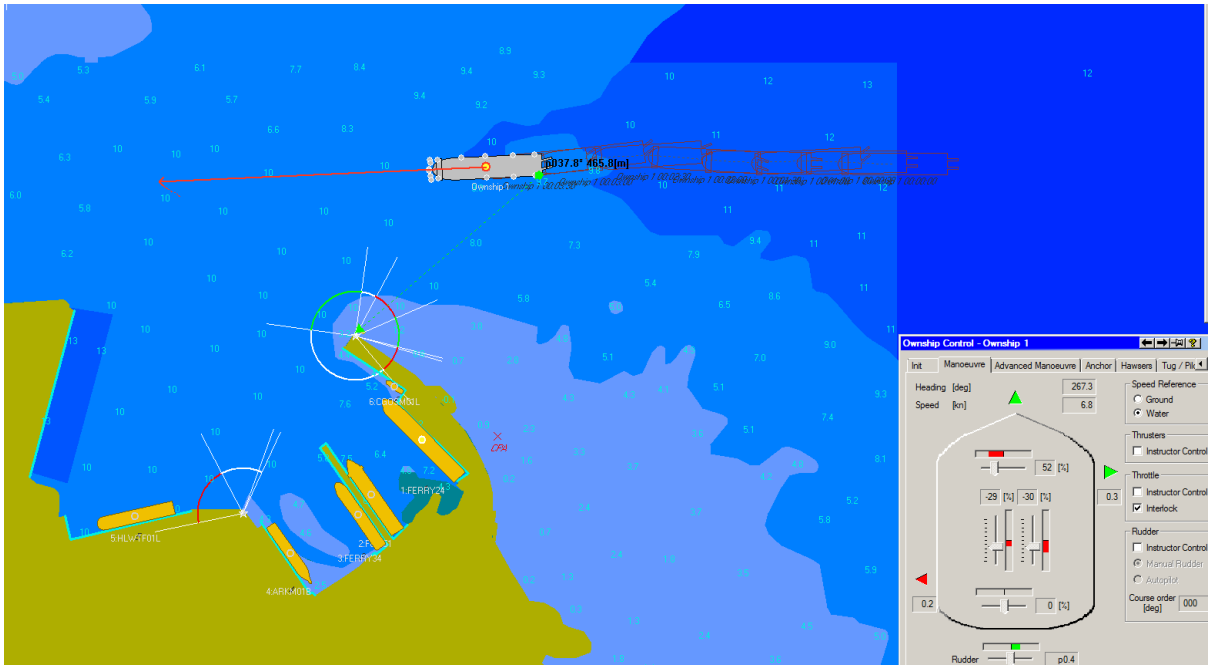

6.0
5.8
6.2
10
13
p098.3° 48.9[m]
Ownship 1
Ownship 1 00:13:5
Ownship 1 00:14:29
Ownship 1 00:14:59
Ownship 1 00:15:29
Ownship 1 00:15:59
Ownship 1 00:16:29
Ownship 1 00:17:00
Ownship 1 00:17:29
Ownship 1 00:17:59
Ownship 1 00:18:30
Ownship 1 00:19:00
Ownship 1 00:19:30
Ownship 1 00:20:00
Ownship 1 00:20:30

Run 2 – Day 1

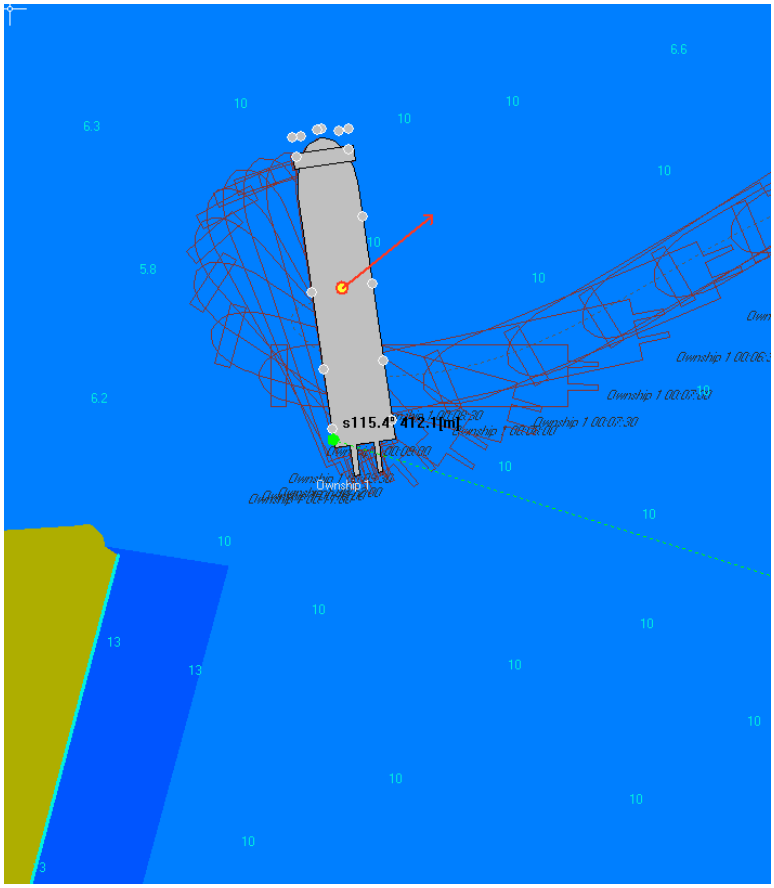
Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay**		
Wind Direction	**SW +/- 10°**	Wind Force	**25 kts +/-5 kts**

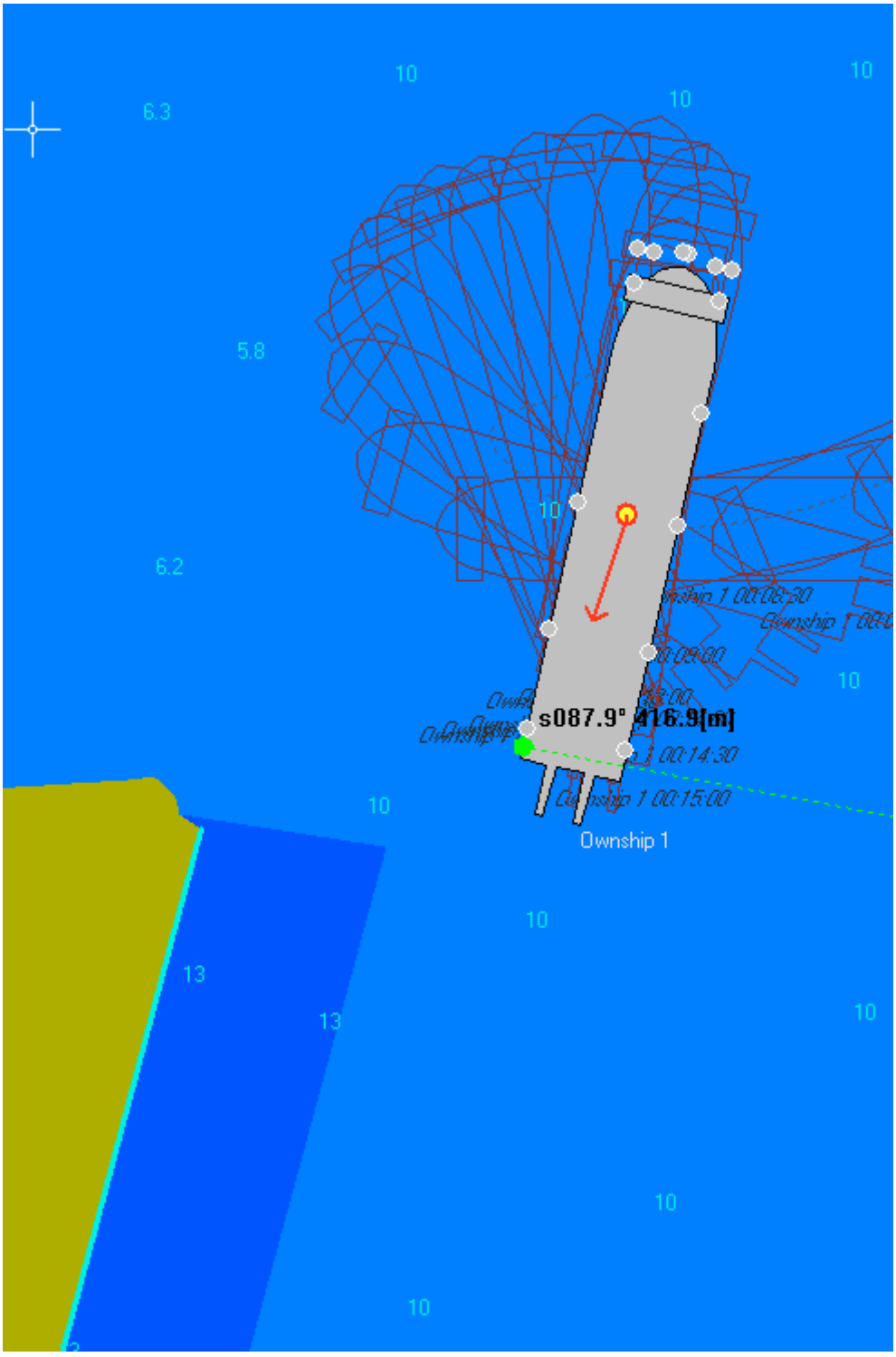
Manoeuvre Plots






p073.2° 280.2[m]
Ownship 1
1:FERRY24


s115.4° 412.1[m]

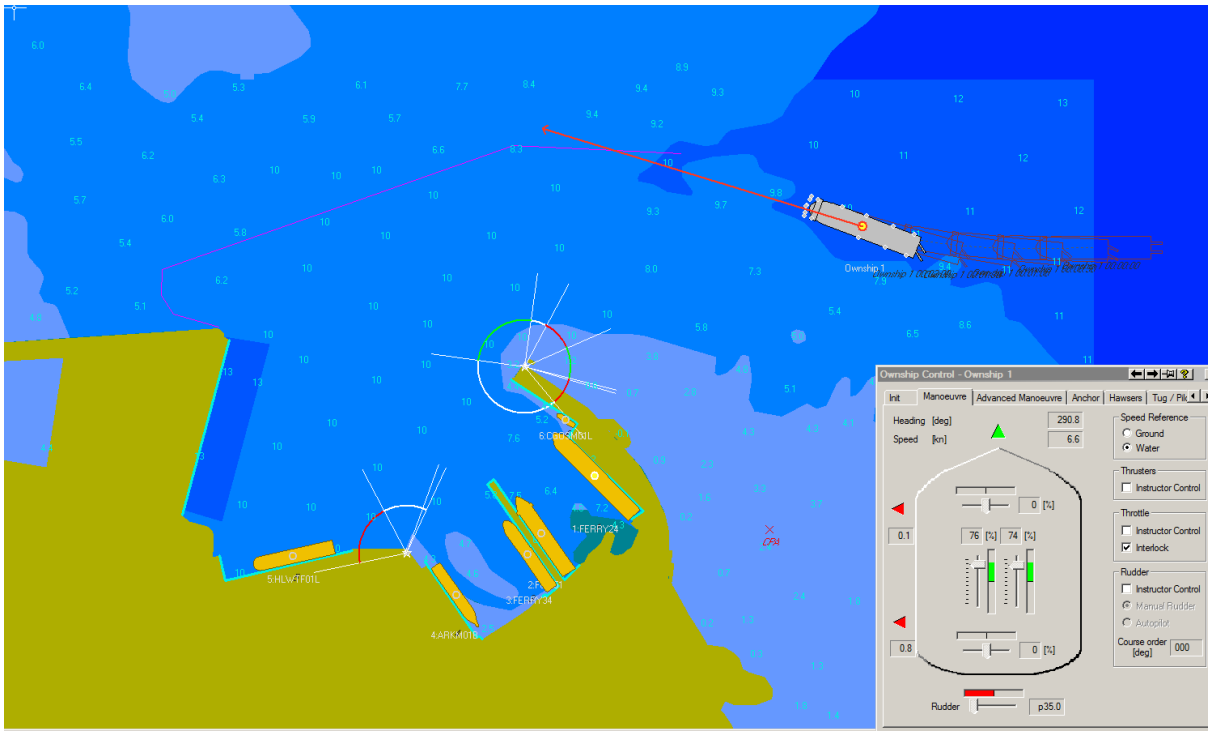

10
10
10
6.3
5.8
6.2
10
10
10
s087.9° 416.9[m]
Ownship 1
10
13
13
10
10
10

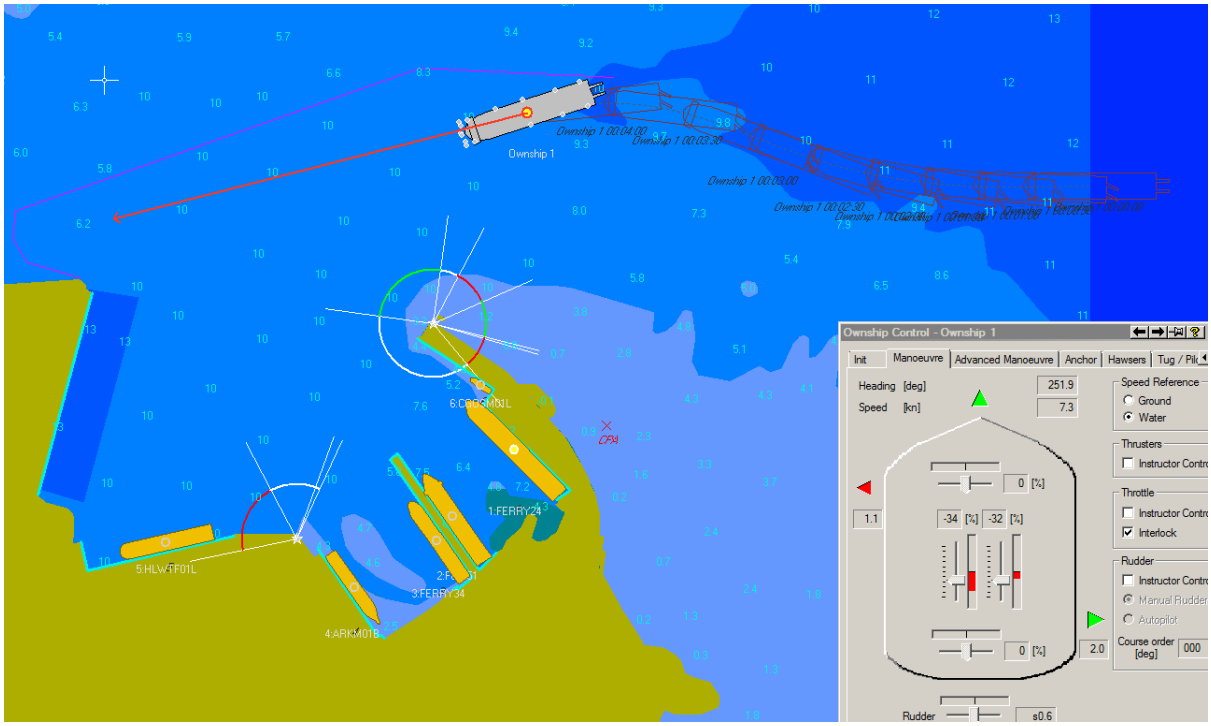

6.0
5.8
6.2
10
13
s057.9° 594.1[m]
Ownship 1

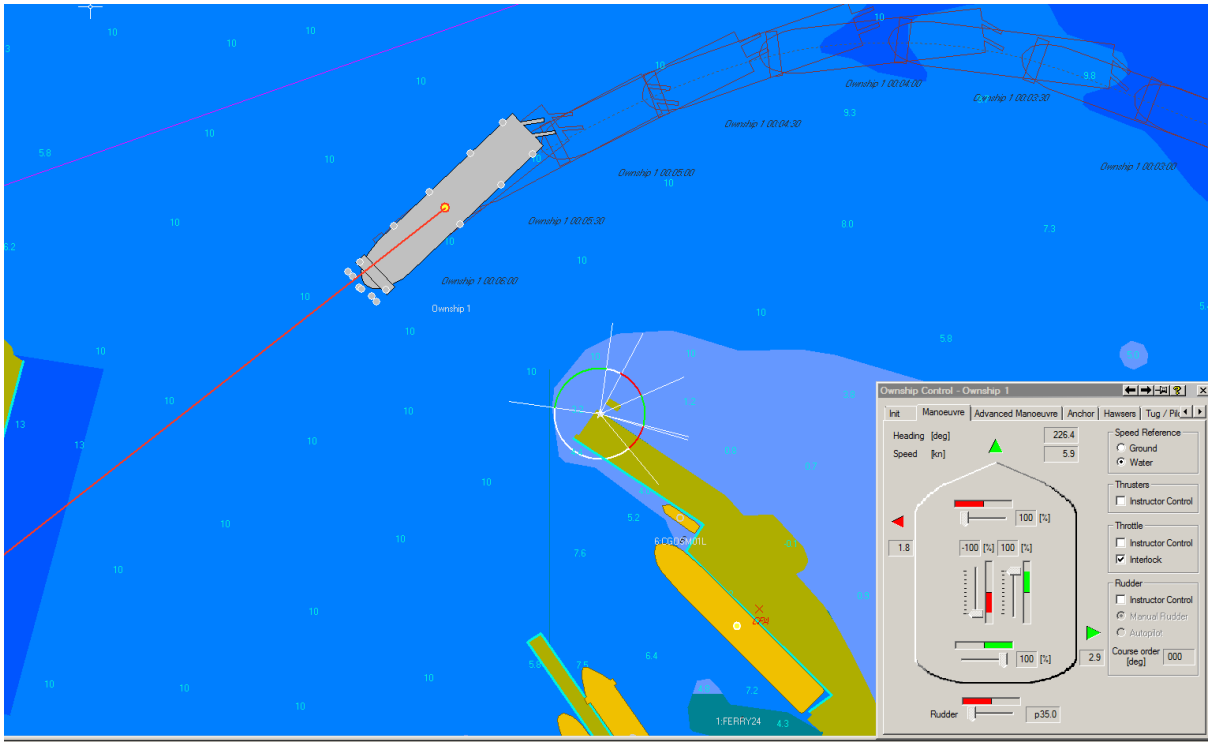
Run 3 – Day 1

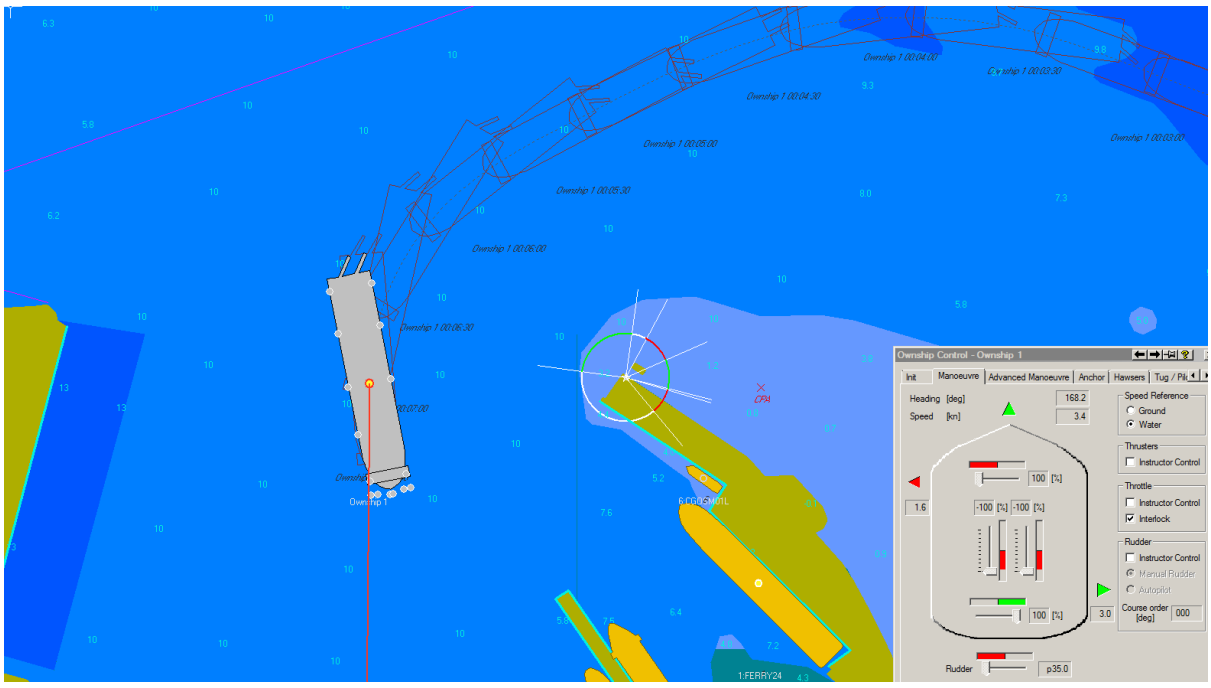
Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay**		
Wind Direction	**NE +/- 10°**	Wind Force	**30 kts +/-3 kts**

Manoeuvre Plots

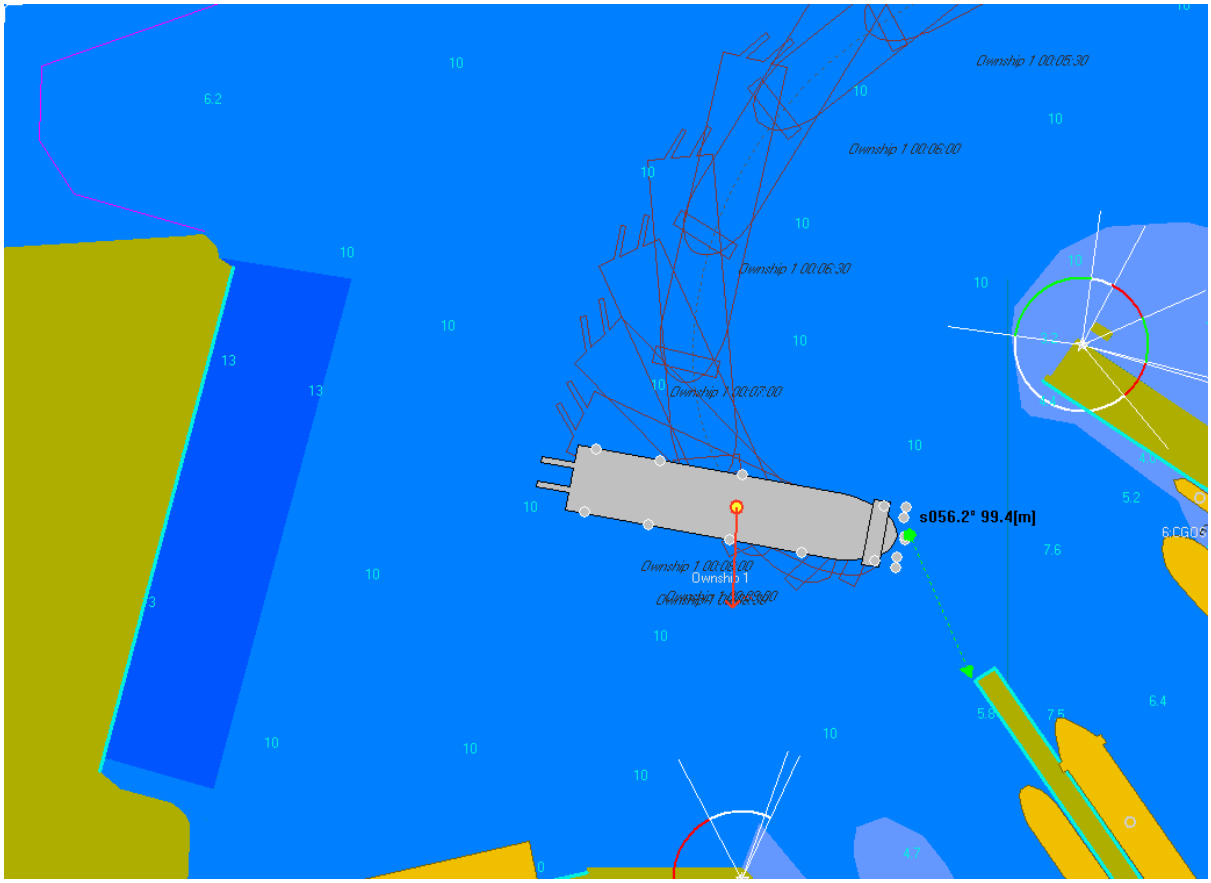





Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
226.4
Speed [kn]
5.9
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
p35.0
1:FERRY24

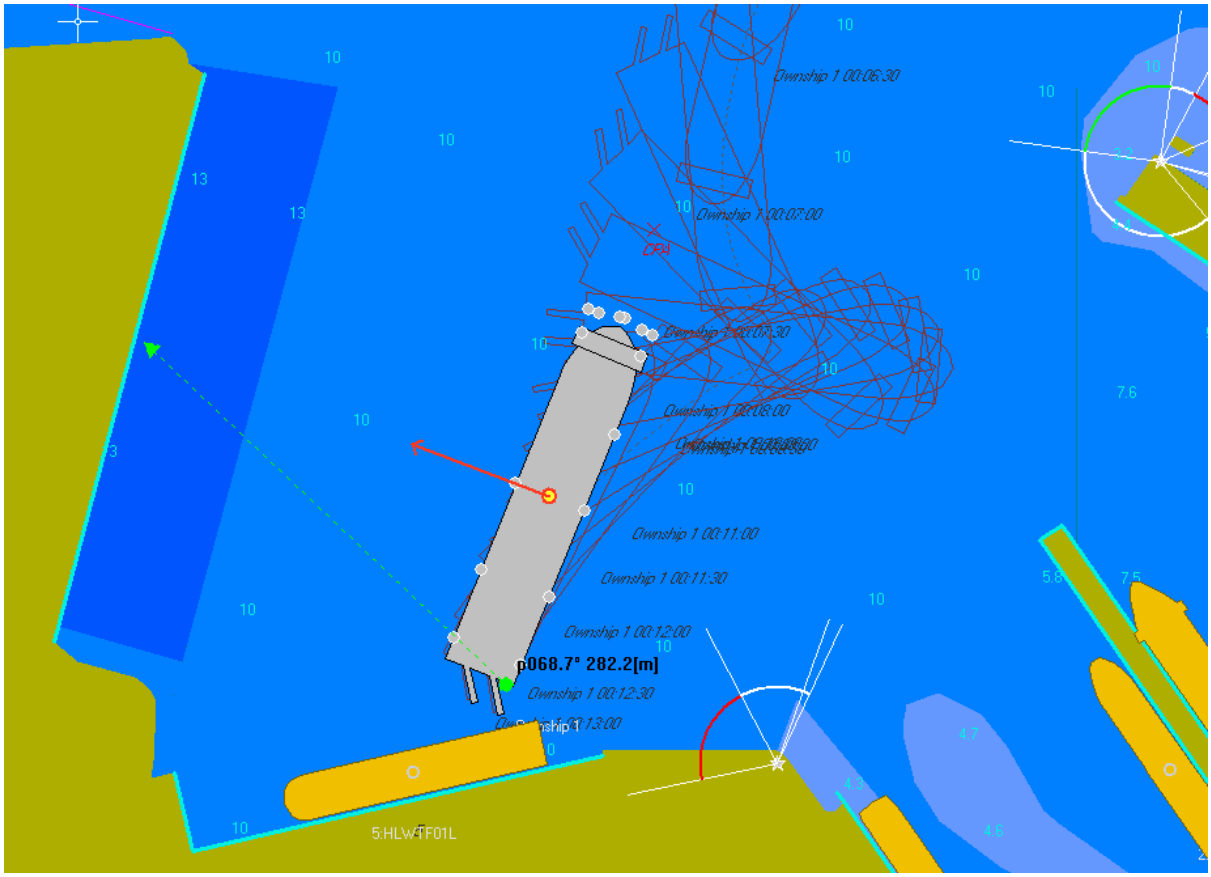

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
168.2
Speed [kn]
3.4
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
p35.0
1:FERRY24

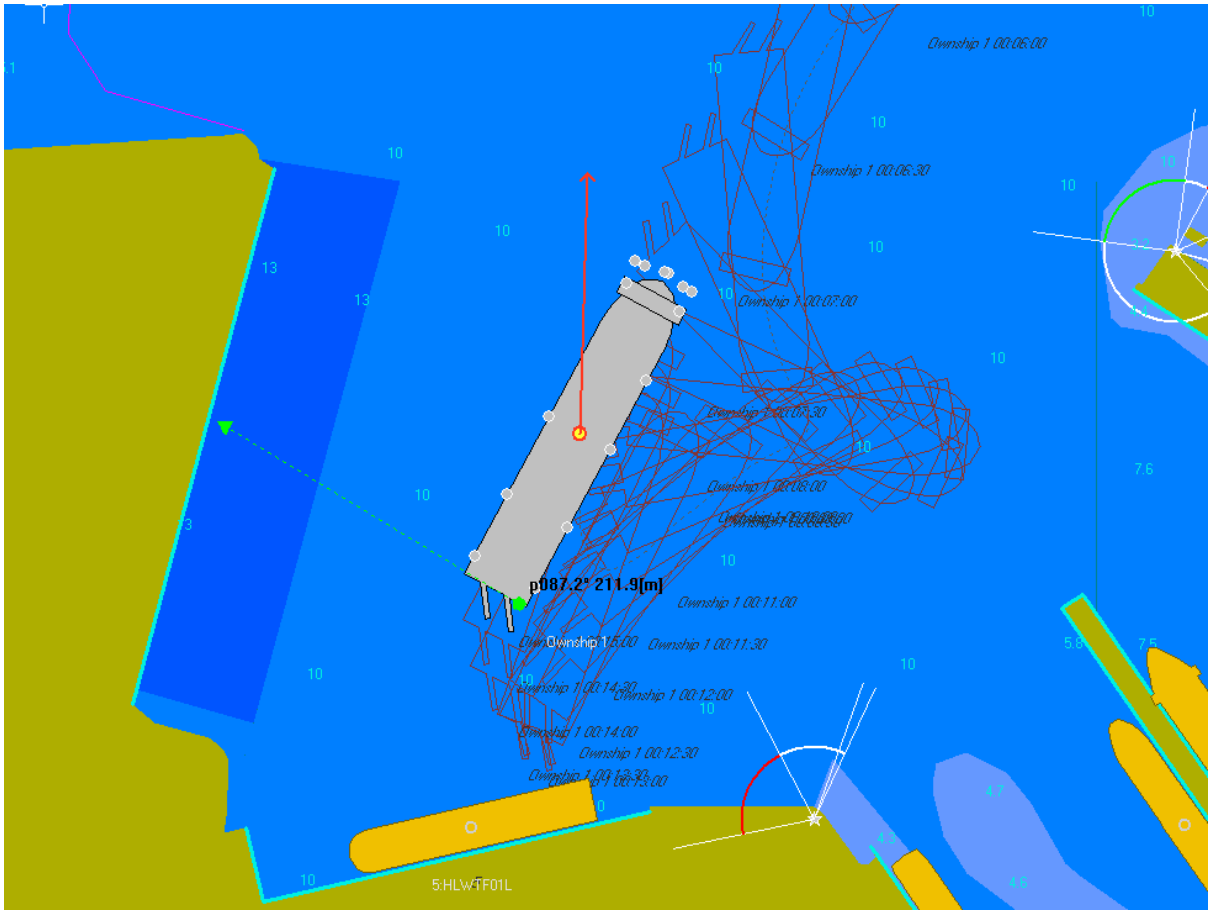

Ownship 1 00:06:30
Ownship 1 00:06:00
Ownship 1 00:05:30
Ownship 1 00:07:00
p018.9° 113.7[m]
Ownship 1
1:FERRY24
Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
Speed [kn]
141.0
2.1
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
p35.0

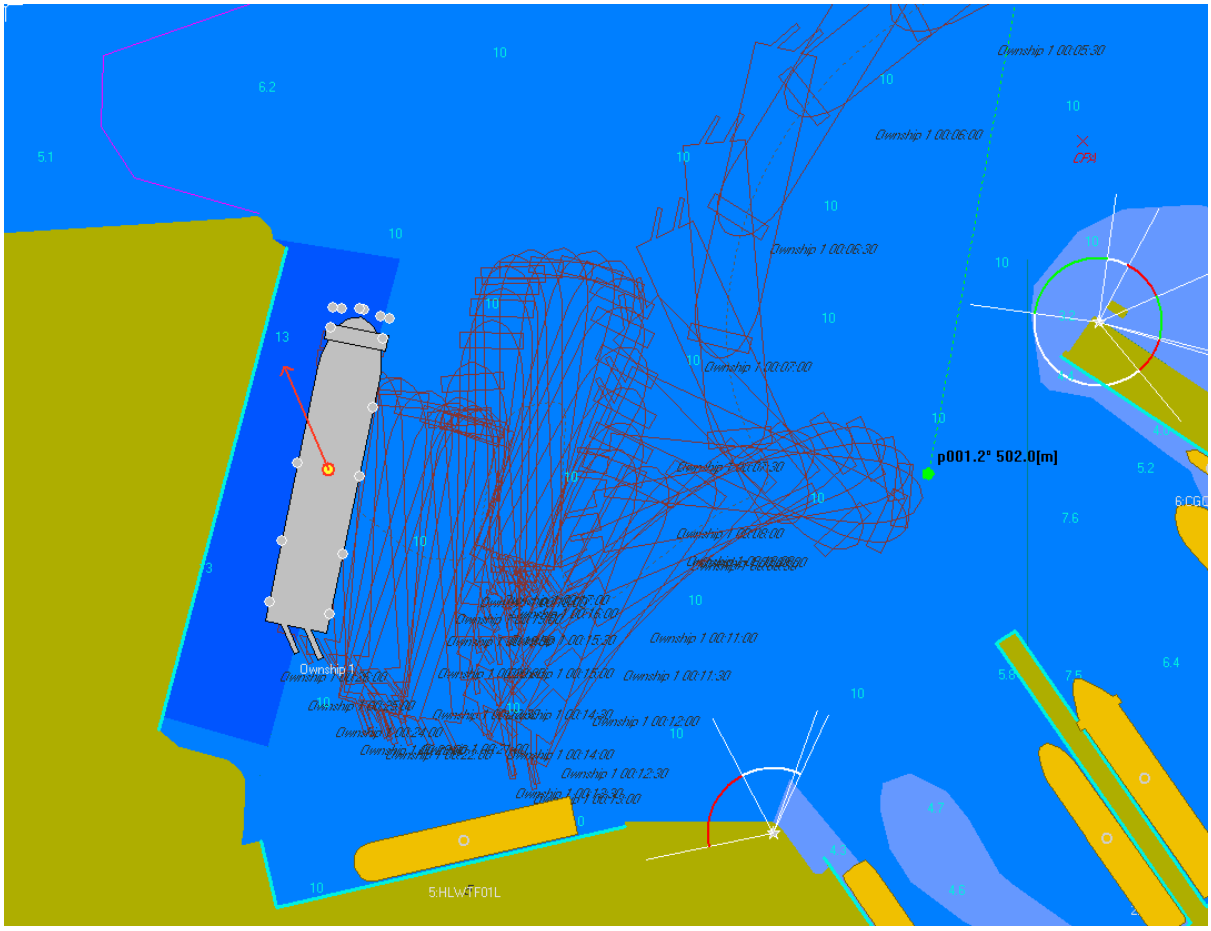

Ownship 1 00:05:30
Ownship 1 00:06:00
Ownship 1 00:06:30
Ownship 1 00:07:00
s056.2° 99.4[m]
Ownship 1


p175.8° 246.5[m]
Ownship 1
1:FERRY24
5:HLW1FF01L


p116.3° 257.7[m]
Ownship 1
1:FERRY24
5:HLW1FF01L
Ownship Control - Ownship 1
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
Speed [kn]
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Interlock
Rudder
Manual Rudder
Autopilot
Course order [deg]


Ownship 1 00:06:30
Ownship 1 00:07:00
Ownship 1 00:08:00
Ownship 1 00:11:00
Ownship 1 00:11:30
Ownship 1 00:12:00
p068.7° 282.2[m]
Ownship 1 00:12:30
5:HLW:TF01L

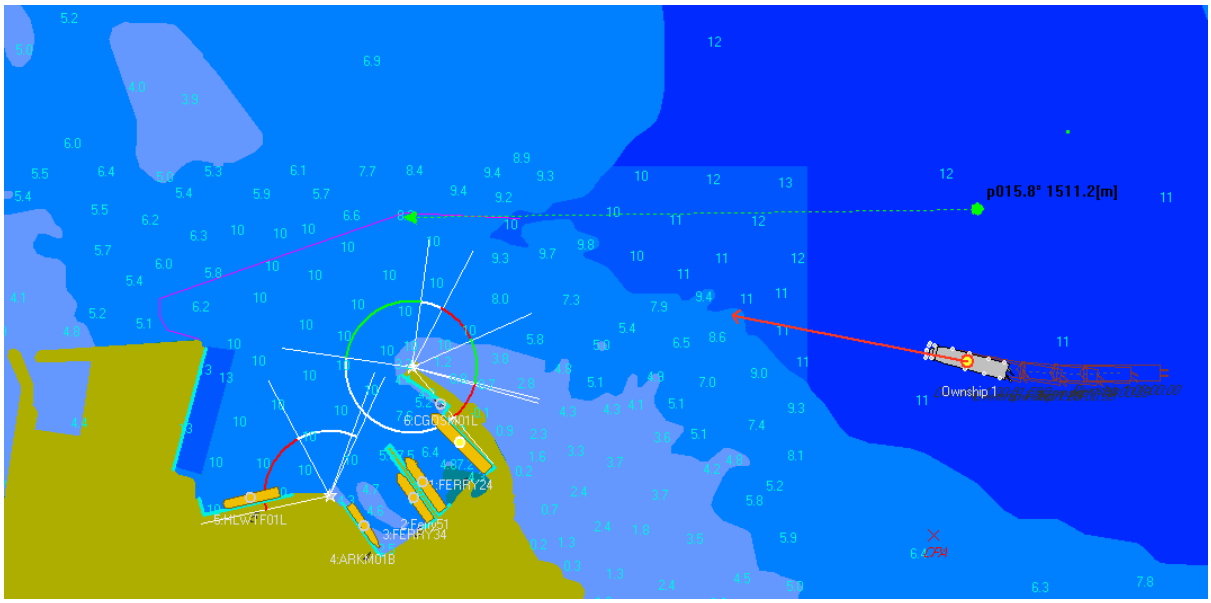

Ownship 1 00:06:00
Ownship 1 00:06:30
Ownship 1 00:07:00
Ownship 1 00:08:00
Ownship 1 00:11:00
Ownship 1 00:11:30
Ownship 1 00:12:00
Ownship 1 00:12:30
p087.2° 211.9[m]
5:HLW:TF01L

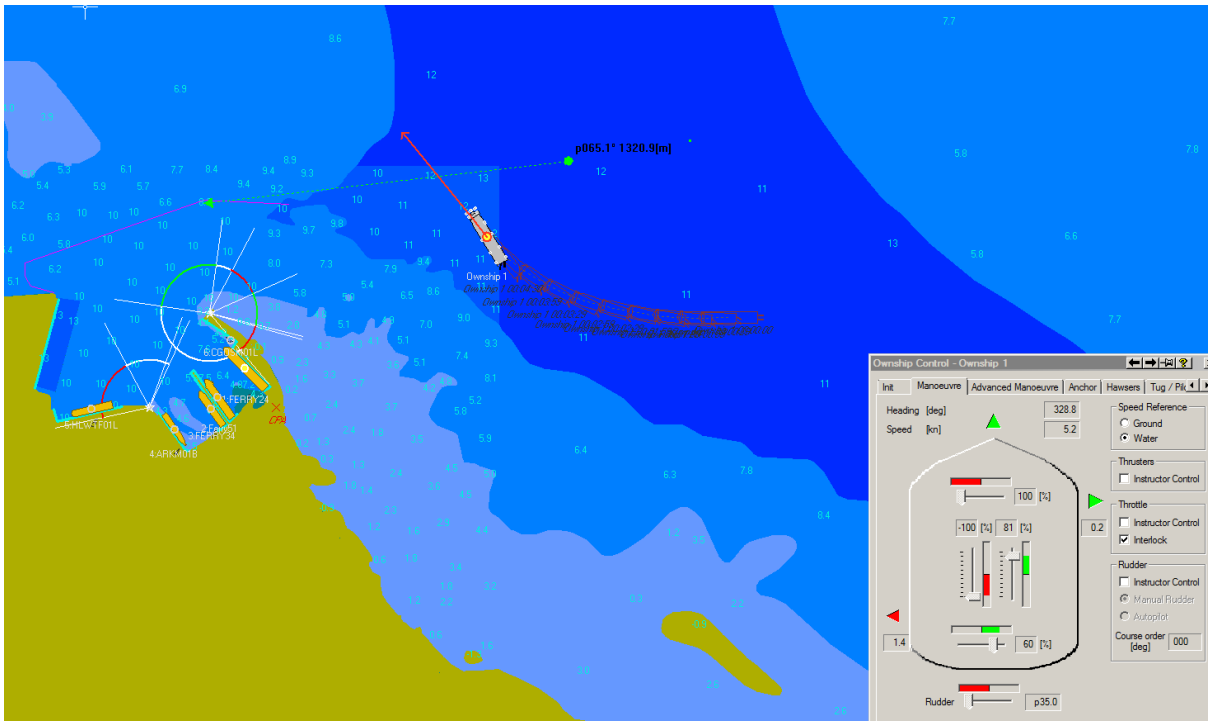

p001.2° 502.0[m]
5:HLW-TF01L

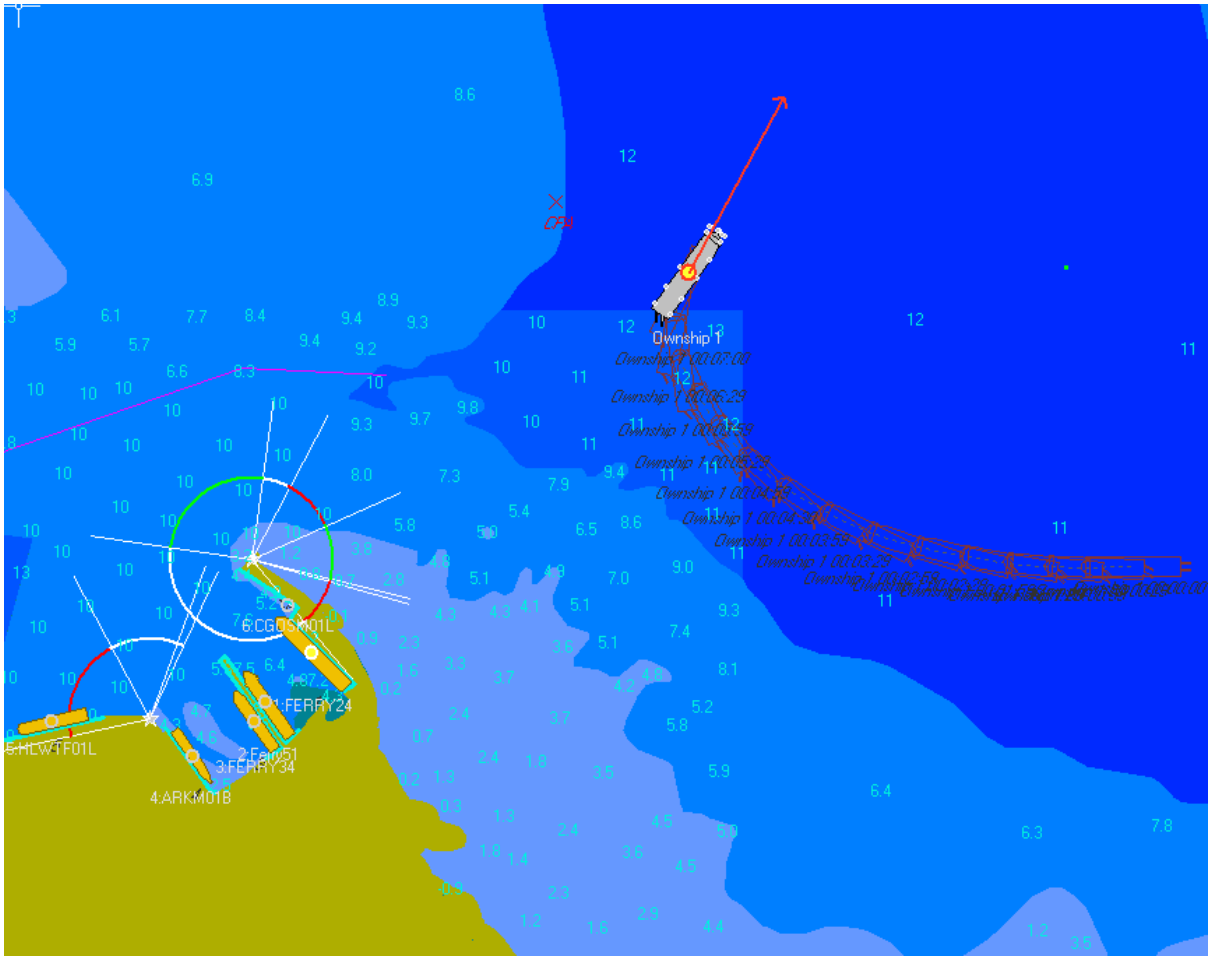
Run 4 – Day 1

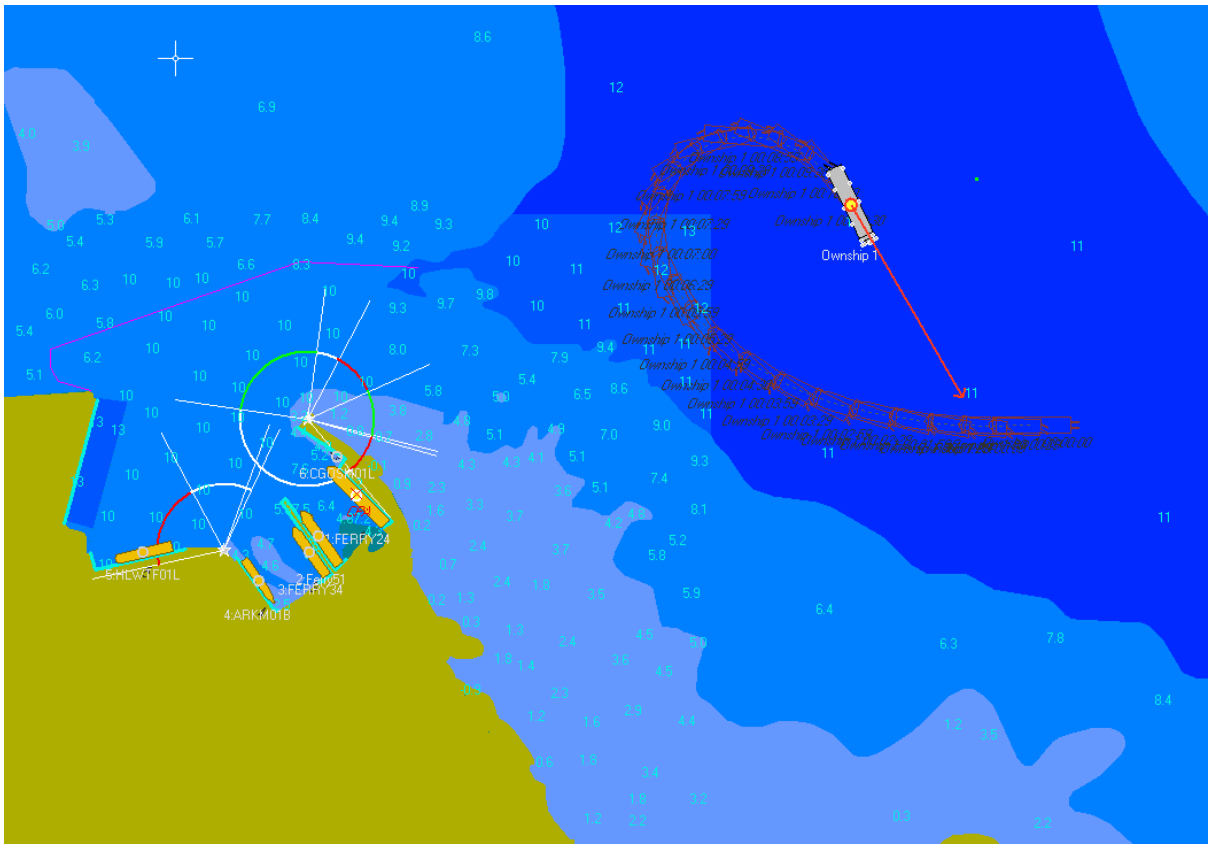
Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay**		
Wind Direction	**NE +/- 10°**	Wind Force	**30 kts +/-3 kts**

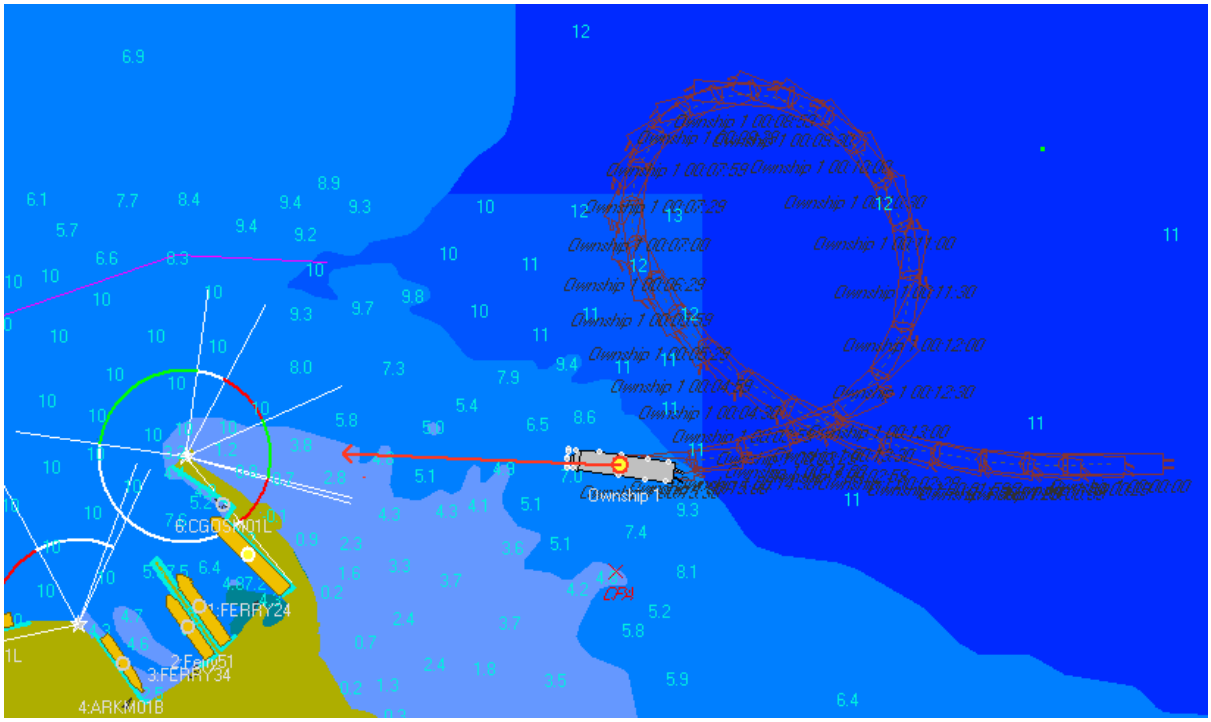
Manoeuvre Plots

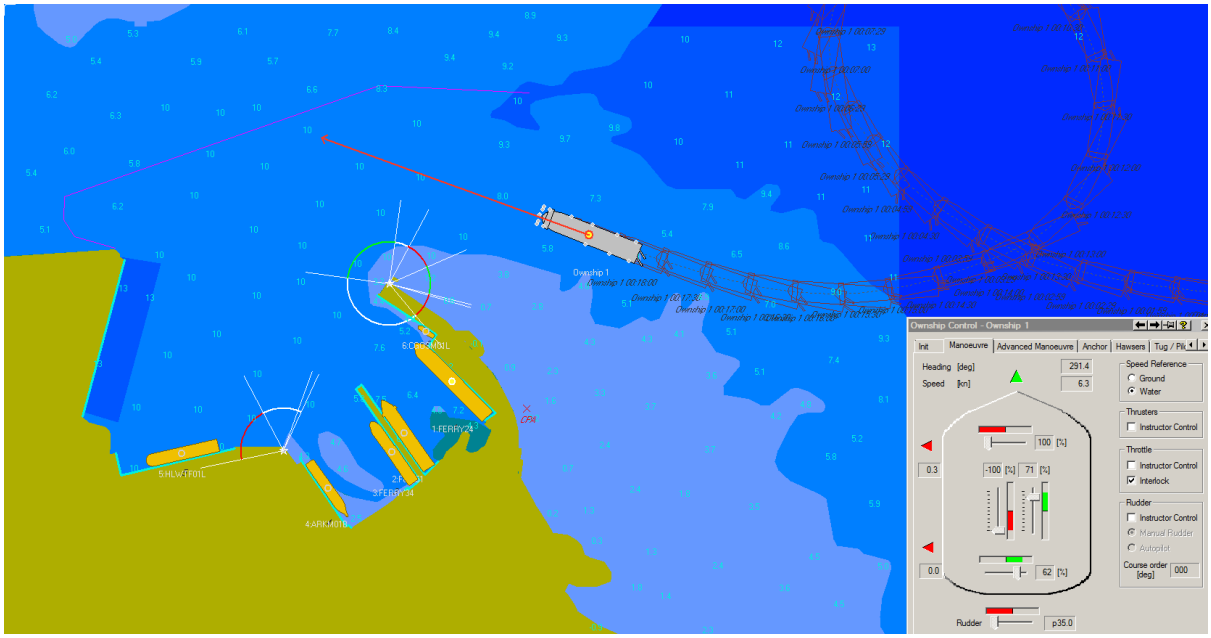


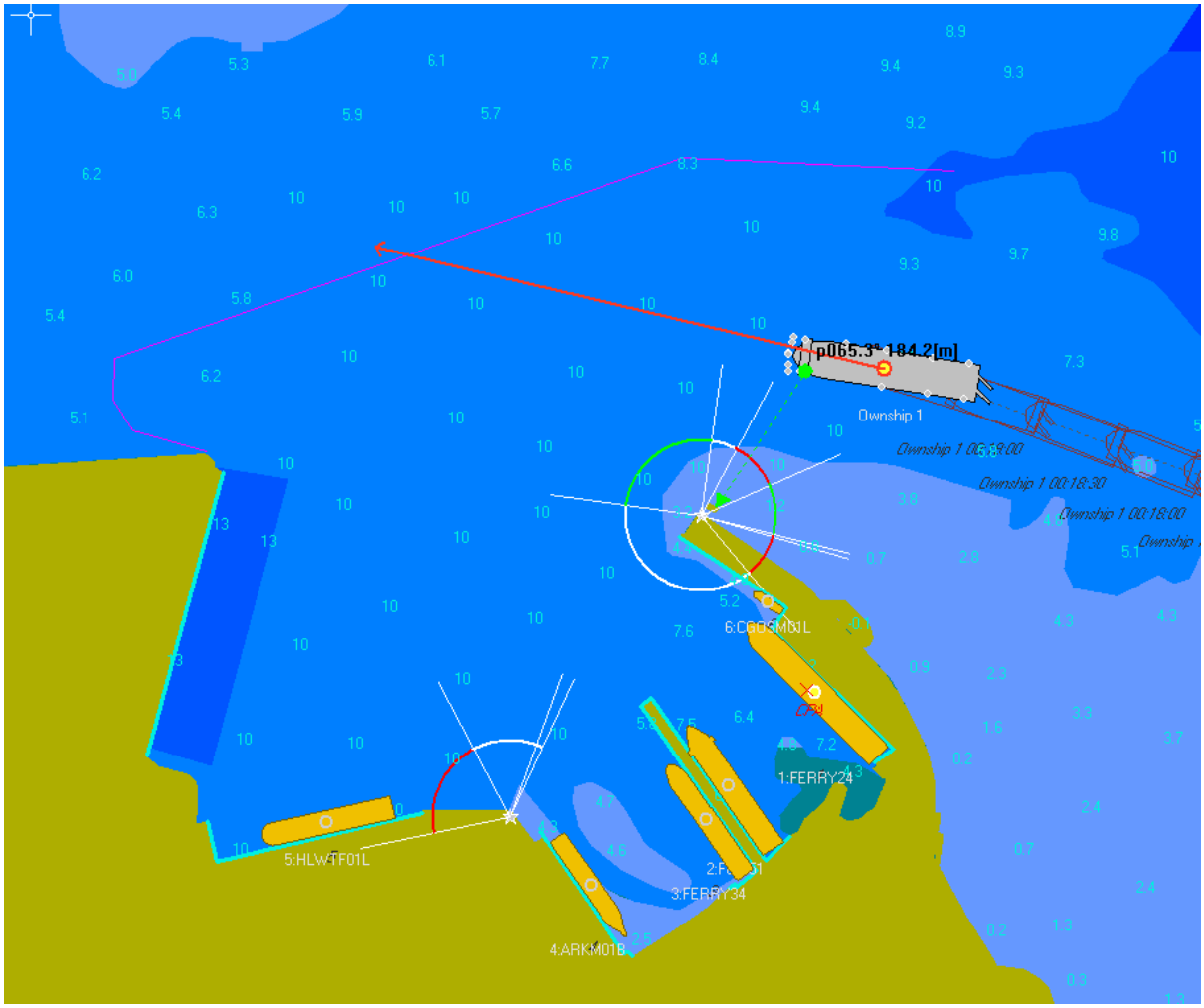



Ownship 1
6:CGDSM01L
1:FERRY24
5:HLW1F01L
2:Ferry51
3:FERRY34
4:ARKM01B


Ownship 1
6:CGDSM01L
1:FERRY24
5:HLW1F01L
2:Ferry51
3:FERRY34
4:ARKM01B


Ownship 1
CPA
1:FERRY24
2:Ferry51
3:FERRY34
4:ARKM01B


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
Speed [kn]
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Interlock
Rudder
Manual Rudder
Autopilot
Course order [deg]
Ownship 1
CPA

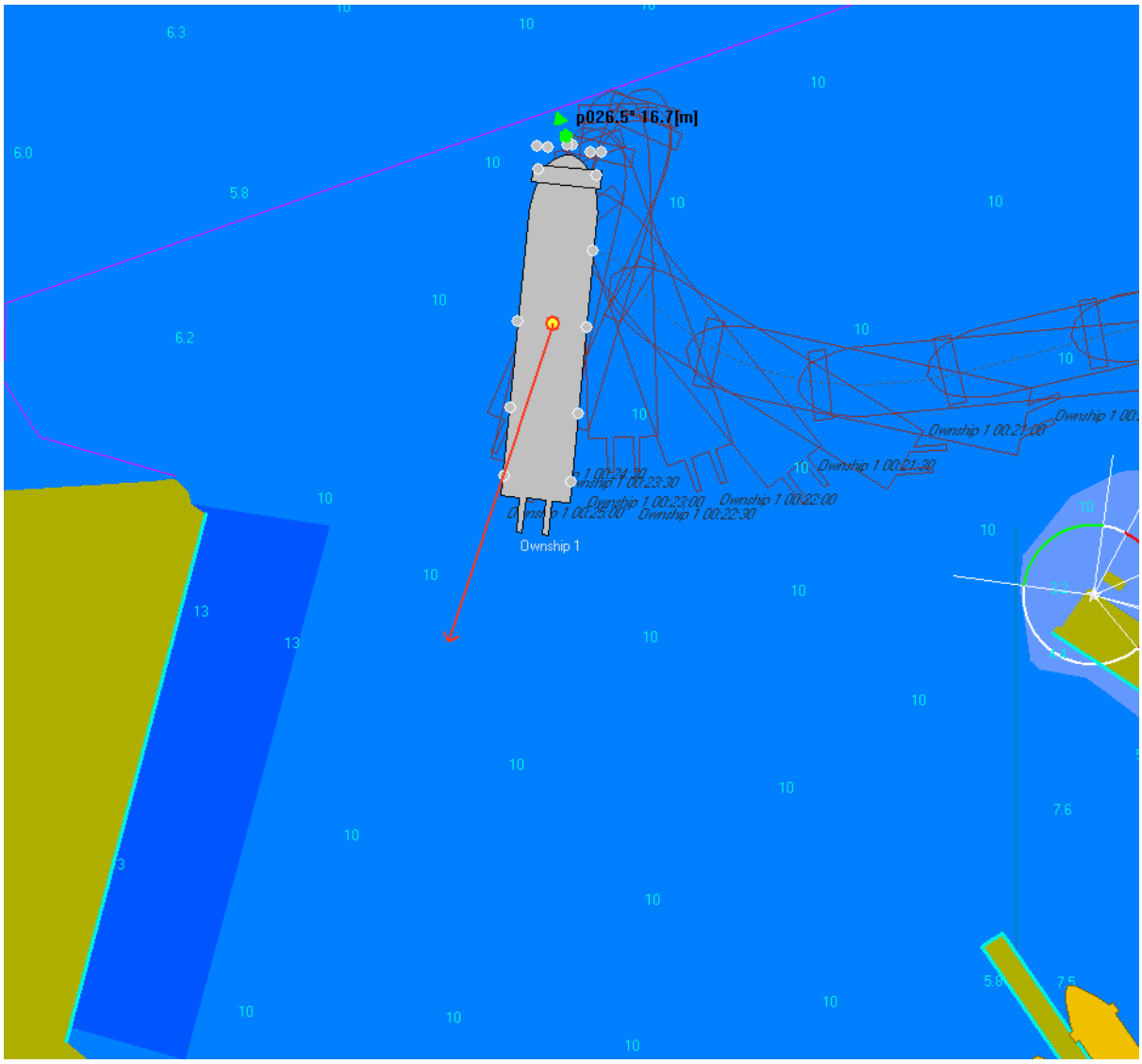

p065.3° 184.2[m]
Ownship 1
Ownship 1 00:19:00
Ownship 1 00:18:30
Ownship 1 00:18:00
6:CONSM01L
1:FERRY24
5:HLWTF01L
3:FERRY34
4:ARKM01B

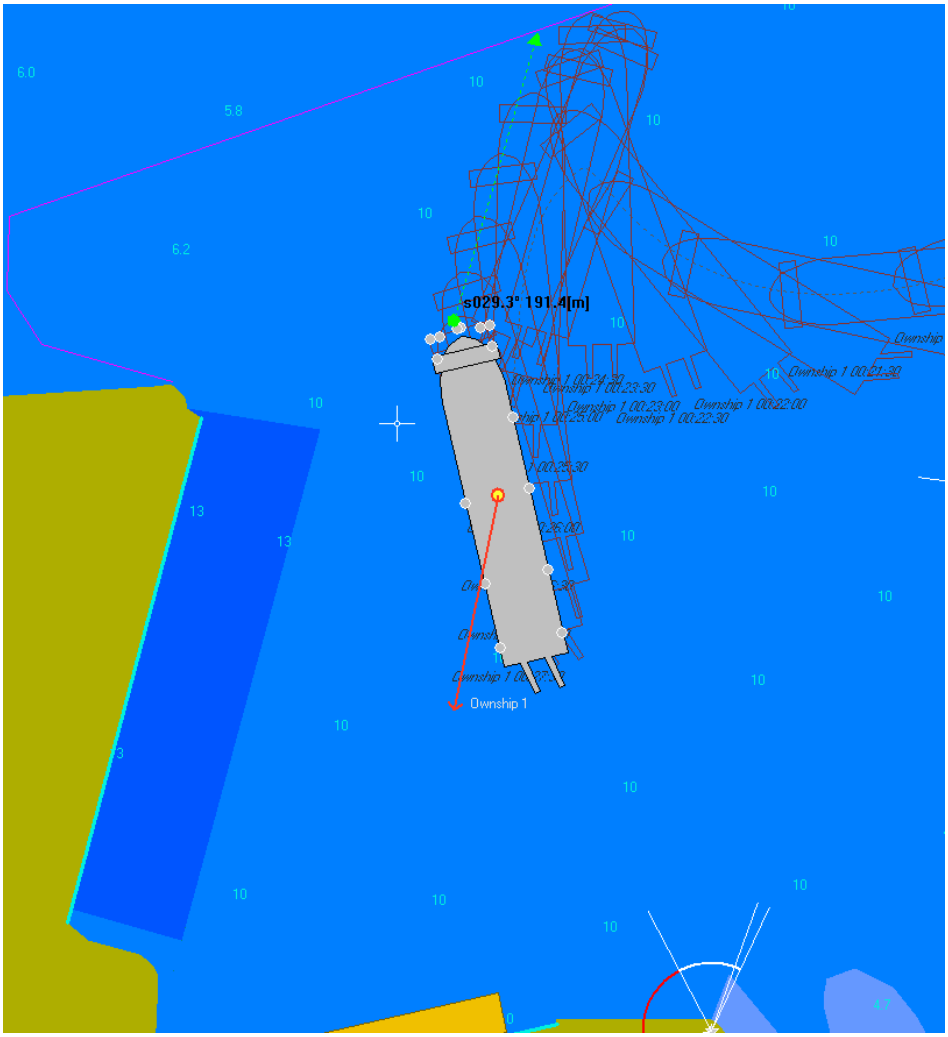

p082.9° 135.7[m]
Ownship 1
1:FERRY24

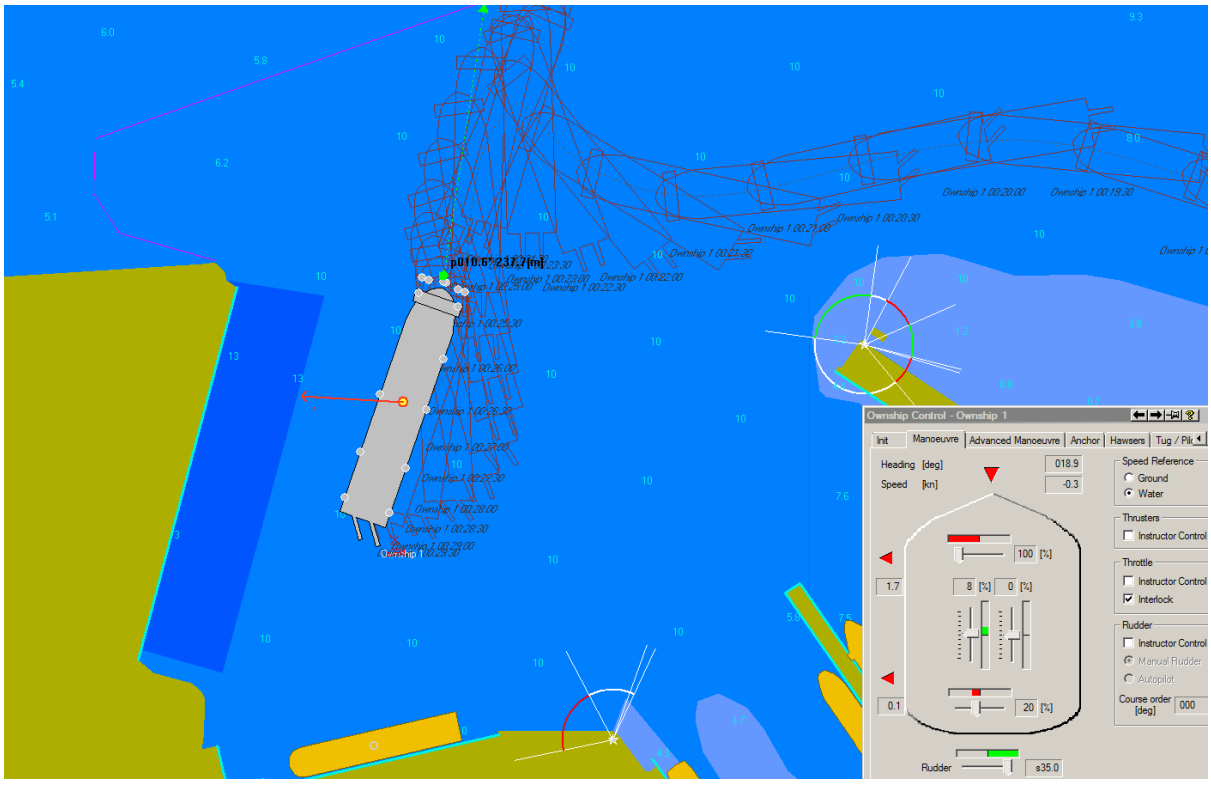

p068.3° 128.9[m]
Ownship 1
1:FERRY24
Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
262.2
Speed [kn]
5.0
Speed Reference
Ground
Water
Thrusters
Throttle
Interlock
Rudder
Manual Rudder
Autopilot
Course order [deg]
Rudder
s35.0


p177.3° 131.7[m]
Ownship 1
1:FERRY24


p109.8° 20.1[m]
Ownship 1
Ownship Control - Ownship 1
Int
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
348.1
Speed [kn]
1.3
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
100 [%]
-100 [%]
-100 [%]
1.5
2.8
-99 [%]
Rudder
p0.4


p026.5° 16.7[m]
Ownship 1

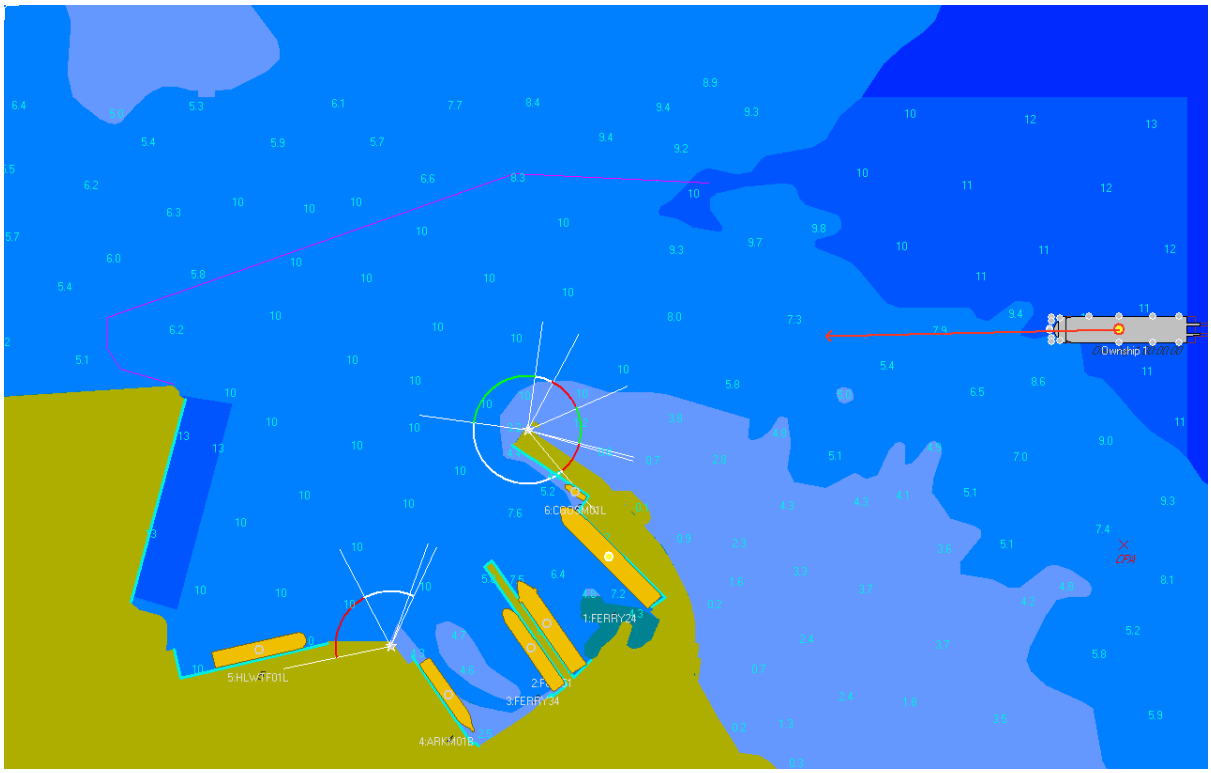

s029.3° 191.4[m]
Ownship 1

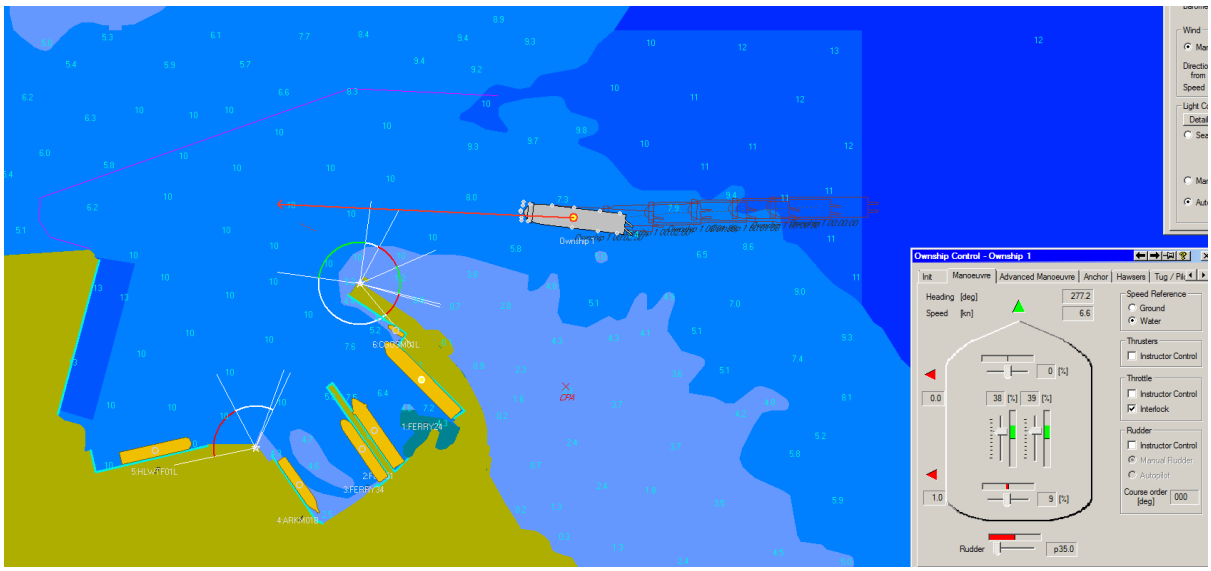

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Tug / Pilk
Heading [deg]
018.9
Speed [kn]
-0.3
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
100 [%]
8 [%]
0 [%]
20 [%]
1.7
0.1
Rudder
s35.0

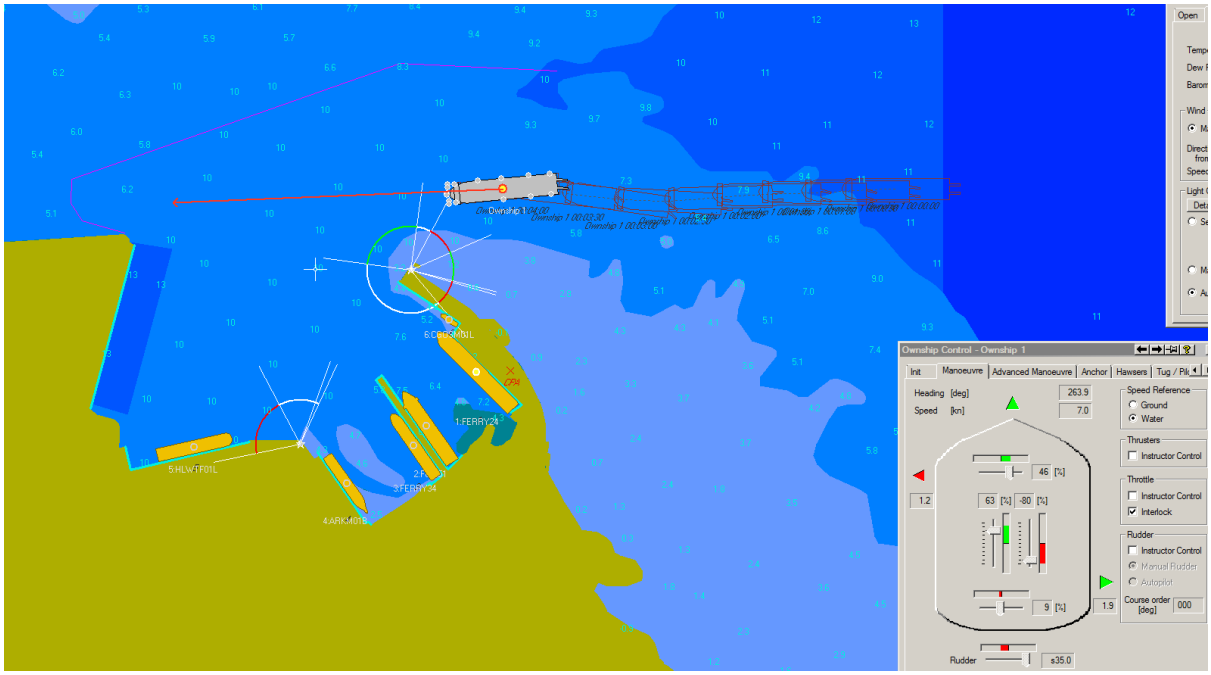
Run 5 – Day 1

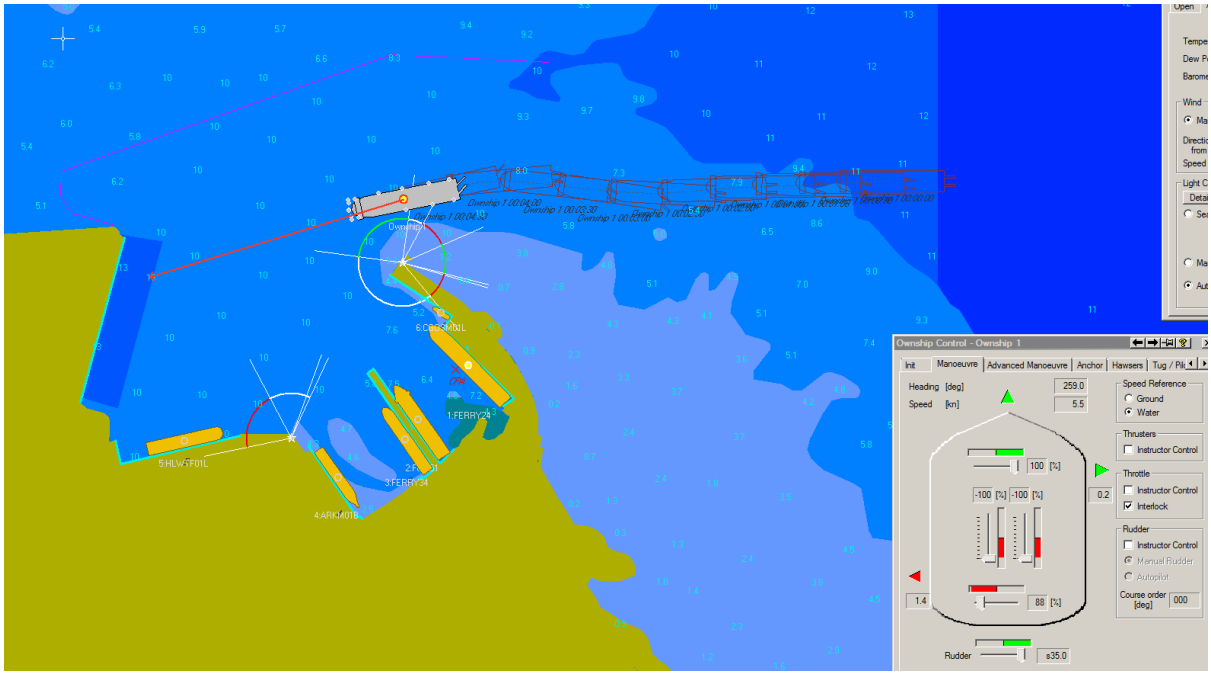
Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay**		
Wind Direction	**NW +/- 10°**	Wind Force	**30 kts +/-3 kts**

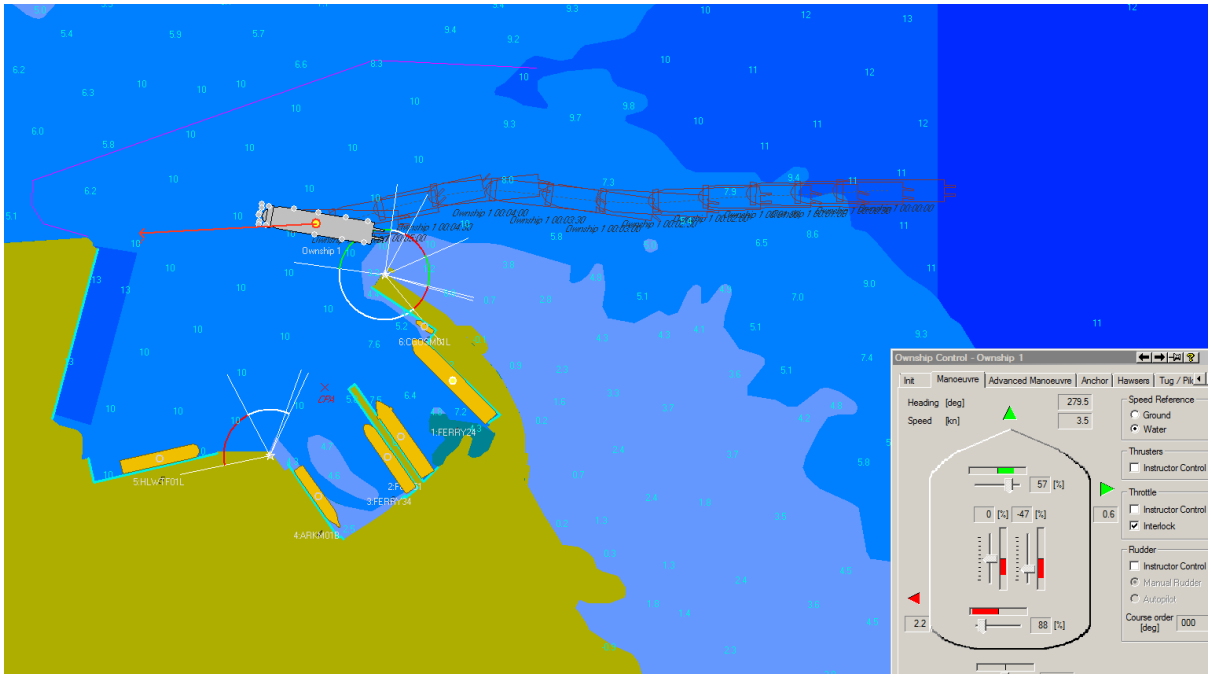
Manoeuvre Plots



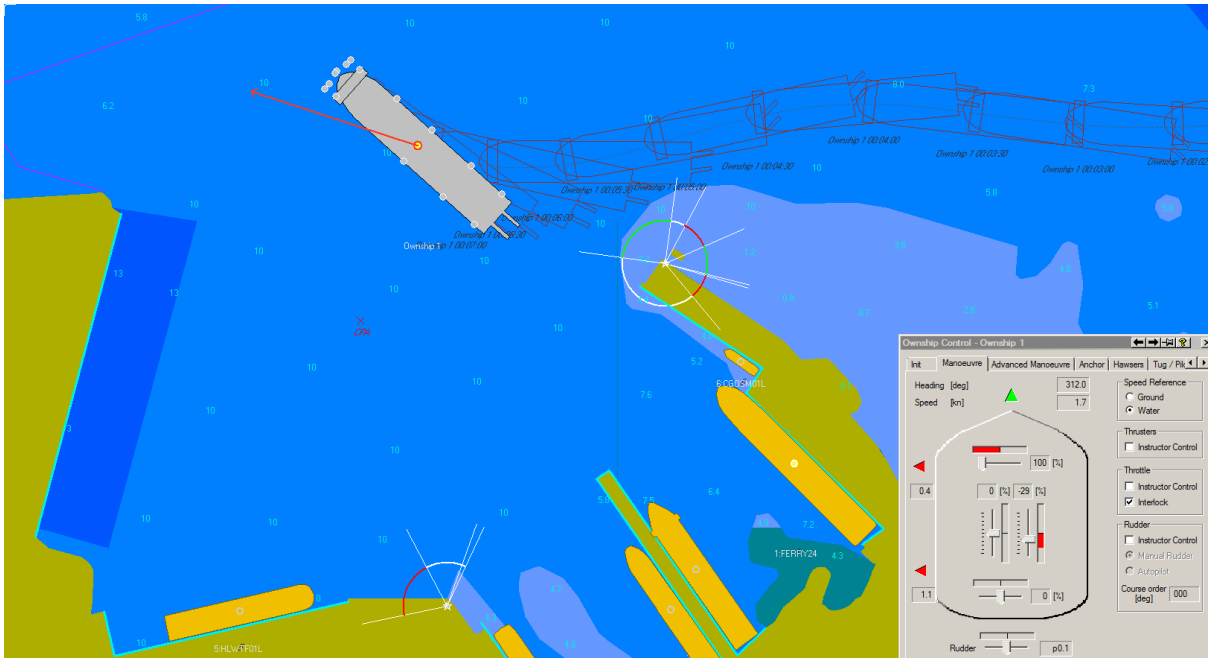


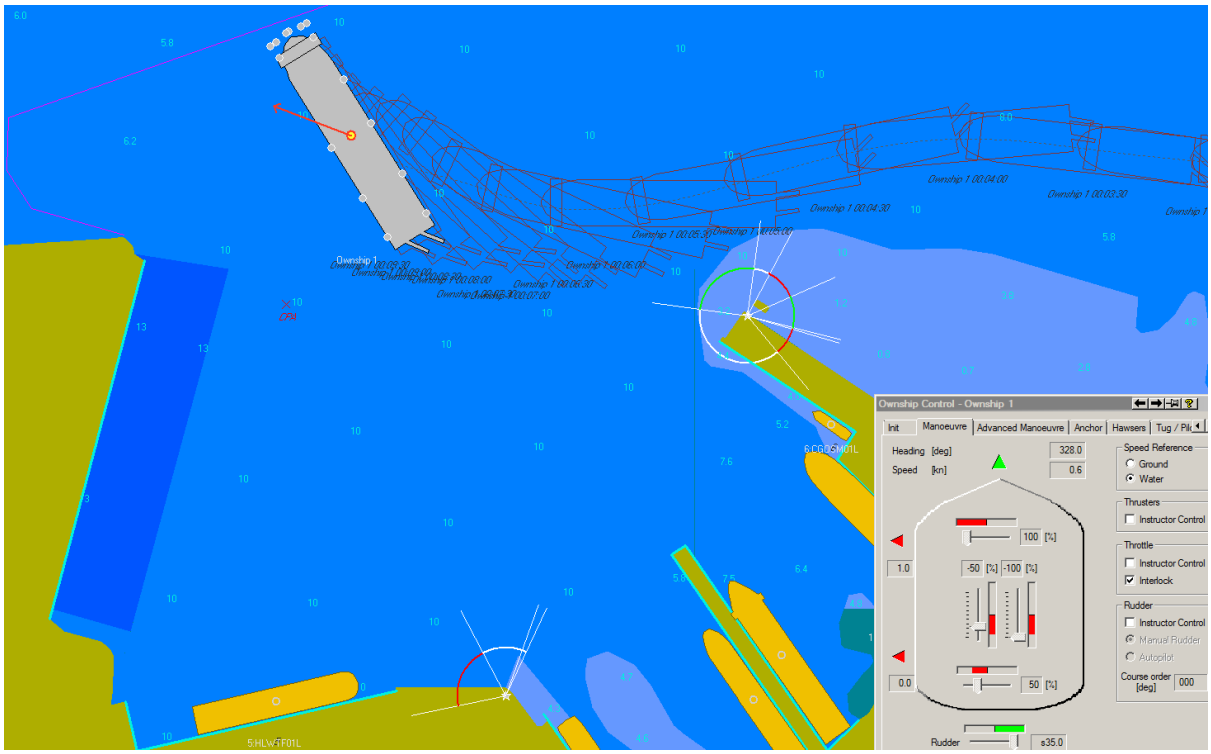

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
263.9
Speed [kn]
7.0
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
s35.0
1.2
1.9
46 [%]
63 [%]
-80 [%]
9 [%]
1:FERRY24
3:FERRY34
4:ARKM01B
5:HLWTF01L
6:CBSM01L

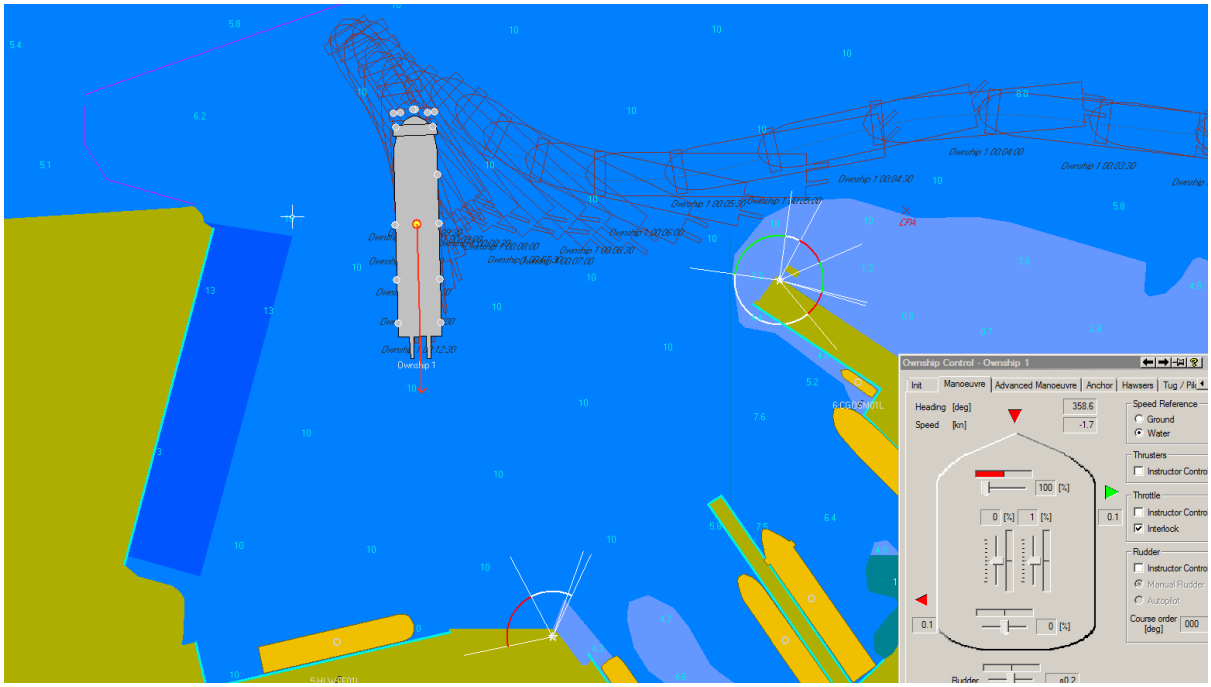

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
259.0
Speed [kn]
5.5
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
s35.0
1.4
0.2
100 [%]
-100 [%]
-100 [%]
88 [%]
1:FERRY24
3:FERRY34
4:ARKM01B
5:HLWTF01L
6:CBSM01L

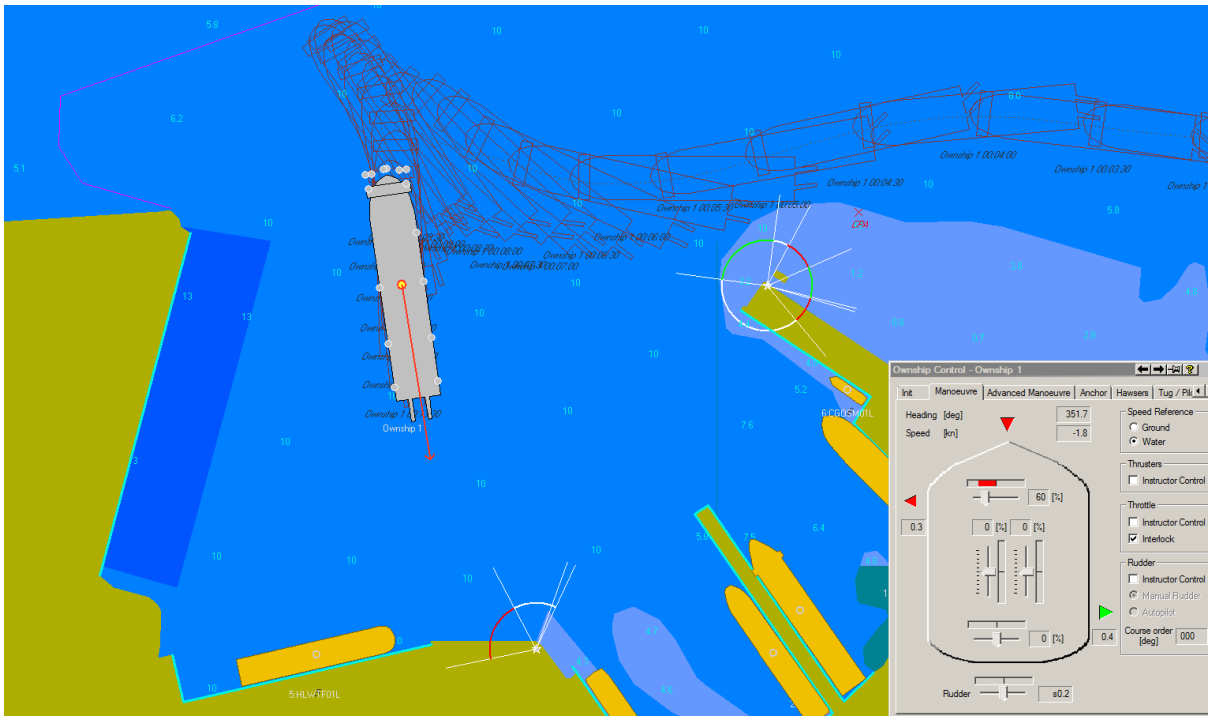

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Tug / Pik
Heading [deg]
279.5
Speed [kn]
3.5
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
57 [%]
0 [%]
-47 [%]
0.6
2.2
88 [%]
Ownship 1
6:CGG:M01L
1:FERRY24
5:HLWTF01L
2:FA
3:FERRY34
4:ARKM01B


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Tug / Pik
Heading [deg]
284.8
Speed [kn]
3.2
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
50 [%]
0 [%]
-47 [%]
0.7
2.3
88 [%]
Rudder
p0.2
Ownship 1
6:CGG:M01L
1:FERRY24
5:HLWTF01L


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
312.0
Speed [kn]
1.7
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
p0.1
1:FERRY24
5:HLW5F01L


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
328.0
Speed [kn]
0.6
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
s35.0
5:HLW5F01L

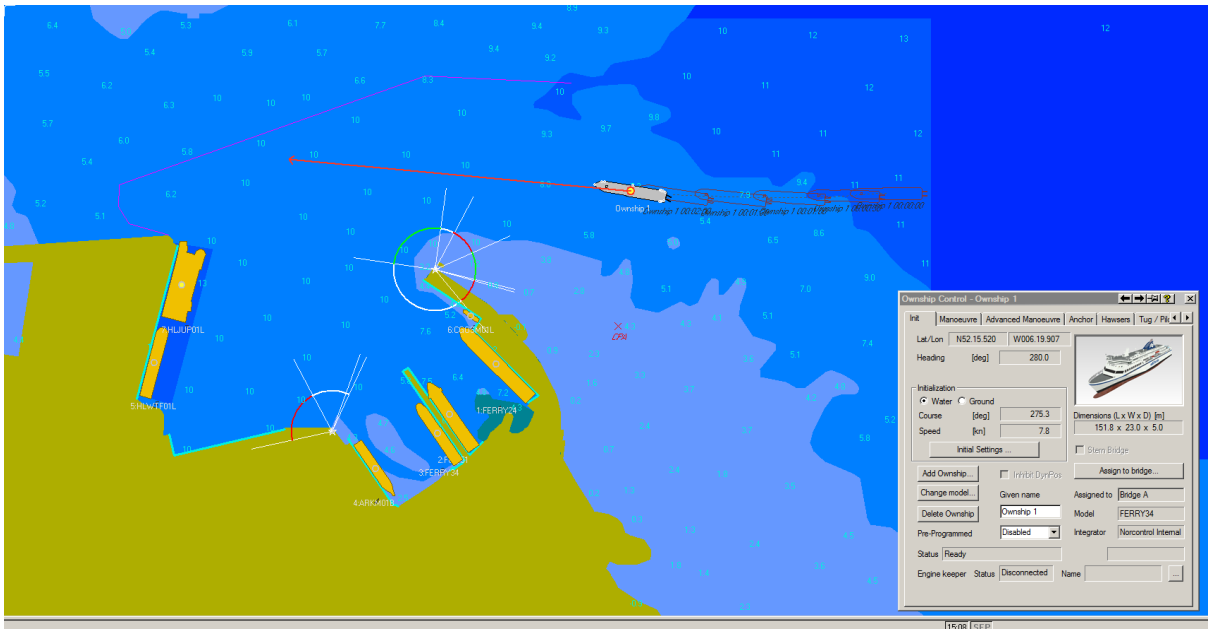

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
358.6
Speed [kn]
-1.7
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Interlock
Rudder
Manual Rudder
Autopilot
Course order [deg]
Ownship 1

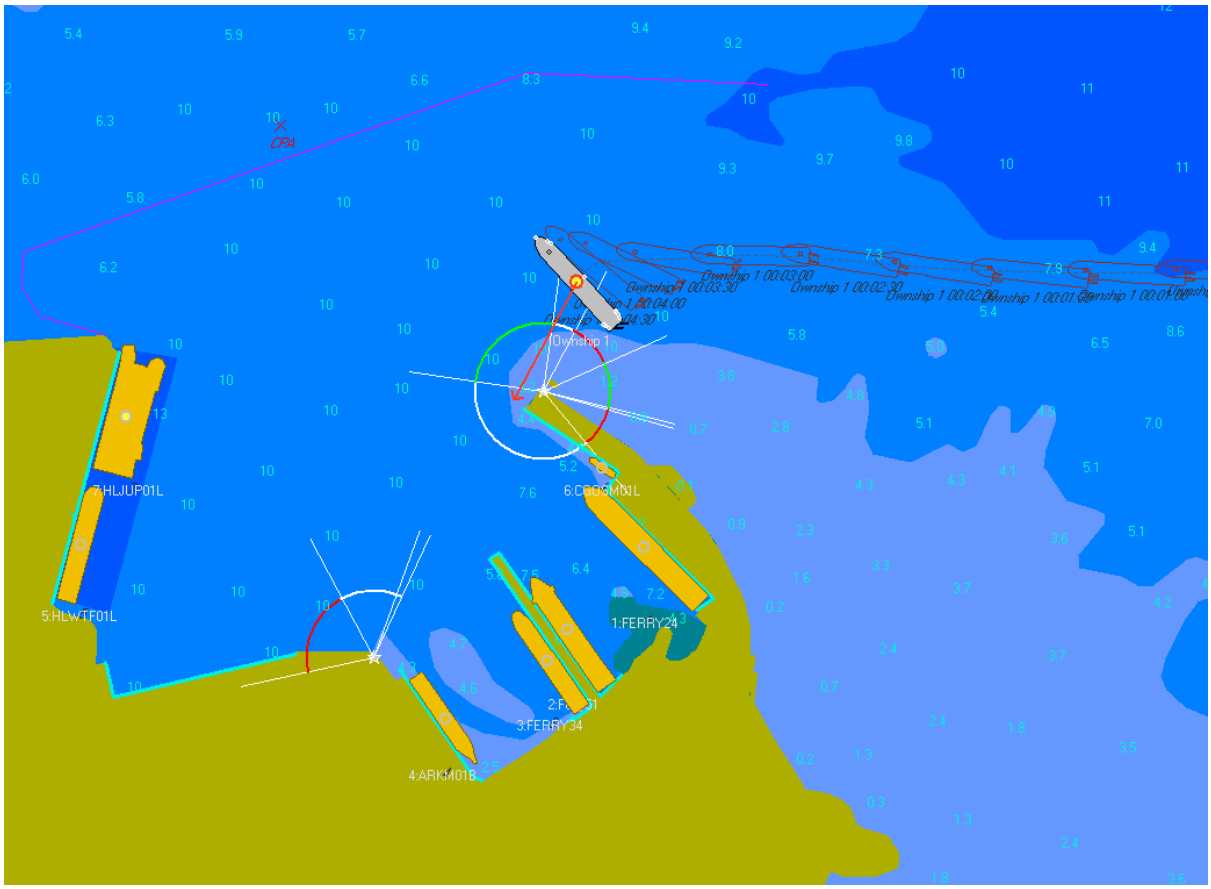

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
351.7
Speed [kn]
-1.8
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Interlock
Rudder
Manual Rudder
Autopilot
Course order [deg]
Ownship 1

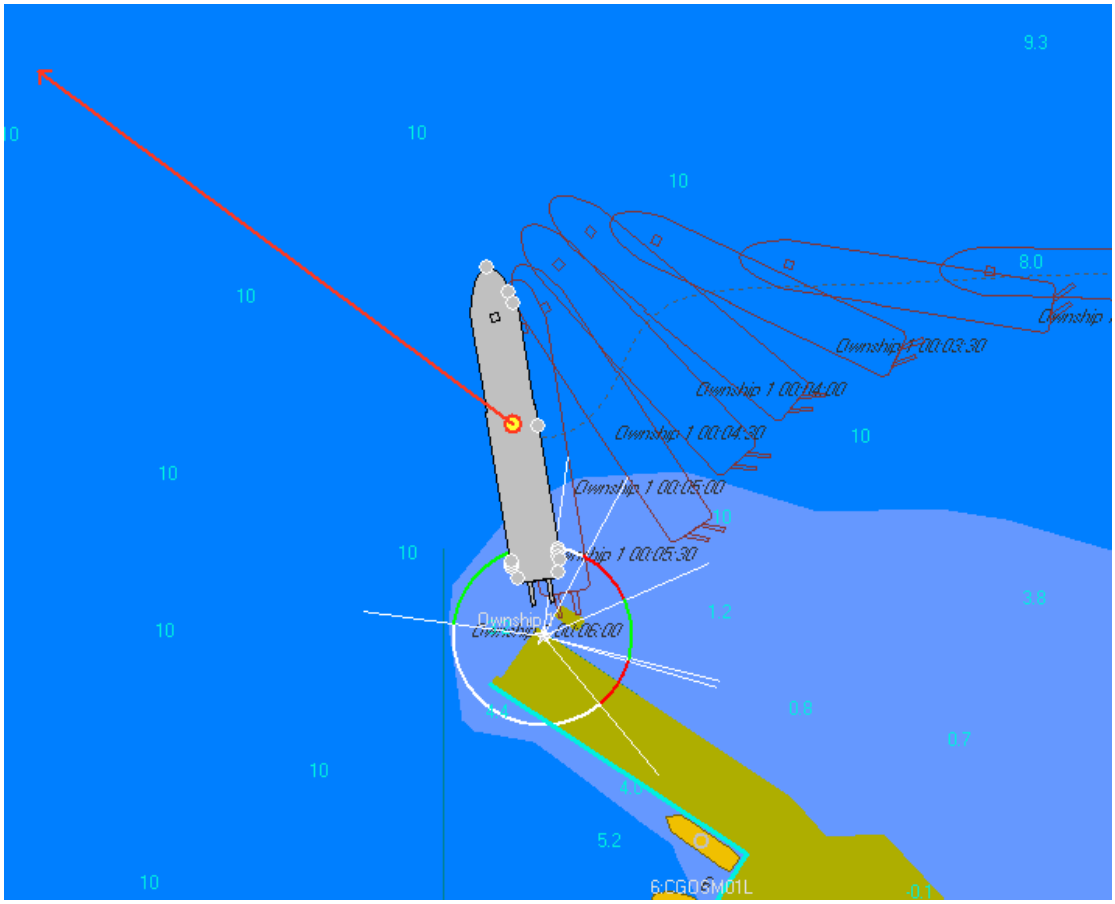
Run 6 – Day 1

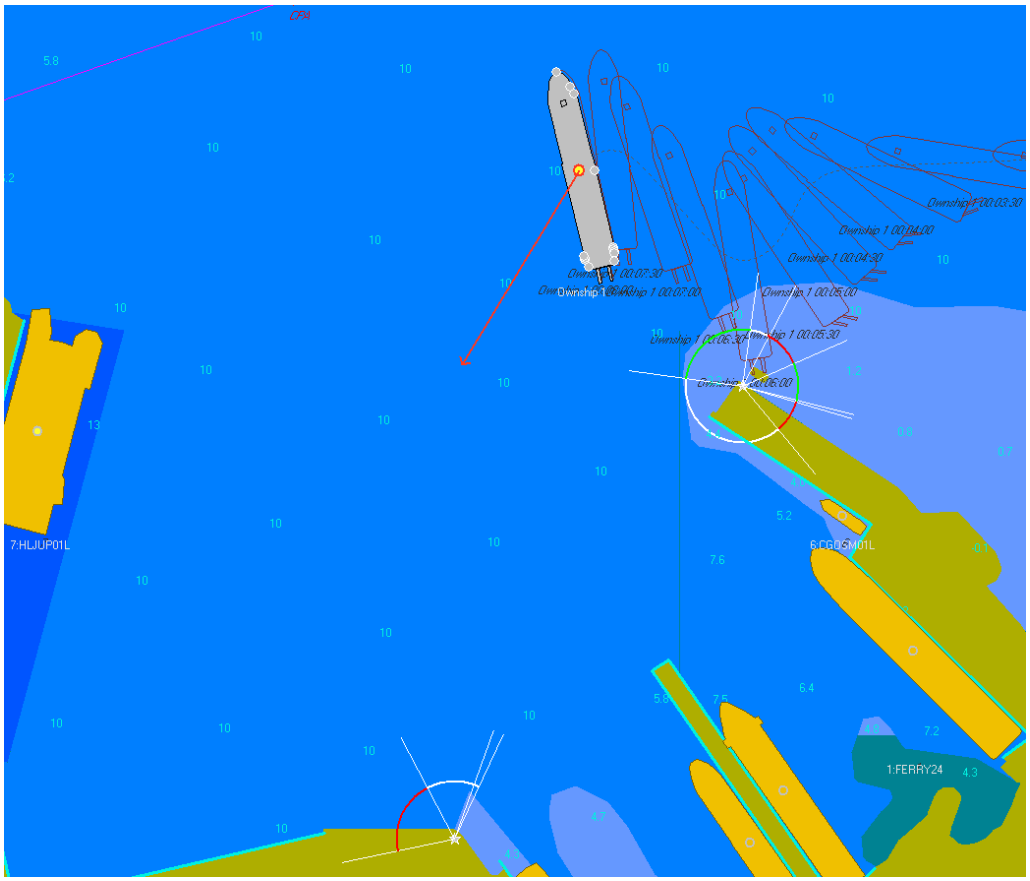
Ship Model	**FERRY34**	Max Draught	**5.0m**
Manoeuvre	**Berthing – 240m Secondary Quay**		
Wind Direction	**NE +/- 10°**	Wind Force	**30 kts +/-3 kts**

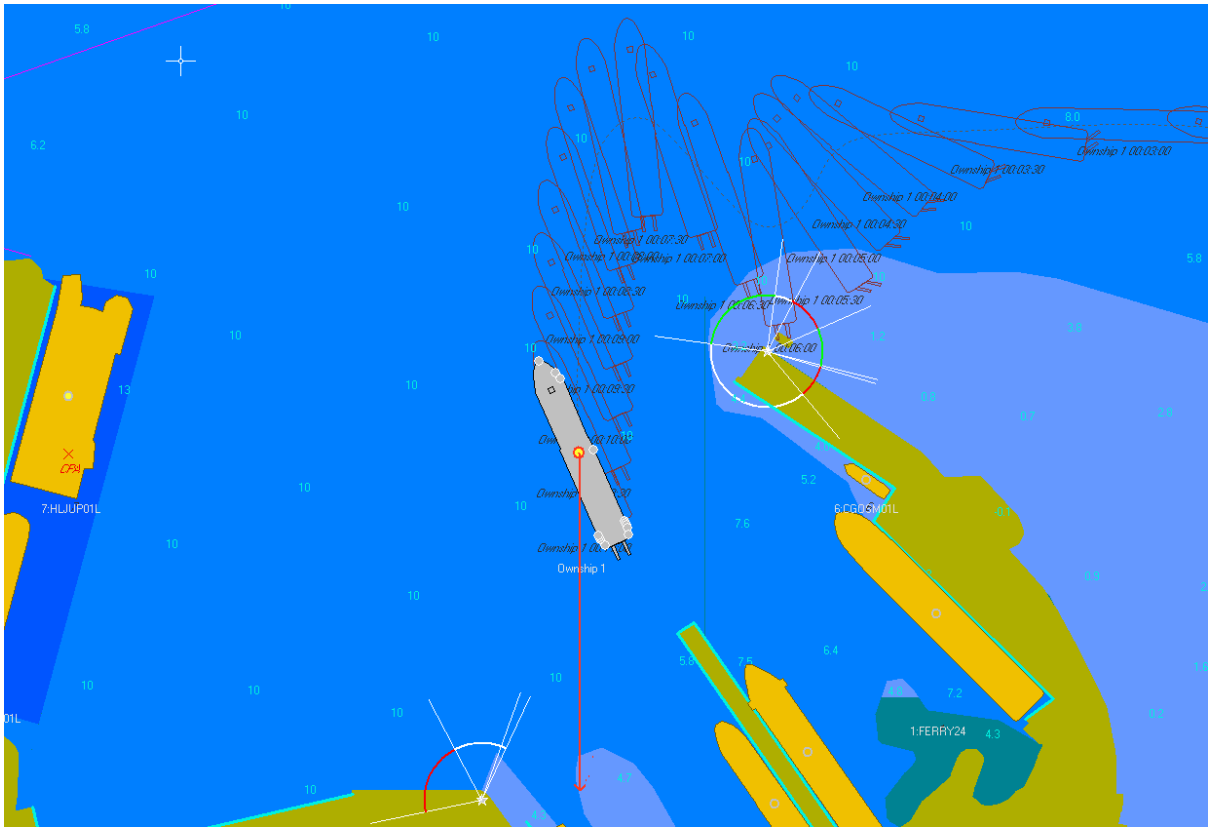
Manoeuvre Plots

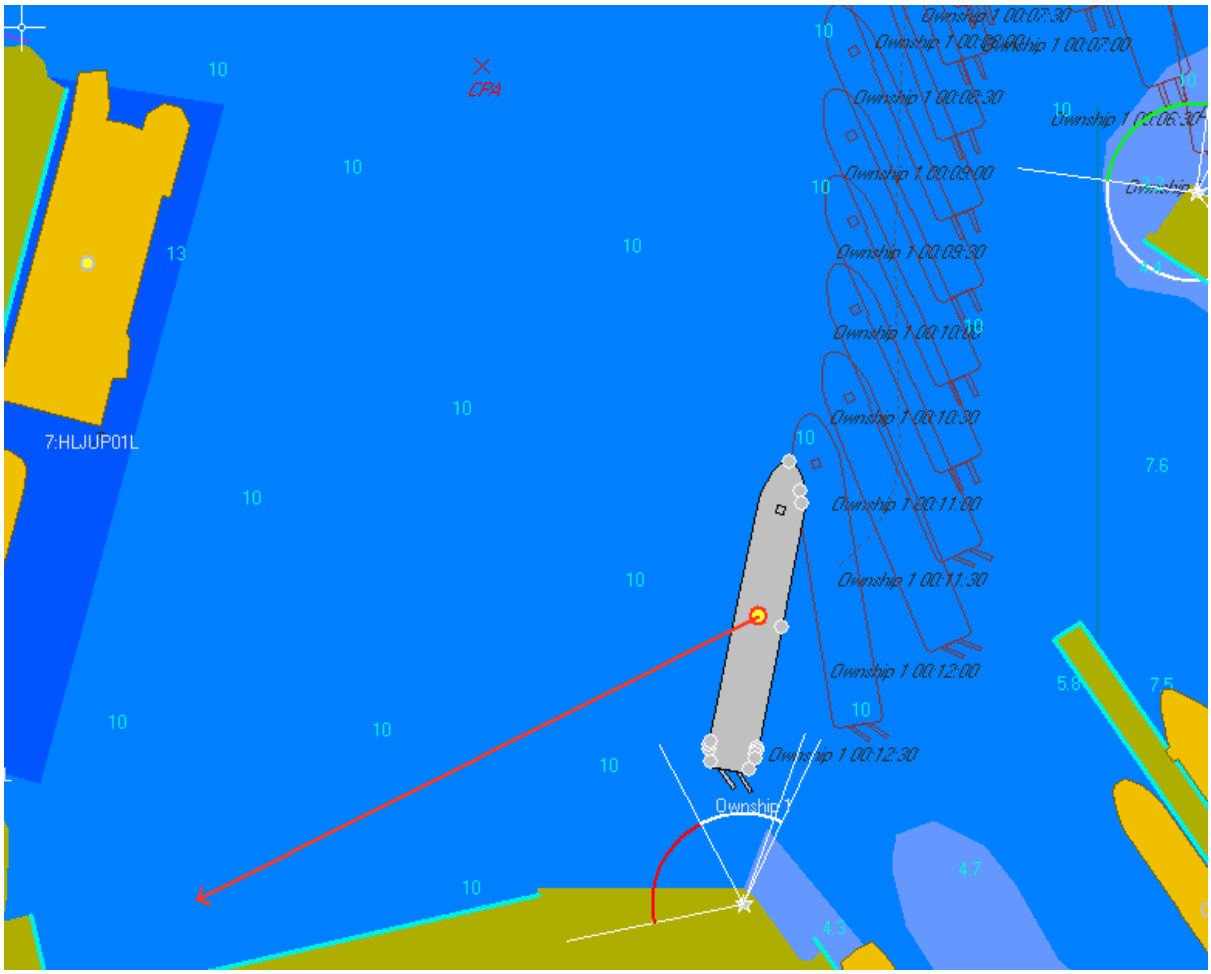


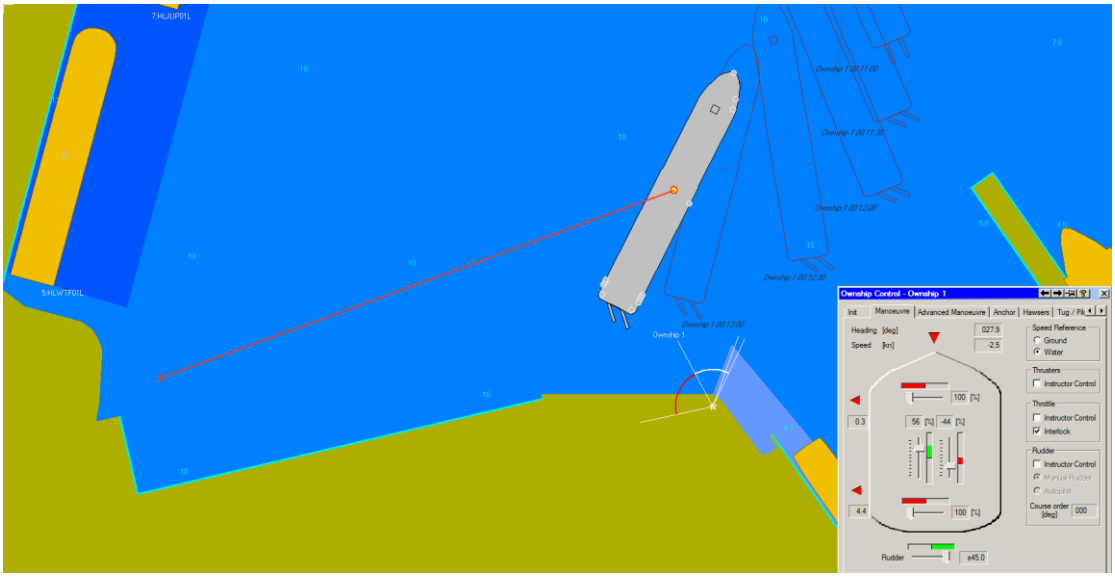


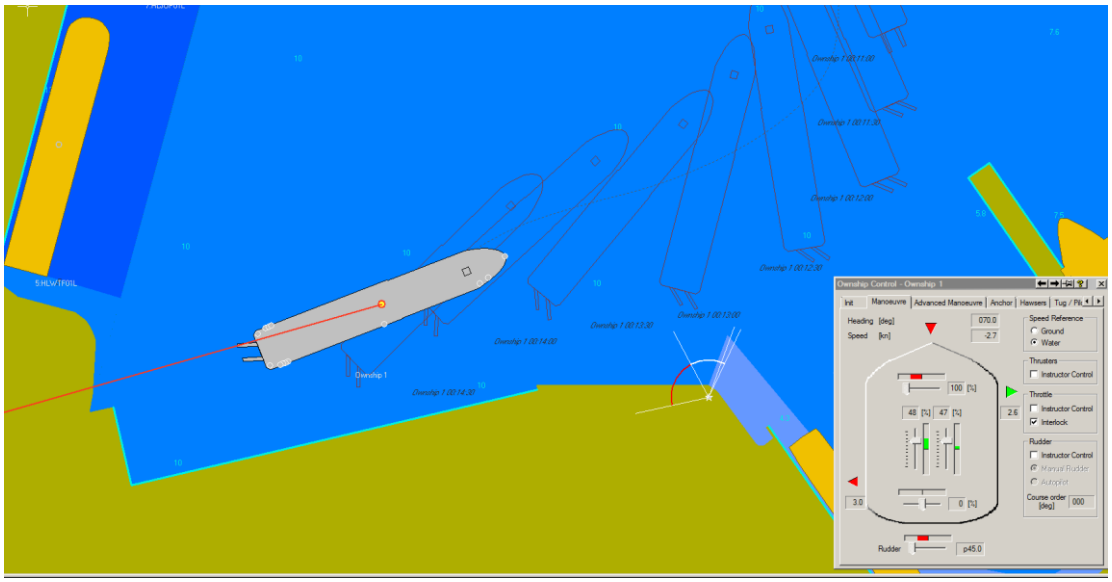

9.3
10
8.0
Ownship 1 00:03:30
Ownship 1 00:04:00
Ownship 1 00:04:30
Ownship 1 00:05:00
Ownship 1 00:05:30
Ownship 1 00:06:00
6:CGDSM01L

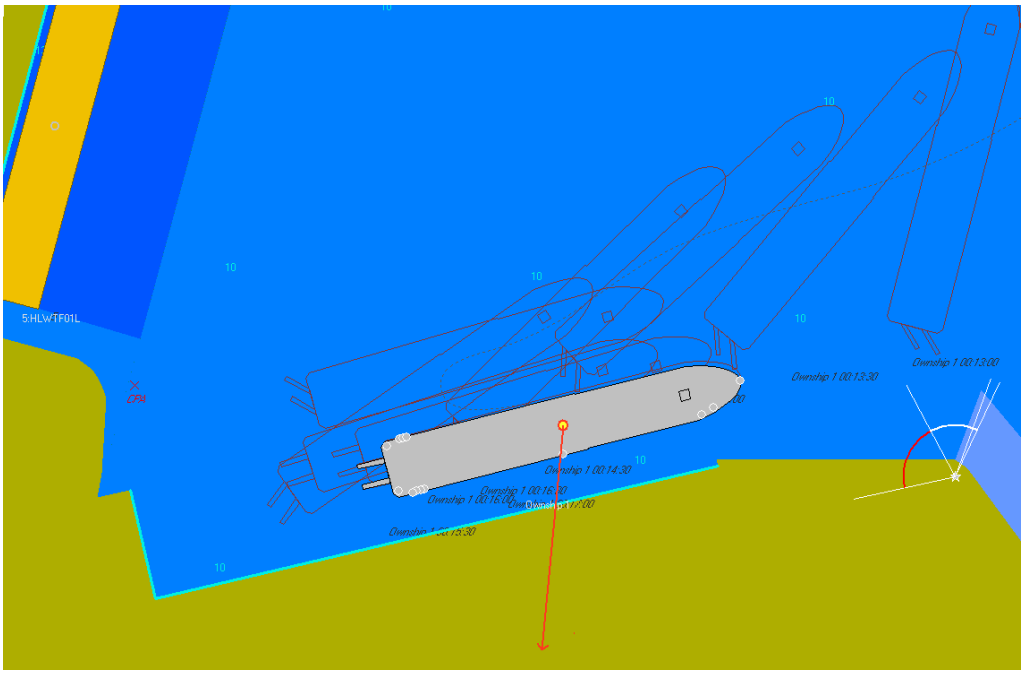

Ownship 1 00:03:30
Ownship 1 00:04:00
Ownship 1 00:04:30
Ownship 1 00:05:00
Ownship 1 00:05:30
Ownship 1 00:06:00
Ownship 1 00:07:00
7:HLJUP01L
6:CGDSM01L
1:FERRY24


7:HLJUP01L
Ownship 1
1:FERRY24


7:HLJUP01L
Ownship 1


7:HLWJP01L
5:HLWTF01L
Ownship Control - Ownship 1
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Interlock
Rudder
Course order

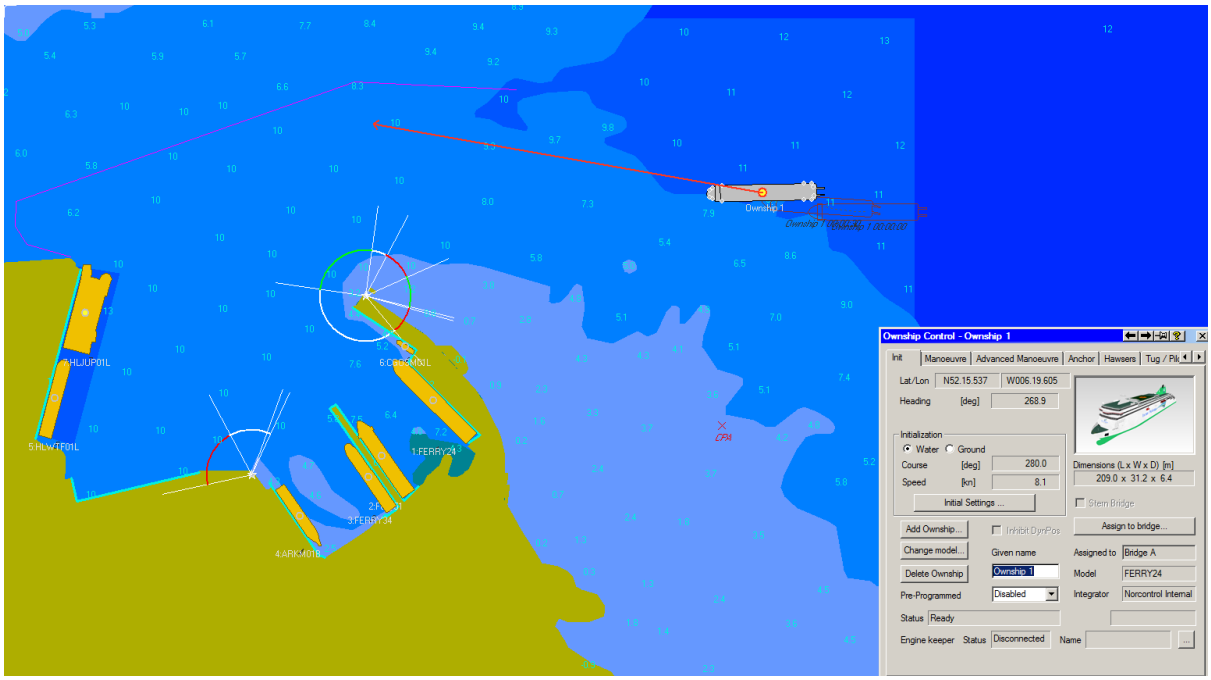

5:HLWTF01L
Ownship Control - Ownship 1
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Interlock
Rudder
Course order

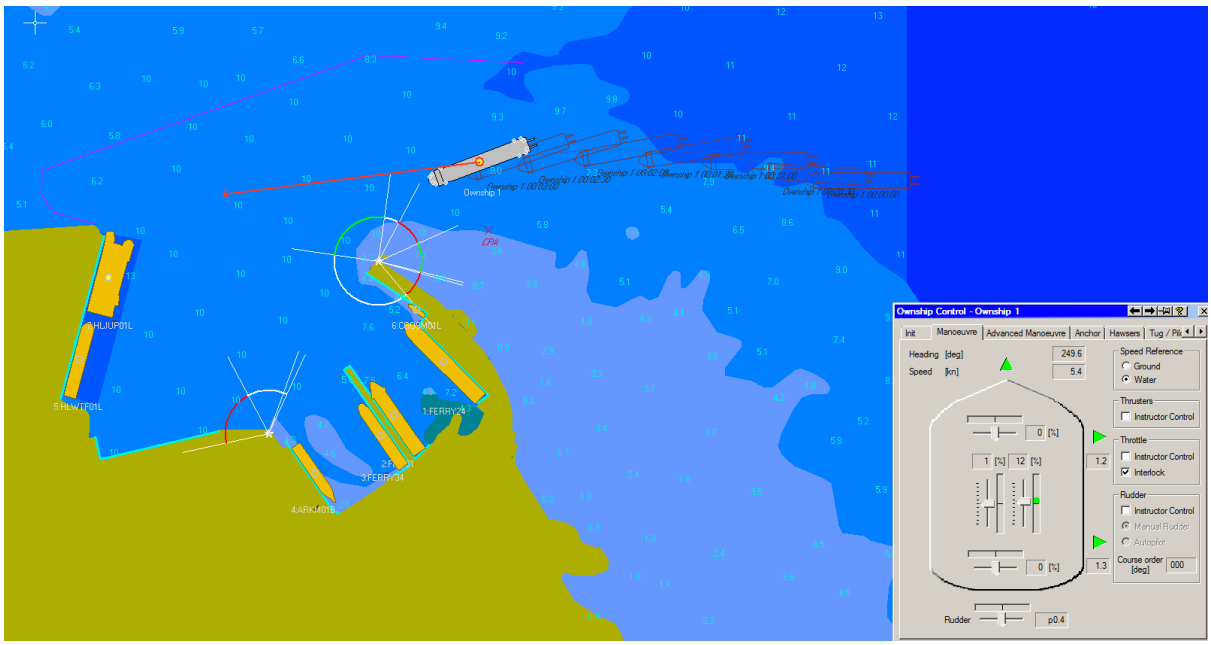

5:HLWTF01L
CPA

Run 7 – Day 1

Ship Model	**FERRY24**	Max Draught	**6.4m**
Manoeuvre	**Berthing – 240m Secondary Quay**		
Wind Direction	**SW +/- 10°**	Wind Force	**40 kts +/-3 kts**

Manoeuvre Plots

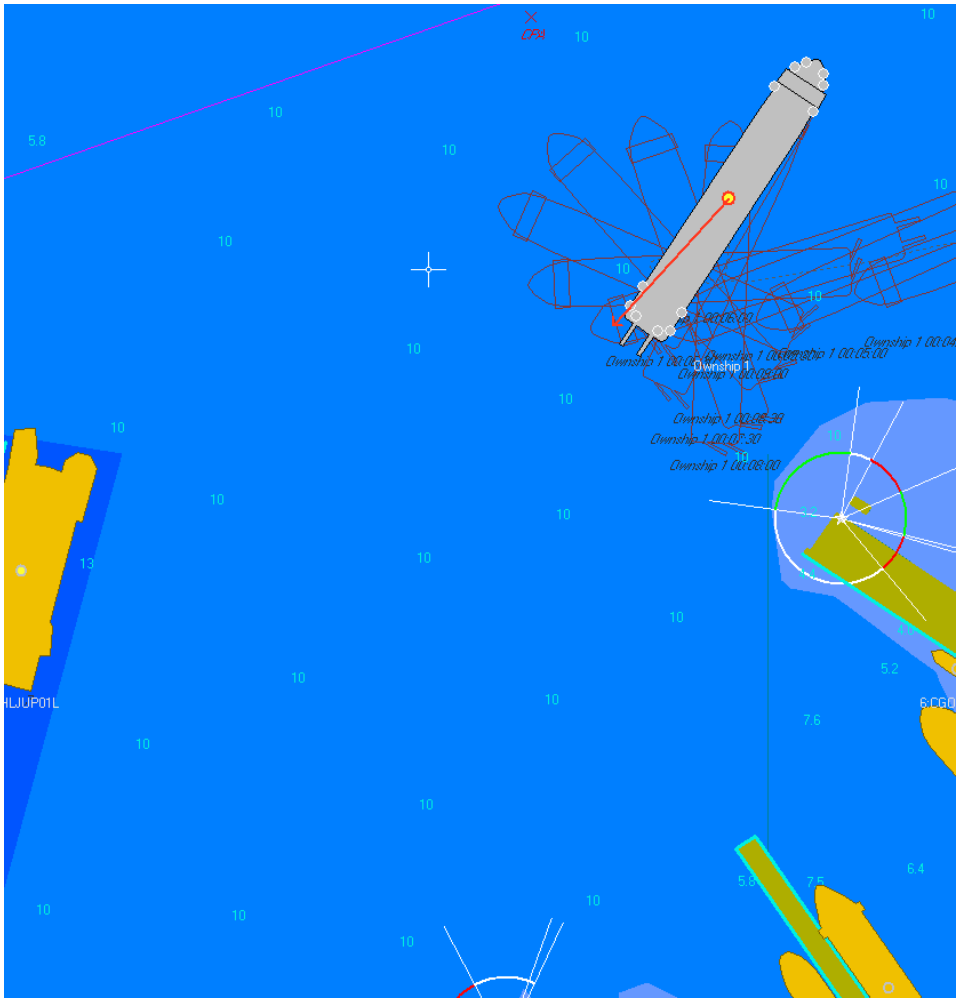


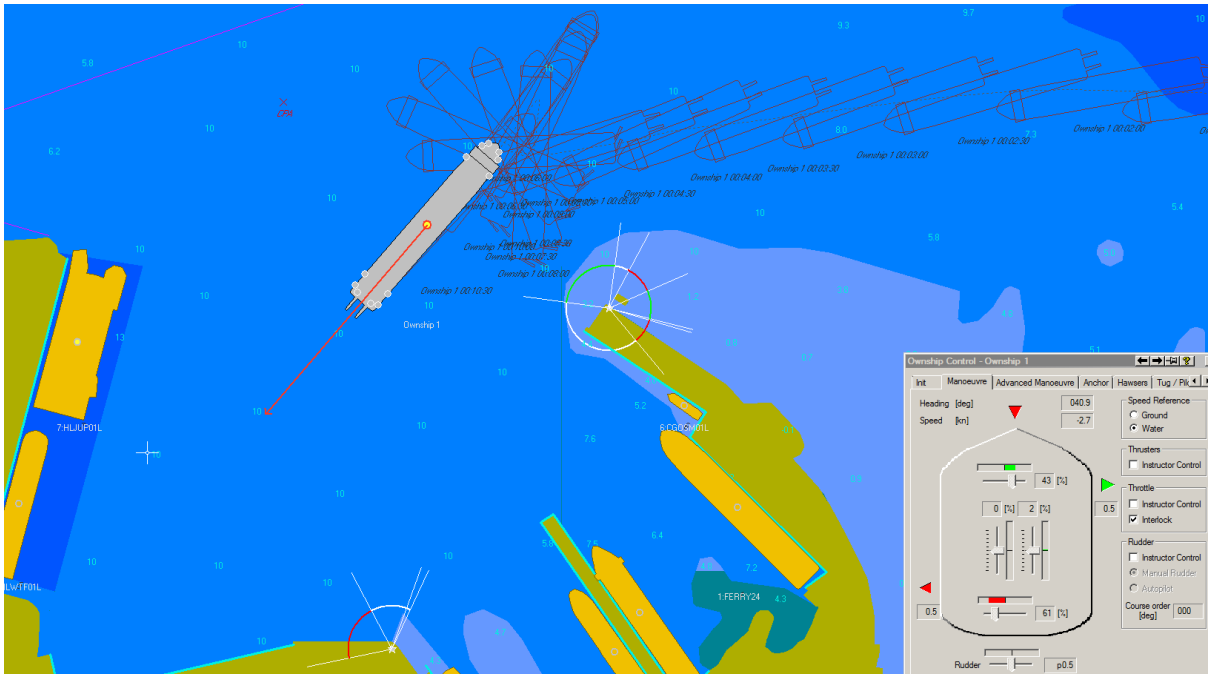


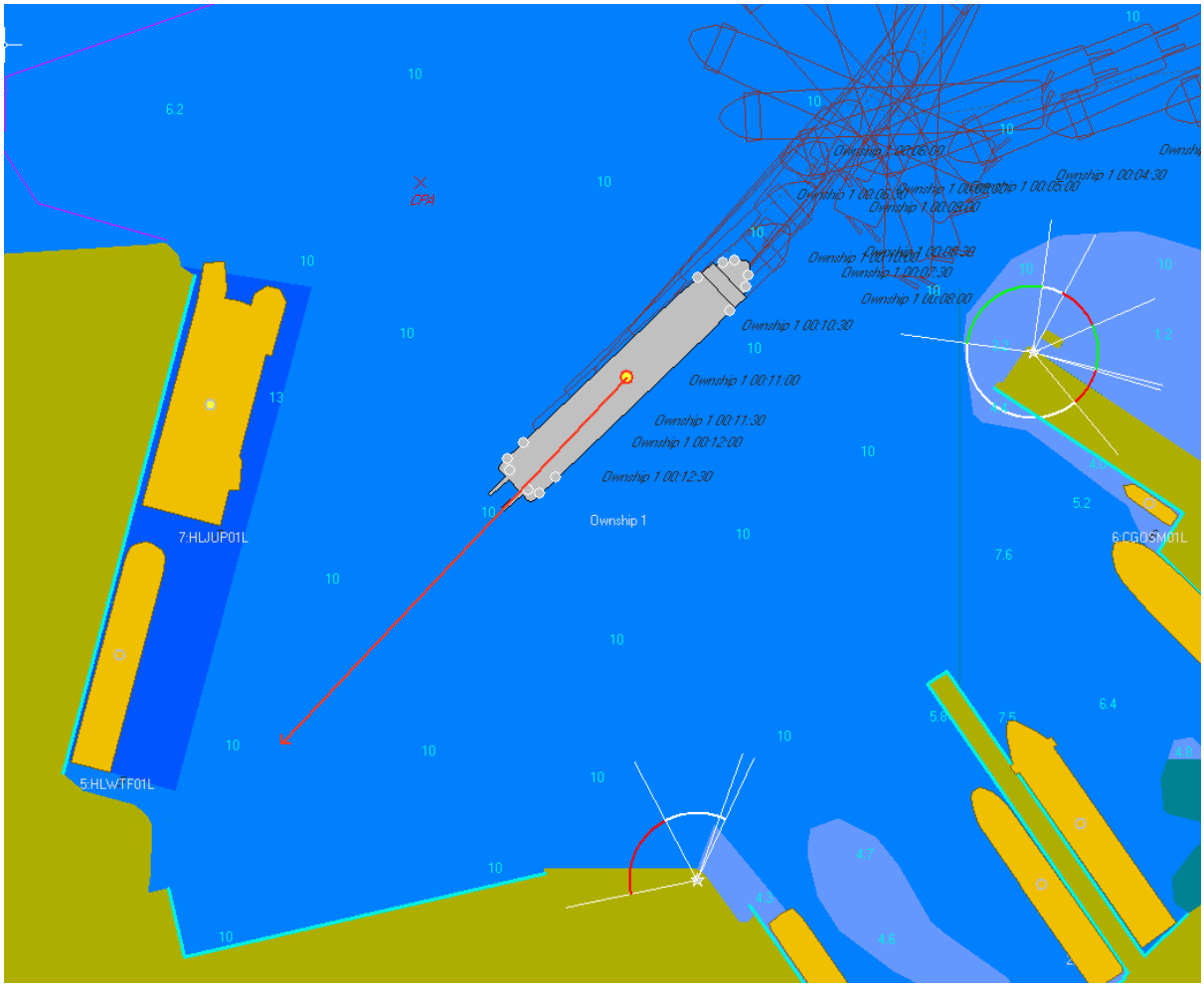

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
Speed [kn]
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
7:HLJUP01L
6:CGCSM01L
1:FERRY24

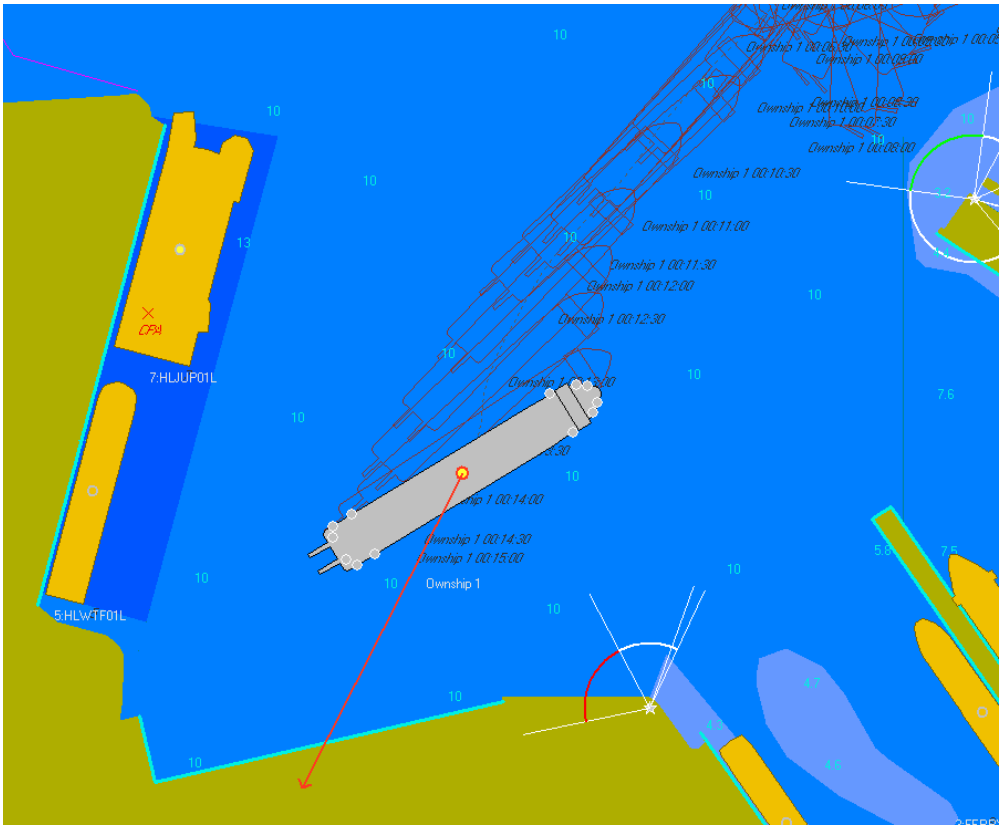

7:HLJUP01L
6:CGCSM01L

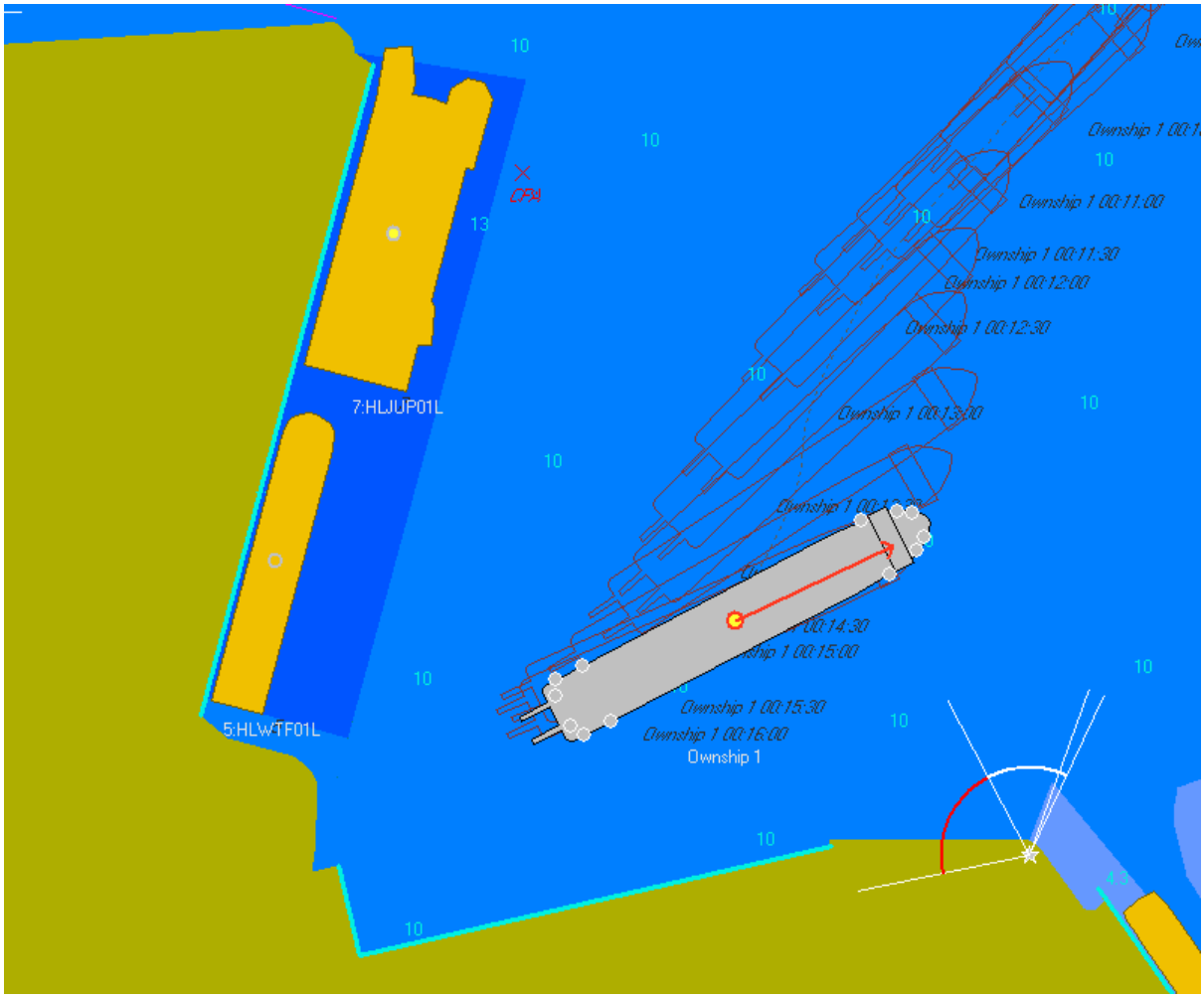

Ownship 1
Ownship 1 00:03:30
Ownship 1 00:04:00
Ownship 1 00:04:30
Ownship 1 00:05:00
6:CG05M01L

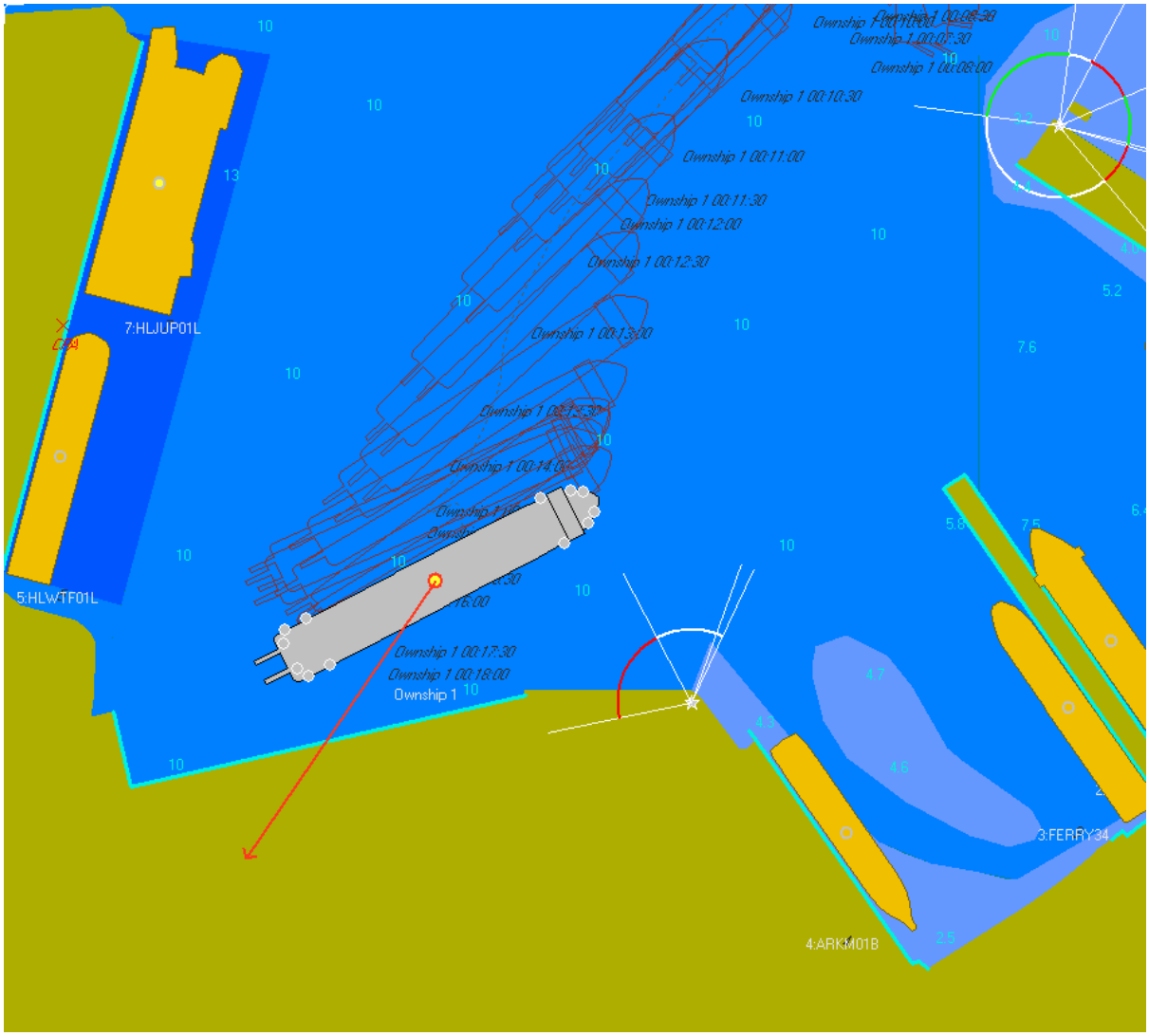

CPA
Ownship 1
Ownship 1 00:05:00
Ownship 1 00:07:30
Ownship 1 00:08:00
HLJUP01L


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Tug / Pil
Heading [deg]
040.9
Speed [kn]
-2.7
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
Rudder
Ownship 1
7:HLJUP01L
1:FERRY24


Ownship 1 00:10:30
Ownship 1 00:11:00
Ownship 1 00:11:30
Ownship 1 00:12:00
Ownship 1 00:12:30
Ownship 1
7:HLJUP01L
5:HLWTF01L


7:HLJUP01L
5:HLWTF01L
Ownship 1

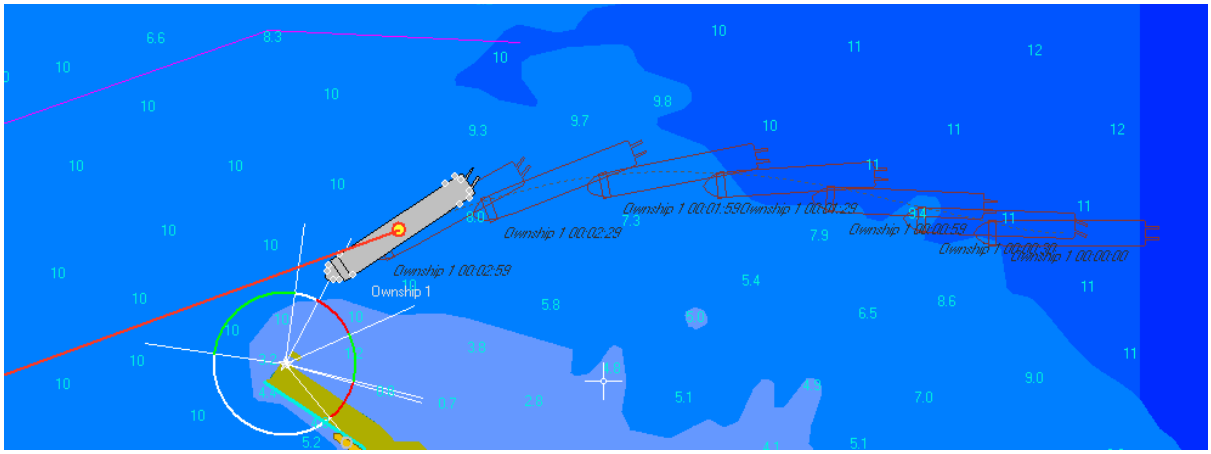

7:HLJUP01L
5:HLWTF01L
Ownship 1

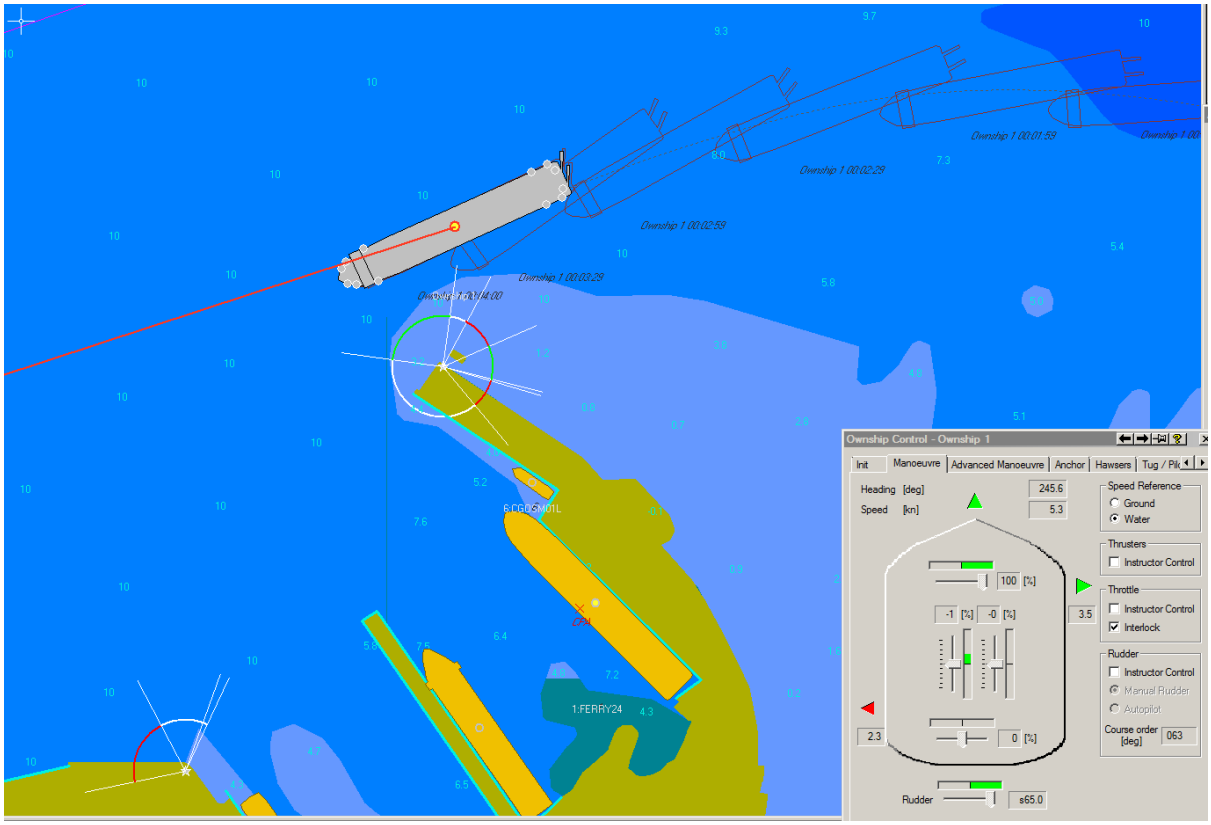

7:HLJUP01L
5:HLWTF01L
3:FERRY34
4:ARKM01B
Ownship 1

Run 8 – Day 1

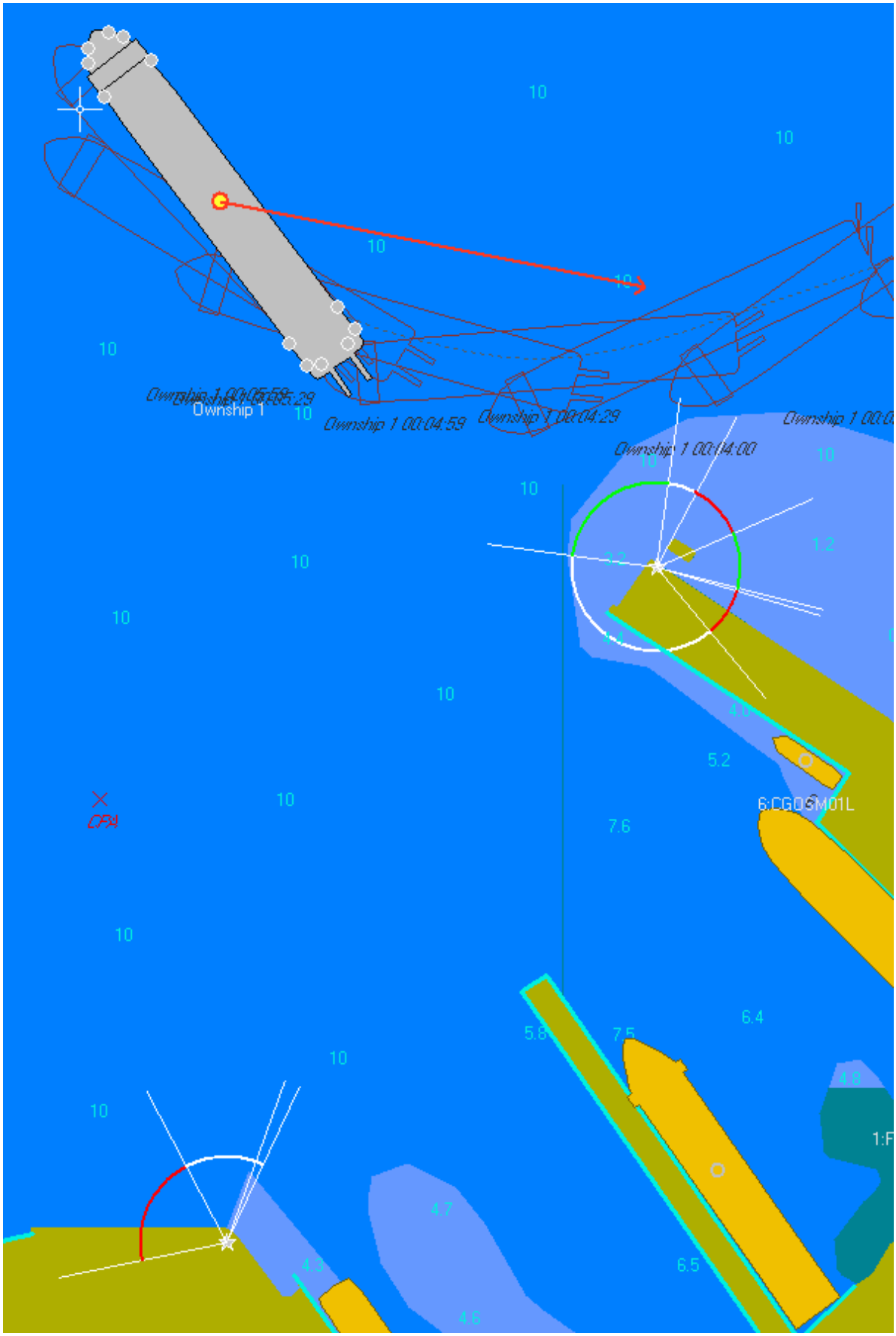
Ship Model	**FERRY24**	Max Draught	**6.4m**
Manoeuvre	**Berthing – No.1 Quay**		
Wind Direction	**SW +/- 10°**	Wind Force	**40 kts +/-3 kts**

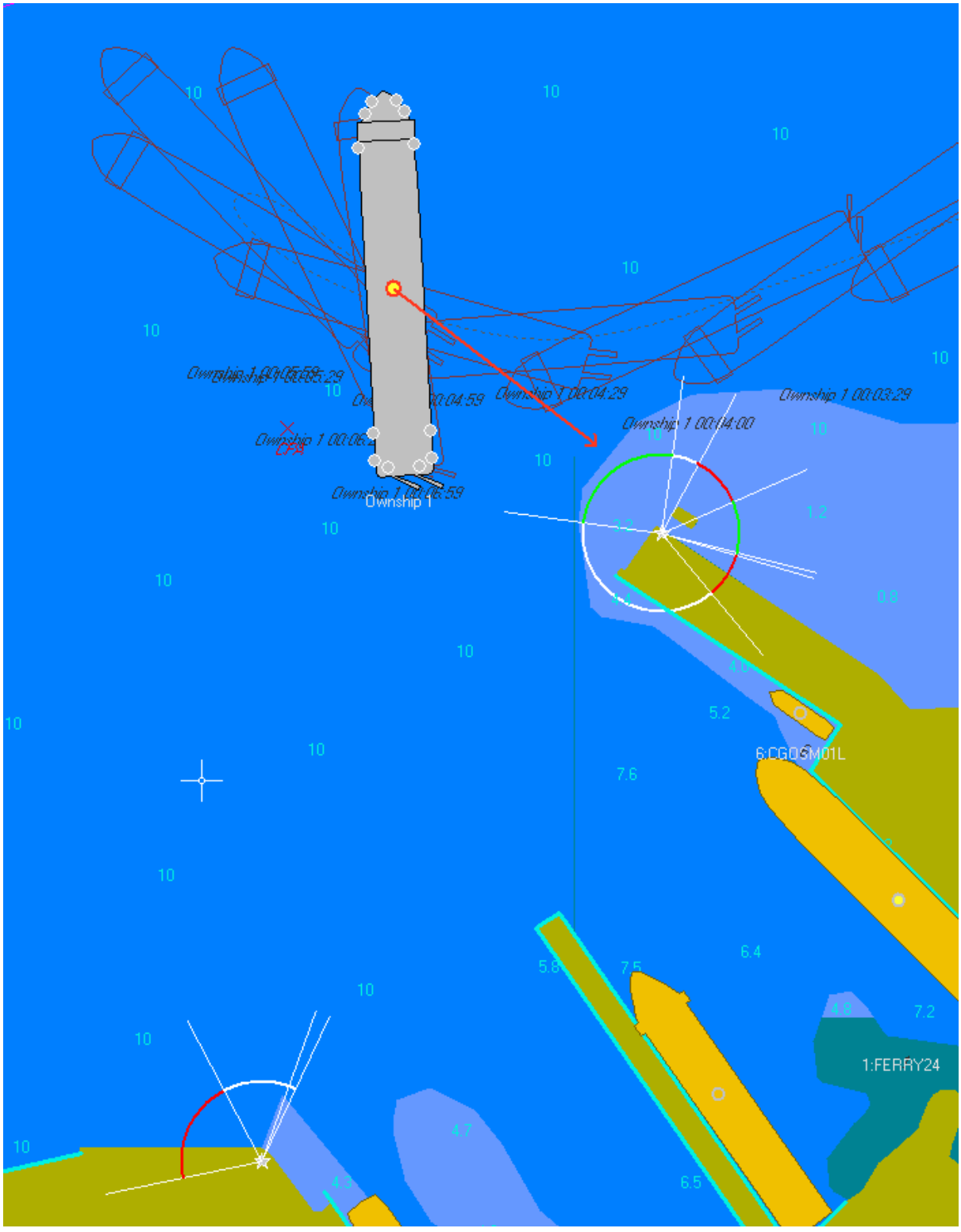
Manoeuvre Plots

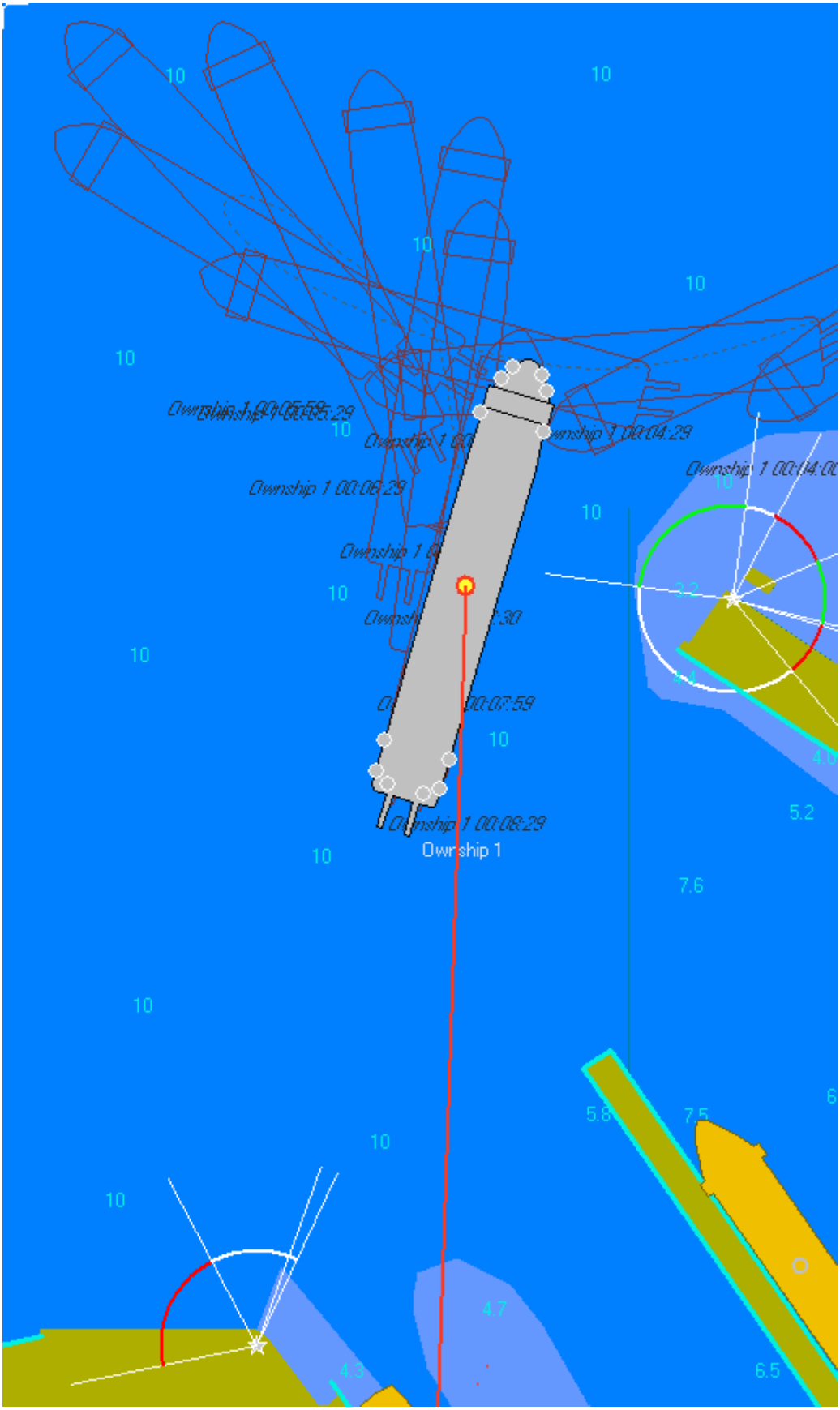


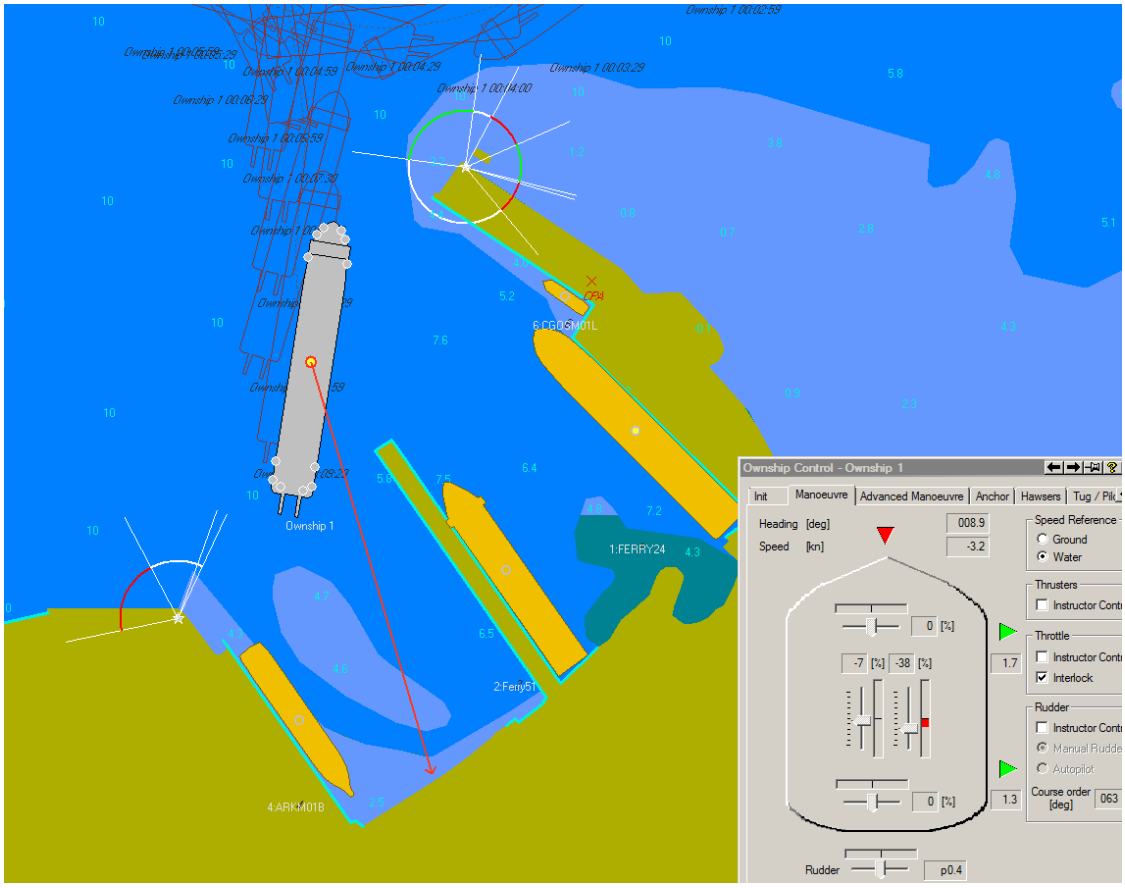

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
245.6
Speed [kn]
5.3
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
063
Rudder
s65.0
1:FERRY24

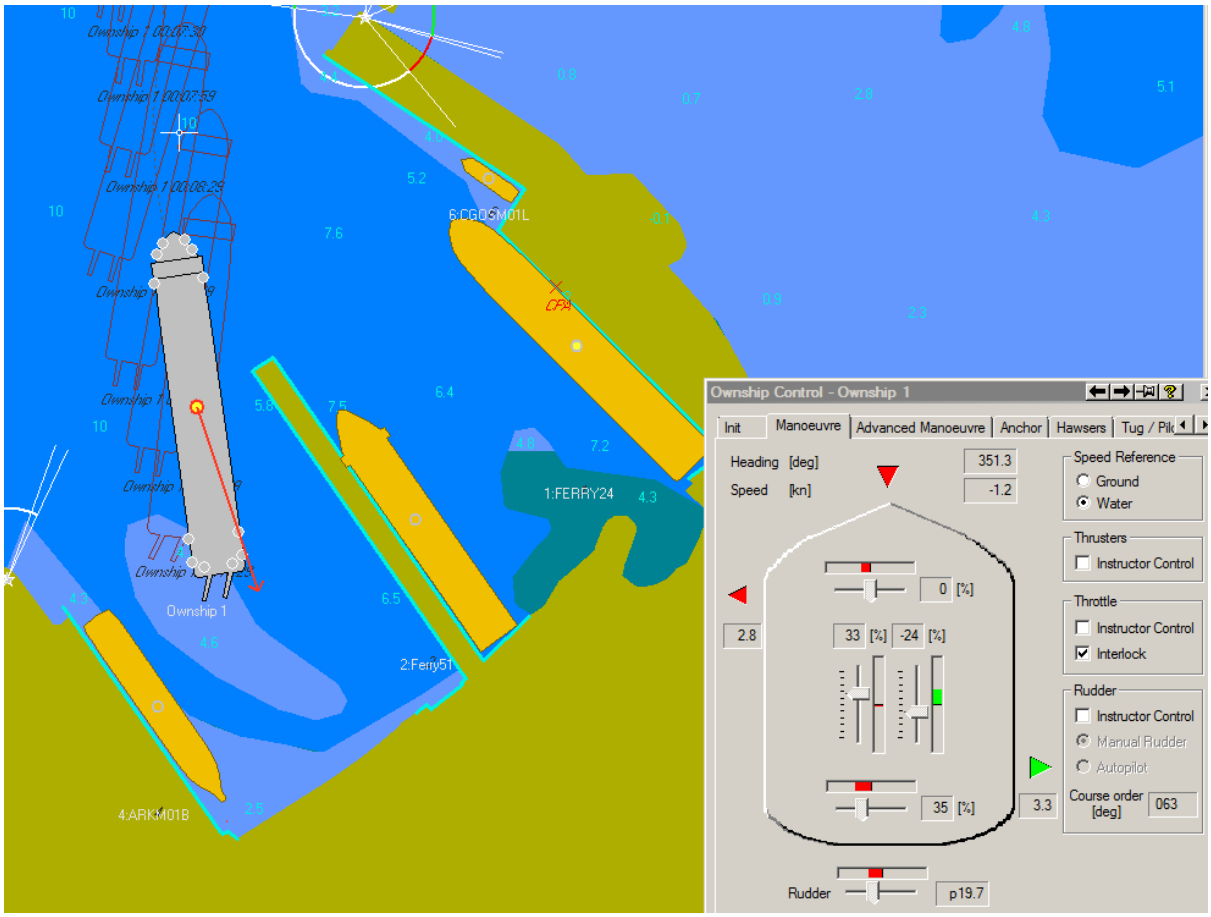

Ownship 1
1:FERRY24

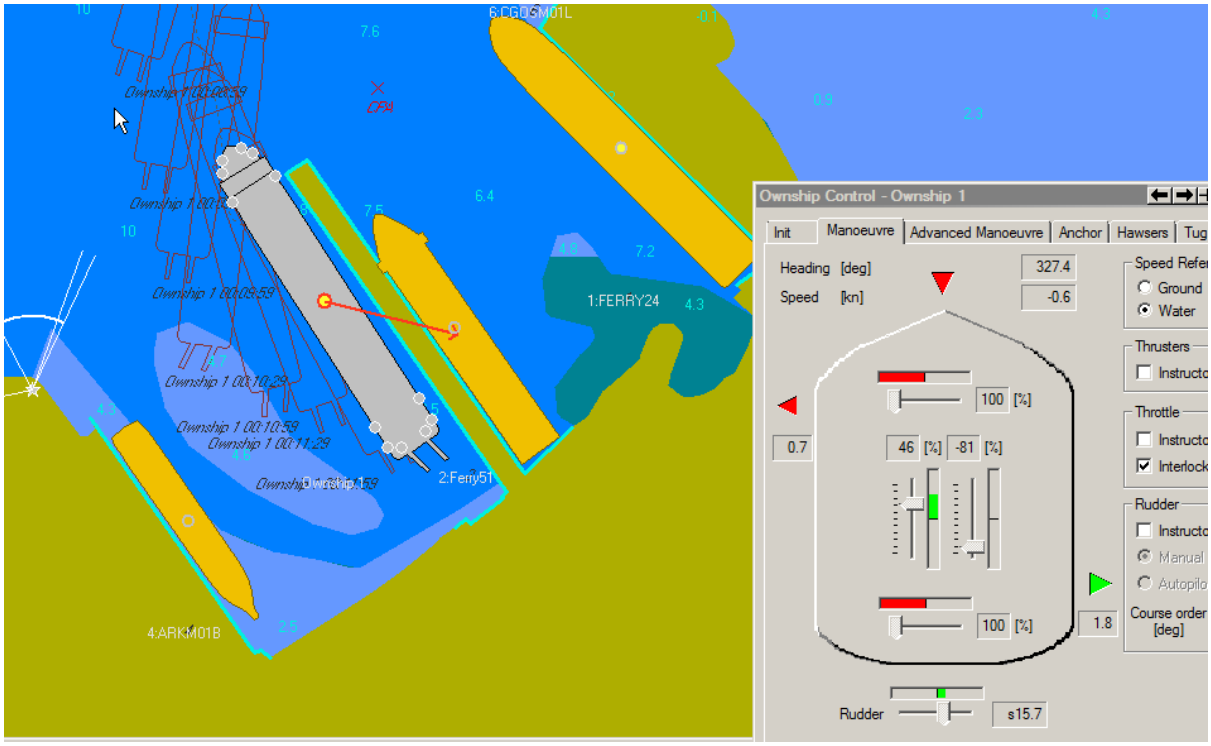

Ownship 1
Ownship 1 00:04:59
Ownship 1 00:04:29
Ownship 1 00:14:00
6:CGDSM01L
10
5.2
7.6
6.4
5.8
7.5
4.8
4.7
4.3
6.5
4.6
1.2


Ownship 1
6:CGO6M01L
1:FERRY24


10
10
10
10
10
10
10
10
10
10
10
10
10
10
10
10
Ownship 1
5.2
7.6
5.8
7.5
6.5
4.7
4.3


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
008.9
Speed [kn]
-3.2
Speed Reference
Ground
Water
Thrusters
Instructor Cont
Throttle
Instructor Cont
Interlock
Rudder
Instructor Cont
Manual Rudde
Autopilot
Course order [deg]
063
Rudder
p0.4
Ownship 1
1:FERRY24
2:Ferry51
4:ARKM01B
6:CGOSM01L


Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Tug / Pilk
Heading [deg]
351.3
Speed [kn]
-1.2
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
063
Rudder
p19.7
Ownship 1
1:FERRY24
2:Ferry51
4:ARKM01B
6:CGOSM01L

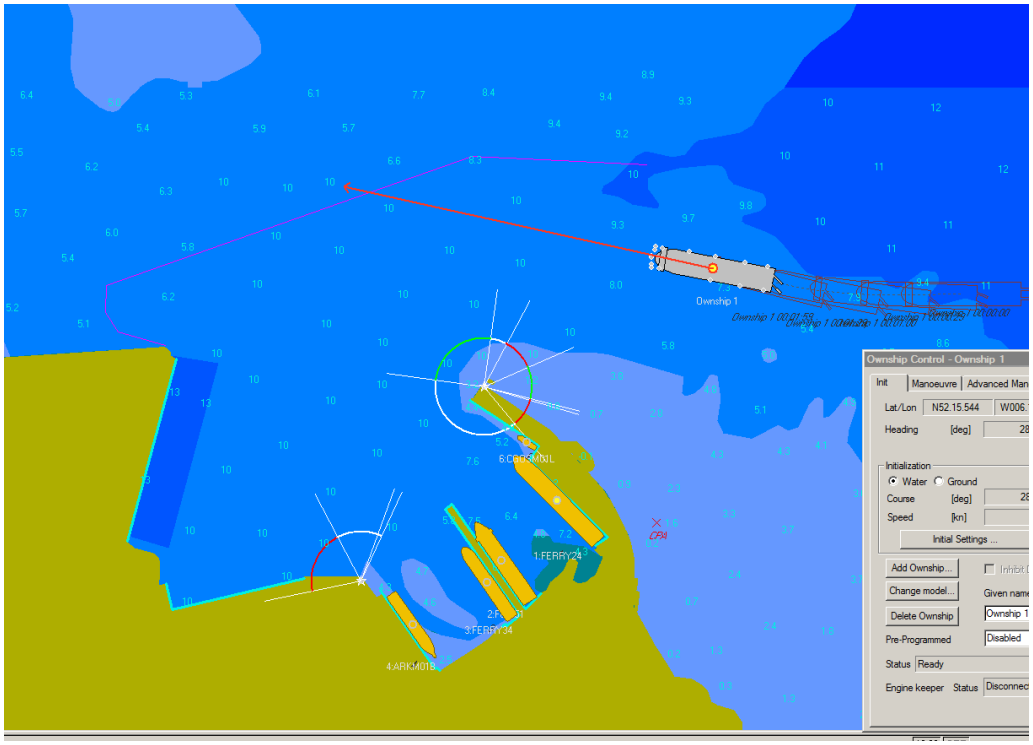

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
327.4
Speed [kn]
-0.6
Speed Refer
Ground
Water
Thrusters
Throttle
Interlock
Rudder
Manual
Course order [deg]
1.8
100 [%]
46 [%]
-81 [%]
0.7
Rudder
s15.7
1:FERRY24
2:Ferry51
4:ARKM01B

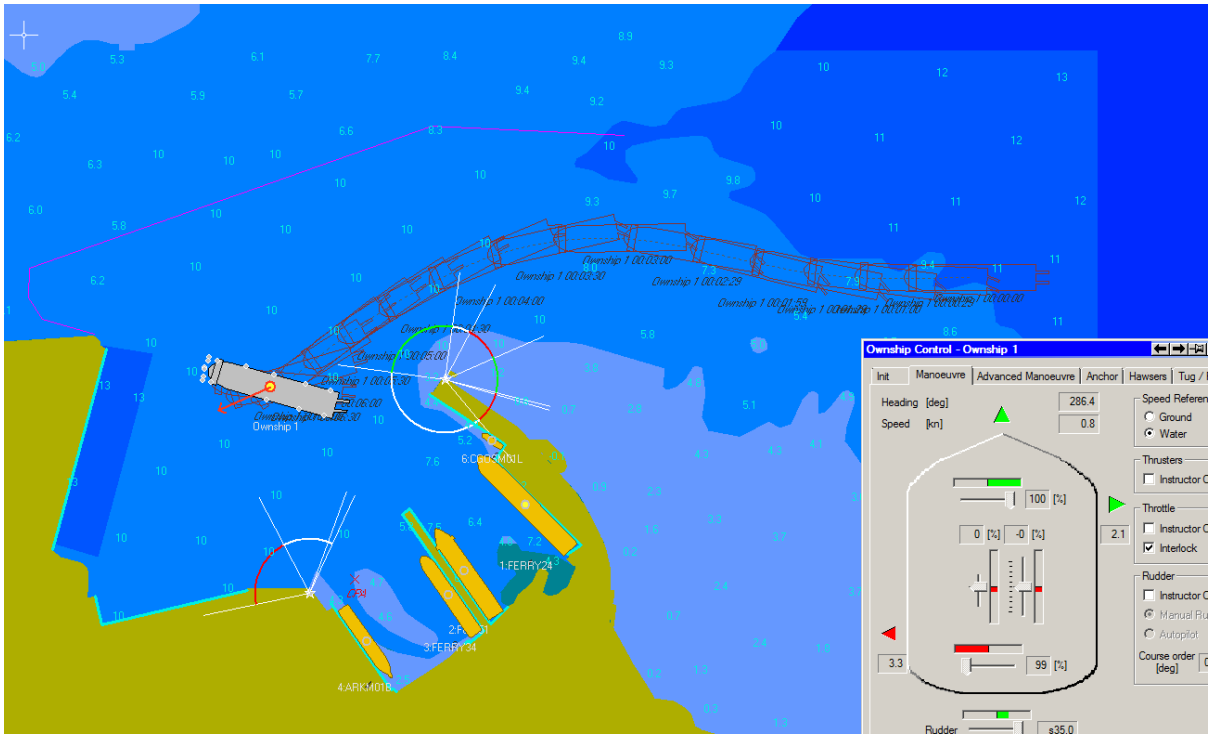
Day 2

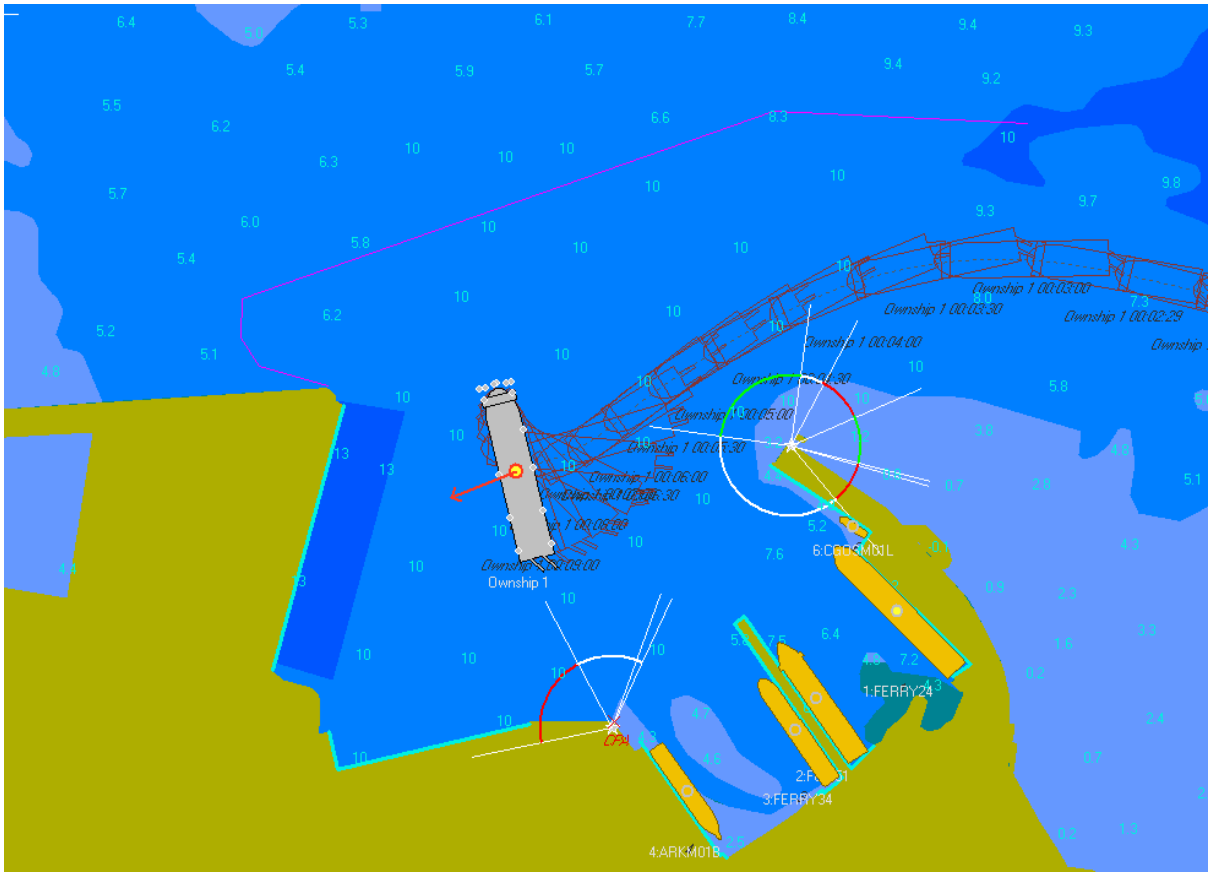
Run 1 – Day 2

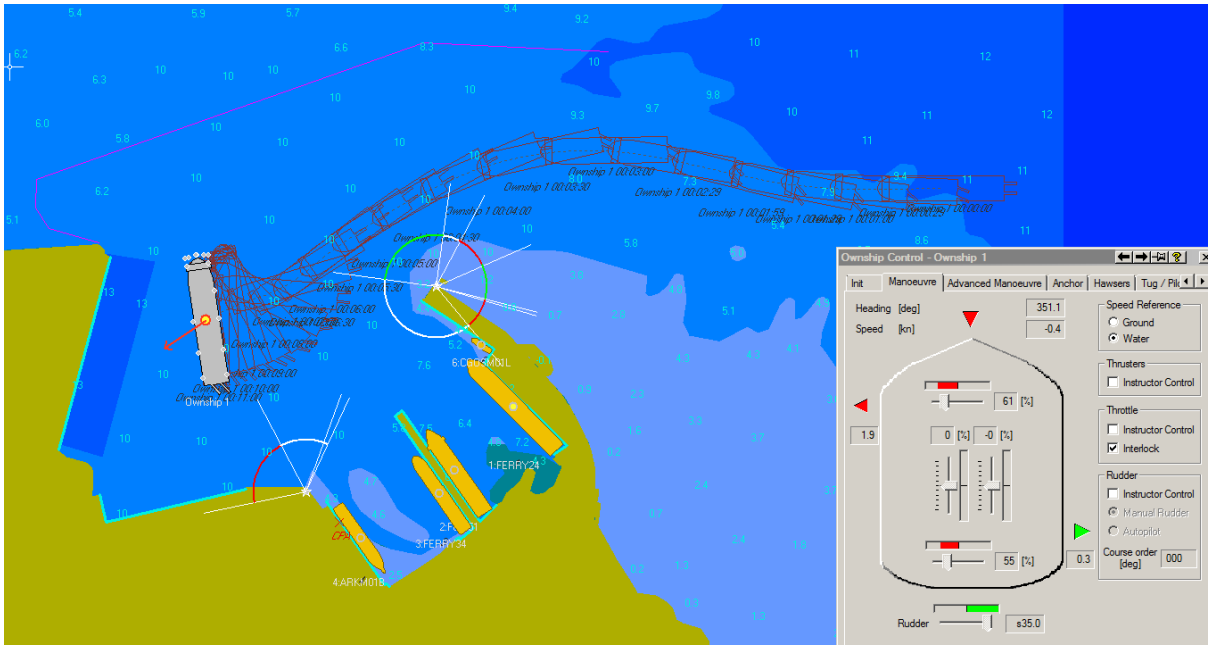
Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay**		
Wind Direction	**NE +/- 10°**	Wind Force	**30 kts +/-3 kts**

Manoeuvre Plots





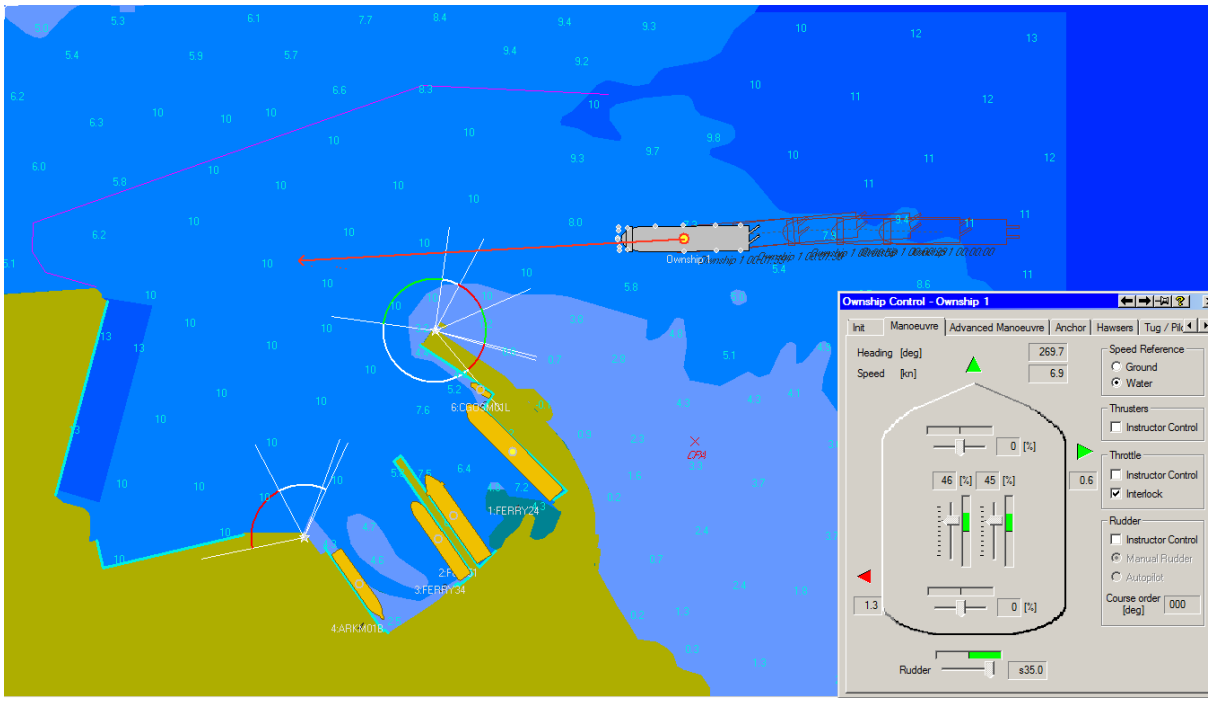

Ownship 1
6:CORSM01L
1:FERRY24
3:FERRY34
4:ARKM01B

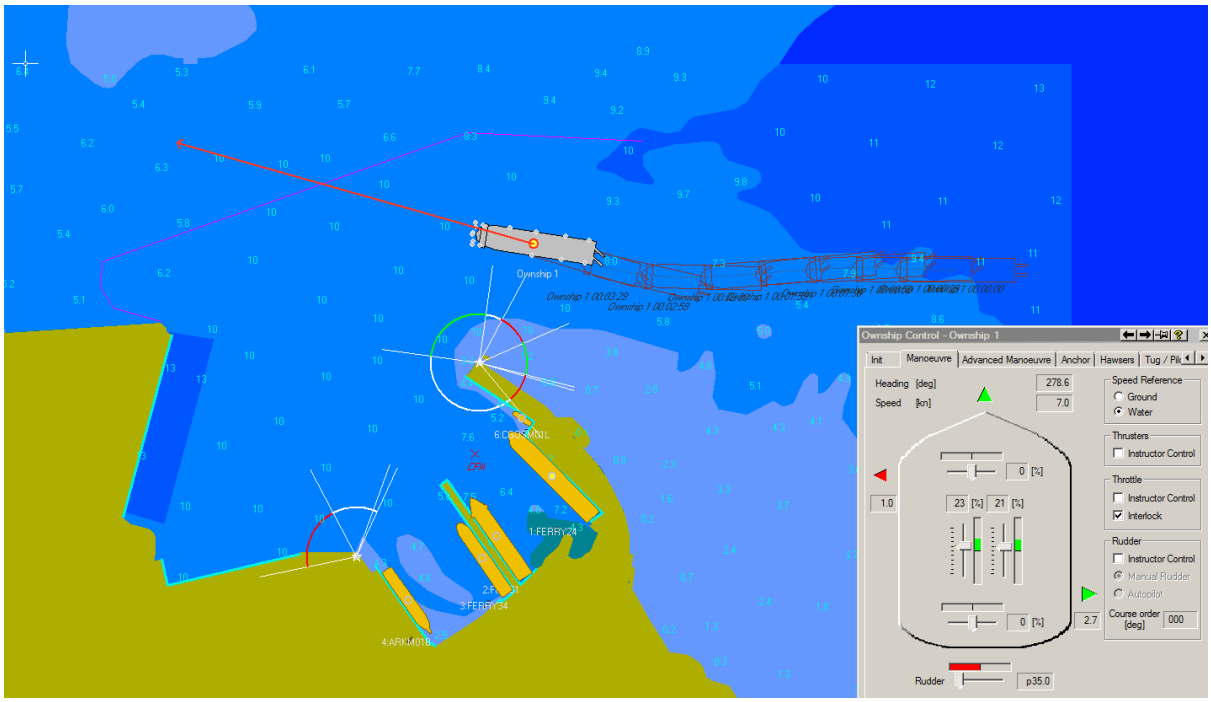

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
351.1
Speed [kn]
-0.4
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
61 [%]
0 [%]
-0 [%]
55 [%]
1.9
0.3
Rudder
±35.0

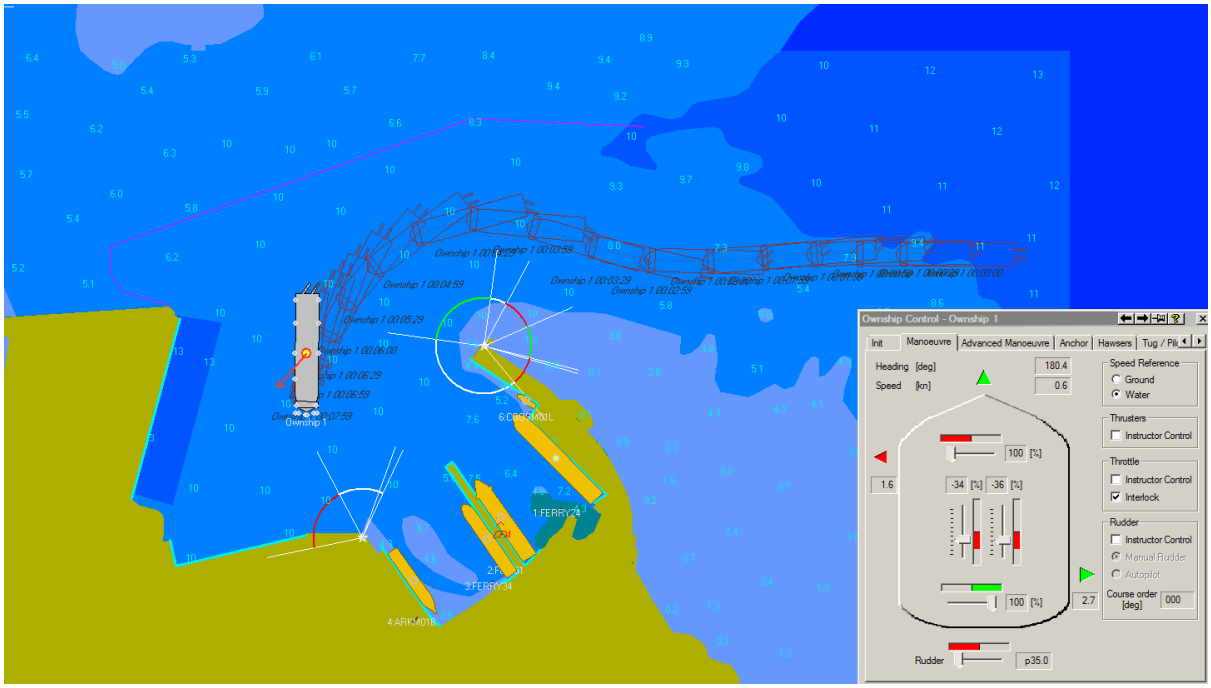
Run 2 – Day 2

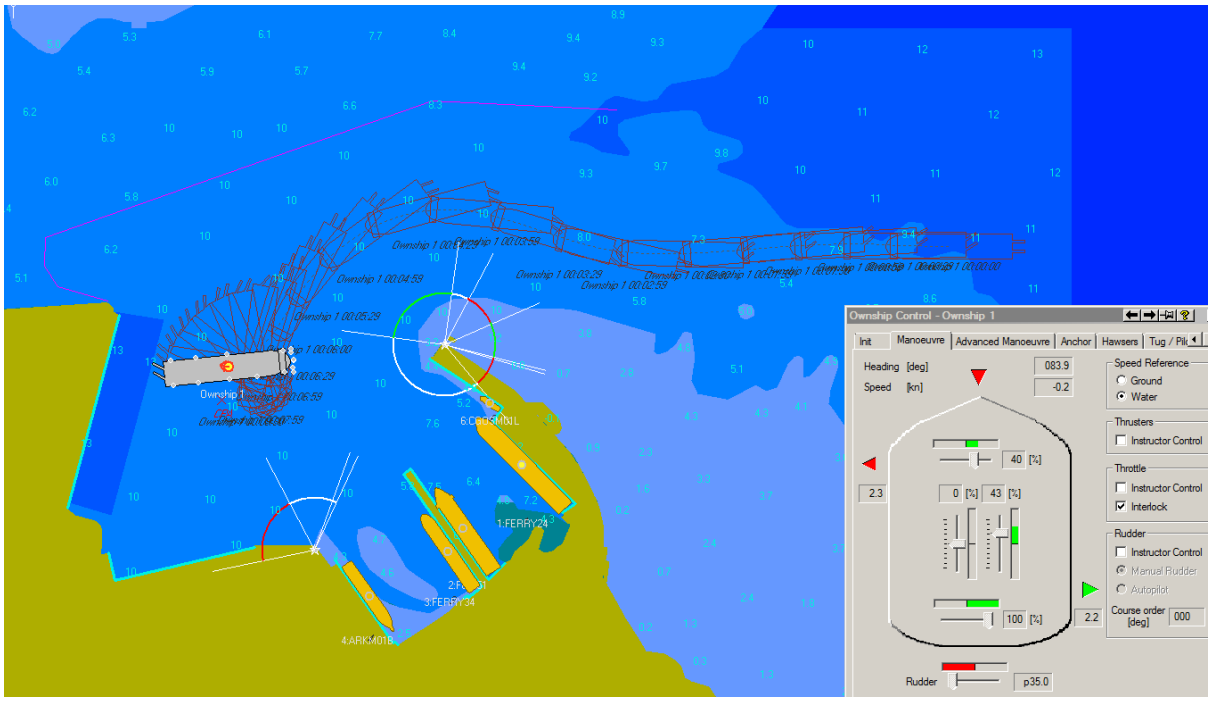
Ship Model	**HLMOD01L Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Berthing – 300m Main Quay or 240m Secondary Quay**		
Wind Direction	**SE +/- 10°**	Wind Force	**30 kts +/-3 kts**

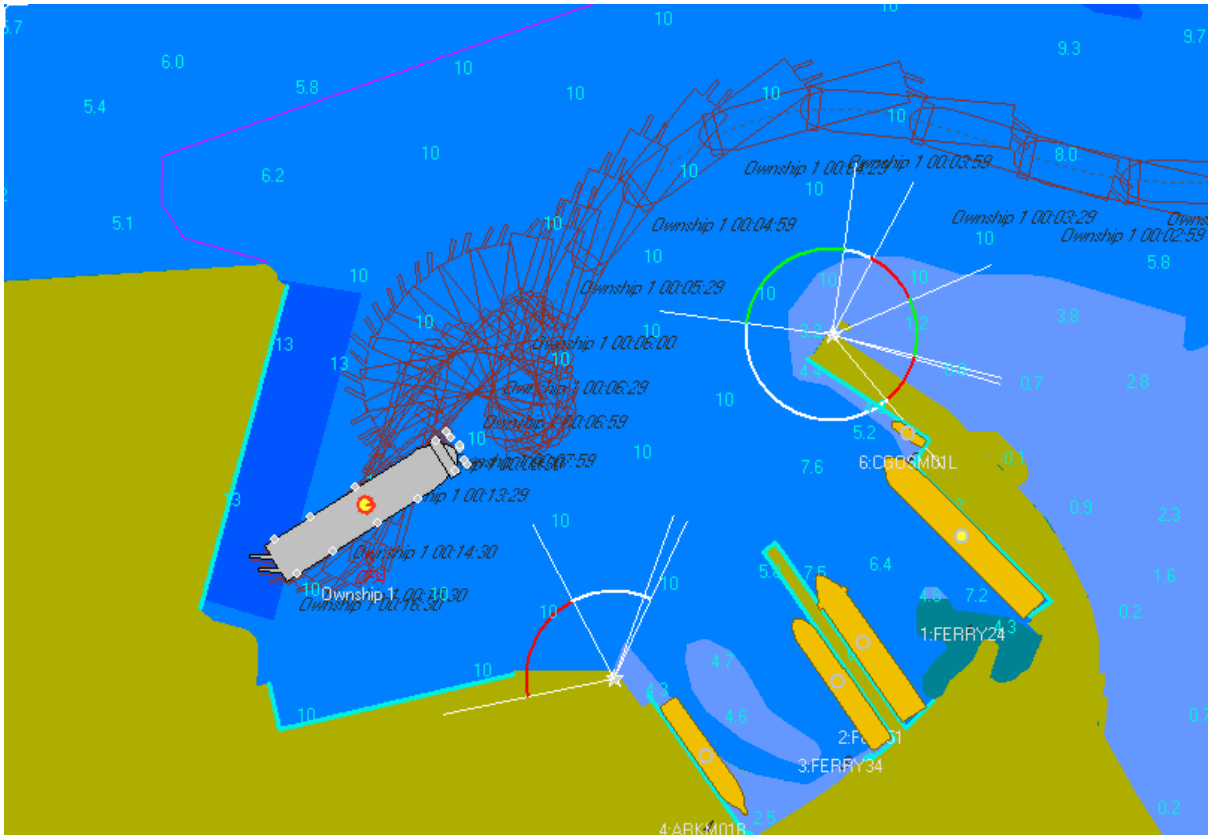
Manoeuvre Plots






Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
180.4
Speed [kn]
0.6
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
100 [%]
-34 [%]
-36 [%]
1.6
2.7
Rudder
p35.0
1:FERRY24
3:FERRY34
4:ARKM01B

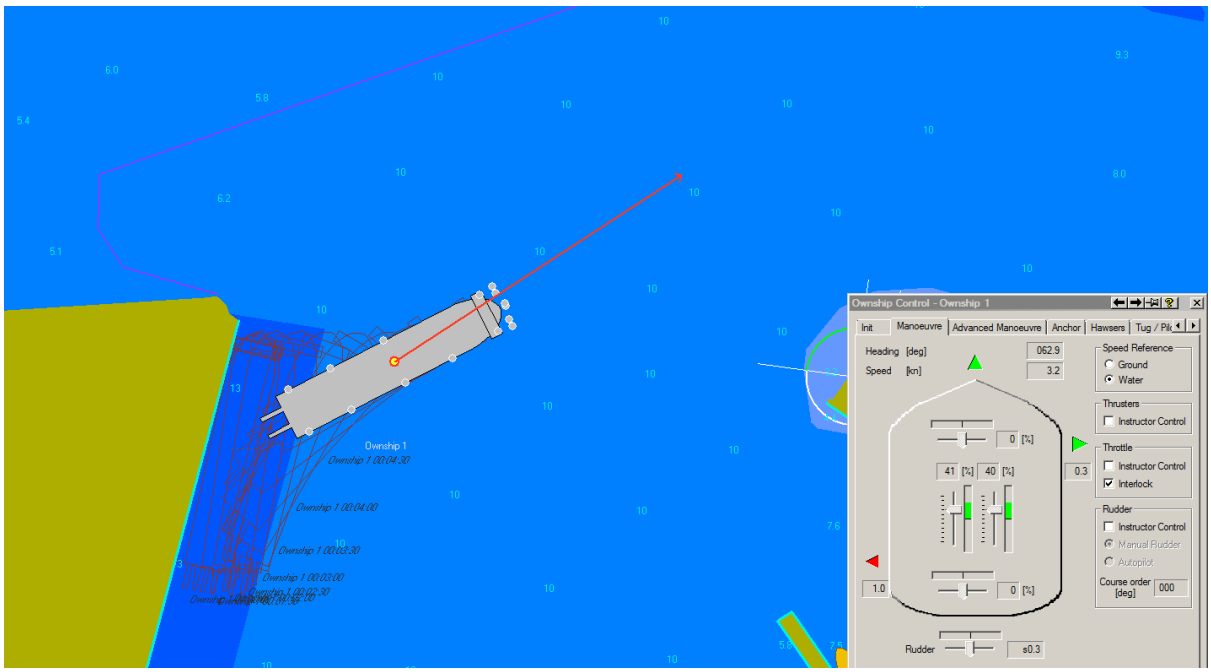

Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
083.9
Speed [kn]
-0.2
Speed Reference
Ground
Water
Thrusters
Instructor Control
Throttle
Instructor Control
Interlock
Rudder
Instructor Control
Manual Rudder
Autopilot
Course order [deg]
000
40 [%]
0 [%]
43 [%]
100 [%]
2.3
2.2
Rudder
p35.0
1:FERRY24
3:FERRY34
4:ARKM01B


Ownship 1 00:04:59
Ownship 1 00:05:29
Ownship 1 00:03:29
Ownship 1 00:02:59
Ownship 1 00:13:29
Ownship 1 00:14:30
Ownship 1
6:CBG3M01L
1:FERRY24
3:FERRY34
4:ARKM01B

Run 3 – Day 2

Ship Model	**HLMOD01L – Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Unberthing – Offshore wind – Bow North**		
Wind Direction	**SW +/- 10°**	Wind Force	**30 kts +/-3 kts**

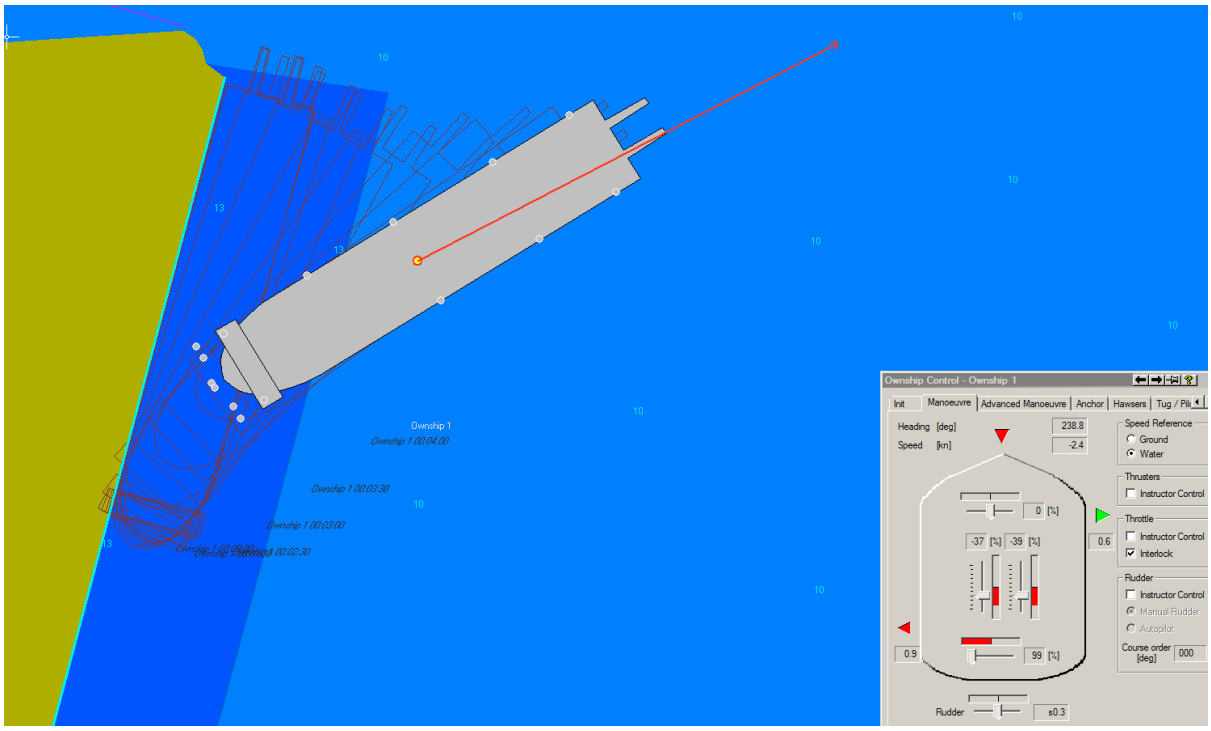
Manoeuvre Plots

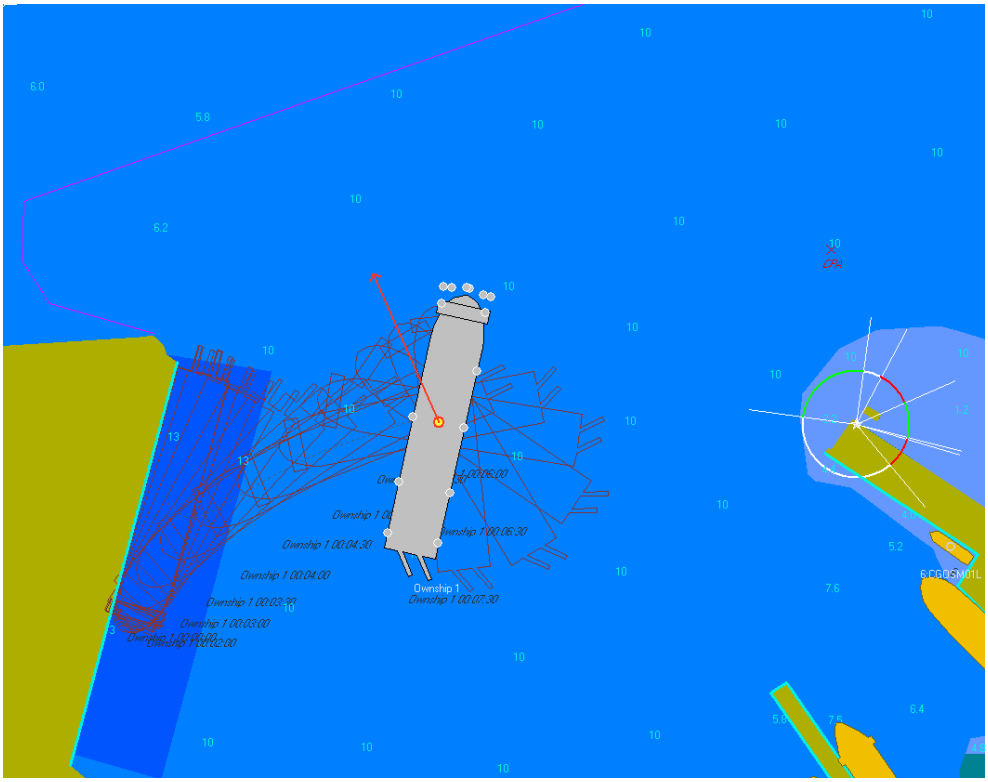


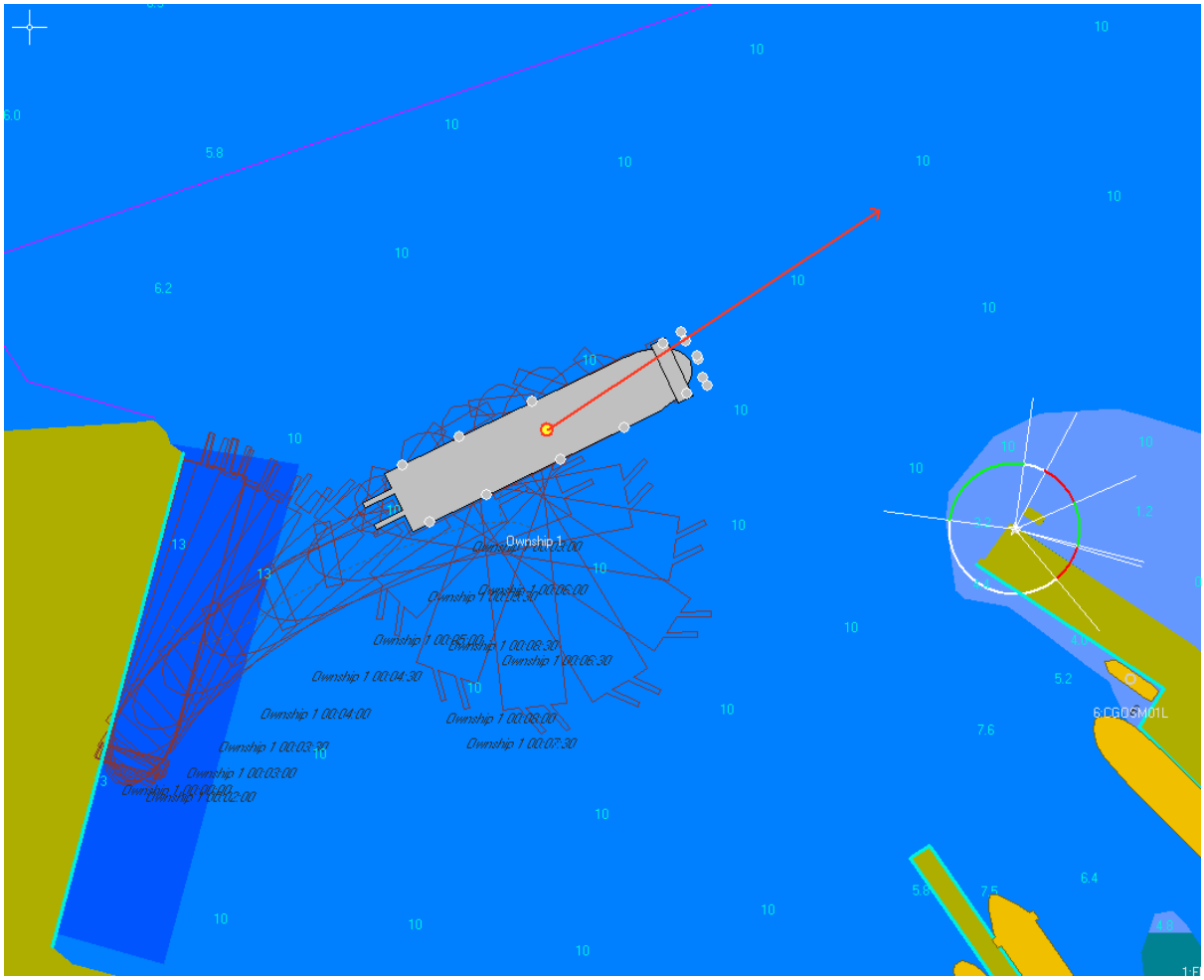
Run 4 – Day 2

Ship Model	**HLMOD01L – Module Carrier**	Max Draught	**9.6m**
Manoeuvre	**Unberthing – Onshore wind – Bow South**		
Wind Direction	**NE +/- 10°**	Wind Force	**30 kts +/-3 kts**

Manoeuvre Plots



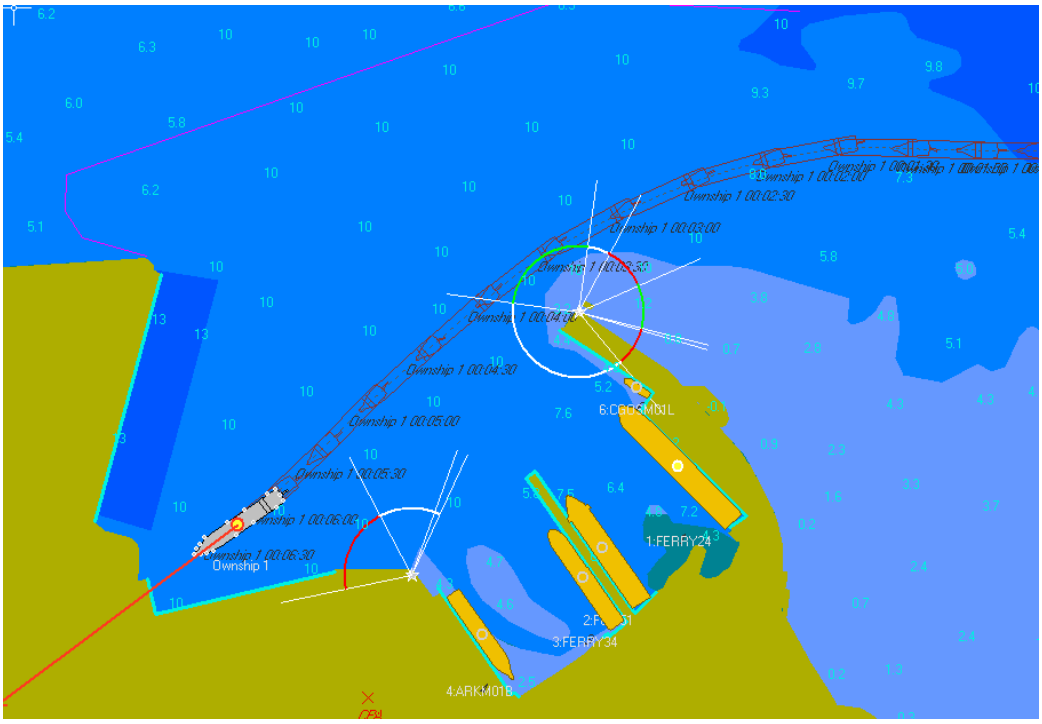


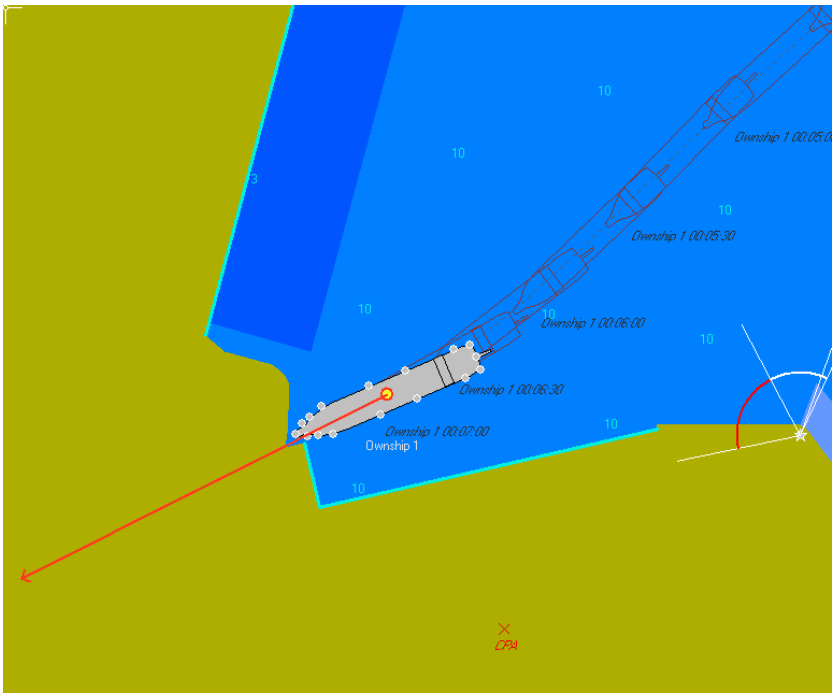

Ownship 1
Ownship 1 00:04:30
Ownship 1 00:04:00
Ownship 1 00:03:30
Ownship 1 00:03:00
Ownship 1 00:06:30
Ownship 1 00:07:30
6:CGOSM01L

Run 5 – Day 2

Ship Model	**ARKM01L**	Max Draught	**9.2m**
Manoeuvre	**Berthing – 240m Secondary Quay**		
Wind Direction	**SW +/- 5°**	Wind Force	**30 kts +/-3 kts**

Manoeuvre Plots



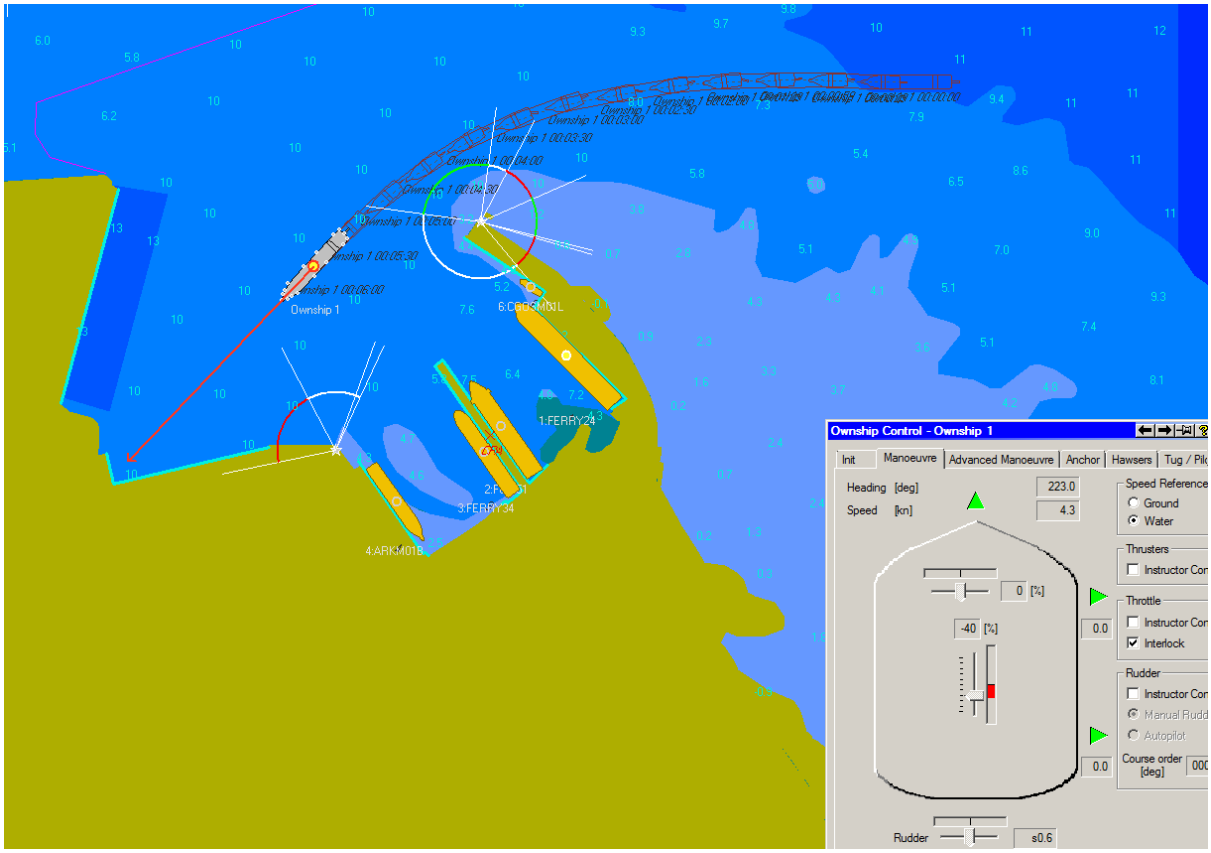


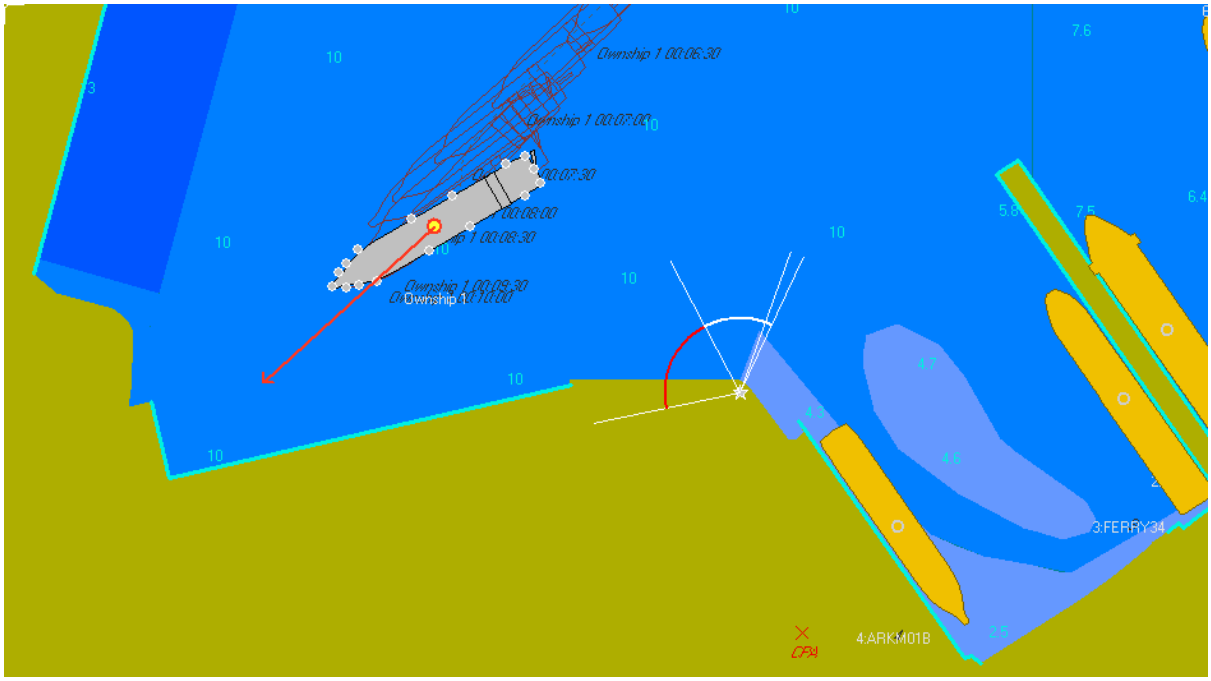
Run aborted – approach speed too high

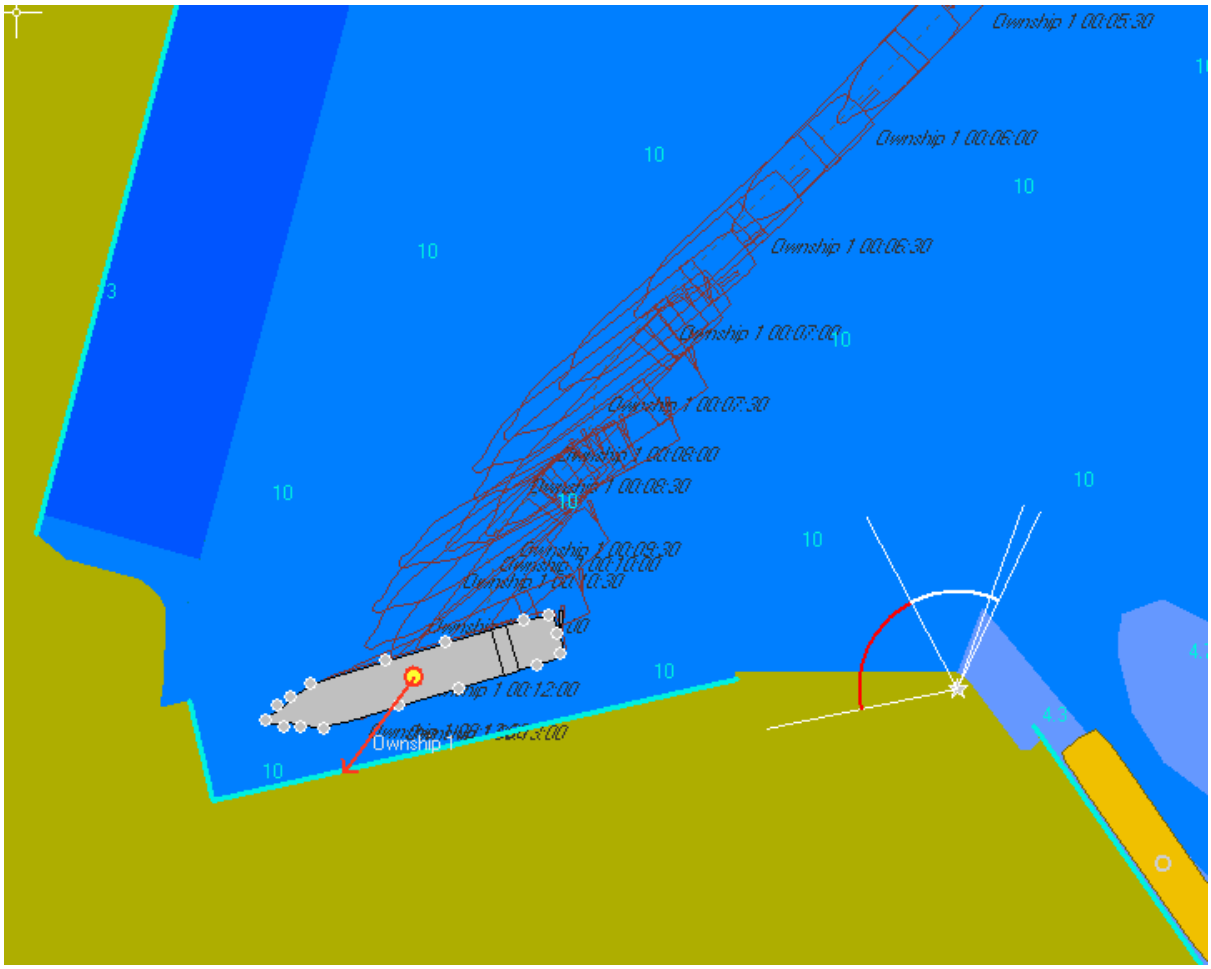
Run 6 – Day 2

Ship Model	**ARKM01L**	Max Draught	**9.2m**
Manoeuvre	**Berthing – 240m Secondary Quay**		
Wind Direction	**SW +/- 5°**	Wind Force	**30 kts +/-3 kts**

Manoeuvre Plots



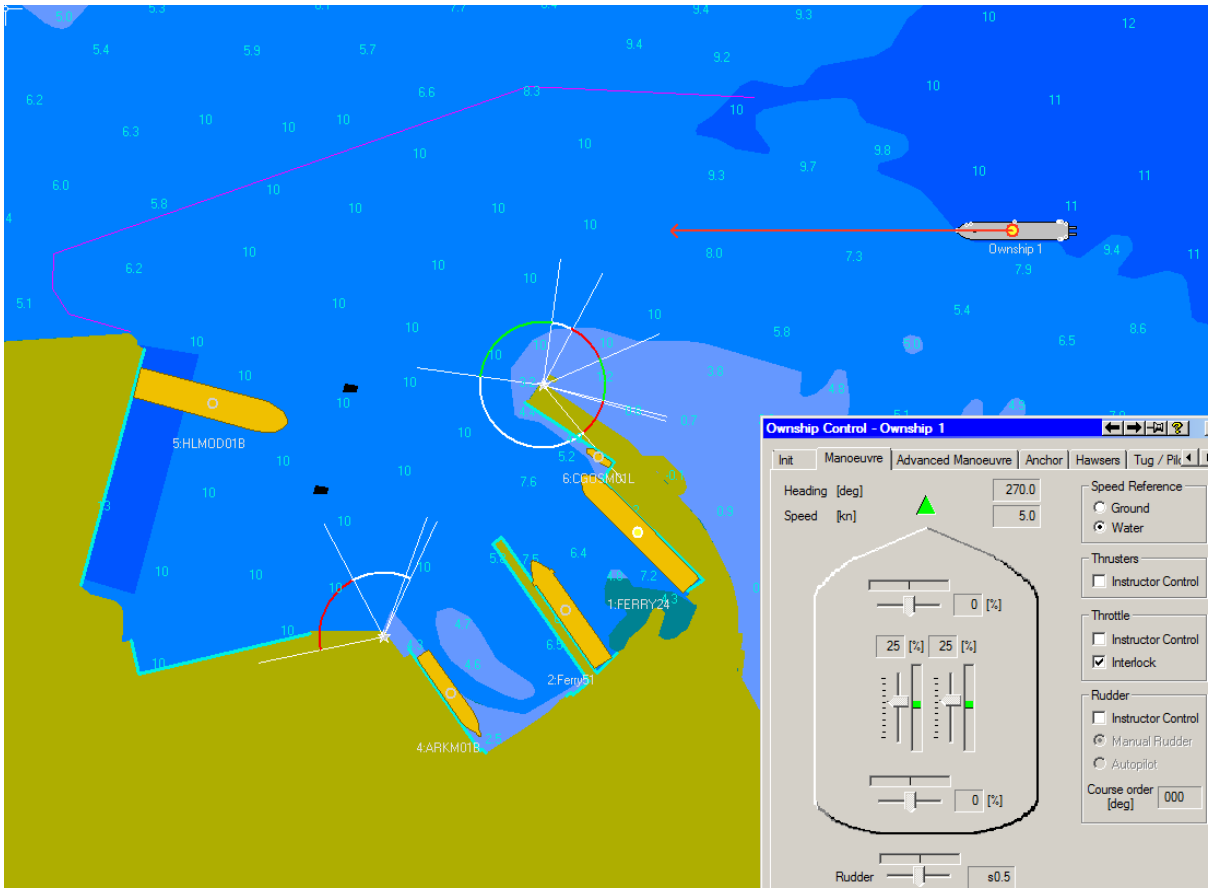

Ownship 1 00:06:30
Ownship 1 00:07:00
Ownship 1
3:FERRY34
4:ARKM01B
CPA

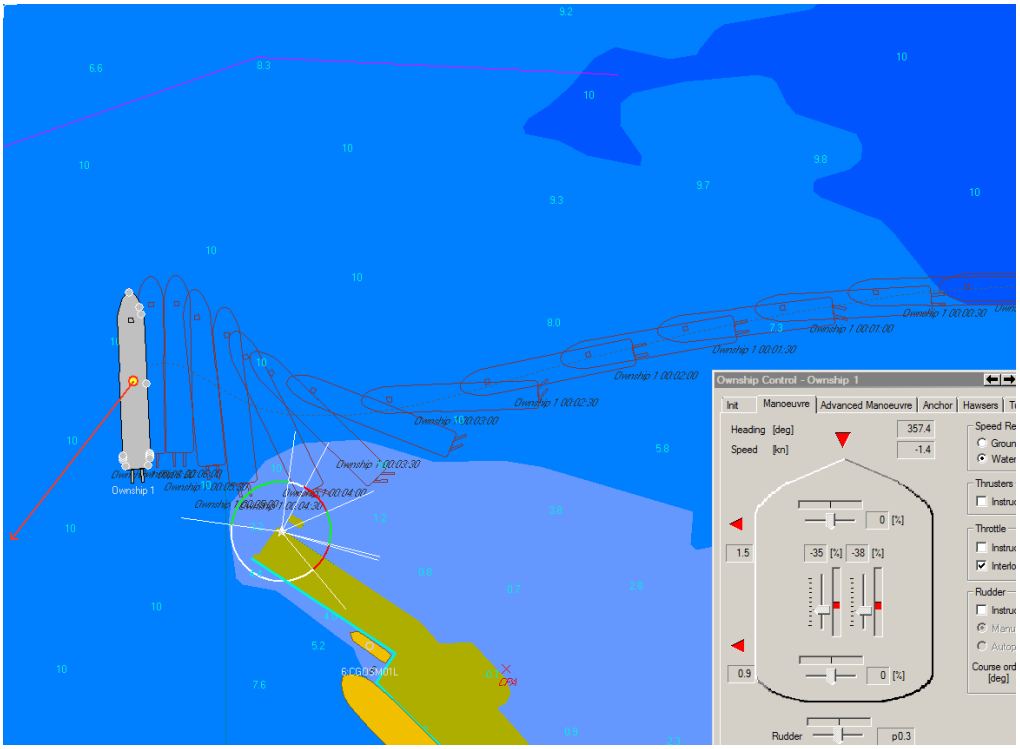

Ownship 1 00:05:30
Ownship 1 00:06:00
Ownship 1 00:06:30
Ownship 1 00:07:00
Ownship 1 00:07:30
Ownship 1 00:08:00
Ownship 1 00:08:30
Ownship 1 00:09:30
Ownship 1 00:10:00
Ownship 1 00:10:30
Ownship 1 00:12:00
Ownship 1

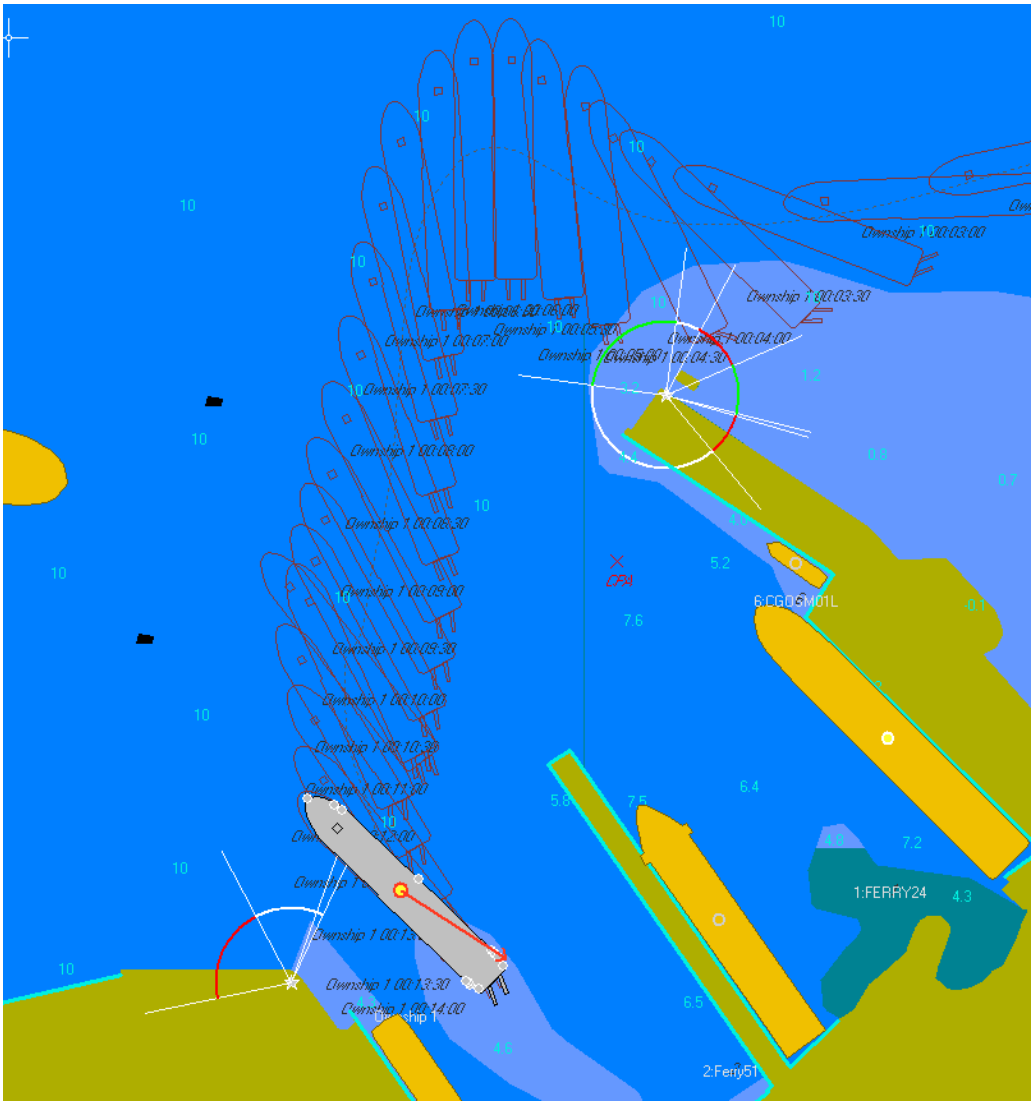
Run 7 – Day 2

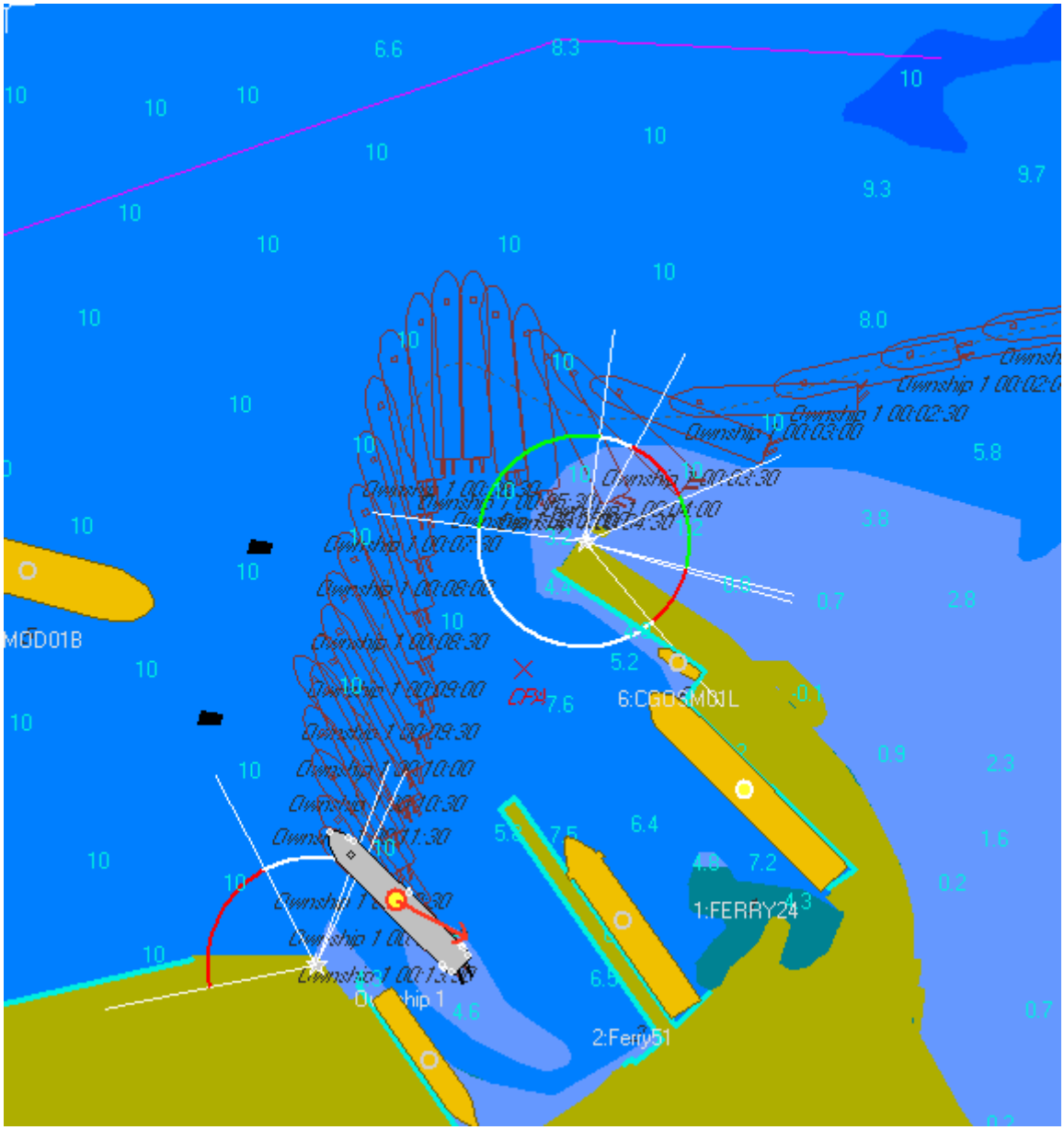
Ship Model	**FERRY34**	Max Draught	**5.0m**
Manoeuvre	**Berthing – No.1 Quay – Harbour obstructed by Module Carrier moored stern to (Mediterranean Moor) 300m Main Quay – black buoys indicate anchor positions**		
Wind Direction	**NE +/- 10°**	Wind Force	**30 kts +/-3 kts**

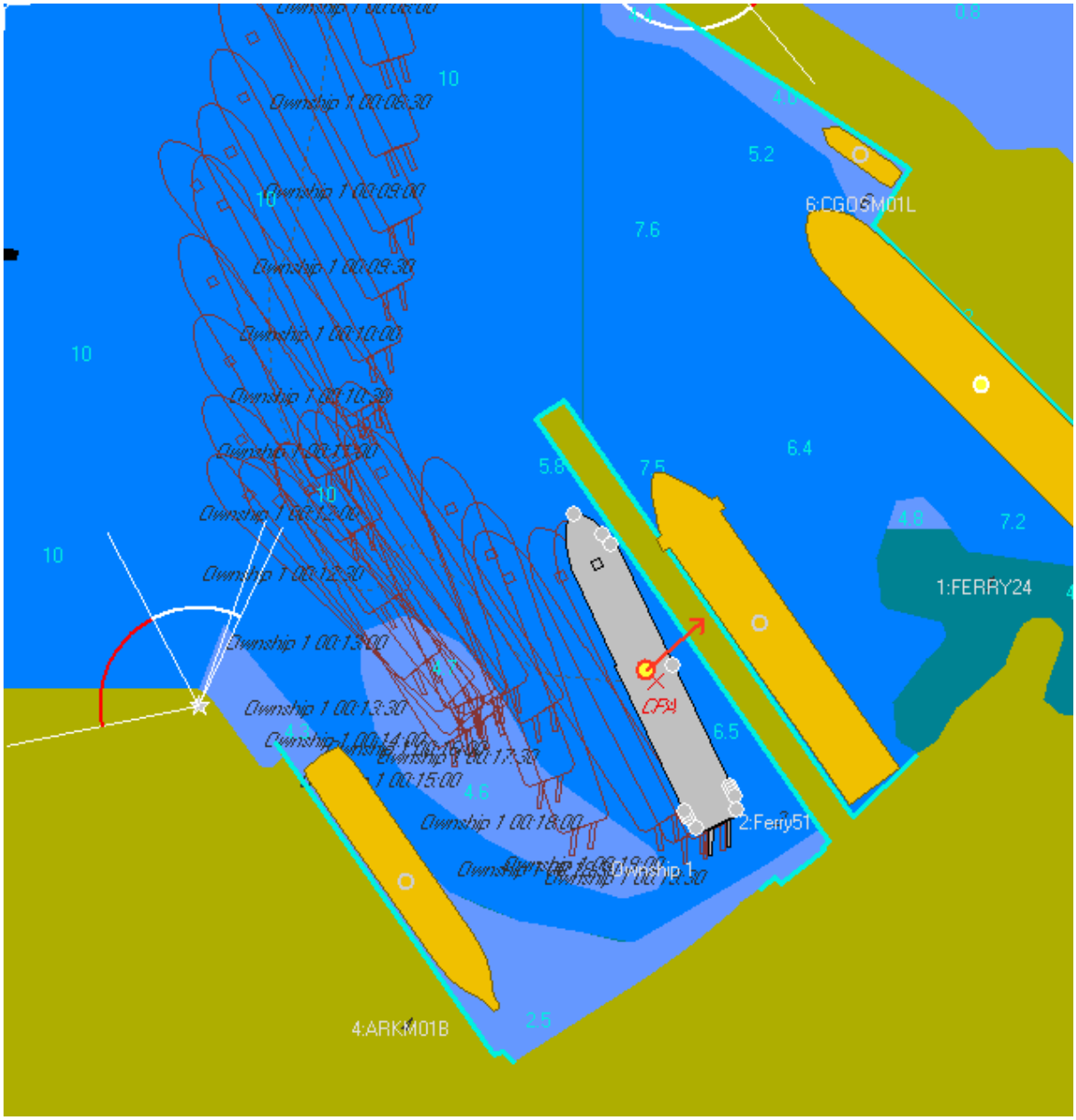
Manoeuvre Plots




Ownship Control - Ownship 1
Init
Manoeuvre
Advanced Manoeuvre
Anchor
Hawsers
Heading [deg]
357.4
Speed [kn]
-1.4
Rudder
6:CGOSM01L


6:CGOSM01L
1:FERRY24
2:Ferry51


6:CGO3M01L
1:FERRY24
2:Ferry51


6:CGOSM01L
1:FERRY24
2:Ferry51
4:ARKM01B
CPA
Ownship 1

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