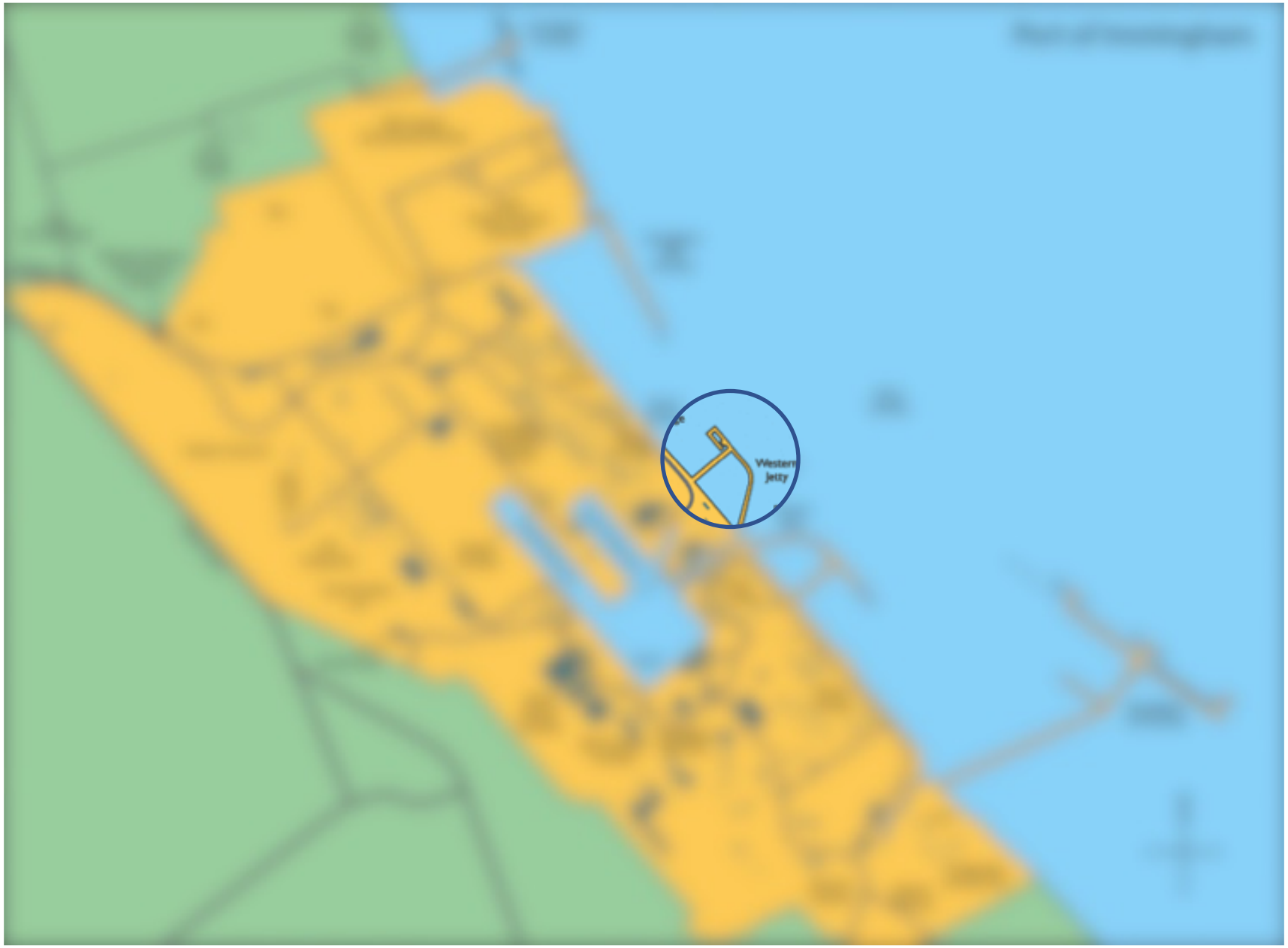
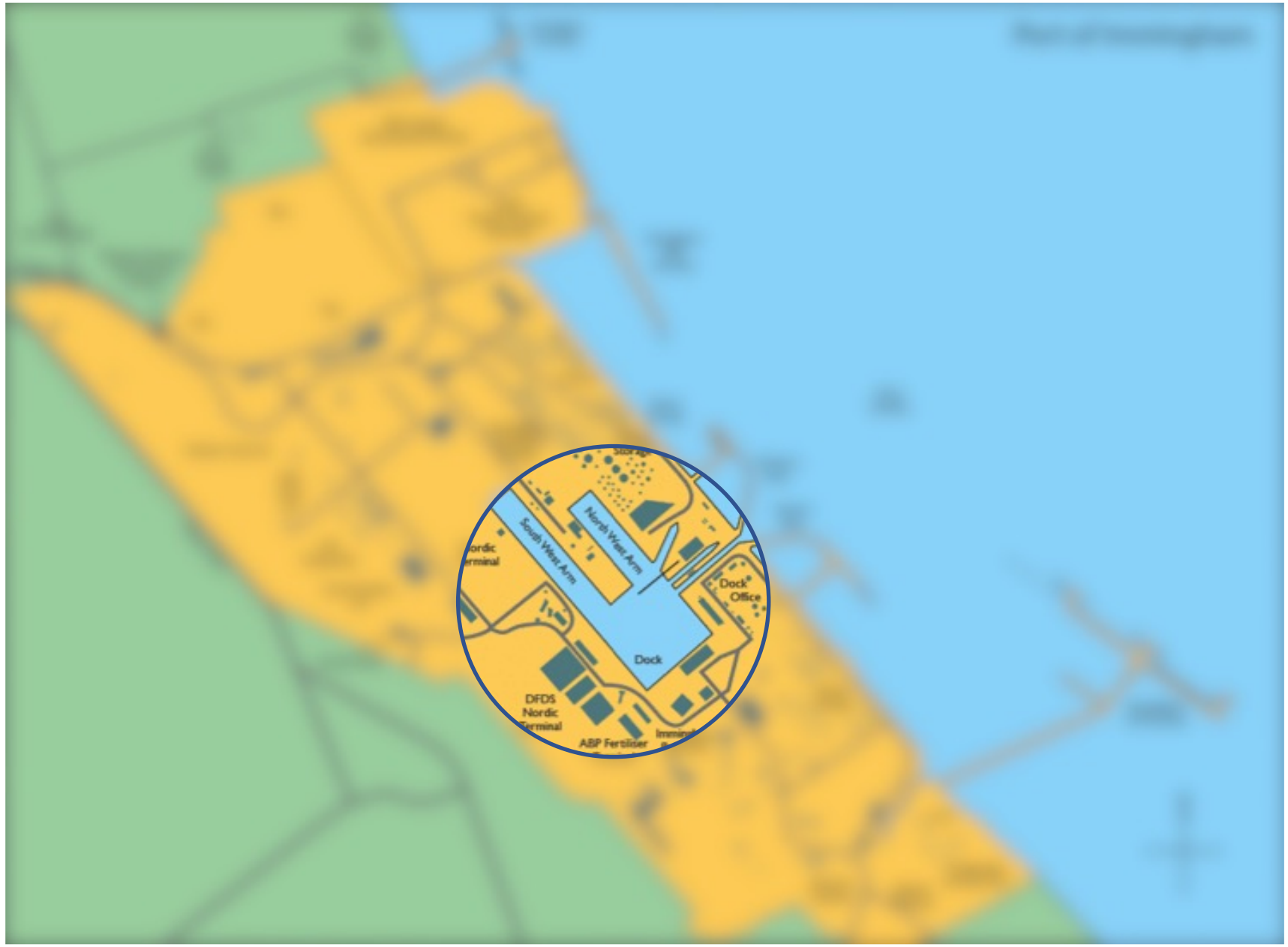
Marine Risk Analysis IERRT

PINS Meeting 24 August 2022


Port of Immingham
LPG Storage Caven
Immingham Gas Jetty
ABP Humber International Terminal
LPG Storage Caven
DFDS Nordic Terminal Riverside
Tata
A160 To A180/M180
Western Entrance And Security Control
Humber Road
Immingham Bulk Terminal
Tata
Tata
Conoco
River Humber
Simon Storage
Immingham Container Terminal
Simon Storage
Western Jetty
Oxbow Coal Ltd
SSM Coal Ltd
Eastern Jetty
North West Arm
South West Arm
Manby Road
CPL Hargreaves
Nordic Terminal
Dock Office
Coal Products Ltd
Nordic Steel
Dock
DFDS Nordic Terminal
Simon Storage
ABP Fertiliser Terminal
Immingham Bulk Park
Immingham Oil Terminal
I.O.T.
Hargreaves Services PLC
Security Control
Eastern Entrance
N

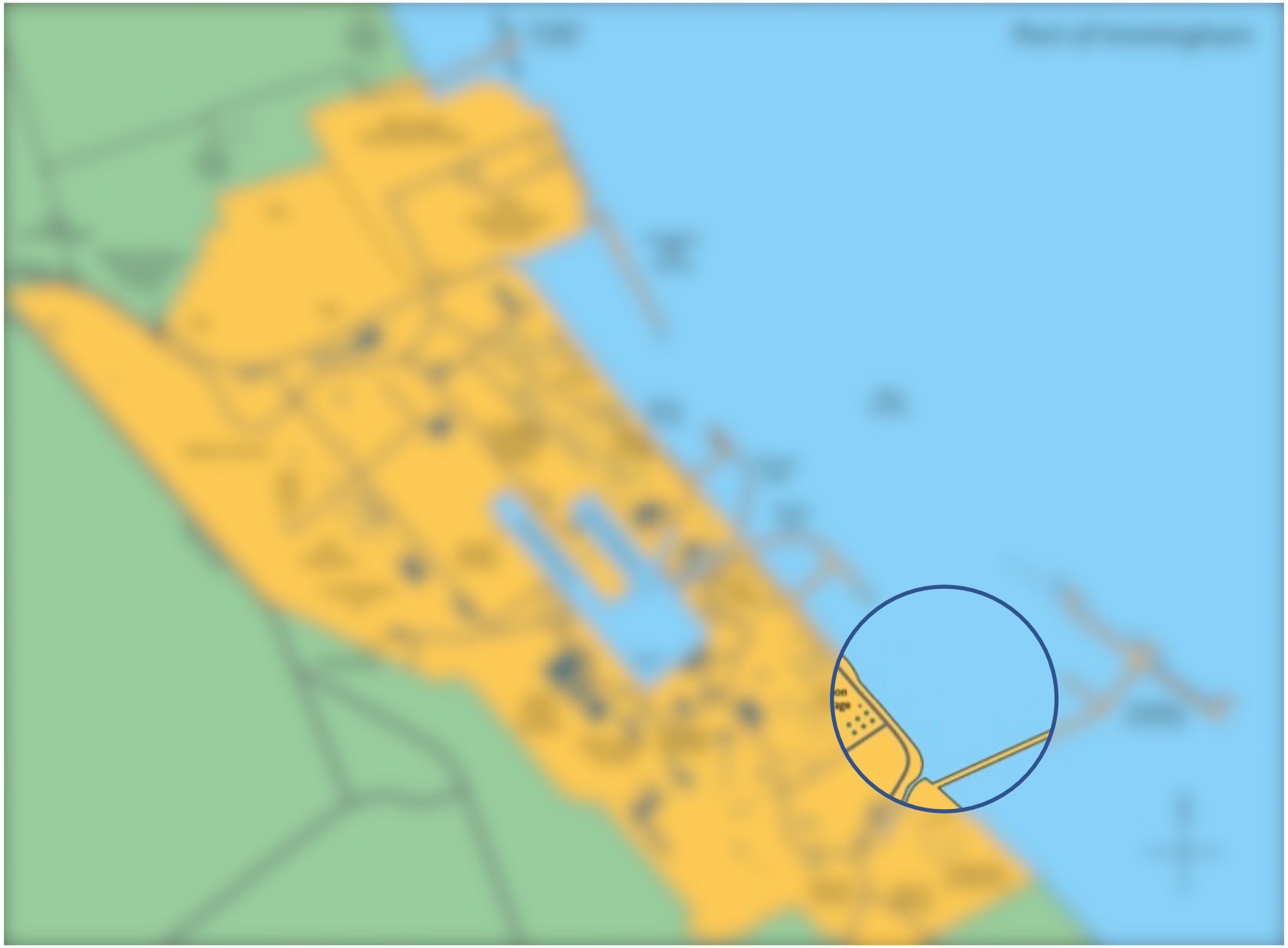

Immingham
Oil Terminal
N

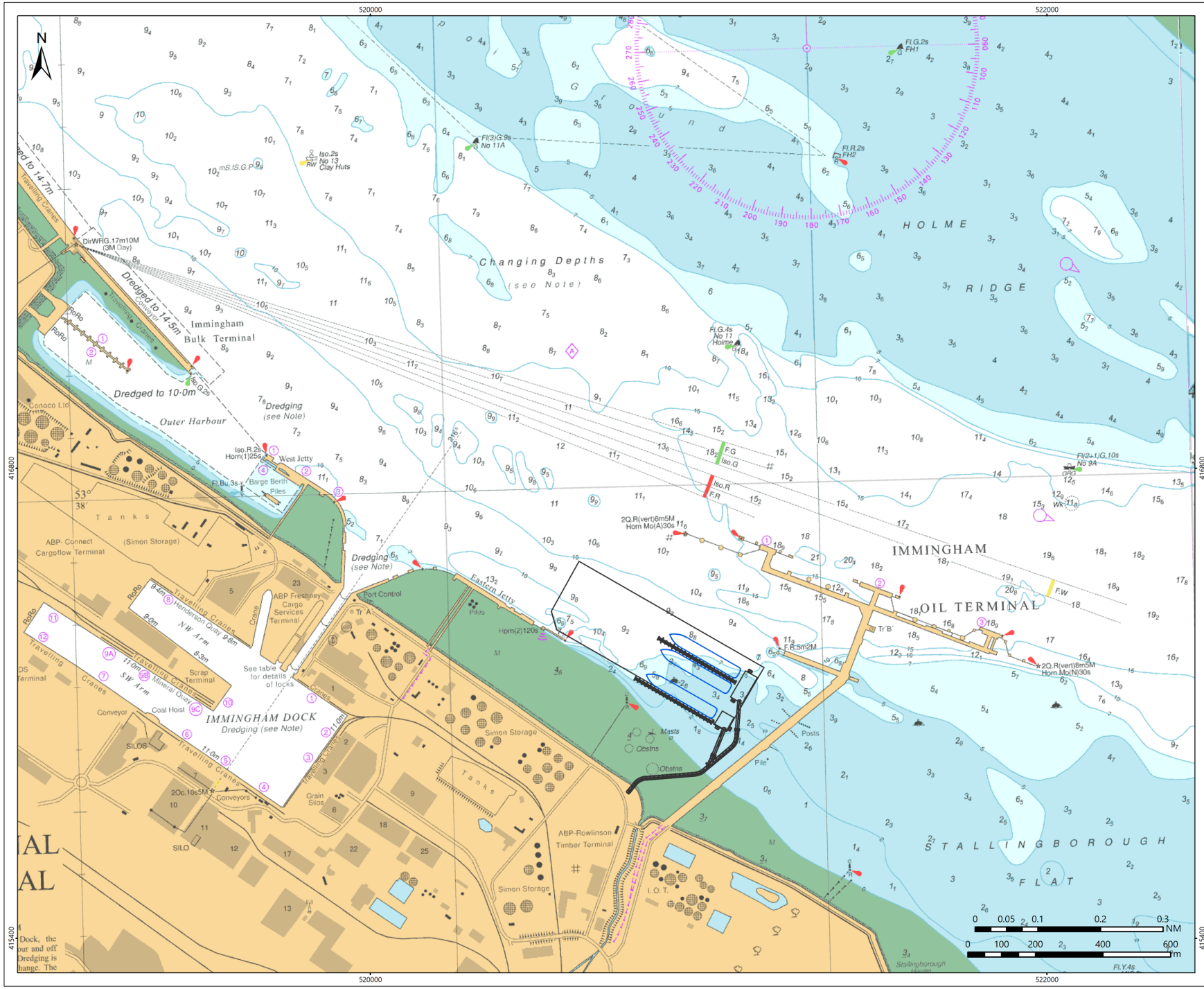

Western
Jetty


South West Arm
North West Arm
Dock Office
Dock
DFDS Nordic Terminal
ABP Fertiliser


Conoco


Immingham
Bulk
Terminal





Legend

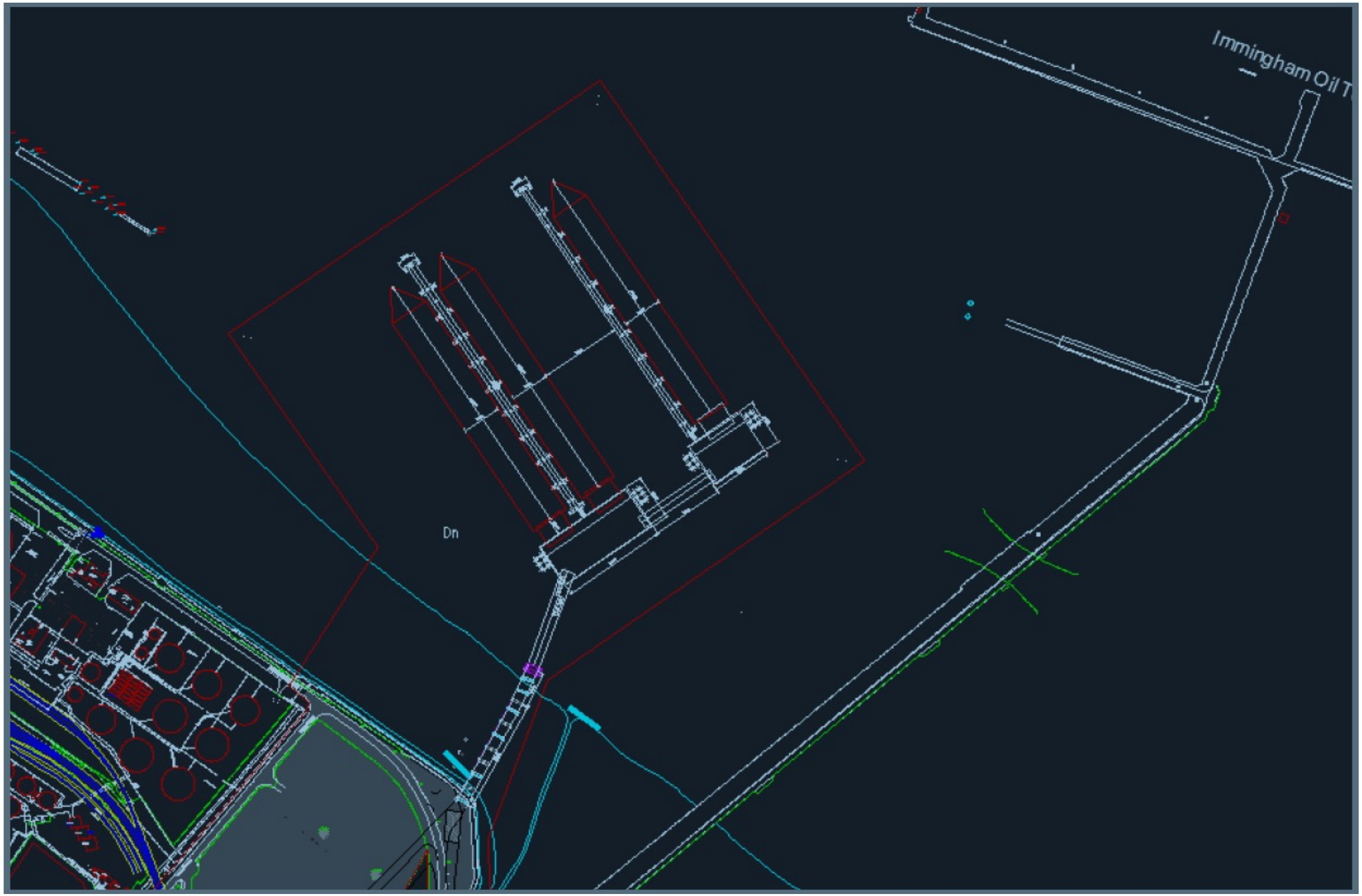
Immingham Eastern Ro-Ro Terminal

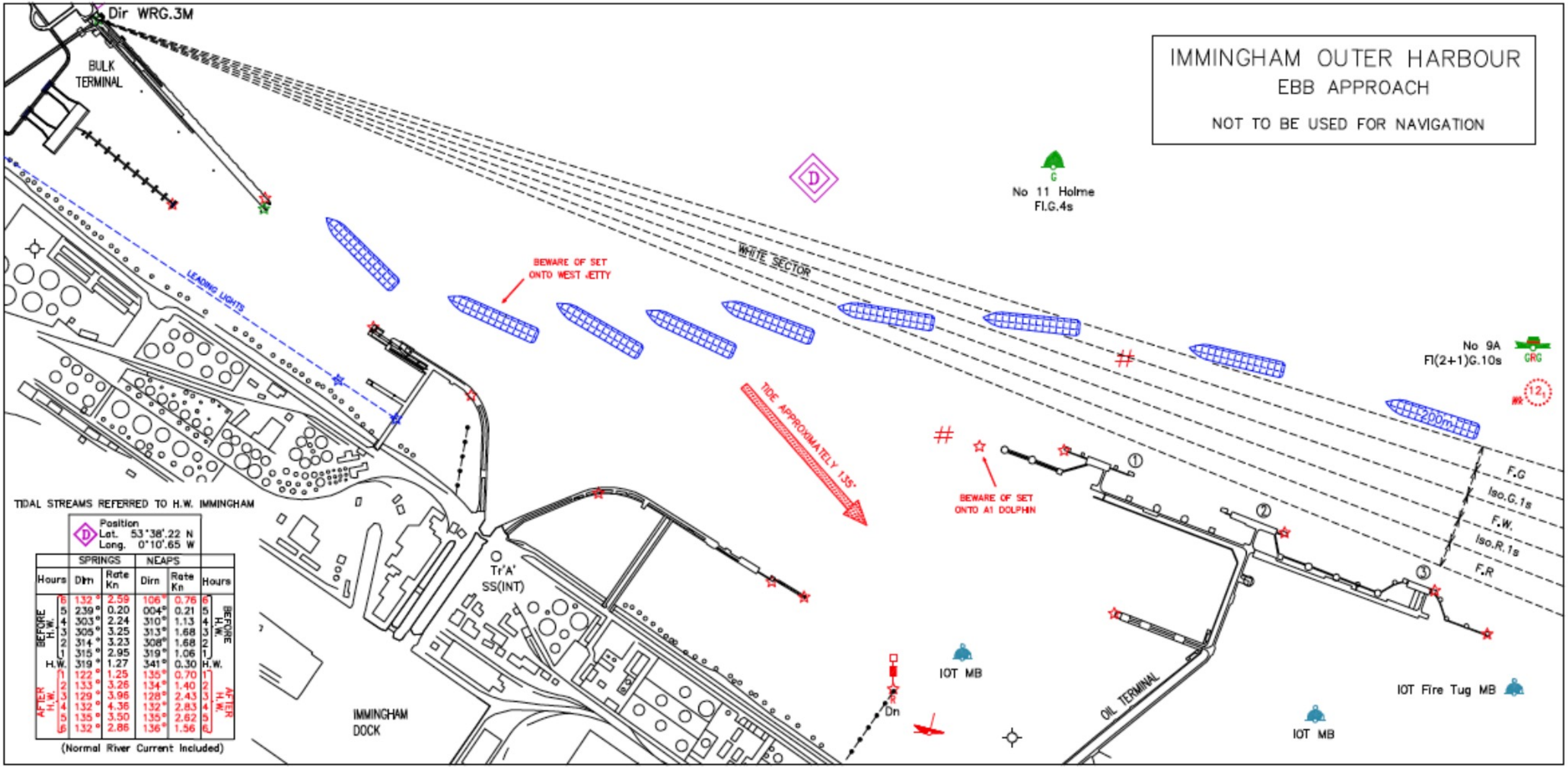
Date	By	QA
26/05/2022	OJR	CRB
Projection	British National Grid	
Scale (A3)	1:10,000	
Project no.	5035	
Fig1.2a_Layout_Marine_AdChart_A3.mxd		

IMMINGHAM EASTERN RO-RO TERMINAL

ILLUSTRATIVE LAYOUT OF PROPOSED MARINE WORKS

FIGURE 1.2 (a)


Immingham Oil T
Dn



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4	132°	4.36	132°	2.83	4
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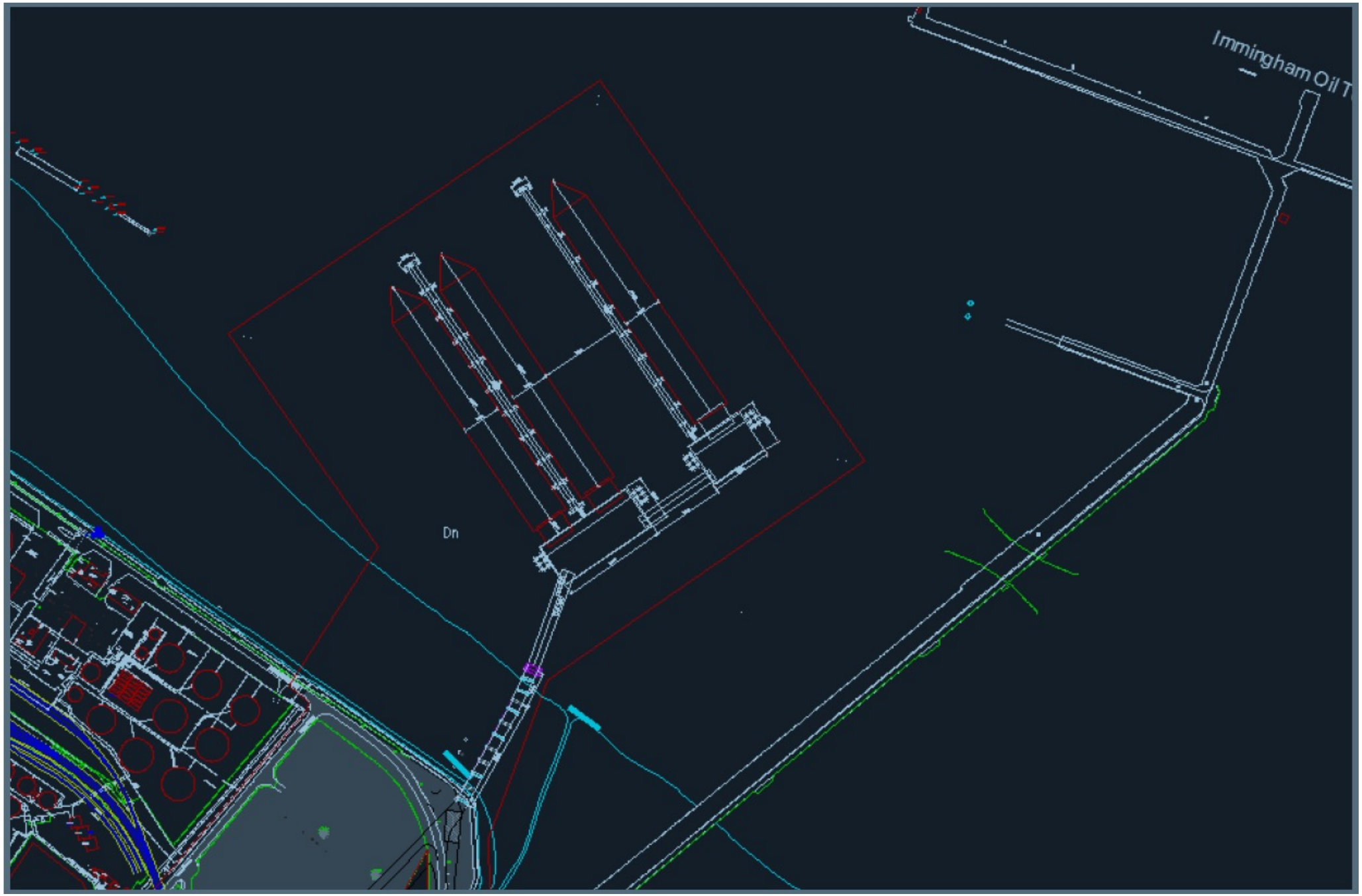
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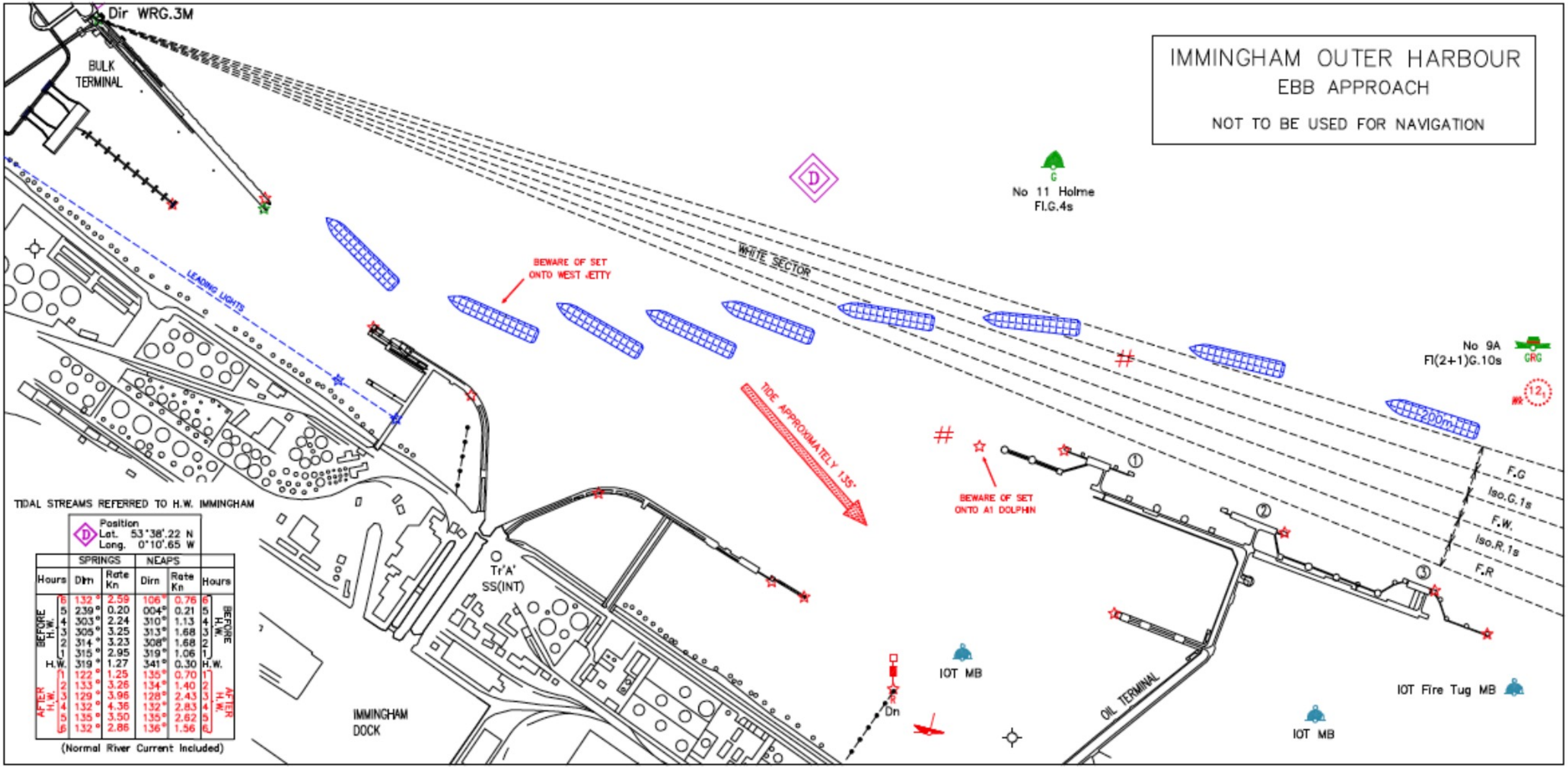

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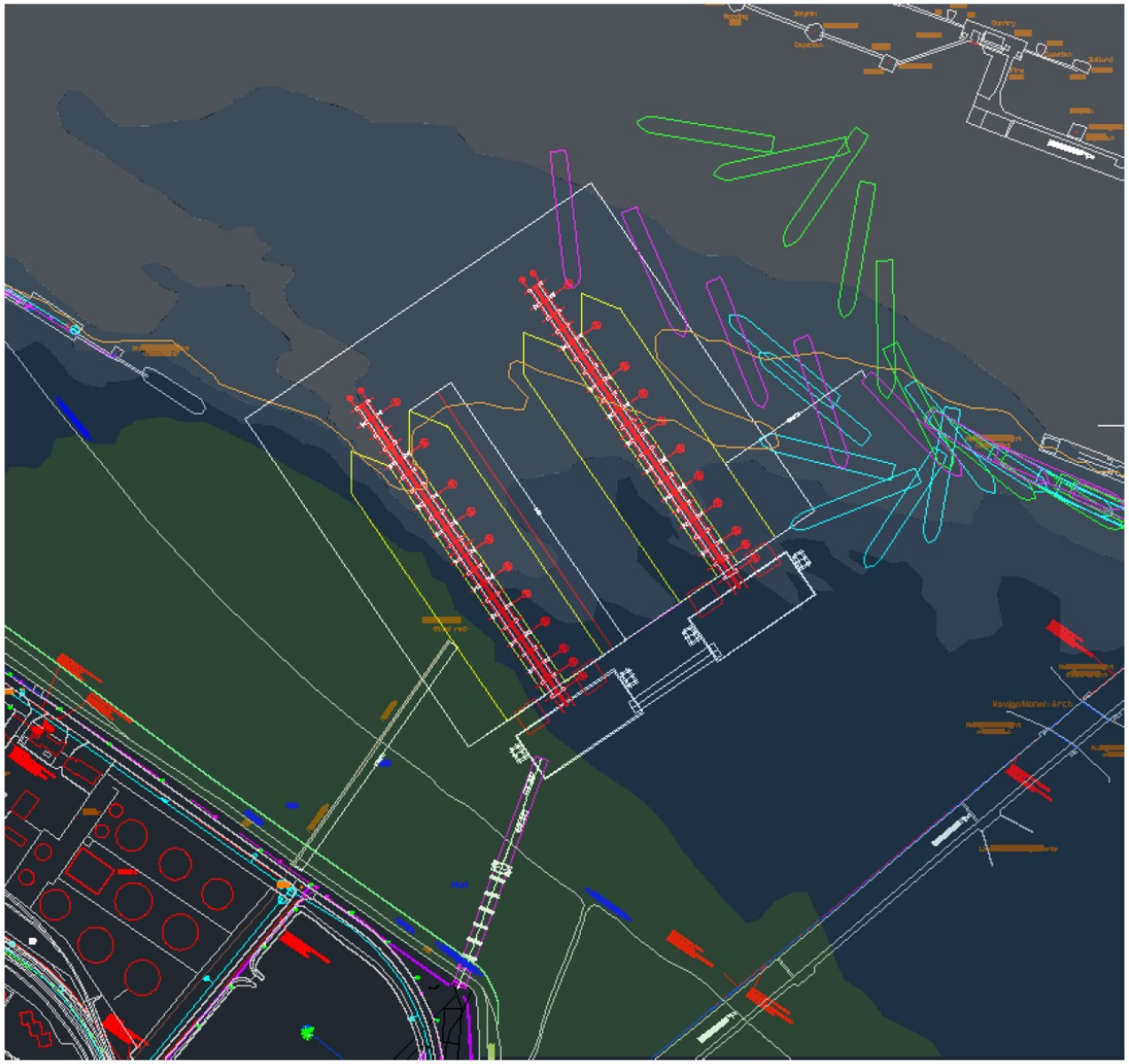


Figure 3.1: Swept paths for vessel departing IOT 6 overlaid on baseline 4 berth proposal

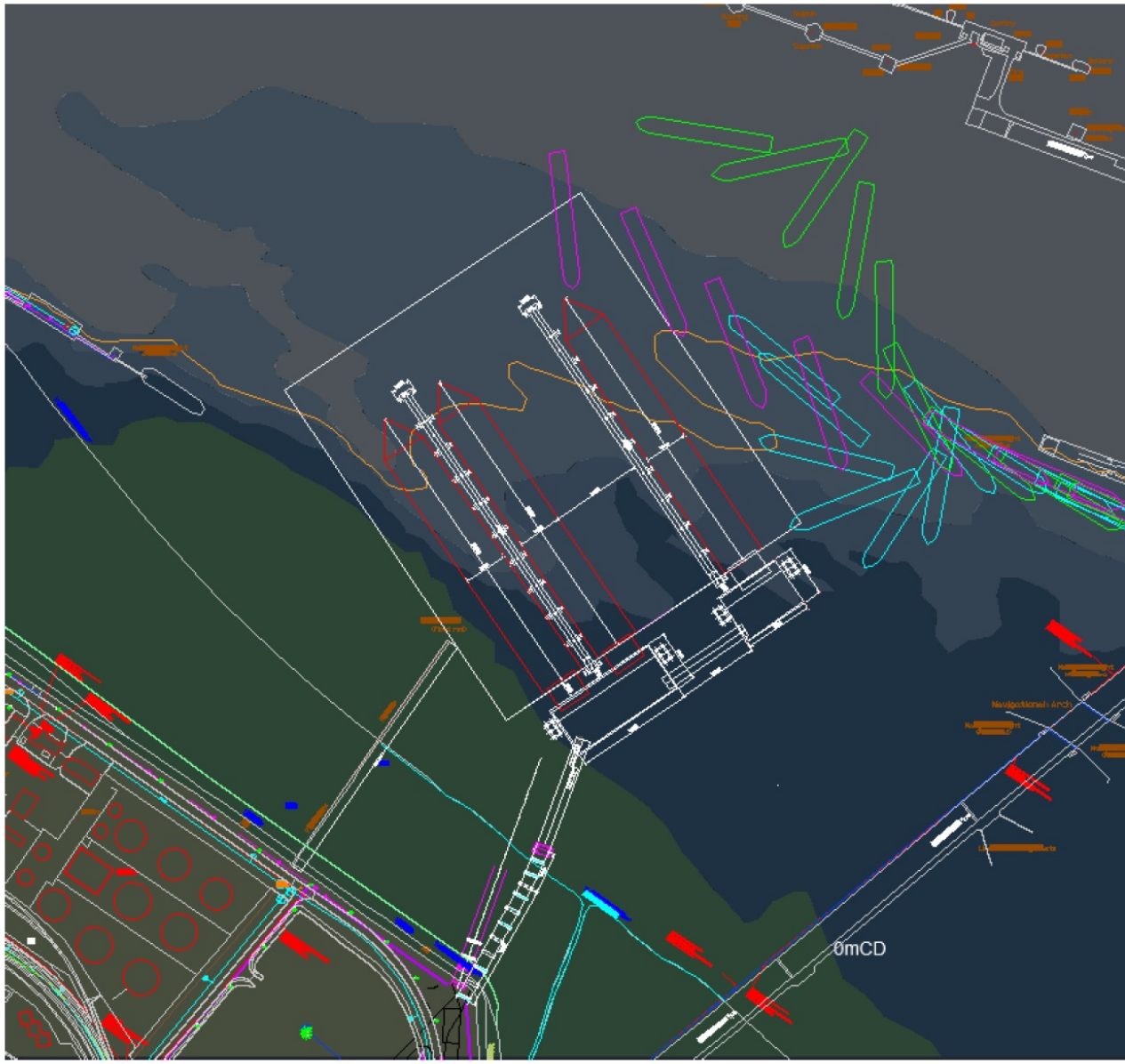
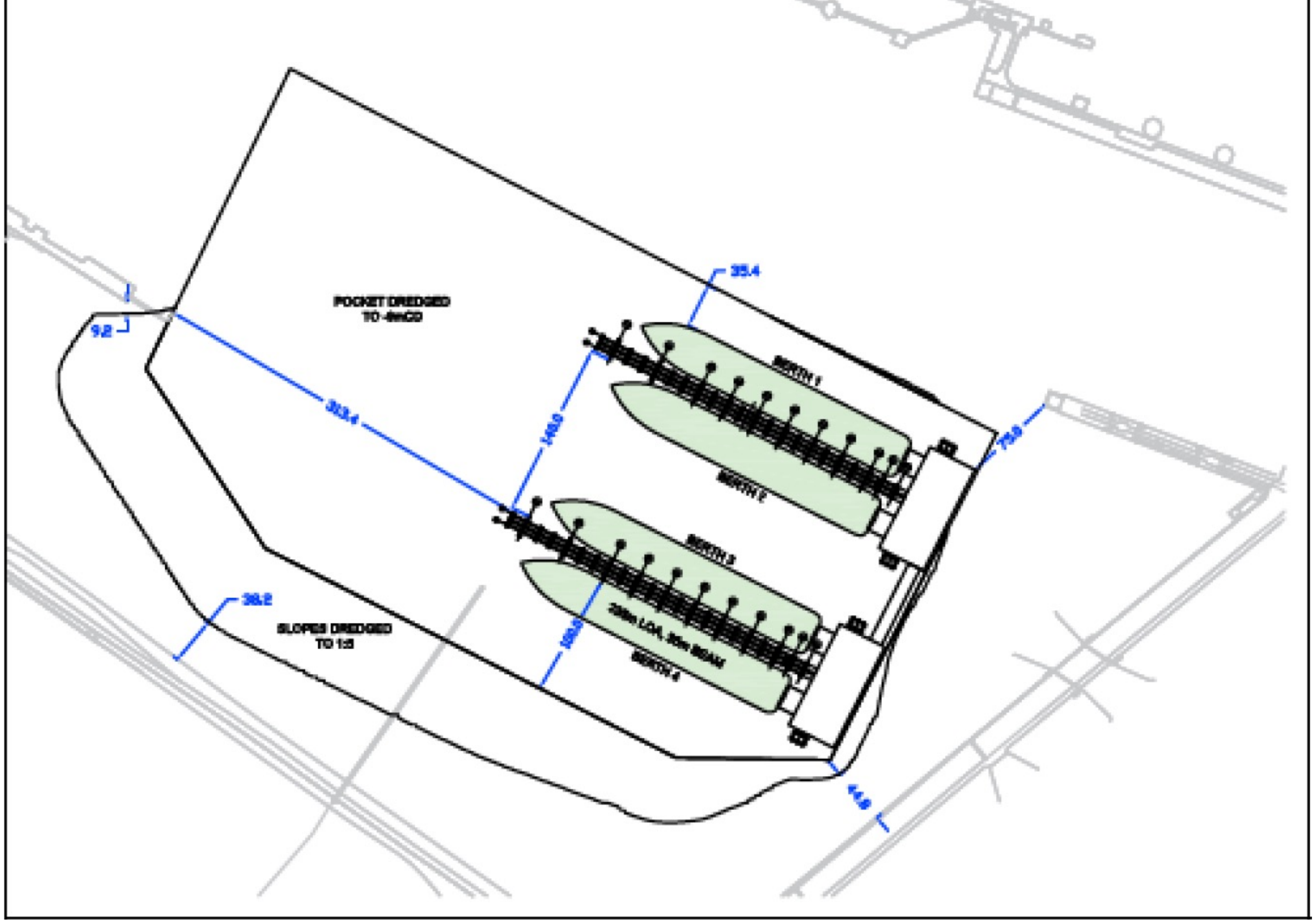
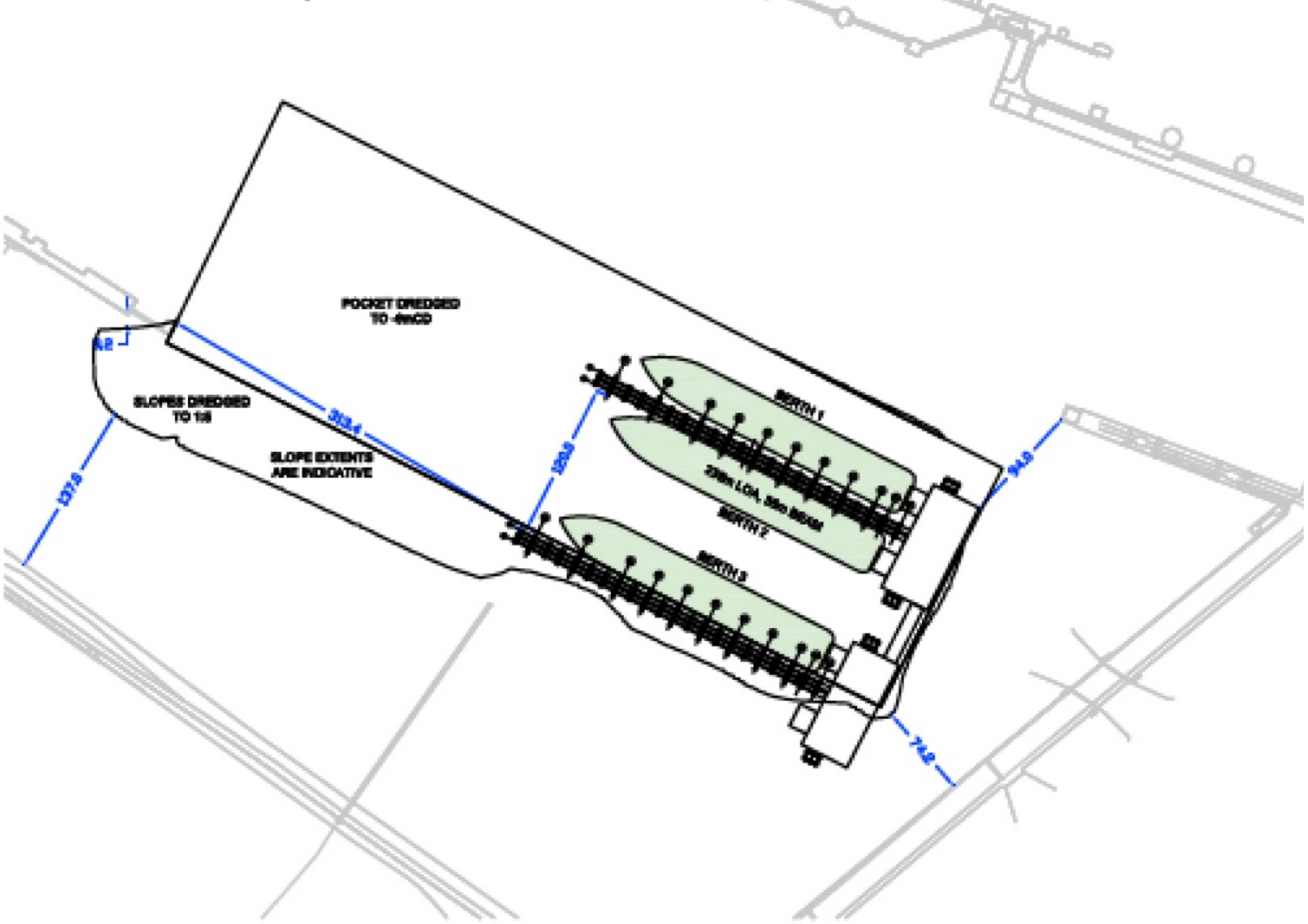


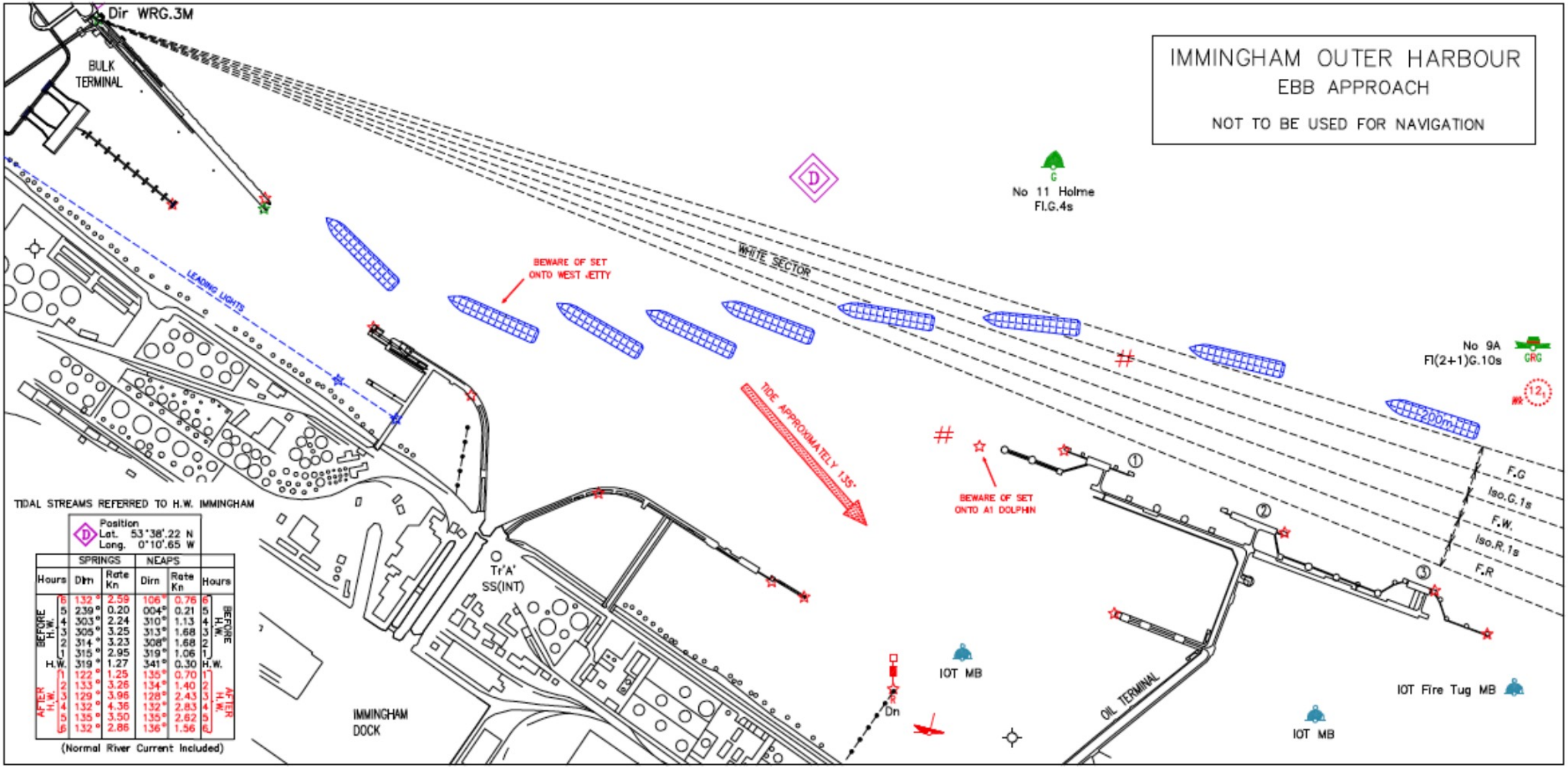
Figure 3.2: Swept paths for vessel departing IOT 6 overlaid on baseline 3 berth proposal

LAYOUT 1: 4 NO. BERTHS AT 297° ORIENTATION



LAYOUT 2: 3 NO. BERTHS, AND BERTHS 1 AND 2 MOVED 20m SW





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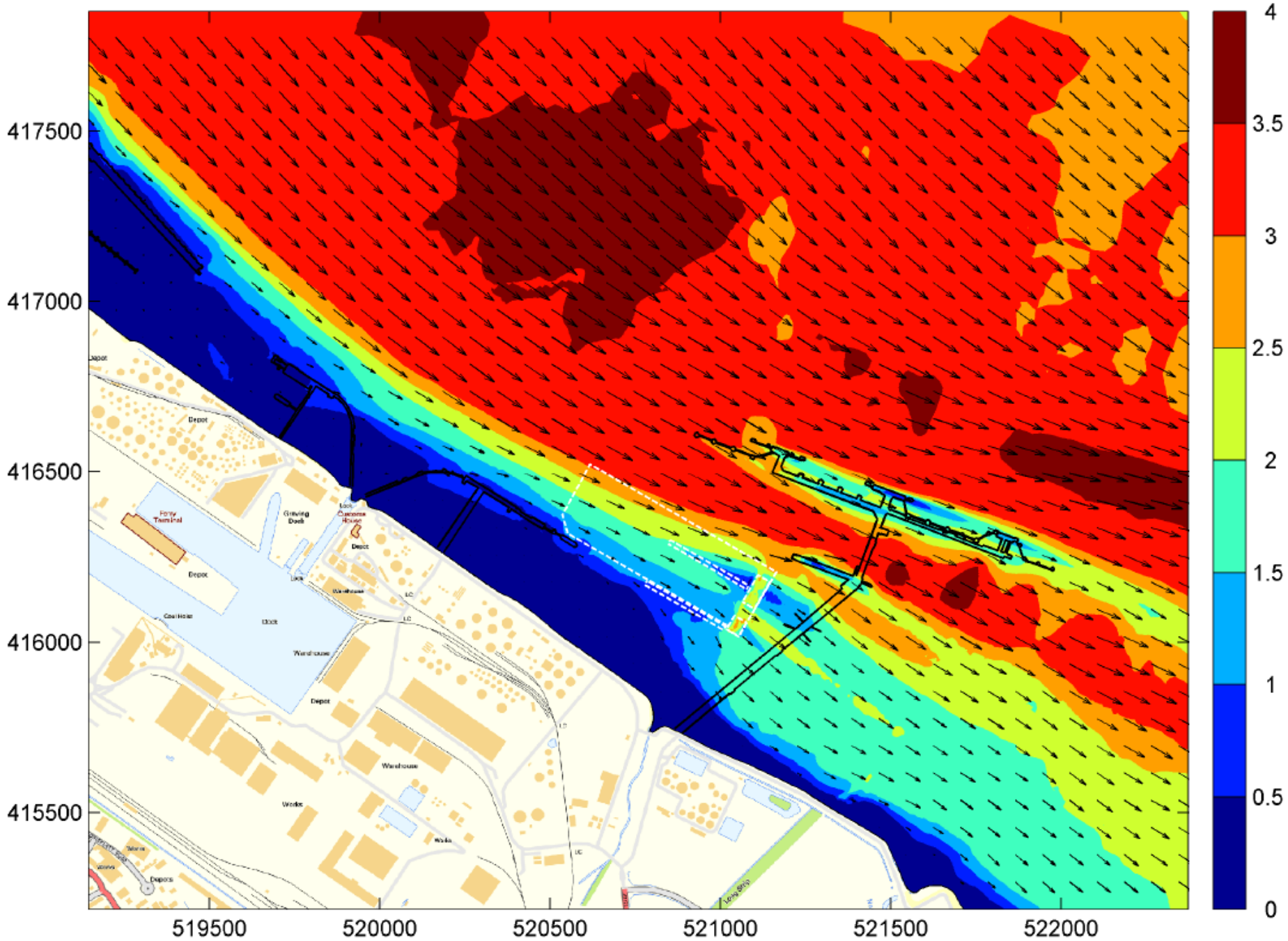
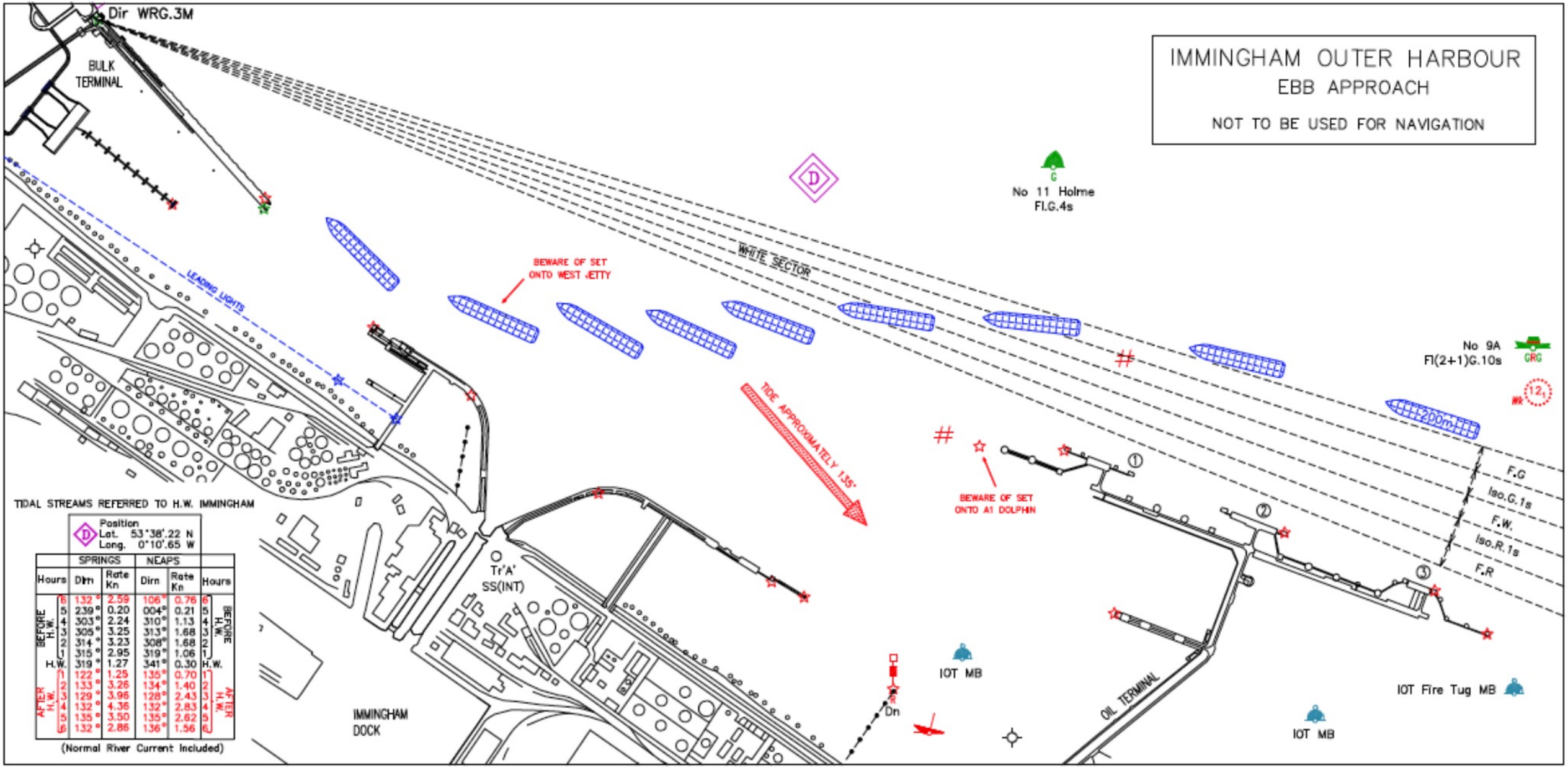


Figure 2.7: Modelled peak spring currents at time of peak ebb tide



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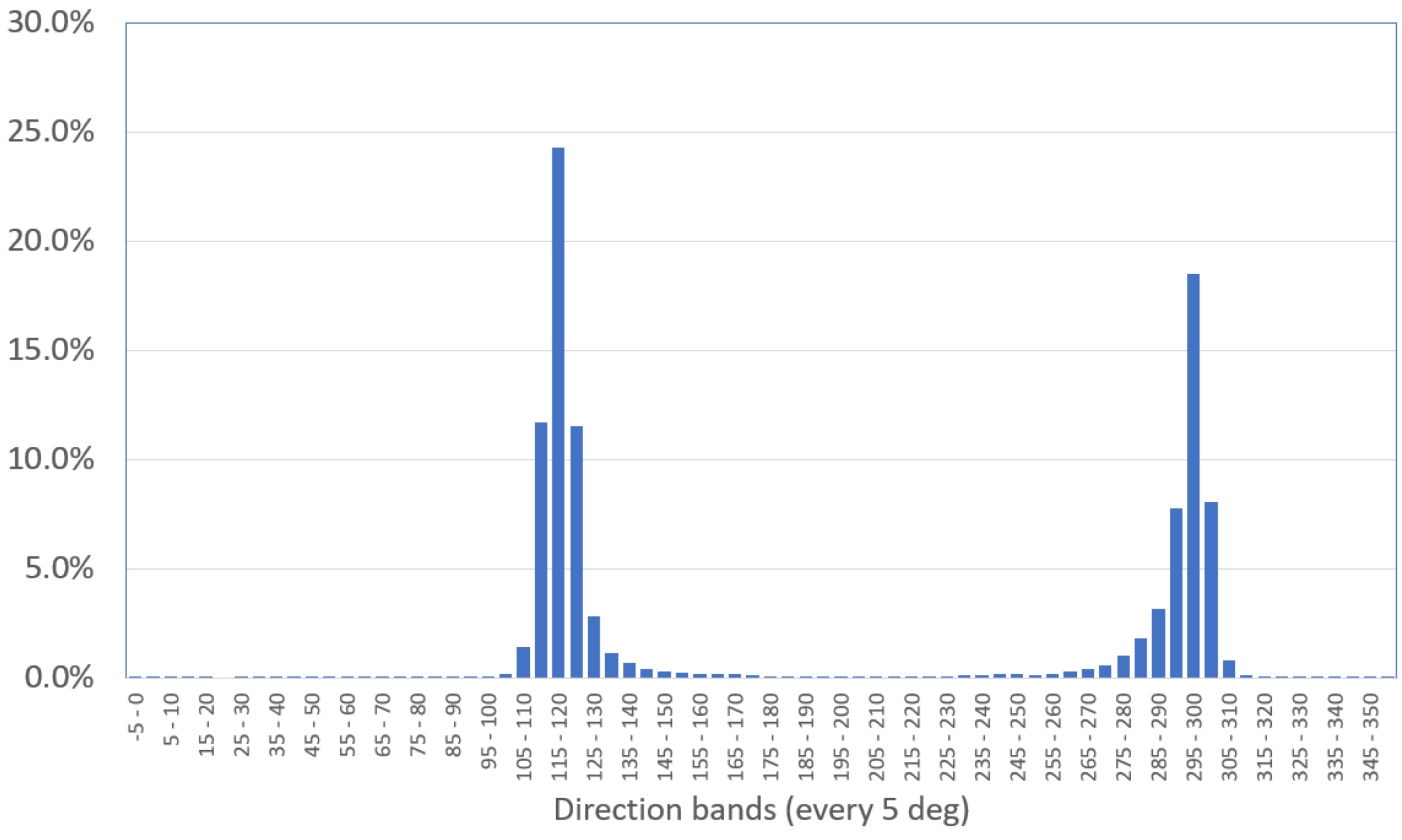
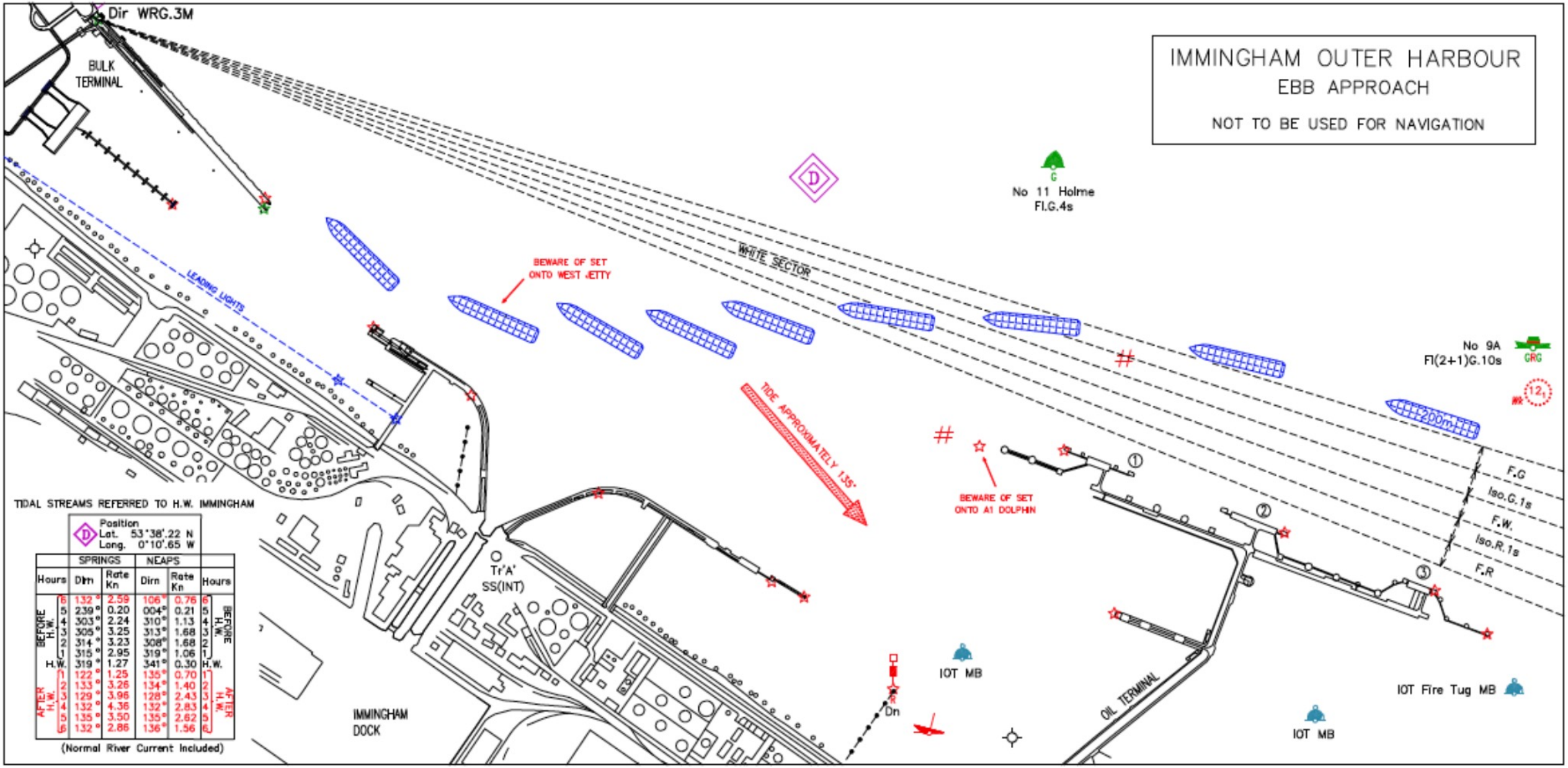

30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
-5 - 0
5 - 10
15 - 20
25 - 30
35 - 40
45 - 50
55 - 60
65 - 70
75 - 80
85 - 90
95 - 100
105 - 110
115 - 120
125 - 130
135 - 140
145 - 150
155 - 160
165 - 170
175 - 180
185 - 190
195 - 200
205 - 210
215 - 220
225 - 230
235 - 240
245 - 250
255 - 260
265 - 270
275 - 280
285 - 290
295 - 300
305 - 310
315 - 320
325 - 330
335 - 340
345 - 350
Direction bands (every 5 deg)



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ABP Humber provided wind data collected from the Immingham Maritime Control Centre (at a height of 24m) between August 2020 and 2021. The data was analysed by HR Wallingford, as shown in Figure 2.12 and Figure 2.13.

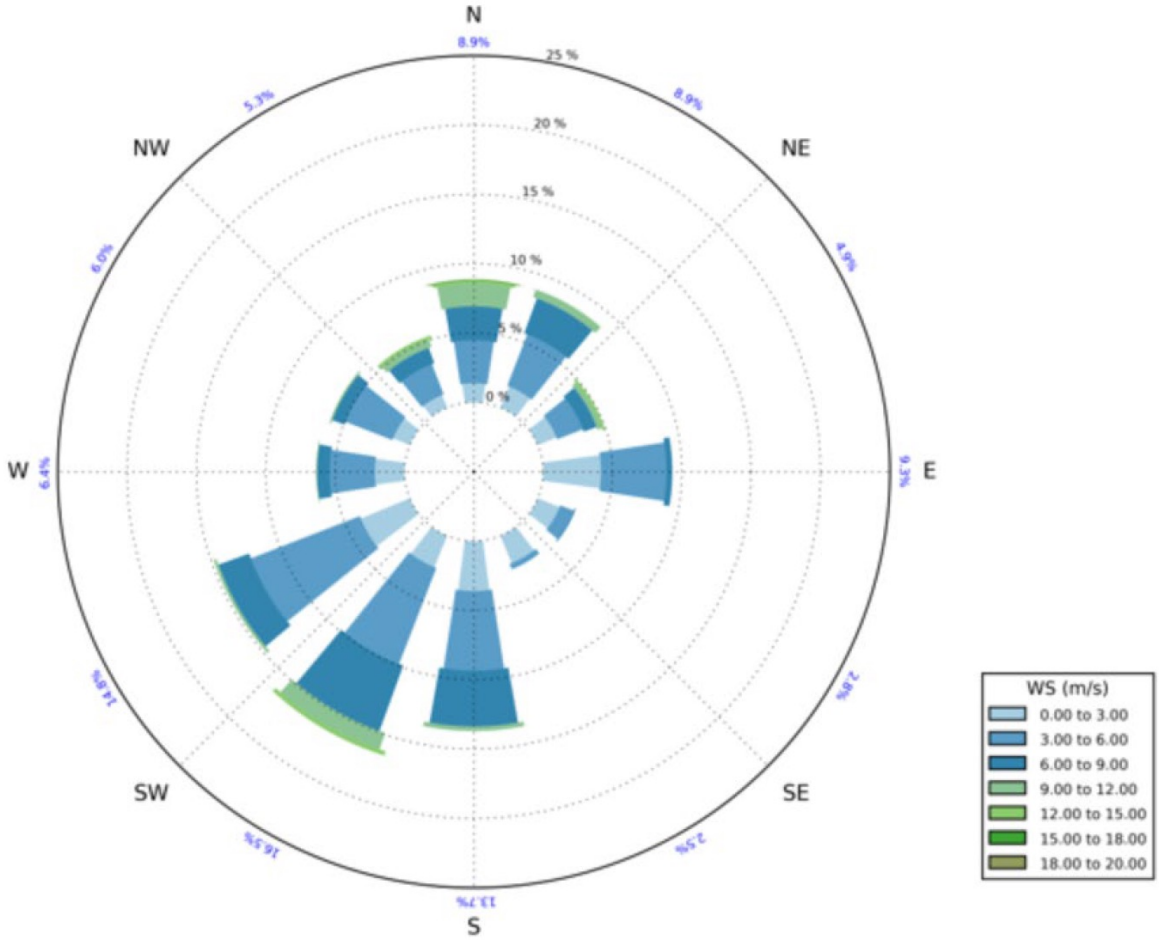


Figure 2.12: Wind rose showing distribution and strength of wind at IOH

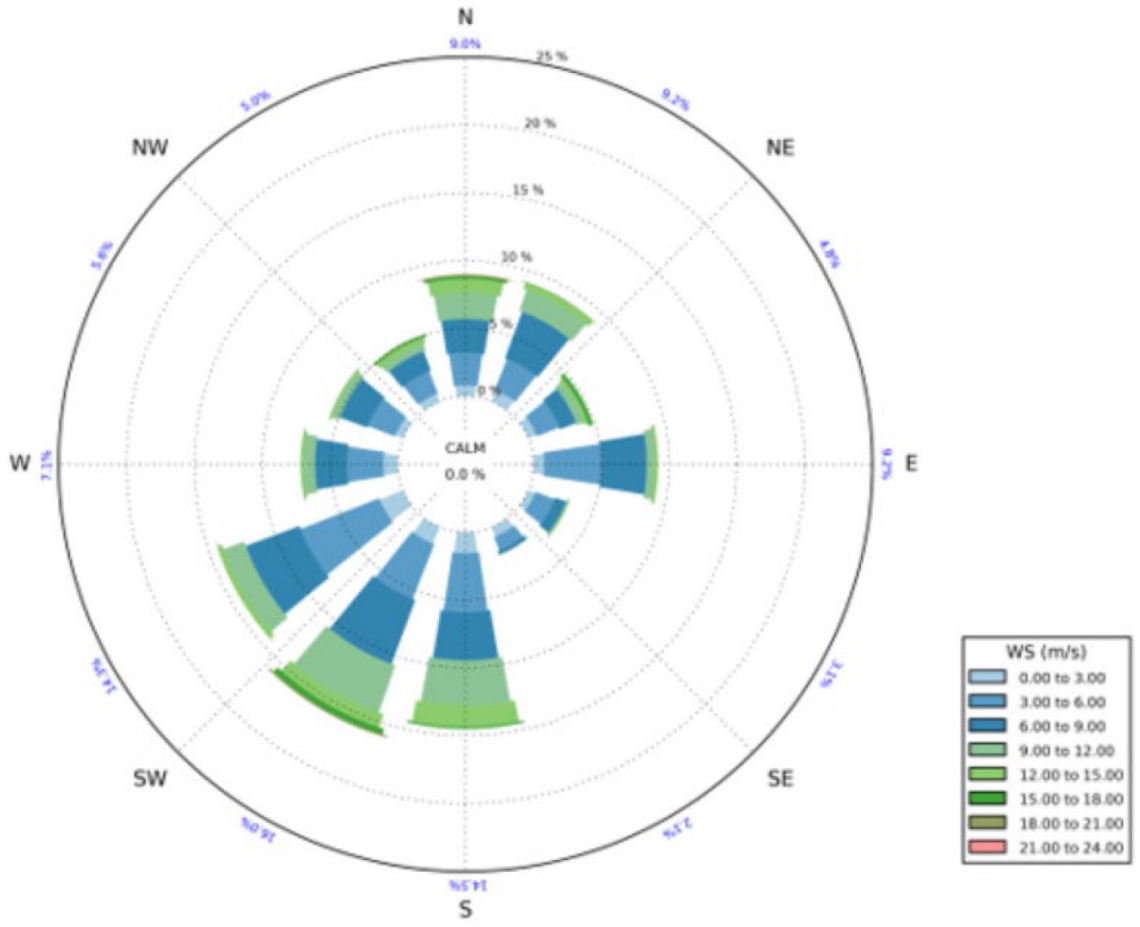
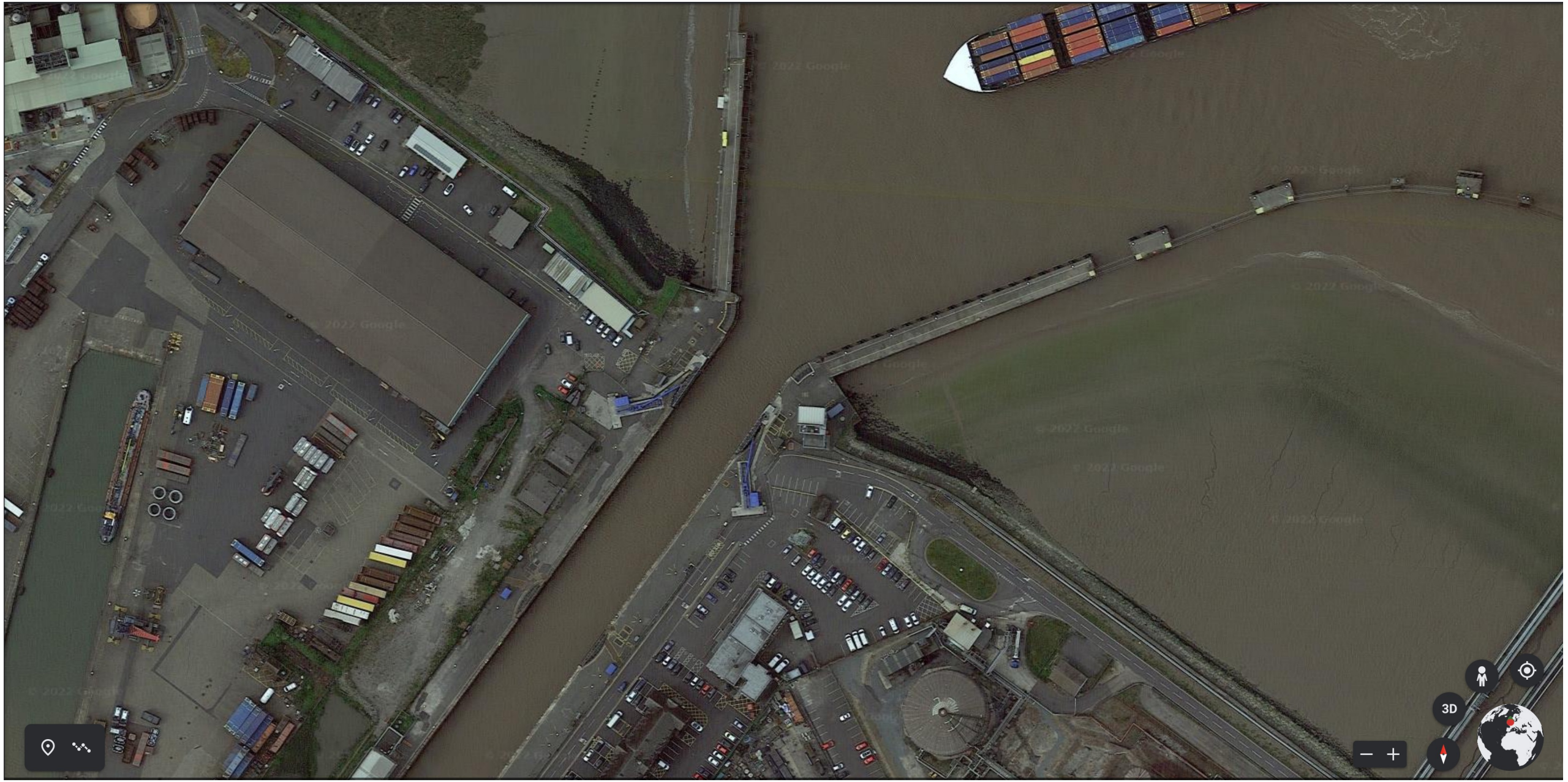
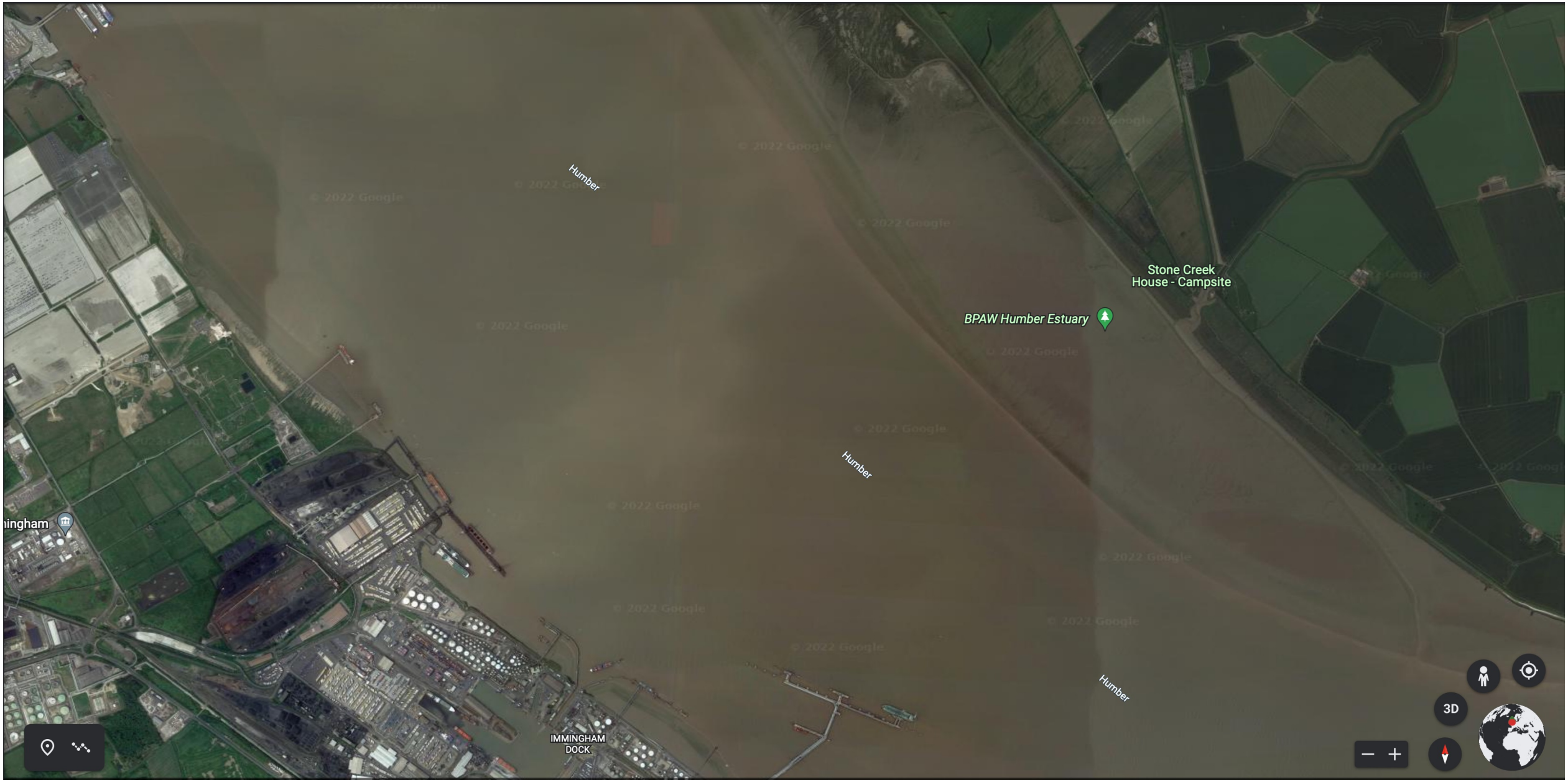


Figure 2.13: Wind rose showing distribution and strength of wind gusts at IOH

Figure 1.2: Immingham Harbour layout

Source: Google Earth 2021


© 2022 Google
3D


Humber
Stone Creek
House - Campsite
BPAW Humber Estuary
Humber
Humber
IMMINGHAM
DOCK
3D

Main Issues

- Tidal flow model is clearly wrong
- Wind data used is taken from the wrong anemometer

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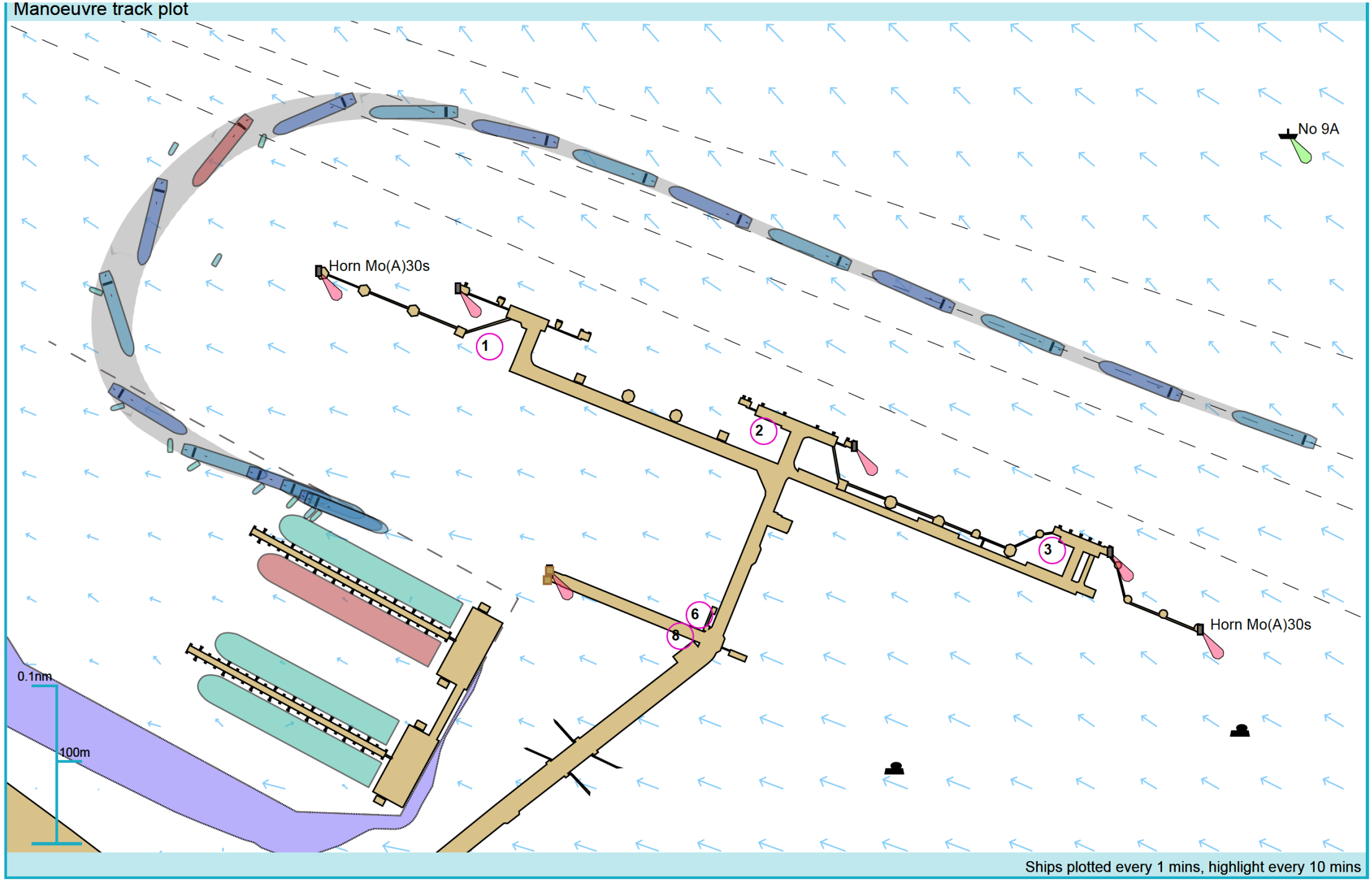
- The use of the DFDS Jinling Class
- Why report in July 2022 for a simulation in 2021?
- Wind sheltering
- How aborts are treated

Run ID	Pilot	Tugs	Vessel	Manoeuvre	Tide/ current	Wind dirn, speed (knots	Outcome	Initial position	Comments and pilot/tug master remarks
34	IC	2 x 70t ASD 70t 2411	237m RoRo	Depart Berth 1	HW-5	SW 30 gusting 35	Pass	Berth 1	Utilised a swing methodology similar to Run 33, though the swing was completed closer to Berth 1/2 jetty. The tugs only assisted in pulling the vessel off the berth as once away from the berth the tide assisted the vessel away to the west. A 62m separation distance from IOT1 dolphins was maintained throughout.
35	IC	16t workboat	104m tanker	Arrival IOT8	HW-5	NE 15	Aborted	IOT3	Vessel successfully turned wide of IOT1, but had picked up speed (4 knots) when coming around and so it was a challenge to maintain distance from Immingham East Berth 1 vessel. Tug secured on port quarter and assisted with push/pull as the vessel straightened up out of the turn, however, the tug was unable to avoid contact with the Immingham East Berth 1 vessel.
36	IC	16t workboat	104m tanker	Arrival IOT8	HW-5	NE 15	Aborted	IOT3	Similar to Run 35 and was aborted before contact would have occurred between the tug and Berth 1 vessel.
37	IC	16t workboat	104m tanker	Arrival IOT8	HW-5	NE 15	Pass	IOT2	Pilot took a more conservative approach (compared with Runs 35 and 36), providing time to line up west of IOT and to reduce speed to below 2 knots before passing Immingham East Berth 1. The subsequent approach was controlled (not requiring tug assistance) and resulted in safely arriving in a berthing position.
38	IC	16t workboat	104m tanker	Arrival IOT8	HW-5	NE 25 gusting 30	Aborted	Min. 12 of Run 37	Tug secured on starboard quarter and provided push assistance as approaching Immingham East Berth 1. This was, however, insufficient to avoid contact with the tug/stern of the vessel. Initial position regarded to be too close to correct and to be revised in the next run.
39	IC	16t workboat	104m tanker	Arrival IOT8	HW-5	NE 25 gusting 30	Aborted	E of min. 12 of Run 37	Initial position revised to further E of previous run providing more clearance from Immingham East Berth 1. Vessel tracked SE towards IOT8, however, contacted the rolling fender at the end of the IOT pier.
40	IC	16t workboat 45t ASD	104m tanker	Arrival IOT8	HW-5	NE 30	Pass	E of min. 12 of Run 37	As run started, 45t ASD secured on starboard beam and the workboat on the starboard quarter. The forward tug (the ASD) started pushing 25 to 50% once S of the pier to keep vessel away from Immingham East Berth 1. Satisfactory berthing manoeuvre.

Manoeuvre track plot



Ships plotted every 1 mins, highlight every 10 mins

Overall it should be noted that manoeuvring to and from the new infrastructure is challenging, requiring precise positing of the vessel, tugs and their attitude to the tidal flow and the wind. Mitigating the inherent risk in the manoeuvring operations will require a robust training solution to be in place.

Additional assessment will be required to identify the detail of recommended procedures and limits for all classes of vessel and a wider range of environmental conditions. This will be particularly pertinent to developing appropriate limits for an initial operating capability.

HR Wallingford

Working with water

Navigational Risk Assessment

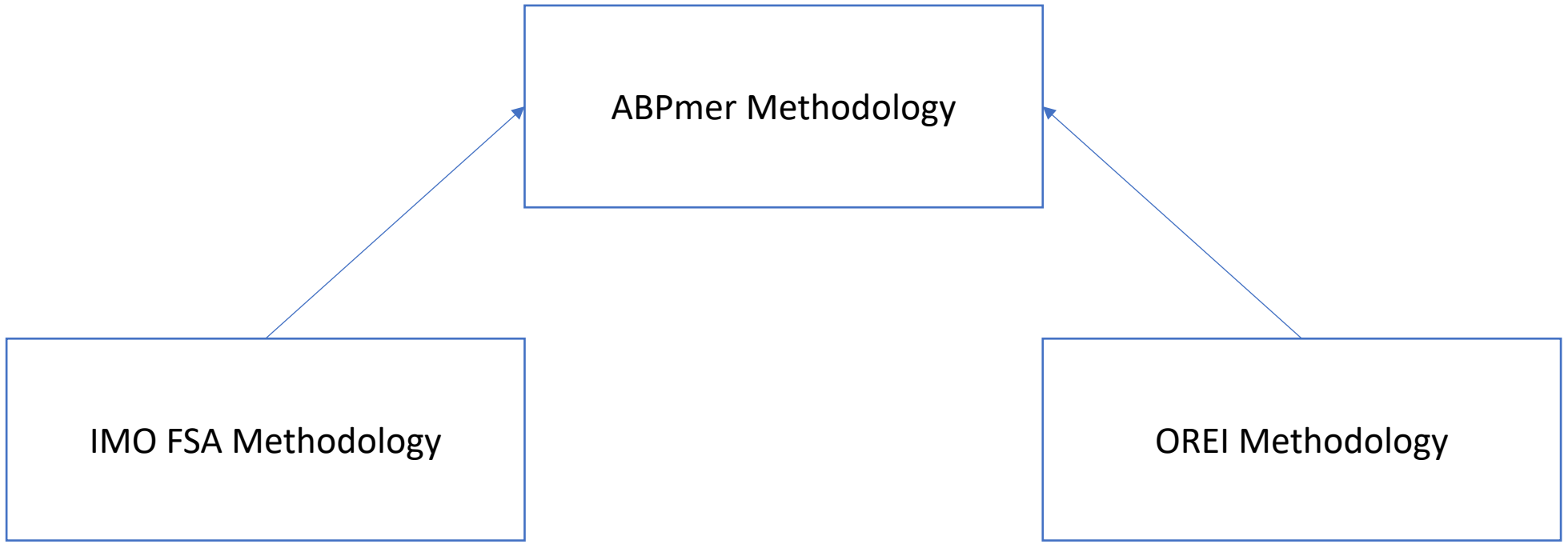
Navigational Risk Assessment Software Available

- HAZMAN II
- ORPA
- MarNIS (produced by ABPmer)

Methodology

1. IMO Formal Safety Assessment – standard assessment when assessing risk in a habour environment

2. OREI Risk Assessment – standard assessment when assessing risk in offshore renewable environment



	Look up Table - Consequence				
Serial	Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
People	No Injury	Minor Injury First aid injury, minimal time lost. Temporary impediment, no long term effects.	Serious Injury Medical atension required. Short term lost of time. Partial disability/impediment with medium to long term effects.	Single Fatality Long term loss of time. Long term effects. Also includes permanent/total disability with long term effefcts.	Multiple Fatalities Multiple long term loss of time and long term effects. Also includes multiple permanent/total disability with long term effefcts.
Property Damages	£0 - £10000	£10000 - £750000	£750000 - £4 million	£4 million - £8 million	> £8 million
Planet (Enviroment)	None (No incident - or a potential incident/near miss)	No Measurable Impact (An incident or event occurred, but no discernible environmental impact - Tier 1 but no pollution control measures needed)	Minor (An incident that results in pollution with limited/local impact - Tier 1, Harbour Authority pollution controls measures deployed)	Significant (Has the potential to cause significant damage and impact - Tier 2, pollution control measures from external organisations required)	Major (Has the potential to cause catastrophic and/or widespread damage - Tier 3, requires major external assistance)
Port reputation	None	Minor (Little local publicity. Minor damage to reputation.	Moderate (Negative local publicity. Moderate damage to reputation.	Serious (Negative national publicity. Serious damage to reputation.	Major (Negative national and international publicity. Major damage to reputation.

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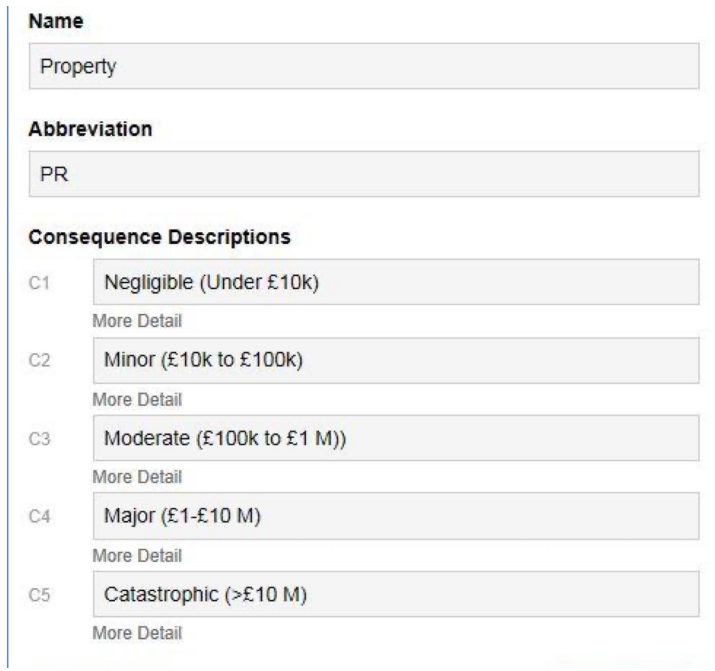
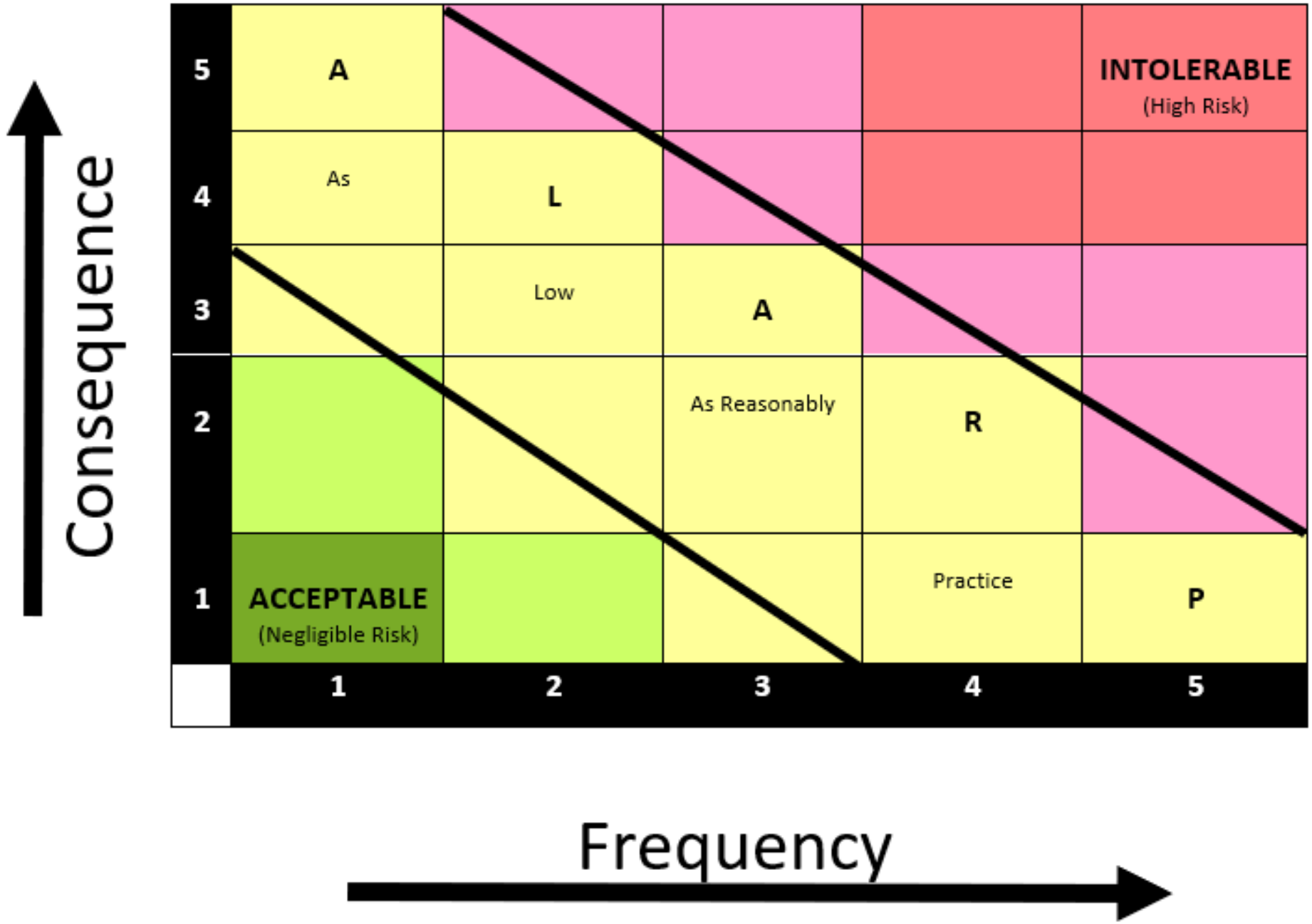


	Look up Table - Likelihood
	Occurance
Rare	The impact of the risk or hazard is realised but should very rarely occur within the lifespan of the entity.
Unlikely	The impact of the risk or hazard may occur within the lifetime of the entity but is unlikely.
Possible	The impact of the risk or hazard could very well occur within the lifetime of the entity without mitigation.
Likely	It is quite likely that the impact of the risk or hazard will occur throughout the lifespan of the entity without mitigation
Almost Certain	The impact of the risk or hazard will occur during the lifespan of the entity (multiple times), mitigation is required to reduce it

Hazman II

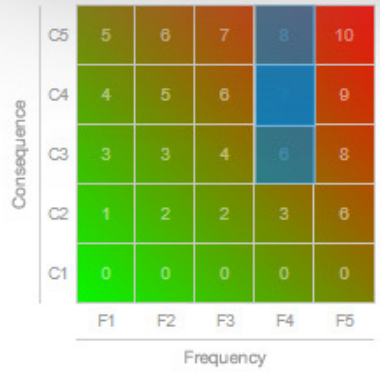
Rare	1 or more in 10,000 years
Unlikely	1 or more in 1000 years
Possible	1 or more in 100 years
Likely	1 or more in 10 years
Frequent	1 or more in 1 year


Consequence
5
4
3
2
1
A
As
L
Low
A
As Reasonably
R
Practice
P
INTOLERABLE
(High Risk)
ACCEPTABLE
(Negligible Risk)
1
2
3
4
5
Frequency

Assessed Risk & Controls

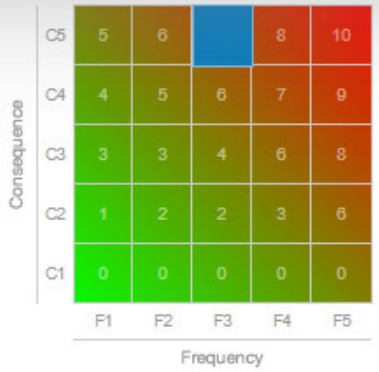
Hazard Baseline Date

Rank	Baseline Risk	Inherent Risk
1 of 8	7.40	7.40



Most Likely Outcome

Low speed ... collision dislodges tanker from berth causing a tier 3 pollution event, major damage, serious injuries too personnel and locally significant port reputation damage



Worst Credible Outcome

RoRo makes contact with berthed tanker in a significant allision that portholes the tanker leading to a tier 3 possible pollution of the petrochemical leading to a fire that causes significant damage and multiple fatalities. Major international news that significantly effects the ports reputation.

Snap	Most Likely Frequency	
Frequency	**Likely** One or more times in 10 years.	4

Snap	Worst Credible Frequency	
Frequency	**Possible** One or more times in 100 years.	3

Most Likely Consequence		
Environment	Major - Upper Tier 3 Declared	5
People	Moderate (Minor Injuries or One Major)	3
Property	Serious (£1M - 10M)	4
Stakeholders	Serious (£1M - 10M) National Exposure	4

Worst Credible Consequence		
Environment	Major - Upper Tier 3 Declared	5
People	Catastrophic (Mulitple Fatalities)	5
Property	Major (£10M +)	5
Stakeholders	Major (£10M +) International	5

NRA Process Issues

- The lack of any involvement from external independent consultants
- The use of mixed methodology to ‘cherry pick’ elements favourable to the applicant
- The decision not to use a recognised Risk Assessment software package
- Only completing 9 out of 25 risk assessments at the workshop and missing key risks (East Jetty)
- The decision of choosing not to produce a risk rating but to allow the ‘Duty Holder’ to decide the acceptable risk level