

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 41 to Deadline 6: AIS Animations Note

Relevant Examination Deadline: 6

Submitted by Vattenfall Wind Power Ltd

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Drafted By:	Vattenfall Wind Power Ltd
Approved By:	Daniel Bates
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1 Introduction

- 1 The development of vessel traffic animations utilising AIS track and point data has been identified by the Applicant as a useful contextual aid to demonstrate shipping traffic patterns during specific time periods within the TEOW study area (5nm of the TEOW Red Line Boundary). The approach of submitting animations utilising the available data has been agreed in principle with the Planning Inspectorate (PINS), with requests made by PINS regarding the need for an accompanying note identifying the methods used and providing an appropriate narrative.
- 2 The objective of this document is therefore to provide an overview of navigation in the study area through reference to 3 separate days in 2017, characteristic of different metocean conditions, and levels of vessel transit reflective of busy days for different vessel types. The animations are drawn from the 12 months SeaRoc/SeaPlanner AIS data (hereafter referred to as 'SeaPlanner') utilised to validate the MGN543 compliant surveys. These days have been identified as:
 - 13th June: Busiest day of 2017 – vessels over 90m (Annex A);
 - 1st August: Busiest day of 2017 – all AIS vessels (Annex B); and
 - 30th November: Adverse metocean conditions and restricted pilotage operations by Estuary Services Limited (ESL) (Annex C).
- 3 The AIS data for these days has been animated using GIS software, with all vessels symbolised by length, except for pilot vessels that have been given a unique symbol for easy identification.
- 4 Commentary regarding vessel activity shown in the animations has been provided by mariners Captain Simon Moore and Commander Paul Brown, and gives a summary, by time, of vessel movements within the study area with particular reference to transits around Elbow Buoy, East Margate Buoy, NE Spit Buoy, NE Spit and NE Goodwin Pilot Diamonds, Margate Roads Anchorage and the Structures Exclusion Zone (SEZ).
- 5 In summary the animations demonstrate that on the busiest days in a 12 month period, either for large (>90m) vessels or all vessels, the traffic density is such that the sea room calculations (4*333m vessels) are inherently precautionary. Through analysis of a restricted (metocean limit state) pilotage operations day it can be seen that the construction of the Thanet Extension will have limited interactions, and the sea room calculations remain proportionately precautionary.

2 Methodology

- 6 This section provides detail on the construction of the animations in GIS software and the data processing tasks undertaken in order to develop the SeaPlanner data into an appropriate, animation-ready format.

2.2 Busiest Days

- 7 The SeaPlanner tracks dataset was interrogated in Esri's ArcMap software to identify the busiest days (the days with the greatest number of tracks) of 2017. The data identified that the busiest day for all vessels was 1st August, whilst the busiest day for vessels over 90m only was 13th June.

2.3 Adverse Metocean Conditions / Restricted ESL Operations Day

- 8 A day of restricted pilotage operations was selected from the ESL service records for 2017 (Annex C, Appendix 22 of this Deadline 6 submission) which were provided to Marico by Richard Jackson on 28th March 2019. The day selected (30th November) was correlated with available metocean data to determine the experienced conditions on the day.
- 9 **Figure 1** provides reference to wave height data recorded by a buoy at Goodwin Sands managed by the Channel Coastal Observatory (CCO, 2019)*. The data recorded at this location correlates well with the service restrictions experienced by ESL, with storm alert threshold limits exceeded on three separate occasions (a storm alert defined as the level exceed, on average, four times per year).

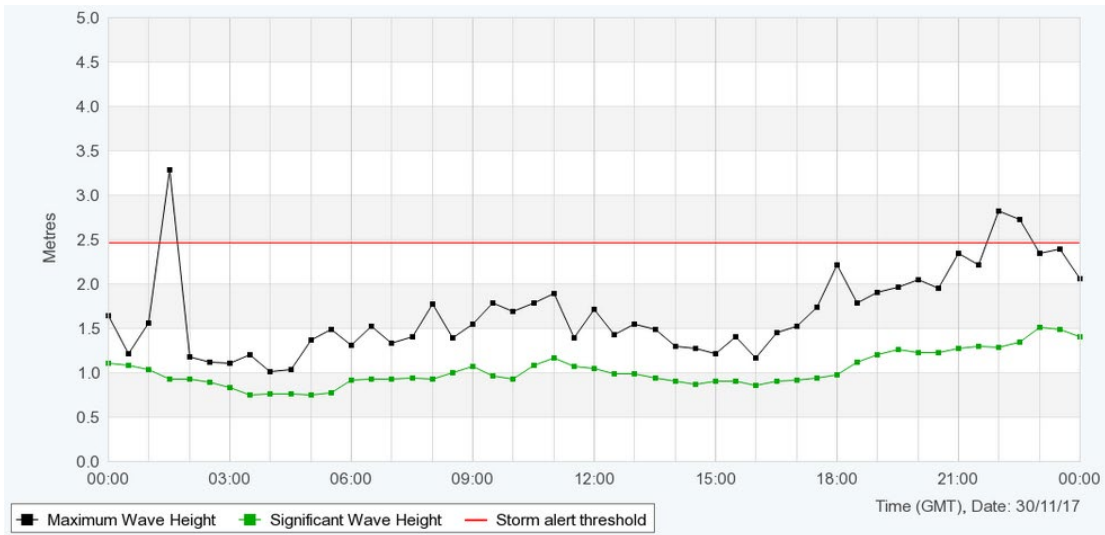


Figure 1: Wave height at Goodwin Sands on 30th November 2017¹

10 Available historic wind data from website rp5.co.uk (Raspisaniye Pogodi Ltd, 2019) for Manston Airport (approximately 3 miles southwest of Margate) gives an indication of wind strength (average 8.6m/s or 16.7 kts) and direction (from the northwest) in the area on the 30th November. A breakdown of these conditions is given in **Figure 2**.

¹ Copyright: New Forest DC, Data from Channel Coastal Observatory

Date / Local time	T	Po	P	Pa	U	DD	Ff
2017 November 30, Thursday	23	2.7	752.9	757.5	0.4	90	Wind blowing from the north-west Strong breeze (11 m/s)
	22	2.5	752.6	757.2	0.2	90	Wind blowing from the north-west Fresh breeze (10 m/s)
	21	2.6	752.5	757.0	0.3	89	Wind blowing from the north-west Fresh breeze (10 m/s)
	20	2.5	752.5	757.0	0.3	86	Wind blowing from the north-west Fresh breeze (10 m/s)
	19	2.4	752.4	757.0	0.5	83	Wind blowing from the north-west Fresh breeze (10 m/s)
	18	2.3	752.2	756.8	0.6	84	Wind blowing from the north-west Fresh breeze (9 m/s)
	17	2.4	752.2	756.7	0.5	81	Wind blowing from the north-west Fresh breeze (10 m/s)
	16	2.7	751.9	756.4	0.0	76	Wind blowing from the north-west Strong breeze (11 m/s)
	15	2.6	751.6	756.2	-0.6	78	Wind blowing from the north-west Fresh breeze (8 m/s)
	14	2.4	751.7	756.3	-0.8	77	Wind blowing from the north-west Fresh breeze (9 m/s)
	13	2.2	751.9	756.4	-1.0	78	Wind blowing from the north-west Fresh breeze (9 m/s)
	12	2.3	752.2	756.7	-0.7	76	Wind blowing from the north-west Fresh breeze (9 m/s)
	11	2.6	752.5	757.0	-0.4	75	Wind blowing from the west-northwest Fresh breeze (8 m/s)
	10	1.9	752.9	757.5	0.0	77	Wind blowing from the north-west Fresh breeze (9 m/s)
	09	1.6	752.9	757.6	0.0	80	Wind blowing from the north-west Fresh breeze (8 m/s)
	08	1.3	752.9	757.6	-0.2	81	Wind blowing from the west-northwest Moderate breeze (7 m/s)
	07	1.1	752.9	757.6	-0.4	82	Wind blowing from the west-northwest Moderate breeze (6 m/s)
	06	0.8	752.9	757.5	-0.8	83	Wind blowing from the north-west Moderate breeze (7 m/s)
	05	1.3	753.1	757.7	-0.7	81	Wind blowing from the north-west Moderate breeze (7 m/s)
	04	1.3	753.3	757.9	-0.7	82	Wind blowing from the north-west Fresh breeze (8 m/s)
	03	1.6	753.7	758.2	-0.3	84	Wind blowing from the north-west Fresh breeze (8 m/s)
	02	1.9	753.8	758.5	0.0	86	Wind blowing from the north-west Fresh breeze (8 m/s)
	01	2.4	754.0	758.5	0.3	87	Wind blowing from the north-west Fresh breeze (8 m/s)
	00	3.6	754.0	758.6	0.4	88	Wind blowing from the north-west Fresh breeze (8 m/s)

Figure 2: Wind conditions at Manston Airport on 30th November 2017

- 11 Cross-referencing the ESL service records (Annex D to Appendix 22) with the available wave and wind data provided suitable assurance for selecting the 30th November 2017 as appropriately characteristic of an adverse metocean conditions / restricted operations day for the purposes of creating an animation.

2.4 Data Processing

- 12 SeaPlanner AIS data points (the points used to develop the vessel tracks) for the 3 selected days were extracted from the vessel database and resampled in ArcMap to 10 second intervals in order to provide output datasets that could be visualised at fixed interval periods within the animation. The resampling was achieved by utilising an existing tool developed internally by Marico that uses vessel date/time, course and speed fields to re-space the data points at a constant time period along the vessel track.

- 13 'Static' vessel data (information relating to vessel names and dimensions) was joined to the AIS data points from the SeaPlanner track lines to give a complete dataset. This process was required for vessels to be symbolised by length and pilot vessels identified. This approach, combined with 3-minute intervals generated from the 10 second increments, provides a near 'real time' account of vessel movements within the study area, compressed into a suitable length time lapse animation.
- 14 ArcGIS Pro was used to generate the animations. In addition to the vessel points and tracks, the animation outputs include the TEOW Red Line Boundary and SEZ, 5nm study area, NE Spit and Elbow buoys and NE Spit Pilot Boarding Station to help give a clear overview of navigation patterns.
- 15 A High-Water (HW) label is included in the animations which runs at the same time steps being visualised by the vessel points to give the status of HW at any period during playback. HW times, taken for Ramsgate, were obtained from Admiralty Total Tide and are given in **Table 1**.

Table 1: HW Times at Ramsgate from Admiralty Total Tide

Date	HW
13 th June 2017	01:27
	13:39
01 st August 2017	06:12
	18:40
30 th November 2017	08:13
	20:52


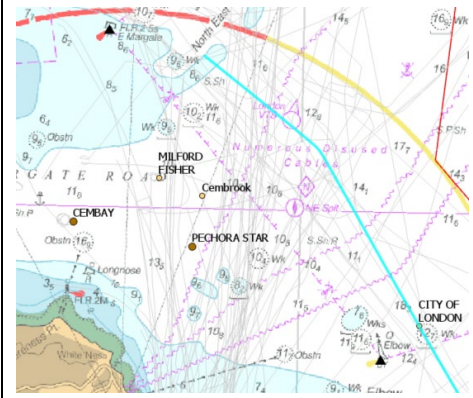
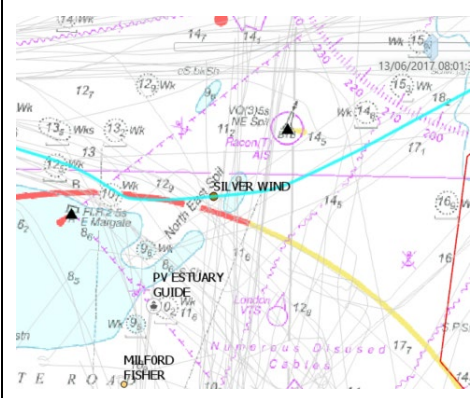
- 16 Each animation runs for two minutes in 3 second timesteps to give a smooth transitional visualisation across the 24hr period. The output file format is .mp4 which has then been compressed for submission to PINS. The compression does not have a visible effect on the quality of the mp4 and has been subject to QA/QC to ensure that the animations remain of a suitable high quality for on screen review.
- 17 The three animations exported from ArcGIS Pro to supplement this report are named as follows:
- 13th_June_2017_gtr90m.mp4;
 - 1st_August_2017_allVessels.mp4; and


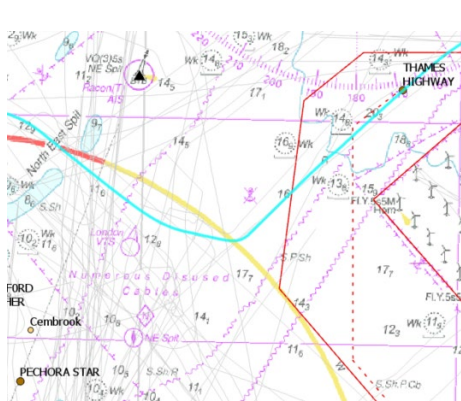
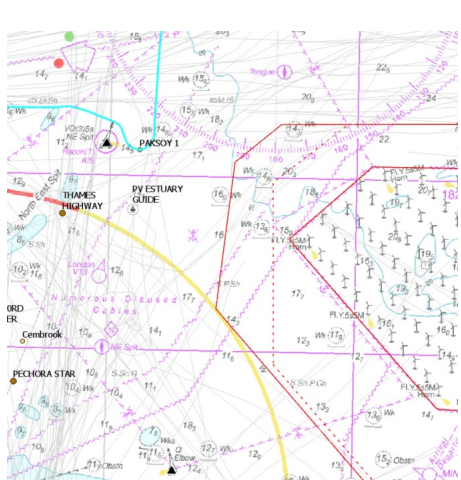
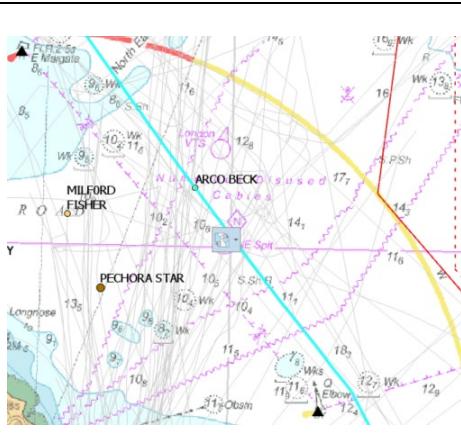
- 30th_November_2017_AdverseMetoceanRestrictedOperations.mp4.



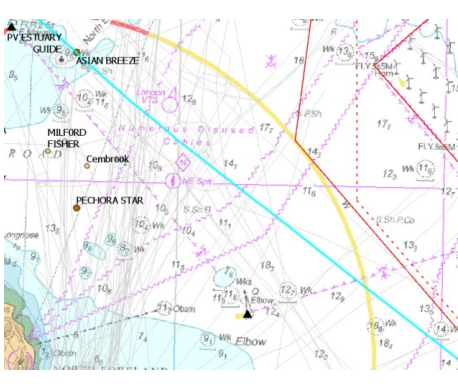
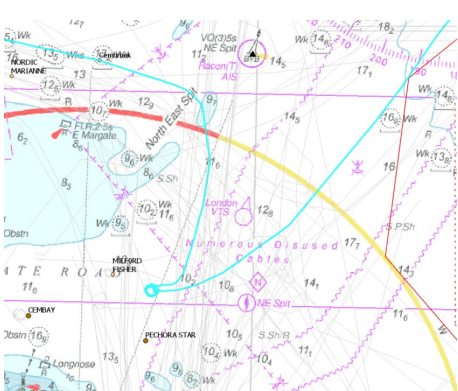
3 Animation Narrative

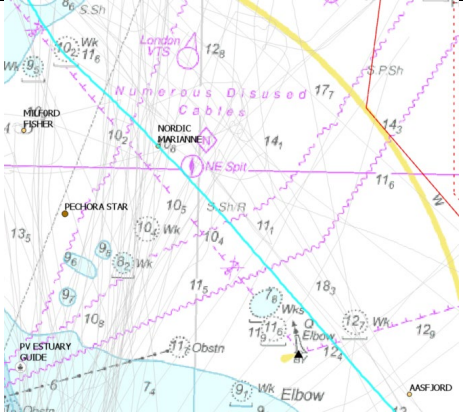
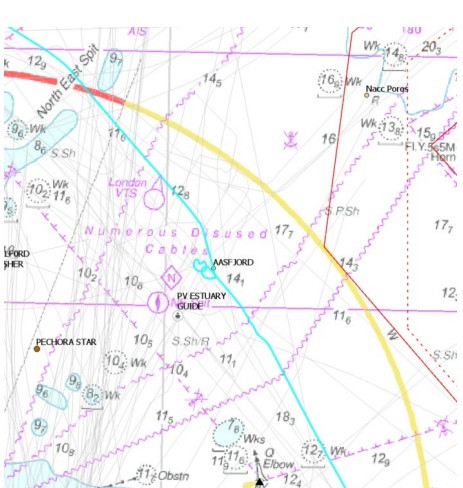
18 The following sections provides a tabulated summary of the animation narratives. The table includes the approximate time of the observation, an image depicting the scenario described including all vessels and a highlighted vessel of interest track, the supporting narrative, and the vessel name(s) with vessel type and length included, with the light blue line indicating the vessel track in question.

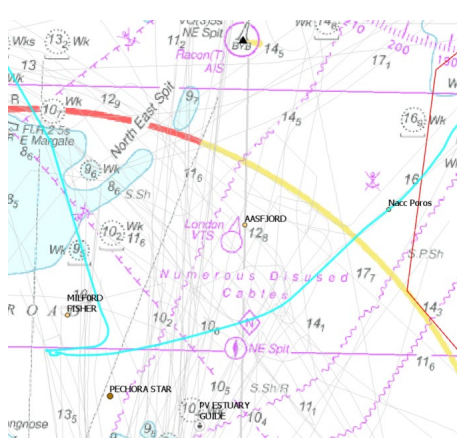

3.2 13th June 2017: Busiest Day – Vessels Over 90m

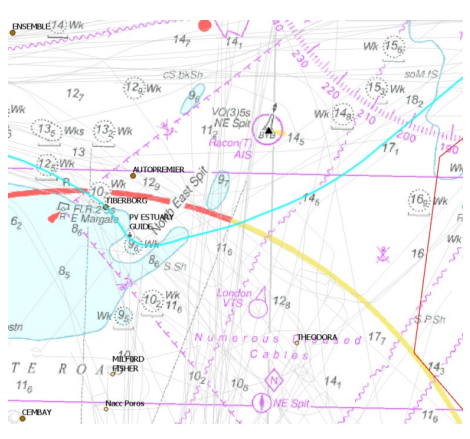
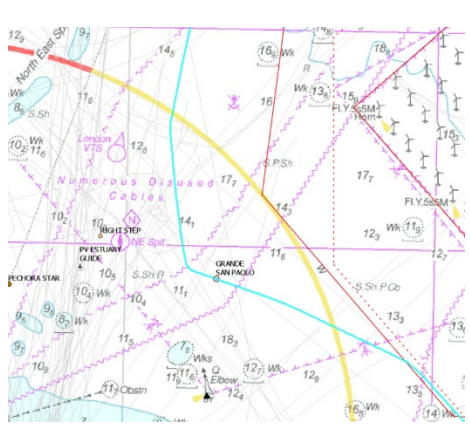

Time	Image	Narrative	Vessel
0218		A 90 to 120m vessels passes close to the East Margate buoy and heads down to the pilot diamond. Pilot transfer takes place to the NW of the pilot diamond and the vessel proceeds outbound to the NE to the east of the NE Spit buoy. This is a standard “dipping down” operation common in the area.	SAND FALCON (120m) Dredger
0500		A 91 to 120m vessel transits through the inshore route from the south inward bound. The vessel passes close to the Elbow buoy well clear of the SEZ and then passes close to the East Margate buoy. This is a standard transit passage for a vessel of this size.	CITY OF LONDON (100m) Dredger
0800		An outbound 120 to 180m vessel lands her pilot by the East Margate buoy and then continues to the east between the NE Spit buoy and the SEZ. It is apparent on this occasion that there is limited dipping down to land her pilot.	SILVER WIND (156m) Passenger

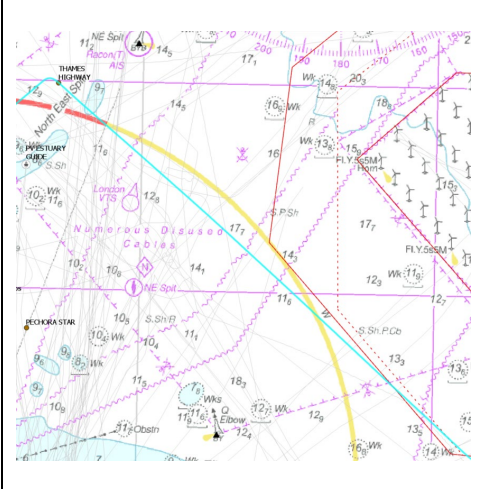
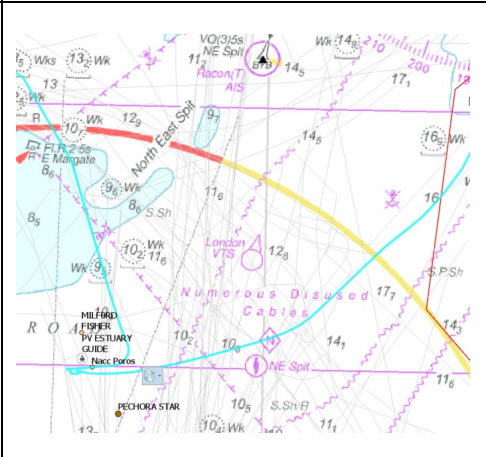
<p>0809</p>		<p>An outbound 120 to 180m vessel passes close to the East Margate and proceeds over the NE Spit bank near low water. The vessel then transits the inshore route passing close to the Elbow buoy and well clear of the SEZ. This is a standard transit passage for a vessel of this size.</p>	<p>ENFORCER (134m) Cargo</p>
<p>1000</p>		<p>An inbound 120 to 180m vessel approaches from the NE and passes on the boundary of the SEZ in the NW corner. The vessel boards a Pilot at 1033 to the NE of the pilot diamond and then proceeds NW to the west of the NE Spit buoy. This is a standard “dipping down” operation common in this area.</p>	<p>THAMES HIGHWAY (148m) Cargo</p>
<p>1021</p>		<p>A 91 to 120m vessel proceeds south from the Tongue Anchorage area to board her pilot. The transfer takes place in the vicinity of the NE Spit buoy and the vessel passes north of NE Spit buoy inbound.</p>	<p>PAKSOY 1 (115m) Cargo</p>
<p>1145</p>		<p>A 91 to 120m vessel transits through the inshore route from the south inward bound. The vessel passes close to the Elbow buoy well clear of the SEZ and then passes close to the East Margate buoy. This is a standard transit passage for a vessel of this size.</p>	<p>ARCO BECK (100m) Tanker</p>

<p>1327</p>		<p>An inbound 120 to 180m vessel approaches from the NE and passes close to the SEZ boundary on the NW corner. The vessel boards a pilot at 1355 to the NE of the pilot diamond and then proceeds NW to the west of the NE Spit Buoy. The vessel passes an outbound 180 to 240m vessel in the vicinity of the East Margate buoy at 1409. This is a standard “dipping down” operation common in this area.</p>	<p>JORK ROVER (141m) Cargo</p>
<p>1409</p>		<p>An outbound 180 to 240m vessel passes close to the East Margate buoy and proceeds over the NE Spit bank at high water landing her pilot well to the NW of the pilot diamond. The vessel continues on passage to the east passing close to the east of the NE Spit buoy and well clear of the SEZ. This is a standard “dipping down” operation comon in this area.</p>	<p>CMA CGM AFRICA FOUR (228m) Cargo</p>
<p>1506</p>		<p>An outbound 120 to 180m vessel passes close to the East Margate buoy and proceeds over the NE Spit bank 2 hours after HW. The vessel lands her pilot at 1521 at the vessel continues to transit south through the inshore route. The vessel passes close to the SW corner of the SEZ and astern of a 91 to 120m vessel which is inward bound for the Port of Ramsgate. This is a standard transit passage for a vessel of this size.</p>	<p>ASIAN BREEZE (164m) Cargo</p>
<p>1654</p>		<p>A 91 to 120m vessel gets underway from the Margate Roads anchorage and boards her pilot to the NW of the pilot diamond. The vessel proceeds inbound passing to the west of the NE Spit buoy over the tail of NE Spit bank and passes and outbound ship at 1724 in the vicinity of the East Margate buoy. This is a standard transit passage for a vessel leaving the anchorage and proceeding in bound. The tight “turn” shown is just the vessel swinging around at anchor and was not the actual pilot transfer itself. Once the vessel gets underway it then boards its pilot to the NE of the</p>	<p>CEMBROOK (100m) Cargo</p>


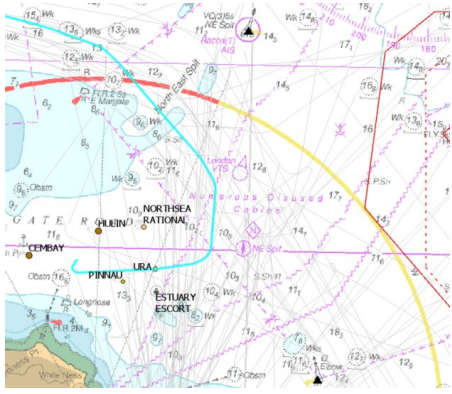

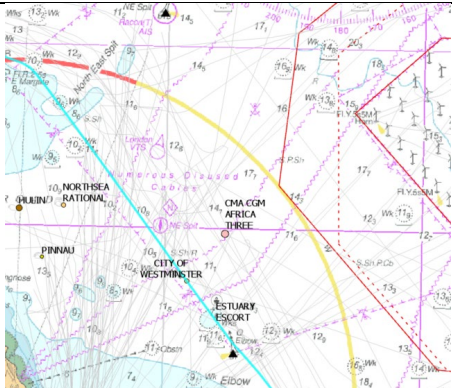
		<p>diamond and proceeds north inward bound.</p>	
<p>1724</p>		<p>An outbound 91 to 120m vessel passes close to the East Margate buoy and proceeds over the NE Spit bank 4 hours after HW. The vessel lands her pilot to the NW of the pilot diamond and continues to transit through the inshore route. She passes close to the Elbow buoy and encounters at 1748 another vessel heading north via the inshore route in the vicinity of the Elbow buoy and well clear of the SEZ. This is a standard transit passage for a vessel of this size.</p>	<p>NORDIC MARIANNE (100m) Tanker</p>
<p>1748</p>		<p>An inbound 91 to 120m vessel transits the inshore route passing another vessel in the vicinity of the Elbow buoy. The vessel arrives in the vicinity of the pilot diamond at 1800 and waits for the pilot boat which arrives at 1909. Another 91 to 120m is approaching from the NE of the wind farm as the pilot boards but is of no concern. The vessel then proceeds NW to the west of the NE Spit buoy and passes over the NE Spit bank. This is a standard transit passage for a vessel of this size.</p>	<p>AASFJORD (114m) Cargo</p>

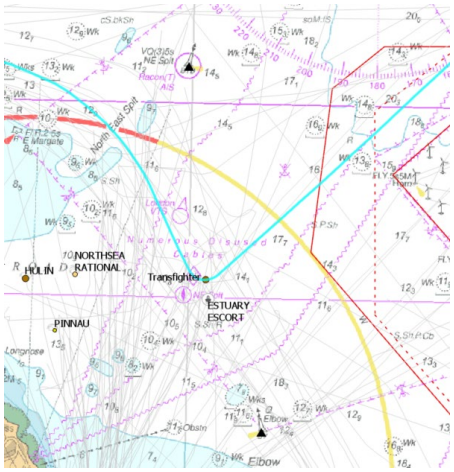
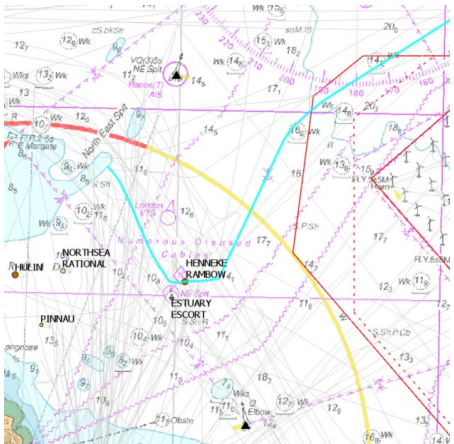
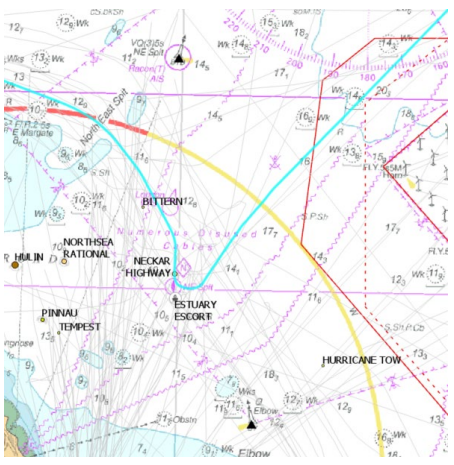
<p>1851</p>		<p>A 91 to 120m approaches from the NW of the windfarm and proceeds to the Margate Roads anchorage. The vessel passes well clear of the previous vessel which was boarding a pilot. This is a standard transit passage for an outbound vessel to the anchorage.</p>	<p>NACC POROS (120m) Cargo</p>
<p>1945</p>		<p>Two vessels are observed heading for the pilotage diamond. The first is 91 to 120m and is outbound which passes close to the East Margate buoy and passed over the NE Spit bank at approximately LW. The second vessel which is 120 to 180m is inbound and approaches from the NE and passes on the boundary of the SEZ in the NW corner down to the pilot diamond. The pilot boards the inbound vessel first at 2000 to the NE of the pilot diamond and the pilot boat then proceeds to the smaller outbound vessel. The transfer takes place close to the NW of the pilotage diamond and the outbound vessel then continues on passage to the east transiting to the east of the NE Spit buoy and clear of the SEZ. There was plenty of sea room for the simultaneous transfers well clear of the SEZ. The inbound vessel heads NW and passes to the west of the NE Spit buoy and passed over the NE Spit bank at LW. She encounters another outbound 120 to 180m vessel in the vicinity of the East Margate buoy at 2012. Both vessel tracks are a standard "dipping down" operation common in this area.</p>	<p>THEODORA (110m) Tanker AUTO PREMIER (126m) Cargo</p>

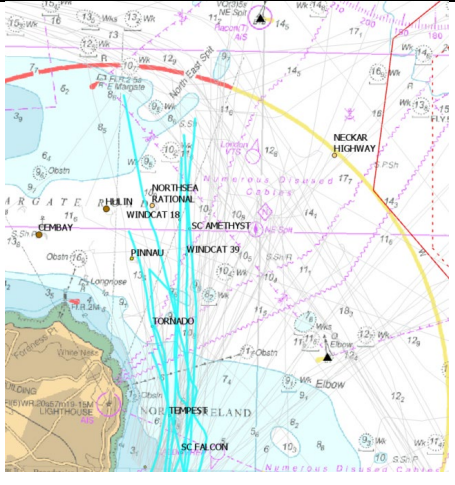
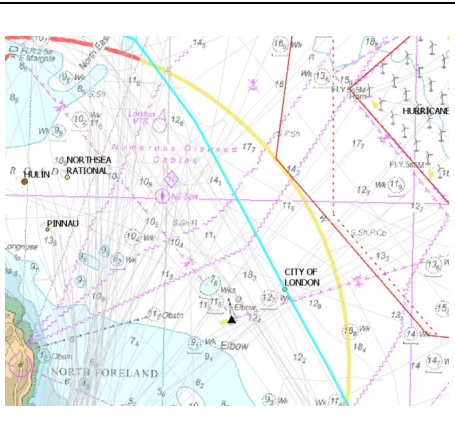
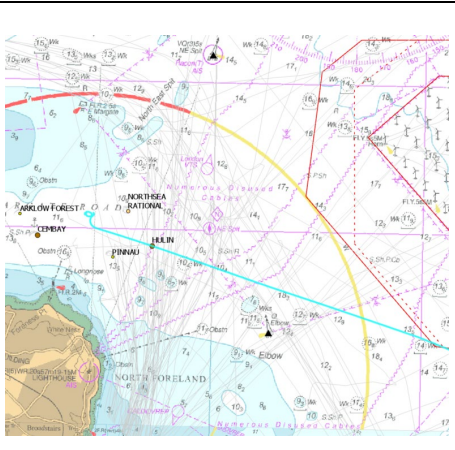

<p>2011</p>		<p>An outbound 120 to 180m vessel passes close to the East Margate buoy and lands her pilot in this vicinity on the NE Spit bank at LW. The vessel continues on her passage to the east passing to the east of the NE Spit buoy and clear of the SEZ. This is a standard transit passage for a vessel in this area.</p>	<p>TIBERBORG (172m) Cargo</p>
<p>2057</p>		<p>An inbound 180 to 240m vessel is seen passing the NE Goodwin pilot diamond transiting the inshore route on the boundary of the SEZ in the SW corner. The vessel heads towards the pilot diamond and encounters a vessel 91 to 120m which is boarding a pilot having recently got underway from the Margate Roads anchorage. The pilot boards at approximately 2200 and the vessel proceeds inbound passing to the east of the NE Spit and well clear of the SEZ 3 hours before HW. This is a standard transit passage for a vessel of this size.</p>	<p>GRANDE SAN PAOLO (214m) Cargo</p>
<p>2124</p>		<p>A 91 to 120m vessel gets underway from the Margate roads anchorage and proceeds towards the pilotage diamond. Her pilot boards at 2154 and the vessels proceeds inward bound passing close to the East Margate buoy and over the NE Spit bank. This is a standard transit passage for a vessel leaving the anchorage and proceeding inbound.</p>	<p>RIGHT STEP (101m) Cargo</p>

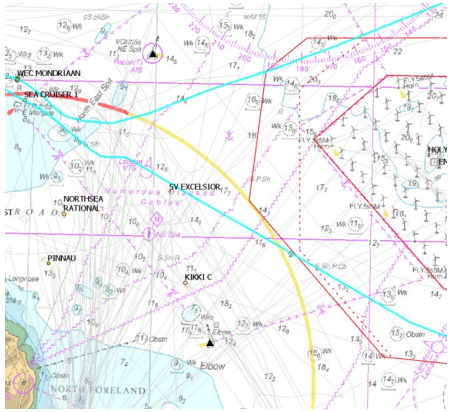

<p>2224</p> 	<p>An outbound 120 to 180m vessel passes close to the East Margate buoy and over the NE Spit bank 3 hours before HW. The pilot lands between the East Margate and NE Spit buoy and then proceeds south through the inshore area proceeding close to the SEZ on the SW side. This is a standard transit passage for a vessel of this size.</p>	<p>THAMES HIGHWAY (148m) Cargo</p>
<p>2333</p> 	<p>A 91 to 120m vessel gets underway from the East Margate anchorage at 2333. Her pilot boards in the anchorage and the vessel proceeds inbound passing over the NE Spit bank and close to the East Margate buoy 2 hours before HW. This is a standard transit passage for a vessel leaving the anchorage and proceeding inbound.</p>	<p>NACC POROS (120m) Cargo</p>

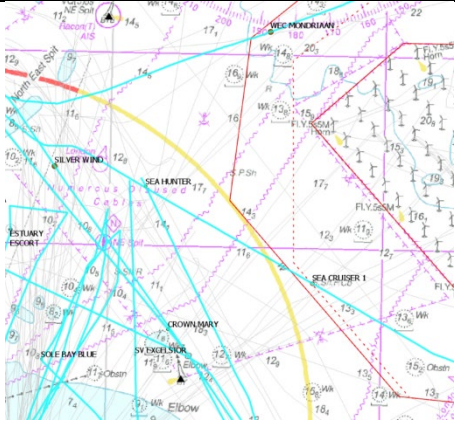
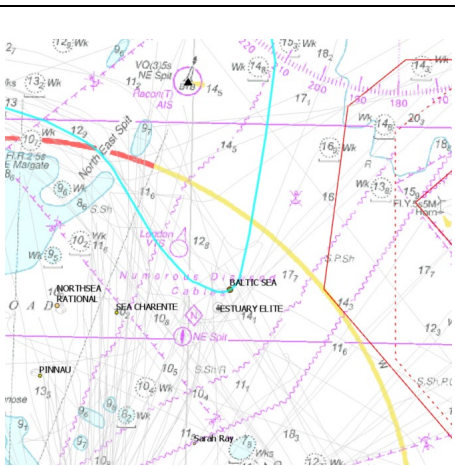
3.3 1st August 2017: Busiest Day – All Vessels

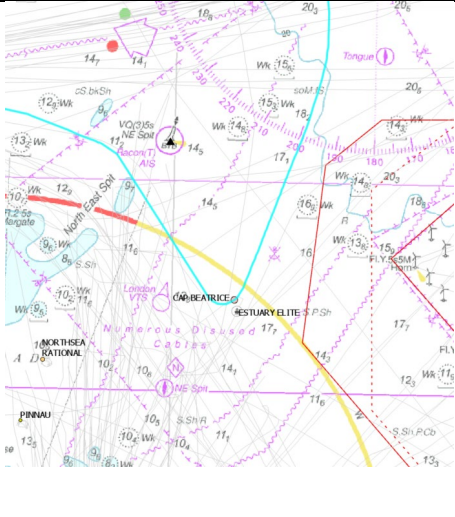
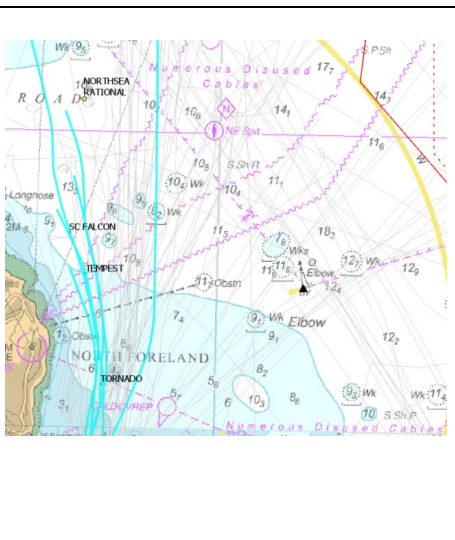
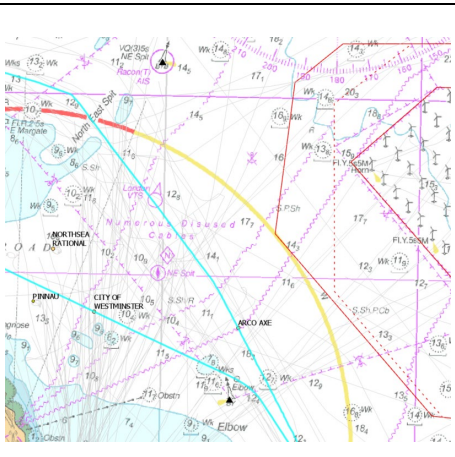

Time	Image	Narrative	Vessel
0001		A 91 to 120m vessel proceeds south through the inshore route passing close to the Elbow buoy and well clear of the SEZ. This is a standard transit passage for a vessel of this size.	ARCO AXE (98m) Dredger
0039		A 91 to 120m vessels gets underway from the Margate Roads anchorage and boards a pilot close west of the pilotage diamond. The vessel proceeds inbound passing over the NE Spit bank and close to the East Margate buoy. This is a standard transit passage for a vessel departing the anchorage and proceeding inbound.	URA (120m) Cargo
0112		An inbound 180 to 240m vessel transits north through the inshore route clear of the SEZ. The vessel boards her pilot at 0154 and then continues inbound passing a smaller 91 to 120m which was proceeding south through the inshore route. The vessel passes to the west of the NE Spit buoy and passes over the NE Spit bank 4 hours before HW. This is a standard transit passage for a vessel of this size keeping a little further to the east in deeper water.	CMA CGM AFRICA THREE (228m) Cargo
0133		An outbound 91 to 120m vessel passes close to the East Margate buoy and passes over the NE Spit bank 4 hours before HW. She encounters a larger 180 to 240m vessel in in the inshore route and passes clear proceeding south through the inshore route and close to the Elbow buoy. This is a standard transit passage or a vessel of this size.	CITY OF WESTMINSTER (100m) Dredger

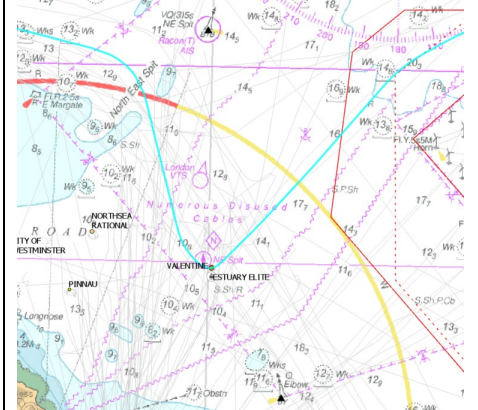
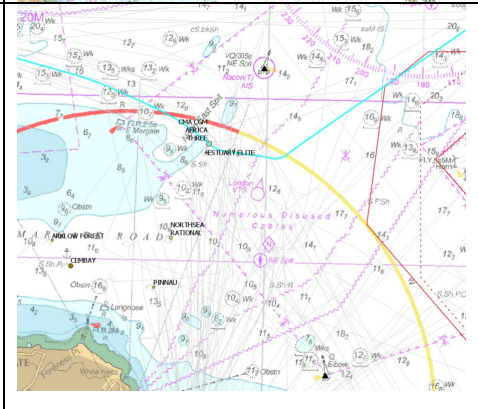
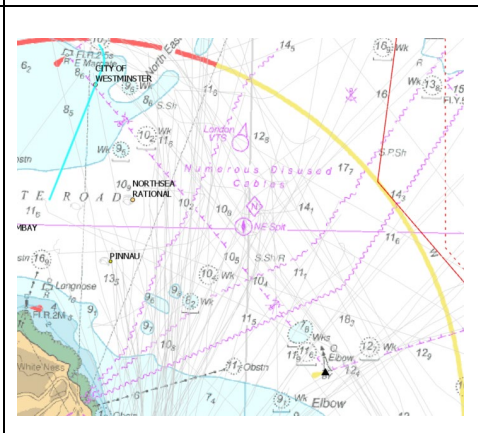
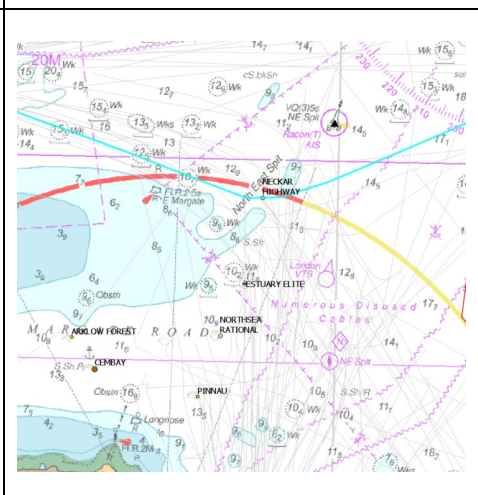
<p>0203</p>		<p>A 120 to 180m inbound vessel approaches from the NE and passes just inside the NW corner of the SEZ. The vessel boards her pilot in the vicinity of the pilotage diamond and then proceeds NW to the west of the NE Spit buoy and across the NE Spit back 3 hours before HW. This is a standard “dipping down” operation for a vessel of this size.</p>	<p>TRANSFIGHTER (179m) Cargo</p>
<p>0515</p>		<p>An outbound 120 to 180m vessel passes over the NE Spit bank to the west of the NE Spit buoy 1 hour before HW. The vessel lands her pilot at the pilotage diamond and then continues her passage to the east passing between the NE Spit buoy and the SEZ.</p>	<p>HENNEKE RAMBOW (134m) Cargo</p>
<p>0612</p>		<p>An inbound 90 to 120m vessel approaches from the NE passing between the NE Spit buoy and the SEZ. The vessel boards her pilot at the pilotage diamond and proceeds NW across the NE Spit bank and close to the East Margate buoy 1 hour after HW. This is a standard “dipping down” operation for a vessel of this size.</p>	<p>NECKAR HIGHWAY (100m) Cargo</p>

<p>0630</p>		<p>Numerous small craft less than 50m are observed departing Ramsgate. These are windfarm service vessels following pre determined and frequently used transit routes through the area.</p>	<p>WINCAT 18, SC AMETHYST, SC FALCON, TEMPEST, TORNADO, WINDCAT 39</p> <p>All <50m & Wind Farm Service Vessels</p>
<p>0845</p>		<p>An inbound 91 to 120m vessel transits the inshore route passing the Elbow and East Margate buoys passing over the NE Spit bank. This is a standard transit passage for a vessel of this size.</p>	<p>CITY OF LONDON (100m) Dredger</p>
<p>1015</p>		<p>A 120 to 180m vessel gets underway from the Margate Roads anchorage and proceeds south through the inshore route passing close to the SEZ boundary in the SW corner. This is a standard transit passage for a vessel leaving the anchorage and proceeding south.</p>	<p>HULIN (128m) Tanker</p>
<p>1054</p>		<p>An outbound 91 to 120m passes over the NE Spit bank 5 hours after HW. The vessel lands her pilot in the vicinity of the pilotage diamond and then continues south through the inshore route. She passes close to the Elbow buoy where in this vicinity she encounters a smaller vessel of 50 to 90m transiting to the north. The smaller vessel gives way by altering her course to starboard and the vessels pass one another at a safe distance well clear of the SEZ. This is a standard</p>	<p>KIKKI C (106m) Cargo</p>

		<p>transit passage for a vessel of this size.</p>	
<p>1112</p>		<p>Two outbound vessels pass close to the East Margate buoy. The smaller vessel of 91 to 120m is overtaking a larger vessel of 120 to 180m. Both vessels pass over the NE Spit bank 5 hours after HW. The smaller vessel transits east through the SW sector of the SEZ. The larger vessel lands her pilot to the north of the pilotage diamond and then continues on passage to the east passing close to the NW corner of the SEZ. A third vessel of less than 50m also overtakes the larger vessel at 1121 in the vicinity of the East Margate buoy. All transit passages are standard for the vessels in question.</p>	<p>WEC MODRIAN (134m) Cargo</p> <p>SEA CRUISER 1 (114m) Cargo</p>
<p>1130</p>		<p>An outbound 120 to 180m vessel passes close to the East Margate buoy and across the NE Spit bank at LW. The vessel lands her pilot to the NNW of the pilotage diamond and proceeds south through the inshore route passing close to the Elbow buoy. This is a standard transit passage for a vessel of this size.</p>	<p>SILVER WIND (156m) Passenger</p>

<p>1130</p>		<p>This is a very busy time in the sea area to the west of the windfarm with a mix of 8 vessels from less than 50 to up to 240m in length. These vessels are either transiting north or south through the inshore route and all vessels pass safely clear of one another. Despite being extremely busy the smaller vessels follow the trend of keeping to the west of the area. This then leaves plenty of sea room for the larger commercial vessels.</p>	<p>EXCELSIOR (23m) Recreational</p> <p>ESTUARY ESCORT (15m) Pilot</p> <p>SOLE BAY BLUE (17m) Recreational</p> <p>CROWN MARY (88m) Cargo</p> <p>WEC MONDRIAAN (134m) Cargo</p> <p>SILVER WIND (156m) Passenger</p> <p>SEA HUNTER (87m) Cargo</p> <p>SEA CRUISER 1 (114m) Cargo</p>
<p>1151</p>		<p>A vessel of 120 to 180m gets underway from the Tongue anchorage and heads south to the pilotage diamond. The vessel boards her pilot to the NE of the pilotage diamond and then proceeds NW to the west of the NE Spit buoy and over the NE Spit bank 5 hours before HW. This is a standard “dipping down” operation for a vessel of this size and it is clear from this track that the vessels turning movement is conducted in relatively small radius, covering approximately 0.5nm.</p>	<p>BALTIC SEA (171m) Cargo</p>

<p>1433</p>		<p>An inbound vessel 180 to 240m gets underway from the Tongue anchorage and proceeds south passing to the east of the NE Spit buoy and clear of the SEZ. The vessel boards her pilot to the NE of the pilotage diamond and proceeds inbound passing to the west of the NE Spit buoy and over the NE Spit bank 3 hours before HW. This is a standard “dipping down” operation for a vessel of this size. This demonstrates a large vessel boarding a pilot comfortably and ‘dipping’ into effectively a U-turn to do so.</p>	<p>CAP BEATRICE (210m) Cargo</p>
<p>1639</p>		<p>Numerous wind farm vessels were observed proceeding back to Ramsgate. They are following pre determined routes and stay well to the west of the operational area.</p>	<p>SC FALCON (18m) Wind Farm Service Vessel TEMPEST (21m) Wind Farm Service Vessel TORNADO (21m) Wind Farm Service Vessel</p>
<p>1717</p>		<p>Two inbound vessels of 91 to 120m transit from the south through the inshore route. The first proceeds to the Margate roads anchorage whilst the second passes over the NE Spit bank between the East Margate and NE Spit buoys. These are standard transit passages for these vessels.</p>	<p>CITY OF WESTMINSTER (100m) Dredger ARCO AXE (98m) Dredger</p>
<p>1827</p>		<p>An inbound 120 to 180m vessel approaches from the NE and passes close inside the SEZ in the NW corner. She boards her pilot at the pilotage diamond before proceeding NW over the NE Spit bank and between the NE Spit and East Margate buoys. This is a standard “dipping down” operation for a vessel of this size.</p>	<p>VALENTINE (163m) Cargo</p>

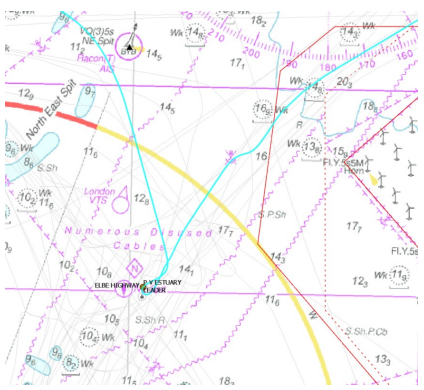
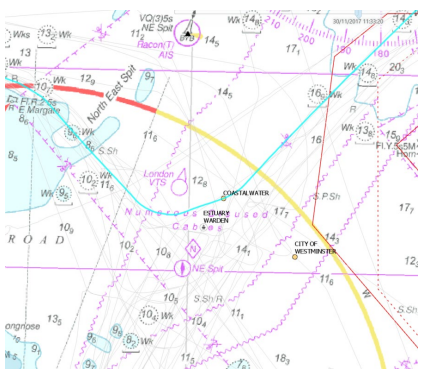
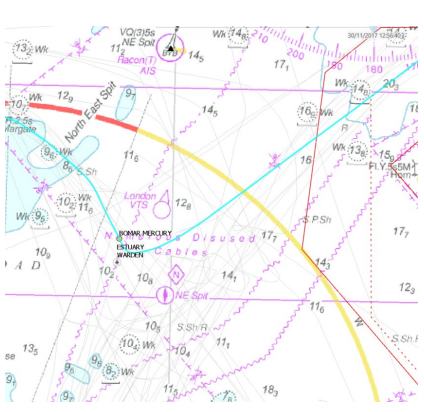
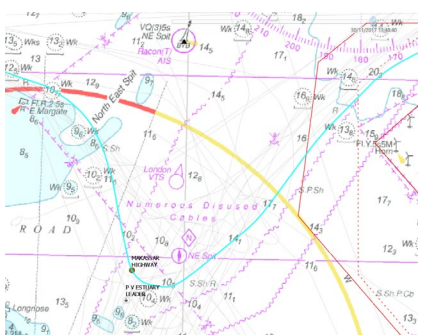
		<p>Whilst the vessel cuts across the boundary of the SEZ, the turn it makes at the pilot diamond occurs in a small area, reflecting that such vessels can and regularly do make significant (approximately 120 degree) turns in relatively little sea room, despite a much larger area being open</p>	
<p>2042</p>		<p>An outbound 180 to 240m vessel passes over the NE Spit bank 2 hours before HW, the vessel lands her pilot between the NE Spit buoy and the pilotage diamond and then proceeds to the east clear of the SEZ. This is a standard “dipping down” operation for a vessel of this size.</p>	<p>CMA CGM AFRICA THREE (228m) Cargo</p>
<p>2236</p>		<p>An inbound 91 to 120m vessel gets underway from the Margate Roads anchorage and proceeds over the NE Spit bank close to the East Margate buoy. This is a standard transit passage for a vessel proceeding into the anchorage.</p>	<p>CITY OF WESTMINSTER (100m) Dredger</p>
<p>2233</p>		<p>An outbound 91 to 120m vessel passes close to the East Margate buoy passing over the NE Spit bank 5 hours after HW. The vessel lands her pilot north of the pilotage diamond and then continues passage to the east passing between the NE Spit buoy and well clear of the SEZ. This is a standard “dipping down” operation for a vessel of this size.</p>	<p>NECKAR HIGHWAY (100m) Cargo</p>

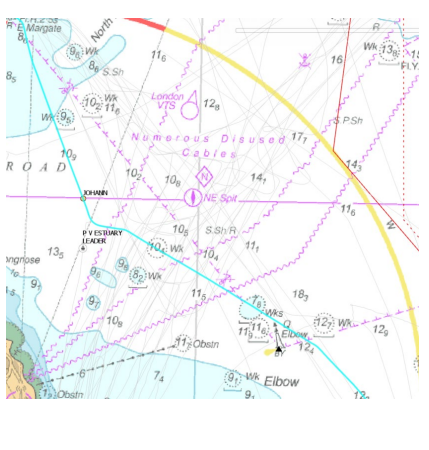
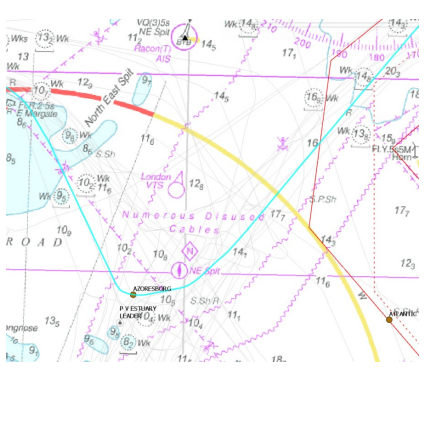


3.4 30th November 2017: Adverse Weather Day – All Vessels

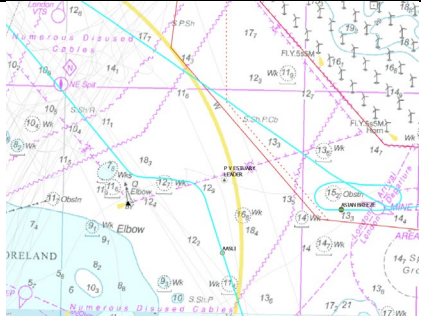
- Wind NW at speeds up to 25 knots, noting that this is considered a limit state in some locations by ESL;
- Swells exceeding 2.5m early morning and building late evening; and
- Tongue Pilot Station “Off Station”.

Time	Image	Narrative	Vessel
0009		An outbound 90 to 120m vessel “dips down” passing close to the East Margate buoy and heads down to disembark her pilot almost on top of the diamond and the vessel proceeds outbound to the NE to the east of the NE Spit buoy and along the edge of the SEZ.	SAND FALCON (120m) Dredger
0215		A 120-180m vessel “dips down” passing south of the NE Spit Buoy and embarks her pilot close to the diamond and then retraces her route back to the NW once again passing south of the NE Spit Buoy – Given the unusual approach to NE Spit, this vessel may have diverted from the SUNK.	MAKASSAR HIGHWAY (139m) Cargo
0245		An outbound 180 to 203m vessel “dips down” passing close to the East Margate buoy and heads down to disembark her pilot 0.5nm to the north of the diamond and the vessel proceeds outbound to the NE to the east of the NE Spit buoy passing the boundary of the SEZ as she does so.	STI HACKNEY (184m) Tanker

<p>0348</p>		<p>An inbound 180 to 203m vessel “dips down.” She passes the previous outbound vessel (0245) in the vicinity of the Tongue diamond (and crosses the boundary of the SEZ) and boards her pilot close to the NE of the NE Spit diamond doing a round turn on the process. She then proceeds south of the NE Spit Buoy inbound. This passing is not considered to be out of the ordinary and neither vessel needed to take action to avoid collision. A full round turn was undertaken in poor metocean conditions, at night, in a relatively small area, well outside of the SEZ.</p>	<p>MSC EYRA (203m) Cargo</p>
<p>0457</p>		<p>An inbound 120 to 180m vessel approaches from the N, passes to the east of the NE Spit buoy and boards her pilot close to the East of the diamond. She then heads inbound over the NE spit bank south of the NE Spit buoy. This demonstrates a similar manoeuvre to the vessel at 0348.</p>	<p>HARBOUR FIRST (144m) Tanker</p>
<p>0657</p>		<p>An inbound 120 to 180m vessel approaches from the NE (passing over the boundary of the SEZ) passes to the east of the NE Spit buoy and boards her pilot just less than 0.5m east of the diamond, performing a round turn as she does so. She then heads inbound south of the NE Spit Buoy.</p>	<p>ALDEBARAN J (140m) Cargo</p>

<p>1000</p>		<p>An inbound 120 to 180m vessel approaches from the NE (passing close to the boundary of the SEZ, but outwith the proposed area in which above sea structures may be placed) passes to the east of the NE Spit buoy and boards her pilot almost exactly on top of the diamond. She then heads inbound south of the NE Spit Buoy.</p>	<p>ELBE HIGHWAY (148m) Cargo</p>
<p>1133</p>		<p>An outbound inbound 90 to 120m vessel passes close to the E Margate Buoy and disembarks her pilot very close to the north of the diamond. She then heads outbound to the NE clipping the outermost edge of the SEZ boundary as she does so. During disembarkation, another inbound vessel which does not embark a pilot passes close astern – it is reasonable to assume that this close pass was agreed over the radio with the disembarking pilot or with the pilot cutter.</p>	<p>COASTAL WATER (91m) Tanker</p>
<p>1300</p>		<p>An outbound 90 to 120m vessel “dips down” passing close to the East Margate buoy and heads down to disembark her pilot almost on top of the diamond and the vessel proceeds outbound to the NE to the east of the NE Spit buoy clipping the edge of the SEZ boundary as she does so.</p>	<p>BOMAR MERCURY (120m) Tanker</p>
<p>1348</p>		<p>An outbound 120 to 180m vessel “dips down” passing close to the East Margate buoy and heads down to disembark her pilot 0.2nm to the west of the diamond and the vessel proceeds outbound to the NE to the east of the NE Spit buoy passing the boundary of the SEZ as she does so.</p>	<p>MAKASSAR HIGHWAY (139m) Cargo</p>

<p>1812</p>		<p>An outbound 90 to 120m vessel passes close to the East Margate buoy and heads down to disembark her pilot 0.6nm to the west of the diamond (and outside of the no anchoring area) and the vessel proceeds outbound via the inshore channel to the south east. Characteristic of a typical vessel movement, transiting the inshore route, buoy hopping</p>	<p>JOHANN (117m) Cargo</p>
<p>2045</p>		<p>An outbound 120 to 180m vessel “dips down” passing close to the East Margate buoy and heads down to disembark her pilot 0.2nm to the south west of the diamond and the vessel proceeds outbound to the NE to the east of the NE Spit buoy passing the boundary of the SEZ as she does so. At this point the metocean conditions are deteriorating, however the vessel is still able to board a pilot well outside of the SEZ in a relatively small area.</p>	<p>AZORESBOG (143m) Cargo</p>
<p>2157</p>		<p>Two outbound 120 to 180m vessels in line astern separated by 2nm, “dip down” pass close to the East Margate buoy and head down to disembark their pilots 0.3nm to the south of the diamond. Both vessels consecutively then proceed outbound to the NE to the east of the NE Spit buoy passing the boundary of the SEZ as they do so. The neatness of the manoeuvre clearly indicates that the two embarked pilots have coordinated the transfers to achieve sufficient separations and to execute the transfers closer to Ramsgate than would be normal. This is all being undertaken at the time of highest significant wave height and to the west of the no anchoring area, demonstrating the propensity to board vessels closer to shore (and consequentially further away from the wind farm) in poor metocean conditions. This is also the first double transfer of the day.</p>	<p>ALDEBARAN J (140m) Cargo ELBE HIGHWAY (148m)</p>
<p>2258</p>		<p>An outbound 90 to 120m vessel passes close to the East Margate</p>	<p>AASLI (99m) Cargo</p>

		<p>buoy and conducts a pilot disembarkation in the vicinity of the Elbow buoy. This unusual position has clearly been agreed with the embarked pilot to allow the pilot cutter to meet the second vessel. This in an inbound 120 to 180m vessel which has come south around the boundary of the windfarm and embarks her Pilot within the SEZ and approximately 2nm east of the elbow buoy. She also performs a round turn while doing so, on completion she then starts her entry inbound to London passing close to the East Margate Buoy. Given this was undertaken in relatively close proximity to the existing wind farm, further offshore from the Elbow buoy, there is no reason why this could not be undertaken further south.</p>	<p>ASIAN BREEZE (164m) Cargo</p>
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4 Summary

19 The following section provides concluding comments from Captain Simon Moore and Commander Paul Brown relating to the overall observations made across the duration of each of the animations.

4.2 Concluding Remarks – Captain Simon Moore

- The animations show a pattern of movement which are considered to be representative. The vast majority of vessels elected to transit between the East Margate and NE Spit buoys passing over the NE Spit bank regardless of the height of tide.
- There were very few simultaneous pilotage operations despite the higher density of traffic on 13 June and 1 August. The simultaneous pilot boarding and landing operations were conducted well clear of the SEZ, and therefore notably clear of the proposed area in which turbines may be placed at all times and in adequate of sea room.
- It was observed that boarding and landing operations do not take place exclusively in the vicinity of the NE Spit pilotage diamond. The vast majority were completed to the NW and NE of the pilotage diamond.
- It shows that the concentration of vessels passing between the NE Spit buoy and SEZ is very low. Despite these animations representing some of the busiest days there were no multiple ship encounters in this area and therefore any allowance for doing so inherently allows for rare occurrences and/or increases in future traffic density.
- Only one vessel was observed having to give way or take avoiding action. This was completed in adequate sea room between the Elbow buoy and SEZ.
- Most vessels transiting through the inshore route buoy hopped passing close to the Elbow and East Margate buoys well clear of the SEZ.
- No vessels over 240m passed through the inshore route in the 48 hours observed.
- Numerous small vessels were observed in the sea area to the west of the windfarm. These vessels did not adversely impact on pilotage operations or general navigation in the area.
- There is a peak in small vessel movements of less than 50m in the morning around 0630 and again in the evening around 1630. These are mainly the windfarm service vessels proceeding from and to the Port of Ramsgate.
- All inbound and outbound vessels used the Princes Channel exclusively.

- The animations show that the remaining sea room with the SEZ in place is adequate for the size and number of vessels which use the inshore area to the west of the windfarm.

4.3 Concluding Remarks – Commander Paul Brown

- Traffic density appeared to be low during the 24 hours studied, and congestion did not occur.
- There were two double pilot transfers in the period. Both double transfers appear to have been carefully coordinated by the embarked pilots or ESL to allow each vessel plenty of sea room to manoeuvre.
- The majority of vessels elected to transit in or outbound between the East Margate and NE Spit buoys passing over the NE Spit bank regardless of the height of tide.
- Pilot transfer operations in the ‘limit state’ of heavy weather operations seemed to concentrate more in the vicinity of the NE Spit pilotage diamond than in benign conditions. This can be explained by the natural tendency to want to minimise the time in heavy weather in a small pilot cutter and thus the desire to bring the vessels closer inshore and by consequence, further away from the wind farm.
- Most of the vessels exiting or entering towards the NE Spit pilot station followed the short distance track around the north of the existing wind farm and south and east of the NE Spit Buoy. This shows them entering the boundary of the proposed SEZ but infrequently entering the boundary of the area in which turbines are proposed to be placed.
- No vessels over 240m passed through the inshore route in the 24 hours observed and whilst it is recognised that larger vessels do occasionally transit the area, this is representative of the general conditions.
- All inbound and outbound vessels used the Princes Channel exclusively.
- The animations show that the remaining sea room with the SEZ in place is adequate for the size and number of vessels which use the inshore area to the west of the windfarm.

5 References

- CCO 2019, Regional Coastal Monitoring Programme – Goodwin Sands, viewed 02 May 2019,
https://www.channelcoast.org/data_management/real_time_data/charts/?chart=70.
- Rospisaniye Pogodi Ltd 2019, Weather in Manston (airport), viewed 02 May 2019,
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