



## Transit Great Belt Bridge Northbound with Maximum Draft

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# DanPilot – Stigsnaes & Ensted +15m

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## Abstract

At the request of Inter Terminals Denmark, this report has been undertaken by DanPilot. The focus of the report is to investigate the possibilities regarding northbound sailings from Stigsnaes and Ensted Oil Terminals, passing the Great Belt Bridge, for laden vessels with a draft exceeding 15.0 m (Suezmax).

In order to investigate the feasibility of such sailings, simulator tests as well as real time tests were carried out by DanPilot. All tests were conducted on the basis of vessels of a similar size (Suezmax), to ensure the best foundation for the findings in this report.

In addition, DanPilot carried out a risk assessment, which is included in this report.

The pilotage of any such deep-draft voyage will take place according to our usual Service Terms and Conditions. The Service Terms and Conditions can be found at [www.danpilot.dk](http://www.danpilot.dk).

For further safe voyage planning, see.<sup>1</sup>

## Current limitations

At present, northbound sailings passing the Great Belt Bridge are limited to a maximum of 15.0 m draft, due to the water depth restrictions of 17.0 m southeast of Gedser in *Kadett Renden* (pos. 58°38'1 N; 012°21'9 E).

New soundings show that at the East Bridge area of the Great Belt, a maximum depth of 18.25 m exists in a 130 m wide channel. In order to navigate in this area offering 18.25 m water depth, the navigating vessel must remain close to the center line in the northbound separation. In addition, the width of the channel with a depth of 17.25 m is 350 m. See Fig. 003.

## Overall description and findings

The following description of the transit from Stigsnaes, for vessels with a draft exceeding 15.0m, should be noted.

To date, DanPilot has conducted simulator trials in the area concerned, with vessels with drafts of 17,0 m. These simulations were performed over the course of two full days, and with two pilots operating independently. The trials were subject to various weather conditions (wind and currents) in order to fully evaluate the impact of currents, wind and swells. No mishaps or near-misses occurred during the extensive simulation testing.

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<sup>1</sup> <http://www.dma.dk/sitecollectiondocuments/publikationer/ntdw.pdf>



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See the following details and report from Force Technology:

Simulator test: FORCE Technology 12/5 – 13/5/2016.

Report/FORCE 116-24157.

A significant number of passages (tracks from pilotages in the northbound lane before the Great Belt Bridge) have been collected by DanPilot, in order to fully evaluate whether maintaining navigation within the 130 m wide lane (with 18.25 m depth as in the survey) would be problematic for Suezmax vessels. See Fig. 001.

## **Status 2019**

At present, DanPilot has carried out five northbound passages for Suezmax vessels with a draft exceeding 15.0 m. See Fig. 002, as well as “Actual pilotages performed” at the end of this report for further details.

When conducting these passages, your pilot from DanPilot will bring onboard a “PPU” (Portable Pilot Unit), as well as navigation instruments, in order to ensure optimum reliability and safety for vessel, cargo and crew. DanPilot uses a special CAT ROT and CAT1, in order to connect to GLONAS/SBAS signals during the pilotage. At a later stage, DanPilot will introduce the use of an RTC system, which receives independent position updates.

In order to be fully updated on developments, Inter Terminals will be supplied with tracks for the pilotages passing the area, together with a Statement of Facts (water level, current, wind and traffic report). This information will be supplied by DanPilot.

In the interest of optimum safety for the vessel, cargo and crew, DanPilot has agreed with Great Belt VTS that vessels navigating southbound will be advised by VTS to keep a westerly course during passage, while a deep-draft Suezmax vessel is proceeding northbound. (Vessel Traffic Service - VTS)

When commencing a northbound passage with a deep-draft vessel, DanPilot will place two experienced and highly professional pilots onboard. The pilots will board the vessel at the point of departure and remain onboard until the vessel is safely north of the Great Belt Bridge.

All bathymetric data from the survey will be loaded into the pilot’s PPU (Chart). *See Fig. 003.*

On the basis of the simulations and actual pilotages performed, DanPilot has conducted a Risk Assessment regarding the maximum permitted current and wind conditions, as well as the water level at the time of passage. See Fig. 004.



# DanPilot – Stignæs & Ensted +15m

## Risk matrix

On the basis of the simulations and actual pilotages conducted, below is a risk matrix, based on the risk assessment performed by DanPilot.

Departure Stignæs /Ensted "tss-bridge-N"	>15-16,5m			Bridge passage North bound lane
Wind speed max. 15 m/sec.				
Current force/ Current dir	0-1	1 – 1.5	1.5 – 2-0	2- 3
North dir.				
South dir.				

Wind speed from >15 to 20 m/sec				Bridge passage North bound lane
Current force/ Current dir	0-1	1 – 1.5	1.5 – 2-0	2- 3
North dir.				
South dir.				

Low	Normal
Medium	Attention – by decreasing values and +waterlevel = ok
High	No transit

Figure 004.



# DanPilot – Stigsnaes & Ensted +15m

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	<b>Max. Acceptable low water – during passage bridge area</b>
15,00m – 16,00m	Min. -30 cm
16,01m – 16,30m	Min. -20 cm
16,31m – 16,50m	Min. -10 cm

**Important!** In the conclusions from Force Technology, the maximum current is stated to be 1.0 knot north- or southbound. The reason for allowing 1.5 knots above is that the simulations conducted were based on a draft of 17.0 m. DanPilot recommends a maximum draft of 16.5 m at water level = 0.

The risk matrix concerns the current at the bridge area and departure from Stigsnaes Oil Terminal. At Ensted Oil Terminal the current is not an issue.

It must also be noted that the current very rarely exceeds 1.5 knots – for 90% of the year the current is below this figure.

The route southbound in route T into Stigsnaes and Ensted (not Kadet-renden!) is without problems (UKC) for 17 m draft and has already been used for many years. For the northbound passage from Ensted we do have enough water all the way, except for the area in the northbound lane (bridge), and therefore the same risk matrix must be used.

The UKC allowance is always up to the captain and owners of the vessel.

The vessel's AIS plug must be in order – to be used together with the Cat-rot system.

For arrival and departure, Stigsnaes and Ensted, see Port Regulations May 2016 (Stigsnaes) and Port Information and Safety Regulations (Ensted) January 2016.

## Conclusions from Force Technology

The conclusion below has been translated from Danish to English by DanPilot.

“The following conclusions apply solely to the simulated vessel, under the simulated weather conditions. These conclusions and recommendations are based on a high number of simulations, as deemed adequate to describe the operating conditions regarded by the pilots to be the most adverse conditions under which an operation can be carried out at Stigsnaes.

These conclusions and recommendations are a product of consensus between the participating pilots and consultants.

# DanPilot – Stigsnaes & Ensted +15m



It is possible for a Suezmax vessel navigating at extreme draft (defined as 17.0 m draft) to pass through the suggested channel (130-m wide), while subject to wind speeds of up to 17 m/s and/or currents of up to 1 knot. Simulations show that exceeding the aforementioned limits will result in a severe risk that the vessel will be unable to navigate within the limits of the channel.

In order to safely transit the channel, it is necessary that all traffic in the area maintains a safe distance to the channel at all times. This applies in particular to southbound traffic, which must maintain a safe distance to the center line between the northbound and southbound trade lanes (Route Tango, below the Great Belt Bridge). During the simulations, it was observed that in the event of undesirably close passages between vessels, the pilot would tend to navigate further towards the eastern edge of the channel, resulting in the risk of unintentional grounding of the vessel.

- While there is limited room for navigation within the 130m-wide channel, simulations indicate that navigation is possible under certain conditions, as listed below. The wind speed must be less than 17 m/s and currents must not exceed 1 knot, due to the drifting and manoeuvring of the vessel (large rudder angles and significant engine power).
- The transit area must be free of other traffic, meaning that all other vessels must maintain a safe distance from the centre line. This should be possible, as the water depths are relatively deep throughout the southbound separation. Northbound vessels must maintain an adequate distance at all times.”

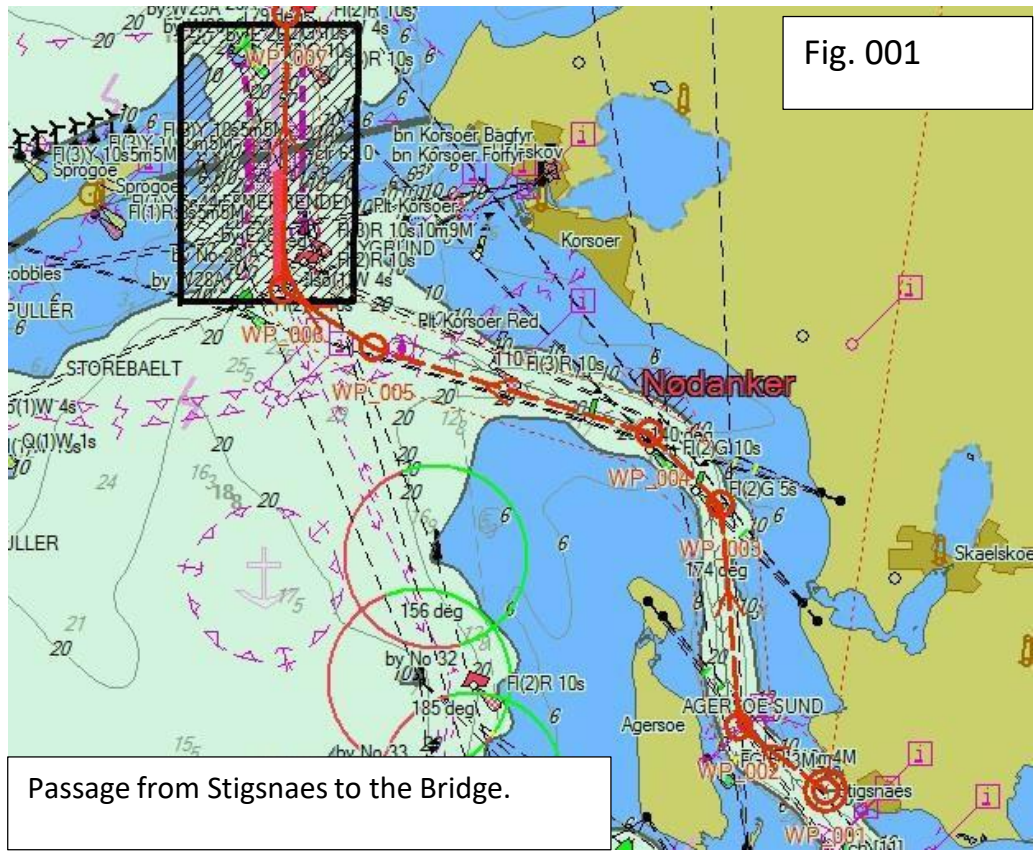


Great Belt Bridge passage

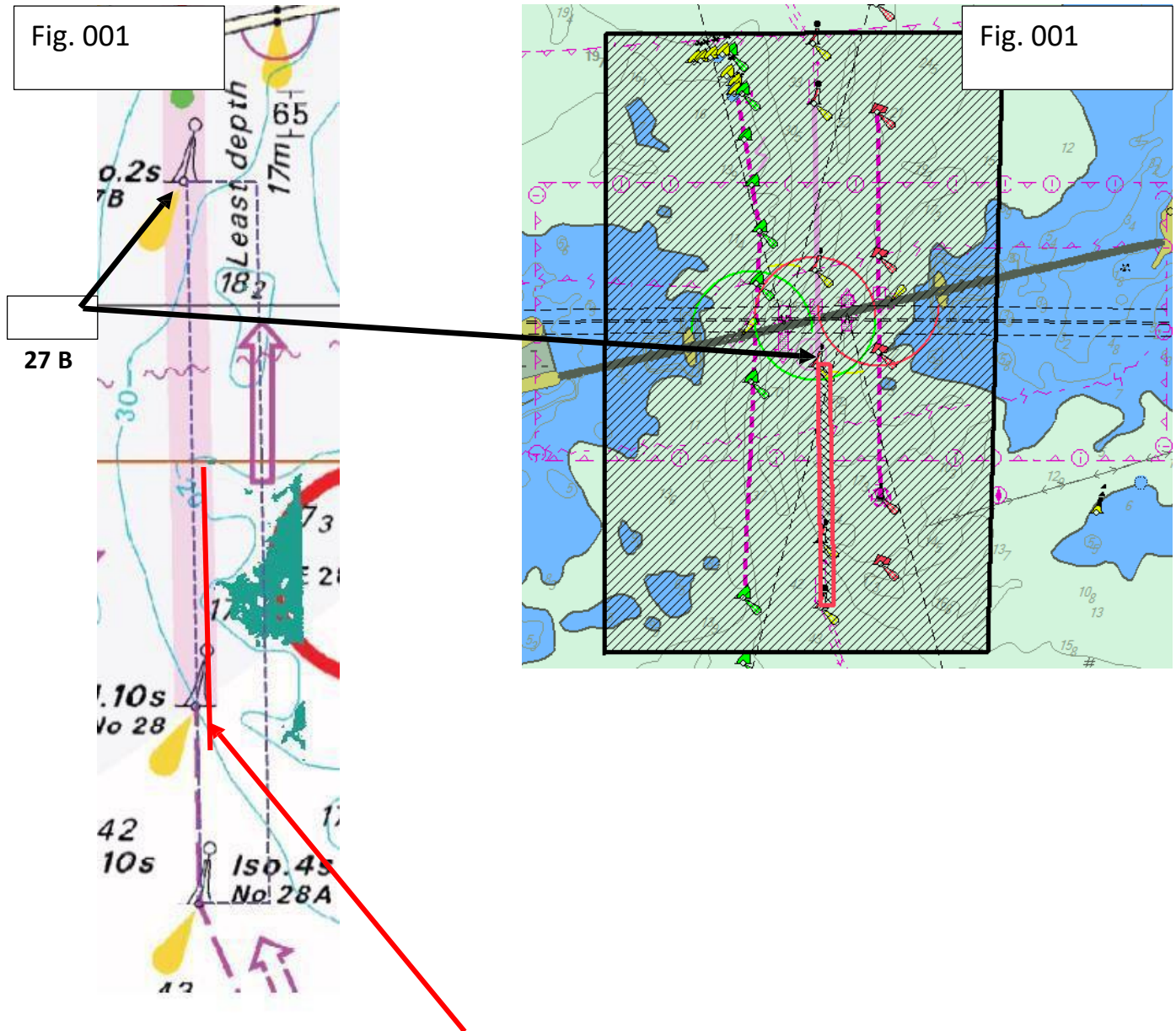


# DanPilot – Stigsnaes & Ensted +15m

## Area and charts



# DanPilot – Stigsnaes & Ensted +15m



The red line above (2 ship lengths with 18.25 m depth) shows the area concerned, which has recently been surveyed. In the area that is 130 m wide from the centerline and eastward, stretching from buoy nos. 28A to 27B, where we are to plan your ship's route, the minimum depth is 18.25 m.

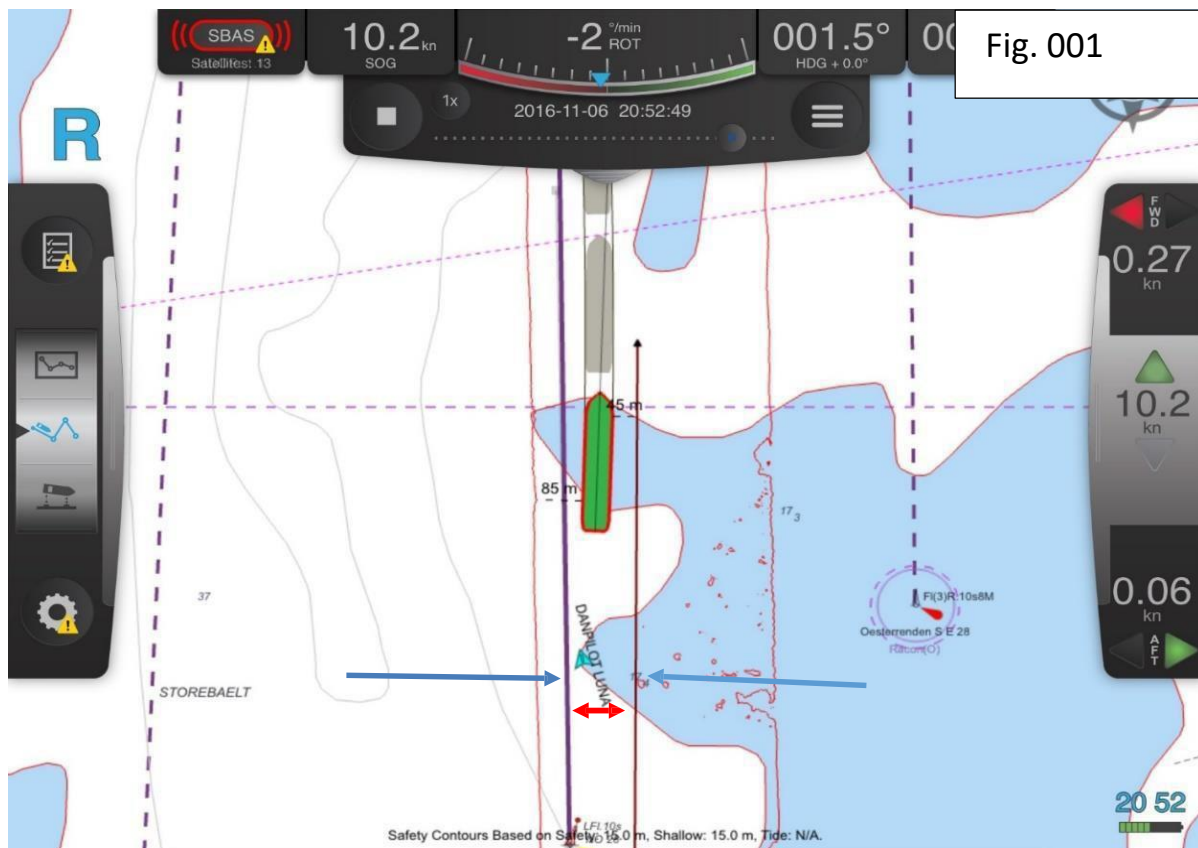


# DanPilot – Stigsnaes & Ensted +15m



From Ensted to the Bridge passage.

Ensted, Aabenraa.



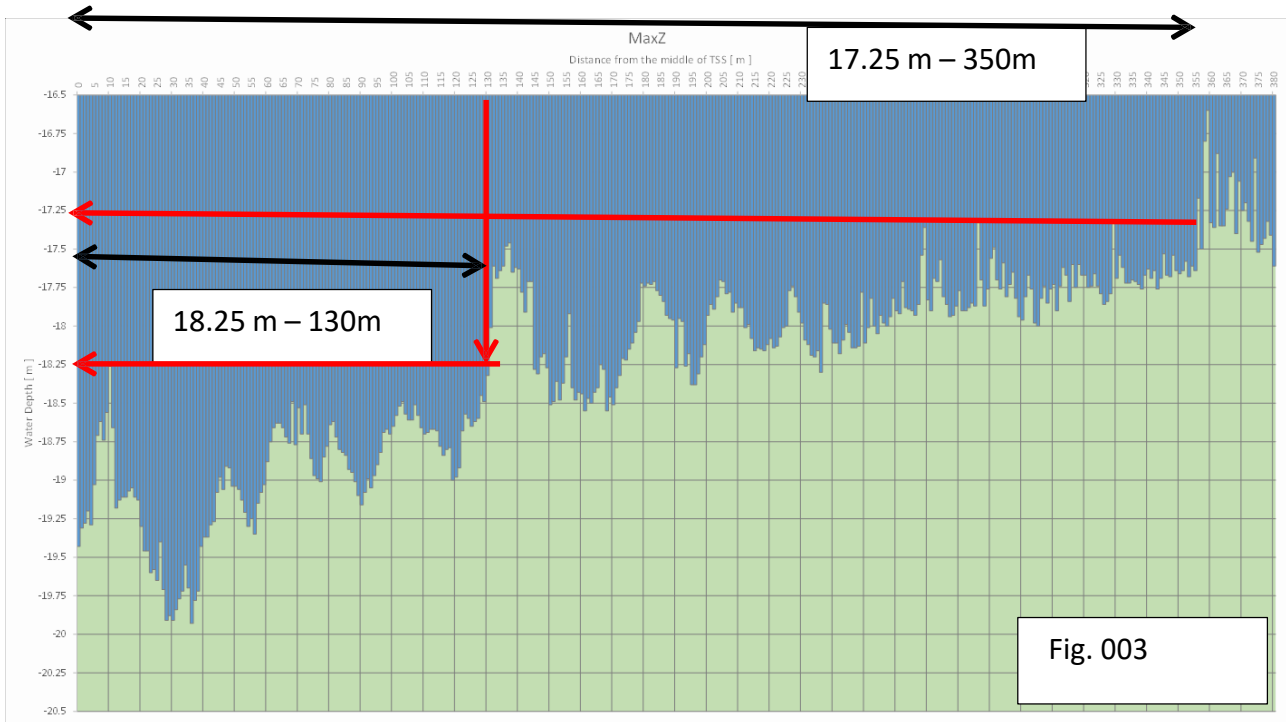
Transit with M/T Ridgebury Alina L (Suezmax) 15.10-m draft, 6/11/2016.

The red lines/area is the bathymetric overlay – here the setting is 18.3 m (curve of depth)

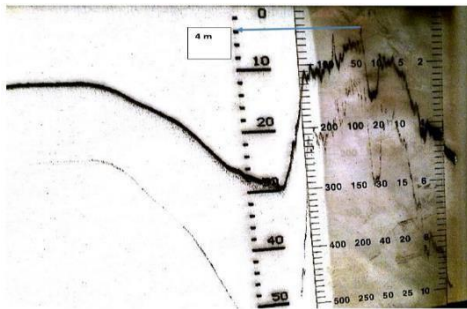
130 m – lane ↔



# DanPilot – Stigsnaes & Ensted +15m



Bridge passage area with more water (18.25 m in the Northbound lane).



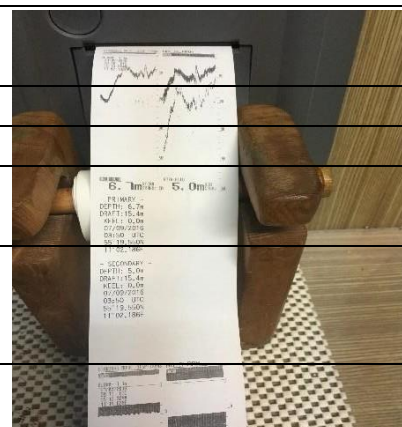
Echo sounder reading on a 15.4-m passage (4 m under keel).

# DanPilot – Stigsnaes & Ensted +15m



## Actual pilotages performed

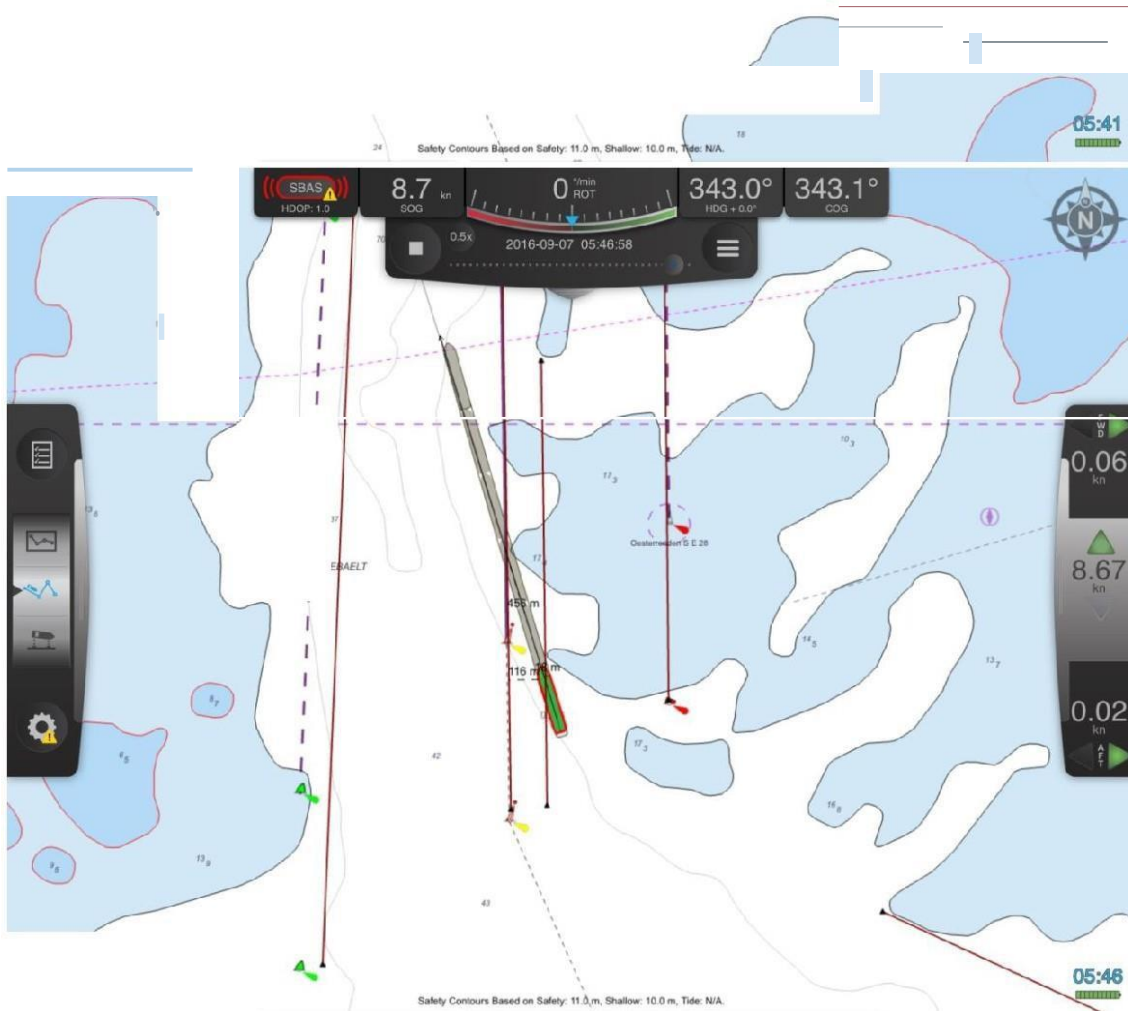
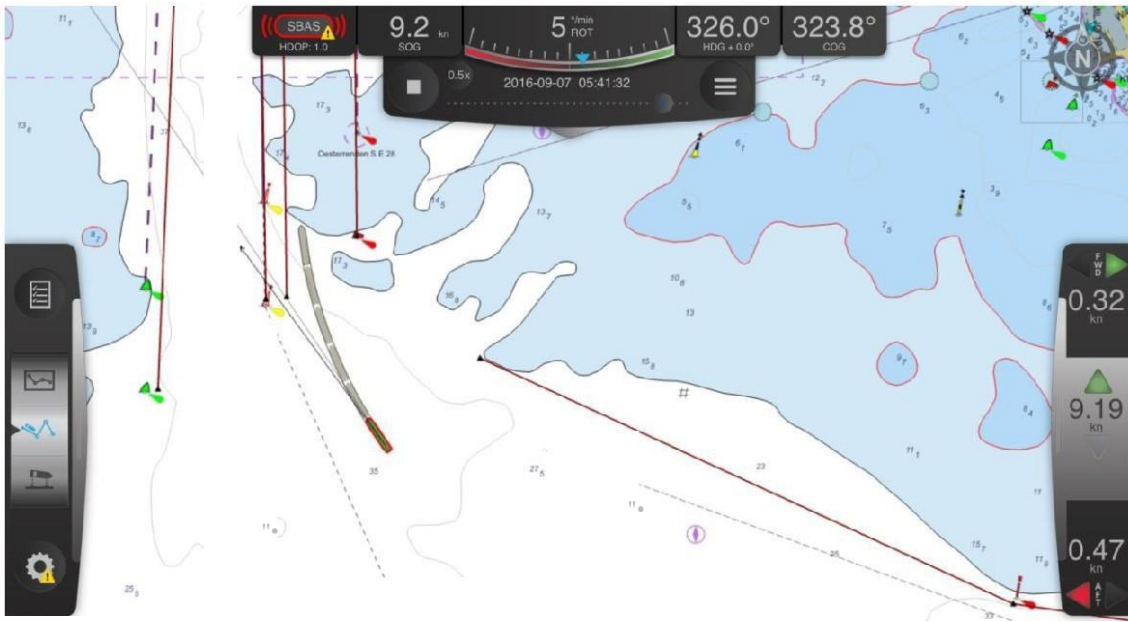
Date / year / time of departure	7/9 2016 0330lt
Name of pilot(s)	[REDACTED]
Name of ship	[REDACTED]
Imo no.	
Date/time pos. "bridge passage"	7/9 2016 0530lt
Draft A/M/F	15.4. 15.4 15,4
Trim	0
Water level at Korsør "bridge passage"	+24 Korsør
Density of water	1.012
Current setting and force	N 1.1
Traffic in the area	No traffic
Speed when passing "Bridge passing"	10
Ship UKC calculation	$18.25+0.24-15.4-0.81=2.28$
Copy of track (by mail)	Yes
Water level data (by mail) Forecast	
VTS – informed "close to center passage – southbound ships > not close to centre line southbound!"	Yes
Use all external nav. Instrument – and Cat/xx running Sbas-mode	Cat rot+sbas
If possible > Log from echo sounder – take camscanner copy on the 2 Ships' lengths with 'low lower area'	Picture lowest depth reading = 5.0 m (ship's sounder)
	Fig. 002







# DanPilot- Stigsnaes & Ensted +15m





# DanPilot- Stigsnaes & Ensted +15m





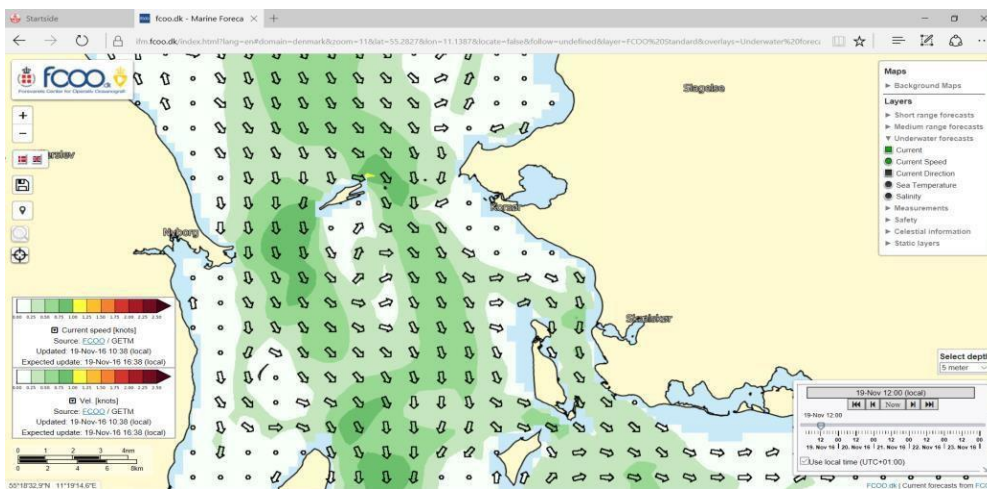
# DanPilot – Stigsnaes & Ensted +15m



## Forecast wind, water level, current

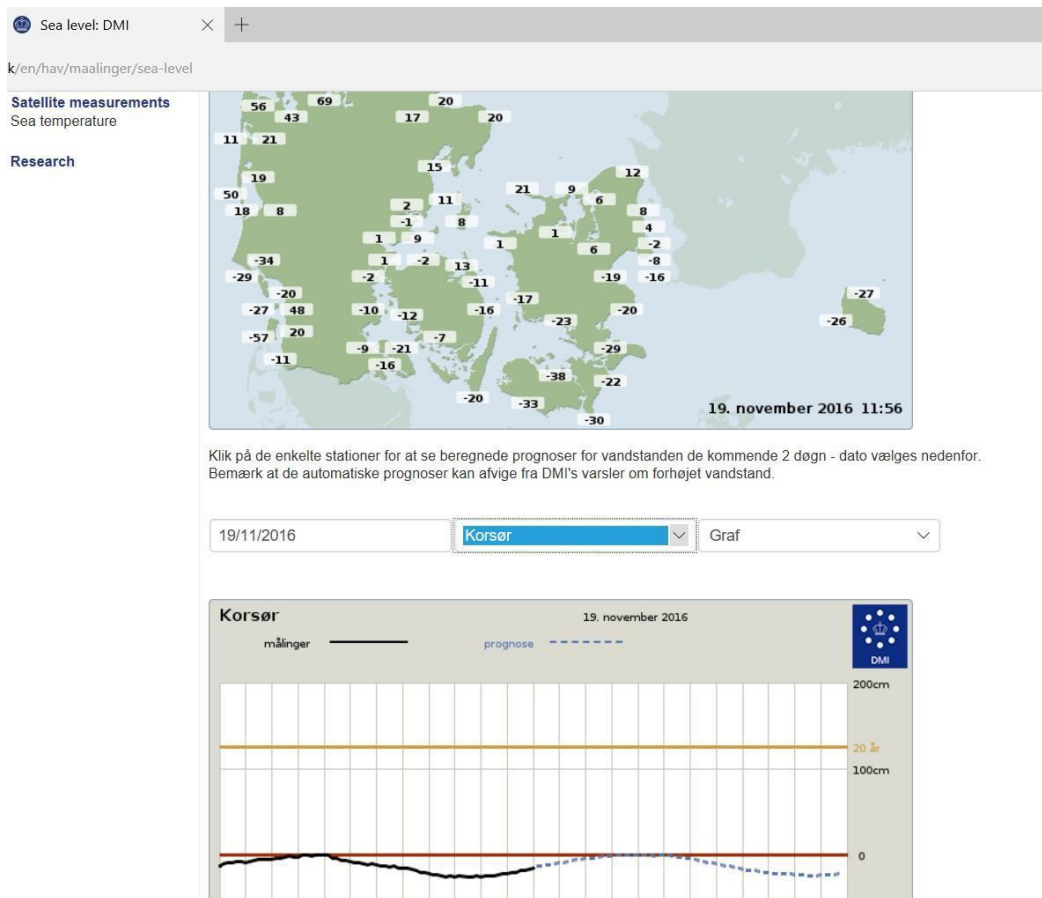
Fcco.dk

The area has several good weather stations and observation points.



The tide varies from + 0.3 to - 0.3 m (normal variation).  
In heavy gales and storms this can be +1.5m/-1.5m (extreme weather conditions).

Dmi.dk



See also

Pre planning I – transit

[http://www.trykteamepub.dk/epub/DanPilot Transit Passage Plan/page 1.html](http://www.trykteamepub.dk/epub/DanPilot_Transit_Passage_Plan/page_1.html)

Pre planning II – Harbour

[http://trykteamepub.dk/epub/DanPilot Harbour Plan/](http://trykteamepub.dk/epub/DanPilot_Habour_Plan/)

Preplanning III – Ship to ship operations

[https://trykteamepub.dk/epub/DanPilot ship to ship/](https://trykteamepub.dk/epub/DanPilot_ship_to_ship/)

Pre planning IV – mooring and unmooring

[http://www.trykteamepub.dk/epub/DanPilot Mooring and Unmooring/](http://www.trykteamepub.dk/epub/DanPilot_Mooring_and_Unmooring/)

PEB (Pilot Emergency booklet)

[http://trykteamepub.dk/epub/Danpilot PEB/](http://trykteamepub.dk/epub/Danpilot_PEB/)

**Re Departure Stignaes oil Terminal (Interterminals, Jetty SOT)  
Departure 21/2/2019**

Pilot(s)  
HarbourPilot - 122  
HarbourPilot - 005

**Departure weather:**

Current South 0.5 to 0.75 knots Wind Westerly 2-5 m/sec. Visibility Rain – 2 nm


**Weather bridge passage:** Current South 0.5 to 0.75 knots Wind Westerly 2-5 m/sec. Visibility Rain – 2 nm

**Navigation equipment:**

Vessels equipment  
PPU with standalone DGPS receiver (SBAS= 0,4m)



<b>Date / year / time departure</b>	21/2/2019 etd 2300. Last line cast off 23:25
<b>Name of Pilot(s)</b>	122 +
<b>Name of ship</b>	ELANDRA FALCON
<b>Imo no.</b>	9792486
<b>Date/time pos. "brigde passage"</b>	22/2/2019 00:58 LT
<b>Draft A/M/F</b>	16.15m – 16.15m – 16.15 m
<b>Trim</b>	0
<b>Water level at Korsoer "brigde passage"</b>	+ 48 cm
<b>Density of water</b>	1.010
<b>Current setting and force</b>	Setting south 0,5 – 0,75 knots
<b>Traffic in the area</b>	No traffic during bridge passage
<b>Speed when passing "Bridge passing"</b>	7,8 SOG + 0.5 current 8.3 knots
<b>Ship UKC calculation</b>	Depth min= (18.25 + 0.48)- 16.15 = 2.58m (static)
<b>Copy of track (by mail)</b>	

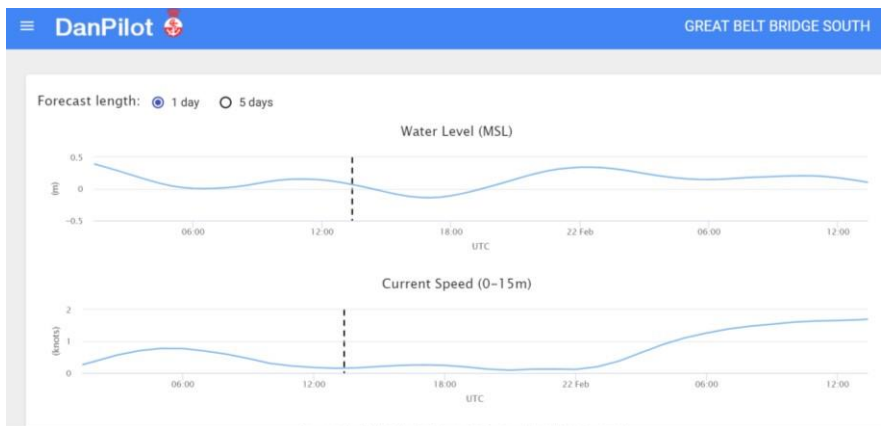
<b>Waterlevel data (by mail)</b>	
<b>Risk – matrix</b>	<b>Green ( se below)</b>
<b>Great Belt Traffic</b>	Informed by mail 4 hours in advance.

**Conclusion:**

The passage was without any problems. The VTS Greatbelt was contacted in order to keep southbound vessel to the vest when passing south, however no ships was passing at the time of passage with M/T Elandra Falcon. Our Matrix for passing was with add. Draft was green.

**Forecast**

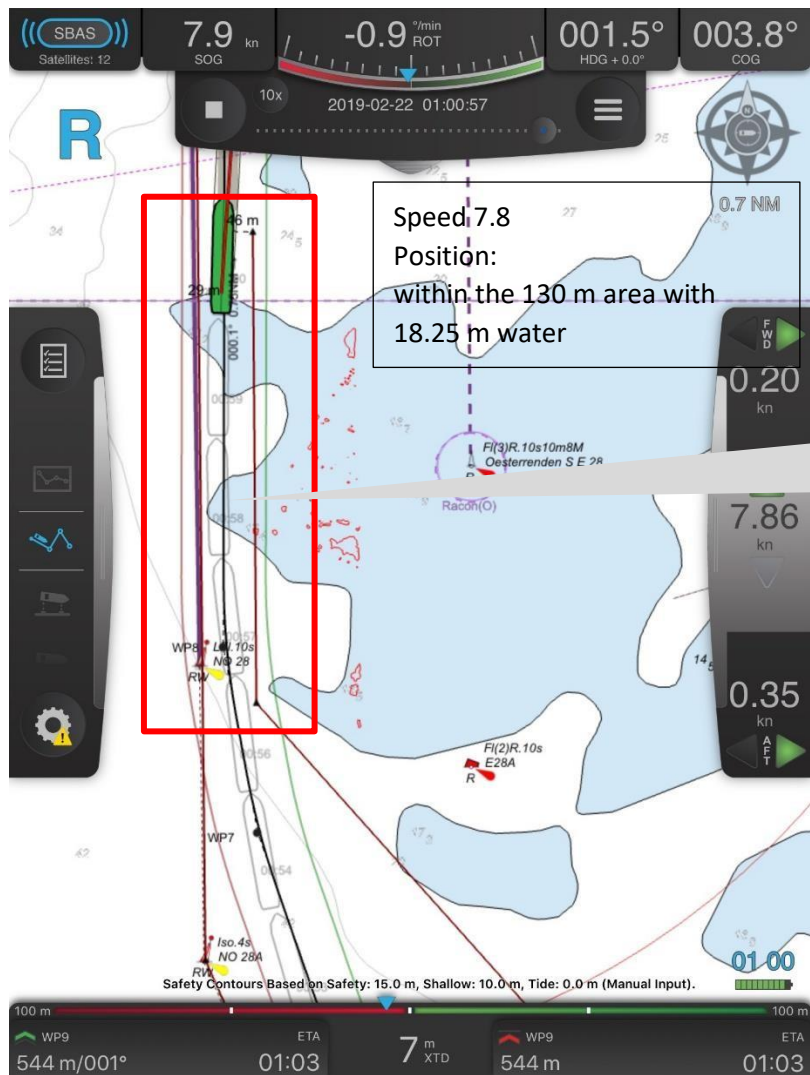
21/2/2019 at 14:20 – etd. 2200 from Stignæs.



**Length Overall x Breadth Extreme: 277m x 48m – Draft 16.15M**

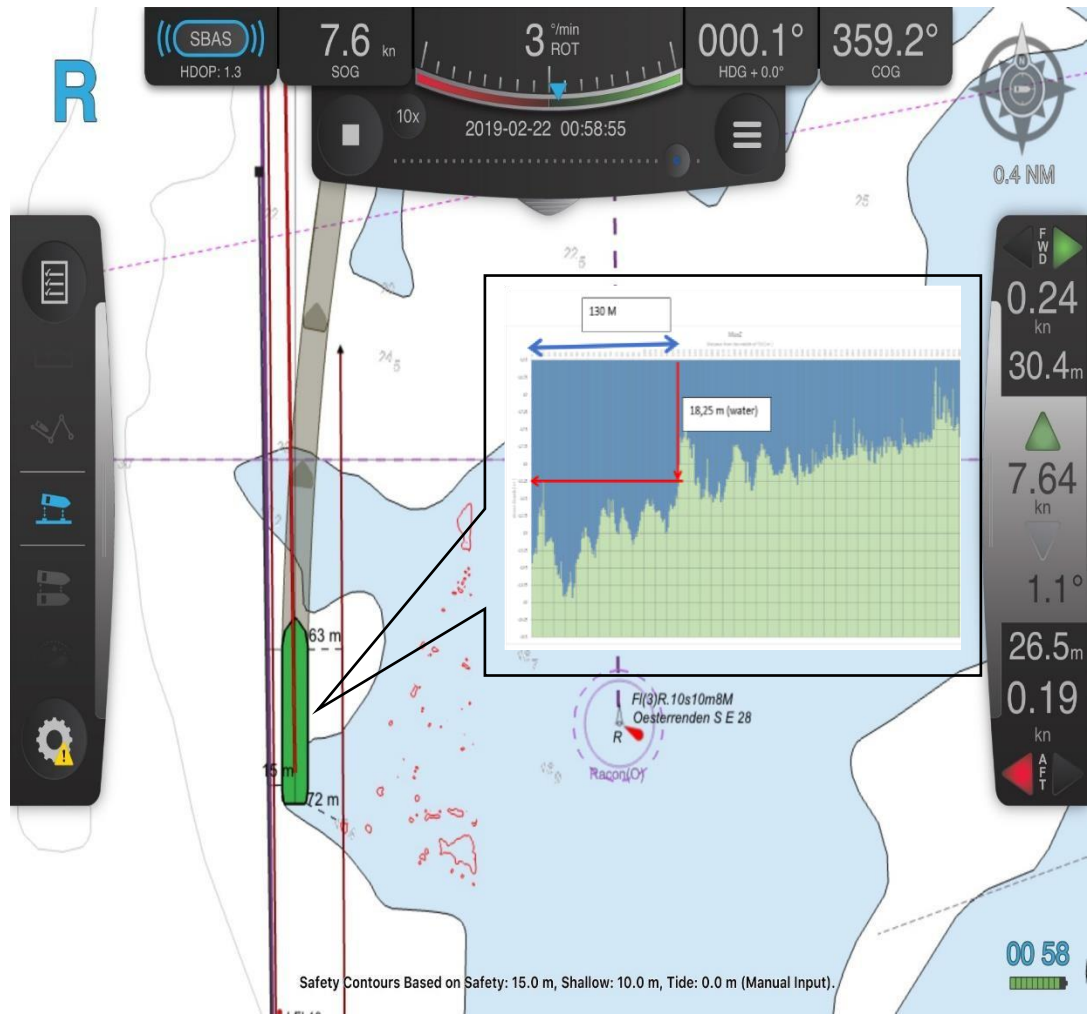


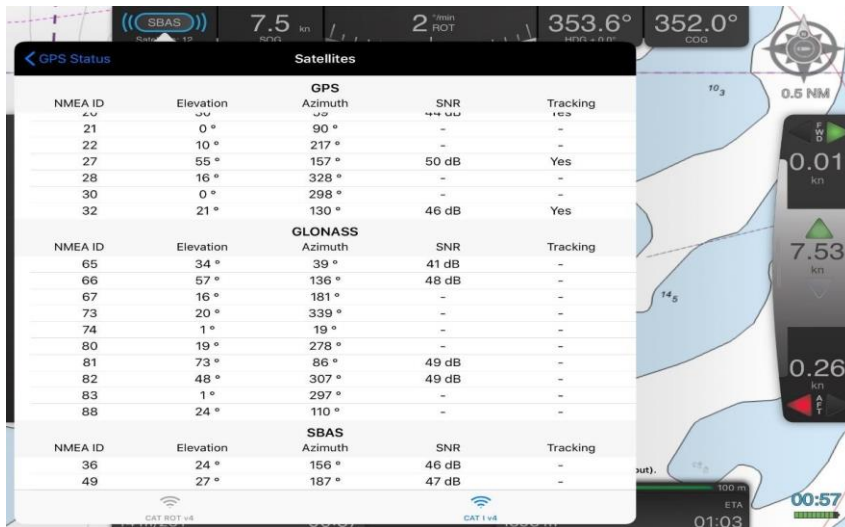
**Water – level when passing bridge.**



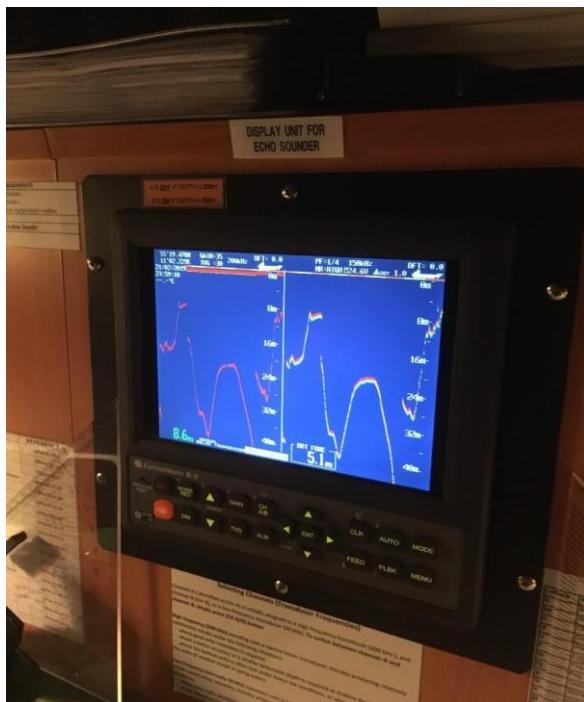
00:58 HRS LT

Length Overall x Breadth Extreme: 277m x 48m – Draft 16.15M



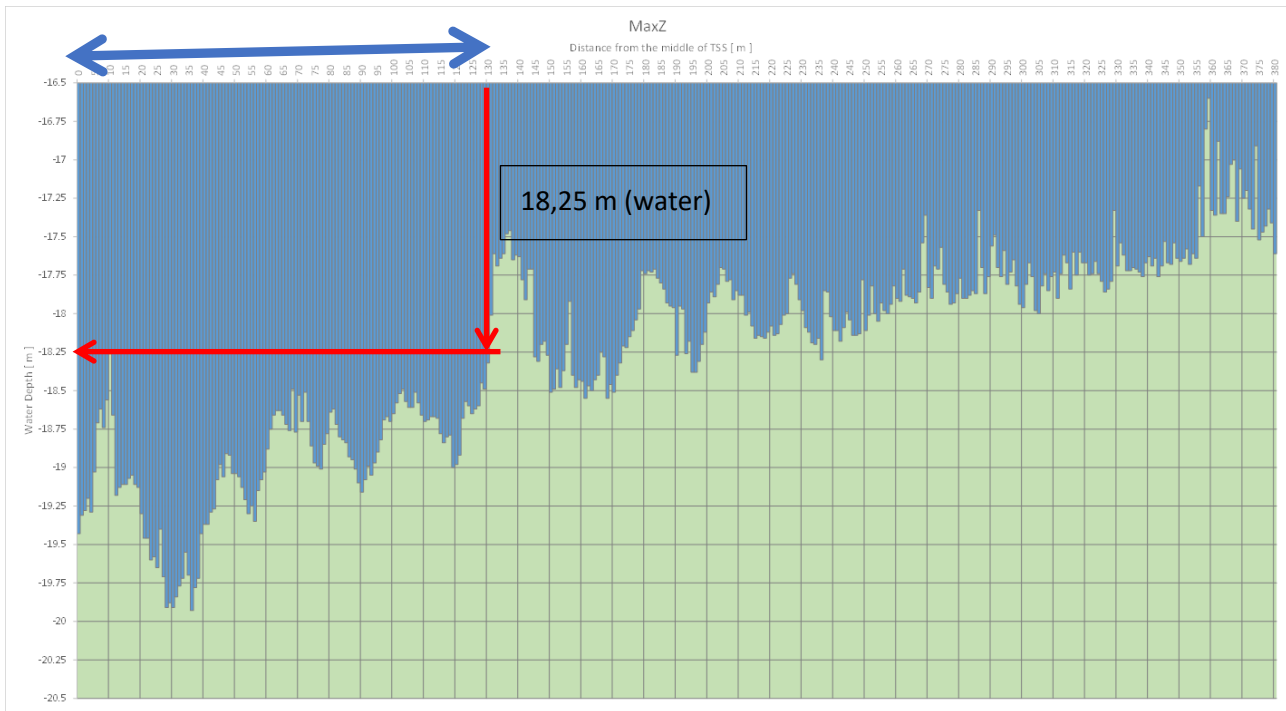


**The min. Echo Sounder reading**

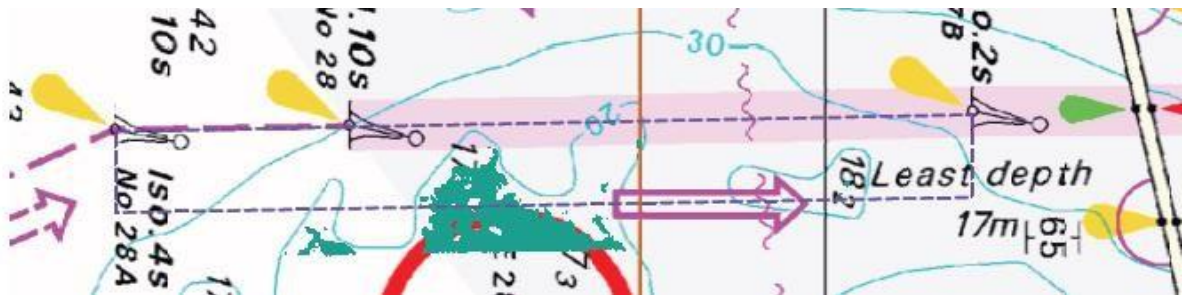


**The picture show 5.1 the lowest reading was 3.5 m**

130 M



Bridge passage area with more water.



The 130 m area with more water than chart is showing. Survey loaded on Pilot's ppu unit.

**Draft north and South Transit**

