

Morgan Marine Planning Application User Group Hazard and Risk Assessment -Safety of Navigation

Commercial Shipping Bathymetric Information

Background

- The Brightlingsea Harbour Pilots have written a Report and Risk Assessment into the Proposed Extension of Morgan Marine, (July 2021).
- These slides provide bathymetric data to support the hazards discussed in the Pilots Report namely:-

• The Current Swing.

- Turning options using the Gut with bow line.
- Contingency to ground bows on the mud in the Gut.
- The Current Abort Options.
 - Failure to stop at the wharf Contingency is to proceed to the Folly Insufficient water ship turning.
 - Bow line breaks or engines fail during turn Contingency is drop anchor.

• Swing with New Infrastructure.

- Turning options with Gut dredged to +0.5mCD. No contingency for grounding.
- Effect of the proposed Dolphin. Current dolphin position is impacted on most turns Marmus turning design does not work. -Redesign.
- Bow line breaks Contingency is Drop anchor. West Basin will need more dolphins or sheet piles for protection. Redesign.
- Abort Options with New Infrastructure
 - Engines fail and bow line breaks Contingency is drop anchor.
 - Failure to stop at Wharf Contingency is to proceed to Folly.

Bathymetric Survey Data

- The following bathymetric survey data is provided.
- Note that the soundings are based on CD. Positive is drying above CD, negative is water depth at CD.
- The land surveys were carried out by drone. The water survey was carried out from boats.
- Both survey systems use GPS for fix positioning and levels to an accuracy of 2 to 5cm.

Bathymetric Survey of Morgan Marina

Survey

April 2019.

- Contours based on chart datum (CD).
- Positive is height above CD. Negative is depth below CD.
- Grid + should not be viewed as Bathymetric Data
- Hickman's tidal moorings are at +0.5m to +1.0mCD.



Ordinance Survey location of Mean Low Water (MLW) line and Mean High Water (MHW)line

- Mean LW /HW are used by MMO and Planning.
- The Mean Low Water line corresponds to about +1mCD.

0.5 50.6 0.9 0.8



3.6 3.6 3.8 3.9 4.1

The Current Swing - Summary of ship sizes and Drone surveys

- Table 1 summarises the ship sizes taken from the information provided to BHC by the shipping agents before the ships arrive at Brightlingsea Wharf.
- The majority of ships using Brightlingsea Wharf are 85 to 90m long. A few ships are up to 100m long. No 105m long ships have used the wharf in the last 5 years.
- Four Drone surveys were undertaken by BHC to provide data on routine ship turns using the Gut to the East of the Wharf.
 - No hazards were encountered during these turns.
 - Bow lines were used for these turns.

TABLE 1 - SUMMARY OF SHIP SIZES

Date	Ship	Length	Beam	Draft –	Draft Full	ΕΤΑ	HW level	HW time	Comment
		(m)	(m)	empty(M)		HW time	(mCD)	UT (hr)	
						(hr)			
90m ships	Drone survey ships								
10/9/19	MV Carolin G	88.6	12.5	2.8		10.31			Drone Survey
4/3/21	MV Eerns Carrier	84.95	10.7m	2.7	4.15	03.17	5.2	03.17	Drone survey
30/3/21	MV Fehn Calypso	87.91	11.41	2.7	4.20	14.15	5.3	13.15	Drone survey
14/4/21?	M/V Truffaldino	88.95	12.4	Approx 3.0	4.50	01.27	5.0	01.11	Drone survey says 17/4/2021
1/7/21	MV Seg	81.20	12	3.2	4.2	18.00	4.4	17.00	Drone survey
100m ships									
25/7/2018	Wilson Cadiz	99.9	12.8	3.8m	5.9?				
27/9/2018	MV Wilson Clyde	99.91	12.8	2.5 Bow 3.0m stern	4.9?	13.20		14.20	
17/2/2020	RMS Duisberg	99.9	11.47	2.5	3.4	PM		18.45	
19/10/2020	RMS Baerl	99.9	11.47	3.2m	3.95	?	?		Empty draft on 18-8-21 2.6m bow, 2.7m stern. – Tide 4.0mCD at 0736hrs
105m ships									
	105m ship	105		2m?					No ships this size.

• Assume High Water of 5.0mCD for ship berthing.

• Drone surveys only on 90m ships . - No drones for 100m ships. They are less frequent.

- The typical ship is 88m long with a 2.8m as an empty draft. Laden draft = 4.3m.
- The long ship is 100m in length with 3.8m empty draft. (Note E-mailed ship data on draft can be 0.5m greater than the ship condition when it arrives at Brightlingsea).

Drone Survey of Ship Turning – MV Carolin G - 10/9/2019

- 88.6m long
- 2.8m draft empty
- Note long bow line would allow bow to hit proposed sheet pile wall.



Ship turning - MV Eerns Carrier 4/3/2021

- Length 84.95m
- Draft 2.7m
- Ship initially at wharf to attach the bow line.
- The long bow line would allow the bow to hit proposed sheet pile.
- Proposed dolphin would be hit during this routine turn.



- 10

- 3

Marmus proposed

New proposed

Google Satellite

1:750

30

40 m

Ship Turning - M/V Truffaldino - 14/4/2021

and proposed Dolphin locations are included.

- Length 88.95m
- Draft Approx 3.0m.
- Ship initially at wharf to attach bow line.
- Note long bow line allows bow to hit sheet pile.
- Proposed dolphin would be hit.
- Proposed pontoons would be hit.



block plan Dolphin position

Google Satellite

Marmus proposed

1:750

30 40 m

20

- 1

2

- 3

4

Ship Turning – MV Seg

- Ship Length 81.20m
- Draft 3.2m.
- Initially ship at wharf to attach bow line.
- The long bow line allows bow to hit proposed sheet pile.
- Proposed dolphin would be hit.
- Proposed pontoon would be hit

and proposed Dolphin locations are included.



6

7

- 1

2

- 3

block plan

Marmus proposed

1:750

30

40 m

20

Dolphin position

Google Satellite

The current swing – Sections showing the ship position during the turn

- 88m ship
 - The section shows the position of the ship during the turn. The bow must be well into the Gut to ensure the ship can turn without the stern going aground. A mean high water spring tide of 5.0mCD has been assumed.
- 100m ship
 - The section shows the position of the ship to avoid going aground. A tide level of 5.4mCD has been assumed. This is unusually high.

Note:-

- The ship's ballast may be arranged to reduce the draft at the bows. However this cannot be assessed until the Pilot joins the ship.
- This highlights the importance of getting the ship's bow into the Gut.
- The current contingency plan is that if the bow line is too long the ship's bow will ground in the mud and this controls the pivot point of the ship.

Ship Turning - 88m long by 2.8m draft at HWST = 5.0mCD

- 88m ship grounds in the Gut and has 3m to spare on the stern before grounding.
- Proposed dredge level for sheet pile design is +0.5mCD. This would remove the option of grounding the bow.



Ship Turning – 100m long ship with 3.2m draft tide needs to be 5.4mCD

- 100m long ship.
- No records of arrival time.
- For this ship to turn the tidal height needs to be 5.4mCD.



Marmus Dolphin design and ship turning

- The planning application provides a routine turning sequence for an 88m long ship.
- The following examples can be compared with the drone survey data.
- It can be seen that the bows did not go far enough into the Gut and the sterns would have gone aground.

Marmus Dolphin Design – Appendix 2 – Design and Method "Typical Ship" - 88m long by 13.2m wide by 1.88m draft

- Short bow line leads to the ship being too far south and the stern grounding.
- A short bow line avoids the risk of the ship hitting the dolphin and the bow being trapped against the wharf.
- The 1.88m stern draft is small compared with other 88m ships, see Table 1.



Ship turning Marmus Dolphin Design and Method

Sea bed at stern	3.0mCD
Draft	1.88.
Tide level	5.02mCD (HWST)
Sea bed at stern	3.0mCD
Draft	2.8mCD
Tide level	5.8mCD tide required

Flawed Assumptions:

Bow line too short.

Ship too far into channel during the turn. Hard to avoid hitting Dolphin.



Current Swinging – Use of the Bow Line and Anchor

Bow Line

- The following slide shows the use of the bow line during the turn.
- It is important that the bow line is not locked off; it cannot take the full momentum of the ship.
- A parting bow line can be very dangerous because of whiplash effect.
- Excessive slack in a bow line can result in it being sucked into the bow thrusters.

Anchoring

• If the bow line parts the contingency plan is to drop the anchor with about 27m of chain. The anchored ship would be at high risk of collision with the boats on the existing western basin pontoons, particularly with a southerly wind.

Existing Swing - Bow line controlling turn 17-4-2021 – 89m long ship

- Normal conditions: Taut bow line controls turn.
- If engines fail: the bow line stops the ship drifting back on the tide and wind to impact existing moorings.







Current Swing (no Dolphin) - Loss of machinery during swing - Bow line breaks - Use anchor.

- Rapid deployment of anchor.
- 27m of chain to be fed out with anchor.

		Existi	ng pontoon	
An	nchor dropped	Brightlingsea Creek		
* sectoral Google	l l l l l l l l l l l l l l l l l l l	Anchor chain 27m	n + 105m ship =	132m
Brightlingsea Creek	International Property in the		and the second second	
Measure distance	ce ×			T.

Abort options with new infrastructure

During a ship turn

- The new West Basin sheet piles are designed to be dredged to +0.5mCD. It is anticipated that Morgan Marine would dredge the Gut so that yachts can access the new hoist.
- Grounding the ship on the mud is no longer an option.
- In the event of engine failure and the bow line parting the only option is to anchor.

Prior to starting turn

- If the ship fails to stop at the Wharf it will proceed towards the Folly.
- This is considered for laden and unladen ships.

East end of Proposed Marina – Unladen Ship Passage past East Basin

- Assume 88m ship with 2.8m unladen draft.
- Ships berth at MHWS =5mCD.
- Consider a 7m wide vessel berthed on pontoon.
- Channel width is 43m with no vessel and 36m with a 7m wide vessel.
- This is less than the sweep envelope of the 31.05m for a 105m ship and 26.4m for the 90m ship.
- On this basis Unladen ships can pass the new East Basin.



East end of Proposed Marina – Laden Ship Passage past East Basin

- Assume 88m ship
- Laden draft = 4.3m
- Unladen draft = laden draft.
- Ships berth at MHWS =5mCD.
- The new pontoon is 17m from the existing pontoon.
- Consider a 7m wide vessel berthed on the pontoon.
- The existing channel width is 22m+17m-7m = 32m.
- The proposed channel width is 22m-7m = 15m
- The ship sweep envelope is:-
 - 31.05m for a 105m ship
 - 26.4m for the 90m ship.
- On this basis laden ships cannot safely pass the East Basin.



Ship passage to the Folly and ship turning at the Folly

Ship Passage to the Folly

- Ship passage to the Folly depends on the water depth and channel width at the Folly.
- Once the ship is near the Folly it can anchor in line with the channel.

Ship Turning at the Folly

- Ship turning at the Folly is more difficult because of the shallow channel.
- The ship may have to reverse out of the channel past the East Basin. A tug may be required.

Ship Turning in Folly

- Yellow circle represents a 90m long ship turning on the spot.
- Unladen draft = 2.8m.
- Laden draft = 4.3m.



The Yellow Circle represents a 90 metre diameter ship turning on the spot (no room for error best case scenario). Both the Bow and Stern of the ship,

Passage to and Turning at the Folly

- Assume 88m ship
- Unladen draft = 2.8m.
- Laden draft = 4.3m.
- Ships berth at MHWS =5mCD.
- The sweep envelope is:-
 - 31.05m for a 105m ship
 - 26.4m for the 90m ship.
- The channel is wide enough for 90m laden ships to travel to the Folly.
- From the cross section:-
 - Laden channel width is 28m.
 - Unladen channel width is 66m.
- There is insufficient depth to turn 90m ships either laden or unladen.



Martins Farm - Sand Barges

- Sand barges, which ceased running to Martins Farm wharf in 2005, were 30m long and therefore did not require Pilots.
- The existing channel bed up to Martins Farm is at +2mCD.
- Significant channel dredging would be required to reinstate previous operations. However, the proposed East Basin Pontoon would restrict safe navigation.

Conclusions for Ship Turning

- Based on the Pilot risk assessment report and these bathymetric studies the proposed West Basin planning submission is not viable for safe navigation.
- The East Basin planning submission is not viable for safe navigation if ships overrun to the Folly.