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**MOTT
MACDONALD**

**A494 RIVER DEE
TOW PASSAGE PLAN
MOSTYN TO QUEENSFERRY
R7M-522027-TPP-002**

This Sheet Must be Completed at Each Revision Once Approved for Issue

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A494 River Dee - Tow Passage Plan

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Revision History

Rev	Date	Description
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1. Purpose

The purpose of this document is to provide a clear plan of the intended management for the identified tow to ensure a safe working system is applied and compliance with authorities including IMO, MCA and HSE.

2. Scope

The scope of this document is to cover the identified tow only. Vessels and routes not directly identified within this document are beyond its scope and therefore the document will not be applicable to those procedures.

3. Introduction

This document has been produced to detail the plan for towing the Jack-Up Barge “Haven Seaseven” from River Mersey Dry Dock, Liverpool, to the project site at the A494 Road Bridge on the River Dee. The JUB will be used as an elevated platform for piling operation as part of the A494 bridge replacement project. This document is to be read in conjunction with the accompanying document R7M-522027-MST-001. The tow arrangement is considered a non-routine towage based on the PLA’s definition below.

“Any towage operation involving or likely to include a combination of two or more towing and/or pushing vessels in an arrangement not previously risked assessed and reviewed by the Harbour Master.”

R7M Project Number:	522027
Project Name:	A494 River Dee
Project Description:	Haven Seaseven Jack-Up Barge used to support the construction of 2no bridges on the River Dee
Client:	Mott Macdonald
Type of Tow:	Routine / Non-Routine
Contract Conditions:	TBC
Tow Date:	TBC
Tow Start Location:	River Mersey Dry Dock
Tow Finish Location:	River Dee, Queensferry

Key Mobilisation Locations



3.1

Abbreviations

BP	Bollard Pull (tonnes)
CD	Chart Datum
DAP	Designated Person Ashore
HIRA	Hazard Identification & Risk Assessment
HW	High Water
LW	Low Water
MHWN	Mean High Water Neaps (in meters above Chart Datum)
MHWS	Mean High Water Springs (in meters above Chart Datum)
MLWN	Mean Low Water Neaps (in meters above Chart Datum)
MLWS	Mean Low Water Springs (in meters above Chart Datum)
PLA	Port of London Authority
Qty	Quantity
R7M	Red7Marine

RAMS	Risk Analysis Management Systems
TBT	Tool Box Talk
UKC	Under Keel Clearance
VTs	Vessel Traffic Service
WAH	Working At Height
WLL	Working Load Limit

3.2 References

DNV GL Noble Denton, 2013. *0030/ND Rev 5 - 22 June 2013 - Guidelines for Marine Transportations*, Høvik: DNV GL Noble Denton.

IMO, 2018. *Guidelines on the safety of towed ships and other floating objects, including installations, structures and platforms at sea. RES A.765*, s.l.: IMO.

IMO, 1972. *International Rules for the prevention of collisions at sea*, s.l.: IMO.

IMO, 2018. *'Code on Intact Stability' 2002 Edition RES A.749*, s.l.: IMO.

Marine Accident Investigation Branch, 2012. *Collision, Capsize and Foundering of the Tug Chiefton, Report No. 12/2012*, Southampton: Marine Accident Investigation Branch.

Port of London Authority, 2014. *Code of Practice for Craft Towage Operations on the Thames*, London: Port of London Authority.

Renewable UK, 2013. *Guidelines for the Selection and Operation of Jack-Ups in the Marine Renewable Energy Industry*, London: Renewable UK.

4. Vessel Details

4.1 Jack-Up Barge Information

The Haven Seaseven, also as known as C-7 Series Modular Self Elevating Platform, is 30.50m in length, 18.30m wide and has a hull depth of 2.13m. The barge is equipped with 4 number of legs 1.22m diameter 38m long legs.

Additional information of the barge can be found in the table below.



Type:	C-7 Series Modular Self Elevating Platform
Classification:	Bureau Veritas Hull Offshore Self-Elevating Unit
Length:	30.50m
Breadth:	18.30m
Depth:	2.13m
Deck Area:	520m ²
Max Leg Length:	38.00m
Leg Diameter:	1.22m
Leg Spud Cans	3.0m Dia.
Jacking Speed:	15m / hour
Jacking Stroke:	0.69m
Max Deck Load / Point Load:	400t / 15/m ² (Subject to Free Leg Length)
Max Free Leg Length:	31.50m
Max Crane Self Weight:	300 tonne (Subject to Free Leg Length)

4.2 Towing Vessel(s)



Position:	Lead Tug
Name:	MRV Fossor
Classing / Certification:	MCA Fit for Purpose
Owners:	Carmet Marine Services
Length Overall:	17.0m
Breadth:	4.9m
Draught:	1.1m
Air Draught:	5.0m
Bollard Pull:	5 ton
Speed:	8 knots
No. of Persons on board during tow:	3
Comments:	



Position:	Stern Tug
Name:	MVR Mary M
Classing / Certification:	Multi-Role Vessel MRV15
Owners:	GSS Marine Services
Length Overall:	15.82m
Breadth:	7.42m
Draught:	1.2m
Air Draught:	3.4m
Bollard Pull:	6 ton
Speed:	8 knots
No. of Persons on board during tow:	2
Comments	

5. Key Roles and Responsibilities

This section identifies the responsibilities of the various parties. The responsibilities outlined in the IMO Guidelines on the safety of towed ships and other floating objects, including installations, structures, and platforms at sea, have been used and incorporated into these definitions wherever possible.

5.1 Tow Master

A Tow Master must be appointed for all Non-Routine Towage Operations. The Tow Master must be a person suitably qualified and experienced to take on the role; and must be identified and appointed by the principal Vessel Operator (towage contractor) before planning for the Non-Routine Towage Operation commences. The Tow Master (who may also be the (Tug) Master) has the following roles and responsibilities:

- Co-ordinating the planning, preparation, and rehearsal(s) for the towage operation;
- Developing a comprehensive operational risk assessment for the entire operation, and presenting it to the relevant Harbour Master(s);
- Preparing and submitting a passage plan and details of the towing configuration to the Harbour Master(s); • Determining the proposed manning and competency requirements for all personnel (excluding any Pilots) involved in the operation;
- **Overall responsibility for the safety and conduct (where no Pilot is embarked) of the towage operation and the passage;** and
- Ensuring that a proper record and audit trail of the planning and approval process, and the operation itself, is maintained;
- Ensuring that all warranty surveyors and tow surveyors have agreed the arrangement.

5.2 Tug Master

The Master of a vessel at all times has responsibility for the safety of his/her vessel, crew and of any vessels being towed. The Master has the authority to make decisions affecting the safety and conduct of the tug, crew, and any craft under tow. Due to the hazardous nature of towing, Tug Masters (and crew) should ensure that:

- All onboard pre-sail checks are completed before getting underway;
- Any risk assessments required are completed and applied before engaging in towage operations;
- All crew are fit, have correct PPE and are correctly trained for the task to be carried out;
- Crew are properly briefed on the work to be carried out;
- Good communication is established and maintained between the Tug Master and crew at all times during towage operations;
- Towing gear is in good condition and prepared for use (towing equipment should be inspected both before and after towage operations);
- All watertight hatches and doors are kept closed whilst towing to maintain the watertight integrity of the vessel(s);
- All identified and agreed procedures, including towing gear configuration, are completed in accordance with the planned procedures identified in this document.

5.3 Barge Master

The Master of the barge will have similar responsibilities to those of the Tug Masters identified above however after the tug has connected to the barge and the barge is afloat, the Barge Masters responsibilities are transferred to the Tug Master.

The Master of a vessel at all times has responsibility for the safety of his/her vessel, crew and of any vessels being towed. The Master has the authority to make decisions affecting the safety and conduct of the barge and crew. Prior to connecting the tow and passing over responsibilities to the Tow Master, the Barge Master is to ensure that:

- All on board pre-sail checks are completed before getting underway;
- Any risk assessments required are completed and applied before engaging in towage operations;
- All crew are fit, have correct PPE and are correctly trained for the task to be carried out;
- Crew are properly briefed on the work to be carried out;

- Good communication is established and maintained between the Barge Master, Tug Master, and crew at all times during towage operations;
- Towing gear attachment points are in good condition and prepared for use (towing equipment should be inspected both before and after towage operations);
- All watertight hatches and doors are kept closed whilst towing to maintain the watertight integrity of the barge;
- All items on deck are suitably sea fastened;
- Items on deck are positioned as per deck plan to ensure the barge is trim;
- Any tow specific configurations for the barge are adhered to, for example lowering jack up barge legs to a specific draught for stability or clearances;

The Barge Master may also act as the tow master for transit and positioning. Refer to section 5 for clarification of roles.

5.4 Pilots

One or more Pilots are also likely to be required in NonRoutine Towage Operations.

Where a Pilot is allocated to a craft towage operation, the Pilot has the following roles and responsibilities:

- Providing local knowledge, information, and advice to the Tug Master and/or Tow Master;
- Notwithstanding the responsibilities of the Tug Master and/or Tow Master; taking conduct of the navigation of the tug and tow(s);
- Immediately advising the relevant Harbour Master(s) on any aspects of the towage operation that give the Pilot cause for concern;
- Acting as the PLA's representative on board; undertaking a liaison role on behalf of the Harbour Master as circumstances require; and
- Providing advice and support to the Harbour Master in the planning, risk assessment and rehearsal(s) for any Non-routine Towage Operations.

It must be noted that in all cases, the Tug Master has the command of and is responsible for his/her vessel and crew.

5.5 Able Seamen, Crew, Engineer Etc.

These roles will be covered by the individual operating company's roles and responsibilities and are beyond the scope of this document to review in detail. All additional tug crew fall under the management & supervision of the Tug Master or their allocated representative on board.

6. Weather and Environmental Limits

6.1 Operating Parameters

The table below identifies the weather and environmental conditions for the tow and site barge positioning operations to occur in. The below threshold values will not be exceeded:

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Description	Task				
	Tow from Port to Queensferry	Site Positioning of JUB and FlatTop Barges (in Port Movement)	Jacking and Preloading	Lifting Operations from deck of JUB (Elevated)	Personnel transfers to / from JUB CTV Ladder
Wind:	BF5 Average wind speed for departure may exceed BF4 but not BF5 (mean average over 10 minutes period)	BF4/5	BF5	BF5 (10 m/s)	BF6 (12m/s)
Current:	<4.0 knots	<1.0 knots	<1.0 knots	-	-
Visibility:	1000m	1000m	250m	250m	250m
Max Wave Height:	<1.2m	<0.6m	<0.6m	<2.0m	<1.0m

The final decision on whether to suspend operations due to weather limitations will be made by the Barge Master based on site conditions at the time of the event. Ultimately it is the Barge Master who has overall responsibility for the safety and wellbeing of the crew onboard.

6.2 Beaufort Scale Extract

Force	Wind (knots)	Wind (knots)	WMO Classification	Appearance of Wind Effects on the Water
0	<1	<0.52	Calm	Sea surface smooth and mirror-like
1	1-3	0.52 – 1.55	Light Air	Scaly ripples no foam crests
2	4-6	1.56 – 3.10	Light Breeze	Small wavelets, crests glassy, no breaking
3	7-10	3.11 – 5.15	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps
4	11-16	5.16 – 8.24	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps
5	17-21	8.25 – 10.81	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray
6	22-27	10.82 – 13.89	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray
7	28-33	13.90 – 16.98	Near Gale	Sea heaps up, waves 13-20 ft, white foam streaks off breakers

8	34-40	16.99 – 20.58	Gale	Moderately high (13-20ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks
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7. Seafastening

Sea fastenings should not in any circumstances be removed until the jack-up has completed preloading and elevated to the operating air gap. Primary sea fastenings will be designed to be removed without damage to the cargo.

Appropriately sized and conditioned accessories are to be used for the sea fastening process. For the sea fastening of small items of cargo web straps, chain, or wire lashings may be used, or for standard container securing arrangements using certified twist-lock fittings. However, for larger items of plant such as cranes suitably sized chains, shackles, bottle screws etc. will be utilised.

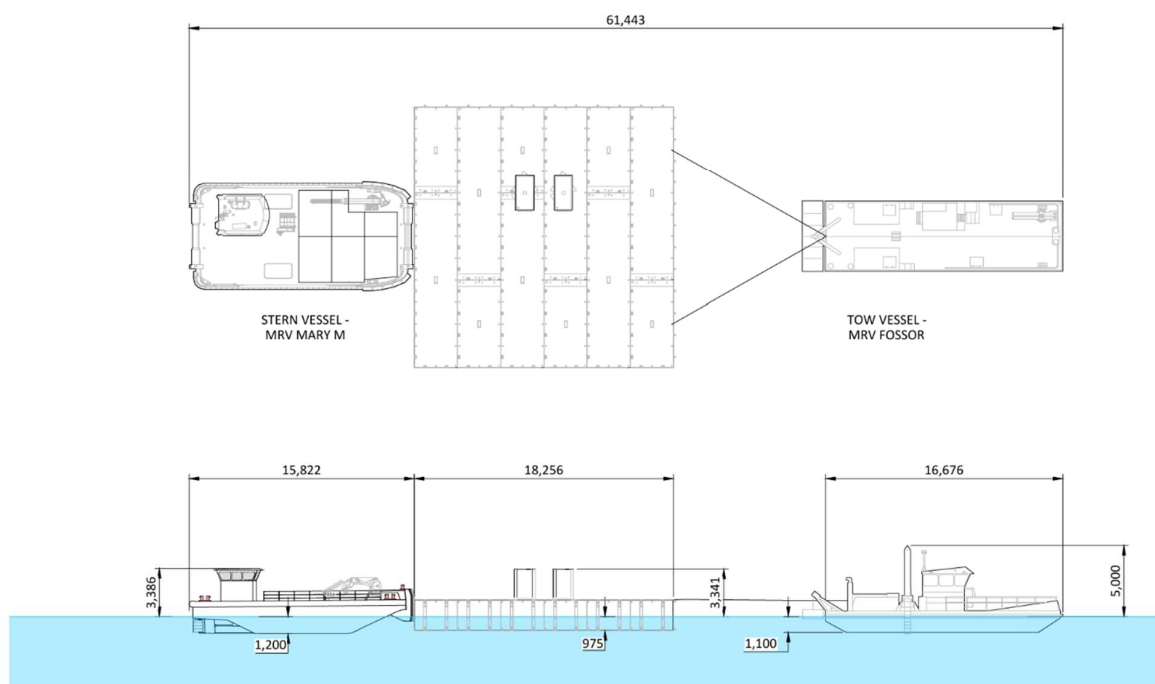
Sea fastenings that are welded to the deck will be fitted onto the bulkheads of the barge and to a suitable location on the cargo. Where the same sea fastenings are to be used for multiple transits, inspection of welded sea fastenings and/or bolted connections is required prior to commencing each transit.

The Barge Master is to inspect the sea fastenings to confirm that they are adequate before any movement is to occur.

8. Tow Configuration

Tow Plan

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9. Bollard Pull Requirements

9.1 Bollard Pull Calculation

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Bollard Pull Calculation

Tow Plan Reference: R7M-522027-TTP-001
B.P. Calc Load case: 1.00

Description	Input
Towed Vessel Name	Haven Seaseven
Towed Vessel Type	Modular JUB
Towed Vessel Length Over All	30.50 m
Towed Vessel Beam	18.30 m
Towed Vessel Depth	2.13 m
Towed Vessel Block Co-efficient	0.99

Description/Element of Tow: Tow from Mostyn to A494 Road Bridge, River Dee

Location Type: Sheltered Coastal Waters
Type of Water: Salt Water
Water Density: 1.025 tonne/m³

Input System: Manual
Displacement Tonnage: 555.39 tonne

Draught: 0.99 m

Displacement Tonnage: 555.39 tonne

Tow Speed: 4.00 Knots

Beam Av. Air Draught from Waterline: 2.00 m

K Sea Condition Factor: 2.00

Required Bollard Pull: 5.59 tonne

Available Bollard Pull

Vessel Name	Spec BP	Efficiency (%)	Max BP
Fossor	5.00 t	80%	4.00 t
Mary M	6.00 t	80%	4.80 t
-	0.00 t	80%	0.00 t
11.00 t			8.80 t

Down Rate for Angle of Operation

Vessel Name	Angle Relative to Tow	Utilisation (%)	Planned BP
Fossor	25 °	79%	3.17 t
Mary M	25 °	79%	3.80 t
-	0 °	100%	0.00 t
			6.97 t

Required Bollard Pull: 5.59 tonne

Available Bollard Pull: 6.97 tonne

10. Passage Plan

10.1 Shelter / Waypoints

Where weather conditions prevent the tow from continuing, a list of safe havens have been generated by the Tug Master. The Tug master will ensure that these safe havens have been identified on current and updated paper charts prior to departure. The ports listed below have been contacted to confirm that the unit can enter if required and any restrictions identified.

List of Shelter / Waypoints:

- The Port of Mostyn Ltd
- Tata Steel Wharf

10.2 Route Navigational Hazards

- Shallow water/drying outside of main navigational channel;
- Large, moored vessels to outer reach of navigation channel;
- Moored small vessels and mooring buoys to outer reach of channel;
- Small vessel movements in main channel;
- Navigational buoys and markers;
- Piers and jetties outside of navigational waters;
- Leisure craft
- Strong tidal flows
- Low lying bridges
- Significant wave heights
- Strong currents and winds

10.3 Bridge Clearances / Water depths

Bridge heights above Chart Datum have been provided by the Harbourmaster. Prior to the tow, a full survey of the tow route will be carried out to confirm riverbed levels. Based on current information, the riverbed depths vary across the River Dee and fluctuate dependent on the season. This is particularly true at the existing bridges piers due to hydrodynamic effects generated from tidal and river flow currents. Riverbed levels across the tow path at bridge spans vary up to ~1.0m and is the area of particular concern for the transfer of the vessels.

It has been identified at the planning stages that there is sufficient clearance for the vessels to pass under at each of the bridges without the need for ploughing or dredging. Red7Marine advise 1m of air and water draft above and below the vessel for bridge clearances. However, 0.5m has been planned historically for projects as if required.

The air draft of Haven Seaseven and the supporting vessels were calculated as no more than 6.0m and water draft of 1.2m. An additional 0.5m will also be added to this value as a safety margin, providing a required clearance of 6.5m from the underside of the bridge to the waterline and 1.7m from the water line to the riverbed. These details and the required tidal heights are provided in the table below. A diagram showing the vessels and approximate bridge and tide heights are provided in Appendix A.

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It is important to note that the river levels on the River Dee are known to fluctuate by up to 3m. Recorded data is available to enable fluctuation patterns to be reviewed throughout the year according to the season. In addition, water levels on the site may differ to the predicted tidal levels due to freshwater flow that may be present from upstream. Both factors need to be studied before dredging operations are planning and the transfer of the vessel is completed.

	Soffit Height Above (mCD)	Bed Level (mCD)	Tug Air Draft (m)	Tug Water Draft (m)	Safety Margin (m)	Maximum Tide Height (mCD)	Minimum Tide Height (mCD)
Hawarden Bridge	9.5	0.6	5.0	1.2	0.5	4.0	2.3
Queensferry B5441 Bridge	9.0	1.0	5.0	1.2	0.5	3.5	2.7
A494 Road Bridge	8.85	0.4	5.0	1.2	0.5	2.9	2.1
A494 New Road Bridge	9.20	0.4	5.0	1.2	0.5	3.2	2.1

Table 1 – Bridge / Riverbed clearances

A494 River Dee - Tow Passage Plan

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