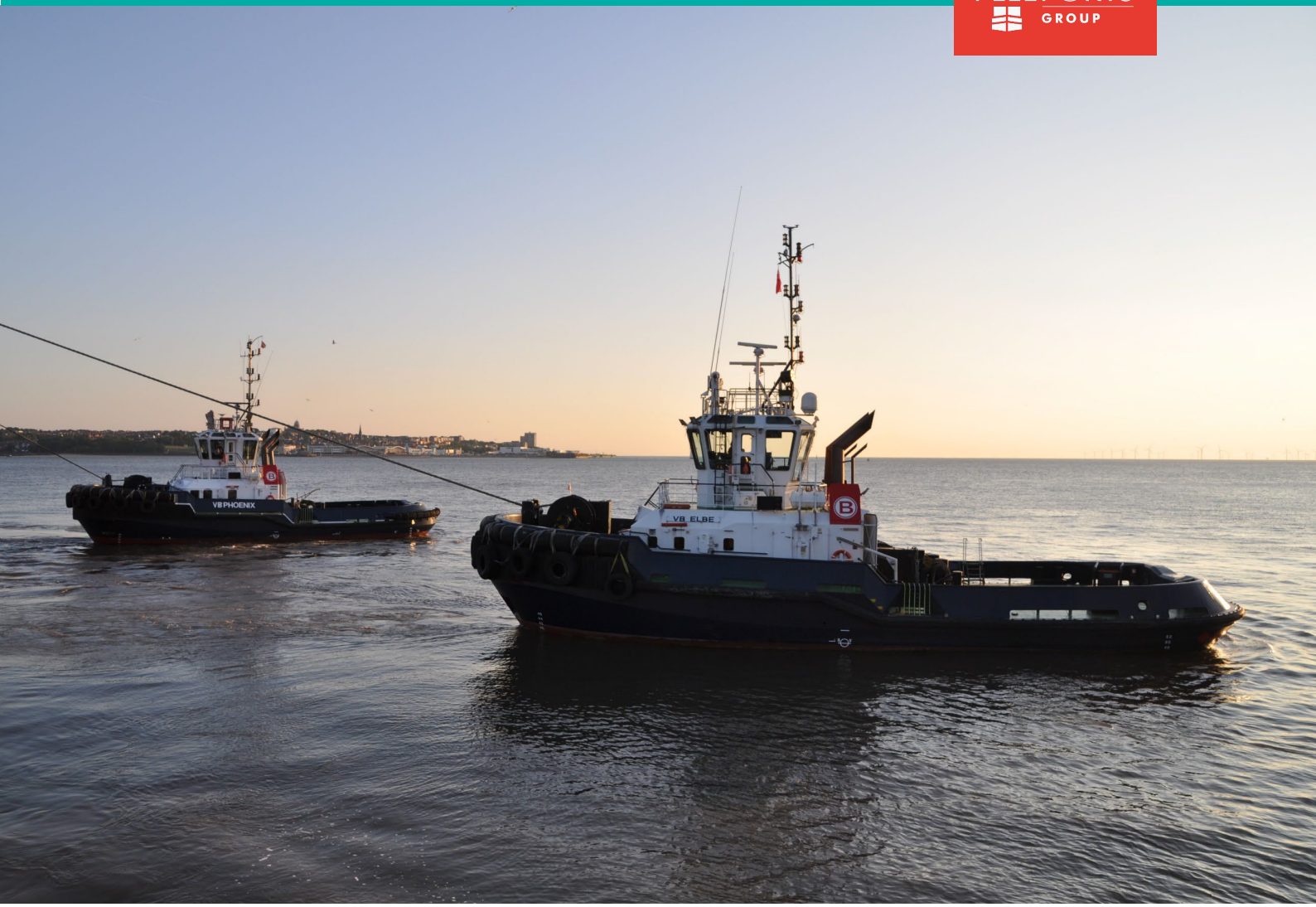


Port of Liverpool Towage Guidelines

The Mersey Docks and Harbour Company Limited

peelports.com

Peel Ports Group
More Than Ports

TABLE OF CONTENTS

Towage Guidelines

Introduction

The Mersey Docks and Harbour Company Limited (the statutory harbour authority and the competent harbour authority for the Port of Liverpool) has developed these guidelines to enhance the safety of towage operations within the Port of Liverpool and to provide a framework to enhance communications and teamwork between towage operators, tug masters, pilots, pilotage exemption certificate holders, vessel masters, and the harbour authority.

These guidelines must be read in conjunction with the Directions, Byelaws, and other Guidelines produced from time to time by The Mersey Docks and Harbour Company Limited and any instructions or guidelines produced by terminal operators. Notwithstanding, the provisions of The Mersey Docks and Harbour Company Limited's Directions and Byelaws will prevail.

Interpretation

Unless the context otherwise requires, in these Guidelines—

"ASD" means azimuthing stern drive;

"master" means the master of a vessel;

"MDHC" means The Mersey Docks and Harbour Company Limited;

"PEC holder" means a deck officer holding a current pilotage exemption certificate issued by MDHC;

"pilot" means an authorized Liverpool pilot;

"PMSC" means the Port Marine Safety Code issued by the UK Department for Transport and the accompanying Guide to Good Practice on Port Marine Operations;

"Port" means the Port of Liverpool;

"PWC" means the person with conduct of the vessel (i.e. a pilot, a PEC holder, or the master of the vessel, as appropriate);

"STCW" means the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, as amended;

"towage operation" means any operation in connection with the holding, pushing, pulling, moving, escorting, or guiding of or standing-by a vessel, and the expression "towing" will be likewise understood;

"tug" means any tug, workboat, or other vessel used for towing;

"tug master" means the master of a tug;

"vessel" means any vessel, craft, or object of whatsoever nature (whether or not coming within the usual meaning of the word "vessel").

Unless the context otherwise requires, words implying the singular include the plural and vice versa, and words importing gender will include any other gender.

1. TOWAGE GOVERNANCE AND STANDARDS

Towage governance

The PMSC requires statutory harbour authorities to develop a method and criteria to approve tugs and their operators working within the harbour authority's jurisdiction. Statutory harbour authorities must be satisfied that tugs operating within their jurisdiction can do so safely. Statutory harbour authorities may facilitate this requirement through compliance checks designed to assess the operational safety and support systems (including risk assessment), training, plans, and procedures developed by tug operators. A compliance check is designed to be simple and relevant to the operations conducted by each tug operator and is intended to satisfy the requirements placed upon MDHC via its compliance with the PMSC. A compliance check does not absolve the tug operator from its responsibility to operate safely and in compliance with industry best-practice and relevant rules, regulations, and standards.

Registration requirements

Tugs operating within the Port must be registered with MDHC. MDHC reserves the right to inspect any registered tug by whatever means it deems necessary.

MDHC may permit a tug that is not registered with MDHC to operate within the Port on a single-voyage basis if that tug is undertaking a special towing operation (e.g. dead tow of a barge directly to or from sea), and it would be neither safe nor practicable for the tow to be handed over to a registered tug. Notwithstanding any permission given, a tug granted exemption from registration must meet the same safety, crewing, and operational standards required for registered tugs.

Qualifications for tug crews

The Maritime & Coastguard Agency does not determine qualifications for tug crews operating tugs within ports and harbours. However, the Maritime & Coastguard Agency supports and approves various training and qualification schemes that can be applied to tug crews. These schemes are detailed within the PMSC. Tug operators should set minimum qualification standards for tug crews, considering their areas of operation and crew complement.

Masters of tugs operating within the Port should hold either a Certificate of Competency to STCW standards or a Boatmasters' Licence (or equivalent) with an appropriate towage endorsement.

Experience of tug crews

Tug operators should ensure that their crews are trained with a sound understanding and knowledge of the tugs they operate, relevant towage techniques, and the areas of the Port within which they will operate. MDHC will require tug operators to demonstrate how they ensure their tug masters have sufficient local knowledge to operate within the Port.

Working hours of tug crews
Tug operators should have systems in place to monitor and manage tug crews' working hours in accordance with relevant national and international legislation.

Personal protective equipment (PPE)
Through risk assessment, tug operators should evaluate the requirement for using PPE by persons on board a tug on a task-specific basis (e.g. towing, free-running, self-mooring). It is a tug master's responsibility to enforce the wearing and use of PPE in accordance with the tug operator's minimum requirements.

Tug suitability
Tug operators should ensure that their tugs are fit for their intended purpose and have valid certification (commensurate with the intended purpose and areas of operation) and insurance in place.

Automatic identification system and charts
Tugs operating within the Port must have an operational Automatic Identification System (AIS) to aid Mersey VTS, Dockmasters, and other vessels in maintaining situational awareness. Tug masters must also have access on board to up-to-date navigational publications, including charts covering the intended areas of operation.

Risk assessments
Tug operators should have current risk assessments in place for all standard towing operations that they may perform. Any unusual operations should at least be covered by a dynamic risk assessment.

Training and education of pilots regarding towage operations
National and international training standards require pilots to demonstrate, before using tugs during an act of pilotage, their knowledge of working with tugs and to become acquainted with the characteristics and limitations of the tugs operating within the Port.

Use of tugs by PEC holders
Unless possessing a valid Towage Endorsement, PEC holders must not use tugs on a towline or move their vessels as a dead ship using tugs. PEC holders without a valid Towage Endorsement can only use tugs for pushing. If a PEC holder without a valid Towage Endorsement intends to use a tug on a towline, a pilot must be booked to take the conduct of the vessel.

The Port of Liverpool Pilotage Directions detail the requirements for PEC holders to obtain and retain a Towage Endorsement.

2. MINIMUM TOWAGE REQUIREMENTS

Towage types
There are several types of towage operations, each of which brings challenges and risks. These towage operations can be summarized as follows:

- **Ship-assist towage:** assisting self-propelled vessels underway, typically during entry, departure, or shifting within the Port
- **Dead tows:** assisting vessels without propulsion, such as (but not limited to) dead-ships, barges, pontoons, or rigs during entry, departure, or shifting within the Port
- **General towage:** activities typically undertaken by workboats, including towage of smaller barges and pontoons within the limits of the Port
- **Project towage:** unusual towage activities requiring special consideration, such as assisting with the launching of vessels

The most frequent type of towage undertaken within the Port is **ship-assist towage**, and a tug requirements matrix has been developed to provide guidance for masters on the number of tugs that should be ordered, considering the size of the vessel and the location of the towage operation.

Ship-assist towage matrix

The ship-assist towage matrix sets baseline guidance for the minimum towage requirement for self-propelled vessels arriving at or departing from specific locations within the Port. The towage matrix has been derived from experience, analysis of vessel movements (including discussions with pilots and tug operators), and risk assessment. Without consultation with a pilot, masters must order tugs to assist their vessels in accordance with the towage matrix:

Assisted vessel's length overall	Liverpool Container Terminal 2	Gladstone River Entrance	Langton River Entrance	Alfred River Entrance	Twelve Quays	CLCT	Cammell Laird Shipyard	Tranmere Oil Terminal	Bromborough Wall	Eastham Locks	QEII Lock	Garston
<95m	Refer to specific facility guidelines	-	-	-	1	Refer to specific facility guidelines	1	Refer to specific facility guidelines	-	-	-	-
95m – 120m		1	1	1	2		2		1	1	1	1
121m – 140m		2	2	2	2		2		2	2	2	2
141m – 160m		2	2	3	2		2		2	2	2	2
161m – 180m		2	3	3	2		3			2	3	
181m – 210m		3	3	3	2		3				3	
>210m		3					4					

(subject to the maximum permitted length for the relevant River entrance or facility)

In determining the minimum towage requirements shown in the ship-assist towage matrix, the following assumptions have been made:

- **Assisted vessel:** a vessel (not exceeding the normal maximum permitted beam for the relevant River entrance) without defects, with a start–stop main engine, having a

dead slow ahead speed of 6.5 knots, with a normal spade-rudder, but without thrusters

- **Assisting tugs:** each tug being a tractor or ASD-type tug with a minimum bollard pull of 30 tonnes
- **Weather conditions:** favourable weather conditions

Deviation from the ship-assist towage matrix

Owing to the considerable variations in vessel size, type, condition, and degree of manoeuvring capability, the recommended number of tugs from the ship-assist towage matrix may be more than the safe minimum number of tugs required for a particular vessel in particular circumstances. Accordingly, the master may order the recommended number of tugs in accordance with the towage matrix or opt to consult with a pilot. Through the pilot consultation process, the pilot and master may, by use of their professional judgment, agree to deviate from the recommendations of the towage matrix to set a safe and appropriate level of tug assistance for the vessel in specific circumstances. Likewise, conditions relating to the vessel or the prevailing conditions may result in the required level of tug assistance exceeding the recommendations of the towage matrix. Furthermore, the Harbour Master may direct that a vessel uses tug assistance exceeding the recommendations of the towage matrix.

During the consultation process to assess the tug assistance required by a vessel, the following points should be considered:

- **Assisted vessel:**
  - dimensions
  - draught and under-keel clearance
  - windage area
  - type of main propulsion and steering systems
  - manoeuvring aids (e.g. thrusters)
  - unusual design features
  - extant defects
- **Tugs:**
  - availability of tugs
  - types of tugs (including conventional tugs)
  - bollard pull (including the minimum and maximum available)
- **Intended towing operation:**
  - location (including manoeuvring room)
  - complexity
  - disposition of other vessels in the area
  - tidal conditions
  - environmental conditions (including visibility)
  - availability of line handers or gig boats

Towage types other than ship-assist towage

Requirements for towage types other than ship-assist towage should be set by either pilot consultation or, if a pilot is not required, documented risk assessment by the person responsible for the relevant towage operation.

3. ADDITIONAL PLANNING FOR DEAD TOWS

Dead tows are non-routine operations involving the towage of any vessel that is incapable of self-propulsion at the time that it is being towed, and are subject to special consideration.

Tow Master

Each dead tow operation must have a designated Tow Master (who may be the master of the vessel to be towed, the master of one of the assisting tugs, or a person specifically appointed to act in the capacity of Tow Master) who is suitability competent to have overall responsibility for the intended towage operation. The Tow Master is responsible for completing the dead tow application and the risk assessments, method statements, and passage plan required for the dead tow operation. For the avoidance of doubt, the Tow Master **must not** be the pilot. The pilot (if required) will be the PWC.

Dead tow applications

Before undertaking a dead tow operation, MDHC must give consent for the towage operation. The Tow Master must apply for this consent on the relevant application form (available to download from MDHC's website), which must be supported by relevant method statements, passage plans, specifications, certifications, etc. When a dead tow operation requires a pilot, the operation will be subject to a compulsory pilotage consultation.

Dead tow applications must be submitted with sufficient time for review (reviews are generally not considered on weekends or Bank Holidays) and a pilot consultation (if required). In the case of complex towage operations, MDHC may require a working group of personnel with suitable skills and knowledge to be convened to ensure that all risks have been considered and suitable method statements have been developed.

Dead tow application forms must be completed in full; failure to do so may result in rejection of the application with associated delays to or cancellation of the intended dead tow operation.

Dead tow toolbox talk

When MDHC has consented to the dead tow operation, before the tow commences, the Tow Master should give a toolbox talk to all parties involved directly in the dead tow operation. As appropriate, the toolbox talk should include the master, pilot, and tug master.

Depending upon the nature of the dead tow, the Tow Master may be on board the vessel to be towed or on board one of the assisting tugs. Wherever the Tow Master is stationed, the Tow Master's role and overall responsibility for the dead tow operation must be clearly understood by all involved parties.

4. PREPARING FOR TOWAGE OPERATIONS

Planning and coordination

Before towing operations commence, a plan should be agreed upon by the master and the pilot in consultation with the tug master. This plan should take account of all relevant factors, such as tides; wind; visibility; vessel type, size, and handling characteristics; and specific berth requirements. The pilot should have a sound knowledge of the assigned tug's capabilities and limitations. The pilot and master should agree that the assigned tug is suitable and positioned correctly for the intended operation. The pilot, master, and tug master must agree on the plan before the towage operation begins.

The PWC is responsible for coordinating the use of a tug, and communication with the tug should be made by the PWC or a person appointed for that task (e.g. an assistant pilot). It is the duty of the PWC and the master to ensure that the vessel is handled in a safe and controlled manner, with due regard for the safety of the tug.

The number of personnel employed in any towage operation, both on board the vessel and the tug, should be determined considering the size of the vessel and the prevailing operational and environmental circumstances. In all cases, sufficient crew should be provided to ensure that individuals are not exposed to undue risk and that the towage operation can be conducted safely and efficiently. Due regard should also be given to the size, weight, and scope of the towing gear and lines to be handled.

All those responsible for personnel involved or equipment used in the towage operation must ensure that safe working practices are followed, and that equipment is fit for purpose. They should also ensure that personnel involved are trained, adequately briefed in their duties, and issued with and use suitable and effective PPE.

Master–Pilot Exchange

When a tug is to be used, in addition to the standard information given during the Master–Pilot Exchange, the master should provide the pilot with details of:

- Positions of fairleads, chocks, bollards, and strong points that can be used for towing, including the safe working loads (SWL)
- Areas of the hull strengthened or suitable for pushing by tugs and relevant identification marks employed (which is required owing to variations in vessel design and construction)
- Any special features of the vessel (e.g. controllable pitch propellers, thrusters, azipods)

All deck fittings used for towing should be marked with their SWL, and a mooring equipment plan must be available on board. Masters and pilots should exchange this information verbally at the earliest opportunity.

Failure to provide the SWL of a vessel's fittings may damage the vessel or the assisting tug.

Note: Use of a vessel's mooring lines as towlines is not recommended and should be avoided wherever possible. Tug masters should not tow using a vessel's lines unless in an emergency. However, if there is a requirement to do so, the master should confirm the SWL of the mooring lines to be used, and tug masters should consider this when assessing the level of power to be applied to reduce the likelihood of parting the mooring line.

The pilot should provide the master with details of:

- Type of tug to be used and its bollard pull (or the details for each tug if more than one is used)
- The mode of towage (e.g. towing on a line or pushing), which should be recorded on the Master–Pilot Exchange document
- Tug rendezvous time and position
- Planned (optimum) speed of the vessel through the water when connecting the tug
- VHF channel to be used for vessel–tug communications in addition to the usual Port Operations VHF channels
- The method by which the vessel crew should make fast and let go towlines
- Requirement for a dedicated crew member to monitor the tug and its towline while the tug is making fast and letting go
- Requirement for vessel crew not to release the towline in an uncontrolled manner (which otherwise could result in injury to the tug crew or fouling of the tug's or vessel's propulsion)
- Prohibition on the use of weighted heaving lines
- Any high-risk areas during the transit (concerning the possible use of the assigned tug)

Pilot–Tug Master Exchange

The pilot and tug master should, as a minimum, discuss the following points (as required):

- SWL of the vessel's fitting to which the tug will be made fast
- Position and maximum allowable force of any pushing points on the vessel's hull
- Rendezvous time and position considering vessel traffic in the area and prevailing weather and sea conditions
- The planned (optimum) speed of the vessel through the water for making fast or letting go of the tug
- The maximum speed of the tug
- Passage details in their entirety while accompanied by the tug, including details of any swinging manoeuvres and sequence for making fast, letting go or pushing

- Berthing details in their entirety, including tug positioning (both in respect of the vessel or to Port features) and the vessel's intended berthing position
- Intended or emergency use of the vessel's anchors
- Any anticipated shallow water or tidal effects where significant surges may be experienced that might affect the tug
- Any further information deemed pertinent that may have arisen from the Pilot–Master Exchange or during the towage operation

Vessels under the conduct of a PEC holder

When a tug is to assist a vessel under the conduct of a PEC holder (subject to the limitation of a Towage Endorsement), the PEC holder will undertake the exchange of information with the tug master that a Pilot would otherwise undertake.

Information provided by the tug master

In addition to the exchange of information detailed above, the tug master should advise the PWC immediately:

- When the tug (giving the tug's name) is in position to assist, when made fast and when let go
- If there is any reduction in the tug's operational characteristics, such as its ability to manoeuvre, deliver bollard pull, or any other operational defect that could affect the tug's capabilities
- Of any concerns regarding the safety of the tug and its crew; in which case, the PWC and the tug master should take immediate action to ensure the safety of both the tug and the vessel—if necessary, aborting the towage operation as soon as it is safe to

Preparations on board the tug

Before getting underway, the tug master should ensure that (a) all on-board pre-departure checks are completed; (b) the crew are fit and appropriately rested; (c) the crew are adequately trained for the operation; and (d) the crew have the appropriate PPE for the intended operation and instructions for when and how to use that PPE.

Inspection and testing of towing equipment

In addition to any inspection and maintenance standards for tugs generally, tug operators should have in place minimum standards for the frequency of inspection of towing equipment (preferably daily) and the testing of the emergency release mechanisms (including local and remote operation) for towing hooks and towing winches. All methods of release (e.g. tripping or run-out) should be tested in addition to the mode of release (e.g. pneumatic, manual pull, lever, knock-out). Consideration should be given to testing the release mechanism with the equipment under load. Release mechanisms should also be tested if a fault is suspected or if an exceptional shock-loading has been experienced.

Under no circumstances should towing gear be connected to any winch or hook that has a suspect release mechanism.

MDHC may request records of the testing of emergency release mechanisms as part of the tug registration process or a compliance check.

Inspection of towing gear

All fixed and running gear, including ropes, should be carefully maintained, tested, certified, and regularly inspected for wear, damage, and corrosion. Particular attention is drawn to ensuring that fairleads, lead bollards, mooring bitts, etc. are used appropriately, are free from damage, and within their design capabilities. All towing gear (including heaving lines and messengers) in use should be inspected for damage before undertaking and after completing a towage operation, which is especially important for gog ropes.

Tug masters should ensure that the gear used for towing is fit for purpose and in good working order to ensure reliability.

Access to the tug's working deck

Mooring and towing operations inflict immense loads upon towing equipment and towing gear. As a result, sudden failure in any part of the system may cause death or severe injury to personnel. While towing, the tug master should enforce a clear-deck policy. Tug crew should not go on the working deck while the tug is towing unless there is no other alternative, or access is for the sole purpose of the safety of the tug or its crew; in which case, tension on the line should be reduced to the absolute minimum for the duration of the required on-deck activity.

Watertight integrity

The watertight integrity of the tug should be maintained at all times. When the tug is engaged in any towage operation, all watertight doors and hatches should be securely fastened and, wherever possible, the crew should avoid working below the waterline.

Watertight doors and hatches should be marked with signs stating they must remain closed during towage operations. If watertight doors or hatches are opened while the crew moves about the tug during a towage operation, they should be closed and re-secured immediately after use. Watertight doors and hatches should not be left open, even if access is required for only a brief time.

If during towing operations anyone on board the assisted vessel observes a watertight opening on the tug that is not closed and which may affect the tug's watertight integrity, they should inform the PWC immediately who, in turn, should inform the tug master.

5. COMMUNICATIONS

VHF communications

VHF communications are a vital component of safe towage operations. It is essential that those on board the vessel and the assisting tug can communicate promptly and effectively throughout the towage operation.

Before towing operations commence, VHF communications between the vessel and the tug should be established, and a working channel should be selected. After VHF communications

have been established, tested, and information has been exchanged (as specified in these Guidelines), personnel should limit transmissions to those relating directly to the towing operation. Furthermore, VHF transceivers used for vessel–tug communications should be set to transmit on reduced power whenever possible.

All communications should identify the parties communicating to prevent any misunderstanding. The PWC should inform the tug master before making any large course alterations, increases or reductions in speed, kicks of the main engine, or anchor use.

It is also important that effective communications are maintained between the relevant parties on board the vessel (including the bridge team and between the master and the mooring parties) and the tug.

Where applicable, the PWC should also establish contact with line handlers and berth masters. Consideration should be given to whether communications with line handlers and berth masters should be conducted on the same VHF channel used for communications with the tug or on a separate VHF or UHF channel. Line handlers and berth masters should consider monitoring the vessel–tug VHF working channel to gain an appreciation of progress during the towage operation.

Parties using handheld VHF or UHF radios should ensure that the units are fully charged before use.

VHF reporting requirements

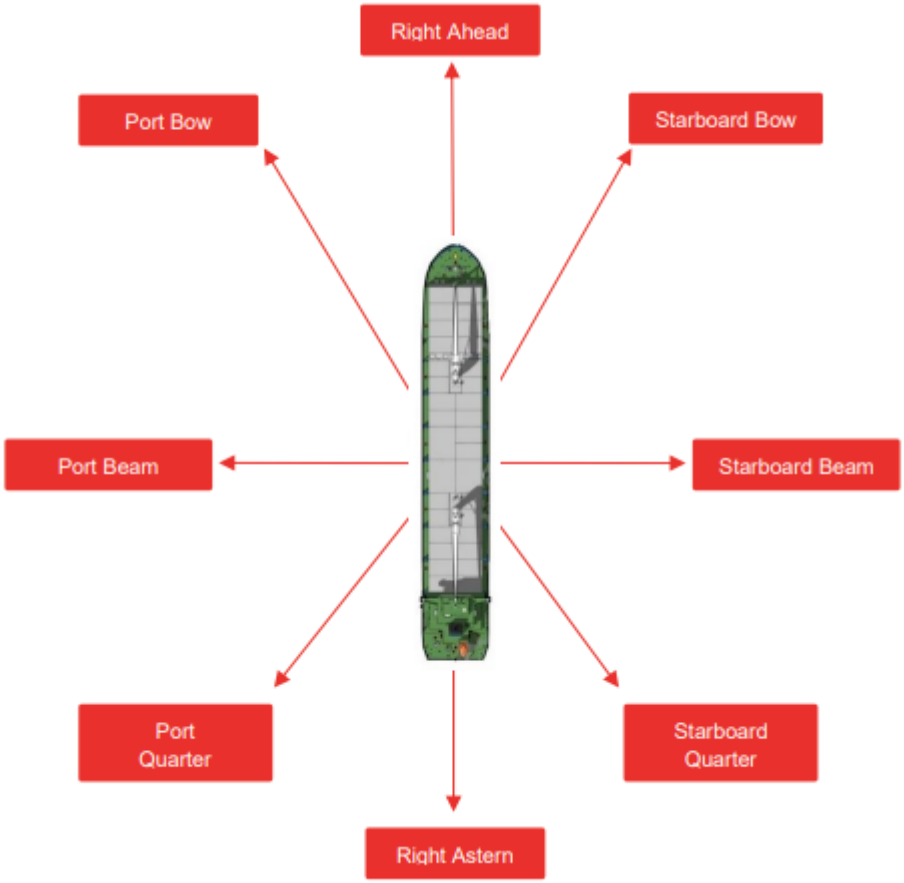
Establishing communications between vessels, tugs, line handlers, and berth masters does not relieve the master and tug master from their obligations to report their respective vessels' movements to Mersey VTS or the relevant Dockmaster in accordance with MDHC's requirements. However, when towing, a tug will be considered to be "part" of the assisted vessel, and the tug master does not need to report the tug's movements separately. However, wherever possible, the tug master should maintain a listening watch on the relevant Port Operations channel.

Instructions to tugs

During towage operations, the PWC must clearly, unambiguously, and in English give their instructions to the assisting tug.

The force required from a tug could be requested as a percentage of maximum bollard pull (e.g. 25%, 75%, 100%) or weight on the towline (e.g. slack-line = no weight, tight-line = weight of the tug without power applied).

Ideally, directional instructions should be given with respect to the assisted vessel (e.g. port quarter, starboard bow, broad-off starboard quarter):



Irrespective of the format of the instructions, they must be unambiguous and used consistently throughout the towage operation.

Instructions for a tug should take the format:

NAME OF TUG + POWER REQUIRED + DIRECTION REQUIRED

To recreate closed-loop communication, upon receipt of an instruction, the tug master should repeat that instruction.

Instructions for a tug should be given using the tug's name, not the tug master's name, which will assist the vessel's bridge team with situational awareness.

Any indistinct or unclear communications must be questioned.

Failure of VHF communications

If those on board the vessel or a tug suspect that VHF communications have been lost with the other party, attempts should be made as soon as possible to re-establish communications using a different VHF set tuned to the relevant working channel. If this is unsuccessful, the party suspecting a loss of communication should sound signal

"K" (— • —) on the whistle. On the sounding of this signal, as far as is reasonably practicable and safe to do so, the vessel and the assisting tug should hold position until communications by VHF or other means can be established.

Hand signals

Hand signals may be used between the tug crew and the vessel crew while making fast and letting go where VHF communication is impossible between the parties. If hand signals are used, they should comply with industry standards, e.g.:

6. TOWING OPERATIONS

Connecting and disconnecting the towline

Before commencing a tow, the tug master should determine the towing gear suitable for the operation and instruct the tug crew accordingly.

When receiving heaving lines, the tug crew should be aware of the risk of injury by being struck by a 'monkey's fist' or other weighted object attached to the heaving line. The tug crew should indicate where the heaving line should be thrown and stand clear of that area.

Before making a tug fast, the master must remind the mooring party that using dangerously weighted heaving lines is illegal. **MDHC will report the use of dangerously weighted heaving lines to the Maritime & Coastguard Agency**.

When making fast to the vessel, the tug crew should ensure that the towline is clear of any obstructions, able to run freely, and is payed out from the tug in a controlled manner.

While letting go a tug, the vessel crew should be aware of the risk of injury if the towline is released in an uncontrolled manner, and the tug crew should avoid standing directly below a towline that is being let go. Tug crews should also be aware that any towline that has been released but is still outboard of the tug may foul on steelwork or fendering or be drawn into the tug's propellers, causing it to come tight unexpectedly.

Speed when making fast and letting go

Tug operators should agree with their tug masters recommended maximum speeds through the water (not speed over the ground) for making fast and letting go. These recommended maximum speeds should be tug-specific owing to the varying design of tugs and their propulsion systems. However, such recommendations should not fetter a tug master's ability to determine, through a dynamic risk assessment, the maximum speed for making fast or letting go given the prevailing circumstances.

Prior to making fast or letting go, the tug master should agree with the PWC on the maximum speed of the vessel through the water (not speed over the ground) while the tug makes fast or lets go.

When a tug is making fast or letting go, the vessel must be kept on a steady heading and at a steady speed. Sudden changes to the vessel's engine speed, rudder angle, or heading may affect a tug that is making fast or letting go. If it is necessary to change the vessel's speed or heading, etc. while a tug is making fast or letting go, agreement for the change should be sought from the relevant tug master, and such changes should be kept to the minimum required.

In strong tidal conditions, a high percentage of a tug's power may be utilized to keep pace with the assisted vessel, and there may be limited reserve power available to enable effective tug manoeuvring. Excluding escort towage, tug effectiveness generally decreases with increasing speed through the water.

It remains the responsibility of the PWC and the tug master to ensure that making fast or letting go is conducted at a safe speed for all the participating vessels.

Interaction

Interaction and its effects on tugs and their handling should be understood by tug masters, masters, pilots, and PEC holders.

When a vessel moves relative to the surrounding water, high- and low-pressure areas are generated around its hull. These areas of high- and low-pressure can cause adverse effects on the handling of a tug near the vessel. As the tug moves relative to the vessel, the tug passes through the various pressure fields, which will cause the tug to be either rejected from or drawn towards the vessel, and the tug master must compensate for this interaction. The closer the tug is to the vessel and the higher the vessel's speed relative to the water, the greater the interaction that the tug feels.

The areas of strongest interaction are around the vessel's bow and stern. When operating close to the vessel in these areas, the tug master should be aware of the flare of the vessel's hull and its bulbous bow (if fitted), which may be fully or partially submerged.

Keeping the vessel at a steady speed and on a steady heading is essential when a tug operates close to the vessel, especially when the tug is making fast or letting go. Furthermore, at night, it may be more difficult for the tug master to maintain situational awareness, especially as the tug transitions from well-lit areas of the vessel to areas in shadow (e.g. under the flare of the bow).

Running or holding against the tide

The PWC should be aware that it is sometimes difficult to manoeuvre a tug against the tide (e.g. running against the tide or holding position against the tide) without putting weight on the towline. When holding against the tide, tug masters may prefer to angle their tugs parallel to the tide when not directly pulling on the towline or pushing on the vessel.

Girting and capsizing

All parties involved in towage operations must have a clear understanding of girting and its consequences. A tug towing on a towline with the towline made fast amidships (i.e. a conventional tug or an ASD tug operating conventionally) is susceptible to girting. Girting can happen if the towline comes at right angles to the tug (i.e. leading off the beam) and the tug is pulled bodily through the water by its tow. The heeling moment generated by the towline acting in concert with the tug's underwater hull resistance may be sufficiently powerful to overcome the tug's righting lever, which, unless the towline is released in good time, can lead to deck-edge immersion, flooding, and capsize of the tug.

Girting can happen rapidly, and it cannot be assumed that a towing hook will release, a winch will pay out, or that the towline will part prior to a capsizing incident.

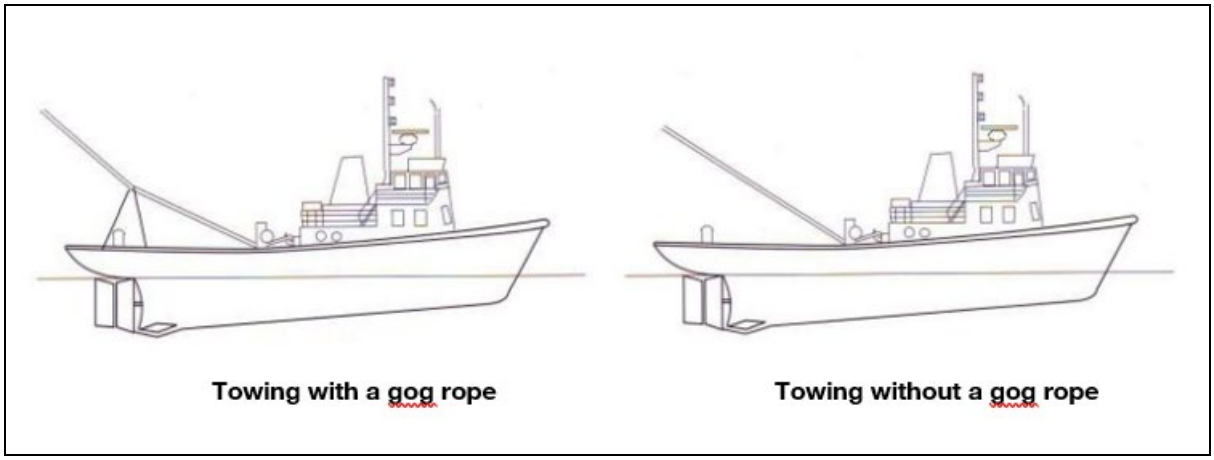
Common causes of girting are:

- The assisted vessel turns abruptly, and without warning, away from the tug
- The assisted vessel overtakes the tug
- The tug is pulled stern-first and turns 90° to the direction of motion

While it is possible to girt and capsize tractor tugs, their design, omnidirectional propulsion, and the usual method of towing make them more likely to recover from a near-girting situation.

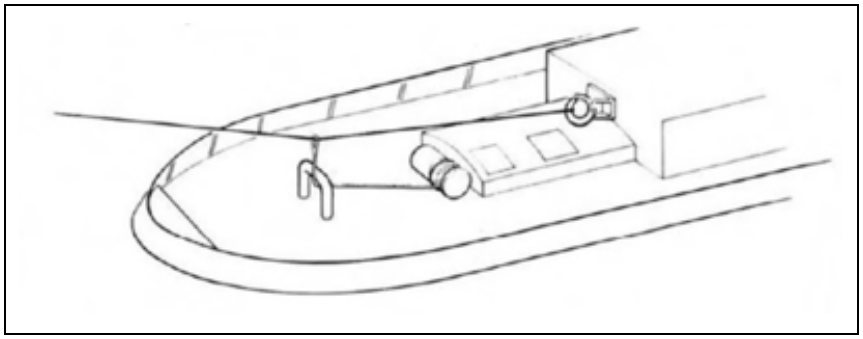
Use of a gog rope

When towing conventionally (i.e. towing on a line from a hook, winch, or bitts located near amidships), the risk of girting can be reduced using a gog rope (also known as a gob rope). As illustrated below, the gog rope is passed over the towline and, when made fast, the gog rope (a) limits the arc of movement of the towline; and (b) shifts the effective towing point towards the tug's stern.



A gog rope is effective when a tug is towing conventionally and the tug is likely to be dragged astern (e.g. when operating stern-to-stern with the assisted vessel), or when there is a high likelihood of the towed vessel overtaking the tug (e.g. a tug swinging a dumb barge with headway). Depending on the length of the gog rope, the towline cannot swing across the tug's beam, and the tug is kept in line with the towline, which reduces the risk of girting if the tug is pulled stern-first through the water or if the tow overtakes the tug.

If a gog rope's length can be adjusted during the towing operation, its effectiveness can be improved, and its limitations reduced. Adjusting a gog rope's length can be achieved by having a dedicated gog rope winch (as illustrated below) or passing the gog rope around a capstan.



It will be appreciated from the illustration above that a gog rope can limit how far the tug can turn at the end of the towline. In certain circumstances, improper use of a gog rope can severely restrict a tug's manoeuvrability and effectiveness. Therefore, tug operators using a tug to tow conventionally should provide specific training and instruction to the tug master regarding when a gog rope must be used, and the effectiveness and limitations of using a gog rope.

Because gog ropes are effective in preventing girting, they (and any associated equipment) should be subject to thorough inspection before and after use. If there are any signs of damage or degradation, a gog rope and any associated equipment should be replaced.

Critical tug positions alongside

Positioning a tug alongside a vessel is a matter for discussion between the PWC and tug master. The PWC should inform the tug master of any areas of the hull where the tug must not land or push (e.g. in the way of watertight doors or between frames).

When approaching a vessel to come alongside to push, make fast, or let go, the tug master should be aware of the vessel's bulbous bow, other underwater protrusions (e.g. stabilizer fins), the flare of the vessel's hull at the bow and stern, and anything projecting beyond the vessel's hull (e.g. deck cargo or cranes).

Safe working load of the vessel's fittings

As mentioned in these Guidelines, those involved in towing operations should establish the SWL of the vessel's fittings used for towing. Using fittings with a SWL lower than the assisting tug's bollard pull should be avoided wherever possible. If this is not possible, the tug master must be advised of the SWL of the fittings being used, and the tug master should limit the tug's power accordingly. Panama fairleads are preferred to other types of fairleads for towing operations.

Bollard pull

Bollard pull is the measurement of the static force that a tug can exert on a stationary object in ideal, controlled conditions. The actual towing force that a tug can apply to an assisted vessel may be less or more than its rated bollard pull and depends upon many factors, including the method of assistance, speed of the tug through the water, and wave conditions.

Towline length

The tug master should determine the length of the towline to be used considering factors such as manoeuvring room, freeboard of the assisted vessel, speed of the assisted vessel, wave or swell conditions, and the tug master's experience. There are advantages and disadvantages to both short and long towline lengths, and those involved in towing operations should familiarize themselves with how the manoeuvrability of both tugs and assisted vessels is affected.

Towing on a short towline reduces the required manoeuvring room and increases the tug reaction speed; however, short towlines also reduce the tug master's reaction time to deal with adverse situations. Operating on a short towline can also limit the tug master's situation awareness because the assisted vessel occupies more of the tug master's field of vision. These negative aspects of using a short towline are exacerbated by increasing the speed of the tug and the assisted vessel. When operating on a short towline, the tug master should constantly and closely observe course and speed changes.

Tug masters should carefully consider the towline length when operating as the forward tug assisting a vessel underway at speed.

Static forces in towlines

The tug master should consider the angle of the towline to the horizontal. Increasing the angle of the towline to the horizontal increases the tension in the towline without increasing the effective towing force on the vessel. While there is not always a direct relationship between the towline angle, the effective towing force, and tension in the towing line, analysis indicates that the following may be considered indicative of the relationship:

Towline angle to horizontal (°)	Tension in towline (% of effective towing force)
0	100
30	120
40	130
50	155
60	200
70	300
80	575

The table shows that for a tug pulling on a steep towline at less than its maximum bollard pull, the tension in the towline may exceed the SWL of the towline and the fittings on board both the tug and the assisted vessel.

Increasing the length of the towline will decrease the towline's angle and tension in the towline. This action may also increase the effectiveness of the tug because it should reduce the propeller wash impinging upon the assisted vessel's hull.

Dynamic forces in towlines

Waves, swell, sudden accelerations of the tug, and incorrect tug manoeuvres generate dynamic forces in towlines. The tug master can control horizontal tug accelerations by careful manoeuvring, but this is not the case with vertical accelerations caused by waves and swell.

Vertical accelerations significantly affect the forces in a towline, especially short and steep towlines. A longer towline composed of materials offering some elasticity is better at absorbing dynamic forces and reducing peak dynamic-force loads. The choice of towline composition and its elasticity are critical considerations for tugs that must operate in significant wave or swell conditions.

As with static forces, there is no direct relationship between towline length and dynamic forces. However, dynamic forces of twice the effective towing force are not uncommon, particularly when towlines with little stretch, such as steel wire and some modern fibre towlines, are used. When a tug operates under heavy loads in waves and swell, dynamic-force loads may cause the towline to part or the winch brake to slip.

Escort towage

Escort towage differs from normal ship-assist towage because escort towage is usually conducted at speeds higher than those encountered during ship-assist towage.

Escort towage can be either passive (where a tug runs close to the vessel, ready to offer assistance if required) or active (where a tug is made fast to the vessel). If active escort towage is being performed, it should be undertaken by a tug designed for that purpose.

Depending on the vessel's speed through the water, the escort tug will generate forces in its towline either directly (using its propulsion to pull directly against the towline) or indirectly (using, amongst others, hydrodynamic forces acting on the tug's hull to generate a force in the towline). When a tug operates indirectly, the towline forces may exceed the tug's rated bollard pull significantly; therefore, the choice of fairlead and bollard on board the vessel to which the escort tug will be made fast is critical.

Safety during towage operations

During towage operations, the tug crew should be alert to any adverse change in circumstances relating to the towline, the tug, or its crew. Any such changes should be reported to the tug master immediately. Such reporting is vital on tugs where the tug master has a restricted view of the crew or towline.

While a tug is made fast, the vessel crew should remain clear of the towline and the bollard to which it is secured. The vessel crew should only approach the towline if instructed to do so as part of letting go of the tug. The vessel crew should be aware that towlines can part or be released by the tug without warning.

Mooring boats

When mooring boats are used for mooring and unmooring operations, the PWC and tug master should always be aware of the position and intentions of the mooring boats, especially in strong tidal conditions, at night, or during periods of adverse weather conditions. Maintaining awareness of the position of mooring boats is particularly important in circumstances where visibility is limited from the vessel's or tug's wheelhouse. Wash from the vessel's and tug's thrusters and main propulsion (including controllable pitch propellers turning with neutral pitch) can cause significant problems for mooring boats, especially when they are close to the vessel or tug when picking up or running with lines. A vessel's propeller should only be turned after first confirming the positions of the mooring boats and that they are clear. Pre-agreed sound signals can be used as a warning when vessel noise compromises VHF monitoring on board a mooring boat.

7. TOWAGE IN ADVERSE WEATHER CONDITIONS

Adverse weather conditions limit the effectiveness of tugs, which could reduce safety margins. Therefore, towage operations in adverse weather conditions should be subject to careful planning and dynamic risk assessment by the parties involved.

Towing in restricted visibility

Some areas of the Port are prone to patches of restricted visibility (caused by fog, mist, snow, rain, sleet, or any other conditions which impair visibility) when conditions can change without warning, and visibility can reduce rapidly. Furthermore, when a vessel has committed to transit, it may not be an option to come alongside a berth or to abort its intended transit and

return to the departure location. Therefore, transiting areas that are prone to restricted visibility requires careful management.

Minimum visibility for all planned towage operations is two cables (370m) or the assisted vessel's length, whichever is greater, so that the PWC can see the tug and the tug master can see the assisted vessel.

In circumstances where restricted visibility exists or is likely to exist, those involved in the towage operation should, as part of the passage plan and risk assessment process, agree on how the towage operation will be conducted, identify the hazards associated with the towage operation, and decide on the risk reduction measures that will apply. When completing this assessment, the following should be considered:

- Characteristics of the vessel, including crew competency and minimum speed to maintain steerage
- For vessels under the conduct of a pilot, the availability of a portable pilot unit loaded with the most recent survey information
- Type of tug and the proposed method of towing
- Operational status of navigational aids and equipment on board both the vessel and the tug
- Movement of other vessels in the area
- State of tide and trend
- Navigational characteristics of the area including the use of information from Mersey VTS or the relevant Dockmaster.
- A contingency plan should visibility deteriorate after the towage operation has commenced or if the tug must let go at any stage of the operation

If visibility reduces and becomes restricted during the towing operation or visibility decreases below the limits mentioned above, those involved in the towage operation should discuss and agree upon a course of action to ensure the safety of all persons and vessels involved. Some potential courses of action are:

- Let go the forward tug, or any other assisting tug, and take the vessel to anchor
- Use the tug to swing the vessel, then let go the tug, and the vessel proceeds to either an anchorage or beyond the Port limits
- Let go of the forward tug or any other assisting tugs, and have the tug assist in a pushing mode
- Allow the tug to manoeuvre the vessel under the PWC's instructions, which may include using the tug to maintain the vessel's position at a safe location within the Port

The tug master should inform the PWC immediately of any concerns regarding the safety of the tug and its crew. If necessary, the operation should be aborted as soon as it is safe to do so.

The PWC should report changes to the intended towage operation to Mersey VTS or the relevant Dockmaster.

Towing in heavy weather conditions

In circumstances where heavy weather (e.g. high winds or heavy swell) exists or is likely to exist, those involved in the towage operation should, as part of the passage plan and risk assessment process, agree on how the towage operation will be conducted, identify the hazards associated with the towage operation, and decide on the risk reduction measures that will apply. When completing this assessment, the following should be considered:

- Sea or swell conditions at the intended operating area and the route to or from that area
- Wind speed (including gusts), direction, and trend; e.g. rising, steady or falling
- State of tide and trend
- Information contained in the latest weather forecast and reports from other vessels in the area
- Type of tug and the proposed method of towing (including consideration of the likelihood of shock-load to the towing gear)
- Movement of other vessels in the area
- Navigational characteristics of the area including the use of information from Mersey VTS or the relevant Dockmaster
- A contingency plan should conditions deteriorate after the towage operation has commenced or if the tug must let go at any stage of the operation.

If conditions deteriorate during the towing operation, those involved in the towage operation should discuss and agree upon a course of action to ensure the safety of all persons and vessels involved.

Some potential courses of action are:

- The tug does not make fast but remains on station to assist the vessel to a position of safety
- The tug lets go and remains on station to assist the vessel to a position of safety
- The tug lets go to assist in a pushing mode

The tug master should inform the PWC immediately of any concerns regarding the safety of the tug and its crew. If necessary, the operation should be aborted as soon as it is safe to do so.

The PWC should report changes to the intended towage operation to Mersey VTS or the relevant Dockmaster.

8. FURTHER GUIDANCE AND ADVICE

Further guidance, advice, and information regarding towing operations and associated matters can be found in the following publications:

- Tug Use in Port (Polestar Publishing)
- Bow Tug Operations with Azimuthing Stern Drive Tugs (Polestar Publishing)
- Tug Stability (Polestar Publishing)
- Pilots' Pocket Guide and Checklist (BTA)
- Guidelines for Safe Harbour Towage Operations (ETA)
- The Risk of Tugs Capsizing due to Girting (West of England P&I)
- Recommendations for Ships' Fittings for Use with Tugs (OCIMF)
- Port Marine Safety Code and Guide to Good Practice on Port Marine Operations (DfT)
- Code of Safe Working Practices for Merchant Seafarers (MCA)
- Marine Guidance Notes and Marine Shipping Notices (MCA)

Operative from June 2024

List of Amendments

No.	Effective Date	Details
0	June 2024	Original as issued
1	August 2024	Added reference to the LCT2 facility guidelines in the towage matrix
2		