



BELFAST HARBOUR COMMISSIONERS

BELFAST HARBOUR TOWAGE OPERATIONS MANUAL



Belfast Harbour

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MARINE AND RISK CONSULTANTS LTD

BELFAST HARBOUR COMMISSIONERS

BELFAST HARBOUR TOWAGE OPERATIONS MANUAL

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Towage Operations Manual

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ABBREVIATIONS

Abbreviation	Detail
ASD	Azimuth Stern Drive
ATD	Azimuth Tractor Drive
BHC	Belfast Harbour Commission
BML	Boat Masters Licence
BTA	British Tug Owners' Association
CHA	Competent Harbour Authority
DPA	Designated Person Ashore
ETA	European Tug Owners' Association
GtGP	A Guide to Good Practice on Port Marine Operations
HW	High Water
IMO	International Maritime Organisation
ISM	International Ship Management Code
kt	Knot (unit of speed equal to nautical mile per hour, approx. 1.15 mph)
LW	Low Water
m	Metre
Marico Marine	Marine and Risk Consultants Ltd
MCA	Maritime and Coast Guard Agency
MGN	Marine Guidance Note
nm	Nautical Mile
NRA	Navigation Risk Assessment
NWA	National Workboat Association
PEC	Pilotage Exemption Certificate
PMSC	Port Marine Safety Code
PPE	Personal Protective Equipment
SHA	Statutory Harbour Authority
SMS	Safety Management System
STCW	Standards of Training Certification and Watchkeeping
VHF	Very High Frequency (radio communication)
VS	Voith-Schneider
VTE	Voluntary Towing Endorsement
VTS	Vessel Traffic Service

REFERENCES

In preparation of this manual the following documents were used as references and, where appropriate, utilised:

- A Guide to Good Practice on Port Marine Operations (September 2017);
- Belfast Harbour Minimum Towage Requirements;
- Belfast Harbour Towage Review – Simulation Report (Nov 2017);
- Belfast Harbour Towage Information;
- European Tug Owners’ Association (ETA) – “Guidelines for Safe Harbour Towage Operations” (2015);
- Forth Ports Towage Guidelines;
- MAIB Investigation Reports;
- National Workboat Association: The Use of Workboats for Towage - Good Practice Guide (December 2016);
- Port of London Authority Towage Guidelines;
- Port Marine Safety Code (November 2016);
- Pilots’ Pocket Guide and Checklist (Working Safely with Harbour Tugs) – UK Chamber of Shipping;
- Tug Use in Port – A Practical Guide (Captain Henk Hensen); and
- Tug Stability – A practical Guide to Safe Operations (Captain Henk Hensions and Dr Markus van der Laan)

Other useful references:

- IMO Resolution A765 (18) Guidelines on the Safety of Towed Ships and other Floating Objects;
- IMO MSC Circular 1175 Guidance on Shipboard Towing and Mooring Equipment;
- MGN 308 (M+F) Mooring, Towing or Hauling Equipment on all Vessels – Safe Installation and Safe Operation;
- MGN 468 M Voluntary Towage Endorsement Scheme;
- MGN 199 (M+F) Dangers of Interaction;
- MSN 1752 (M) The Merchant Shipping (Load Line) Regulations 1998, as amended by the Merchant Shipping (Load Line) (Amendment) Regulations 2000, Schedule 2;
- MCA: Instructions to Surveyors, Load Line Instruction (MSIS 1) Part 8, Section 8.11 Tugs and Section 8.12 Safety of Towed Ships and Other Floating Objects;
- MCA: The Safety of Small Workboats and Pilot Boats – a Code of Practice (the ‘Workboat Code’) particularly part 11.7 Stability of Vessels Engaged in Towing and 25.2 Vessels Engaged in Towing;
- MCA Code of Safe Working Practices for Merchant Seafarers (CSWP); and
- Shipowners P&I Club - Tugs and Tows, a Practical Safety and Operational Guide.

GLOSSARY

Assisting methods	The term used to describe the way in which harbour tugs assists seagoing vessels.
Bollard	A single post or upright fitting used to secure a mooring line. Bollards are usually found on docks, piers, or wharves
Bollard Pull	A measure of a tug's pulling power. It is usually measured in tons by securing the tug to a scale. The tug then pulls against the scale and its bollard pull in tons is recorded. Bollard pull is determined by a combination of the tug's horse power and the type of propellers that it uses.
Breasted/alongside methods	A tug securely lashed alongside a ship, usually with a minimum of three lines: head line, spring line and stern line. Also called "on the hip" or "hipped up".
Bulwark	The side plating that forms the railing around a tug's main deck. Also, it is commonly called the waist.
Dead-ship	A ship which cannot use her own propulsion.
Escort tugs	Tugs specifically built for escorting at high speeds.
Escorting tug	Any type of tug escorting a ship underway.
Girting	Risk of capsizing, especially with conventional tugs, due to high athwartships tow line forces. Also known as girding, girthing or tripping.
Gob line	A rope or steel wire used on conventional tugs to shift the towing point.
Messenger	A light rope attached to the tow line to heave the tow line on board a ship.
Norman pins	Short iron bars fitted in the gunwales of the transom to prevent the tow line from slipping over the side gunwales. Sometimes called "King Pins".
Nozzle	A tube around the propeller to increase propeller performance. The nozzle can be fixed or steerable.
Pennant	A separate part at the final part of the tow line which is most liable to wear on board an assisted ship, at ship fairleads, etc. The pennant can be of a different construction to the tow line.
Propulsion	Azimuth propellers: 360° steerable propellers which can deliver thrust in any direction. Also called "Z-pellers", "Rexpellers", "Duckpellers" (azimuth propellers in nozzles); CPP: Controllable pitch propellers; FPP: Fixed pitch propellers; and VS: Voith Schneider propulsion: propulsion system with vertical propeller blades, also called cycloidal propulsion system.
Push-pull	A tug made fast so that it can pull as well as well as push at a ship's side. Depending on the type of tug, its location and the assistance required, it can be secured with one, two or three lines.
Sponson	A strongly flared section in the side of a tug, commencing at or just below the waterline, which results in substantial increase in deck area and reserve buoyancy without increasing the beam at the waterline.
Stemming	A tug coming under the bow of a ship at speed.
Stretcher	That part of a tow line, between the original tow line and pennant, which absorbs the dynamic forces in the tow line. Also called a spring and often made of nylon, polyester or a polyester/polypropylene combination.

Towing on a line	A tug assisting a ship while towing on a line as is in common use in many European countries.
Towing Point	Point of application of the tow line force. It is the point from where the tow line goes in a straight line towards the ship.
Tow line	A flexible hawser used for towing purposes.
Tripping	A tug towing on a line swinging around and coming alongside a ship's hull due to excessive speed by the ship in relation to a tug's capabilities and towing angle. The expression "tripping" is also used for girting.
Tug engine power	BHP: Brake Horse Power: power delivered by the engine; SHP: Shaft Horse Power: power delivered to the propeller shaft (approx. 97% of BHP); BP: Bollard pull, equal to 1000kgf; and MCR: Maximum Continuous Rating (of tug engine).
Tonne	The practical used for force e.g. for bollard pull, equal to 1,000kg force and for "weight" equal to 1,000kg.
Tug simulation	Interactive tug: A tug simulated on bridge manoeuvring simulator, able to interact with other bridge manoeuvring simulators, which are simulating other tugs and/or the assisted ship; Vector tugs: Tugs simulated by just a force vector.
VS-tug	A tug with VS propulsion.

1 INTRODUCTION

This manual, approved by Belfast Harbour Commissioners (BHC) in consultation with Belfast Lough Pilotage Services and Belfast Harbour towing operators, describes the procedures and policies to promote and improve safety for those responsible when directing tugs during harbour ship towing, barge and dead-ship towing operations. It includes shipboard safety practices and personnel safety issues and forms a body of knowledge with which all those connected with marine towing operations in Belfast Harbour should be familiar.

BHC considers it important that pilots and tug masters understand their respective concerns when undertaking towing operations and in that respect a real-time bridge navigation simulation workshop, facilitated by HR Wallingford and led by Marine & Risk Consultants Ltd. (Marico Marine), was held between 30th October and 3rd November 2017 inclusive. Representatives from BHC, Belfast Lough Pilotage Services and Belfast Harbour towing operators attended the workshop. The simulator workshops were primarily focussed on themes of operational marine and navigation safety to inform input to this manual.

Belfast Lough Pilotage Services and the respective towing operators' management should adopt and maintain these procedures, in accordance with their own safety management systems, to ensure the safety of the tug operation and the protection of the environment by ensuring the following:

- Clearly defined standards;
- Tug crews are appropriately trained and qualified including the need to train with pilots;
- Open reporting of incidents is essential to gain maximum benefit from any lessons learned;
- Effective communication and team work between all parties including:
 - Regular liaison meetings;
 - Safety workshops;
 - Pilots tripping on tugs and tug masters accompanying pilots; and
 - All parties attending simulator training.
- The availability of up-to-date relevant industry publications and guidelines;
- Performance monitoring of towing marine services together with defect and reliability reporting measures; and
- Environmental operating limits.

This manual, as part of the BHC Marine Safety Management System (MSMS), complies with the Port Marine Safety Code (PMSC) and will be kept under continuous review and amended where necessary to ensure the inclusion of statutory regulations, best practice and improved procedures as agreed with Belfast Lough Pilotage Services and the respective towing operators.

Compliance with this non-mandated manual shall be the responsibility of all employees connected with marine towing activities in Belfast Harbour. Regular compliance audits at the direction of Belfast Harbour Mater will be undertaken by a suitably qualified representative of BHC ensuring that the requirements as set out in the manual are being maintained.

It should be noted that this manual does not replace Belfast Lough Pilotage Services or the respective towing operator's marine safety management system or International Safety Management (ISM) Code as required under legislation.

Furthermore, this manual should be read as appropriate in conjunction with Belfast Harbour Towing Information (see **Annex A**) and Belfast Harbour Minimum Towing Requirements (see **Annex B**).

2 PURPOSE

The purpose of these marine operation policies and supporting procedures described in this manual are for the advice and guidance of all those staff actively involved in harbour towage in Belfast Harbour. The manual falls within the structure of an integrated BHC Marine Safety Management System (MSMS).

2.1 DOCUMENT APPROVAL

Document Approval			
Designation	Name	Signature	Date
Belfast Harbour Master	Captain K Allen		

2.2 TOWAGE OPERATIONS MANUAL – DISTRIBUTION LIST

The following table shows holders of this manual. To avoid any confusion all copies of this document will be distributed electronically as well as any future updates / amendments.

Distribution List	
1	Belfast Harbour Commissioners Harbour Master
2	Belfast Harbour Commissioners Deputy Harbour Master
3	Belfast Harbour Commissioners Deputy Harbour Master (2)
4	Belfast Harbour Commissioners Assistant Harbour Master
5	Belfast Harbour Commissioners Vessel Traffic Services
6	Belfast Harbour Commissioners Operations Director
7	Belfast Harbour Commissioners Designated Person
8	Belfast Lough Pilotage Services
9	David Ferran & Sons
10	John McLoughlin & Son (Shipping) Ltd
11	SMS Towage Ltd
12	Cancelled
13	Clarksons Port Services
14	Stena Line
15	Belfast Harbour Drydock (Harland & Wolff)

2.3 AMENDMENT LIST

Amendment List

3 POLICIES AND RESPONSIBILITIES

All personnel involved in towing operations i.e. pilot, vessel master and tug master, have overriding authority in their areas of respective responsibility to deviate from this operations manual to make decisions in respect of safety and pollution prevention and request assistance should this be necessary.

3.1 OBJECTIVES

The objectives of this manual are to:

- Prevent incidents and protect personnel;
- Through training and appropriate experience ensure that all operations are undertaken safely;
- Develop a sense of personal responsibility for health, safety and protection of the environment;
- Demonstrate that safe systems of work are essential to efficient towing operations;
- Demonstrate preparation for handling safety and environmental emergencies; and
- Demonstrate through satisfactory records that towing operations are conducted in accordance with these policies.

3.2 IMPLEMENTATION

Responsibility for implementation of the procedures set out in this manual rests with BHC line management. However, Belfast Lough Pilotage Services and each of the respective towing operator line managers and onboard staff are also expected to ensure adherence to the spirit of this manual.

BHC Harbour Master is responsible for ensuring that matters relating to compliance with this manual are adhered to.

All personnel involved in towing operations are required to comply with Belfast Harbour Statutory Harbour Authority (SHA) safety rules and regulations.

When considering new business or operational routines, full account will be taken to ensure that towing operation standards are maintained.

3.3 OPERATIONS MANUAL POLICY

This Operations Manual shall be available to all staff involved in harbour towing operations including:

- BHC marine staff;
- Belfast Lough Pilotage Services;
- Belfast Harbour towing operators:
 - Marine staff ashore; and
 - Tug masters and crew.
- PEC holders who may require the assistance of Belfast tug(s); and
- Belfast Harbour Drydock (Harland & Wolff).

Tug masters are expected to be knowledgeable and fully conversant with this Operations Manual whilst on board the tugs under their command. Assessment of their knowledge, understanding and proficiency in operating the system will be carried out during internal audit (undertaken by an appropriate member of the BHC Harbour Master department), by informal interview and observation of standards maintained in line with the voluntary licensing scheme (see **Section 3.11**).

The respective towing operator Designated Person Ashore (DPA)/Operations Manager, tug masters, pilots and others as required will be consulted in the event of procedural changes to the manual before documents are issued. A summary of changes will be recorded in the "Introduction" section of this manual.

3.4 MANAGEMENT REVIEW OF OPERATIONS MANUAL

The BHC Harbour Master in conjunction with Belfast Lough Pilotage Services and Belfast Harbour towing operators will review the effectiveness and suitability of the Operations Manual every year or following a towing related incident, whichever is the sooner.

It is the responsibility of BHC to advise those affected on the implications of safety matters being reviewed. If urgent safety management towing related matters require discussion, a management review, chaired by BHC HM may be held at any time. The tug master is responsible for facilitating and reporting all matters relating to safety to their respective company Operations Manager who in turn will report same to the Belfast Harbour Master.

3.5 PORT MARINE SAFETY CODE (PMSC)

The PMSC sets out a national standard for every aspect of port marine safety. Its aim is to enhance safety for everyone who uses or works in the UK port marine environment. It is endorsed by the UK Government, the devolved administrations and representatives from across the maritime sector and, while the PMSC is not mandatory, these bodies have a strong expectation that all harbour authorities will comply. In that respect, it should be noted that a successful prosecution has been brought against a harbour authority for breach of section 3 of the Health and safety at Work Act 1974¹, in that non-compliance with the fundamental elements of the PMSC evidenced a failure to provide a safe system of work.

3.6 A GUIDE TO GOOD PRACTICE ON PORT MARINE OPERATIONS (GTGP)

A "Guide to Good Practice on Port Marine Operations" (GtGP) is intended to supplement the PMSC. It contains useful information and more detailed guidance on many issues relevant to the management of ports and other marine facilities. With regards to towing the following statement is extracted from Section 10 of the GtGP:

¹ <http://www.hse.gov.uk/enforce/hswact/scopeapplication.htm>

“Procedures for towage in ports, harbours and at terminals need to be developed, managed and regularly reviewed by harbour authorities, tug operators, pilots and ship owners, to ensure a safe and efficient service. Procedures should include responses to emergencies. Effective communication and team work between all parties is essential”.

3.7 BELFAST HARBOUR TOWAGE INFORMATION & MINIMUM TOWAGE REQUIREMENTS

Belfast Harbour has produced a source of information on tugs and towage procedures for masters of vessels using Belfast Harbour known as: “Belfast Harbour Towage Information” (see **Annex A**). It should be read, as appropriate, in conjunction with the Port’s “Minimum Towage Requirements” (see **Annex B**) which state the minimum towage requirements for each berth within the port for various vessel sizes and types and the “Navigational Guidelines” within the port.

3.7.1 Belfast Drydock Towage Guidelines

In consultation with BHC Belfast Drydock have developed towage guidelines (see **Annex D**) for vessels entering and leaving the drydock.

3.8 MARINE SAFETY MANAGEMENT SYSTEM

Not all towage operators are required to comply with the ISM Code; it is however recognised that implementing a MSMS is consistent with good practice. A structured and recorded system of an appropriate size to the operation not only improves safety, and protects the employees but also protects the owner/operator. It is difficult to comply with accepted good practice if no MSMS system is in place.

Experience shows that accidents often occur during routine operations and an MSMS assists to identify the risks, allowing important lessons to be learnt so they will not be repeated. Risks are increased with:

- Poor planning;
- Poor communication;
- Poor supervision;
- Failure to appreciate the dangers of a task or operation;
- Lack of experience or knowledge;
- Misuse of equipment;
- Taking of short cuts, possibly due to commercial pressure;
- Unpredictable environmental factors such as weather, tide or current;
- Changes or unappreciated factors of the tow, such as cargo shift; and
- Unexpected events, such as equipment failure or unusual traffic movements.

Effectively managing the human factor can lessen the exposure to accidents. A MSMS allows a company to put into place the building blocks for reducing incidents of human error.

3.9 LIAISON AND CO-ORDINATION

Ship towing operations have inherent risks. These risks can largely be mitigated by good communications with open reporting, dialogue and regular liaison.

Among the means of facilitating cooperation and understanding between stakeholders, the following should be considered:

- Regular stakeholders' meetings to include, but not limited to, marine incident reports and lessons learnt;
- Regular tug master and pilot meetings;
- Management of change, such as modern technologies and the introduction of new tugs;
- Strategic planning for port developments as they impact on towing requirements, including new berths or vessel types;
- System to communicate changes to dedicated port fleet, including dry-docking or redeployment;
- BHC advocates an integrated approach to the training of tug masters and pilots where appropriate (through simulation, if required);
- Pilots to accompany tug masters on tug operations; several during initial training and thereafter periodical re-familiarisation;
- Tug masters to accompany pilots on the same basis as above;
- Clear directions from harbour authorities when there are requirements to act contrary to guidelines;
- Encourage open discussion between stakeholders in case of any difficulties being experienced and promote "no blame" culture;
- Institute incident and near-miss reporting system including feedback and lessons learnt;
- Contingency planning including towing in restricted visibility; and
- Emergency response exercises.

3.10 STANDARD SHIP TOWING RISK ASSESSMENT

Belfast Harbour MSMS is underpinned by effective identification and assessment of navigational hazards. Belfast Harbour use the HAZMAN II system to be the basis for initial identification and review of hazards, and to ensure consistent and effective review and implementation of control measures. BHC navigation risk assessment includes a generic harbour towing risk assessment which will be reviewed with the respective key stakeholders on a regular basis or following an incident. Hazards associated with harbour towing operations are detailed in **Section 7**.

All towage companies operating in Belfast Harbour will have a risk assessment covering all standard towing operations and any unusual or specific operation will require at least a dynamic risk assessment.

The following risk control measures are key criteria, in reducing the resultant risk scores for each hazard, when preparing for and during a towage operation:

- BHC “Minimum Towage Requirements” document;
- BHC Navigational Guidelines;
- BHC MSMS including navigation risk assessment;
- Towage operator SMS/ISM, including risk assessment and standard operating practices;
- Adequate passage planning;
- Tug master qualification, training and experience;
- Pilot authorisation (including PEC holders), training and experience;
- Vessel traffic monitoring through a 24 hour VTS;
- Communication (ship master/pilot and tug master/pilot exchange of information);
- Assessing the size and type of vessel or barge to be towed and any limitations of the tow;
- Tow wire and towing equipment is suitable (inspected and tested);
- Adequate manoeuvring space;
- Appropriate speeds agreed during; connection, under tow and disconnection;
- Tug maintenance; and
- Emergency contingency plans.

The towage risk assessment will also consider the vessel in relation to the existing:

- Port geography;
- Tug power / bollard pull;
- Berth facilities, length, fendering, bollard strength, gangway positions;
- Wind strength and direction;
- Tidal current rates, and ship handling windows;
- Tidal heights and under keel clearances in channel and in berth;
- Mooring arrangements and the extent of berth overhangs;
- The effect on vessels in other berths;
- The effect on other vessels using the harbour channels or swing basin including interaction effects;
- Day/night manoeuvres;
- Vessel beam in relation to berth pocket width;
- Vessel displacement in relation to tug power;

- Vessel engine power in relation to displacement;
- Vessel type and block coefficient;
- Vessel handling characteristics;
- Vessel manoeuvring aids;
- Vessel turning circle diameter and stopping distance;
- Vessel windage area; and
- Visibility from the bridge.

3.11 TUGS/WORKBOATS AND TOWAGE OPERATOR'S VOLUNTARY LICENSING REGIME

It is intended that BHC will implement a voluntary licencing regime to approve tugs, workboats and operators.

The following list, extracted from "A Guide to Good Practice on Port Marine Operations" (GtGP) (Section 10.4), will form the basis of a basic checklist for the master and crew (see **Annex C**):

- Master and crew experience and in-house training;
- Master and crew certification;
- Master's knowledge of relevant directions, bye laws, contingency plans and guidelines (if any);
- Master's knowledge of generic or own passage plans;
- Master's knowledge of tug stability, girting and vessel interaction;
- Master's knowledge of facilities' MSMS;
- Master's awareness of watertight integrity issues when towing;
- Capability of the tug;
- Ability of the tug and crew to respond to emergency situations;
- Crew's general safety culture, tool box talks, pre-operational briefings;
- PPE standards and knowledge of required use;
- Charts relevant and in date;
- Communication equipment checks;
- Condition and maintenance standards of the tug/workboat;
- Towing winch emergency release mechanisms proven;
- Frequency of checks on emergency release mechanisms; and
- Level of liability cover.

The licensing regime will assess a tug or workboat and its crew's suitability to operate in Belfast Harbour (see **Annex C** for possible licence format).

The licensing process will be subject to appropriate consultation.

3.12 BELFAST HARBOUR TOWAGE INFORMATION

Belfast Harbour does not provide towage. Towage within Belfast Harbour is provided commercially by **four** independent operators:

- David Ferran & Sons;
- John McLoughlin & Sons;
- SMS Towage; and
- Waterfront Services.

Whilst stipulating minimum towage requirements and regulating movements within the port through the Vessel Traffic Service (VTS), under normal circumstances Belfast Harbour are not involved with the contracting of towage services.

The booklet “Belfast Harbour Towage Information” has been produced to provide a source of information on tugs and towage for masters of vessels using Belfast Harbour. The full document can be found in **Annex A**.

3.13 TOWAGE CERTIFICATES

Provided certain conditions are met vessels which call regularly to the port may be exempted from some or all the Belfast Harbour “Minimum Towage Requirements” (see **Annex B** for clarification).

3.14 WORKING LANGUAGE POLICY

The English language is the official working language spoken on board all tugs operating in Belfast Harbour, when complying with this manual as well as when undertaking operational duties. All written reports, log books and other correspondence are to be completed legibly in the English language.

3.15 MEDICAL REQUIREMENTS POLICY

All crew employed on tugs operating in Belfast Harbour must be in possession of an in date medical certificate in line with the recommendations of national and international legislation.

3.16 EXPERIENCE

Towage operators must ensure their crews are trained (see **Section 4**) with a competent understanding of:

- The tugs they operate;
- Towage techniques e.g. ship assist, push/pull etc.; and
- The berth to/from which they will operate.

3.17 WORKING HOURS

All tug crew members must be properly rested in line with the requirements of national and international legislation.

4 TRAINING AND CERTIFICATION

As a minimum, the qualifications of crews on board tugs shall meet the requirements of the MCA guidelines as set out in “A Guide to Good Practice on Port Marine Operations” Section 10.5 (see **Annex F**) as detailed below:

Where tugs and workboats are working with pilots and/or other craft in the performance of towage, team work, tool box talks, briefings and clear communications are essential. Team training on location, in simulators and at safety workshops should be prescribed as necessary.

The Maritime & Coastguard Agency (MCA) does not determine qualifications for personnel operating tugs within the harbour but does support and approve training schemes for towage which form the basis for standards available to facilities. These are:

- **Boat Masters Licence (BML) with a Towage Endorsement (BML TE):** the minimum requirement for holders of Boat Masters or RYA Certificates to conduct any towage operation in harbour or at sea in a workboat coded vessel. The certificate holder sits an MCA oral examination locally.
- **Voluntary Towage Endorsement (VTE):** a BTA and NWA jointly supported scheme which includes a detailed towage-specific syllabus recognised by the MCA covering recorded training, assessment and independent examination. Holders do not need to undertake the BML TE.
- **STCW Tug Mate/Master:** a BTA-sponsored, MCA-recognised, training scheme which includes the VTE syllabus, (transferable) MSQs, Training Record Books, independent examination, and significant service in tugs prior to an MCA oral examination. This scheme, and its small vessel Engineer equivalent, are those that are considered “best practice” for mainstream towage operators of tugs more than 24m registered length, 150GT or 350kW.

4.1 FAMILIARISATION TRAINING

To ensure full continuity of operations on-board the tug and to ensure that the safety of all personnel, the tug and the environment are protected, all personnel joining a tug should familiarise themselves with all aspects of their responsibilities and the vessel’s emergency procedures. Each towage operator should ensure that an appropriate induction familiarisation checklist is in place.

4.2 CREW TRAINING

Following investigations into a number of tug incidents (see **Annex E**), the MAIB strongly urged:

- All tug operators review their training schemes to ensure that tug masters receive comprehensive familiarisation training before taking control of a tug that is equipped with significantly different propulsion systems. Such training should incorporate instruction and validation on all manoeuvres that the master is likely to undertake in their port or operations; and
- All harbour authorities, pilots and tug operators regularly review the capabilities and limitations of their harbour tugs and their crews; (see Capt. Henk Hensen, “*Bow Tug Operations with Azimuth Stern Drive Tugs*”, NI, UK, 2006).

A good training system should:

- Lay out clearly in writing the whole structure of dos, don’ts, whys and wherefores;

- Design the structure to protect the rights of all parties concerned, i.e.:
 - The trainee;
 - The training master;
 - The competency check master;
 - The clients (pilot and ship-owner);
 - Owners of third party assets (BHC, berth tenant etc.) and
 - BHC authorised towing operators.
- Ensure competency-based training starts with the basic steps and works its way through listed and identified steps one by one, thus climbing a ladder of competency and confidence to an agreed predetermined standard.
- Use skilled, respected and qualified trainers who have empathy with the trainees and are adept at getting the message across to colleagues;
- Include repetitive training that fixes the basic moves in the subconscious minds of the trainees;
- Ensure trainees are trained to competently drive the tug before undertaking towing operations;
- Give equal emphasis to operational and procedural knowledge;
- Develop a tug master's professionalism in all facets of the job;
- Be designed to cope equally with timid, apprehensive trainees as well as over confident; and
- Be based on an effective 'style' of tug driving using a combination of authority, control and finesse.

4.3 TRAINING – SEAMAN

A seaman training logbook will assist in developing and progressing the seaman's skills with the aim of becoming tug master. The training logbook recommended is as described and detailed in the Marine Guidance Note (MGN) 468².

The MGN describes the arrangement for the MCA recognised voluntary towing endorsement scheme. It has been developed at the request of the United Kingdom towing and workboat industry to help ensure that masters engaged in towing operations have the necessary skills for such specialist operations.

The MGN identifies competence standards and the specific knowledge, understanding and proficiency needed to safely operate in the towing industry.

The logbook is not compulsory but seamen, whether they wish to progress to tug master or not, are positively encouraged to use the logbook.

Seamen should complete the logbook and tasks that are listed in the book. A tug master should sign off each task once satisfied that the seaman has reached a competent level in that task.

The checklist for tug handling states the minimum number of manoeuvres a seaman is expected to achieve competently per class of tug.

² <http://www.dft.gov.uk/mca/mgn468.pdf>

Once the logbook has been completed, with the tasks and checklist also completed, the master may issue a “Certificate of Training”. More than one tug master must sign off this certificate.

Tug masters are encouraged to pass on their knowledge and skills to their crews to help in their development. Tug masters should bear in mind that should they become incapacitated, the seaman is the individual tasked with maintaining the safety of the tug.

4.4 TOWAGE TRAINING FOR PILOTS

BHC requires Belfast Lough pilots, as part of their initial training and revalidation process, periodically attend on board tugs during harbour towing operations and ideally should find time to attend on both the bow tug and the stern tug.

Pilots will have done so during their initial training period, but as they progress further through their career whilst qualifying to handle larger vessels, they may tend to forget how it feels to be at the other end. Therefore, by attending periodically on board a tug during a live harbour towing operation and, if opportunity exists, by attending simulator sessions ideally together with the tug masters, they will constantly keep in mind the tug masters’ concerns and the tug masters can gain insight in the pilot’s concerns. This will eventually work to the benefit of the tugs’ crews and the crews of the assisted vessels because it will undoubtedly influence the safety of all parties concerned.

5 TOWAGE OPERATIONS

There are several types of towage operations undertaken in Belfast Harbour each of which brings its own challenges and risks. These can be summarised as:

- **Ship Assist Towage** or assisting vessels under way, typically during entering or leaving and/or shifting berth within a harbour;
- **Dead Tows** or assisting vessels without propulsion including, but not limited to; barges, pontoons, dredgers, rigs which typically involves vessels entering and leaving harbour being towed by a sea-going tug or other vessel;
- **General Towage** including towage of smaller barges, pontoons, rigs normally within harbour limits and marine construction equipment; and
- **Project Towage** including unusual events which require special consideration.

Towage can be undertaken utilising several different methods and in many differing configurations including over the bow, over the stern, pushing, pulling, using long or short towlines, fixed or adjustable lengths, with or without towing bridles, lashed alongside ("hipped up") and using single or multiple tugs.

The choice of method will depend on the type/size of the assisted vessel and type/size/capability of the tug or workboat. The tug master and crew must be suitably qualified (see **Section 4**) and experienced and are competent to not only to conduct the manoeuvre but also advise if the plan and/or its execution is unsafe.

The following section describes the policy on the use of tugs with relation to movement carried out on vessels in the approaches to, and within Belfast Harbour.

5.1 TYPES OF TUGS OPERATING IN BELFAST HARBOUR

There are currently **six (6)** tugs permanently based within the port, these fall into two established categories:

- **2** x omni-directional tugs; and
- **4** x conventional tugs.

The following is a brief description of the types of tugs operating in Belfast Harbour. A full description of individual tugs and their respective towage operators can be found in **Annex A**.

5.1.1 Tractor Tugs

Tractor tugs are extremely manoeuvrable and are principally used for ship docking operations. There are three commonly used tractor types, Voith-Schneider (VS), Azimuth Tractor Drives (ATDs) and Rotor Tugs. Azimuth Stern Drive (ASD) tugs are commonly called Reverse Tractors when towing bow to bow.

5.1.2 Voith-Schneider Tractor Tug (VST)

The term “Tractor Tug” is used where the propulsion units are located about 0.3 x LOA from the bow with the towing point located at the opposite end of the tug, close to the stern. The main difference between the azimuth stern drive and the tractor tug types is the location of the propulsion units.

The Voith-Schneider Tractor Tug (employing Voith-Schneider cycloidal propellers) as shown below in **Figure 1** was introduced for ship-handling due to its exceptional manoeuvrability and ability to rapidly change heading.



Figure 1: Voith Schneider

5.1.3 Azimuth Stern Drive (ASD) (Z-peller)

ASD's (see **Figure 2**) have azimuth propulsion units in place of conventional propulsion; these enable the propeller and its associated nozzle to rotate about its vertical axis (360° rotation). The position of the propulsion units is identical to that of a conventional twin-screw tug. Just as with a twin-screw tug, these propulsion units can operate independently, making it possible for the tug to move forwards, backwards, sideways and turn around its own axis with great precision. ASD tugs can tow over the bow (see below), normally from a bow winch, which is typical when operating in a Push/Pull mode or when fast on the centre-lead.



Figure 2: Azimuth Stern Drive.

5.1.3.1 ASD Tugs – Bow to Bow Towing

Early European designed ASD tugs, not fitted with full length box keels (or skeg) do not have the same course stability as later ASD tugs when operating in the Bow-to-Bow mode. The guide detailed below is aimed at those ASD tugs without full length box keels.

The established procedure is for ASD tugs to tow over the bow of the tug.

Where there is a mix of Voith and ASD tugs, the ASD tug will normally be employed at the stern of the towed vessel.

Should there be a requirement to use an ASD tug on the bow of a towed vessel particular attention should be paid to the safe speed of the vessel being towed (see **Section 5.15.4**).

This manoeuvre must not be rushed: tugs should be made fast as early as is reasonably practical. The tug master should confirm to the pilot that the design, handling characteristics of his tug, together with his risk assessments and training are appropriate for the operation. He should inform the pilot immediately at any point during the manoeuvre should he have any safety related concerns.

5.1.4 Conventional Screw Tug

Worldwide, the largest number of tugs belongs to the conventional screw type (see **Figure 3**). The towing point (e.g. towing bits, hook or winch) is located approximately 0.45 x LOA from aft. To improve their

manoeuvrability, conventional screw tugs may be fitted with a steerable nozzle, a bow thruster or a retractable azimuthing bow thruster. Tugs fitted with the latter device are referred to as “Combi-Tugs”.



Figure 3: Conventional Tug

Twin-screw conventional tugs offer increased manoeuvrability over a single-screw tug, as the two screws can be worked independently and in opposite directions, thus enabling the tug to pivot within its own length.

5.2 TUG TYPE – ADVANTAGES AND DISADVANTAGES

The design of the tug (its hull shape, skeg, power, winch arrangements etc.) will affect its suitability for different types of manoeuvre. Typical examples are listed in the following table:

Tug type	Advantages	Disadvantages	Typical use
ASD standard	Most common; Highly manoeuvrable; and Safer bow to bow.	Older designs not so manoeuvrable; and Not all capable of safe bow to bow.	Ship assist in port.
Tractors Voith	Highly manoeuvrability in confined spaces e.g. locks; Lower risk to girting.	Costly to build and maintain/run.	Mainly lock ports.
Conventional	Lower operating costs.	Less manoeuvrable; and Higher risk of girting.	Mainly small ships, barges etc.

5.3 INSPECTION OF TOWING EQUIPMENT

Inspection of towing equipment shall include all ropes, wires, shackles, messengers, winches, hooks and any other item specifically designed or used, to provide towage services. In date test certificates shall be held on board for all equipment in use.

Equipment shall be inspected every time before use and on recovery after completing towage services. Damaged or suspect items of equipment are to be immediately withdrawn from service and clearly marked "*Not to be used*".

If any item of equipment is damaged during towage operations, the Master/Pilot of the vessel shall be informed and the respective towage operator Operations Manager.

Under no circumstances should a tug crew leave a tug, after completing a job, without replacing damaged equipment or advising the respective towage operator Operations Manager and the engineer responsible of the situation.

5.4 TOWING WINCHES VERSUS TOWING HOOKS

Towing hooks on tugs are gradually being replaced by towing winches, the latter having significant advantages over towing hooks.

Towing winches come in various designs. Some winches have the capacity to shorten the towline whilst pulling at full power, others need to be made tension-free for hauling in the towline.

When using towing hooks, the length of the towline cannot be adjusted, whereas where winches are provided, the length of the towline can be adjusted as best suited to meet the requirements of the harbour towing operation.

Furthermore, in the unfortunate event of a towline parting, the tug can rapidly recover the parted towline and reconnect with a second line. In some cases, tugs are fitted with winches have a split drum or even better a double drum. This will make it easier for a second line to be passed onto the vessel if the towline parts.

5.5 TESTING OF WINCH AND HOOK RELEASE MECHANISMS

Towing winch and towing hook release mechanisms are to be frequently tested for correct operation. All methods of "tripping" or "run out" are to be tested (pneumatic, manual pull, lever or knock out etc.).

Release mechanisms are also to be tested at other times, if a fault is suspected or an exceptional shock loading has been experienced.

Under no circumstances must towing equipment be connected to any winch or hook that has a suspect release mechanism. Correct maintenance and operation are essential.

5.6 PREPARING FOR TOWAGE OPERATIONS

Before beginning towing operations, a comprehensive plan of action (part of the ship's port passage plan) should be prepared and agreed by the pilot and ship master (see **Section 5.12**) taking account of all relevant factors, including tide, wind, visibility, the ship's size, type and characteristics and the berth operator requirements. The pilot should have a good knowledge of

the type and capabilities of the tugs allocated to the job. Furthermore, it is important that the pilot and master ensure that the tug(s) are both suitable for the task ahead and positioned on the vessel to be most effective to facilitate a safe operation.

Any conflict or mismatch between the required manoeuvre and the tugs allocated must be resolved before the towing operation begins.

Responsibility for co-ordinating a towing operation lies with whoever has the conduct of the vessel being towed, be that the master or the pilot. When berthing and unberthing, it is the duty of the master and pilot to ensure that the vessel is handled in a safe and controlled manner, having due regard to the safety of all those involved, whether it be on the ship, assisting tug(s), line-handlers or mooring gangs and other port users as appropriate.

The number of personnel employed in any towing operation should be determined having due regard for the size of the vessel and the prevailing operational and environmental circumstances. In all cases, sufficient manpower should be provided to ensure that individuals are not exposed to undue risk, and that the 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.

5.7 PREPARATIONS ON BOARD THE TUG

Operations such as towing impose very great loads upon ropes or warps, gear and equipment. Because of the imposed loads, sudden failure in any part of the system may cause death or serious injury to personnel. Tug masters should avoid men being stationed or necessarily working in the bight of a warp or rope formed by the lead from the winch or windlass round and through the fairleads and over-side. In any case, the consequences of failure in any part of the system must be carefully considered and effective precautions taken.

All fixed and running gear including ropes should be carefully maintained, tested, certified and regularly inspected against wear, damage and corrosion. Attention is drawn to the need to ensure that fairleads, lead bollards, mooring bitts etc. are:

- Used appropriately and within their design capabilities;
- Correctly sited; and
- Effectively secured to a part of the ship's structure which is suitably strengthened.

5.8 MAINTAINING WATERTIGHT INTEGRITY ON MAIN DECK AND TOWING DECK

It is essential that a watertight seal is always maintained on main-deck and towing deck, whilst towing, to avoid water entering below decks in a girting situation.

This applies to all watertight doors, hatch openings and emergency escapes. Openings that are required to be closed should be marked accordingly with an appropriate sign.

Rubber seals and locking dogs are to be kept in good working condition and properly fitted. Always operate all closing devices and dogs fitted; it is not sufficient to lock two dogs on a watertight door fitted with six.

If entry is required through a hatch or door during towing operations, the tug-master should be informed and the hatch or door closed immediately after entry. Do not leave open, even if only inside for a brief period.

5.9 METHOD OF OPERATION

There are three principal methods of ship handling operations:

- On-the-line or centre-lead towing;
- Push-pull method; and
- Indirect Towing.

5.9.1 On the Line

“On the line” towing means that the tug is connected to the assisted vessel by a towline normally made fast on or close to the centre-lead forward or aft.

The towline is connected to the tug by a towing hook, towing winch or secured to towing bitts (all of which are known as the towing point). The location of the towing point will vary between tugs types: conventional, ASD or Tractor.

When made fast to a vessel’s bow, the effectiveness of tugs towing on a line will decrease with increasing headway. This is because, as headway increases, more of the tug’s power is used in maintaining its position relative to the vessel, as opposed to being applied as an assisting force through the towline.

The danger with towing on the line is the risk of girting and capsizing. Girting happens when the towline comes at right-angles to the tug. The tug is pulled bodily through the water by its tow, which can lead to deck-edge immersion, flooding and capsize; unless the towline is released in good time. The location of the towing point on ASD tugs (when operating over the bow) and Tractor tugs reduces the risk of girting.

Tugs towing centre-lead forward are also exposed to the danger of being “run down”. A higher probability occurs when making fast close under the bow, a manoeuvre which must be managed very carefully.

5.9.2 Push-Pull

The push-pull operation means that the tug is connected to the assisted vessel by a tow line (ASD and conventional tugs will use a bow line, whilst tractor tugs will use a stern line) and remains in close proximity to the vessel. This enables the tug to push on the vessel, but then check/control the vessel by pulling-back on the tow line.

Due to the loss of power of conventional tugs when running their propellers astern (about 25%), their ability to pull-back on the line will be limited. It is more difficult for conventional tugs to maintain position when pulling back than tugs with azimuthing propulsion units.

5.9.3 Indirect Towing

Indirect towing is a way of enlarging the exerted force when turning and/or decelerating the tow. This mode applies only to the trailing tug, or stern tug. The tug is made fast to the vessel by a towline and is dragged by the assisted vessel. The tug uses its thrust to maintain a sheered position relative to the tow’s heading whilst the towing force is generated by the drag forces acting on the tug’s hull and transmitted via the towline. The drag forces on the tug can be substantially higher than the bollard pull when the speed through the water is greater than about 6 knots.

With the towline at a large angle to the tug's centre line, indirect towing is a potentially dangerous manoeuvre. Indirect towing requires a highly skilled tug master to achieve the high towline forces without endangering the tug and her crew.

The advent of the purpose-built escort tug, designed for exerting such high loads, has made this operation much more predictable and controllable.

5.10 TOW LINES

The tow-lines used on tugs operating in Belfast Harbour should be designed to withstand all reasonable forces they are likely to be subjected to during towage operations and are to be used wherever possible. The pilot, master and tug master should confer with regards to the minimum safe working load of the rope (see **Sections 5.12** and **5.13**).

5.11 COMMUNICATIONS

VHF communications are a vital component of safe towage operations. It is essential that those onboard the vessel, the tug(s), where appropriate the mooring/line boats, and those on the berth, can communicate promptly throughout the towage operation, should the need arise.

At all times whilst a tug is manned and available for towing operations a listening watch shall be maintained on working and Belfast Harbour VHF frequencies, by the duty tug or the next tug in line if duty tug is working.

Contact should be made to "*Belfast VTS*" prior to joining the shipping *channel* on *VHF Channel 12*, or 028 9044 3504 if no *VHF* is carried.

A continuous VHF radio listening watch must be maintained. At the beginning of each shift, the tug master must ensure that the VHF radio is correctly working and set to the harbour communications channel (usually VHF Channels. 8, or 9 in Belfast Harbour) and that the volume is sufficiently high to be able to hear any communications even if not in the immediate vicinity of the VHF radio.

5.12 PILOT/VESSEL MASTER EXCHANGE

The pilot should advise the master:

- The tug rendezvous time and position;
- The number of tugs and the mode of towage;
 - The planned (optimum) ship speed when connecting to the tug's lines;
- The type of tugs to be used and their bollard pull(s);
- If escorting, the maximum towline forces that the tug may generate at escort speeds;
- Maximum planned speed for the passage;
- The method by which the ship's crew should take on board and release the tug's tow line, and ascertain that the heaving lines available on-board to be passed to the tug are made without any added weight at the throwing end except the acceptable monkey's fists made from rope and rags according to IMO directives;

- That on release, the tug's gear should be lowered back always under control;
- Areas of the transit posing risks with respect to the possible use of the tug;
- Intentions about use and positioning of the tug(s) for berthing manoeuvres;
- Intentions about use of the tug(s) in an emergency (escort operations); and
- Primary and secondary VHF channels for use in the operation.

5.13 PILOT/TUG MASTER EXCHANGE OF INFORMATION

Once VHF communications have been established, tested and relevant information has been exchanged, personnel should keep transmissions to a minimum and should normally only call when passing or receiving instructions, in doubt, or in an emergency.

Prior to towing operations being undertaken, the pilot, master, and tug master(s) should establish suitable means of communication and agree a plan for the towing operation and discuss as a minimum the following issues:

- Confirm tug name(s), type and bollard pull;
- Agree geographical position to make fast;
- The Safe Working Load (SWL) of the vessel's chocks, bollards and strong points to be used for towing. (Failure to provide this information could result in broken equipment);
- The tug connection position in relation to the vessel's propulsion location, considering the prevailing weather and sea conditions. Agree safe position for passing heaving line forward (at the shoulder is safest);
- Check safe heaving line is used;
- The planned (optimum) ship speed when connecting to the tug's lines;
- The maximum speed of the tug:
 - Running free;
 - Connecting/disconnecting; and
 - Whilst connected/working.
- Passage details in their entirety while accompanied by the tug(s), particularly details of any swing manoeuvre, release position and sequence of release;
- Berthing details in their entirety, including tug positioning around the vessel's hull and the vessels required position on the berth;
- Discuss back-up communication arrangements (VHF Ch. 8 primary channel, secondary channel VHF Ch. 9);
- Intended and emergency use of ships anchors;
- Any unusual items regarding the vessel as gleaned from the master/pilot exchange;
- The tug master should advise the pilot (as far in advance as possible of the scheduled manoeuvre) if the tug is experiencing a failure or reduction in its ability to manoeuvre or deliver full bollard pull; and

- When confirming that the tug is fast and ready to assist, the tug master should also confirm both the tug's name and her position on the vessel.

During operations, it is important that effective communications should be maintained between the:

- Towing vessel and both the bridge team, and the mooring decks of the vessel under tow; and
- Ship's tow party and the bridge team.

Communication should be brief, relevant and professional. Remember, other port users are listening and may be waiting to speak on the frequency. If necessary, repeat back orders received, to ensure that they have been recorded correctly.

In all communications, clear identification of the parties' communicating should be used to prevent misunderstandings. The tug master and boatmen should be kept informed of engine movements, helm orders, proposed use of thrusters and anchors on the towed vessel.

If an incident occurs during a normal harbour towing job, log any VHF conversation that you think may have a significant effect on the incident or be contentious at a later date (e.g.: from ship to harbour authority, "*I am aground and require tugs*"). This works both ways, remember, "*what you say*", is also being recorded.

5.13.1 Maintain Communications

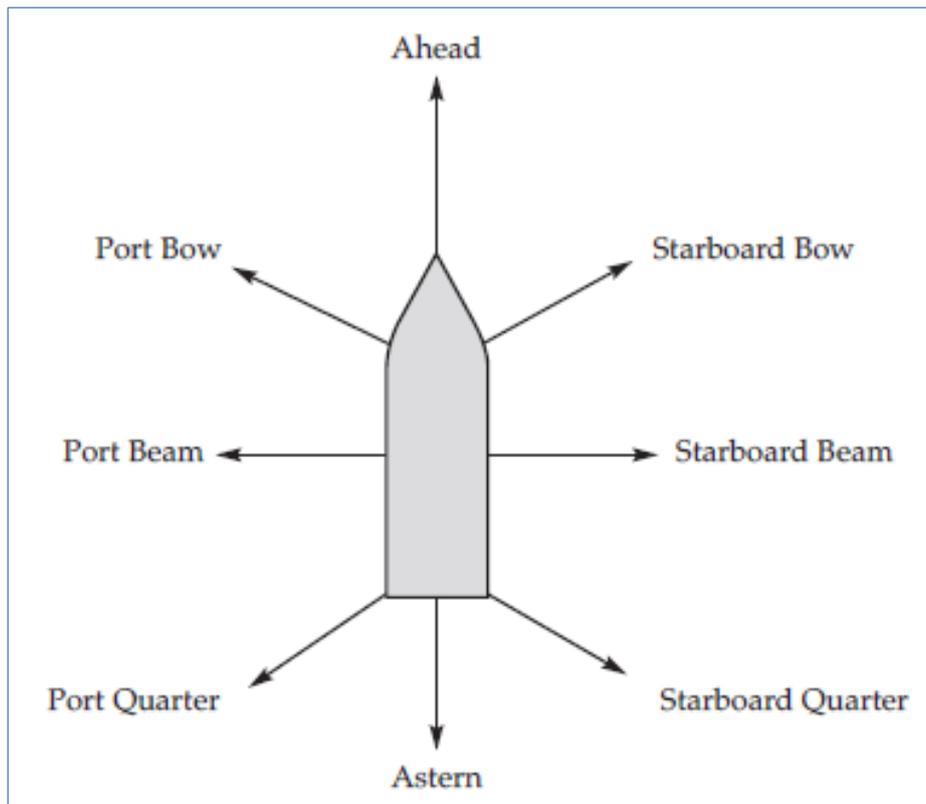
The pilot/master and tug master should ensure that effective communication is maintained throughout the operation. The pilot should ensure that the vessel master is kept apprised of the use/intended use of the tugs, especially should circumstances dictate a change from the intended plan.

The towing operation should be maintained at a safe speed, commensurate with the conditions and circumstances. The vessel's crew should be warned that the tug may be used at full power at any time.

5.14 PILOT INSTRUCTIONS TO THE TUG

It is vital in any regular towing operation that instructions to tugs are specific, consistent and easy to understand.

- Instructions given to tugs should be clear, concise and unambiguous;
- The name of the tug to which the order applies should be called first followed by the command;
- Tug masters should repeat all orders to ensure that they have been understood;
- To avoid confusion, pilots will ask for tug power and directional requirements as follows:
 - The power required will be indicated as **force in tonnes**; and
 - The direction of pull will be indicated as in the diagram below.



5.15 PASSING AND RECOVERY OF TOWING GEAR

5.15.1 Connecting Towing Gear

Before arrival at the tug connecting position, the pilot should establish effective communications with the tug(s) and agree working channel.

The vessel's speed should be reduced to that which allows a safe rendezvous and connection with the tug(s). The required speed should be agreed in advance between the pilot and with (all) the tug master(s) involved. At all times during the connecting process, the pilot should be aware of the position and intention of all relevant shipping movements in the area. He should always keep the Belfast Harbour VTS appraised of his intentions, requesting advice on shipping as necessary.

Passing and recovery of towing gear are hazardous operations exposing crew to risk of injury and the tug to the effects of interaction. The following guidelines are to be always observed:

- Never allow a crew member to stand in the direct line of throw of a heaving line being passed from the ship;
- Always ensure that towing gear being passed is clear to run and not likely to snag on an obstruction;
- Do not stand in the bight of a rope or wire;
- Pass the towing gear to the ship in a controlled manner; and
- Always confirm with the ship's crew that the towing equipment has been made fast.

The pilot should maintain radio contact with the tug master/vessel crew throughout the process. He should be ready to revise the intended tug position if the tug master reports any restrictions at the chosen position, e.g. large flare, overhanging

anchor or unsuitable push up point. The pilot must keep all those involved up to date and apprised of any changes to the agreed plan.

5.15.2 Securing Stern Tug First

It is highly recommended to secure the stern tug first so that the tug can be immediately employed to “brake” the vessel’s speed and steer the vessel as necessary. Normally, connecting the stern tug is much easier and thus quicker than connecting the bow tug. By making fast the stern tug first the pilot can depend on the stern tug to provide immediate assistance if the vessel’s propulsion system or steering gear fails. Moreover, once the vessel is making headway through the water, the vessel’s pivot point shifts forward from mid-ship and will continue to move forward as the speed increases. Thus, assistance from the stern tug will undoubtedly be more effective than any assistance that can be rendered by the bow tug particularly at speed in the region of 4 - 6 knots or above through the water, thus further enhancing the argument in favour of connecting the stern tug first.

5.15.3 Tug Positioning and Speed

The pilot should always advise the tug master before making headway on the vessel, allowing the tug to move to a suitable position for towing while making way.

The positioning of tugs on a vessel is a matter for discussion between the pilot and/or master and the tug master(s), having full regard for the areas of the hull, which should be avoided, e.g. watertight doors, between frames etc.

If the tugs are made fast alongside they are at their most effective with a minimal ship speed through the water.

When the engines are put on astern and /or the vessel starts to move astern, the stern tug will be drawn in towards the vessel. It is therefore imperative that the tug master is fully informed and aware that the vessel has engaged its engines astern so that he may take evasive actions, if necessary.

5.15.4 Safe Speed – Advice to Pilot/Master

When taking up the tow line, tug masters will ideally expect a speed of about 4 to 6 knots through the water. This gives the necessary way to assist the tugs in manoeuvring close to the ship whilst also giving plenty of power in reserve should they have to break away. As the tug master is trying to balance the tug and able to pass the towline he is looking for a steady speed. If the pilot or Master requires to change the speed, e.g. to maintain steerage way, he must tell the tug master of his intentions before ordering a change to the engine speed.

The forward tug is especially vulnerable when passing up the tow line. This tug will position itself very close under the bow, sometimes under 1m from the ship’s water-plane. The tug master will be concerned about any bulbous bow or other underwater protrusion, the proximity of the flare of the bow and other odd bits sticking out (some container ships for example). At the same time, the tug master is fighting the hydraulic pressure wave that exists around the bow. The forward tug would be most disconcerted with a change of speed while passing up the tow. Alterations of course should also be avoided whilst connecting the tow.

5.15.5 Releasing Towing Gear

During disconnection, both the vessel's and tug's crew on deck should be aware of the risk of injury if the towing gear is released from the tow in an uncontrolled manner and avoid standing directly below.

Any towing gear which has been released and is still outboard may 'foul' on the tug's propeller(s), steelworks or fendering, causing it to come tight unexpectedly. The towline should always be lowered onto the tug deck, never just 'cast off' and left to run. The following guidelines should be observed when releasing towing gear:

- Beware of ships crews releasing gear in an uncontrolled manner and not using the messenger to lower rope/wire to tug;
- Whenever possible "shorten in" to shortest length possible before giving ship's crew the "all clear" to let go. This will avoid the possibility of a rope or wire being caught in tugs propellers or trapped between sections of fendering, if released in an uncontrolled manner;
- Never stand directly under the ships fairlead during letting go;
- Be aware of possible interaction effects. The violent movements caused by two vessels coming into contact could cause a crew member to be injured in a slip or fall;
- When recovering towing gear, clear the ship as soon as possible. It is always easier to recover gear at a slow speed than a higher speed, which may be necessary if running ahead of the ship; and
- Always re-stow gear correctly so that it is ready for use immediately, should an incident arise.

5.15.6 Ships Mooring Lines

Ships mooring lines should not normally be used for towing operations except in an emergency, or where a proper risk assessment has been carried out. Where such use is authorised, extreme caution should be taken to ensure that the size and condition of the line is suitable and that it is kept slack and under control when lowering to the tug and making fast.

5.16 REPORTING OF DAMAGE

All damages to Belfast Harbour operated tugs and towed vessels must be formally reported to BHC and the respective towage operator responsible person.

Damages should be reported by the fastest means possible. Also, at the time of the incident verbally report damage to pilot or Master of the vessel.

5.17 ESCORTING DUTIES

The two modes of escorting duties are:

- **Active** - Tug is connected to the stern of ship by towline; and
- **Passive** - Tug is not connected to ship by towline.

"Active Escorting" can only be conducted if the following criteria can be met:

- Crews and pilots are familiar with active escorting procedures and techniques; and

- Active escorting is port policy.

Passive Escorting, whereby a tug shadows the progress of a ship during the transit, is undertaken at Master's / Pilot's discretion.

Active Escorting or indirect towing – (when the tug is dragged through the water by the tow line during transit) is not currently undertaken within the Port. However, in the interests of completeness an explanation of this procedure is detailed below.

5.17.1 Active Escorting

Direct Towing:

- **Direct Arrest Mode** - Used to take the way off a ship. The escort tug applies force to the towline to take the way off the ship; and
- **Combination Mode** - Used to oppose the turning moment of a disabled ship. From a position broad on the quarter of the disabled ship, the escort tug applies a force on the towline to counter a steering sheer.

Indirect Towing:

- **Indirect Arrest Mode** - To turn a ship. The escort tug applies the towing force at an angle of about 90 degrees to its towing point, from a position off the ship's quarter, so that a combination of towline force and tug hull interaction is applied to the ship's stern to turn the ship. There is also an element of braking force in this mode.

The decision to put crew on the aft deck to handle the towline and messenger to connect from the escorted ship will rest solely with the tug-master. The criterion for this task will be whether the man can safely carry out the task.

When connecting/disconnecting, the tug-master is to manoeuvre the tug as close to the ship's stern as is safely practicable. If the tug master considers that weather/sea conditions or the ship's speed is excessive at the normal position for making fast, he will passively escort the ship and delay making fast until satisfied that it is safe to do so and contact the ship explaining why he/she is unable to make fast.

Should the tug master decide that conditions preclude the crew from going on the aft deck for letting go, he will manoeuvre the tug as close to the stern of the ship as is safely practicable. He will then instruct the ship's crew to lower the towline and messenger at a controlled speed, so that it can be heaved onto the tugs winch without being dropped into the water during the recovery process.

When connecting/disconnecting, the time spent on the aft deck by the tug crew member is to be kept to the minimum.

5.17.2 Passive Escorting

No additional safety procedures are required for "Passive Escorting". However, in the event of an emergency onboard the escorted vessel, which requires the escort tug to provide assistance, normal safety procedures will apply.

If in the opinion of the tug-master, he and his crew are fatigued to the point that they are unable safely to undertake a "Passive Escort", the Master is to inform line management and/or VTS.

SAFETY POINTS TO REMEMBER:

- Escorting is a risk reducer not a risk eliminator;
- Always have 1.5 - 2.0 knots of extra speed in hand; and
- Do not attempt active escorting unless you have been trained and procedures are in place.

5.18 TOWING BARGES/DEAD SHIPS

A dead ship is defined as a vessel in a condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.

Towing barges and dead ships by their nature require careful consideration and as such are subject to an individual risk assessment (see **Section 3.10**) and approval process (see **Annex B**).

5.19 NON-STANDARD MARINE MOVEMENT (SPECIAL CATEGORY MOVEMENTS)

It is recognised that due to the considerable variations in vessel size, shape, condition and degree of capability, certain marine movements may require an individual assessment of the planned movement undertaken and a pre-movement planning meeting is to be held between all organisations/individuals who are involved. This is particularly pertinent when a damaged or disabled vessel or unusual floating structure is to be moved within the port.

There may be other circumstances such as abnormal berthing arrangements or a reduction in available towage assets, which would call for an individual assessment of a proposed shipping movement.

5.19.1.1 Factors to be considered

In addition to the baseline criteria, there are numerous other factors which need to be included in the overall assessment of tug support including, albeit not exhaustive, are listed in the table below:

Assessment of tug support	
Vessel draught	Orientation of berth;
Sea state	Weather forecast/restrictions
Assets available	Berthing crew;
Destination berth	Tug master experience
Vessel windage	Line boat availability
Tow line length	Vessel defects damage
Pilot experience	Load-line exemption certificate
Risk mitigation	Marine warranty /insurance.

The method for implementing a “Special Category” assessment should consist of the BHC HM representative, vessel manager, pilot(s) and tug master(s) to complete an appropriate dynamic risk assessment.

The assessment of the risk and the methods for mitigating such risks shall be firstly determined by local knowledge, professional experience and where appropriate simulation.

The results of the assessment and/or simulation shall be considered and the lead pilot in consultation with other relevant stakeholders shall agree a risk assessment and method statement with the master. This risk assessment and method statement will be basis in which approval will be given and should complement the vessels' passage plan.

5.19.2 Barge/Dead Ship to have a Tow Master

A recommendation made by the MAIB following the Chieftain report (see **0**) states:

"planning should take into account the need for a contractor's method statement setting out the various contracted stages and responsibilities, a full passage plan, relevant experience and the need for a person to be in charge."

Unless otherwise agreed with the port authority, a barge/dead ship operation is to have a Tow Master (responsible person) to be in charge on board the barge/dead ship; this should not be the pilot. The Tow Master should be suitably competent and experienced in barge operations, and will have overall responsibility for the safety and conduct of the passage and towage operation. The Tow Master must also be satisfied that all appropriate risk assessments are in place.

The Tow Master where appropriate and safe will board the barge on arrival/departure (in the absence of an embarked individual) and will act as Tow Master. He / she will always remain responsible for the safety of the barge. Whilst alongside a responsible organisation is to be nominated and Belfast VTS notified accordingly.

If it is not safe or appropriate to be aboard the barge then the Tow Master will be on board an agreed tug and their responsibilities will remain the same as if they were on the barge.

5.20 "DO NOT" AND "DO" IN HARBOUR TOWAGE OPERATIONS

DO NOT actions of Pilot, Ship's Master and Mooring Parties:

- Send the crew to the mooring stations (too) late;
- Maintain the speed of the vessel too high whilst securing tugs;
- Use DANGEROUSLY HEAVILY WEIGHTED HEAVING LINES;
- Execute course changes whilst the tugs are securing their towlines;
- Use tug masters' name when communicating orders to the tugs;
- Engage the vessel's engine/s during manoeuvres without first informing the respective tug masters;
- Throw the heaving line (at the bow) from the centre line but from the ship's shoulder;
- Make rapid and excessive steering changes without informing the tugs;
- Build up speed in excess of 6 knots through the water with the bow tug (still) connected;
- Use full engine power particularly on a large vessel when a tug is secured aft;
- Keep floodlights shining into the tug master's eyes; this will impair his night vision and will seriously hamper his ability to estimate distances and to assess the operations;
- Keep floodlights shining towards the tug in case of restricted visibility;
- Make headway on own power in very dense fog with a bow tug secured without prior agreement between tug and pilot. Consider letting the tug(s) tow the vessel rather than using the vessel's propulsive power;
- Build up speed over 6 knots through the water starting from a "dead ship" with a bow tug secured;
- Drop the towline at the stern when disconnecting the tug (unless instructed otherwise by the tug.);
- Delay "to drop" the towline at the bow when disconnecting the tug once instructed to do so by the tug; and
- Wait for something to happen to start preparing the heaving line(s) again.

DO Pilot - Master exchange of information or vice versa:

- Pilot-Master exchange to include info on modus operandi of tugs:
 - Tug name(s), type, bollard pull and position for securing;
 - Normal heaving line or heavy messenger line; and
 - Position for passing heaving line forward (bow/shoulder).
- First make fast the stern tug then the bow tug;
- First let go the bow tug, then the stern tug;
- Pilot to instruct vessel's Master to have his crew at mooring stations in ample time, agree on period of notice needed by ship's crew;
- At night, pilot to instruct vessel's Master to turn off blinding floodlights;
- Inform vessel's Master of local regulations, if applicable;

- To secure the bow tug in very dense fog, it is imperative that the assisted vessel takes off all speed through the water and the tug moves in to make fast;
- It should be discussed and agreed well in advance with the tug master whether once the bow tug is secured the vessel may use her own propulsion power;
- Keep vessel's speed at maximum 6 knots through the water particularly when the bow tug is being connected and whilst the bow tug is still connected;
- Pilot to use tug's name when giving orders, so the bridge team can understand the Pilot to inform the stern tug when engaging the vessel's propeller in order to watch out for the propeller wash;
- Pilot to inform the stern tug about any rudder position changes about to be effected during manoeuvring;
- Tug Master to inform the pilot whilst reaching 75% of the total engine power of the tug; and
- Pilot to be made aware of any "novice" or "trainee" Tug Masters or of any Tug Masters who may not be familiar with the area and who will be participating during the harbour towing operation.

DO actions of Pilot, Ship's Master and Mooring Parties:

- Bring speed down sufficiently before securing a tug, especially the bow tug;
- Limit use of propeller to the minimum required for steering;
- Drop the towline at the bow when disconnecting the tug, however only when instructed to do so by the tug;
- Slack away the towline slowly at the stern when disconnecting the tug and only let go off the messenger line when instructed to do so by the tug;
- Use tug's names when conveying orders to the tug and provide clear and concise instructions;
- Turn off floodlights as soon as the tug is secured;
- Have a spare heaving line ready at hand and a skilful deckhand to handle same;
- Use heaving lines with light weights, preferably using soft sand bags; and
- Inform the stern tug before engaging engines astern.

6 TUG NAVIGATION OPERATIONS

6.1 WATCHKEEPING RESPONSIBILITIES

Watchkeeping responsibilities whilst carrying out normal harbour towing operations are to comply with Belfast Harbour Regulations, as well as the guidelines for keeping a safe navigational watch. Fundamental to any safe watch keeping routine, whilst underway, are the following four factors.

- Maintain a proper and efficient lookout;
- Comply with collision regulations;
- Be sure of tug's position; and
- Never leave the bridge unattended.

6.2 NAVIGATING WITHIN BELFAST HARBOUR LIMITS

In addition to the guidelines contained above in **Section 6.1** it is a fundamental requirement to comply with all Belfast Harbour Regulations, contingency/emergency plans and the international collision regulations.

Speed restrictions must be strictly complied with. Remember other port users may not be professionally aware of the dangers involved e.g. small pleasure craft, people on the foreshore, divers and contractors working on jetties/berths may be swamped and injured by a tugs wash, if going at an excessive speed.

6.3 NAVIGATING IN RESTRICTED VISIBILITY

When visibility is reduced the hazards associated with towing operations are increased.

Belfast Harbour has parameters in place (see **BHC MSMS**) due to restricted visibility. However, there will be times when despite the docks or terminals being closed to vessel movements towing operations which have started may need to proceed to a conclusion.

These procedures apply to all towing operations which started prior to the onset of restricted visibility.

Restricted visibility is all circumstances where visibility is, or is expected to, reduce to a distance where the tugs normal ability to perform may be impaired. Such restrictions in visibility could be due to fog, mist, snow, rain, sleet or any other conditions which impair visibility.

In circumstances where restricted visibility exists, or is likely to exist, the Master/Pilot and tug master shall as part of the passage plan and risk assessment process agree how the operation will be conducted, what dangers are associated with towing in restricted visibility and what risk reduction measures should be applied. When completing this assessment, the following should be considered:

- Type of tug, propulsion method, towing from winch or hook and location of winch/hook;
- Proposed method of towing;
- Operational status of navigational aids and equipment;

- Minimum speed to maintain steering of vessel to be assisted;
- Movement of other vessels in the area;
- Navigational characteristics of the area of the port including the use of information from VTS; and
- Contingency plan should visibility deteriorate after the tow has commenced and/or if the tug must disengage at any stage of the operation.

Minimum visibility for all planned towing operations is 0.5nm, and such that the Master/Pilot can see the tug and the tug master can see the towed vessel.

Should visibility fall below the minimum once a towing operation has commenced, and the pilot can no longer see the bow tug, he/she shall reduce speed to a minimum safe speed and if safe and appropriate to do so take all way off the vessel. Following discussion with the tug master the contingency plan discussed and agreed at the planning stage will be implemented. This could include one or more of the following:

- Use the tugs to turn the vessel, let go the tugs and the vessel proceeds either to an anchorage or to the outer Lough
- Let go the forward tug and/or both tugs and have the tugs assist in a pushing mode;
- Allow the tugs to manoeuvre the vessel under the pilot's instructions. This may include using the tugs to maintain the vessel's position at a safe location in the Lough, channel or turning circle; and
- If safe to do so the aft tug may remain attached for escort, when required. If considered unsafe by any party the aft tug will be let go and remain passive for escort.

If the above options are not safe or practicable then as a last resort, with the agreement of all parties that it is the safest course of action, the operation can continue to completion.

The agreed course of action should be fully communicated to Belfast VTS.

All towing operations in restricted visibility should be conducted with the assisted vessel maintaining minimum safe manoeuvring speed.

The tug master should immediately inform the Pilot/Master of any concerns that he may have as to the safety of his tug and crew. The pilot and tug master should take immediate action to ensure the safety of both the tug and assisted vessel; if necessary they should abort the operation as soon as it is safe to do so.

The tug master proceeding to a job and all parties involved in the operation, should report any lack of visibility, immediately it is observed, to Belfast VTS and the vessel that they are rendezvousing with.

6.3.1 Additional Watch-Keeping Responsibilities aboard Tug

During restricted visibility additional watch-keeping responsibilities must be considered, these are:

- The tug master must take charge of conning the tug and have another member of crew on to act solely as lookout;
- Maintain a moderate speed (defined as a speed at which a collision is avoidable);

- Use all electronic navigational aids at your disposal to determine own position and other ships positions (if possible do not rely solely on electronic navigation aids);
- Close watertight doors and openings to maintain watertight integrity;
- Make the appropriate sound signals in accordance with collision and port regulations; and
- Comply with Rule 19, “Conduct of vessels in restricted visibility”:

(a) This Rule applies to vessels not in sight of one another when navigating or near an area of restricted visibility.

(b) Every vessel shall proceed at a safe speed adapted to the prevailing circumstances and conditions of restricted visibility. A power-driven vessel will have her engines ready for immediate manoeuvre.

(c) Every vessel shall have due regard to the prevailing circumstances and conditions of restricted visibility when complying with the Rules of Section I of this Part.

(d) A vessel which detects by radar alone the presence of another vessel shall determine if a close-quarters situation is developing and/or risk of collision exists. If so, she shall take avoiding action in ample time, provided that when her action consists of an alteration of course, so far as possible the following shall be avoided:

(i) an alteration of course to port for a vessel forward of the beam, other than for a vessel being overtaken;

(ii) an alteration of course towards a vessel abeam or abaft the beam.

(e) Except where it has been determined that a risk of collision does not exist, every vessel which hears apparently forward of her beam the fog signal of another vessel, or which cannot avoid a close-quarters situation with another vessel forward of her beam, shall reduce her speed to the minimum at which she can be kept on her course. She shall if necessary take all her way off and in any event, navigate with extreme caution until danger of collision is over.

6.4 TOWING IN ADVERSE WEATHER CONDITIONS

When towing in adverse weather, hazards associated with towage operations are increased.

In circumstances where heavy weather (i.e. high winds and/or heavy swell) exists, or is likely to exist, the Master/Pilot and tug master shall as part of the passage plan and risk assessment process agree how the operation will be conducted, what hazards are associated with the towage operation and what risk reduction measures should be applied. When completing this assessment, the following should be considered:

- Sea and/or swell conditions at the intended operating area and the route to/from same;
- Wind speed, direction and trend i.e. rising, steady or falling;
- State of tide and trend;
- Information offered by latest weather forecast and other vessels in the area;
- Type of tug, propulsion method, towing from winch or hook and location of winch/hook;
- Proposed method of towing, including likelihood of shock-load to towing gear;
- Movement of other vessels in the area; and
- Navigational characteristics of the area of the port including the use of information from VTS.

Contingency plan should weather deteriorate before/after the tow has commenced and/or if the tug must disengage at any stage of the operation. This could include after careful consideration, but not only be limited to, one or more of the following:

- Tugs do not make fast and remain on station to assist the vessel to a position of safety;
- Tugs are let go and remain on station to assist the vessel to a position of safety; and
- Tugs are let go to assist in a pushing mode.

If there is likelihood that the weather conditions may pose a significant threat to the tug crew/tug/towing gear, the tug master should immediately inform the pilot/Master of any concerns that he may have. The pilot and tug master should take immediate action to ensure the safety of the assisted vessel/tug/tug crew and, if necessary, the operation aborted as soon as it is safe to do so.

The agreed course of action should be fully communicated to Belfast Harbour VTS.

When the tug is proceeding to a job in poor weather conditions, the tug master is to make a pro-active report to discuss the weather conditions with Belfast Harbour VTS, the pilot and, if necessary, the vessel with which they are rendezvousing.

6.5 MOORING TUG ALONGSIDE A BERTH OR AT A BUOY

Tugs are to be moored alongside a berth or at a buoy in a condition that sufficient mooring lines are used to prevent excessive movement due to tide or other vessel movements, and provide a safety margin should a rope or ropes part due to a sudden surge.

When moored to a buoy consider implications of swinging circle, particularly at low water and the use of a slip wire or rope for letting go safely.

At all moorings, a safe means of access must be provided. This means a gangway or approved ladder with, where applicable, a safety net.

6.6 MONITORING PERFORMANCE OF NAVIGATION AIDS AND EQUIPMENT

The tug crew should be fully conversant with the operating manuals for navigation equipment fitted on board their tug.

Many items of equipment are fitted with a self-test facility (e.g. a Search and Rescue Transponder (SART) and an Emergency Position Indicating Radio Beacon (EPIRB) etc.) and these should be checked on a regular basis (following switching on and correct adjustment or at frequent intervals if continuously running) to confirm correct operation. If a self-test facility is not fitted, other known means should be used to establish correction function. Radar ranges and bearings against visual fixing, echo sounder against charted depth, compass error (both gyro and magnetic) by transit bearing or leading lights etc.

7 TOWAGE HAZARDS

7.1 SAFETY OF TUG CREW

Safety of crew is the first responsibility of tug masters.

All towage operations and manoeuvres must be conducted in a safe and seamanlike manner. If at any time a tug master is requested to carry out a manoeuvre, which he considers will result in a hazardous situation; he is to decline the order, stating the reasons why.

During towage operations, the towing gear equipment and personnel should be continuously monitored and any change in circumstances immediately relayed to the tug master. This is particularly important on tugs where the tug master has a restricted view of the towing area/personnel.

Whilst engaged in towing operations the minimum number of crew essential to carry out duties, is to be on deck, and never exposed to a rope or wire under tension or load. Crew should be aware that the tow may have to be released in an emergency, and that this may occur without warning. Wherever possible, a "clear deck" of crew should be in operation whilst towing.

Personal Protective Equipment (PPE) and working lifejackets should be worn always whilst engaged in, or near, towing operations on towing deck. It is the tug master's responsibility to enforce the wearing and use of safety equipment.

7.2 INTENTIONS WHEN TOWING

The pilot or Master should always advise the tug master of his intentions, allowing the tug master to anticipate the effect of the manoeuvre on his tug. Whenever possible the pilot or master should advise the tug master before making any engine movements. Un-notified sudden or large speed increases or course alterations should be avoided. The positioning of tugs on a vessel is a matter for discussion between the pilot and/or Master and the tug master(s), having full regard for the areas of the hull, which should be avoided, e.g. watertight doors, between frames etc.

In strong tidal conditions, a high percentage of the tug's power may be absorbed in maintaining position on the vessel before applying thrust to the vessel.

7.3 INTERACTION AND SHALLOW WATER EFFECTS

The effects of interaction between vessels and shallow water are well known, and it is not intended for this manual to give guidance on all the various kinds that can be experienced.

However, tug-masters should be aware of the critical manoeuvres when these effects are most likely to be apparent, that is whilst connecting and disconnecting to the ship, whilst manoeuvring away from the ships side and moving ahead.

In areas where interaction exists, and when manoeuvring alongside a tow, the tug master should be aware of the possibility of underwater obstructions such as bulbous bows, stabiliser fins etc. He/she should be aware of the actions of side thrusts which may present a hazard to the tug.

7.4 GIRTING

Ship's Masters, Pilots and Tug Masters must have a clear understanding of girting and its consequences. Girting happens when the towline comes at right-angles to the tug. The tug is pulled bodily through the water by its tow, which can lead to deck-edge immersion, flooding and capsize; unless the towline is released in time. It can occur very rapidly and it should not be assumed that the winch will pay out or that the towline will part before capsizing occurs. It can happen at the forward as well as at the stern of an assisted vessel. A conventional tug is particularly vulnerable and, being less manoeuvrable, it may be impossible to extract from a problematic situation. Girting may occur because:

- The assisted vessel turns abruptly and without warning away from the tug;
- The speed of the vessel is too high; and
- The tug is too far astern of its intended position, compared to the speed of the vessel.

7.4.1 Use of Gog Rope to Prevent Girting in Tugs and Workboats

This brief guide extracted from National Workboat Association "The Use of Workboats for Towing - Good Practice Guide" is intended as an aide memoire for conventionally propelled tugs and workboats in the safe use of gogs and gogging arrangements (otherwise known as bridles or gobs) in the prevention of girting.

Girting can occur when the tug is attached over her stern with a towing line from a hook or winch and is dragged astern at a speed through the water which prevents being able to manoeuvre and so brings the tow line over the side of the tug and the consequent heeling moment either capsizes her or pulls her over until down-flooding and sinking occurs. Trials and experience show that this can occur at speeds lower than 3 knots, depending on tug size, sea state, propeller wash and other factors and smaller workboats are particularly vulnerable.

Incidents have occurred in the workboat industry when a workboat has been at the opposite end of the tow to a larger and more powerful sea or harbour tug, where the imbalance in power and manoeuvrability (particularly if a modern tractor harbour tug is on the other end of the tow) means that the workboat can easily become overpowered by the other tug, and Masters should always be aware of the dangers of this potential imbalance when assisting tows or being assisted with their own tow.

Masters of modern manoeuvrable workboats can be overconfident of the ability of their vessel and themselves to withstand such forces until it is too late, there are sufficient well documented incidents to show that caution is always required.

Girted tugs have frequently been lost due to not following the basic, well promulgated and seamanlike precaution of ensuring that all appropriate hatches, doors and vents are closed before undertaking a towing manoeuvre, due to the possibility of very quick down-flooding through such openings when the tug starts to heel to larger angles.

If the tug may be put in a position where girting is possible at any stage during the planned towing manoeuvre, all such precautions must be taken.

It should be noted that some workboats are built without the necessary deck fittings required to attach an effective gog, and should therefore never be used in a situation where there is any risk of girting until they are suitably modified.

The necessity for towing over the stern at all should be considered bearing in mind that many tug/workboats can provide useful manoeuvring assistance by being the stern tug with the towing line rigged from the tug's bow with up to 60% of the ahead BP being available with the engines astern, or alternatively by being made fast alongside (hipped up) or indeed close coupled as a pushing/stern tug, all of these providing a safer and perhaps more appropriate alternative.

Trials have shown that the forces applied on a gog can exceed 70% of the BP of the tug, so the strength of the gog and fittings must be commensurate with the forces that may be applied, bearing in mind that parting of the gog or failure of a fitting will have an instantaneous and severe effect on the tug. All parts of the arrangement must therefore be maintained in good condition and regularly inspected. The point of attachment of the gog on the tug must be on the centreline and as close to the after end as possible. The gog may be attached to the towing line by shackle if there is a suitable connection in the towing line in the right location, but if it is attached by having a riding saddle over the tow line this should preferably be in the form of a saddle rather than a shackle bow to prevent bending the tow line round a small radius.

If the gog cannot be heaved in under load, it must be secured hard down at the start of operations and only released once the danger of girting has passed (e.g. when the tow is close to the berth and the speed of the tow is suitably slowed).

Trials and experience have shown that the dangers of girting are high when the speed of the tow approaches 3 knots and above, but that they can occur at lower speeds, particularly with smaller vessels and with the effect of environmental factors such as propeller wash, tidal effects and sea state.

Experience also shows that if a girting situation starts to develop it will do so extremely rapidly so tug masters and crews need to be practised in releasing the tow under load when the tension required to release the tow hook may be much higher than expected, or at least be aware of the extra force that will be required if practice trials have only been done with minimal load on the hook.

Communication between the tug master(s), vessel/tow master and/or pilot must be clear and concise, leaving no room for misunderstandings to develop, bearing in mind that each party sees it from their own perspective and that may be very different from that of others. Before the operation commences all must be clear about the intended sequence of events and must raise any issues of perceived risk or potentially safer ways of operating. Any necessary changes to the plan during the operation must be clearly communicated to all parties and acknowledged as understood.

The most difficult decisions to be taken by the tug master concerning the use of a gog may be the requirement to have it slack so as not to interfere with the necessary manoeuvring ability of the tug, and therefore the ability to properly assist/control the towed vessel, but then to be sure of having it snugged down or of being safely released from towing duties when the towed vessel's speed increases towards 3 knots or more. This can occur, for example, when acting as stern tug in assisting a ship from a berth when the ship is clear of the berth and starts to come ahead and make way with the tug still attached.

In these circumstances, the tug must be able to release from the tow before the ahead speed generated starts to build up, thus putting the tug in danger of girting, or must be able to be gogged hard down if the tug is required to remain attached, for example if the ship is shifting berths within the port.

Clearly if the tug lacks a gog winch it will be very difficult to safely harden it down, and if the tug is using her own towing gear it is not easy to manoeuvre effectively to enable the tow line to be released by the ships' crew.

Another dangerous circumstance arises if the tug is acting as a head tug and the towed vessel starts to overtake it, either because it is a ship and needs to make way for any reason and so applies power, or when the tow is non-propelled. This can happen either because the tow has built up speed and then does not respond quickly enough to the slowing down or alteration of course of the head tug, or because of another tug is pushing or towing alongside and adding power.

This is especially dangerous when the head tug is on a very short towline: If it is too short to allow the tug to move to the side of the tow, perhaps in the case of a square bow, wide barge, so that the stern of the tug contacts the tow and gets run over, or with any tow where the towline length is insufficient to allow the tug to make a required alteration of course and/or speed while allowing the space for it to take effect on the tow.

Since the head tug must be able to move from side to side to control the heading of the tow, a gog would increase the dangers to the tug unless slack enough to allow the necessary manoeuvring room.

As always, the tug should avoid trying to make any sharp turn with the tow and keep the towing speed low to avoid dangerous circumstances arising.

There is not always a simple answer to these risks, so they must be clearly understood and allowed for in the planning of the tow between the tug master(s), pilot and master of the towed vessel 15. If a tug is to make fast stern first to a tow under way, the normal safe operational sequence would be as follows:

- When the speed of the tow has been reduced and it is safe to do so, run alongside the stern quarter on the lee side of the tow and come alongside, holding station by maintaining the same speed as the tow and keeping the helm slightly towards the tow;
- Pass up (or take down from the tow if they have a suitable towline) the towline to the stern of the tow, make fast, rig and secure the gog hard down;
- When the towline is fast and the gog rigged, move ahead slowly, remaining alongside the tow, until the towline is under tension;

- When the speed of the tow is sufficiently reduced through the water and the pilot/tow master is ready, start to move slowly away from the tow while maintaining tension on the towline by easing the helm slightly away from the tow;
- The tow will move ahead and the tug will come around in an arc until astern of the tow; and
- Do not slack off the gog until the ahead motion of the tow is sufficiently slow to allow the tug to manoeuvre safely with a slackened gog without risk of girting.

Additional Information on girting can be found in Tug Stability a Practical Guide to Safe Operations by Henk Hensen and Markus van der Laan.

7.5 SPEED WHEN MAKING FAST

The vessel's speed should be reduced to that which allows a safe rendezvous and connection with the tug(s). The required speed should be agreed in advance between the Master (and pilot if embarked) and with (all) the tug(s) master(s) involved. The recommended maximum safe speed through the water for a centre-lead forward tug is six knots. At all times during the connecting process, the pilot/Master should be aware of the position and intention of all relevant shipping movements in the area. He/she should always keep Belfast Harbour VTS apprised of his intentions, requesting advice on shipping as necessary.

7.6 UNCONTROLLED RELEASE OF TOWLINE

When releasing the tow, it is important that the tug's messenger is not disconnected from the towline and the ship is at a safe speed. At the bow, the towline should be released in one motion. At the stern, or with the tug alongside, the towline should be slackened gently using the messenger line so that the towline can be recovered back onto the tug's winch safely. Communication, with the pilot advising the tug first and then instructing the master of the ship to order his crew to release in a controlled manner once the tug has confirmed in position, is critical.

8 SAFETY MANAGEMENT

The GtGP recommends that harbour authorities develop systems to ensure continued safe and efficient towing services including the ability to respond to emergencies. BHC expects towing operators to include a reference to managing safety within their respective SMS/ISM, but for the avoidance of doubt the following section gives some basic safety management guidance.

8.1 CONTINGENCY PLANS

Contingency plans could include the following:

- Girting or girding situation;
- Failure or parting of the tow wire;
- Failure of gob wire arrangements;
- Grounding of the tug or tow;
- Loss of hull integrity in either tug or towed vessel;
- Collision or contact with a fixed object or installation;
- Loss of main propulsion power or electrical power;
- Failure of steering and/or other critical control systems;
- Man overboard;
- Bridge, accommodation or engine room fire; and
- Actions to take in the event of unexpected poor weather.

Regular emergency training exercises should be encouraged.

8.2 ACCIDENT, INJURY AND HAZARDOUS INCIDENT REPORTING

An accident is any unforeseen, uncontrolled event which has the potential for injury or loss, whether injury or loss were sustained at the time or not.

In the event of a serious accident, major injury or time critical severe injury contact Belfast Harbour VTS Duty Officer, with urgent request for assistance from the emergency services, who will initiate the necessary action.

Guidelines:

- During initial contact keep report brief and factual;
- Description of incident;
- Whether any injuries;
- Extent of damage;
- Whether assistance is required;

- Allocate a dedicated VHF channel or telephone line to deal with communications;
- Administer first aid, if possible;
- Prepare tug for receiving emergency services (e.g. helicopter evacuation); and
- Maintain a log of events as they happen.

The incident/accident should be recorded on an appropriate incident form. Belfast Harbour host a Marine Incident/Near Miss Reporting Form for these purposes.

8.2.1 Incident Reporting

All incidents, accidents and near misses must be reported, however trivial they may seem at the time, not just those that cause injury. These include:

- Reporting of hazards and potential hazards;
- Dangerous occurrences;
- Near misses;
- Accidents to vessels;
- Accidents resulting in personal injury;
- Technical incidents resulting in damage, or potential damage to machinery; and
- Pollution of any kind (oil or garbage).

In addition to the above local reporting requirements, it is a legal requirement for UK “Flag State” vessels to report to the MCA/MAIB) certain incidents and accidents.

In general terms, a “Reportable Accident” means any contingency caused by an event on board a tug or involving a tug when:

- There is loss of life or major injury to any person on board or any person is lost or falls overboard from a tug; and
- A tug is lost, presumed lost; abandoned; materially damaged by fire; explosion, weather or other cause; is in collision; is disabled or causes serious harm to the environment.

Any of the following occur and where, taking into account their circumstances, they might have been liable to cause serious injury or to cause damage to the health of any person, a collapse or bursting of any pressure vessel, pipeline or valve; a collapse or failure of any lifting equipment, access equipment, hatch cover, staging or boatswain’s chair or any associated load bearing parts; a contact with loose asbestos fibre except when full protective clothing is worn; or an escape of any harmful substance or agent.

A reportable major injury is any fracture other than to fingers, thumbs or toes; any loss of limb or part of a limb; dislocation of the shoulder, hip knee or spine; loss of sight (whether temporary or permanent); penetrating injury to the eye; or any other injury leading to hypothermia, or requiring resuscitation or admittance to hospital for more than 24 hours.

A reportable serious injury is any injury other than a major injury which results in incapacity for more than 3 working days, excluding the day of injury.

A minor injury is an injury that does not incur lost time and is therefore **not reportable**.

8.3 MAINTENANCE OF SAFETY EQUIPMENT

At all times safety equipment is to be maintained to the highest standard. It is ultimately the responsibility of the tug-master to ensure equipment is in date and has been serviced at the appropriate time.

8.4 SAFE SYSTEMS OF WORK

A Safe System of Work is a means of implementing control measures which may be taken to protect those who may be put at risk in some key areas on board ship. Such measures should be based on the findings of the risk assessment.

All components of the work should be examined. Consider the following:

- **People:** - who is involved, competence, information, training, instruction, supervision etc.;
- **Plant and equipment:** - what is used, suitability, design, maintenance, guarding arrangements, isolation and ergonomic factors (matching person to the task);
- **Materials:** - handling (mechanical or manual) and health hazards;
- **Environment:** - lighting, heat, cold, noise, ventilation, wet conditions, welfare facilities etc.; and
- **Place of work:** - condition of floors and decks, access into and egress from, means of emergency escape, working space etc.

Only when all the components of the work have been examined can a safe system be devised. The following controls should be considered in descending order of priority:

- **Eliminate the hazard** - highly unlikely aboard a tug;
- **Reduce the hazard** - Is there a safer alternative (e.g.; less toxic, low voltage, lower noise level etc.);
- **Enclose the hazard** - fit guards, spill trays, insulation etc.;
- **Isolate the hazard from people** - fencing, guard rails, trip switches, isolation locks;
- **Control the extent of the exposure/contact with the hazards** - Reduce the length of time and exposure, rotate persons more frequently, purchase toxic substances in smaller containers etc.; and
- **Personnel Protective Equipment** - Wear PPE to lessen the effect of the injury or accident.

8.5 SAFE MEANS OF ACCESS

It is the tug master's responsibility to ensure a safe "Means of Access" between the tug and jetty or another vessel alongside and wherever possible the following "Means of Access" should be provided:

- A gangway, or portable ladder, securely rigged, and fenced. Gangways should not be inclined more than 30° and portable ladders rigged at an angle of between 60° and 75° from the horizontal;
- A bulwark ladder, or steps, where the gangway rests on top of the bulwarks or rails;
- Adequate lighting, either fixed or portable for the full area occupied by the gangway, both ashore and onboard;

- A lifebuoy fitted with light and safety line should be provided ready for use at the point of access aboard the tug; and
- A safety net rigged to minimise the risk of injury to a person falling from the gangway or ladder.

Consideration should always be given on how to transfer personnel and equipment to the towed vessel or unit during an emergency. Personnel should always wear life-jackets and utilise communication equipment and portable lights during darkness. The safety of personnel is paramount and a transfer should not go ahead if considered too dangerous.

Points to Remember:

- Portable and rope ladders are only to be used for access where no alternative, safe means is available;
- When boarding an unmanned tug, check the "Means of Access" first. Do not assume it is in the same safe condition as when it was last used.

9 TOWAGE AUDITS

Towage audits, as part of the non-mandatory licensing regime (see **Section 3.11**), are intended to determine, by objective evidence, whether safety activities relating to towage operations are evaluated for effectiveness in compliance with this operations manual. The audit should identify if there are deficiencies, and any requirement for action on board the tugs or ashore.

Audits will be led by suitably qualified personnel, authorised by BHC Harbour Master.

The person(s) assigned to conduct the audit shall have received adequate training or be qualified and competent as follows:

- Have pertinent and demonstrated knowledge of Management Systems or Quality Assurance Standards and their applicability in respect of shipping and port regulations, or
- Have received adequate training, or
- Have participated in an audit as a team member under the supervision of a trained and competent person until they are deemed competent.

Prior to the audit, the auditor(s) should meet with the tug master and the following should be discussed:

- Time scale of audit;
- Safety of crew and auditors;
- Limitations due to operational circumstances;
- Agree areas to audit; and
- Previous observations/non-conformances.

The auditor(s) shall assess the activities under review using a copy of the relevant checklist. The auditor will raise non-compliance and corrective action lists for each failure to comply with the requirements of this manual.

If time and conditions permit, areas of audit should be as thorough and complete as possible. However, it is not essential to complete every checklist or every point on a checklist.

If deficiencies are found a non-conformance should be raised. It should not be an auditor's goal to create non-conformances for the sake of proving an audit has been completed. Non-conformances should only be raised when a procedure has not been followed.

On completion of audit, the auditor will:

- Where possible, hold a closing meeting with the Tug Master and other personnel that deemed appropriate. The auditor should present their findings and conclusions. This should include positive elements as well as non-conformances; and
- Prepare an audit report and forward to the respective towage operator responsible person.

The towage operator responsible person should ensure that the audit report and non-conformances are acted upon and respond directly to BHC Harbour Master.

9.1 SAMPLE AUDIT CHECKLIST

AUDITOR GUIDELINES & CHECKLIST

1. All internal audits are to be conducted in using the following checklist for guidance.
- 2 Wherever possible an audit trail should be followed. Individual procedures and systems of work should not be audited in isolation. Remember you are following the system through from shore to tug and this includes all aspects of general, safety and quality management.
- 3 There is no need to check all records made available since previous audit. Sample at random and only look further if you find an unacceptable high-level of irregularities.
- 4 Discuss with tug crew and staff how they "do the job". It is only by doing this that you will be able to establish their understanding and compliance with procedures and Operations Manual.
- 5 Ensure that you comply with all Safe Systems of Work when conducting audits. For safety reasons, **do not audit a tug without another person in attendance**. This does not have to be an auditor.
- 6 When writing the audit report, "paint a picture" and describe the condition. To state that a system is "satisfactory" is not sufficient.
- 7 Hold an informal opening meeting to establish the outline structure of the audit visit.
- 8 Consider working together when auditing a tug, particularly if time is at a premium.
- 9 On board tugs, consider carefully the implications, consequences and frequency of use, when recommending "Immediate Corrective Action" required before further operation.
- 10 When inspecting equipment, wherever possible see it running and check full operation.
- 11 Unsafe systems of work and potential fire risks are to be given the highest audit priority.
- 12 Do not let cosmetic appearance, old age or lack of sophistication cloud your judgement. Fit for purpose, properly maintained and recorded are the main priorities.
- 13 Cleanliness and orderliness are often good indicators both afloat and ashore on how well a system is operating.
- 14 Hold an informal closing meeting to summarise audit findings and agree corrective action timescales.
- 15 Corrective actions, with completion timescales are to be listed in the audit report and referenced to the applicable system procedure.

Annex A Belfast Harbour Towage Information

INTRODUCTION

This booklet has been produced to provide a source of information on tugs and towage procedures for Masters of vessels using Belfast Harbour. It should be read, as appropriate, in conjunction with the Port's Minimum Towage Guidelines which state minimum towage requirements for each berth within the port for various vessel sizes and types and the General Directions for Navigation within the port.

Towage within Belfast Harbour is provided commercially by 5 independent operators. Belfast Harbour does not provide towage. Whilst stipulating minimum towage requirements and regulating movements within the port through the Vessel Traffic Service (VTS), under normal circumstances Belfast Harbour are not involved with the contracting of towage services.

Within Belfast Harbour a Towage Committee has been established. This consists of representatives from: each of the towage companies, Belfast Lough Pilotage Services, PEC holders and Belfast Shipping Agents Association. The drafting of this document has been undertaken with the involvement of the committee.

MINIMUM TOWAGE REQUIREMENTS

Belfast Harbour has published a document entitled Minimum Towage Requirements which is available for download at: <https://www.belfast-harbour.co.uk/port/towage-boating/>

These Towage Requirements state the minimum towage for each berth, broken down into categories consisting of ship's length, vessel orientation and whether or not they are fitted with a bow thruster. It should be noted that these are minimum requirements and in no way, prevent the Master of a vessel or the Port Authorities from increasing the number or size of tugs as they see necessary. Where the requirements state 'individually risk assessed'; the Harbour Master, in consultation with the ship's Pilot and Master as appropriate, will decide upon the necessary towage.

TOWAGE CERTIFICATES

Provided certain conditions are met; vessels which call regularly to the port may be exempted from some or all of the minimum requirements. Such exemptions are subject to a procedure contained within the Port's Marine Safety Management System and, if successful, will result in the vessel being issued with a Towage Certificate. This certificate is valid for wind strengths below 20 knots only, above 20 knots Minimum Towage Requirements apply. Possession of a Towage Certificate does not prevent the Master of the vessel from using tug(s) should it be deemed necessary.

PROCEDURE FOR OBTAINING TOWAGE SERVICES

Towage within Belfast Harbour is arranged through the local Shipping Agents.

All of the towing operators operating within the port can provide tug assistance at two hours' notice. Therefore, the Master should request any tugs he requires through his Agent taking this notice period into consideration.

Direct contact details for the Towing Operators are provided in Annex I of this booklet.

In exceptional circumstances, should Port Control be asked to contact tugs on behalf of the Master, the exact towing provider, type size and number of tugs should be clearly stated.

In cases of emergency, that is when the Master or Pilot of a vessel deem that towing is required to safely execute a transit or manoeuvre that has already commenced, the Port Controller is authorised to allocate any towing resources immediately available to go to the assistance of that vessel.

Nothing in this procedure prevents the Duty Harbour Master from allocating towing to any vessel as he considers appropriate.

Except in cases of emergency or otherwise as directed by the Duty Harbour Master, an inbound vessel requiring a tug for arrival will not be permitted to pass the Fairway Buoy until the tug has confirmed it is ready to be mobilised.

TUG TYPES AVAILABLE WITHIN THE PORT

There are currently 6 tugs permanently based within the port, these fall into two established categories:

- Omni-directional tugs (x 2); and
- Conventional tugs (x 4).

1. **Omni-directional tugs:**

Omni-directional tugs are tugs fitted with omni-directional propulsion units, either vertical Voith Schneider propulsion units or Azimuth Propellers.

Such units can deliver thrust in any horizontal direction, hence the term 'omni-directional'.

The propulsion units (two; side by side) can be situated:

- a. under the bow, as is the case with Voith Schneider tugs and can be the case with azimuth propellers; such tugs are called tractor tugs; and
- b. under the stern, as is the case with azimuth propellers; such tugs are called ASD-tugs (azimuth stern drive tugs).

2. **Conventional Tugs**

Single screw, twin screw or triple screw tugs, all called conventional tugs, are less manoeuvrable compared to tugs with omni-directional propulsion units.

Manoeuvrability of conventional tugs can be upgraded by installing specific rudder systems and/or bow thrusters. Another alternative is the use of steerable nozzles, which also increase manoeuvrability.

Details of each individual tug in the Port, including a description of their propulsion systems are provided in Annex II to this booklet.

Note that for purposes of the Belfast Harbour Minimum Towage Requirements, the Tugs are classified by bollard pull strength rather than propulsion type:

- Intermediate Tugs are tugs with a bollard pull of less than 20 tonnes; and
- Large Tugs are tugs with omni-directional propulsion systems and a bollard pull greater than 20 tonnes.

METHODS OF TUG USAGE

Belfast Harbour Minimum Towing Guidelines specify the minimum number and bollard pull of tugs. Currently, the tugs within the port with bollard pull less than 25 Tonnes are twin screw tugs and those with bollard pull over 25 Tonnes are omni-directional tugs.

Escorting:

Active Escorting or indirect towing – (when the tug is dragged through the water by the tow line during transit) is not currently undertaken within the Port.

Passive Escorting, whereby a tug shadows the progress of a ship during the transit, is undertaken at Master's/Pilot's discretion.

Push/Pull

The push-pull operation means that the tug is connected to the assisted vessel by a short line and remains in close proximity to the vessel.

This enables the tug to push on the vessel, but then check/control the vessel by pulling-back on the short line.

Should only pushing be required, a tow line may not be necessary.

Due to the limited power of conventional tugs when running their propellers astern, their ability to pull-back on the line will be limited. As a rule of thumb, the maximum astern bollard pull of conventional tugs is approximately 65% of the ahead bollard pull.

When in Push/Pull use, ASD and conventional tugs will normally be bow-to, whilst tractor tugs will normally be stern to the vessel.

On the line

On the line towing (also referred to as the European method as this is the traditional method of tug assistance in European ports) involves the towline being connected to the tug by a towing hook or towing winch. The location of the towing point will vary between tug types: conventional, ASD or Tractor.

When made fast to a vessel's bow:

The effectiveness of tugs towing on a line will decrease with increasing headway. This is because, as headway increases, more of the tugs power is used in maintaining its position relative to the vessel, as opposed to being applied as an assisting force through the towline.

When configured in a stern-to-stern tow:

The following safety matters should be taken into account by the ship:

- Speed of the ship should be kept low, preferably less than 3 knots and never over 4 knots;

- Ship's propeller use to be limited to Dead Slow Ahead/Dead Slow Astern; should more engine power be needed this should be done in consultation with the Tug's Master;
- Similarly, ship's rudder use should be such that it does not cause any problem for the tug;
- When approaching the berth the ship's speed is to be lowered to approximately 1 knot in good time to enable the tug to reposition/drop gob rope to assist in mooring; and
- Beware that tug may need to release tow line at short notice should a risk of girting arise*.

***There are dangers associated with towing on the line; namely risk of girting and capsizing. Girting happens when the towline comes at right-angles to the tug. The tug is pulled bodily sideways through the water by its tow, which can lead to deck-edge immersion, flooding and capsize - unless the towline is released in good time. As a safety measure, all conventional tugs operating within Belfast Harbour are equipped with gob rope systems and on load release hooks. A gob rope system (or similar system) keeps the tow line low and fixed to the after end of the tug and, when operating stern to stern, can prevent the tug veering off course and presenting a dangerous aspect to the direction of travel. The location of the towing point on ASD tugs (when operating over the bow) and Tractor Tugs significantly reduces the risk of girting.**

TOWAGE OTHER THAN HARBOUR TOWAGE

The Master of a vessel engaged in towing or pushing, other than those engaged in harbour towage operations, shall give a minimum of 60 minutes notice to Port Control and shall specify the details of the tow.

Dead ship tows require the authorisation of the Harbour Master and are to be conducted in hours of daylight.

Vessels engaged in towing/pushing may only tow/push one other vessel/object at a time.

Tugs and tows will be subject to the Harbour's Pilotage Directions.

PREFERRED VHF ETIQUETTE WHEN WORKING WITH TUGS

Establishing Communications:

Bridge to Bridge Communication between the vessel being assisted and the tugs should primarily be established on the port operations frequency, VHF Channel 12. Thereafter a working channel should be selected by the Pilot/Master of the vessel being assisted for all subsequent tug and berthing communications – Usually VHF Ch. 8, 10 or 14.

On changing to the working channel, all vessels should radio check with the Pilot/Master.

Prior to the berthing manoeuvre, the plan pertaining to each tug should be passed by the Master/Pilot. This will include:

- The position of the tug relative to the vessel;
- If lines are to be used and whether they will be tugs lines or ships lines (Note: tugs in Belfast normally use tugs lines);
- Method of use, e.g. On the line, push/pull, escorting; and
- Berthing instructions and whether the vessel will swing prior to berthing.

Tug Position

Throughout the manoeuvre the Master/Pilot should endeavour to keep the Tug's Master fully updated, with particular reference given to the desired position of the tug relative to the vessel. It should be borne in mind that it will take time for a tug to reposition during the operation, for example:

- From pushing to pulling (and vice versa); and
- Pulling on stbd bow to pulling on port bow, etc.

This will mean the ship's Master/Pilot needs to anticipate the next required tug movement and communicate this to the tug in order to allow the Tug Master time to reposition:

- If working on the line, the tug may need time to change sides of the vessel or to change direction of thrust in the case of conventional tugs; and
- If working in push/pull mode, the tug will need advance warning to either be "out on the line" ready to take the weight, or to "come in ready to push".

Tug Pushing/Pulling instructions

In order to avoid possible confusion between differing bollard pull strengths of varying tugs, any instructions to tugs should state force in tonnes.

<i>Examples of preferred VHF instructions between vessel and tug</i>	
Master/Pilot	Surrey, stand by to pull on stbd quarter
Tug	Surrey ready to pull on stbd quarter
Master/Pilot	Surrey, 15 tonnes pull on stbd quarter
Tug	When power is on Surrey pulling 15 tonnes
Master/Pilot	Surrey, increase to 20 tonnes pull
Tug	Increase to 20 tonnes When power has been increased Surrey pulling 20 tonnes
Master/Pilot	Surrey, ease to 10 tonnes... Pull 10 tonnes on stbd beam
Tug	When in new position and at new power setting Surrey pulling 10 tonnes on stbd beam
Master/Pilot	Surrey, stop
Tug	When power is off Surrey all stopped

Note:

The tug master will keep that power setting and position relative to the ship until instructed to do otherwise by the Master/Pilot.

Instructions with PORT or STARBOARD in them refer to the port or starboard side of the vessel being towed.

Contact details for towing operators within the port:

Towage Provider	Contact Details
<p>SMS Towing</p>	<p>York Dock Belfast BT3 9LG ops@smstowage.com 01482 350999 (24 Hrs)</p>
<p>John McLoughlin & Son</p>	<p>Divis Berth Northern Road Belfast Harbour BT3 9AL scotttasker@btconnect.com 028 9035 1714 +44(0)7786198975 (24 hours)</p>
<p>David Ferran & Sons</p>	<p>Ferran Port Services LTD Ferran Marine Services LTD Gotto Wharf 1 1 Herdman Channel Road Belfast Harbour Belfast BT3 9LG justin@davidferran.co.uk administrator@davidferran.co.uk 02890 351 411 (Dock Office, 24 hrs)</p>
<p>Waterfront Services (Michael F. Ewings (Shipping) Ltd.)</p>	<p>Michael F. Ewings (Shipping) Ltd. Hurst House 15-19 Corporation Square Belfast BT1 3AJ Office: 028 9024 2242 (24h) info@mfewings.com mark@mfewings.com</p>



VESSEL IDENTIFICATION

Vessel's Name:	Masterman	
Operator:	SMS TOWAGE	
Callsign:	2GXM9	

PERFORMANCE

Maximum Speed:	13 knots
Bollard Pull:	45 Tonnes
Engines:	2 x Caterpillar Type 3512 B. 3200BHP
Propulsion Type:	2 x Rolls Royce Azimuth Stern Drive (ASD)

TOWING EQUIPMENT

Fwd:	Single Drum Towing Winch - 25m/Min. Brake 100T Hold
Aft:	Single Drum 750m x 40mm Wire

VESSEL DIMENSIONS

L.O.A.:	24.39m
Beam:	9.15m
Draught:	4.4m
GT:	144.26

CERTIFICATION

MCA:	Workboat Cat 2
Class:	Germanisher Lloyd 100 A5



VESSEL IDENTIFICATION

Vessel's Name:	Merchantman	
Operator:	SMS Towing	
Callsign:	2IVH2	

PERFORMANCE

Maximum Speed:	13 knots
Bollard Pull:	50 Tonnes
Engines:	2 x Caterpillar Type 3512B. 3200BHP
Propulsion Type:	2 x Rolls Royce Azimuth Stern Drive (ASD)

TOWING EQUIPMENT

Fwd:	Single Drum Towing Winch – 25m /Min. Brake 100T hold
Aft:	Mampaey Towing Hook – Cert 50T

VESSEL DIMENSIONS

L.O.A.:	24.39m
Beam:	9.15m
Draught:	4.4m
GT:	144.57

CERTIFICATION

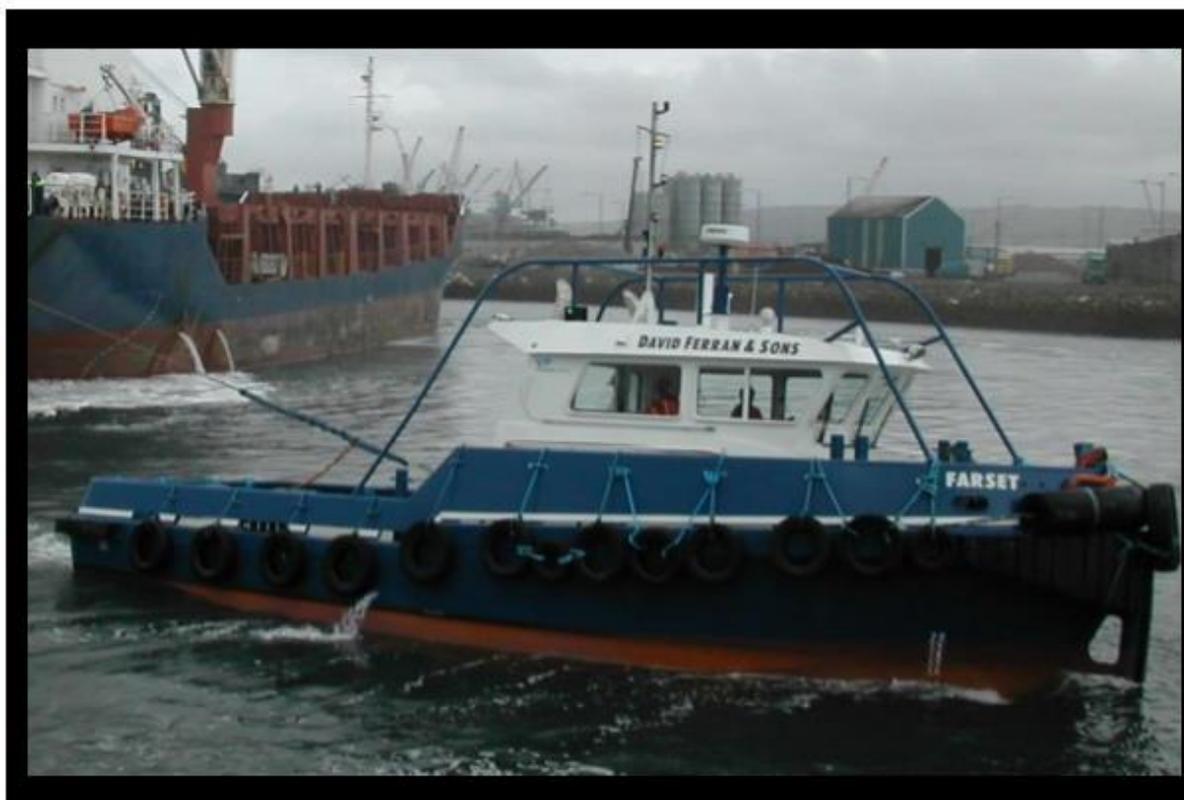
MCA:	Workboat Cat 2
Class:	Lloyds Register



VESSEL IDENTIFICATION	
Vessel's Name:	Sally McLoughlin
Operator:	John McLoughlin & Son (Shipping) Ltd
Callsign:	2CRQ4
PERFORMANCE	
Maximum Speed:	10.3 knots
Bollard Pull:	23 Tonnes (18 Tonnes astern)
Engines:	2 x Doosan 4V222 – 596 kW (800 bhp each) @ 1800 rpm.
Propulsion Type:	Twin screw, fixed pitch in kort nozzles. Bow thruster.
TOWING EQUIPMENT	
Fwd:	“H” Bitts; 10 tonne towing winch
Aft:	10 tonne towing winch; remote release Mampaey Towing Hook (on load release), remotely controlled gob rope winch.
VESSEL DIMENSIONS	
L.O.A.:	16.0 m
Beam:	6.2 m
Draught:	2.9 m
GT:	46 (Displacement 107 tonnes)
CERTIFICATION	
MCA:	Workboat Cat 2 (60 miles from safe haven), Pilot Boat Endorsement
Class:	-



VESSEL IDENTIFICATION	
Vessel's Name:	Eileen McLoughlin
Operator:	John McLoughlin & Son (Shipping) Ltd
Callsign:	2HAL5
PERFORMANCE	
Maximum Speed:	10.3 knots
Bollard Pull:	24.9 Tonnes (21.5 Tonnes astern)
Engines:	2 x Doosan 4V222 – 596 kW (800 bhp each) @ 1800 rpm.
Propulsion Type:	Twin screw, fixed pitch in kort nozzles. Bow thruster.
TOWING EQUIPMENT	
Fwd:	Towing winch 50 tonne Brake – 25 tonne Pull. Stainless steel bow towing lead
Aft:	10 tonne towing winch; remote release Mampaey Towing Hook (on load release), remotely controlled gob rope winch.
VESSEL DIMENSIONS	
L.O.A.:	16.0 m
Beam:	6.2 m
Draught:	2.9 m
GT:	46 (Displacement 107 tonnes)
CERTIFICATION	
MCA:	Workboat Cat 2 (60 miles from safe haven), Pilot Boat Endorsement
Class:	-



VESSEL IDENTIFICATION	
Vessel's Name:	Farset of Belfast
Operator:	David Ferran & Sons
Callsign:	MAKF8
	
PERFORMANCE	
Maximum Speed:	12 knots
Bollard Pull:	14.8 Tonnes
Engines:	2 x Volvo Penta TAMD D12-550 – 408kW (550bhp) @ 1900rpm.
Propulsion Type:	Twin screw, fixed pitch in Kort nozzles.
TOWING EQUIPMENT	
Fwd:	-
Aft:	Swivel hook, quick release. Remotely controlled gob rope winch.
VESSEL DIMENSIONS	
L.O.A.:	15.43m
Beam:	5.45m
Draught:	1.7m half load condition
GT:	N/A (Displacement 55 tonnes half load condition.)
CERTIFICATION	
MCA:	Workboat Cat 3 (20 miles from safe haven), Pilot Boat endorsement
Class:	-



VESSEL IDENTIFICATION	
Vessel's Name:	Michael Francis
Operator:	MF Ewings (Shipping) Ltd.
Callsign:	ZQHT6
	
PERFORMANCE	
Maximum Speed:	10 knots
Bollard Pull:	13 Tonnes
Engines:	2 x Caterpillar 3408B TA/B – 700kW (940bhp) @ 1800rpm.
Propulsion Type:	Twin screw, fixed pitch in Kort nozzles.
TOWING EQUIPMENT	
Fwd:	Fixed post.
Aft:	Mampaey disc type towing hook, 15 ton SWL
VESSEL DIMENSIONS	
L.O.A.:	16.89m
Beam:	5.29m
Draught:	2.24m
GT:	N/A (Displacement 62 tonnes)
CERTIFICATION:	
MCA:	Workboat Cat 3 (20 miles from safe haven)
Class:	DT (MCA) - Tug.

Annex B Belfast Harbour Minimum Towage Requirements

MINIMUM TOWAGE REQUIREMENTS

Mariners are advised that as of 0001 on the 1st of January 2012 the following minimum towage requirements will be in operation within Belfast Harbour and constitute an update to Belfast Harbour's Marine Safety Management System.

These towage requirements are effective for average wind speeds up to 20kts. For wind speeds in excess of 20kts, towage requirements will be assessed by the Ship's Master and Pilot and confirmed with the Harbour Master.

Table 1: Towage requirements for ships berthing at Oil berths OB1, OB2 & OB3

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	
OB1 & OB2	Less than 105m	No towage required	No towage required	
	From 105m and less than 130m with a bow thruster	One tug ≥ 20 tons.	One tug ≥ 10 tons	Ships will normally berth bow south
	From 130m and less than 150m with a bow thruster	One tug ≥ 20 tons	One tug ≥ 20 tons	Ships will normally berth bow south
	Vessels without a bow thruster	Individually risk assessed	Individually risk assessed	
	Up to 120m with bow thruster	No towage is required		
OB3	Up to 120m without bow thruster	One tug ≥ 10 tons	One tug ≥ 10 tons	
	Over 120m	Individually risk assessed	Individually risk assessed	
	All shifts between OB1, OB2 & OB3 for ships greater than 105m requires one tug not less than 10 tons.			
All shifts from outside Musgrave channel will be treated as arrivals				

Table 2: Towing requirements for ships berthing at Musgrave Scrap Wharf

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	
Musgrave Scrap Wharf	Less than 100m	No towage required	No towage required	
	From 100m and less than 120m with bow thruster	No towage required	No towage required	
	From 100m and less than 120m without bow thruster	One tug ≥10 tons	One tug ≥10 tons.	
	From 120m and less than 140m, with bow thruster	One tug ≥20 tons	One tug ≥ 20 tons.	
	From 120m and less than 140m, without bow thruster	One tug ≥20 tons (one additional tug of ≥10T may also be required).	One tug ≥20 tons (one additional tug of ≥10T may also be required).	
	Over 140m	Individually risk assessed.	Individually risk assessed.	

Table 3: Towing requirements for ships berthing at oil berth OB4

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	
OB4	Less than 120m	No towage required	No towage required	
	From 120m and less than 140m with bow thruster	One tug ≥20 tons	No towage required	
	From 120m and less than 140m without bow thruster	One tug ≥20 tons	One tug ≥10 tons may be required.	
	From 140m and less than 160m with bow thruster	One tug ≥ 25 tons	No towage required	
	From 140m and less than 160m without bow thruster	One tug ≥25 tons for berthing (one additional tug of ≥ 10T may be required to assist)	One tug of ≥10T may be required to assist	
	From 160m and less than 180m with bow thruster	Two tugs with not less than 70 tons combined bollard pull (one tug must ≥40 tons)	One tug ≥40 tons	
	From 160m and less than 180m without bow thruster	Two tugs with not less than 70 tons combined bollard pull (one tug must be >40 tons)	One tug not less than 40 tons (One additional tug >25t may be required to assist)	
	Over 180m	Individually risk assessed	Individually risk assessed	

Table 4: Towing requirements for ships berthing in Herdman channel

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	
Berths in Herdman Channel	Less than 100m	No towage required	No towage required	
	From 100m and less than 120m with bow thruster	No towage required	No towage required	
	From 100m and less than 120m without bow thruster	One tug ≥10 tons may be required	One tug ≥10 tons may be required	
	From 120m and less than 140m with bow thruster	One tug ≥25 tons	No towage required	Berthing <u>north</u> bow
	From 120m and less than 140m without bow thruster	One tug ≥25 tons (one tug ≥ 10 tons may also be required)	One tug ≥10 tons may be required	
	From 120m and less than 140m with bow thruster	One tug ≥25 tons	One tug ≥25 tons	Berthing <u>south</u> bow
	From 120m and less than 140m without bow thruster	One tug ≥25 tons (one additional tug ≥10 may also be required)	One tug ≥25 tons (one additional ≥ 10 tug may also be required)	
	From 140m and less than 180m with bow thruster	One tug ≥35 tons	One tug ≥25 tons	
	From 140m and less than 180m without bow thruster	Two tugs ≥ 25 tons each	Two tugs ≥25 tons each	
	Greater than 180m	Two tugs ≥70 tons combined bollard pull (one tug ≥ 40 tons)	Two tugs ≥70 tons combined bollard pull (one tug must ≥ 40t)	

Table 5: Towing requirements for ships berthing at Stormont Wharf and West Twin Wharf

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	
Stormont Wharf and West Twin Wharf	Up to 100m	No towage required	No towage required	
	From 100m and less than 120m with bow thruster	No towage required	No towage required	
	From 100m and less than 120m without bow thruster	One tug ≥10 tons may be required	One tug ≥10 tons may be required	
	From 120m and less than 140m with bow thruster	One tug ≥25 tons	No towage required	Assumes ships berthing bow north
	From 120m and less than 140m without bow thruster	One tug ≥25 tons (One additional tug of ≥ 10T may also be required)	One tug of ≥10T may be required	
	From 140m and less than 160m with bow thrusters	Two tugs ≥25 tons each	One tug ≥25tons	Assumes ships berthing bow north
	From 140m and less than 160m without bow thrusters	Two tugs ≥ 25 tons each	One tug ≥25tons (one additional tug of ≥10T may also be required)	
	From 160m and less than 180m with bow thruster	Two tugs ≥ 60 tons combined bollard pull (the smaller tug must be ≥ 25 tons)	One tug ≥25 tons	Assumes ships berthing bow north
	From 160m and less than 180m without bow thruster	Two tugs ≥ 60 tons combined bollard pull (the smaller tug must be ≥ 25 tons)	Two tugs ≥25 tons each	
	From 180m and less than 240m	Two tugs ≥ 70 tons combined bollard pull (one tug must be ≥ 40 tons) for berthing	Two tugs ≥25tons each	Assumes ships berthing bow north
	Greater than 240m	Individually risk assessed		

Table 6: Towing requirements for ships berthing at VT3

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	

VT3	Up to 140m fitted with bow thruster	No towage required	No towage required	
	From 140m and less than 180 with bow thruster	One tug ≥ 40 tons for berthing	No towage required	Assumes ships berthing bow north
	From 140m and less than 180 without bow thruster	Two tugs ≥ 70 tons combined bollard pull (one tug must be ≥ 40 tons)	Two tugs ≥ 70 tons combined bollard pull (one tug must be ≥ 40 tons)	
	From 140m and less than 180 with bow thruster	One tug ≥ 40 tons for berthing	One tug ≥ 25 tons May be required	Assumes ships berthing south
	From 140m and less than 180 without bow thruster	Two tugs ≥ 70 tons combined bollard pull (one tug must be ≥ 40 tons)	Two tugs ≥ 70 tons combined bollard pull (one tug must be ≥ 40 tons)	

Table 7: Towing requirements for ships berthing at York & Barnett Docks

Berth	Ship length overall, m	Required number and size of tug bollard pull (tons)		Comment
		Arrival	Departure	
York & Barnett Docks	Up to 75m	No towage required	No towage required	
	From 75m and less than 115m with bow thruster	No towage required	No towage required	
	From 75m and less than 115m without bow thruster	Individually risk assessed	Individually risk assessed	
	Vessels greater than 115m to be risk assessed to determine the required towing			

NOTE

- The Harbour Master will decide Towing requirements to any other berth or dock, depending on the circumstances prevailing at the time.
- It is assumed that all the vessels manoeuvring equipment is operational and effective. Where this equipment is inadequate or defective additional towing may be applied.
- The same tug requirements will apply for vessels being shifted between different channels within the Port, as per departure/arrival.
- The Harbour Master retains the right to override these Towing requirements at any time.
- Cruise vessels and Specialised Ships will be individually risk assessed.

MINIMUM TOWING REQUIREMENTS FOR SHIFTING

- Vessels which do not require towing for either arrival or departure as per BHC Minimum Towing Requirements will not normally require tug assistance for shifting.
- Any vessel requiring 1 tug of not less than 25 tonnes bollard pull as per BHC Minimum Towing Requirements will normally require 1 tug of not less than 10 tonnes when shifting distances in excess of a ship's length.
- Any vessel requiring more than 1 tug of not less than 25 tonnes bollard pull as per BHC Minimum Towing Requirements will normally require 1 tug of not less than 25 tonnes when shifting distances in excess of 50m. (With prior agreement of the Harbour Master 2 tugs each being \geq than 10t but with a combined bollard pull in excess of 25t may replace 1 tug of not less than 25t Bollard Pull)
- Linesmen are required for ships covered by points 1 and 2 when shifting more than a ship's length. Vessels covered by point 3 are required to have linesmen for shifts in excess of 50m. Ship's crew must wear appropriate PPE for this operation including a Lifejacket.

NOTE

- The Master of a vessel retains the right to ask for towing in excess of this requirement.
- These requirements are subject to the Weather conditions prevailing at the time of the shift.

TOWAGE EXEMPTION CERTIFICATES

Under certain circumstances, vessels which call regularly to the port may be exempted from the minimum requirements. Such exemptions are subject to a procedure contained within the Port's Marine Safety Management System, and if successful will result in the vessel being issued with a Towing Exemption Certificate. Certificates are valid for wind strengths below 20knots only. Possession of a Towing Exemption Certificate does not prevent the Master or Pilot of the vessel from using tug(s) should they deem necessary.

TOWAGE OPERATORS

BHC requires Towage Service Operators operating in the Port of Belfast to comply with the following minimum standards:

Crew Training:

Crew must be suitably qualified and able to demonstrate the competencies necessary to achieve the towage acts defined within these Towage Requirements. Evidence of training must be available and provided to BHC Harbour Master on request.

Tugs with a Bollard Pull of less than 25 Tons may be:

- Be equipped with twin screw propulsion or meet the requirement of a tug in excess of 25 tons;
- Provide appropriate and recent certification of bollard pull capability;
- Be equipped with a swivel hook with remote release; and
- Be inspected annually to the MCA code of Practice for The Safety of Small Work Boats and Pilot Boats for operation in Category 3 Waters and have no outstanding findings to such code other than those waived by BHC Harbour Master as unnecessary to operations within Belfast Harbour

Tugs with a Bollard Pull of 25 Tons or more will:

- Be omni-directional and demonstrate the manoeuvring capability necessary to achieve the towage acts defined within these Towage Requirements;
- Provide appropriate and recent certification of bollard pull capability;
- Be equipped with a swivel hook with remote release;
- Be equipped with a suitable winch; and
- Hold valid Certification to the UK Ship Classification or other International Standard to operate as a Tug not engaged in Long International Voyages and have no outstanding findings to such certification other than those waived by BHC Harbour Master as unnecessary to operations within Belfast Harbour.

PORT CENTRE

CAPTAIN K. G. ALLEN

BELFAST

HARBOUR MASTER

1st January 2012

Annex C Ship Towage & Master/Crew Licence Application Forms

PART A: SHIP TOWAGE APPLICATION & LICENCE

POLICY

Whilst the issue of this license, by Belfast Harbour Commissioners, is not mandatory, vessels engaged in towage within Belfast Harbour are strongly recommended to apply for this licence.

Any vessel intending to engage in Ship Towage operations within Belfast harbour shall be in possession of:

A current Certificate of Registry.....

A valid Load Line Certificate or Certificate of Class.....

A valid Safety Equipment Certificate or Record of Inspection.....

A valid Statutory Certificate of Coding for a vessel under 24m.....

TUG DETAILS

Name of tug	
Year of build	
Tug Classification	
Vessel Number	
Owner Details	
LOA:	Beam:
Maximum Draught	Tonnage:

BOLLARD PULL (Maximum continuous bollard pull over 10 min period)

Date of Certificate:	
Max Cont. Pull Ahead:	
Max Cont. Pull Astern:	
Copies of Certificates Attached	Yes No

TOW-LINES	Use	Type	Diameter- Length-MBL	Date Commissioned	No. of Tows
Winch No 1					
Main Line					
1st Pennant					
2nd Pennant					
Winch No 2					
Main Line					
1st Pennant					
2nd Pennant					
Winch No 3					
Main Line					
1st Pennant					
2nd Pennant					
TOWING SYSTEM - Type Hook/Bitts/ Gob Line condition					
TOWING HOOKS - Type and condition					
WINCHES - Type and Condition (Single, Split or Twin)					
GOB EYES/ROPES					
Closest First Aid Point to Towing Equipment:					

Location of Secondary Emergency Towing Release:

QUICKRELEASE SYSTEMS: Suitability of Bridge System Control to Master for Release:

	Local	Remote	Secondary
Winch No 1			
Loaded Condition			
Winch No 2			
Loaded Condition			
Winch No 3			
Loaded Condition			

Comments:

The above vessel has been inspected and deemed to meet the requirements for the issue of a Ship Towing Licence

The above vessel has been inspected and *failed* to meet the full requirements for the issue of a Ship Towing Licence.

BHC Inspection Officer:

Date:

PART B: MASTER & CREW TOWAGE LICENCE CERTIFICATION

Vessel:	Owner:
Name of crew members:	
Master:	Mate:
Engineer:	Seaman:
Master and crew experience and in-house training.	
Master and crew certification.	
Master's knowledge of relevant directions, bye laws, contingency plans and guidelines (if any).	
Master's knowledge of generic or own passage plans.	
Master's knowledge of tug stability, girting and vessel interaction.	
Master's knowledge of Company SMS.	
Master's awareness of watertight integrity issues when towing.	
Ability of the tug and crew to respond to emergency situations.	
Crew's general safety culture, tool box talks, pre-operational briefings.	
PPE standards and knowledge of required use.	
Charts relevant and in date.	
Communication equipment checks.	
Condition and maintenance standards of the tug/workboat.	
Towing winch emergency release mechanisms proven.	
Frequency of checks on emergency release mechanisms.	
Level of liability cover.	
The crew of the above vessel have been inspected and deemed to meet the requirements for the issue of a Master/Crew Towage Licence.	
The crew of the above vessel have been inspected and <i>failed</i> to meet the full requirements for the issue of a Master/Crew Ship Towage Licence.	
BHC Inspection Officer:.....Date:.....	

Annex D Belfast Drydock Towage Guidelines

GUIDANCE ON TOWAGE APPLICABLE TO VESSELS ENTERING/LEAVING BELFAST DRYDOCK.

LOA	No. of Tugs		Comments	Weather
	BEAM <35m	BEAM >35m		
≤180m as per Belfast Harbour Minimum Towing Requirements				
180-220m	2 Tugs >70t Bollard Pull One of which must be >40t			
180-220m		2 Tugs >70t Bollard Pull One of which must be >40t. An Additional Tug of ≥20t will also be required.	Mules to be used	Wind speeds Should be ≤15 knots
220-270m	2 Tugs > 70t Bollard Pull One of which must be > 40t. An Additional Tug of ≥20t will also be required.			
220-270m		2 Tugs >70t Bollard Pull One of which must be >40t. An Additional Tug of ≥20 tons will also be required.	Mules to be used	Wind speeds Should be ≤10 knots
>270m	3 Tugs >100t Bollard pull. One of which must be >40t.	3 Tugs >100t Bollard pull. One of which must be >40t.	Mules to be used	

The Harbour Master may change these requirements as he considers appropriate.

All vessels must be fully operational and at a draft which allows the proper and effective use of manoeuvring equipment, including bow thrusters.

Dead-ship movements and special projects will be individually risk assessed.

All tugs ≥25tons must be Omni-directional.

Annex E MAIB Recommendations for Port and Towage Operators

MARINE ACCIDENT INVESTIGATION BRANCH RECOMMENDATIONS

Summarised below are conclusions made by the MAIB to port authorities and towing operators (Dutch Safety Board in the case of the *Fairplay 22*) following incidents with the tug's concerned.

1. TUG DOMINGUE – 20TH SEPTEMBER 2016

The tug Domingue girted and capsized while assisting the container ship CMA CGM Simba departing from the port of Tulear, Madagascar. As a result of the accident two of Domingue's five crew died.

Domingue had been connected to CMA CGM Simba's port quarter to help pull the vessel's stern off the berth. During the manoeuvre, the prevailing tidal conditions caused CMA CGM Simba to move towards a mooring dolphin. To avoid striking the dolphin, CMA CGM Simba's master briefly manoeuvred his vessel ahead, the pilot did not warn the tug that they would be coming ahead. As CMA CGM Simba built up ahead speed Domingue girted and capsized.

Safety Issues

Domingue was less manoeuvrable than the port's normal tug which was undergoing maintenance, and its crew were inexperienced in assisting ships.

The tug was not fitted with a gog rope, nor did the towing point have any mechanism to release the tow in an emergency and doors and hatches on the tug were open.

The extent to which a plan for CMA CGM Simba's departure had been discussed between the pilot and Domingue's skipper before commencement is uncertain, and during the manoeuvre no-one on board CMA CGM Simba monitored the tug's position.

2 ASTERIX – FAWLEY, SOUTHAMPTON 30 MARCH 2015

2 x injuries

Girting, capsize & foundering.

Conclusions.

Although girting was recognised as a hazard, the tug operators risk assessment's control measure was simply to use a gog rope on every tow.

Coxswain was not sufficiently trained or experienced to use the gog rope to best effect, or to make an early assessment that an extremely hazardous situation was developing.

Asterix's gog rope was set at an intermediate length that was neither short enough to move the towing point sufficiently aft to prevent girting nor long enough to facilitate maximum manoeuvrability.

With the gog rope secured to the H-shaped bit, it was not possible for the crew to rapidly and safely adjust the towing point when the towline was under tension.

With additional controls in place, such as effective proactive communications between the pilot and *Asterix's* coxswain at defined stages of the operation, the risk of girting could have been reduced.

mv Donizetti's pilot relied on tug masters and launch coxswains to act autonomously and to inform him when in doubt or difficulty.

Asterix's coxswain and deckhand showed a low perception of risk, which delayed their response to the developing situation.

Asterix's coxswain did not anticipate the potential danger of girting and the need to communicate his concerns to the pilot at an earlier stage.

The company's launch crew training programme for coxswains did not recognise the level of skill and experience required to prevent girting.

There is a current lack of formal published guidance for the operators of small vessels engaged in towing operations, including specific actions required to prevent girting.

A lack of joint training and interaction between pilots and mooring launch coxswains in Southampton is likely to have had a negative impact on operational liaison.

The effort required to operate *Asterix's* towing hook emergency manual release mechanism increased in proportion to the loading on the hook.

Asterix's coxswain's RYA/MCA Yachtmaster certificate of competence, if commercially endorsed, would have allowed him to operate without any form of towage endorsement or completion of the company's training programme contrary to the guidance contained within the PMSC Guide to Good Practice.

As *Asterix* began to roll following its capsize, water from the wheelhouse was able to enter the accommodation through the open hatchway.

3. CHIEFTAIN - RIVER THAMES 12TH AUGUST 2011

Collision, capsize & foundering

1 x fatality.

Conclusions

Late & inappropriate action taken to avoid buoyed area and *Chieftain's* lack of reserve power contributed to the collision.

Risk assessment of short tow lines, the inability to lengthen the tow and appropriateness of emergency stop trials to determine a safe tow not fully recognised.

Lack of formal risk assessments of vessel operations □ Lack of watertight integrity discipline – doors & hatches left open led to down-flooding.

Functionality of *Chieftain's* towing hook release system in doubt – no evidence of planned maintenance.

Chieftain's Mate did not always wear lifejacket on deck.

Dangers of overrun due to variation in speeds between the tow and tug not properly recognised or considered.

Lack of experience of all with push/pull configuration not recognised during planning/risk assessment of operation

Method statement not provided, nor was need for it considered.

Loss of situational awareness in terms of positioning, monitoring & effect of tidal stream.

4. FAIRPLAY 22 - (DUTCH SAFETY BOARD) – NEAR HOOK OF HOLLAND 11TH NOVEMBER 2010.

2x fatalities, 1 x injury

Collision & capsize.

Fairplay 22 capsized during securing at the bow of ferry in high winds and at high speed.

Conclusions

Capsize followed a heeling moment caused by collision, which heeled tug over to 35 degrees. Water was able to flood into engine room through vents and a watertight door which was left open. The tug was unable to right itself and capsized.

Hydrodynamic forces around bow caused tug to lose position, colliding with bulbous bow and ending up broadside to bow. These forces increase with speed and proximity of tug to the other vessel.

Risk assessment associated with sailing close to the bow of a seagoing vessel to take measures to minimise risk. Particular attention to be paid to speed through the water.

Monitor operational procedures including speed maintained during tug assistance and the closing of watertight & weathertight operations.

5. LLANDDWYN ISLAND – 1 MARCH 2010

On 1 March 2010, a deckhand on board the workboat “Llanddwyn Island” was struck by a towing hawser after it had parted during a towing operation.

The MAIB investigation found that the use of commercially endorsed RYA certificates alone, as acceptable qualifications for the operation of workboats, was highly questionable. The report went on to note that the

introduction of voluntary towing endorsements would have a positive impact on the safety of towing operations if workboat owners and authorities commissioning workboat services insist that skippers hold the relevant towing endorsements for the work undertaken.

6 IJSSELSTROOM - PETERHEAD 14TH JUNE 2009

No casualties.

Girting & capsize.

Conclusions

Lack of a bridle (or gob rope) – once pull of tow and direction of thrust became misaligned, there was nothing to prevent towline leading onto the beam.

Speed of tow – as tug was towed stern first using engines ahead to manoeuvre, became less effective as the speed of the tow picked up.

Angle of deck edge immersion 7.6° – would have further increased angle of heel.

Tug would only have needed to be heeled over for 10 seconds for sufficient water to enter engine room to create 46.4° angle of list – allowing further flooding to continue.

Lack of instruction or guidance regarding towing in “winch” or “freewheel” mode”.

Lack of familiarity and testing of emergency brake release.

Lack of risk assessment or briefing (pilots, tug skippers, port).

Conning position and bridge ergonomics.

Underestimated severity of result of girting.

7. FLYING PHANTOM - RIVER CLYDE 19TH DECEMBER 2007

3 x fatalities & 1 x injury.

The “*Flying Phantom*” was girted and sank in dense fog while working as bow tug, with tragic loss of life.

Conclusions

Tow-line emergency release did not act quickly enough.

Limits for towing in restricted visibility.

No formal pre-towage checks – resulted in engine room door being left open.

Bridge ergonomics & crew experience in restricted visibility in confined waters.

Procedures & risk assessments not robust.

Lessons from an accident at one port are not always being learnt at another.

8 TRIJNIE – 8 SEPTEMBER 1998

On 8 September 1998, the workboat Trijnie was acting as a stern tug to the 7686grt tanker Tillerman for a manoeuvre to the entrance lock for Milford Docks. As Trijnie attempted a peel-off turn, from where it was running ahead on the tanker's starboard quarter to its port quarter, the towline became tight across the tug's port beam, heeling it over to port and allowing water over the after deck. Despite his best efforts, the coxswain could not break out of the girting, and Trijnie capsized and sank with the loss of its deckhand, whose body was later recovered from the wheelhouse.

The MAIB investigation found that Trijnie did:

- Not have a gog rope rigged;
- The emergency towing hook release wire was not connected;
- The operations manager who assigned Trijnie did not know what towing mode it would use; and
- Tillerman's pilot could not see the tug from the bridge, assuming that it had been running with the ship stern-to-stern, from which position it would have been relatively easy for the tug to position itself on the ship's port quarter.

Furthermore, the pilot did not know that this was the first time that the tug coxswain had undertaken such an operation. Had Trijnie's engine room hatch cover been properly secured, it is probable that the tug would have remained afloat longer than it did.

Annex F A Guide to Good Practice on Port Marine Operations (Section 10 Towage)

The following section is extracted from “A Guide to Good Practice on Port Marine Operations” Section 10 “Towage operations”:

10.1: Introduction

This section provides guidance on the following:

- Risk Assessment & Towage Guidelines;
- Towage Types:
 - Ship Assist Towage;
 - Dead Tows & Project Towage; and
 - General Towage
- Tugs/Workboats & Operator’s Approval; and
- Training & Certification.

10.1.1 Procedures for towage in ports, harbours and at terminals need to be developed, managed and regularly reviewed by harbour authorities, tug operators, pilots and ship owners, to ensure a safe and efficient service. Procedures should include responses to emergencies. Good communication and team work between all parties is essential.

10.1.2 This section provides guidance on establishing good practice for the safe operation of towage services within port, harbour and terminal limits.

10.2 Risk Assessment & Towage Guidelines

10.2.1 Berthing and un-berthing operations using tugs should be risk assessed by harbour authorities. Based on that risk assessment the harbour authority, in consultation with other stakeholders, should develop specific towage guidelines which should be incorporated into their Safety Management Systems.

10.2.2 For routine ship assist towage it is recommended that the guidelines include the minimum bollard pull and/or number of tugs for a ship of a particular size for each berth location. Guidelines should take account of assisted ship length, draft, manoeuvrability and anticipated SWL of bollards. Guidelines will have to be modified on the day depending on environmental conditions, any defects with the assisted ship and the capability of the tugs available.

10.2.3 When considering towage activities, it is appropriate for organisations to specify certain limitations. As a minimum, it is recommended that the following be included in the towage guidelines:

- minimum acceptable visibility;
- maximum swell conditions; and
- maximum speed through the water for making fast tugs.

10.2.4 Guidelines on when to abort or cancel an intended towage operation, due to restricted visibility or the potential for restricted visibility, will depend on factors including manoeuvring room, duration of the tow,

minimum speeds, abort contingency plans and the towage method employed. Organisations and towage operators should set limits for towage in restricted visibility and stipulate any special measures, necessary at other agreed levels of visibility, such as push/pull versus centre-lead towing, especially for the forward tug.

10.2.5 Swell conditions will not affect all facilities but, where they do, the ability of tugs to make fast safely, remain fast once connected without snatching or parting the towlines and being able to maintain position are critical considerations. The tug master must have the final decision on whether to make fast the tow.

10.2.6 It is essential that the pilot/ship master agrees with the tug master, as part of the pre-operation interchange, what the ship's speed through the water will be when the tug is made fast and thereafter. Excessive speed will cause dangerous interaction between the ship and tug and could be fatal for the tug.

10.2.7 The Pilots' Pocket Guide and Checklist¹ gives additional specific guidance on:

- Pilot-tug master exchange;
- best practise Do's and Don'ts for harbour towage;
- additional guidance on restricted visibility;
- guidance for assisted vessel crews;
- assisted vessel speeds;
- tug types;
- heaving lines;
- towing points and girting;
- interaction;
- escort towage;
- connecting and letting go;
- risk and hazards to consider; and
- pilot and tug master meeting discussion points.

10.2.8 Guidelines should be used to ensure that tug crews are appropriately trained and qualified (see Section 10.5). They should also include the need for tug crews to train with pilots. In particular, pilots and tug masters should conduct regular liaison meetings, safety workshops, visits including pilots tripping on tugs and tug masters accompanying pilots and all parties attending simulator training and refreshers together. Trips should cover as varied a selection of towage activities as possible including escorting (where applicable). It is recommended that, at minimum, liaison meetings between facility representatives, pilot associations and towage operators take place every quarter.

10.2.9 Open reporting of incidents and candid exchanges are essential to gain maximum benefit from any lessons learned. The Pilots' Pocket Guide and Checklist includes bullet points for items to be discussed at liaison meetings including identification of good practice and improvements. Any accidents and near misses

should be thoroughly reviewed and relevant MAIB reports discussed with changes to guidelines being made if necessary.

10.3 Towing Types

10.3.1 There are several different types of towing operation each of which brings its own challenges and risks. These can be summarised as:

Ship Assist Towing or assisting vessels under way, typically during entering or leaving and/or shifting berth within a harbour;

Dead Tows or assisting vessels without propulsion including, but not limited to, barges, pontoons, dredgers, rigs which typically involves vessels entering and leaving harbour being towed by a sea-going tug or other vessel;

General Towing including towing of smaller barges, pontoons, rigs normally within harbour limits and marine construction equipment; and

Project Towing including unusual events which require special consideration.

10.3.2 Towing can be undertaken utilising several different methods and in many differing configurations including over the bow, over the stern, pushing, pulling, using long or short towlines, fixed or adjustable lengths, with or without towing bridles, lashed alongside (“hipped up”) and using single or multiple tugs.

10.3.3 The choice of method will depend on the type/size of the assisted vessel and type/size/capability of the tug or workboat. The tug master and crew must be suitably qualified and experienced and are competent to not only to conduct the manoeuvre but also advise if the plan and/or its execution is unsafe.

Ship Assist Towing

10.3.4 Larger facilities are likely to have resident commercial towing operators with smaller operations having their own arrangements or mobilising tugs from elsewhere on an ad hoc basis.

10.3.5 Ship assist towing can be an extremely hazardous activity and good team work is essential.

10.3.6 Operators of hydrocarbon marine terminals are active in creating their own guidelines in association with relevant Harbour Authorities. These may include escorting passively (tug running free with the vessel) and/or actively (tug made fast normally centre-lead aft) and the escorting criteria should be included in the guidelines and pilot/tug master training/liaison.

10.3.7 When a vessel piloted under a Pilotage Exemption Certificate (PEC) requires a tug, it is recommended that a Pilot be engaged.

Dead Tows & Project Towing

10.3.8 Dead tows, unusual objects and non-routine towing events will require individual assessment, including risk assessment, and planning.

10.3.9 For arrivals/departures from/to sea, dead tows should be pre-approved by the facility utilising a towing plan format which includes risk assessment and method statements regarding:

- harbour tug positioning and utilisation;
- whether the tow is to be transferred from the sea tug: transferring tows creates additional hazards, particularly handling heavy equipment, and whether the sea tug remains fast until the tow is alongside will depend on berth characteristics, locks etc., the characteristics of the sea tug and the availability of suitable harbour tugs;
- riggers/line handlers being transferred to the tow to recover sea gear, emergency tow lines and to prepare the tow for berthing;
- weather limitations and sea state;
- suitability of destination berth and whether adjacent berths need to be cleared; and
- the number of suitably experienced pilots required for the sea tug and/or tow.

10.3.10 For in-harbour non-routine tows, key decisions should be recorded and the person (acting as towing or barge master) who is responsible for the safety of the manoeuvre and the towage plan, should be clearly identified. This person is responsible for:

- conducting an appropriate risk assessment/safety case to be submitted to the harbour authority;
- producing a method statement;
- the passage plan; and
- the safety of the manoeuvre.

10.3.11 The facility should give written approval for the tow to go ahead once the towage plan has been reviewed and agreed.

10.3.12 In exceptional circumstances, and for major projects, the use of simulated trials should be considered.

10.3.13 Pilots training should include towage events of non-routine towage including dead tows utilising a variety of tug types.

General Towage

10.3.14 Some ports and harbours will have multiple towage activities being conducted by small tugs and workboats that are routine, repetitive and may be conducted with standard plans.

10.3.15 Although guidelines cannot prescribe definitive procedures for all possible towage activities, since each operation will present individual and sometimes unique challenges, facilities are recommended to issue general directions to ensure safe practise.

10.3.16 It is not recommended to utilise a tug, workboat or other craft that is not designed or equipped for a particular towage event. For example, a fishing vessel conducting a rescue of another fishing vessel may need to release the tow to a suitable harbour tug or workboat before entering restricted waters. Tugs or workboats attending to a dredging project should not be engaged to berth a ship purely because it is near at

hand except in certain emergency situations and only then when operated by an experienced ship-handling master since this practice has resulted in tragedy in the past.

10.4 Tugs/Workboats & Operator's Approval

10.4.1 It is recommended that facilities develop their own criteria to approve tugs, workboats and operators. Such criteria may include inspections of the vessels themselves and may, where the legal process exists, include a licensing regime.

10.4.2 When assessing a tug or workboat and its crews' suitability to operate the following issues, focussed on Ship Assist Towing, should be considered:

- Master and crew experience and in-house training;
- Master and crew certification;
- Master's knowledge of relevant directions, bye laws, contingency plans and guidelines (if any);
- Master's knowledge of generic or own passage plans;
- Master's knowledge of tug stability, girting and vessel interaction;
- Master's knowledge of facilities' SMS;
- Master's awareness of watertight integrity issues when towing;
- Capability of the tug;
- Ability of the tug and crew to respond to emergency situations
- Crew's general safety culture, tool box talks, pre-operational briefings;
- PPE standards and knowledge of required use;
- charts relevant and in date;
- communication equipment checks;
- condition and maintenance standards of the tug/workboat;
- towing winch emergency release mechanisms proven;
- frequency of checks on emergency release mechanisms; and
- level of liability cover.

10.5 Training & Certification

10.5.1 Where tugs and workboats are working with pilots and/or other craft in the performance of towing, team work, tool box talks, briefings and clear communications are essential. Team training on location, in simulators and at safety workshops should be prescribed by facilities. Operational information exchange between pilots and tug masters is highly commended.

10.5.2 The MCA does not determine qualifications for personnel operating tugs within ports and harbours but does support and approve training schemes for towing which form the basis for standards available to facilities. These are:

Boat Masters Licence (BML) with a Towing Endorsement (BML TE): the minimum requirement for holders of Boat Masters or RYA Certificates in order to conduct any towing operation in harbour or at sea in workboat coded vessel. The certificate holder sits an MCA oral examination locally.

Voluntary Towing Endorsement (VTE): a BTA and NWA jointly supported scheme which includes a detailed towing-specific syllabus recognised by the MCA covering recorded training, assessment and independent examination. Holders do not need to undertake the BML TE.

STCW Tug Mate/Master: a BTA-sponsored, MCA-recognised, training scheme which includes the VTE syllabus, (transferable) MSQs, Training Record Books, independent examination, and significant service in tugs prior to an MCA oral examination. This scheme, and its small vessel engineer equivalent, are those that are considered “best practice” for mainstream towing operators of tugs more than 24m registered length, 150 GT or 350 kW.

10.5.3 Organisations should satisfy themselves that towing operators have suitable in-house training and assessment schemes for their tug masters which address tug types and local conditions, skills and experience. Persons holding unlimited STCW certificates entering the towing industry should be subject to a bespoke in-house training scheme – relevant parts of the VTE syllabus could be utilised as a basis for such schemes.

10.5.4 More detail on training can be found in Section 12 (of GtGP).