



INTERNATIONAL
MARITIME
ORGANIZATION



Food and Agriculture
Organization of the
United Nations



GloLitter
partnerships

Guidance Document on Developing Port Waste Management Plans



Guidance Document on Developing Port Waste Management Plans

By
Peter Van den dries
IMO Consultant
Brussels, Belgium

Published by
the International Maritime Organization
and
Peer Reviewed by
the Food and Agriculture Organization of the United Nations

Published in 2022 by the
GLOLITTER PROJECT COORDINATION UNIT
INTERNATIONAL MARITIME ORGANIZATION
4 Albert Embankment, London SE1 7SR, United Kingdom
www.imo.org

© Copyright 2022 International Maritime Organization (IMO)

Cover Photo © *Peter Van den dries*

Proofread by *Sally Sargeant*

Typeset by *Eyetooth Design*

Cover Design by *Big Sky*

Required citation: GloLitter Knowledge Product:
Guidance Document on Developing Port Waste Management Plans

Disclaimer: The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the International Maritime Organization (IMO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by IMO in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of IMO.

Copyright notice: All rights reserved. Permission to print or save the document or excerpts is only granted for private, non-commercial use, and without any right to resell or redistribute them or to compile or create derivative works therefrom. Any copyrights within the document remain with the original rights holder: IMO. Enquiries should be directed to the address above.

Preparation of the Guidance Document on Developing Port Waste Management Plans

This Guidance Document under the GloLitter Knowledge Product series, entitled *Guidance Document on Developing Port Waste Management Plans*, was funded by the GloLitter Partnerships Project.

GloLitter is implemented by the International Maritime Organization (IMO) in collaboration with the Food and Agriculture Organization (FAO); initial funding was provided by the Government of Norway via the Norwegian Agency for Development Cooperation (Norad).

This report is one of the knowledge products contributing to GloLitter Outcome 1:
Global awareness of Sea Based Marine Plastic Litter (SBMPL) expanded.

This report is based on work conducted by Mr Peter Van den dries, under the technical supervision and coordination of the GloLitter Project Coordination Unit.

Contents

	<i>Page</i>
Abstract	vii
Abbreviations and acronyms	ix
1 Introduction	xi
1.1 GloLitter Partnerships Project	xi
1.2 Scope of this activity	xi
2 Purpose of a Port Waste Management Plan	1
2.1 Waste management planning in general	1
2.2 Port Waste Management Planning	3
2.3 Purpose of a Port Waste Management Plan	4
2.4 Evaluation, approval and monitoring	4
3 Port Waste Management Plans: legal and policy framework	5
3.1 Introduction	5
3.2 International regulatory framework regarding the management of waste from ships: the MARPOL Convention	5
3.3 International regulatory framework on the environmentally sound management of hazardous and other wastes: the Basel Convention	9
3.4 Other regulatory instruments relevant for Port Waste Management Planning	11
3.5 Ensuring the adequacy of port reception facilities	14
4 Management of plastic waste from ships	19
4.1 Types of waste generated onboard ships	19
4.2 Amounts of waste generated onboard ships	20
4.3 Waste from ships as a source of marine litter	21
4.4 Management of plastic waste	23
5 Elements of a Port Waste Management Plan	29
5.1 Developing Port Waste Management Plans: an introduction	29
5.2 Who is to draft the PWMP	30
5.3 Essential elements for a “basic” PWMP	31
5.4 Optional elements for a PWMP	40
5.5 Flanking policy measures	42
5.6 Approval and review of the PWMP	46

		<i>Page</i>
6	Models of Port Waste Management Plans	47
6.1	Ports’ characteristics impacting the delivery of waste from ships	47
6.2	Merchant seaports, cruise/passenger ports	48
6.3	Fishing ports	54
6.4	Recreational ports	56
7	Useful references	59
	Marine litter (general)	59
	Legal and policy framework	60
	Waste from ships	61
	Fishing as a source of marine litter	61
	Circular economy	63
8	Annexes	65
	Annex 1 – Model of Port Waste Management Plan for merchant seaports and cruise/passenger ports	67
	Annex 2 – Model of Port Waste Management Plan for fishing ports	75
	Annex 3 – Model of Port Waste Management Plan for recreational ports	80
	Annex 4 – Pre-assessment questionnaire for merchant seaports	85
	Annex 5 – Pre-assessment questionnaire for fishing ports	94

Figures

	<i>Page</i>
Figure 1: Waste hierarchy	2
Figure 2: ALDFG at sea	22
Figure 3: Big bag used for the onboard collection of passively fished waste in United Kingdom	27
Figure 4: Big bag used for the onboard collection of passively fished waste in the Netherlands.	27
Figure 5: Examples of different options for the geographical scope of the PWMP	33
Figure 6: Composition of MARPOL Annex V waste collected in 2019 in the port of Antwerp . . .	45
Figure 7: Port Sudan (Sudan)	49
Figure 8: Collecting barge in port of Rotterdam (NL).	51
Figure 9: Sewage collection in port of Trelleborg, Sweden	52
Figure 10: Receptacles for garbage in port of Favignana, Italy.	55
Figure 11: Marina di Ragusa, Italy	56
Figure 12: Receptacles for garbage in Marina di Ragusa, Italy.	57

Tables

	<i>Page</i>
Table 1: Overview of MARPOL Annexes	5
Table 2: Common waste types generated onboard ships (source: CE Delft, 2017)	19
Table 3: Amount of MARPOL Annex V waste generated onboard a ship	20
Table 4: MARPOL Annex V onboard waste generation estimates (1000 tonnes) for vessels in European waters for 2013 by subcategory and ship segment	20
Table 5: Ship waste generated and delivered annually, and the resulting “waste gap”. Content sourced from 2018 Impact Assessment accompanying the proposal for an EU Directive on port reception facilities for the delivery of waste from ships; MARWAS (Annex I-IV waste); Annex V waste estimates are based on Sherrington et al. (2016)..	23
Table 6: Types, quantity, drivers and options for management of ship-generated waste	36

Abstract

Marine plastic litter has been generally recognized as a threat to ocean health. Although it is generally assumed that the majority of plastic waste entering the world's ocean comes from land-based sources, marine plastic litter also results from sea-based activities such as fishing and shipping. Therefore Parties to MARPOL are required as port States to ensure the provision of port reception facilities (PRF) that are adequate to meet the needs of users, from large merchant ships to small recreational vessels, and without causing undue delay to the ships using them.

Ports and terminals may also have to meet national, regional and/or local regulations regarding waste management and/or waste treatment, including as part of a national, regional or local waste strategy aiming towards a more resource efficient and circular economy.

It is generally acknowledged that the adequacy of PRFs can be improved by establishing up-to-date Port Waste Management Plans (PWMPs), especially when they are developed in consultation with the relevant stakeholders. The main purpose of a PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port. In a more comprehensive form a PWMP can also be compelled as a guidance document for port users and other stakeholders, that brings together all the relevant elements, procedures, goals and responsibilities linked to the delivery, collection, treatment, monitoring and enforcement of waste from ships, including cargo residues. The PWMP can also implement requirements and goals of the national waste management strategy, translating the goals regarding the environmental sound management of waste, including the transition towards a more circular economy, into the practical processes and procedures applied within the port area.

This Guidance Document describes the key and optional elements that are to be included in a PWMP, and how they are to be developed taking into account the port's characteristics. This Guidance Document also includes models that can be used as a basis for a PWMP in merchant and cruise/passenger ports, fishing ports and recreational ports.

Abbreviations and acronyms

ALDFG	Abandoned, Lost, or otherwise Discarded Fishing Gear
ANF	Advance Notification Form
CR	Cargo residues
ECA	Emission Control Areas
EMSA	European Maritime Safety Agency
EPS	Extended polystyrene
ESM	Environmentally sound management
EU	European Union
FAO	Food and Agriculture Organization
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
GGGI	Global Ghost Gear Initiative
GIA	Global Industry Alliance
GISIS	Global Integrated Shipping Information System
GloLitter	GloLitter Partnerships
GT	Gross Tonnage
HME	Harmful to the Marine Environment
IMO	International Maritime Organization
ISO	International Organization for Standardization
KIMO	Kommunernes International Miljøorganisation (Local Authorities International Environmental Organisation)
LDC	Least Developed Countries
LPC	Lead Partnering Country
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee
MPL	Marine plastic litter
NGO	Non-governmental organization
NLS	Noxious Liquid Substance
ODS	Ozone Depleting Substances
OVAM	Flemish Waste Agency (Belgium)
OWS	Oil Water Separator
PAME	Protection of the Arctic Marine Environment

PE	Polyethylene
PET	Polyethylene terephthalate
PP	Polypropylene
PRF	Port reception facilities
PRFD	Port Reception Facility Database
PVC	Polyvinyl chloride
PWMP	Port Waste Management Plan
RAP	Regional Action Plan
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea
RRFP	Regional Reception Facilities Plan
SBMPL	Sea-based marine plastic litter
SIDS	Small Islands Developing States
SOLAS	International Convention on the Safety of Life at Sea
VGMFG	Voluntary Guidelines on the Marking of Fishing Gear
VLCC	Very Large Crude Carriers
WDR	Waste Delivery Receipt
WRHP	Waste Reception and Handling Plans

1 Introduction

1.1 GloLitter Partnerships Project

The GloLitter Partnerships Project (GloLitter) is funded by an initial contribution from the Government of Norway and implemented by the International Maritime Organization (IMO) in partnership with the Food and Agricultural Organization (FAO) and aims to reduce and prevent marine plastic litter originating from the shipping and fisheries sectors. This global project supports thirty developing countries in five regions in identifying opportunities for the prevention and reduction of marine litter.

GloLitter achieves its objectives by focusing on a number of areas identified in the IMO Action Plan to Address Marine Plastic Litter from Ships, and the FAO Voluntary Guidelines on the Marking of Fishing Gear. The project expands government and port management capacities, instigates legal, policy and institutional reforms at the country level. It develops mechanisms for sustainability, and enhances regional cooperation to support transition of maritime transport and fisheries sectors towards a low plastics future.

This project spurs global efforts to demonstrate and test best practices to deal with MPL, and enhances global knowledge management and information sharing to support the objectives. The partnership is three-tiered involving global, regional and country level partners; representing government, industry and non-governmental organizations.

1.2 Scope of this activity

The overall goal of the GloLitter Partnership is to enable developing countries to effectively implement and enforce international regulatory frameworks as well as best practice for prevention, reduction and control of MPL, and in particular Sea Based Marine Plastic Litter (SBMPL) through capacity building, policy making, action planning, practical steps in reducing dumping of fishing gears and legislative developments; all aiming at supporting the international efforts in dealing with MPL.

The development of this Guidance Document fits within the framework of GloLitter Outcome 1: Global awareness of Sea Based Marine Plastic Litter (SBMPL) expanded that includes the activity aimed at developing a model “Port Waste Management Plan” with guidance that subsequently will be used by participating ports to use and customize to their specific ports’ requirements.

This Guidance Document provides an overview of the key elements of Port Waste Management Plans, references to issues and situations that may have an impact on the delivery of waste from ships, and tools for the development of a Port Waste Management Plan. It also provides models of a Port Waste Management Plan that can be used for merchant seaports, passenger/cruise ports, fishing ports and recreational ports.

2 Purpose of a Port Waste Management Plan

2.1 Waste management planning in general

The development and implementation of waste management plans is an approach that is, for quite some time now, commonly used for land-based operations in order to take stock of the existing situation, define objectives, define appropriate strategies and identify the necessary implementation measures. Establishing a waste management plan can be done on a national, regional or local level, and waste management planning has become a key element of public planning efforts in many countries.

Waste management plans play a key role in achieving a sustainable waste management. Their main purpose is to give an overview of all waste generated (including imported, and by specific waste streams) and treatment options for this waste. In a broad sense, these plans can provide a framework for:

- *Compliance with waste policy and target achievement*

Waste management plans, national as well as local/regional, are important instruments contributing to the implementation and achievement of policies and targets set out in the field of waste management at national, regional and international level. In the case of several planning levels or parallel planning, waste management plans should be developed in a coordinated way. In this case it is a good practice to have regional plans approved by the central government.

- *Stocktaking of waste and capacity for managing it*

Waste management plans provide an outline for the management of waste streams from different sources and quantities. Furthermore, they contribute to ensuring that the capacity and the nature of collection, segregation and treatment systems, including recycling, other recovery and disposal methods as well as waste exports and imports, match the type and quantity of the waste to be managed. A waste management plan should cover all relevant waste streams, their generation, treatment and shipment. The status of the existing waste management system should be described in detail.

- *Outline of needs and future developments*

Waste management plans should contain forecasts of future waste streams and the import and export of waste as well as the associated needs for new collection schemes, recovery and disposal installations. This includes capacity planning for recovery and disposal installations and sufficient information on location criteria for treatment plants. In order to estimate the future relevance of a waste stream, the evolution of its quantity should be assessed. Planning of collection systems and waste treatment capacity should be based on comprehensive estimation of future needs. The waste management plan should also contain a concrete list of sites suitable for waste treatment installations.

- *Information on general waste management policies and technological measures*

Plans must describe waste management policies that aim to comply with the waste hierarchy and to achieve continuous improvement in waste management. This may include any special arrangements for specific types of waste (waste oils, hazardous waste or waste streams addressed by specific national/international legislation).

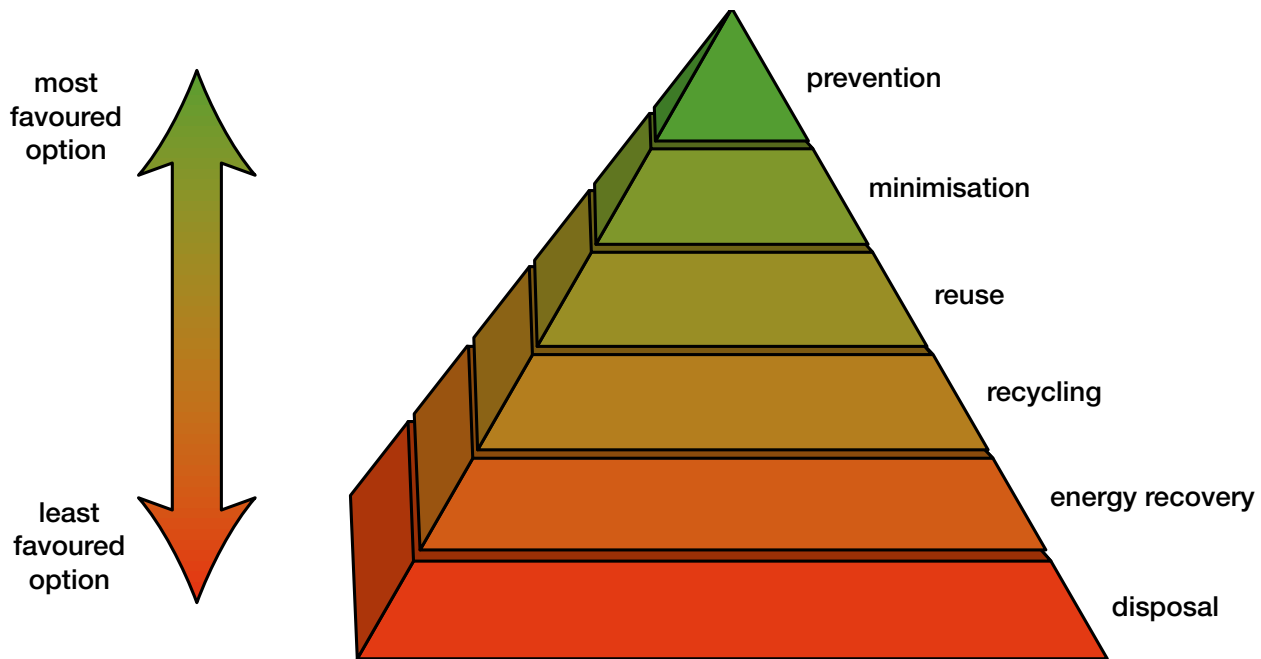


Figure 1: *Waste hierarchy (source: Wikipedia)*

In addition, waste management plans can discuss and arrange the following aspects:

- *Outline of waste management organizations*
Organizational waste management aspects, including allocation of responsibility between public and private actors.
- *Evaluation of waste policies*
Evaluation of specific waste policy instruments, with a strong focus on economic instruments.
- *Awareness campaigns/provision of information*
Use of awareness campaigns and provision of information directed at the general public or at a specific group of consumers.
- *Outline of economic and investment requirements*
Waste management plans can provide a statement of financial requirements for the operation of collection schemes, treatment of waste, etc. On this basis, the needs for future investments in waste treatment plans may be determined.
- *Waste prevention programmes*
Waste prevention programmes can be integrated into waste management plans or other environmental policy programmes, or can be established as standalone programmes. Waste prevention programmes need to describe as a minimum the waste prevention objectives and existing prevention measures, indicating to what extent these objectives and measures are aimed at the decoupling of economic growth from the environmental impacts of waste generation, and specifying benchmarks for adopted waste prevention measures.

Efficient waste management commonly requires the participation and cooperation of several involved parties/ authorities, and coherent planning helps to avoid unnecessary duplication of effort and thus benefits all participants in their work together.

2.2 Port Waste Management Planning

Parties to the International Convention for the Prevention of Pollution from Ships (MARPOL) are required as port States to ensure the provision of port reception facilities (PRF) that are adequate to meet the needs of the users, from the largest merchant ship to the smallest recreational craft, without causing undue delay. These reception facilities are to be provided at ports and terminals.

Although MARPOL does not regulate the collection and treatment of waste from ships beyond the PRF requirement, ports and terminals may also have to meet national, regional and/or local regulations regarding waste management and/or waste treatment. Furthermore, the need to manage waste from ships at ports and terminals as part of an environmentally sound management approach for avoiding, minimizing and eliminating pollution from ships, e.g. as part of a national, regional or local waste strategy aiming towards a more resource efficient and circular economy, is of key importance.

Adequate PRF should meet the needs of users, from large merchant ships to small recreational vessels, and without causing undue delay to the ships using them. The way this level of adequacy is being achieved is relatively open, and there is a comparably high degree of freedom to organize the reception of waste from ships in a suitable manner.

But it is generally acknowledged that the adequacy of PRFs can be improved by establishing up-to-date Port Waste Management Plans (PWMPs), especially when they are developed in consultation with the relevant stakeholders. These plans bring together in a single document the relevant elements, procedures, goals and responsibilities linked to the delivery, collection, treatment, monitoring and enforcement of waste from ships, including cargo residues.

As ports are very different, also PWMPs can be tailor-made, taking into account the ports' characteristics. Also the legal framework regarding the management of sea-based wastes at land-based facilities (such as PRF) is not always compatible: a PWMP can bring the applicable legal instruments together, and clarify the relevant procedures and processes.

In European ports the development and usage of PWMPs is already very common, as the first EU PRF Directive 2000/59/EC, which was adopted in 2000, already required the development of Waste Reception and Handling Plans for each port receiving seagoing vessels (irrespective of the types of vessel calling, and irrespective of the size of the port). The second EU PRF Directive 2019/883/EU contains even more detailed requirements regarding the development, usage, approval and renewal of PWMPs.

The 2015 Ex-Post evaluation* of the EU PRF Directive 2000/59/EC also confirmed that the adequacy of PRF has been improved with the introduction of the PRF Directive. Although it is not possible to attribute this improved adequacy of PRF solely to the use of PWMPs, as the development of waste reception and handling plans for all types of port is a fundamental element of the PRF Directive, it most likely has impacted it.

But also, many ports outside Europe have drafted and implemented PWMPs, and the number is still growing. Some examples of ports that have developed PWMPs are:

- South Africa: port of Cape Town, port of Durban
- United Arab Emirates: Abu Dhabi ports
- British Virgin Islands ports, Cayman Island ports
- India: port of Mormugao

In order to have a good understanding of what a PWMP exactly is, the following can be accepted as a good *description of a PWMP*:

* Ex-Post evaluation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues, PWC/Panteia, 2015

A Port Waste Management Plan (PWMP) is a document produced by a port or terminal unifying their policy on waste reception facilities for ships and outlining the facilities available at the location. This PWMP should demonstrate that ports and terminals fulfil all the requirements of local, national, regional and/or international regulations and that the facilities and infrastructure are available to meet the needs of vessels normally using the port/terminal without causing undue delays.

2.3 Purpose of a Port Waste Management Plan

The main purpose of a PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port. In a more comprehensive form a PWMP can also be compelled as a Guidance Document for port users and other stakeholders, that brings together all the relevant elements, procedures, goals and responsibilities linked to the delivery, collection, treatment, monitoring and enforcement of waste from ships, including cargo residues. The PWMP can also implement requirements and goals of the national waste management strategy, translating the goals regarding the environmental sound management of waste, including the transition towards a more circular economy, into the practical processes and procedures applied within the port area.

As the PWMP contains all relevant information related to the collection of waste from ships, it should preferably be a public and legally binding document, accessible for port users and all other stakeholders. It is therefore useful that the key information of the approved PWMP is made publicly available and disseminated to the port users, as it will help shipowners and agents with their decisions related to the delivery of waste from ships. This can be done through publication on the port's website, or by distributing specific literature (e.g. brochure, flyer) to the ships and their agents.

Furthermore, as the PWMP contains relevant information useful for policy makers as well as enforcing authorities, it may also be distributed to relevant public stakeholders inside and outside the port, such as Environmental Authorities, the Harbour master, Shipping Inspectors, Port State Control, Maritime Administration, Customs Department, etc.

2.4 Evaluation, approval and monitoring

When undertaking an evaluation of the PWMP, the competent authority should consider the submitted PWMP against the requirements provided in its national legislation. If any of the mandatory content of the PWMP has not been adequately addressed, the plan should not be approved and the port authorities should receive a justification in order for them to rectify the outstanding issues immediately.

Ports should undertake a major review of their PWMP regularly (e.g. every 3 to 5 years), and also when there are significant changes in the operation of the port, such as an important structural increase or decrease in the number or types of ships, the development of new infrastructure in the port, a change in the provision of port reception facilities, or new onboard waste treatment techniques.

Effective monitoring of the PWMP is considered to be essential to ensure that the plan is properly implemented, and that the PRF are operating as required. The purpose of monitoring will be to verify and ensure the functioning of the system in practice in accordance with the approved PWMP. The monitoring of implementation of the plans can include an ad hoc inspection for each port, at least once during the validity period of the plan, to align with the need for periodical reapproval. Inspections may be more frequent if regular complaints have been received about the inadequacy of PRF in any particular port. It can be noted that the inspection of PRF is often in the competence of different enforcement bodies and exercised within a different legal framework than that applicable to the inspections on board of ships. In this respect, an integrated framework for monitoring PRF as well as a good collaboration between the different enforcement authorities involved, is equally important.

3 Port Waste Management Plans: legal and policy framework

3.1 Introduction

As maritime shipping and its operations not only imply activities at the high seas, in international waters and in coastal areas but also in ports, on rivers and at inland terminals, the corresponding legal and policy framework for shipping and ship-related operations also needs to cover all these areas. The delivery of waste from ships to port reception facilities is a fine example of how sea- and land-based regulations can meet.

However, as the origin of the land- and sea-based legal and policy frameworks often differs, as a result, also the legal and policy frameworks for the onboard management of wastes and residues on ships differ from the legal requirements regarding the collection, delivery and processing of wastes at land-based facilities. And often these legal frameworks are not compatible or complementary.

This chapter provides an overview of the key legal and policy instruments applicable to the management of waste from ships, including the establishment of waste management plans, starting from the moment when the wastes are generated during the normal operations onboard a ship, during their transfer from the ship to the reception facility, and finally during the disposal at land-based facilities.

3.2 International regulatory framework regarding the management of waste from ships: the MARPOL Convention

3.2.1 General overview

The International Convention for the Prevention of Pollution from Ships (MARPOL) aims at preventing and minimizing pollution from ships, both accidental pollution and pollution from routine operations. It currently includes six technical Annexes:

Table 1: Overview of MARPOL Annexes

Annex	Subject	Entry into force
Annex I	Prevention of pollution by oil	2 October 1983
Annex II	Control of pollution by noxious liquid substances in bulk	6 April 1987
Annex III	Prevention of pollution by harmful substances carried by sea in packaged form	1 July 1992
Annex IV	Prevention of pollution by sewage from ships	27 September 2003
Annex V	Prevention of pollution by garbage from ships	31 December 1988
Annex VI	Prevention of air pollution from ships	19 May 2005

As the MARPOL Annexes I and II are mandatory, States ratifying or acceding to MARPOL must give effect to the provisions of these two specific Annexes at a minimum, and the optional Annexes they have ratified. Nowadays all Annexes to MARPOL have entered into force.

In general MARPOL contains provisions in order to regulate which types of waste from ships can (and as a consequence also which cannot) be legally discharged into the sea, onboard waste management, and enforcement and inspections. The MARPOL Annexes I, II, IV, V and VI also contain a requirement regarding the availability of adequate PRFs.

3.2.2 Port Reception Facilities requirements in MARPOL

In order to reduce and eliminate pollution from ships, the provision of adequate port reception facilities is a key requirement: the ability to fully comply with the discharge requirements of Annexes I, II, IV, V and VI of MARPOL* is directly related to the availability of adequate reception facilities in port. Therefore each Party is to ensure the provision of adequate facilities at ports and terminals to meet the needs of ships using them, without causing undue delay.

The MARPOL requirements regarding the availability of adequate PRF are contained in the following regulations:

- Regulation 38 of Annex I;
- Regulation 18 of Annex II;
- Regulation 12 and 13 (passenger ships in Special Areas) of Annex IV;
- Regulation 8 of Annex V;
- Regulation 17 of Annex VI.

In general governments are required to take all necessary measures to ensure the provision of reception facilities that are adequate to meet the needs of ships using their ports or terminals. It may be noted that MARPOL states that the “government” is to ensure the provision of adequate reception facilities. This, however, does not mean that only the government of a Party must provide the facility: in practice, the government may delegate this responsibility and require a local authority, e.g. the port authority or terminal operator to provide the facilities.

It can be noted that MARPOL does not set any prescriptive standards for port reception facilities other than requiring that they are to be “adequate”, nor does MARPOL contain any requirements regarding the development of Port Waste Management Plans. However, the IMO has adopted several guidelines addressing and recommending the use of PWMPs. At least in the following IMO guidelines explicit reference is being made to PWMPs:

- *Consolidated guidance for port reception facilities providers and users* (MEPC.1/Circ.834/rev.1);
- *Guidelines for ensuring the adequacy of port waste reception facilities* (MEPC.83(44));
- *Guidelines for reception facilities under MARPOL Annex VI* (MEPC.199(62)).

3.2.3 The IMO GISIS database

In order to facilitate the dissemination of information and promote public access to sets of data collection by the IMO Secretariat, the IMO has developed an internet-based database on information for shipping: the Global Integrated Shipping Information System[†] (GISIS). This database contains both information open to the general public and a member’s area section with more specific information only accessible to registered IMO users.

The GISIS Port Reception Facility Database (PRFD) provides data on facilities for the reception of all categories of ship-generated waste. The database aims at improving the rate of reporting alleged inadequacies of reception facilities so that the problem can be tackled more effectively.

Parties to MARPOL are also required to communicate the information on available PRFs in their ports into the PRFD.

* It must be noted that, differing from all other MARPOL Annexes, Annex III does not explicitly require the provision of port reception facilities.

[†] <https://gisis.imo.org/Public/Default.aspx>

3.2.4 Special Areas and Emission Control Areas

The possibility to legally discharge waste at sea is an element that can influence the delivery of ship's waste to PRF. Although MARPOL regulations have become stricter over the years, it is still allowed – under specific conditions – to discharge certain waste types at sea.

Due to specific oceanographic, ecological and traffic characteristics of some sea areas, MARPOL defines certain sea areas as Special Areas (for MARPOL Annexes I, II, IV and V) and Emission Control Areas (for MARPOL Annex VI), in which the application of stricter measures for the protection of sea pollution is required. Under MARPOL, these special areas are provided with a higher level of protection than other areas of the sea. An up-to-date list of all the IMO Special Areas can be found on the IMO website (<http://www.imo.org> – click on Our Work (Marine Environment), then Special Areas under MARPOL).

As the discharge criteria for wastes from ships are stricter in Special Areas, ships sailing in those areas might not meet these criteria and therefore be required to deliver their wastes to a PRF. States and port authorities should therefore take into consideration the importance of compliance in these Special Areas. MARPOL Parties whose coastlines border the relevant special areas are obligated to provide adequate PRF.

3.2.5 Small Island Developing States (SIDS)

IMO has recognized the unique challenges that Small Island Developing States (SIDS) experience in providing adequate reception facilities for waste from ships. This was first recognized in 2000 in IMO resolution MEPC.83(44) *Guidelines for ensuring the adequacy of port waste reception facilities*, then given a firm legal basis through MARPOL amendments in 2011.

SIDS may satisfy waste reception facilities regulations through regional arrangements when, because of those States' unique circumstances, such arrangements are the only practical means to satisfy these requirements. Parties participating in a regional arrangement can develop a Regional Reception Facilities Plan (RRFP), taking into account the guidelines developed by the IMO. The relevant guidelines are found in IMO resolution MEPC.221(63) *Guidelines for the development of a regional reception facilities plan*.

3.2.6 MARPOL Guidelines

The use and provision of PRF for waste from ships is fundamental to the overall success of MARPOL in its objective of reducing and ultimately eliminating intentional pollution of the marine environment by ships. Therefore, the IMO has adopted several guidelines related to the management of waste from ships, providing additional tools to all stakeholders (private and public) in order to provide good practices. These practices can be used by governments when establishing stricter national or regional requirements, but also by port authorities when organizing the collection of waste from ships.

Guidelines related to the management of MARPOL Annex V (garbage, including plastics) are:

- a) *Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.295(71), adopted on 7 July 2017)

These guidelines aim to assist:

- governments in developing and enacting domestic laws which implement MARPOL Annex V;
- shipowners, ship operators, ships' crews, cargo owners and equipment manufacturers in complying with requirements set forth in MARPOL Annex V and relevant domestic laws; and
- port and terminal operators in assessing the need for, and providing, adequate reception facilities for garbage generated on all types of ship. In the interest of uniformity, governments are requested to refer to these Guidelines and related Guidance Document(s) developed by the IMO when developing and enforcing appropriate national regulations.

b) Consolidated guidance for port reception facility providers and users (resolution MEPC.1/Circ.834/Rev.1, adopted on 1 March 2018)

This consolidated guidance is intended to be a practical guide for:

- ships' crew who intend to deliver MARPOL wastes and residues ashore;
- PRF providers who seek to provide timely, efficient port reception services to ships.

It provides a basis for establishing best practice procedures, with an eye towards improving the integration of PRFs into a more comprehensive waste management scheme in which final disposal of MARPOL wastes/residues occurs in a manner that protects the environment, with due regard for the health and safety of workers and the general population. It is based on the requirements established in MARPOL and the guidance provided in the IMO's manual *Port Reception Facilities – How to do it* and the *Guidelines for ensuring the adequacy of port waste reception facilities* (resolution MEPC.83(44)). Building on this manual and the adequacy guidelines, the consolidated guidance suggests how modern environmental management systems and procedures can assist with the improvement of MARPOL wastes/residues delivery ashore.

The consolidated guidance also recommends that, in order to provide efficient PRF services that meet the needs of ships calling at a port without causing undue delay, port authorities should prepare a Port Waste Management Plan and should ensure that relevant information about the reception services available and associated costs are communicated to ship operators well in advance of the ship's arrival.

Procedures recommended by the IMO include communication and reporting procedures and the use of standardized forms, such as:

- Format for reporting alleged inadequacies of port reception facilities;
- Standard format of the advance notification form for waste delivery to port reception facilities;
- Standard format for the waste delivery receipt.

c) Guidelines for the development of Garbage Management Plans (resolution MEPC.220(63), adopted on 2 March 2012)

These guidelines provide direction on complying with the requirements for a ship's garbage management plan, and are intended to assist the shipowner/operator in the implementation of regulation 10.2 of the revised MARPOL Annex V.

A ship's garbage management plan should detail the specific ship's equipment, arrangements and procedures for the handling of garbage. The plan may contain extracts and/or references to existing company instructions.

d) Guidelines for the development of a regional reception facilities plan (resolution MEPC.221(63), adopted on 2 March 2012)

This guideline provides guidance for the development of a Regional Reception Facilities Plan (RRFP), in order to assist party States in specific geographic regions of the world in the appropriate and effective implementation of the MARPOL regulations that require the provision of adequate PRF.

Considering that the unique circumstances of Small Island Developing States (SIDS) pose unique challenges for these states in meeting international shipping's needs for discharging ship-generated wastes and residues, this guideline provides tools in order to facilitate the development of a port reception facilities plan, including the provision of adequate reception facilities, on a regional basis.

In accordance with the guidelines, "the majority of States participating in an RRFP should be SIDS. Although non-SIDS may participate, they should do so only so far as their ports may be Regional Waste Reception Centres. The obligations of non-SIDS to provide adequate reception facilities in all ports and terminals will not be satisfied by regional arrangement."

- e) *Guidelines for ensuring the adequacy of port waste reception facilities* (resolution MEPC.83(44), adopted on 13 March 2000)

These guidelines contain information for the provision and improvement of port waste reception facilities and are designed to complement the IMO *Comprehensive Manual on Port Reception Facilities*.^{*} The guidelines provide information relating to the ongoing management of existing facilities, as well as for the planning and establishment of new facilities. The guidelines are also intended to encourage States to provide adequate port waste reception facilities and ships to make more effective use of these facilities. This will make a substantial contribution to the ultimate aim of MARPOL to achieve the elimination of intentional pollution of the marine environment.

The main objective of these guidelines is to remind States that wastes arise from all maritime activities – commercial, fishing and recreational – and that each activity requires specific attention. In particular, the guidelines are intended to:

- assist States in planning and providing adequate port waste reception facilities; and
- encourage States to develop environmentally appropriate methods of disposing of ships' wastes ashore.

These guidelines are designed to address governments, port States and port authorities for their activities aimed at provision of adequate port waste reception facilities required under the provisions of MARPOL.

3.2.7 IMO manual Port Reception Facilities – How to do it

The first IMO manual on port reception facilities, the *Comprehensive Manual on Port Reception Facilities*, was published in 1995. In 2016 it was updated and revised in order to:

- take into account updates on the regulatory framework;
- include several new waste management methods;
- broaden the scope to the management of other ship-generated wastes and residues such as ballast water sediments and residues from the application or removal of anti-fouling systems.

Also the title of the manual was amended to *Port Reception Facilities – How to do it*.

The manual contains practical information to governments and competent (port) authorities, in particular to those in developing countries, as well as to the shipping industry, agencies and waste contractors seeking guidance when implementing MARPOL. It also provides guidance on how to deal with possible inadequacies, as, in order to fully comply with MARPOL, a party State has to ensure the provision of adequate port reception facilities meeting the needs of ships normally using their ports, without causing undue delay to the ships.

As MARPOL does not contain any explicit requirements regarding the downstream processing and treatment of wastes and residues from ships once received in a port reception facility, it should be noted that as an addition the manual does elaborate on the downstream management of the ship-generated wastes and residues once received ashore. Also the issue of Port Waste Management Planning is extensively addressed in this manual.

3.3 International regulatory framework on the environmentally sound management of hazardous and other wastes: the Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. It covers “hazardous wastes” as well as “other wastes”.[†] Although the Basel Convention explicitly excludes “wastes which derive from the normal operations of a ship, the discharge of which is covered by another international instrument”, the Parties to the Basel Convention developed a clear interest in the collection and disposal of wastes and residues from ships.

^{*} This manual was updated in 2016 and was renamed *Port Reception Facilities – How to do it* (also see section 3.2.7 of this Guidance Document).

[†] Wastes collected from households and residues arising from the incineration of household wastes.

Within the framework of the Basel Convention, the following documents have been developed regarding wastes from ships:

- legal analysis of the application of the Basel Convention to hazardous and other wastes generated on board ships;
- assessment of how far the Basel Convention technical guidelines cover wastes covered by MARPOL;
- guidance manual on how to improve the sea-land interface to ensure that wastes falling within the scope of MARPOL, once offloaded from a ship, are managed in an environmentally sound manner.

3.3.1 Framework on the environmentally sound management of wastes

“Environmentally sound management” (ESM) is defined in article 2 of the Basel Convention as:

taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes.

However, it is widely acknowledged that ESM is understood and implemented differently. While implementation of the Basel Convention requires application of its provisions in a consistent manner, countries as well as facilities may have different ways of applying ESM as they face different realities. In addition, ESM of wastes cannot be guaranteed within the confines of waste management without effective legal and institutional systems, including government oversight, and adequate infrastructure to protect the occupational safety and health of workers, communities and the environment. In the absence of such effective systems and infrastructure, ESM may not be readily available in some countries and as regards facilities.

Therefore, the framework on the environmentally sound management of hazardous wastes and other wastes was developed, in order to identify what countries should do at the national level and, collectively, as Parties to the Basel Convention, to address the challenges of implementing ESM of wastes in a systematic and comprehensive manner. Intended as a practical guide for all stakeholders participating in the management of such wastes, the framework comprises three sections:

- a) a common understanding of what ESM encompasses;
- b) tools to support and promote the implementation of ESM;
- c) strategies to identify strategies to implement ESM.

In order to support and promote the implementation of ESM different tools can be used, including a combination of legislation and regulations, guidelines and/or codes of practice, voluntary certification schemes, voluntary agreements and schemes, mechanisms for cooperation at the international, regional, national and local levels, including with industry, training and awareness programmes and incentive schemes. These tools may be tailored to address specific waste streams.

3.3.2 Technical guidelines

The Basel Convention has adopted guidelines for numerous waste streams and disposal operations. These guidelines are available at the Basel Convention’s website.* Although not legally binding, these technical guidelines provide the foundation upon which countries can operate at a standard that is not less environmentally sound than that required by the Basel Convention. These guidelines are aimed at assisting countries in ensuring the environmentally sound management of hazardous and other wastes.

* <http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/TechnicalGuidelines/tabid/8025/Default.aspx>

3.4 Other regulatory instruments relevant for Port Waste Management Planning

3.4.1 EU Port Reception Facilities Directive

3.4.1.1 Key elements

In 2000 the European Union adopted Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues. In 2019 this Directive was revoked by Directive (EU) 2019/883 on port reception facilities for the delivery of waste from ships.

The purpose of this Directive is to protect the marine environment against the negative effects from discharges of waste from ships using ports located in the EU, while ensuring the smooth operation of maritime traffic, by improving the availability and use of adequate port reception facilities and the delivery of waste to those facilities.

The PRF Directive applies to all ships (including fishing vessels and recreational craft but with the exception of warships, naval auxiliaries or other ships owned or operated by a State and used, for the time being, only on a government non-commercial basis), irrespective of their flag, calling at, or operating within, a port of an EU Member State, and to all ports of the EU Member States normally visited by these ships.

Key requirements of the PRF Directive include:

- a) An obligation for the EU Member States to ensure the availability of PRF adequate to meet the needs of ships normally visiting the port, without causing undue delay;
- b) Ports are to develop and implement a Waste Reception and Handling Plan (WRHP), following consultation with all relevant parties, in particular the port users or their representatives. These plans shall be evaluated and approved by the competent authority in the EU Member State;
- c) The master of a ship is to complete an advance waste notification form and forward it in due time (at least 24 hours prior to arrival), informing the port of call about the ship's intentions regarding the delivery of waste from ships, including cargo residues;
- d) A mandatory delivery for all ship-generated waste. However, the PRF Directive also includes the possibility for the vessel not to deliver its waste when it has sufficient dedicated waste storage capacity until the next port of delivery;
- e) Upon delivery, the PRF operator or the authority of the port where the waste was delivered shall truly and accurately complete the waste delivery receipt and issue and provide, without undue delay, this waste delivery receipt to the master of the ship;
- f) The implementation of a cost recovery system where the costs of operating PRF for the reception and treatment of waste from ships, other than cargo residues, are covered through the collection of an indirect fee from ships, irrespective of delivery of waste to a PRF, and thus providing an incentive to ships not to discharge its waste at sea. For MARPOL Annex V wastes, not being cargo residues, this indirect fee is to cover the total cost of the collection and treatment of the waste, in order to ensure a right of delivery without any additional charges based on the volume of waste delivered*;
- g) A possibility for Member States to exempt a ship calling at their ports from specific obligations, where there is sufficient evidence that:
 - the ship is engaged in scheduled traffic with frequent and regular port calls;
 - there is an arrangement to ensure the delivery of the waste and payment of the fees in a port along the ship's route; and
 - the exemption does not pose a negative impact on maritime safety, health, shipboard living or working conditions or on the marine environment.
- h) The establishment of an enforcement scheme, by which EU Member States ensure that any ship may be subject to inspection.

* Except where the volume of waste delivered exceeds the maximum dedicated storage capacity mentioned in the advance notification form.

Both the advance waste notification form and the waste delivery receipt are based on the formats used in the IMO Consolidated guidance (resolution MEPC.1/Circ.834/Rev.1).

3.4.1.2 Port Waste Management Plans

The EU PRF Directive 2019/883 contains several requirements regarding Port Waste Management Planning:

- Appropriate Waste Reception and Handling Plans (WRHP) are to be in place and implemented for each port.* There is no distinction between merchant seaports, fishing ports or recreational ports, but where required for reasons of efficiency, the WRHP may be developed jointly by two or more neighbouring ports in the same geographical region, with the appropriate involvement of each port, provided that the need for and availability of PRF are specified for each port;
- Detailed requirements for the development of the WRHP are set out in Annex 1 of the PRF Directive, making distinction between mandatory and optional content:
 - Mandatory elements
 - assessment of the need for PRF, in light of the needs of ships normally visiting the port;
 - description of the type and capacity of PRF;
 - description of the procedures for the reception and collection of waste from ships;
 - description of the cost recovery system;
 - description of the procedure for reporting alleged inadequacies of PRF;
 - description of the procedure for ongoing consultations with port users, waste contractors, terminal operators and other interested parties; and
 - overview of the type and quantities of waste received from ships and handled in the facilities.
 - Optional elements
 - summary of relevant national law and the procedure and formalities for the delivery of the waste to PRF;
 - identification of a point of contact in the port;
 - description of the pre-treatment equipment and processes for specific waste streams in the port, if any;
 - description of methods for recording the actual use of the PRF;
 - description of methods for recording the amounts of the waste delivered by ships;
 - description of methods for managing the different waste streams in the port.
- The WRHPs are to be developed following ongoing consultations with the relevant parties, including in particular with port users or their representatives, and where appropriate local competent authorities, port reception facilities operators and organizations implementing extended producer responsibility obligations and representatives of civil society. These consultations should be held both during the initial drafting of the plans and after their adoption, in particular when significant changes have taken place;
- EU Member States are also to ensure that the following information on the availability of adequate PRF in their ports and the structure of the costs is clearly communicated to the ship operators, is made publicly available and is easily accessible, in an official language of the Member State where the port is located and, where relevant, in a language that is internationally used:
 - location of PRF applicable to each berth, and, where relevant, their opening hours;
 - list of waste from ships normally managed by the port;

* Small non-commercial ports which are characterized by rare or low traffic from recreational craft only may be exempted, if their PRF are integrated in the waste handling system managed by or on behalf of the relevant municipality and the EU Member States where those ports are located ensure that the information regarding the waste management system is made available to the port users.

- list of contact points, the PRF operators and the services offered;
- description of the procedures for delivery of the waste;
- description of the cost recovery system, including waste management schemes and funds, where applicable.
- Where required for reasons of efficiency, the WRHPs may be developed jointly by two or more neighbouring ports in the same geographical region, with the appropriate involvement of each port, provided that the need for and availability of PRF are specified for each port;
- EU Member States shall evaluate and approve the WRHP and ensure its re-approval at least every 5 years after it has been approved or re-approved, and after significant changes* in the operation of the port have taken place;
- EU Member States shall monitor the port's implementation of the WRHP. Where no significant changes have taken place during the five-year period, the re-approval may consist of a validation of existing plans.
- It can be noted that in its 2016 *Guidelines for the interpretation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues*[†] the European Commission provided additional guidance regarding waste reception and handling plans, including:
 - mandatory elements;
 - scope: ports that must have a waste reception and handling plan;
 - consultation with relevant parties;
 - evaluation, approval and monitoring; and
 - reporting of inadequacies.

Also the European Maritime Safety Agency (EMSA) issued in 2016 its *Technical Recommendations on the Implementation of Directive 2000/59/EC on PRF*, containing information on the development, approval, monitoring and implementation of waste reception and handling plans.

3.4.2 ISO Standard on “Arrangement and management of port reception facilities”

The International Organization for Standardization (ISO) is a worldwide federation of national standards bodies. Although ISO standards are voluntary and industry oriented, there are several examples where governments have used international standards as trusted solutions to complement existing regulations.

The ISO Standard 16304 on “Arrangement and management of port reception facilities” is meant to complement ISO 14001 on environmental management systems, by adding a port component that extends the principles of ISO 14001 to ships' waste management in ports. It provides a specific methodology that any port, harbour, terminal or marina can apply to the planning, development and operation of its PRF. Also, the processes put in place during the preparations for ISO 14001 accreditation will assist in meeting the development of a holistic Port Waste Management Plan (PWMP) under this international standard.

The standard also covers principles and issues that should be considered in the development of a PWMP, its implementation and PRF operations. The operation of any PRF is governed by the principles and procedures included in the PWMP.

According to the ISO standard on “Arrangement and management of port reception facilities” the PWMP is to take into account the national waste management strategy and defines how and by whom waste is collected at a port or terminal. This is seen as being necessary, as waste streams received from ships calling on ports or terminals must be dealt with in an environmentally sound manner.

* Those changes may include structural changes in traffic to the port, development of new infrastructure, changes in the demand and provision of port reception facilities, and new onboard treatment techniques.

[†] Commission Notice 2016/C 115/05 of 01/04/2016

Key elements of a PWMP are:

- development;
- publication;
- implementation;
- enforcement of delivery of ship-generated waste and cargo residues by competent authorities; and
- monitoring of the plan to ensure that all parties, including ships and facility providers, are adhering to the plan, that the plan is and remains fit for use and the reception facilities are adequate.

According to the ISO standard the PWMP should include relevant information on key areas outlining pertinent procedures and management measures, such as an analysis of the relevant regulations, responsibilities of the relevant stakeholders, an assessment of the need for PRF, a description of the cost recovery system, etc.

3.5 Ensuring the adequacy of port reception facilities

Through its Annexes (with the exception of Annex III) MARPOL requires the provision of adequate PRF, which are to meet the needs of ships normally visiting the port without causing undue delay. When implementing MARPOL, some governments opted to shift the responsibility to provide these adequate PRF to local authorities such as municipalities or port authorities, or even to private stakeholders (e.g. terminal operators).

As the competent authority, which can resort under either a maritime, port or environmental department, should ensure that the requirements regarding “adequacy” are brought into practice, it must consequently be made clear, both for the enforcing authority as for the stakeholder that is required to provide the PRF, how “adequacy” is to be defined.

3.5.1 “Adequacy” guidance according to the IMO

IMO has provided several Guidance Documents regarding the interpretation of adequacy of PRF:

In the *Guidelines for ensuring the adequacy of port waste reception facilities* (resolution MEPC.83(44)) “adequate” is described as: “To achieve adequacy the port should have regard to the operational needs of users and provide reception facilities for the types and quantities of wastes from ships normally visiting the port”.

In addition, “adequate facilities” are being described as those which:

- mariners use;
- fully meet the need of ships regularly using them;
- do not provide mariners with a disincentive to use them; and
- contribute to the improvement of the marine environment.

Furthermore, the provided PRF must “meet the needs of the ships normally using the port” and “allow for the ultimate disposal of ship-generated wastes and residues to take place in an environmentally appropriate way”.

According to the *2017 Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.295(71)) the methodology for determining the adequacy of a reception facility should be based on the number and types of ship that will call at the port, the waste management requirements of each type of ship as well as the size and location of a port. Emphasis should also be placed on calculating the quantities of garbage, including recyclable material, which is not discharged into the sea, in accordance with the provisions of MARPOL Annex V. Due to differences in port reception procedures and additional treatment among ports, PRF may require the separation on board of:

- food wastes (e.g. animal-derived products and by-products because of risk of animal diseases);
- cooking oil (animal-derived products and by-products because of risk of animal diseases);

- plastics;
- domestic waste, operational waste and recyclable or reusable material;
- special items like medical waste, outdated pyrotechnics and fumigation remnants;
- animal wastes, including used bedding from the transport of live animals (due to risk of disease) but excluding drainage from spaces containing living animals;
- cargo residues; and
- E-waste such as electronic cards, gadgets, equipment, computers, printer cartridges, etc.

In fishing ports separate collection can be required of end-of-life/damaged fishing gear, passively fished waste and recovered ALDFG.

When ship operators, ports and terminals assess the expected quantities and types of ship-generated wastes on a per ship basis, the following issues should be considered:

- types of garbage normally generated;
- ship type and design;
- types of main fuel used by the ship (as cleaner fuel such as diesel/gasoline generates less sludge);
- ship's speed (as fuel consumption can indicate sludge production);
- ship's operating route;
- number of persons on board (both crew and passengers);
- duration of the voyage;
- time spent in areas where discharge into the sea is prohibited or restricted; and
- time spent in port.

When selecting the most appropriate type of reception facility for a particular port, attention should be given to alternative methods available: mobile facilities, such as trucks, can enhance a cost-efficient way of collecting ships' wastes. Also floating facilities, such as barges, might be considered more effective, in particular where access by road is not practicable.

It can also be noted that due to additional treatment processes, especially when the principles of environmentally sound management are being applied, PRF and/or port authorities might promote or (financially) incentivize the onboard separation of:

- non-recyclable plastics and plastics mixed with non-plastic garbage;
- rags;
- recyclable wastes;
- cooking oil;
- glass;
- aluminium cans;
- paper, cardboard, corrugated board;
- wood;
- metal;
- plastics (including extruded polystyrene or other similar plastic material);
- E-wastes such as electronic cards, equipment, computers, printer cartridges, etc.;
- garbage that might present a hazard to the ship or crew (e.g. oily rags, light bulbs, acids, chemicals, batteries, etc.);
- damaged/unwanted fishing gear.

When assessing the adequacy of reception facilities, the competent (port) authorities should also consider the technological challenges related to the management and discharge of waste from ships. When doing so, it is recommended that relevant international standards (e.g. the ISO standards) be considered as it helps ensuring that the management of the wastes and residues from ships is environmentally sound.

In the IMO manual *Port Reception Facilities – How to do it* it is explained that, as a minimum, the reception facilities at cargo unloading, loading, and repair ports and terminals should be capable of receiving those types and volumes of wastes, residues and mixtures that are normally handled within that port and which ships intend to deliver to PRF. All ports, including recreational and fishing ports regardless of their size, need to provide adequate facilities to receive garbage and oil residues from engines, etc. Larger ports, with more and various types of ship calling, may need to provide more extensive reception capacity (e.g. for cargo residues, bilge water, quarantine waste, etc.).

The receiving capacity should be at least appropriate in time and availability to respond to the continuing needs of the ships normally using the port. Arrangements needed to facilitate the collection of residues, mixtures and all types of ships' waste without causing undue delay to ships, such as prior notification of types and quantities of wastes and residues expected to be delivered, piping or equipment required for delivery etc. are to be made timely between the ship and the PRF. Also the costs for receiving and processing waste from ships should be fair, and not provide a disincentive for using the PRFs.

Undue delay may arise when the time spent in port for the delivery of residues, mixtures or wastes goes beyond the normal turnaround time of the ship in that port, unless the delay is caused by fault of the ship. In order to provide maximum flexibility for the ship to deliver wastes while avoiding undue delay, in major ports the availability of reception facilities on a 24/7 basis might be considered.

Adequacy can also be achieved at a regional level, e.g. for Small Island Development States (SIDS), when it is undertaken in such a manner as to ensure that vessels do not have an incentive to discharge wastes into the sea.

3.5.2 “Adequacy” according to EU PRF Directive

According to the EU PRF Directive 2019/883 an “adequate” port reception facility is to meet the following requirements:

- a) PRF have the capacity to receive the types and quantities of waste from ships normally using that port, taking into account:
 - operational needs of the port users;
 - size and geographical location of that port;
 - type of ship calling at that port; and
 - exempted ships;
- b) formalities and practical arrangements relating to the use of the port reception facilities are simple and expeditious to avoid undue delays to ships;
- c) fees charged for delivery do not create a disincentive for ships to use the port reception facilities; and
- d) PRF allow for the management of the waste from ships in an environmentally sound manner in accordance with the Waste Framework Directive 2008/98/EC and other relevant EU and national waste law. Therefore EU Member States shall ensure separate collection to facilitate reuse and recycling of waste from ships in ports as required under Union waste law.* However, in order to facilitate this process, PRF may collect the separate waste fractions in accordance with waste categories defined in MARPOL and its guidelines.

* In particular Directive 2006/66/EC, Directive 2008/98/EC and Directive 2012/19/EU

In its preamble 28 the PRF Directive 2019/883/EU also refers to the fact that the development, implementation and re-assessment of the WRHP, based on the consultation of all relevant parties, is essential to ensure the adequacy of PRF.

Poor location, complicated procedures, restricted availability and unreasonably high costs for the services provided are all factors which may deter the use of reception facilities. For a PRF to be adequate, the facility should:

- be available during a ship's visit to the port;
- be conveniently located and easy to use;
- cater for all types of waste streams usually entering the port; and
- not cost so much as to present a disincentive to users.

At the same time, both the size and geographical location of the port may limit what can technically and reasonably be provided in terms of reception and handling of the waste.

4 Management of plastic waste from ships

4.1 Types of waste generated onboard ships

There are many different types of waste that can be generated onboard a ship. Although wastes from ships can be very diverse, the study on *The management of ship-generated waste on-board ships* (CE Delft, 2017) identified the following types of waste that are commonly generated onboard ships:

Table 2: Common waste types generated onboard ships (source: CE Delft, 2017)

MARPOL	Type of waste	Clarification
Annex I	Oily bilge water	Mixture of liquids that are collected in the bilge of a ship
	Oily residues	Sludge from the purification of fuel or lubricating oil or separated waste oil from oil water separators, oil filtering equipment or oil collected in drip trays, and waste hydraulic and lubricating oils
	Oily tank washings	Slops from the cleaning of the cargo holds
Annex IV	Sewage	Drainage and other wastes from any form of toilets and urinals; drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises; drainage from spaces containing living animals; or other waste waters when mixed with these drainages
Annex V	Plastics	Sheets, wrapping, bottles, drums, synthetic ropes, synthetic fishing gear, plastic garbage bags and empty chemical cans
	Food wastes	Any spoiled or unspoiled food substances, including fruits, vegetables, dairy products, poultry, meat products and food scraps generated on board ship
	Domestic wastes	All waste from domestic spaces onboard of the ship that is not food waste, cooking oil or plastic. IMO defines this as "all types of waste not covered by other Annexes that are generated in the accommodation spaces on board the ship. Domestic wastes does not include grey water". Domestic waste therefore typically comprises paper, cardboard, fluorescent lamps, synthetic material, foils, metal cans, lids, glass, pantry packaging waste, etc.
	Cooking oil	Generated onboard during food preparation
	Incinerator ashes	Ashes from onboard incinerators used to burn sludge, domestic, operational waste and other types of waste
	Operational wastes	All solid wastes (including slurries) not covered by other MARPOL Annexes that are collected on board during normal maintenance or operations of a ship, or used for cargo stowage and handling. This includes cleaning agents and additives contained in cargo hold and external wash water but not grey water, bilge water, or other similar discharges essential to the operation of a ship, taking into account the guidelines developed by the IMO
	Cargo residues	Remnants of any cargo which are not covered by other MARPOL Annexes and which remain on the deck or in holds following loading or unloading, including loading and unloading excess or spillage, whether in wet or dry condition or entrained in wash water but does not include cargo dust remaining on the deck after sweeping or dust on the external surfaces of the ship
Annex VI	Ozone depleting substances	ODS are used onboard ships in air conditioning appliances or cooling equipment on reefers. They can also be contained in mobile equipment (fridges, mobile air conditioners)

Part of the waste may be legally discharged into the sea, outside special protected areas, and under certain conditions, such as at a minimum distance from the coast. Waste that cannot be reused on board or legally discharged at sea under international MARPOL standards must be delivered to PRFs, available in ports.

4.2 Amounts of waste generated onboard ships

The amount of waste generated by ships can be reduced depending on the type of fuel used, onboard treatment practices and the availability of equipment such as incinerators, grinders and oil-water separators. However, not all types of waste can be properly or completely treated on board, and not all methods are suitable for all waste types. As an example, compacting paper can be done on board; however, compacting all types of plastics will make them impossible to treat further on shore, or necessitate sorting them out again, increasing the overall cost of the process. Any practice should therefore always keep in view the complete workflow, up to the point of delivery to an appropriate PRF, when necessary, and the final disposal.

The ISO Standard 21070 on the “Management and handling of shipboard garbage” provides examples for calculating the expected amounts of waste for the following MARPOL Annex V waste types: glass, paper/cardboard, packaging/plastics, wood, metal/scrap, special waste* and organic waste. In the *Regional Waste Management Strategies for Arctic Shipping* (2017)[†] these examples were used to draft an outline of the types of shipping that can be expected in Arctic regions, and the need for PRFs based on the amount of expected wastes to be generated (See Table 3). Although this exercise was specifically done for Arctic shipping, it may also provide useful information for worldwide shipping.

Table 3: Amount of MARPOL Annex V waste generated onboard a ship (source: PAME)

Ship type	Number of persons on board	Duration of voyage (in Arctic waters)	Amount of waste generated
Cargo ship (> 400GT)	20	7-14 days	210-420 kg
Cargo ship	20	5-10 days	150-300 kg
Research vessel	25-50	10-30 days	375-2250 kg
Fishing vessel	6-8	5-10 days	45-120 kg
Exploration/offshore support vessel	10-15	7-14 days	105-315 kg
Cruise ship/passenger vessel	15-3000	7-15 days	210-90.000 kg
Cruise ship/passenger vessel	15-3000	15-30 days	450-180.000 kg

The *Study to support the development of measures to combat a range of marine litter sources* (Sherrington et al., 2016) provides the most extensive estimates of waste generation from vessels in European waters for all MARPOL Annex V waste types on an aggregate level and per waste category (see table 4).

Table 4: MARPOL Annex V onboard waste generation estimates (1000 tonnes) for vessels in European waters for 2013 by subcategory and ship segment (source: Sherrington et al. (2016))

Sector/waste stream	Shipping	Fishing	Cruise	Passenger	Recreational	Navy	Total	%
Annex V – domestic	74,4	43,5	86,7	123,0	170,9	8,8	507,3	57%
Annex V – solid CR	122,5	-	-	-	-	-	122,5	14%
Annex V – fishing gear	-	218,5	-	-	-	-	218,5	25%
Annex V – other operational	27,1	4,3	-	0,3	-	0,9	32,6	4%
Total	224	266,3	86,7	123,3	170,9	9,7	880,9	
%	25%	30%	10%	14%	19%	1%		

* “Special waste” was not defined in the ISO 21070.

[†] <https://oaarchive.arctic-council.org/handle/11374/1932>

These data show that the contribution of the various shipping segments in European waters differs between waste categories, where typically passenger ships (cruise, ferries, recreational boating) cover the majority of domestic waste (garbage), while cargo ships are mainly responsible for MARPOL Annex V cargo residues and other operational waste. It should be noted that the figures presented only cover cargo residues from dry bulk (MARPOL Annex V). In calculating the figures, Sherrington et al. (2016) already corrected for legal discharges of food waste. If an average treatment of 25% is assumed (*Impact Assessment for the Revision of Directive 2000/59/EC on port reception facilities*, Ecorys, 2017), the gross waste generation would be an approximate 1,2 million tonnes for all shipping sectors, and about 0,3 million tonnes for merchant shipping alone. Fishing and recreational vessels together account for about half of the total MARPOL Annex V waste generation.

4.3 Waste from ships as a source of marine litter

Even though it is generally assumed that the majority of waste entering the world's ocean comes from land-based sources, there are clear indications that marine litter also results from sea-based activities, although this has not been specifically quantified on any scale, and its contribution to the global burden of plastic debris in the world ocean is poorly understood. Furthermore, certain forms of sea-based marine litter may not only be significant sources of plastic litter, but may well have greater impacts on marine biota and habitats than do other forms of marine litter.

According to the GESAMP Working Group 43 on *Sea-based sources of marine litter*,* sea-based activities and industries contribute to the global burden of marine litter, and this warrants concern largely because synthetic materials comprise significant portions and components of litter entering the world ocean from sea-based and other maritime activities and sources.

4.3.1 Fishing as a source of marine litter

Fishing gear components that contribute to the global ocean burden of plastic marine litter can be generally categorized as: netting, largely comprises mono- or multifilament polymers woven into knotted and knotless meshes; traps and pots, comprises multifilament polymers woven into meshes, monofilament ropes and floats; ropes and lines, comprises a wide variety of non-biodegradable polymer materials; and floats and buoys, commonly comprises polymers including EPS (GESAMP, 2021).

Fishing vessels may deliberately or accidentally release litter such as gloves, storage drums, EPS fish boxes and other personal waste into the marine environment; people participating in sea-based leisure activities, such as recreational boating and fishing, also generate marine litter, including single-use items.

Certain types of fishing gears are more risk-prone to gear loss and impacts (e.g. entanglement and/or ingestion). Whether drifting at sea, or deposited on the seabed, Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG) can become a trapping agent for marine organisms, including endangered species. Incidences of marine wildlife entanglement and ingestion of ALDFG have doubled from 1997 to 2015. Increases in marine wildlife entanglement and ingestion records are documented for marine turtles (100% of the 7 extant species), marine mammals (66% of the 123 extant species) and seabirds (50% of 406 extant species).

ALDFG causes serious economic impacts to fishers and associated fisheries. The direct financial losses from the loss of gear itself and any target species caught in the gear can be substantial. The indirect or "hidden" economic costs are multifaceted, and include lost fishing opportunities due to non-availability of gear in hand (especially for the fishers who do not have spare gear available for an immediate replacement); the loss in value of future landings that might have otherwise been available to the fishers from use of the lost gear item; the loss in value of ghost catch in the ALDFG, now no longer available for fishers to catch and from which to profit; retrieval costs including time and fuel costs to search for the lost gear; and costs incurred by fishers in replacing lost gear (GESAMP, 2021).

* <http://www.gesamp.org/publications/sea-based-sources-of-marine-litter>



Figure 2: ALDFG at sea (Photo credit: Emma Hedley)

4.3.2 Shipping as a source of marine litter

Ships generate solid wastes daily that may end up as marine litter, often containing cargo waste, operational wastes (from cargo stowage and handling), sewage, galley waste, domestic waste from crews and maintenance wastes.

The shipping industry is also a source of microplastics, after routine cleaning of ship hulls, mishandling of cargo made of plastic items or accidental spills of industrial resin pellets. Microplastics are also generated from marine paints and antifouling coatings, from wastewater management and discharge systems (greywater, sewage), and transported through ballast waters (GESAMP, 2021).

Most traditional impacts of marine litter like entanglement and ingestion must be considered mainly as a consequence of general waste discarded overboard from ships, without specific impact in relation to their shipping origin.

Quantification of waste discharged at sea is difficult in the absence of directly available global data. However, a 2018 Impact Assessment accompanying the proposal for the amendment of *EU Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues* estimated the amount of waste that is (potentially) discharged at sea by ships (table 5). Although garbage delivered in ports has increased since the introduction of the EU PRF Directive, a significant delivery gap in waste remains, estimated between 60,000 and 300,000 tonnes, i.e. 7% to 34% of the total to be delivered annually.

While few detailed studies are available that quantify the amounts and types of plastic litter from shipping, 0.001% to 2% of cargo loads are lost annually. As well, 0.01 m³ to 0.1 m³ of operational waste and 0.003 m³ to 0.015 m³ of plastic and domestic wastes are generated per person per day (GESAMP, 2021).

Table 5: Ship waste generated and delivered annually, and the resulting “waste gap”. Content sourced from 2018 Impact Assessment accompanying the proposal for an EU Directive on port reception facilities for the delivery of waste from ships; MARWAS (Annex I-IV waste); Annex V waste estimates are based on Sherrington et al. (2016).

Data source	Waste to be delivered*	Waste actually delivered	Delivery gap
MARPOL Annex I			
Merchant shipping	1.226.000 m ³	1.195.000 m ³	31.000 m ³
All, incl. fishing and recreational vessels	1.290.000 m ³	Unknown	Unknown
	Merchant: 1.226.000 m ³ Fishing: 55.000 m ³ Recreational vessels: 9.000 m ³		
MARPOL Annex IV			
Merchant shipping	1.362.000 m ³	1.226.000 m ³	136.000 m ³
All, incl. fishing and recreational vessels	2.312.000 - 2.562.000 m ³	Unknown	Unknown
	Merchant: 1.362.000 m ³ Fishing: 500.000 – 750.000 m ³ Recreational vessels: 450.000 m ³		
MARPOL Annex V			
Merchant shipping	434.000 tonnes	286.000 – 404.000 tonnes	30.000 – 148.000 tonnes
All, incl. fishing and recreational vessels	881.000 tonnes	580.000 – 820.000 tonnes	60.000 – 300.000 tonnes
	Merchant: 434.000 tonnes Fishing: 266.000 tonnes Recreational vessels: 171.000 tonnes		
MARPOL Annex VI			
Merchant shipping	24.000 m ³ sludge 360.000 m ³ bleed-off	Unknown	Unknown

* The models applied have accounted for the waste that is treated on board and/or legally discharged under MARPOL to avoid overestimating the gap between generation and delivery.

4.4 Management of plastic waste

If onboard storage capacity permits, the ship garbage management plans preferably take into account the possibility of waste recycling, returning for container deposit schemes, reuse, or passive fishing of certain garbage types. The segregation of garbage according to the recommendations of the MARPOL Annex V implementation guidelines should also allow for the delivery of garbage in certain recyclable categories.

To facilitate the delivery to PRF of recyclable wastes, ship operators should consider establishing contracts with facilities in ports that are visited on a regular basis. This will fulfil both the need to use an adequate and authorized service operator as per most environmental management systems, and facilitate the delivery of

segregated waste ashore during each port visit. Where appropriate reception facilities for segregated and/or recyclable wastes are not provided in a port, shipowners/operators are encouraged to request that such facilities are developed in conjunction with environmentally responsible waste management systems. This is important as that way local installations may have a greater volume of inward materials and it will be easier to commercialize outputs.

4.4.1 Plastic waste management

Based on the waste hierarchy mentioned in section 2.1 of this Guidance Document, it is preferable to prevent plastic waste being generated onboard ships. If prevention is impossible reuse followed by recycling may be an option, and if recycling is not possible plastic waste might be incinerated (with energy recovery). Dumping in a landfill is considered as the least preferable option.

Plastic waste can be generated in all types of vessel and often originates from domestic provisions and supplies used for operations on board the ship. Plastic waste typically comprises sheets, wrapping, bottles, drums, synthetic ropes, synthetic fishing nets, plastic garbage bags and empty chemical cans.

4.4.1.1 Prevention

Waste prevention practices can significantly reduce the amount and/or the hazardous character of wastes that are generated on board ships. Some examples of onboard waste prevention measures are:

- ban on the use of single use plastics;
- individual bottles of water to be replaced by larger containers, and/or bottles of soft drinks that are replaced by containers with syrup that is to be mixed with water;
- a water purifier installed in the drinking water system of the ship, which will reduce the usage of plastic bottles;
- use of reusable bottles;
- arrangements with the supplier/distributor of stores for taking back the plastic packaging foil used to cover the ship's stores immediately after delivery.

Measures such as restrictions to the production and consumption of single use plastics and microplastics, in combination with the use of marine bio-degradable plastics, may prevent marine litter, also from sea-based sources such as shipping, fishing, aquaculture and offshore activities.

4.4.1.2 Recycling

Plastic recycling is the process of recovering waste or scrap plastic and reprocessing these materials into other functional and useful products. It is crucial that plastic is recycled as part of the global efforts to reducing plastic and other solid waste to end up in the environment.

Plastics should be recycled for of a number of reasons:

- plastic recycling helps to conserve resources and diverts plastics from landfills or unwanted destinations such as oceans;
- recycling plastic requires less energy than making plastic from raw materials and will reduce CO₂;
- it helps to reduce fossil fuel consumption, since virgin plastic is produced directly from natural gas or crude oil;
- the process of recycling plastic is less expensive and less time-consuming compared to manufacturing new plastic using virgin material.

Most post-consumer plastic waste is recycled using mechanical recycling technology. More specifically, mechanical recycling can be used to recover plastic materials comprising polypropylene (PP), polyethylene (PE), or polyethylene terephthalate (PET).

Mechanical recycling involves mechanical processes such as grinding, washing, separating, drying, re-granulating and compounding to break down waste into plastic flakes. Once dried, plastic flakes can be used to produce new plastic materials.

Due to the complexity of recycling plastics, it is not a practice that is being done onboard ships, and most likely is also not being done in ports in developing countries. Another technique, which is done by using pyrolysis, converts mixed plastics into oils. Depending on the process the oils can be used as paraffine oil for the production of new plastics, or the oil can be used as a fuel. Some recycling units can already be profitable even at low quantities of waste plastics (1t/day).

Plastic recycling is also contributing to a better climate: incineration of plastics generates CO₂ and for the production of primary plastic companies produce CO₂ as well. But even 1 ton of waste plastics delivered to recyclers, saves more CO₂/year than 1 electric car (source: recyclepro.be).

Is recycling an economically viable solution?

In most cases PRFs are economic enterprises and they need sufficient revenue to be able to continue their operations. From that point of view, PRFs will normally choose – within the local legal boundaries – the cheapest solution to process the plastic waste collected. This can be mechanical/chemical recycling, incineration with or without energy recovery, and/or landfilling. This decision depends on the costs and the revenues, and the specific waste infrastructure that is locally available.

Next to the waste fee that is collected from the ship, the revenue (positive or negative cost for the plastic waste to recycle) is to be included. In case certain types of plastic waste, including oils from the chemical conversion of plastic, would generate an additional positive value, this should be considered as an additional revenue.

In some countries governments subsidize the collection of plastic waste in order to prevent the generation of marine litter, especially when it impacts tourism and/or the quality and quantity of fish or aquaculture (which can be important sectors in certain countries). By way of subsidizing the fishery sector, governments could give incentives to set up systems to collect waste plastics (fishing for litter schemes, beach clean-up activities, etc.).

4.4.1.3 Waste-to-energy

Sophisticated incinerators that burn plastic and other municipal waste can produce enough heat and steam to generate electricity for the local grid. According to the World Energy Council the waste-to-energy sector is likely to witness steady growth in coming years, especially in the Asia Pacific region.*

Energy recovery may be a valuable alternative for plastics-rich waste fractions that cannot be sustainably recycled. Some plastics cannot be recycled in an eco-efficient manner for reasons such as:

- the necessary amount, cleanliness and composition of the collected waste streams cannot be guaranteed;
- the technologies for sorting are not available.

Market-driven requirements on quality and standards for recycled material may limit the appropriateness of plastics recycling.

For these types of plastic, energy recovery is the most resource-efficient solution available when compared to landfilling or even to enforced recycling. However, waste-to-energy plants are expensive to build and operate, so they generally charge more than landfills do. And because plants run most efficiently with steady streams of waste, their owners often need to import material from elsewhere.

Large plants can generate enough electricity to supply thousands of houses. However, studies have indicated that recycling plastic waste still saves more energy – by reducing the need to extract fossil fuel and process it into new plastic – than burning it, along with other household waste. Finally, waste-to-energy plants may emit toxic pollutants such as dioxins, acid gases and heavy metals.

* Waste-to-energy. World Energy Council
http://www.worldenergy.org/assets/images/imported/2013/10/WER_2013_7b_Waste_to_Energy.pdf

4.4.2 Management of fishing gear and ALDFG

More than 12 million tons of plastic end up in our seas every year. Fishing gear accounts for roughly 10% of that debris: between 500,000 to 1 million tons of fishing gear are discarded or lost in the ocean every year. Discarded nets, lines and ropes now make up about 46% of the Great Pacific Garbage Patch.*

The IMO has recognized the need to prevent plastic pollution from ships, including fishing vessels and gear. Several measures addressing waste from fishing vessels have been included in the IMO Action Plan on marine plastic litter from ships. The Food and Agricultural Organization of the United Nations (FAO) adopted its Voluntary Guidelines on the Marking of Fishing Gear (VGMFG). The VGMFG are described as an attempt “to improve the state of the marine environment by combatting, minimizing and eliminating abandoned, lost or otherwise discarded fishing gear (ALDFG) and facilitating the identification and recovery of such gear.”

Also abandoned, lost or otherwise discarded fishing gear (ALDFG) is a problem that is increasingly of concern. Various United Nations resolutions include actions to reduce ALDFG and marine debris in general. In general, gillnets and pots/traps are most likely to “ghost fish” while other gear, such as trawls and longlines, are more likely to cause entanglement of marine organisms, including protected species, and habitat damage.

The causes for fishing gear to be abandoned, lost or otherwise discarded are numerous and include adverse weather; operational fishing factors including the cost of gear retrieval, gear conflicts, illegal, unregulated and unreported fishing, vandalism/theft, and access to and cost and availability of shoreside collection facilities. Weather, operational fishing factors and gear conflicts are probably the most significant factors, but the causes of ALDFG accumulation are poorly documented and not well understood. A detailed understanding of why gear is abandoned, lost or discarded is needed when designing and tailoring effective measures to reduce ALDFG in particular locations.

Passively fished waste

During their fishing operations fishermen are often confronted with waste that is unintentionally collected in their nets, so-called passively fished waste. Often this passively fished waste is thrown back into the ocean. In order to avoid this, some international non-governmental organizations (NGOs) have developed schemes often known as “Fishing for Litter”. The idea behind it is simple: instead of throwing the waste back into sea, the fishermen are encouraged to collect it onboard (e.g. in big bags) and deliver it free of charge to a PRF when returning to port. By doing so they reduce the amount of marine litter in our seas by physically removing it. In addition, it also highlights the importance of good waste management amongst the fishing fleet. PRF are being provided in fishing ports where the fishermen can deliver their passively fished waste. As the passively fished waste is in general quite similar to ship-generated garbage, also the PRF for this type of waste is similar.

Fishing for Litter measures have been included in several Regional Action Plans (RAP) on Marine Litter developed by regional seas commissions. Several countries have already implemented this measure, and have set up schemes for the reception of passively fished waste.

In cooperation with regional and/or national stakeholders, participating vessels are given hardwearing bags to collect marine litter that is caught in their nets during their normal fishing activities. Filled bags are deposited in participating ports on the quayside where they are moved by port staff to a dedicated skip or bin for disposal. Operational or galley waste generated on board, and hence the responsibility of the vessel, continues to go through established port waste management systems.

* <https://www.worldwildlife.org/stories/ghost-fishing-gear>



Figure 3: Big bag used for the onboard collection of passively fished waste in United Kingdom (Photo credit: KIMO International*)



Figure 4: Big bag used for the onboard collection of passively fished waste in the Netherlands (Photo credit: KIMO International*)

* KIMO is a network of local governments in the North-East Atlantic and Baltic regions, working together for healthy seas, clean beaches and thriving coastal communities.

5 Elements of a Port Waste Management Plan

5.1 Developing Port Waste Management Plans: an introduction

The main purpose of a PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port. As a consequence, the key elements of a PWMP should also be directly related to the issues that determine the adequacy of a PRF. According to section 5 of the *Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.295(71)) the main issues for determining the adequacy of PRFs are:

- number and types of ship that will call at the port;
- waste management requirements of each type of ship (including calculating the quantities of garbage not discharged into the sea);
- types of PRF; and
- size and location of a port.

Furthermore, governments are to consider technological challenges related to the management (recycling, treatment and discharge) of the garbage received from ships, and take responsible measures within their national programmes to consider garbage management standards.

For Small Island Development States (SIDS) the requirements regarding PRF can also be satisfied through regional arrangements.

In a more comprehensive form, a PWMP can also be compelled as a full guidance document for port users and other stakeholders that brings together all the relevant elements, procedures, regulations, goals and responsibilities linked to the delivery, collection, treatment, monitoring and enforcement of waste from ships, including cargo residues. The PWMP can also implement requirements and goals of the national waste management strategy, translating the goals regarding the environmental sound management of waste, including the transition towards a more circular economy, into the practical processes and procedures applied within the port area.

As addressing the adequacy of a PRF is already a complex issue, also the elements that are to be included in a fully comprehensive PWMP are very diverse, taking into account the ports' and port users' characteristics, the national/local legal framework and policy ambitions, the existing waste management infrastructure within and in the vicinity of the port, etc. This may lead to an extensive and costly analysis and administrative burden for the authority assigned to develop the PWMP, which – especially for developing countries and SIDS – is not always feasible.

Therefore, in case not sufficient resources are available to develop a “full option” PWMP, it is still useful to identify the elements that can be considered as essential for a “basic” PWMP. These elements, which are directly linked to the adequacy of PRF and addressed in section 5.3 of this Guidance Document, are:

- Purpose of the PWMP
- Scope of the PWMP
- Overview of available PRF
- Assessment of the need for PRF
- Description of the procedures related to the delivery and collection of the waste
 - Advance waste notification (not applicable to fishing ports and marinas)
 - Waste delivery receipt
 - Cost recovery system (when applicable)
- Stakeholder consultations
- Reporting of alleged inadequacies

Additional elements, which can be applied in a PWMP that aims to be a fully comprehensive guidance document for all port users regarding the management of waste from ships and are addressed in section 5.4 of this document, are:

- Definitions
- Overview of the relevant regulatory framework
- Record keeping
- Exemptions for frequent callers
- Monitoring and enforcement
- Brief description of the port

Taking into account the local situation, a competent national/regional authority can also decide to distinct between a number of “basic” elements of the PWMP that are to be included as mandatory, and other elements that are optional.

Thus, PWMPs may vary significantly in level of detail and coverage, from a large commercial port to a small fishing port or marina. Some of the items may be only partially applicable to smaller ports with reduced waste streams or with very specialized shipping services.

In some countries small non-commercial ports which are characterized by rare or low traffic from recreational craft only may be exempted from the requirement of PWMP, on condition that:

- their PRFs are integrated in the waste handling system managed by or on behalf of the relevant municipality; and
- the information regarding the waste management system is made available to the users of those ports.

5.2 Who is to draft the PWMP

In general the procedures related to the development, approval and renewal of the PWMP is to be decided by the national competent authority, and is embedded in the appropriate national regulatory instrument(s). Also the responsibility for who is to draft the PWMP is preferably clarified in the national regulatory framework.

Although the responsibility for the development and implementation of the PWMP can differ depending on the national or regional institutional settings, in general the PWMP is to be developed by the port authority, as they hold overall responsibility for the waste handling in the port (collection and treatment of waste and compliance with national regulations). If the operational waste handling is contracted (outsourced) to an external waste operator, it is the obligation of the port to ensure that the waste operator will comply with existing regulations, terms of reference and other important issues specified in the contract with the port.

Many ports operate on a landlord basis and in some cases it might be necessary that also independently managed areas in the ports, such as fishing ports, terminals and chemical plants, draft their own plans and are responsible for managing their services on reception of wastes and residues from ships as part of their operations (also see section 5.3.2 of this Guidance Document). Where responsibility is unclear, terminals should clarify the local situation with the port authority.

Taking into account that maritime shipping by definition is an international business, it is preferable that the PWMP is not only drafted in an official language of the State where the port is located, but also in a language that is internationally used.

5.3 Essential elements for a “basic” PWMP

5.3.1 Purpose of the PWMP

The overall purpose of the PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port, in order to protect the marine environment by reducing discharges into the sea of waste from ships, including cargo residues.

Its objectives are:

- To reduce illegal discharge of waste from vessels;
- To comply with legal duties with regard to waste management;
- To consult with port users, ship agents, operators, waste contractors and regulators in the development and implementation of waste management strategies and measures;
- To prevent the production of waste wherever possible; and
- To re-use or recycle waste wherever possible.

5.3.2 Scope of the PWMP

Defining the scope of the PWMP is essential not only to delineate to which vessels the PWMP applies – and as a consequence: to which vessels the PWMP does not apply – but also the port’s geographical boundaries and areas of jurisdiction.

In some cases the scope of the PWMP can also include restrictions to which types of waste are collected by the PRF in the port. However, this can also be clarified when providing the information of available PRFs and the procedures linked to the delivery and collection of the waste. Furthermore, a delineation based on the types of ship normally calling the port may already include an implicit boundary regarding the types and volumes of waste accepted (e.g. a large oil terminal mainly accepting Very Large Crude Carriers (VLCCs) will not have to provide PRF for waste fishing gear, and a small recreational port will not have to provide PRF for extensive amounts of washing waters containing dry bulk cargo residues).

Observations regarding the types of vessel

Although other classifications may be possible depending on the local situation in ports, here are some examples of different types of shipping that may be included within the scope of the PWMP, or not:

- vessels operating in the marine environment;
- inland navigation;
- merchant shipping, fishing vessels, recreational craft, passenger/cruise ships;
- international shipping;
- domestic shipping;
- ships engaged in port services (such as bunkering activities, cargo-handling, dredging, mooring, pilotage, towing, etc.);
- ships calling the port on a frequent and regular basis within a specific sailing schedule (such as ferries, tourist boat tours, etc.)
- government owned and/or operated vessels in a non-commercial service; and
- warships and naval auxiliaries.

Of course all sorts of combinations are possible.

Warships and naval auxiliaries are already exempt from most international (e.g. MARPOL, SOLAS) and national maritime regulatory instruments which, from a legal as well as a practical point of view, makes it rather difficult to include them within the scope of the PWMP.

The same reasoning applies for ships that are owned and/or operated by a State and used, for the time being, only on government non-commercial service. However, it should be noted that MARPOL requires States to ensure – by the adoption of appropriate measures not impairing the operations or operational capabilities of such ships owned or operated by it – that such ships act in a manner consistent, so far as is reasonable and practicable, with the Convention. Therefore port authorities may still decide to include these types of ship (e.g. state owned dredging vessels, tugboats, pilot vessels, research vessels) within the PWMP.

A distinction that often is made, is between vessels operating in the marine environment and inland navigation. As the regulatory instruments for inland navigation in general differ from that for seagoing vessels, they are often kept outside the scope of the PWMP. Another possibility, taking into account that inland navigation can be quite substantial within a port and waste from inland navigation may be delivered to the same PRFs, is to develop a separate PWMP.

Another observation is that the national or regional competent authorities responsible for the development and approval of the PWMPs for different types of port, often make use of tailor-made standardized models for each type of port. In practice this means that for each target group (merchant seaports, passenger/cruise ports, fishing ports and recreational ports) a “model” PWMP is being outlined, which can be used for each port within that target group. Even the use of a standardized format (e.g. making use of tick/check boxes) is possible.

The advantages of such an approach are multiple:

- reduced risk that the mandatory elements of the PWMP are overlooked, as the content of the PWMP is standardized;
- redundant procedures can be left out for certain types of port: e.g. as fishing vessels in general do not make use of the Advance Notification Form (ANF), this procedure should not be included in the PWMP;
- as all elements are pre-indicated: less administrative burden for the port to draft the PWMP;
- as all elements are standardized: less administrative burden for the competent authority to verify the PWMP;
- focus can be put on the adequacy of PRF, including the assessment of the need for PRF, only for the types of waste that are generated by the ship that are normally calling the port (e.g. no need to address MARPOL Annex II cargo residues in a marina).

Observations regarding the port’s jurisdiction:

Waste management requirements listed in a PWMP can only be applicable and/or legally enforceable within the juridical boundaries of that specific port. Therefore it is important to indicate within the scope of the PWMP the geographical and juridical boundaries of the port, including a map.

However, it is possible that certain specific entities within the port area have a different legal status, and the port authority may not have any jurisdiction in that area, such as:

- private terminals or jetties;
- areas exclusively reserved for fishing vessels or recreational activities;
- residential areas within the port;
- naval or military basis;
- anchorages.

In those cases (also see the examples in figure 5)* ports should liaise with the private companies or appropriate competent bodies to ascertain the best approach regarding the development of the PWMP. Some areas may be taken out of the overarching PWMP, possibly leading towards the development of an individual PWMP for these individual terminals or jetties. The geography of the port, waste facilities in the region, and the type and amount of ships visiting each terminal or jetty should be taken into account when making this decision.

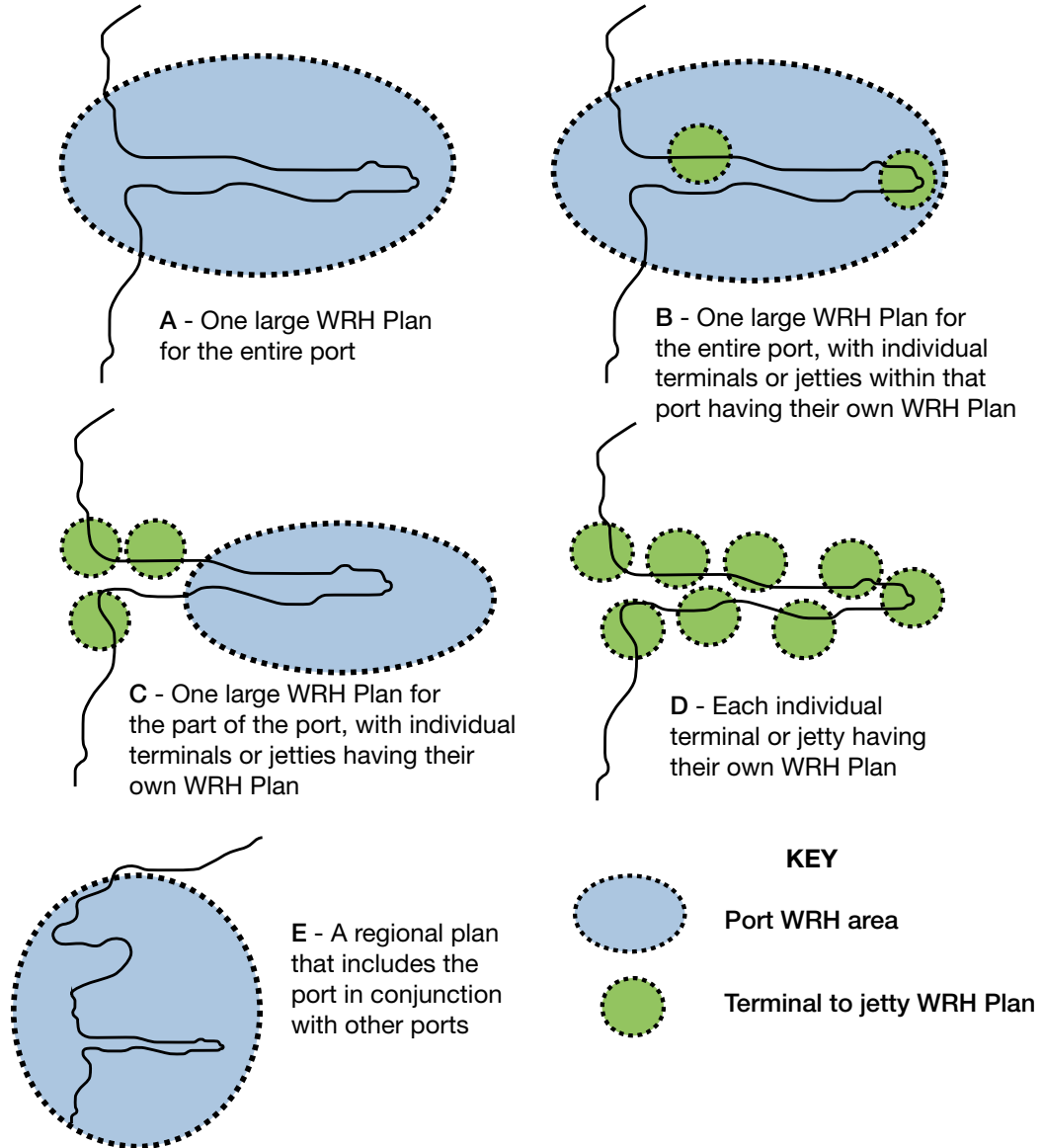


Figure 5: Examples of different options for the geographical scope of the PWMP (source: EMSA Technical Recommendations on the Implementation of Directive 2000/59/EC)

* In this figure “WRH Plan” means “Waste Reception and Handling Plan”, which is the name used in the EU Directive

5.3.3 Overview of available PRF

The PWMP should contain an overview of the available PRF active in the port, including a short description and indication of their capacity. For deciding on what information is to be included in that overview, a good indication can be found in the Port Reception Facilities Database (PRFD) of the IMO's Global Integrated Shipping Information System (GISIS):

Information about the service provider	Name, address, phone, email, website Type of facility: <ul style="list-style-type: none"> – tank truck/portable tank – tanker or barge – fixed
Types of waste accepted	MARPOL Annex I-related (oily waste) <ul style="list-style-type: none"> – oily bilge water – oily residues (sludge) – oily tank washings (slops) – dirty ballast water – scale and sludge from tanker cleaning – other
	MARPOL Annex II-related (chemical/NLS) <ul style="list-style-type: none"> – category X substance – category Y substance – category Z substance
	MARPOL Annex IV-related (sewage)
	MARPOL Annex V-related (garbage) <ul style="list-style-type: none"> A) plastics B) food wastes C) domestic wastes D) cooking oil E) incinerator ashes F) operational wastes G) animal carcasses H) fishing gear I) E-waste J) cargo residues (non HME) K) cargo residues (HME)
	MARPOL Annex VI-related <ul style="list-style-type: none"> – ozone-depleting substances – exhaust gas cleaning residues (scrubber waste)

	Ballast Water Management Convention <ul style="list-style-type: none"> – ballast water – sediment from ballast tanks
Discharge restriction/limitations	<ul style="list-style-type: none"> – Minimum quantity (m³) – Maximum quantity (m³) – Maximum discharge rate (m³/h) – Other
Procedural information	<ul style="list-style-type: none"> – Availability of the reception facility – Minimum prior notice required (hours) – Charging system – Additional information (e.g. cleaning)

In case of additional specific requirements or procedures (e.g. pumping requirements, safety issues, specific requirements regarding segregation of garbage, restrictions for quarantine waste, piping connection standards for sewage, etc.) this information can also be provided in the PWMP.

When there are fixed facilities in the port, it may also be useful to include a map indicating the location of the PRF.

As PWMPs in general are validated for multiple years (e.g. 3 to 5 years) this list is a snapshot at a certain moment in time. Therefore it can be useful to include in the PWMP a link to the website where the up-to-date list can be consulted: this can be the port's website, or the overview provided by the IMO's PRFD in GISIS.

5.3.4 Assessment of the need for PRF

The assessment whether the existing PRFs are sufficiently adequate and whether or not there is a need for additional reception capacity, is one of the fundamental elements of the PWMP. According to the IMO manual PRF – How to do it it is important that this assessment is done based on reliable and detailed information about the types and quantities of wastes from ships delivered in previous years.

Each port should – as a minimum – collect the following information:

- amount of each type of waste actually collected in the port;
- amount of each type of waste which should be collected in the port; and
- amount of each type of waste stored by ships for delivery in other ports.

When collecting this information planners should refer to the data collected during the operation of the previous PWMP and, when available, information received from the Advance Notification Form (ANF) or Waste Delivery Receipt (WDR) developed by the IMO (MEPC.1/Circ. 834/Rev.1). This information will aid the collection of waste statistics and enable waste management planners to tailor the requirements to ensure sufficient capacity of PRF. Ports are advised to keep these data so that plan holder can produce appropriate information when requested. This information will also help ports to review their PWMP and allow changes in the demand for PRF to be monitored.

Also, waste contractors already operating in the port area may be consulted upon in order to determine the expected amounts of wastes from ships.

Planners may also check the information regarding reporting alleged inadequacies of PRF in the PRFD of IMO's GISIS.

Another possibility to collect information to help with assessing the adequacy of existing PRF and the possibility for additional reception capacity, is by using a questionnaire which can be sent out to all relevant port users. It should be noted that questionnaires sometimes can be quite complex, and some questions could be interpreted differently by the respondents. However, depending on the local situation a questionnaire, or even certain parts of the questionnaire that are particularly relevant, can be used.

An example of such a questionnaire is included in Annex 5 of this Guidance Document.

When the data about the types and quantities of wastes from ships delivered in previous years is limited or not available (e.g. in case of newly built ports), a theoretical approach can be applied using existing waste generation rates in combination with expected traffic, possible exemptions and the experience of similar facilities. When preparing a plan it is advised to consider the maximum amount of waste that could be received, and then assess the need for PRF accordingly.

An example of such theoretical waste generation rates has already been provided in table 3 in section 4.2 (Amounts of waste generated onboard ships) of this Guidance Document. Another example is the table provided by the EMSA study regarding *The management of ship-generated waste on-board ships* (CE Delft, 2017):

Table 6: *Types, quantity, drivers and options for management of ship-generated waste (adapted from CE Delft, 2017).*

Type of waste	Generation rate	Driver	On-board treatment
<i>Oily bilge water</i>	0.01-13 m ³ per day, larger ships generate larger quantities.	Condensation and leakages in the engine room; size of the ship.	The amount can be reduced by 65-85% by using an oil water separator and discharging the water fraction into the sea.
<i>Oily residues (sludge)</i>	0.01 to 0.03 m ³ of sludge per tonne of HFO. 0 and 0.01 m ³ per tonne of MGO.	Type of fuel; fuel consumption.	Evaporation can reduce the amount of sludge by up to 75%. Incineration can reduce the amount of sludge by 99% or more.
<i>Tank washings (slops)</i>	20 to hundreds of m ³	Number of tank cleanings; Size of loading capacity.	After settling, the water fraction may be discharged at sea.
<i>Sewage</i>	0.01 to 0.06 m ³ per person per day. Sewage is sometimes mixed with other waste water. The total amount ranges from 0.04 to 0.45 m ³ per day per person.	Number of persons on-board; type of toilets; length of voyage.	Effluent from treatment plants is often discharged at sea where permitted under MARPOL Annex V.
<i>Plastics</i>	0.001 to 0.008 m ³ of plastics per person per day.	Number of person on-board.	Often not incinerated. Dirty plastics (plastics that have been in contact with food) are often treated as a separate waste stream.
<i>Food wastes</i>	0.001 to 0.003 m ³ per person per day.	Number of persons on-board; provisions.	Where permitted under MARPOL Annex V, food waste is often discharged at sea.
<i>Domestic wastes</i>	0.001 to 0.02 m ³ per day per person.	Number of persons on-board; type of products used.	
<i>Cooking oil</i>	0.01 to 0.08 litres per person per day.	Number of persons on-board; type of food prepared.	Although not permitted, cooking oil is sometimes still added to the sludge tank.
<i>Incinerator ashes</i>	0.004 and 0.06 m ³ per month.	Use of incinerator; cost of using incinerator.	The incinerator is not used for all types of waste, mostly for paper sometimes for oily sludge.
<i>Operational wastes</i>	0.001 to 0.1 m ³ per person per day.	Size of the ship; type of cargo.	
<i>Cargo residues</i>	0.001–2 % of cargo load.	Type of cargo. Size of ship.	

When assessing the need for waste reception capacity, also the possible impact of so-called Special Areas should be considered. Due to specific oceanographic, ecological and shipping characteristics of some sea areas, MARPOL has established Special Areas. In these special areas more stringent discharge restrictions apply, and the discharge of waste from ships is subject to more control. As the discharge criteria are stricter, a consequence may be that there is a stronger demand for ships to deliver their waste to PRFs.

Furthermore, the establishment of a special area will only take effect upon sufficient receipt of notifications of the existence of adequate PRF by IMO, from Parties whose coastlines border the relevant special area. Currently the special areas established under MARPOL* are as follows:

- Annex I: Oil
Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, “Gulfs” area, Gulf of Aden, the Antarctic area, North West European Waters, Oman area of the Arabian Sea and Southern South African Waters
- Annex II: Noxious Liquid Substances
Antarctic area
- Annex IV: Sewage
Baltic Sea
- Annex V: Garbage
Mediterranean Sea, Baltic Sea, Black Sea, Red Sea, “Gulfs” area, North Sea, the Antarctic area (south of latitude 60 degrees south) and Wider Caribbean region including the Gulf of Mexico and the Caribbean Sea
- Annex VI: Prevention of air pollution by ships (Emission Control Areas)
Baltic Sea area (SO_x and NO_x), North Sea (SO_x and NO_x), North American ECA (SO_x, NO_x and PM), and United States, Caribbean Sea ECA (SO_x, NO_x and PM).

5.3.5 Description of the procedures related to the delivery and collection of the waste

Modern environmental management systems and procedures assist with the improvement of the delivery of MARPOL wastes ashore. Some of the procedures and good practices recommended by the IMO in its *Consolidated guidance for PRF providers and users* (MEPC.1/Circ.834/Rev.1) include communication and reporting procedures and the use of standardized forms.

5.3.5.1 Advance waste notification (not applicable to fishing ports and marinas)

Prior to arrival, ship operators should check with local stakeholders (agents, port authorities, harbour masters or PRF providers) for port-specific requirements, in order to plan for and accommodate any special handling requirements for that particular port.

In some ports an advance notification from the ship is required regarding its intention to use the reception facilities. This can be requested for logistical reasons by the PRF provider, but also by the port authority e.g. for calculating a waste fee. Providing advance notification to the reception facility of the type and quantity of MARPOL wastes/residues on board and the type and quantity intended to be delivered will greatly assist the PRF operator in receiving the waste while minimizing any delay to the ship’s normal port operation.

General recommended practice is to provide at least 24 hours’ notice, although specific requirements may vary by PRF. If a ship visits a port on a regular basis, a standing arrangement with the PRF may prove to be most efficient. It is also recommended to use the standardized IMO Advance Notification Form.[†]

* For the latest status of the Special Areas, it is advised to consult the IMO website: <http://www.imo.org> – click on Our Work (Marine Environment), then Special Areas under MARPOL.

† Appendix 2 of IMO *Consolidated guidance for PRF providers and users* (MEPC.1/Circ.834/Rev.1)

In many cases, especially in larger ports, this notification process is automated and the agent representing the ship notifies the information of the Advance Notification Form directly into the port's information system. The PWMP should provide all the information that is necessary in order to be able to complete an advance waste notification:

- a model of the notification format (IMO Advance Notification Form);
- information regarding the timing when the advance notification is to be forwarded (e.g. at least 24 hours before calling the port);
- how the information is to be provided (electronically, email, etc.);
- who is to forward the information (the Master of the ship, or the ship's agent);
- details of who is receiving the notification (e.g. Harbour Master's office, port's environmental or operational department), including the contact details (address, telephone number, email, website).

It should be noted that the use of advance waste notification schemes in general is only applied in merchant seaports (including passenger and cruise ports), not in fishing ports or marinas.

5.3.5.2 Waste delivery receipt

Following delivery, the master of the ship should request a Waste Delivery Receipt (WDR) in order to document the type and quantity of MARPOL wastes/residues that were actually received by the PRF. The information from the WDR can also be used for enforcement purposes: it can be kept on board together with the relevant record books (Oil Record Book, Cargo Record Book, Garbage Record Book or the Garbage Management Plan), and presented upon request to the port States' environmental protection agency and/or maritime authority.

IMO has standardized the format of this document* to facilitate its use and application and in order to provide uniformity of records throughout the world.

The PWMP should provide all the information that is necessary for port users to be able to complete the Waste Delivery Receipt:

- a model of the WDR (IMO standardized format);
- when and by whom the WDR is to be completed.

In some cases also port authorities request a copy of the WDR to monitor the actual delivery of waste from ships, e.g. to when assessing the adequacy of the existing facilities or the need for additional reception capacity.

In ports with unmanned reception facilities it is not always possible to provide the ship's master with a WDR.

5.3.5.3 Cost recovery system (when applicable)

Apart from the availability of adequate PRF, which is a primary preventative measure that can reduce the likelihood that ship's waste is discharged at sea, also the cost for their use can discourage waste delivery by ships. Therefore the application of indirect cost recovery systems can take away the economic advantage of discharging into sea: as ships are required to pay a waste fee irrespective whether they use the PRF or not, they might as well deliver the waste.

Although MARPOL does not contain any explicit requirements to install cost recovery systems, section 6.3 of the *2017 Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.295(71)) provides references to the use of compliance incentive systems:

"The augmentation of port reception facilities to serve ship traffic without undue delay or inconvenience may call for capital investment from port and terminal operators as well as the garbage management companies serving those ports. Governments are encouraged to evaluate means within their authority to lessen this impact, thereby helping to ensure that garbage delivered to port is actually received

* Appendix 3 of IMO *Consolidated guidance for PRF providers and users* (MEPC.1/Circ.834/Rev.1)

and disposed of properly at reasonable cost or without charging special fees to individual ships. Such means could include, but are not limited to:

- .1 tax incentives;
- .2 loan guarantees;
- .3 public ship business preference;
- .4 special funds to assist in problem situations such as remote ports with no land-based garbage management system in which to deliver ships' garbage;
- .5 Government subsidies; and
- .6 special funds to help defray the cost of a bounty programme for lost, abandoned or discarded fishing gear or other persistent garbage. The programme would make appropriate payments to persons who retrieve such fishing gear, or other persistent garbage other than their own, from marine waters under the jurisdiction of Government."

Although the "tax incentives" as mentioned in the IMO guidelines are not explicitly implicating the use of cost recovery systems implementing the "polluter pays"* principle, the section does encourage governments to explore the use of systems helping to ensure that garbage delivered to port is actually received and disposed of properly. In addition, the reference to the "reasonable cost or without charging special fees to individual ships" could be interpreted as an encouragement to distribute the cost for the provision and/or the use of PRF over all ships calling the port, e.g. by applying a no-special fee system. Still, the current text leaves substantial room for interpretation.

The main objective of indirect cost recovery systems is that the costs of PRF for ship's waste, including the treatment and disposal of the waste, are covered through the collection of a fee from ships. This is based on the "polluter pays principle", in which the costs are to be fully borne by the port users. Differing from EU ports, where the EU PRF Directive requires† that all costs for PRF are to be covered by fees from ships, in non-EU ports cost recovery schemes can also be based on a partial coverage of costs, e.g. in certain fishing ports of marinas where the cost for the collection and treatment of ship's garbage is included in the municipal waste management scheme.

In smaller ports the use of PRF for fishing vessels, local harbour craft and for visiting vessels is often provided as part of the harbour dues. Visiting commercial craft can be charged on an ad hoc basis for the PRF that they will require. This can either be arranged via the harbour's staff or via the vessel's agent.

It should be noted that in general these indirect cost recovery systems are only applied for the collection and treatment of normal ship-generated waste, not for cargo residues and washing waters containing cargo residues. Cargo residues remain the property of the cargo owner after unloading the cargo to the terminal, and may have an economic value. For this reason, cargo residues should not be included in the cost recovery systems and the application of the indirect fee. The charges for the delivery of cargo residues should be paid by the user of the PRF, as specified in the contractual arrangements between the parties involved or in other local arrangements. Cargo residues also include the remnants of oily or noxious liquid cargo after cleaning operations, to which the discharge norms of MARPOL Annexes I and II apply, and which under certain conditions, as set out in those Annexes, do not need to be delivered in port to avoid unnecessary operational costs for ships and congestion in ports.

5.3.6 Stakeholder consultations

The consultation of the port's stakeholders is one of the key success factors when implementing a proper scheme for the management of waste from ships. A constructive dialogue between the port authority and its relevant stakeholders is considered to be crucial for a proper functioning of the system, in particular for establishing adequate PRF that meet the need of ships normally using the port.

* The "polluter pays" principle is enacted to make the party responsible for producing pollution responsible for paying for the damage done to the natural environment.

† Article 8 of Directive 2019/883/EU on port reception facilities for the delivery of waste from ships

Each port will have customers with differing priorities. Therefore, planners should consult their customers to be able to understand and meet their specific needs. Adequate PRF, at the right price, can only be provided if there is full and constructive dialogue between all stakeholders involved, such as PRF operators, port users or their representatives, and other interested parties such as local competent authorities, waste disposal companies and environmental organizations.

Stakeholder consultations will also help in determining the appropriate levels of service for each waste stream, actual and potential, and identify ways to improve service and reduce disruptions. Furthermore, consultation with governing bodies and local authorities is required to ensure that compliance with local and national legislation or regulations is achieved and maintained.

Stakeholder consultations should not only be undertaken as an integral part during the development of the PWMP, but also after the plans have been adopted. This can also provide the basis for the evaluation and (re) approval of the plans.

To guard that this stakeholder consultation process is not only ensured but also done in transparent way, it is therefore useful that the consultation procedures are included in the PWMP. In order to ensure consistency and a harmonized approach beyond the level of the individual port, these procedures can even be implemented in the national and/or local environmental or port regulatory framework.

There are no strict rules for how these stakeholder consultations are to be organized: the methodology can differ, and may depend on the size and type of the port, the way local stakeholders are organized (e.g. through national/local associations), and take into account the port's institutional framework.

Consultation of draft PWMPs can be done in the form of meetings, or through an official consultation procedure where the draft plan is made public and every interested party can submit their comments within a certain timeframe.

On a more continuous basis, regular review meetings could be held as a way of on-going consultation. At such meetings, the existing waste provision and PWMP could be discussed, together with suggested changes and improvements. Other methods include newsletters, questionnaires, the use of notice boards, contact with ships' agents and local representative bodies.

5.3.7 Reporting of alleged inadequacies

Since the possibility for improving PRF is also dependent on the receipt of adequate information about alleged inadequacies, the provisions for reporting alleged inadequacies of PRF should be included in the PWMP.

The IMO has provided a format for reporting alleged inadequacies of PRF in the Appendix 1 of the *Consolidated guidance for PRF providers and users* (MEPC.1/Circ. 834/Rev.1). It is also available through the Port Reception Facility section of the GISIS website. Completed reports should be forwarded to the flag Administration and, if possible, to the authorities of the port State.

Port States should ensure the provision of proper arrangements to consider and respond appropriately and effectively to reports of inadequacies, informing IMO and the reporting flag State of the outcome of their investigation. Therefore it is useful to embed these procedures in the PWMP. In general it is the responsibility of the Harbour Master to ensure that complaints regarding inadequacies of PRF are dealt with within an appropriate time scale.

It should also be made possible through the PWMP that any port user that believes there are any inadequacies regarding PRF in the port, is able to report this directly to the Port Manager or the person assigned by the port.

5.4 Optional elements for a PWMP

5.4.1 Definitions

In order to avoid discussions or misinterpretations about the key elements of the PWMP, it may be useful to include an overview of definitions, such as:

- definitions of the different types of waste that are accepted (or not) in the port;
- key elements of the cost recovery system (when applicable);
- the different types of ship;

- clarifications about the type of shipping that may affect the delivery of waste (e.g. “short sea shipping”, “regular port calls”, “scheduled traffic”, etc.);
- definitions regarding waste treatment (e.g. “recycling”, “treatment”, “disposal”, etc.);
- description of the involved competent authorities and/or stakeholders.

5.4.2 Overview of the relevant regulatory framework

As not all port users are equally familiar with the up-to-date environmental regulatory framework and the requirements regarding waste management on the national/regional or local level, it may be useful to include in the PWMP:

- an overview of the legislation applying to the port and the provision of PRF;
- a summary of relevant legislation and formalities for the delivery and collection of waste from ships;
- references of the applicable legislation and formalities for the downstream treatment of the waste.

5.4.3 Record keeping

It is important for the port authority (or who else may be responsible for the implementation of the PWMP) to keep record of all relevant documentation related to the delivery, collection and treatment of the waste from ships. Based on this information statistics can be drawn up which enables the port authority to tailor the waste management to the requirements of the port users in order to ensure sufficient capacity of reception facilities.

The most relevant documents to be collected, analysed and evaluated are:

- notification forms from vessels;
- waste delivery receipts;
- information regarding reporting alleged inadequacies of PRF.

It is advised that the port authority keeps copies of the above-mentioned documents for a minimum of 2 years. Furthermore, the data may be forwarded (or at least kept available) for statistical purposes to the environmental and/or maritime authorities.

5.4.4 Exemptions for frequent callers

Due to its type of trade, which is characterized by frequent port calls, short sea shipping and other types of frequent callers (e.g. ferries and tourist boats) may face significant costs and bureaucratic burden within the regime for the delivery of waste to PRF, as they may be expected to notify in advance and pay a waste fee at each and every port call.

To limit the financial burden on the sector, a reduced fee can be charged to vessels based on the type of traffic in which they are engaged.

Furthermore, in order to avoid undue burden for the parties concerned, ships engaged in scheduled traffic with frequent and regular port calls (e.g. at least one call every week/two weeks) are sometimes exempt from certain obligations deriving from the PWMP, when there is sufficient evidence that there are arrangements to ensure the delivery of the waste and the payment of fees. If this is the case, the PWMP should include an overview of the procedure to apply for such an exemption.

5.4.5 Monitoring and enforcement

Effective monitoring of the PWMP is essential to ensure that the plan is properly implemented and that the PRF are operating as required. The purpose of monitoring will be to ensure the functioning of the whole ship waste management system in practice, in accordance with the approved PWMP.

The monitoring of implementation of the plans could include an ad hoc inspection by the competent authority/authorities, at least once during the validity period of the PWMP (to align with the need for periodical reapproval). Inspections should be more frequent if regular complaints have been received about the inadequacy of PRF. The inspection of port facilities is often in the competence of different enforcement bodies and exercised within a different legal framework than that applicable to the inspections on board of ships. In this respect, a good collaboration between the enforcement authorities involved in the monitoring of the PWMP is important.

Competent authorities can develop inspection schemes to verify PWMP compliance (also see section 5.6.2 of this Guidance Document).

Apart from the verification of the PWMP, also the monitoring and enforcement of the ships' compliance with the waste delivery requirements is important. In principle, States have to ensure that all ships may be subject to an inspection and that a sufficient number of inspections is carried out. This general inspection requirement also includes fishing vessels and recreational craft. However, it might not be possible in practice to control all ships which do not deliver their waste in ports.

5.4.6 Brief description of the port

Most existing PWMPs start with a brief description of the port (including a map), providing general information regarding:

- the legal and institutional setup;
- general activities;
- geographical coordinates and nautical details;
- commercial activities and overview of cargo turnover;
- number and types of ship calling the port the previous years.

5.5 Flanking policy measures

5.5.1 The integration of waste from ships in a wider waste management strategy

A waste management strategy is a powerful tool to establish a coherent system of integrated waste management practices and facilities. A proper national waste management strategy leads to an efficient and effective operating waste management system easing the transition towards a circular economy, and therefore it should facilitate the development of regulations, procedures and infrastructure that lead towards the environmentally sound management of both hazardous and non-hazardous wastes. It describes the objectives and goals, and it outlines the practical issues such as collection, transport and storage, and the downstream waste management such as recycling and final disposal.

Key stakeholders such as governments and local authorities, waste generators, waste collectors and transporters, dealers, brokers, waste disposal facilities and non-governmental organizations, all have a crucial role to play.

MARPOL as such does not contain any specific requirements for the downstream management of waste from ships, as it only requires for the provision of adequate PRF and the proper reception of the wastes.

Still, once the wastes and cargo residues are offloaded from a ship, they must be managed in an environmentally sound manner in accordance with the provisions of the national waste management regulatory framework, and – when applicable – the provisions of the overarching waste strategy. According to the *IMO Guidelines for ensuring the adequacy of port waste reception facilities* (resolution MEPC.83(44)) the PRF must “allow for the ultimate disposal of ship-generated wastes and residues to take place in an environmentally appropriate way”.

Although port authorities are in general not directly involved with the provision and operation of downstream waste management infrastructure, the availability of adequate treatment options (e.g. recycling, incineration, landfill) in the vicinity of the port area can be an important advantage when establishing infrastructure for the reception of waste and cargo residues from ships, as this might have an impact on both the capacity and costs for the collection.

Some of these elements of the national waste management strategy may be addressed in the PWMP, such as:

5.5.1.1 *Waste prevention and minimization*

As a priority, waste prevention and minimization are key elements of a waste management strategy. Unnecessary waste generation burdens on waste transport and disposal facilities, and should be avoided. Of course, it is not always possible to efficiently incentivize waste prevention and minimization on board ships by applying land-based regulations.

Some ports therefore have implemented voluntary (financial) incentive schemes, such as a reduction of port fees or the (partial) reimbursement of waste fees for ships that have installed technology or apply management schemes that lead to reduced amounts of onboard generated waste. If this is the case, these procedures are to be included in the PWMP.

5.5.1.2 *Waste hierarchy*

When assessing the best practical environmental option for the management of waste, the following principles should be encouraged:

- 1** reduction of the amount of waste generated;
- 2** its re-use (either for the same or a different purpose);
- 3** recycling to recover value from the waste; and
- 4** composting or energy recovery.

Final disposal of the waste (landfilling, incineration without energy recovery) should only be undertaken if none of the above can be applied.

The most obvious application for ports is to provide facilities for recycling. While the amounts of recyclable waste from ships alone may not make it economic to provide special facilities, they may become viable if they are part of a coordinated system with the local community ashore (also see section 5.5.1.3 of this Guidance Document).

Businesses and visitors in port/terminal areas all produce wastes that must be disposed of and the consultation and involvement of shoreside recycling schemes and vessels that do segregate waste could be considered as part of the PWMP. It is recommended that planners review the manner in which waste from ships as well as port waste is handled by their contractors and encourage environmentally sustainable options in waste management. In particular planners should consider the needs of their customers for reception facilities for segregated wastes.

5.5.1.3 *Addressing both ship- and land-generated waste*

A basic principle when developing a waste management strategy for wastes and residues from ships, is that these ship-generated wastes should not be seen separate from land-based wastes: after all, ship-generated waste systems within a port do not exist in isolation from the rest of the port operations, services and infrastructure, and becomes a part of the total waste stream of a port, once received on shore. As both ship-generated wastes and land-generated wastes in the port are to be managed in an environmentally sound manner, it is obvious that a proper waste management strategy should address the management of both ship-generated wastes and land-generated wastes, either from a domestic or industrial origin.

Especially in smaller ports such as local ports, fishing ports and marinas, the volumes of ship-generated wastes delivered to PRF might not be sufficient enough in order to develop a cost-efficient waste management. Still, when combining the ship-generated wastes with similar wastes generated by land-based industrial activities and municipal wastes, volumes might be sufficient enough in order to establish not only an economically viable business opportunity, but also facilitate environmentally sound waste management.

5.5.1.4 *Cooperation between ports for the provision of PRF*

Increased cooperation between ports may also be a valuable and economically viable option for optimizing the downstream treatment of waste from ships: all ship-generated wastes may be received in all of the participating ports, but are then subsequently transported to central disposal facilities. Such a strategy can be more cost-efficient and effective than the provision of disposal facilities in each of the participating ports.

An inter-port strategy may be applicable on a subnational level, where ports in one country cooperate, or on an international level, where ports in neighbouring countries cooperate. In particular if ports are located in remote areas or in case of a cluster of small ports (e.g. SIDS), inter-port cooperation in the field of reception and treatment might be worthwhile to consider. In case of an international cooperation, special attention should be made to the requirements of the Basel Convention regarding the trans frontier movements of waste.

It can be noted that in 2015 the IMO has already agreed with a Regional Reception Facilities Plan (RRFP) for the *Small Island Developing States in the Pacific Region* (MEPC.1/Circ.859), and has developed a specific framework and guidance for addressing the adequacy of port reception facilities on a regional and inter-port level:

- 2012 resolution MEPC.216(63): *Regional arrangements for port reception facilities under MARPOL Annexes I, II, IV and V*;
- 2012 resolution MEPC.217(63): *Regional arrangements for port reception facilities under MARPOL Annex VI and Certification of marine diesel engines fitted with Selective Catalytic Reduction systems under the NO_x Technical Code 2008*;
- 2012 resolution MEPC.221(63): *Guidelines for the development of a regional reception facilities plan*.

In case of inter-port cooperation also the PWMP can be developed on a regional basis (also see section 5.5.2 of this Guidance Document).

5.5.1.5 Circular economy

Another important element is that an integrated approach to waste management incorporating the entire life cycle of waste, from the moment of generation until its disposal, may save considerable future expenses (the so-called “cradle-to-grave approach”). As ship-generated as well as land-generated wastes contain valuable materials, they might be recovered as a resource material for other industrial activities. Final disposal of these wastes would be an inefficient use of resources, and recovery options should be explored (the so-called “cradle-to-cradle approach”).

The following figure 6 indicates the composition of MARPOL Annex V waste that was collected by PRFs in the port of Antwerp in 2019: noting the substantial volume of plastic that was delivered, this may be a potential source for recycling (as long as the plastic is not mixed or contaminated). Also considering the fact that most likely there will also be plastics in the “other/mixed waste” category, this example indicates the importance of incentivizing a segregated delivery of garbage (also see section 5.5.1.6 of this Guidance Document).

Also for fishing ports this may be a valuable point of attention. Fishing gear consists of many differing types and materials.* However, as there are many types of plastic being used in the production of fishing gear (e.g. polystyrene, PVC), an analysis is necessary to assess the impact of these types of plastic on the recycling options.

* In 2020 the European Commission has published a Study on circular design of the fishing gear for reduction of environmental impacts (<https://op.europa.eu/en/publication-detail/-/publication/c8292148-e357-11ea-ad25-01aa75ed71a1/language-en/format-PDF/source-147995096>)

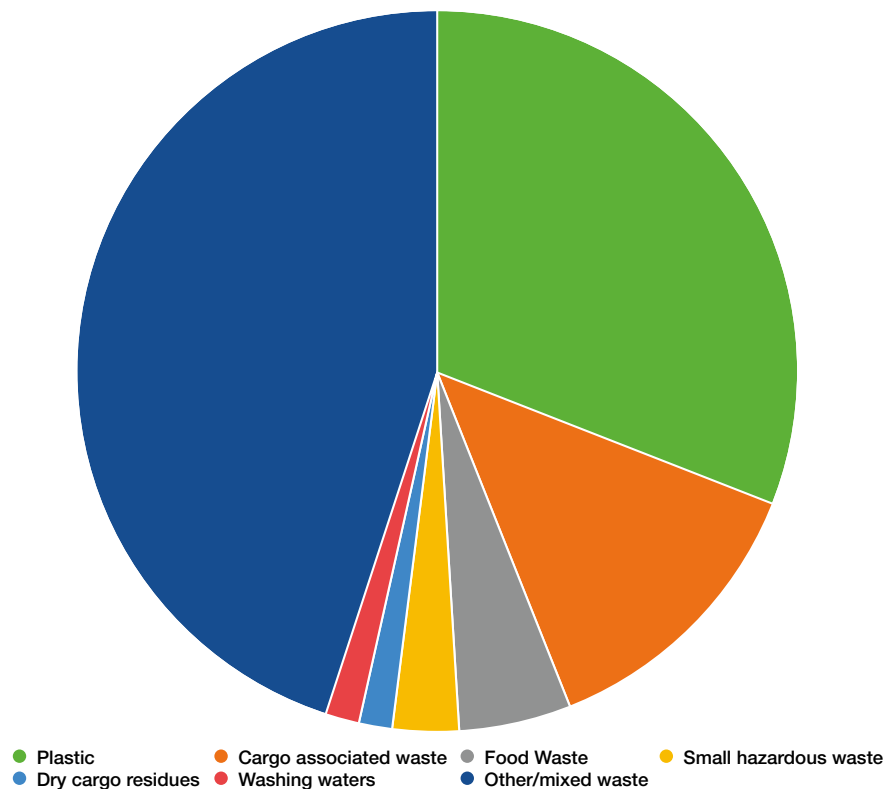


Figure 6: Composition of MARPOL Annex V waste collected in 2019 in the port of Antwerp (based on unpublished data collected by Flemish Waste Agency OVAM, Belgium)

5.5.1.6 Incentivizing the delivery of segregated waste

Procedures for collecting and storing garbage generated on board should be based on the consideration of: what is permitted and what is not permitted to be discharged into the sea while en route; and whether a particular garbage type can be discharged to PRF for recycling or reuse. Still, in order to reduce or avoid the need for extra sorting after the garbage has been delivered to a PRF and to facilitate reuse and recycling, it is preferable that the waste is directly segregated on board according to the recommendations of the IMO 2017 *Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.295(71)), which recommends that garbage is being segregated according to the following waste types:

- non-recyclable plastics and plastics mixed with non-plastic garbage;
- rags;
- recyclable material:
 - cooking oil
 - glass
 - aluminium cans
 - paper, cardboard, corrugated board
 - wood
 - metal
 - plastics (including Styrofoam or other similar plastic material);
- E-waste generated on board (e.g. electronic cards, gadgets, instruments, equipment, computers, printer cartridges, etc.); and
- garbage that might present a hazard to the ship or crew (e.g. oily rags, light bulbs, acids, chemicals, batteries, etc.).

As this is a recommendation and not a MARPOL-requirement, ships can still decide to deliver mixtures of wastes and residues. However, taking into account the principles of environmentally sound waste management, some port authorities and terminal operators decided to incentivize the delivery of certain types of segregated ship-generated waste. A certain practice that already is applied in several ports is to grant ships that deliver segregated wastes a reduction on the port dues and/or waste fee.

Sometimes the shipping industry indicates that even when garbage is being segregated on board according to the recommendations of the IMO guidelines, PRF still collect all wastes in one receptacle and thus mixing everything again. An option therefore could be to address this issue in port regulations in a way that already segregated waste that is delivered to a PRF is in principle to be accepted that way by the PRF and is to be kept segregated for further processing, in order to maximize the potential for recycling.

5.5.2 Regional Port Waste Management Plans

Ports within a certain region may not only choose to cooperate on the provision of adequate PRF but may also choose to develop a common PWMP. In some cases, the PWMP may be developed in a regional context with the appropriate involvement of each port.

Port Waste Management Planning on the basis of a regional arrangement can provide a solution when it is undertaken in such a manner as to ensure that vessels do not have an incentive to discharge waste into the sea. In the development of such regional plans it is imperative that the dedicated storage capacity of vessels involved is sufficient to retain their waste between ports of call. Such planning requires close collaboration between Member States in the same region.

In all cases, the need for, and availability of, adequate PRF has to be specified for each individual port.

5.6 Approval and review of the PWMP

5.6.1 Approval process

In most countries where an official approval process is in place, the authority approving and monitoring the PWMP is either the maritime authority or the environmental authority, at either national or regional level. Sometimes both of these authorities have a role, depending on the type and size of port.

Depending on the type and size of port, the evaluation and approval of the PWMP is usually done in separate stages and with different bodies involved in the process. In addition to the approval by the relevant authority, and in order to be ready for implementation, the plan usually also has to be adopted by the body governing or managing the port concerned.

In some countries or when there is no real approval process in place, the responsibility to provide an up-to-date PWMP may be delegated to the port authority, without an explicit approval (e.g. in some countries there are so many small ports/jetties that it is simply impossible to organize a written consent procedure for these plans). This can be the case for very small ports, small scale yacht moorings provided by hotels, facilities used only by day fishing vessels, fish farms where the majority of waste is generated by onshore facilities, etc.

Locations where fishing vessels are hauled onto beaches are unlikely to need a PWMP, although the controlling authority, e.g. the local council, should be made aware of the need to provide appropriate PRF.

5.6.2 Review

There should be an ongoing process to assess the effectiveness of the PWMP operation. Any comments or complaints should be fully considered, and any necessary remedial action taken. The plan should be kept up to date. It is preferable that there is a formal review of the PWMP at least every 3 to 5 years.

Also, if there is a significant change to the operation of the port, a revised PWMP is to be submitted for approval to the competent authority. Those significant changes may include structural changes in traffic to the port, development of new infrastructure, changes in the demand and provision of port reception facilities, and new onboard treatment techniques.

Authorities may also decide that if during the 3- to 5-year duration period of the PWMP no significant changes have taken place, the re-approval may consist of a validation of the existing PWMP.

6 Models of Port Waste Management Plans

6.1 Ports' characteristics impacting the delivery of waste from ships

Due to an extensive set of variable characteristics ports can be very different:

- geographical location, including the impact of Special Areas and/or seasonal influences such as obstruction of traffic because of occurrence of floating ice;
- size of the port;
- types of traffic (commercial, fishing, recreational, navy, offshore support, etc.);
- types of cargo being handled in the port;
- number of ships calling the port;
- size of the ships calling the port;
- port structure and governance;
- presence of industrial clusters in the port;
- existing capacity for waste collection, storage and treatment; and
- presence of densely populated areas in the port or in the immediate vicinity.

Also specific ship-related and certain operational elements influence the delivery of waste. According to the study on *The management of ship-generated waste types on-board ships* (CE Delft, 2017) ships can opt to treat waste on board and – when complying with the criteria – legally discharge the effluent at sea.

Common examples are:

- treatment of bilge water in an Oil Water Separator (OWS) and the subsequent discharge of the separated oil to a PRF and the water to the sea;
- sewage is treated in different ways and if well treated can be disposed at sea;
- food waste can be comminuted, shredded or passed through a grinder and afterwards disposed at sea or collected in bins and delivered to PRF; and
- washing waters containing certain types of cargo residue are often discharged legally at sea.

It is therefore clear that the need for adequate PRF, including the intermediate storage and downstream waste disposal facilities, is primarily determined by the port users' needs. And as their needs will be very different in differing ports, the provision of adequate PRF and the waste disposal options require good planning and design.

This will also impact the development of a PWMP.

The following sections will resume the key elements for the development of a "basic" PWMP, and focus on specific issues for the four types of port identified:

- merchant seaport;
- passenger/cruise port;
- fishing port; and
- recreational port (marina).

Furthermore a model of PWMP will be presented in the annexes of this Guidance Document for each of these four port types.

It should be noted that, as mentioned above, ports can be very different, even within the same target group. Therefore it will not be possible, within the Terms of Reference of this GloLitter Activity 1.2.1, to develop these models into a substantial level of detail.

The main goal of these model PWMPs is to improve the availability, adequacy and use of PRF, and the key elements are:

- Purpose of the PWMP
- Scope of the PWMP
- Overview of available PRFs
- Assessment of the need for PRF
- Description of the procedures related to the delivery and collection of the waste
 - Advance waste notification (not applicable to fishing ports and marinas)
 - Waste delivery receipt
 - Cost recovery system (when applicable)
- Stakeholder consultation
- Reporting of alleged inadequacies of PRF

In principle the following elements of the PWMP should be similar for each type of port:

- Purpose of the PWMP
- Stakeholder consultations
- Reporting of alleged inadequacies

Therefore these elements are not discussed in the following sections.

6.2 Merchant seaports, cruise/passenger ports

6.2.1 Scope of the PWMP

Unless the port provides terminals that focus on specific types of cargo only, merchant seaports in general receive all types of commercial ship for all types of trade. This can be container ships, dry/liquid bulk, car carriers, breakbulk, etc.

Depending on the size of the port and the way the collection of waste from ships is organized, the planner can decide to exempt certain types of port related shipping active in the port (such as tugboats, dredging vessels, pilot boats, etc.).

Due to the size of the ships that often call cruise ports and large passenger ports, the development of a PWMP for these types of port are in general similar to the ones used in merchant seaports.

There may be a possibility that the merchant seaport also receives fishing vessels and recreational craft, but they often call specific areas in the port (outside the jurisdiction of the port authority) for which a specific PWMP may be developed.



Figure 7: Port Sudan (Sudan) (Photo credit: Peter Van den dries)

6.2.2 Overview of available PRFs

As merchant seaports are characterized by receiving a broad variation of ship types, in general they also have to foresee the availability of PRF for different types of waste, covering all MARPOL Annexes:

MARPOL Annex	Waste type
Annex I (Oil)	Oily bilge water Oily residues (sludge) Oily tank washings Dirty ballast water Scale and sludge from tank cleaning Other (specify)
Annex II (NLS) (*)	Category X substance Category Y substance Category Z substance Other
Annex IV (Sewage)	

MARPOL Annex	Waste type
Annex V (Garbage)	A) Plastics B) Food waste C) Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) D) Cooking oil E) Incinerator ashes F) Operational waste G) Animal carcasses (*) H) Fishing gear (**) I) E-waste J) Cargo residues (Harmful to the Marine Environment, HME) (*) K) Cargo residues (non-HME) (*)
Annex VI (Air pollution related)	Ozone depleting substances and equipment containing such substances Exhaust gas cleaning residues

(*) Not applicable to cruise/passenger ports

(**) Only in case the fishing port falls within the jurisdiction of the port authority and therefore is to be included in the PWMP

For cruise/passenger ports the main focus will be on the collection of garbage, and the need for the collection of segregated waste streams (depending on the need of the ships using the PRF). Although they also generate other types of waste, passenger and cruise vessels are characterized by the extensive volumes of garbage that they produce, due to the amount of people on board. According to a 2007 study* it has been estimated that, although cruise ships represent less than 1% of the global merchant fleet, they are responsible for 25% of all waste generated by merchant vessels. This volume of waste produces pressures on the environment, particularly with respect to disposal at ports of call.

6.2.3 Assessment of the need for PRF

Considering the wide range of waste types (including cargo residues) and larger volumes that may be expected in merchant seaports, the need for PRF (assessed by comparing the amounts of each type of waste actually collected in the port, the amounts of each type of waste which should be collected in the port, and the amounts of each type of waste stored by ships for delivery in other ports) can be quite difficult.

In general the aim is to estimate as accurate as possible the existing situation (types and volumes of waste actually delivered) and compare with the actual need for the ships (maybe not all ships deliver due to lack of adequate facilities, or the application of unreasonable charges). Also an estimate of the situation in the immediate future are to be taken into account (e.g. opening of new terminals that may affect the number and types of ship calling the port, or new types of cargo residues to be collected).

Section 5.3.4 provides several tools that may help to gather useful information. One of the options is to use a questionnaire (or parts thereof), such as the example in Annex 5 of this Guidance Document.

In merchant seaports operations in general take place 24/7, which may impact the need for PRF outside normal operating hours.

* The impact of cruise ship-generated waste on home ports and ports of call: A study of Southampton (September 2007, Marine Policy 31(5):591-598)

Also different types of PRF are to be taken into consideration (truck, barge, fixed facility). When assessing the use of fixed facilities the choice of location is to be well chosen, as ships might need to shift berths which is not only a time-consuming and expensive operation, but this may also lead to undue delay or ships not being keen to use the PRF. Appropriate sites for fixed garbage receptacles therefore include wharves adjacent to moorages, access points to docks, fuel stations and boat launching ramps.



Figure 8: *Collecting barge in port of Rotterdam (NL)*
(Photo credit: Bek & Verburg, NL)

Although it is still possible for sewage to be legally discharged at sea, some passenger and cruise ship owners and operators, for reasons of sustainability, prefer to deliver it to a PRF. Due to the extensive volumes generated by large cruise ships and in order to optimize delivery, the construction of sewage pipelines to each berth might be a feasible option. Especially in passenger ports, where the same vessels often call on a frequent and regular basis, specific facilities can be provided in order to facilitate the collection of liquid wastes, using standardized pipe connections.

In general cruise vessels are equipped with extensive onboard garbage treatment technology (compactors, grinders, shredders, incinerators, etc.), and that materials like paper, metal and glass in many cases are being collected separately inside the ship. This may impact the provision of PRF.

It can also be noted that seasonal traffic and increased tourism may have a substantial impact on the volumes of waste delivered by passenger and cruise vessels.

Although port authorities are in general not directly involved with the provision and operation of downstream waste management infrastructure, the availability of adequate treatment options (e.g. recycling, incineration, landfill) in the vicinity of the port area (e.g. for industrial activities) can be an important advantage when establishing infrastructure for the reception of ship-generated waste, as this may have an impact on both the capacity and the cost for the collection and treatment.



Figure 9: Sewage collection in port of Trelleborg, Sweden
(Photo credit: Clean Baltic Sea Shipping)

6.2.4 Description of procedures related to the delivery and collection of the waste

6.2.4.1 Advance waste notification

In merchant seaport the use of advance waste notification is widely applied, not only in order to provide proper planning to organize collection of the waste from ships and avoid undue delay, but also to allow the port authority for collecting statistics and/or calculating a waste fee.

The PWMP should provide all the information that is necessary in order to be able to complete an advance waste notification:

- a model of the notification format: it is recommended to use the standardized IMO Advance Notification Form;*
- information regarding the timing when the advance notification is to be forwarded (e.g. at least 24 hours before calling the port);
- how the information is to be provided (electronically, email, etc.);
- who is to forward the information (the Master of the ship, or the ship's agent);
- details of who is receiving the notification (e.g. Harbour Master's office, port's environmental or operational department), including the contact details (address, telephone number, email, website).

In cruise/passenger ports the use of advance waste notification often depends on the regularity of the vessels calling: as this type of traffic is often characterized by scheduled sailings with the same ships returning to the same port on a regular and frequent basis, arrangements for the delivery of the waste can be made between the ship operator and the PRF. Therefore it is not always necessary to use the advance waste notification scheme.

* Appendix 2 of the IMO Consolidated guidance for PRF providers and users (MEPC.1/Circ.834/Rev.1)

In many cases, especially in larger ports, this notification process is automatized and the agent representing the ship notifies the information of the Advance Notification Form directly into the port's information system.

6.2.4.2 Waste delivery receipt

The use of a Waste Delivery Receipt (WDR) is in many cases generally applied in merchant seaports. The WDR is a useful tool:

- for the ship and PRF to document waste delivery and collection;
- for the port authority to collect accurate data on waste actually delivered to reception facilities in its port;
- for the enforcing authorities to facilitate inspections.

The PWMP should provide all the information that is necessary for port users to be able to correctly use the WDR:

- a model of the WDR (also here it is recommended to use the IMO standardized format);*
- when and by whom the WDR is to be completed.

In ports with unmanned reception facilities it is not always possible to provide the ship's master with a WDR.

6.2.4.3 Cost recovery system

Although not required by MARPOL, the usage of charging/cost recovery systems is widely applied in merchant seaports. In a Guidance Document[†] on cost recovery systems developed within the framework of the Mediterranean Action Plan on Marine Litter, the following recommendations for cost recovery systems in merchant seaports and cruise/passenger ports were identified per waste type:

MARPOL Annex I	<ul style="list-style-type: none"> – For ship-generated oily waste (bilge water, sludge, waste oil): application of a system containing a fixed indirect fee supplemented with a refundable (deposit) part or penalty (in case of no delivery) – For MARPOL Annex I cargo residues and washing waters: in general the delivery of cargo residues and washing waters is to be charged directly, linked to the amount of waste delivered
MARPOL Annex II (*)	Application of a direct fee system, linked to the amounts of waste delivered to the PRF
MARPOL Annex IV	Depending on the normal and expected traffic in the port (amounts of sewage normally delivered), application of an indirect cost recovery system with unlimited or reasonable amounts.
MARPOL Annex V	<ul style="list-style-type: none"> – For garbage: 100% indirect[‡] cost recovery system, including a full or partial right to deliver – For cargo residues: application of a direct fee system, linked to the amounts of waste delivered to the PRF – As cruise/passenger ports may be heavily affected by seasonal traffic (many ships in high season), also indirect systems can be applied during these periods
MARPOL Annex VI	Application of a direct fee system, linked to the amounts of waste delivered to the PRF

(*) Not applicable to cruise/passenger ports

* Appendix 3 of the IMO *Consolidated guidance for PRF providers and users* (MEPC.1/Circ.834/Rev.1)

† Guidance to determine the application of charges at reasonable costs for the use of PRF or, when applicable, application of the no-special-fee system, in the Mediterranean (REMPEC, 2019)

‡ An "indirect fee system" means a system where a fee is paid by the ship for the provision of PRF, irrespective of the actual delivery of waste from the ship. Depending on the system, the fee can cover full (100%) or partial cost of the waste delivery.

6.3 Fishing ports

6.3.1 Scope of the PWMP

As fishing ports in general are mainly called by no other ships than fishing vessels, the scope of the PWMP may be limited. A possible distinction that could be made is between commercial and recreational fishing.

6.3.2 Overview of available PRF

Compared with other types of shipping, wastes generated by fishing vessels are less diverse. Although the use of mobile collection facilities may be efficient in large fishing ports, the provision of a limited number and types of fixed reception facilities on the quayside can already be adequate.

Due to the limited types of waste that are delivered by fishing vessels, in general fishing ports can focus on the collection of MARPOL Annex I (bilge water and waste oil) and MARPOL Annex V (garbage, including fishing gear). As a consequence, the collection of waste from fishing vessels can be organized relatively easily using tanker trucks (for the bilge water) and drums (for the waste oil), containers and skips (for the garbage and fishing gear).

PRF are to be provided for the following waste types:

MARPOL Annex	Waste type
Annex I (Oil)	Oily bilge water Other (specify)
Annex V (Garbage)	<ul style="list-style-type: none"> A) Plastics B) Food waste C) Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) D) Cooking oil F) Operational waste H) Fishing gear I) E-waste



Figure 10: Receptacles for garbage in port of Favignana, Italy
(Photo credit: Peter Van den dries)

6.3.3 Assessment of the need for PRF

Although rather simple and straightforward, the use of skips and waste containers on the quayside can already be quite adequate PRF for garbage from fishing vessels. Depending on the size of the fishing ports and the number of vessels calling, a number of separate drums/skips/waste containers may be useful for the waste types that the majority of the vessels may deliver:

- waste fishing gear
- other plastics/plastic packaging
- paper/cardboard
- glass
- mixed/domestic waste
- some types of hazardous waste.

In some countries schemes have been set up for the collection and management of passively fished waste, sometimes called “fishing for litter”: these schemes aim to reduce marine litter by working with the commercial fishing industry. Participating fishing vessels are provided with large bags to collect litter floating on the ocean surface or dragged up in their nets. The bags are unloaded when the vessels come into port and collected regularly, enabling the contents to be recycled or appropriately managed via energy-from-waste incineration or landfill. Depending on the local policy initiatives and practices, PRF may also be provided for passively fished waste and retrieved ALDFG.

6.3.4 Description of procedures related to the delivery and collection of the waste

6.3.4.1 Advance waste notification

In general not applicable at fishing ports.

6.3.4.2 Waste delivery receipt

Not always applied at fishing ports.

6.3.4.3 Cost recovery system

In smaller ports the use of PRF for fishing vessels, local harbour craft and for visiting vessels is often provided as part of the harbour dues. Visiting commercial craft can be charged on an ad hoc basis for the PRF that they will require. This can either be arranged via the harbour's staff or via the vessel's agent.

In some countries the cost recovery scheme for fishing vessels is arranged at a national or sub-national level.

In order not to discourage fishers to participate in the so-called "fishing for litter" schemes, the cost for collection and treatment of passively fished waste and retrieved ALDFG are not to be paid by fishers, and may be covered by alternative financing/subsidies on a national or sub-national level.

6.4 Recreational ports

6.4.1 Scope of the PWMP

As recreational ports in general are only used by no other ships than recreational craft, the scope of the PWMP may be limited.



Figure 11: Marina di Ragusa, Italy (Photo credit: Peter Van den dries)

6.4.2 Overview of available PRF and assessment of the need for PRF

In marinas/recreational ports it is not always necessary to provide large and differentiated PRF. Only in case the port is used by a substantial number of large yachts, the types and volume of delivered waste will be relatively limited.

By far the largest volume of ship-generated waste to be delivered to a PRF in a marina will be garbage, mainly of a domestic type. As in these ports the main types of waste delivered will be garbage and household waste, general receptacles designed for the collection of the most common fractions of household waste will be sufficient.

Plastic, paper and cardboard wrapping materials, steel, tin and aluminum food and drink cans, glass and plastic bottles, etc. will all need to be accepted by a marina's PRF.

MARPOL Annex	Waste type
Annex I (Oil)	Oily bilge water Other (specify)
Annex IV (Sewage)	Also from chemical toilets
Annex V (Garbage)	<ul style="list-style-type: none"> A) Plastics B) Food waste C) Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) D) Cooking oil I) E-waste



Figure 12: Receptacles for garbage in Marina di Ragusa, Italy
(Photo credit: Peter Van den dries)

Depending on possible local discharge requirements and taking into account the size of the port (e.g. facilitating large motor yachts) and the number and types of ship calling, it might be useful to equip the facility with a pumping station for the collection of bilge water (oily water mixture, mainly consisting of water) and/or waste from chemical toilets.

Also some specific receptacles may be provided for certain types of hazardous wastes (batteries, E-waste, paint boxes, oil, etc.).

6.4.3 *Description of procedures related to the delivery and collection of the waste*

6.4.3.1 *Advance waste notification*

Not applicable at recreational ports.

6.4.3.2 *Waste delivery receipt*

In general not applied in recreational ports.

6.4.3.3 *Cost recovery system*

In recreational ports the use of PRF is mostly provided as part of the harbour dues, and may vary depending on the size of the vessel. Visiting vessels can be charged on an ad hoc basis for the PRF that they will require.

7 Useful references

Marine litter (general)

Fanshawe, T., & Everard, M. 2002. *The impacts of marine litter*. Report of the Marine Litter Task Team. Marine Pollution Monitoring Management Group.

GESAMP. 2016. *Sources, fate and effects of microplastics in the marine environment: Part 2 of a global assessment*. GESAMP Reports and Studies Series No. 93 (ed. by P.J. Kershaw, & C.M. Rochman). IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection.

GESAMP. 2019. *Guidelines for the monitoring and assessment of plastic litter in the ocean*. GESAMP Reports and Studies Series No. 99 (ed. by P.J. Kershaw, A. Turra & F. Galgani). IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP/ISA Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection.

GESAMP. 2020. *Proceedings of the GESAMP International Workshop on assessing the risks associated with plastics and microplastics in the marine environment*. Reports to GESAMP No. 103 (ed. by P.J. Kershaw, B. Carney Almroth, P. Villarrubia-Gómez, A.A. Koelmans & T. Gouin). IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP/ISA Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection.

GESAMP. 2021. *Sea-based sources of marine litter*. GESAMP Reports and Studies Series No. 108 (ed. by K. Gilardi). IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP/ISA Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection.

Mouat, J., Lopez Lozano, R. & Bateson, H. 2010. *Economic impacts of marine litter*. KIMO (Kommunernes Internationl Miljøorganisation).

Sherrington, C., Darrah, C., Hann, S., Cole, G. & Corbin, M. 2016. *Study to support the development of measures to combat a range of marine litter sources*. Report for DG Environment of the European Commission. Bristol, Eunomia Research & Consulting Ltd.

Ten Brink, P., Lutchman, I., Bassi, S., Speck, S., Sheavly, S., Register, K. & Woolaway, C. 2009. *Guidelines on the use of market-based instruments to address the problem of marine litter*. Brussels, Institute for European Environmental Policy / Sheavly Consultants, Virginia Beach, VA, USA.

Van Acoleyen, M., Laureysens, I., Lambert, S., Raport, L., Van Sluis, C., Kater, B., van Onselen, E., Veiga, J. & Ferreira, M. 2014. *Marine Litter study to support the establishment of an initial quantitative headline reduction target – SFRA0025*. Report for DG Environment of the European Commission. Brussels, ARCADIS / Leiden, Coastal and Marine Union (EUCC).

Veiga, J.M., Fleet, D., Kinsey, S., Nilsson, P., Vlachogianni, T., Werner, S., Galgani, F., Thompson, R.C., Dagevos, J., Gago, J., Sobral, P. & Cronin, R. 2016. *Identifying sources of marine litter*. JRC Technical Report. Luxembourg, Publications Office of the European Union.

Verlis, K. & Wilson, S. 2020. Paradise trashed: Sources and solutions to marine litter in a small island developing state. *Waste Management*, 103: 128–136.

<https://doi.org/10.1016/j.wasman.2019.12.020>.

Legal and policy framework

Ecorys. 2017. Supporting study for an impact assessment for the revision of Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues. Presentation of the report for the European Commission.

https://portal.helcom.fi/meetings/MARITIME%2017-2017-409/Related%20Information/6_Revision%20of%20Directive%202000-59-EC%20on%20PRF_EU.pdf.

Hastings, E. & Potts, T. 2013. Marine litter: Progress in developing an integrated policy approach in Scotland. *Marine Policy*, 42: 49–55.

<https://doi.org/10.1016/j.marpol.2013.01.024>.

HELCOM (Baltic Marine Environment Protection Commission). 2015. Regional Action Plan for Marine Litter in the Baltic Sea.

<https://helcom.fi/wp-content/uploads/2019/08/Regional-Action-Plan-for-Marine-Litter.pdf>.

IMO. 2016. Recommendation to encourage action to combat marine litter. Annex 8 to Report of the 38th Consultative Meeting of Contracting Parties to the London Convention and the 11th Meeting of Contracting Parties to the London Protocol, LC 38/16. 18 October 2016.

IMO. 2018. Action plan to address marine plastic litter from ships. Resolution MEPC.310(73) of the Marine Environment Protection Committee. Adopted 26 October 2018.

<https://www.wcdn.imo.org/localresources/en/MediaCentre/HotTopics/Documents/IMO%20marine%20litter%20action%20plan%20MEPC%2073-19-Add-1.pdf>.

International Convention for the Prevention of Pollution from Ships (MARPOL). 1973.

[https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx).

London Convention. 1972. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

<https://www.wcdn.imo.org/localresources/en/OurWork/Environment/Documents/LC1972.pdf>.

London Protocol. 2006. 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (as amended in 2006).

<https://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Pages/LDC-LC-LP.aspx>.

Panteia & Pwc. 2015. *Ex-post evaluation of Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues*. Report for the European Commission.

<https://ec.europa.eu/transport/sites/transport/files/modes/maritime/studies/doc/2015-ex-post-evaluation-of-dir-2000-59-ec.pdf>.

REMPEC (Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea). 2019. Operational Guidelines on the provision of reception facilities in ports and the delivery of ship-generated wastes in the Mediterranean. REMPEC/WG.45/9/1. Adopted at the 13th Meeting of the REMPEC Focal Points.

Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. n.d. Overview of technical guidelines adopted under the Basel Convention:

<http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/TechnicalGuidelines/tabid/8025/Default.aspx>.

Sherrington, C., Darrah, C., Hann, S., Cole, G. & Corbin, M. 2016. *Study to support the development of measures to combat a range of marine litter sources*. Report for DG Environment of the European Commission. Bristol, Eunomia Research & Consulting Ltd.

SPREP (Secretariat of the Pacific Regional Environment Programme). 2015. A Regional Reception Facilities Plan for the *Small Island Developing States in the Pacific region*. SPREP/IMO.

https://www.sprep.org/attachments/Publications/WMPC/reception_facilities_plan_final.pdf.

UNEP. 2009. *Marine litter: A global challenge*. Nairobi, UNEP.

UNEP/MAP (United Nations Environment Programme / Mediterranean Action Plan). 2015. *Marine litter assessment in the Mediterranean*. Athens, UNEP/MAP.

Waste from ships

CE Delft. 2017. *The management of ship-generated waste on-board ships*. Report for the European Maritime Safety Agency.

Earll, R.C., Williams, A.T. & Tudor, D.T. 2000. *Pilot project to establish methodologies and guidelines to identify marine litter from shipping*. Report for the Maritime and Coastguard Agency (research project 470). Prepared by Coastal Management for Sustainability.

Jägerbrand, A.K., Brutemark, A., Barthel Svedén, J. & Gren, I.-M. 2019. A review on the environmental impacts of shipping on aquatic and nearshore ecosystems. *Science of the Total Environment*, 695.

<https://doi.org/10.1016/j.scitotenv.2019.133637>.

NOWPAP MERRAC (Northwest Pacific Action Plan Marine Environmental Emergency Preparedness and Response Regional Activity Centre). 2015. *Best practices in dealing with marine litter in fisheries, aquaculture and shipping sectors in the NOWPAP region*.

Sanches, V.L., Aguiar, M.R.d.C.M., de Freitas, M.A.V. & Pacheco, E.B.A.V. 2020. Management of cruise ship-generated solid waste: A review. *Marine Pollution Bulletin*, 151.

<https://doi.org/10.1016/j.marpolbul.2019.110785>.

Slišković, M., Boljat, H.U., Jelaska, I. & Mrčelić, G.J. 2018. Review of generated waste from cruisers: Dubrovnik, Split, and Zadar port case studies. *Resources* 7(4).

<https://doi.org/10.3390/resources7040072>.

Widmer, W., Underwood, A.J. & Chapman, M.G. 2002. Recreational boating on Sydney Harbour: Public perception of potential environmental impacts. *Natural Resource Management*, 5: 22–27.

WSC (World Shipping Council). 2014. Survey results for containers lost at sea – 2014 update.

WSC. 2017. Containers lost at sea – 2017 update. World Shipping Council press release issued on 10 July 2017.

WSC. 2020. Containers lost at sea – 2020 update. World Shipping Council press release.

Fishing as a source of marine litter

Da Ros, L., Delaney, E., Fiorin, R., Lucaroni, G., Moschino, V., Nesto, N., Picone, M., Riccato, F., Tonin, S. & Zambetti, V. 2016. *Hands-on manual to prevent and reduce abandoned fishing gears at sea*. Produced under the LIFE-GHOST Project (“Techniques to reduce the impacts of ghost fishing gears and to improve biodiversity in North Adriatic coastal areas”).

<http://www.buildingevidence.group/library/publications/GHOST%20Hands-on-manual.pdf>.

FAO. 2004. Report of the fifth session of the Advisory Committee on Fisheries Research (Rome, 12–15 October 2004). FAO Fisheries Report No. 758. Rome, FAO.

<https://www.fao.org/3/y5778e/y5778e.pdf>.

FAO. 2012. *Recreational fisheries*. FAO Technical Guidelines for Responsible Fisheries No. 13. Rome, FAO.

<https://www.fao.org/3/i2708e/i2708e.pdf>.

FAO. 2014. Report of the 24th session of the Coordinating Working Party on Fishery Statistics (Rome, 5–8 February 2013). FAO Fisheries and Aquaculture Report No. 1077. FAO, Rome.

<https://www.fao.org/3/i4034e/i4034e.pdf>.

FAO. 2015. *Voluntary guidelines for securing sustainable small-scale fisheries in the context of food security and poverty eradication*. Rome, FAO.

<https://www.fao.org/3/i4356en/I4356EN.pdf>.

FAO. 2018. *The State of World Fisheries and Aquaculture 2018: Meeting the Sustainable Development Goals*. Rome, FAO.

<https://www.fao.org/3/i9540en/I9540EN.pdf>.

FAO. 2019a. *Voluntary guidelines on the marking of fishing gear – Directives volontaires sur le marquage des engins de pêche – Directrices voluntarias sobre el marcado de las artes de pesca*. Rome, FAO.

<https://www.fao.org/3/ca3546t/CA3546T.pdf>.

FAO. 2019b. Report of the third meeting of the Regional Working Group on Illegal, Unreported and Unregulated Fishing (Bridgetown, 26–28 September 2018). FAO Fisheries and Aquaculture Report No. 1296. Bridgetown, FAO.

<https://www.fao.org/3/ca7572en/CA7572EN.pdf>.

FAO. 2020. *The State of World Fisheries and Aquaculture 2020: Sustainability in action*. Rome, FAO.

<https://www.fao.org/3/ca9229en/ca9229en.pdf>.

Gilman, E. 2015. Status of international monitoring and management of abandoned, lost and discarded fishing gear and ghost fishing. *Marine Policy*, 60: 225–239.

<https://doi.org/10.1016/j.marpol.2015.06.016>.

Gilman, E., Chopin, F., Suuronen, P. & Kuemlangan, B. 2016. *Abandoned, lost and discarded gillnets and trammel nets: Methods to estimate ghost fishing mortality, and the status of regional monitoring and management*. FAO Fisheries and Aquaculture Technical Paper No. 600. Rome, FAO.

<https://www.fao.org/3/i5051e/i5051e.pdf>.

Huntington, T. 2017. *Development of a best practice framework for the management of fishing gear – Part 2: Best practice framework for the management of fishing gear*. Global Ghost Gear Initiative.

Kim, S.-G., Lee, W.-I. & Yuseok, M. 2014. The estimation of derelict fishing gear in the coastal waters of South Korea: Trap and gill-net fisheries. *Marine Policy*, 46: 119–122.

<https://doi.org/10.1016/j.marpol.2014.01.006>.

Link, J., Segal, B. & Casarini, L.M. 2019. Abandoned, lost or otherwise discarded fishing gear in Brazil: A review. *Perspectives in Ecology and Conservation*, 17(1): 1–8.

<https://doi.org/10.1016/j.pecon.2018.12.003>.

Macfadyen, G., Huntington, T. & Cappell, R. 2009. *Abandoned, lost or otherwise discarded fishing gear*. UNEP Regional Seas Reports and Studies No. 185 / FAO Fisheries and Aquaculture Technical Paper No. 523. Rome, UNEP/FAO.

<https://www.fao.org/3/i0620e/i0620e.pdf>.

Matthews, T. R. & Glazer, R. A. 2010. Assessing opinions on abandoned, lost, or discarded fishing gear in the Caribbean. In *Proceedings of the 62nd annual meeting of the Gulf and Caribbean Fisheries Institute, Cumana, Venezuela, 2–6 November 2009*, 12–22. Gulf and Caribbean Fisheries Institute.

Mengo, E. 2017. *A review of marine litter management practices for the fishing industry in the north-east Atlantic area*. Report for OSPAR Action 36 (“To develop best practice in the fishing industry”). Cefas (Centre for Environment, Fisheries and Aquaculture Science).

Milliken, A.S. & Lee, V. 1990. *Pollution impacts from recreational boating: A bibliography and summary review*. Narragansett, RI, Rhode Island Sea Grant Publications.

Mobilik, J.-M., Ling, T.-Y., Husain, M.-L. & Hassan, R. 2016. Type and quantity of shipborne garbage at selected tropical beaches. *The Scientific World Journal*, 2016, Article ID 5126951.

<http://dx.doi.org/10.1155/2016/5126951>.

MRAG Europe, IPMA (Portuguese Institute for Sea and Atmosphere), Wageningen University and Research, Technical University of Denmark, Spanish Institute of Oceanography, Thünen Institute, Marine Institute (Foras na Mara), Cefas (Centre for Environment, Fisheries and Aquaculture Science) & AZTI-Tecnalia. 2020. *Study on circular design of the fishing gear for reduction of environmental impacts*. Report for the Executive Agency for Small and Medium-sized Enterprises of the European Commission. Luxembourg, Publications Office of the European Union.

<https://data.europa.eu/doi/10.2826/548271>.

NOAA (National Oceanic and Atmospheric Administration). 2015. *Impact of “ghost fishing” via derelict fishing gear*. Report of the NOAA Marine Debris Program. Silver Spring, MD, USA, NOAA.

https://marinedebris.noaa.gov/sites/default/files/publications-files/Ghostfishing_DFG.pdf.

Richardson, K., Hardesty, B.D. & Wilcox, C. 2019. Estimates of fishing gear loss rates at a global scale: A literature review and meta-analysis. *Fish and Fisheries*, 20(6): 1218–1231.

<https://doi.org/10.1111/faf.12407>.

Richardson, K., Haynes, D., Talouli, A. & Donoghue, M. 2017. Marine pollution originating from purse seine and longline fishing vessel operations in the Western and Central Pacific Ocean, 2003–2015. *Ambio*, 46(2):190–200.

<https://doi.org/10.1007/s13280-016-0811-8>.

Richardson, K., Asmutis-Silvia, R., Drinkwin, J., Gilardi, K.V.K., Giskes, I., Jones, G., O’Brien, K., Pragnell-Raasch, H., Ludwig, L., Antonelis, K., Barco, S., Henry, A., Knowlton, A., Landry, S., Mattila, D., MacDonald, K., Moore, M., Morgan, J., Robbins, J., van der Hoop, J. & Hogan, E. 2019. Building evidence around ghost gear: Global trends and analysis for sustainable solutions at scale. *Marine Pollution Bulletin*, 138: 222–229.

<https://doi.org/10.1016/j.marpolbul.2018.11.031>.

Circular economy

Bilkovic, D.M., Havens, K.J., Stanhope, D.M. & Angstadt, K.T. 2012. Use of fully biodegradable panels to reduce derelict pot threats to marine fauna. *Conservation Biology*, 26(6): 957–966.

<https://doi.org/10.1111/j.1523-1739.2012.01939.x>.

Kim, S., Kim, P., Lim, J., An, H. & Suuronen, P. 2016. Use of biodegradable driftnets to prevent ghost fishing: Physical properties and fishing performance for yellow croaker. *Animal Conservation*, 19(4): 309–319.

<https://doi.org/10.1111/acv.12256>.

Lopez, J., Ferarios, J.M., Santiago, J., Ubis, M., Moreno, G. & Murua, H. 2019. Evaluating potential biodegradable twines for use in the tropical tuna FAD fishery. *Fisheries Research*, 219.

<https://doi.org/10.1016/j.fishres.2019.105321>.

MRAG Europe, IPMA (Portuguese Institute for Sea and Atmosphere), Wageningen University and Research, Technical University of Denmark, Spanish Institute of Oceanography, Thünen Institute, Marine Institute (Foras na Mara), Cefas (Centre for Environment, Fisheries and Aquaculture Science) & AZTI-Tecnalia. 2020. *Study on circular design of the fishing gear for reduction of environmental impacts.* Report for the Executive Agency for Small and Medium-sized Enterprises of the European Commission. Luxembourg, Publications Office of the European Union.

<https://data.europa.eu/doi/10.2826/548271>.

ScienceDirect. n.d. Cradle-to-grave [overview of topics].

<https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/cradle-to-grave>.

UNEP. 2004. *Why take a life cycle approach?* UNEP/SETAC Life Cycle Initiative. Paris, UNEP.

https://sustainabledevelopment.un.org/content/documents/846Why_take_a_life_cycle_approach_EN.pdf.

UNEP. 2005. *Life cycle approaches: The road from analysis to practice.* UNEP/SETAC Life Cycle Initiative. Paris, UNEP.

<https://www.lifecycleinitiative.org/wp-content/uploads/2012/12/2005%20-%20LCA.pdf>.

8 Annexes

Annex 1	Model of Port Waste Management Plan for merchant seaports and cruise/passenger ports
Annex 2	Model of Port Waste Management Plan for fishing ports
Annex 3	Model of Port Waste Management Plan for recreational ports
Annex 4	Pre-assessment questionnaire for merchant seaports
Annex 5	Pre-assessment questionnaire for fishing ports

Annex 1 Model of Port Waste Management Plan for merchant seaports and cruise/passenger ports

Section 1: Identification of the port

Name of the port:
Address:
Geographical coordinates:
Type of port (several options possible):
<input type="checkbox"/> merchant seaport
<input type="checkbox"/> passenger port
<input type="checkbox"/> cruise port
<input type="checkbox"/> fishing port
<input type="checkbox"/> recreational port/marina
<input type="checkbox"/> other (please describe)

Section 2: Purpose of the PWMP

The overall purpose of the PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port, in order to protect the marine environment by reducing discharges into the sea of waste from ships, including cargo residues.

Its objectives are:

- To reduce illegal discharge of waste from vessels;
- To comply with legal duties with regard to waste management;
- To consult with port users, ship agents, operators, waste contractors and regulators in the development and implementation of waste management strategies and measures;
- To prevent the production of waste wherever possible; and
- To re-use or recycle waste wherever possible.

Section 3: Scope of the PWMP

Ships calling the port to which this PWMP applies (several options possible):

seagoing vessels international shipping
 inland navigation domestic shipping
 both both

Type of ships:

merchant vessels passenger vessels
 dry bulk passenger
 container ferries
 ro-ro cruise vessels
 oil tanker other (please describe)
 chemical/product tanker
 LNG/LPG
 mobile offshore drilling units
 other (please describe)

other (please describe)

Are there certain areas within the port outside the port authorities' jurisdiction:

no
 yes (please describe)

Section 4: Overview of available PRFs

PRF are available for the following types of waste (more than one option possible):

MARPOL Annex	Waste type	Type of PRF		
		Truck	Barge	Fixed (***)
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Oily tank washings <input type="checkbox"/> Dirty ballast water <input type="checkbox"/> Scale and sludge from tank cleaning <input type="checkbox"/> Other (specify)			
Annex II (NLS) (*)	<input type="checkbox"/> Category X substance <input type="checkbox"/> Category Y substance <input type="checkbox"/> Category Z substance <input type="checkbox"/> Other			
Annex IV (Sewage)	<input type="checkbox"/>			

MARPOL Annex	Waste type	Type of PRF		
		Truck	Barge	Fixed (***)
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> E. Incinerator ashes <input type="checkbox"/> F. Operational waste <input type="checkbox"/> G. Animal carcasses (*) <input type="checkbox"/> H. Fishing gear (**) <input type="checkbox"/> I. E-waste <input type="checkbox"/> J. Cargo residues (Harmful to the Marine Environment, HME) (*) <input type="checkbox"/> K. Cargo residues (non-HME) (*)			
Annex VI (Air pollution related)	<input type="checkbox"/> Ozone depleting substances and equipment containing such substances <input type="checkbox"/> Exhaust gas cleaning residues			

(*) Not applicable to cruise/passenger ports

(**) Only in case the fishing port falls within the jurisdiction of the port authority and therefore is to be included in the PWMP

(***) Also drum/skip/container on the quayside. Please also add map indicating the exact location of the PRF(s)

List of available PRFs:

Information about the service provider	Name, address, phone, email, website Type of facility: <ul style="list-style-type: none"> – tank truck/portable tank – tanker or barge – fixed
Types of waste accepted	MARPOL Annex I-related (oily waste) <ul style="list-style-type: none"> – oily bilge water – oily residues (sludge) – oily tank washings (slops) – dirty ballast water – scale and sludge from tanker cleaning – other
	MARPOL Annex II-related (chemical/NLS) <ul style="list-style-type: none"> – category X substance – category Y substance – category Z substance
	MARPOL Annex IV-related (sewage)

	<p>MARPOL Annex V-related (garbage)</p> <ul style="list-style-type: none"> A. Plastics B. Food wastes C. Domestic wastes D. Cooking oil E. Incinerator ashes F. Operational wastes G. Animal carcasses H. Fishing gear I. E-waste J. Cargo residues (non HME) K. Cargo residues (HME)
	<p>MARPOL Annex VI-related</p> <ul style="list-style-type: none"> – ozone-depleting substances – exhaust gas cleaning residues (scrubber waste)
	<p>Ballast Water Management Convention</p> <ul style="list-style-type: none"> – ballast water – sediment from ballast tanks
Discharge restriction/limitations	<ul style="list-style-type: none"> – Minimum quantity (m³) – Maximum quantity (m³) – Maximum discharge rate (m³/h) – Other
Procedural information	<ul style="list-style-type: none"> – Availability of the reception facility – Minimum prior notice required (hours) – Charging system – Additional information (e.g. cleaning)

Section 5: Assessment of the need for PRF

MARPOL Annex	Waste type	Capacity (m ³)		
		Available capacity	Necessary capacity	Need
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Oily tank washings <input type="checkbox"/> Dirty ballast water <input type="checkbox"/> Scale and sludge from tank cleaning <input type="checkbox"/> Other (specify)			
Annex II (NLS) (*)	<input type="checkbox"/> Category X substance <input type="checkbox"/> Category Y substance <input type="checkbox"/> Category Z substance <input type="checkbox"/> Other			
Annex IV (Sewage)	<input type="checkbox"/>			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> E. Incinerator ashes <input type="checkbox"/> F. Operational waste <input type="checkbox"/> G. Animal carcasses (*) <input type="checkbox"/> H. Fishing gear (**) <input type="checkbox"/> I. E-waste <input type="checkbox"/> J. Cargo residues (Harmful to the Marine Environment, HME) (*) <input type="checkbox"/> K. Cargo residues (non-HME) (*)			
Annex VI (Air pollution related)	<input type="checkbox"/> Ozone depleting substances and equipment containing such substances <input type="checkbox"/> Exhaust gas cleaning residues			

(*) Not applicable to cruise/passenger ports

(**) Only in case the fishing port falls within the jurisdiction of the port authority and therefore is to be included in the PWMP

Section 6: Advance Waste Notification

Advance Waste Notification applied in the port:

- No
- Yes
 - IMO standardized model (appendix 2 of MEPC.1/Circ.835/Rev.1)
 - Other: please specify

Procedures related to the use of the Advance Waste Notification:

- When?
- By whom?
- How?

Section 7: Waste delivery receipt

Waste delivery receipt applied in the port:

- No
- Yes
 - IMO standardized model (appendix 3 of MEPC.1/Circ.835/Rev.1)
 - Other: please specify

Procedures related to the use of the Waste Delivery Receipt:

- When?
- By whom?
- How?

Section 8: Cost recovery system

Is there a cost recovery system applicable for the delivery of waste from ships:

- No
 Yes

In case of yes:

MARPOL Annex	Waste type	Type of cost recovery system		
		Indirect	Direct	Combined
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Oily tank washings <input type="checkbox"/> Dirty ballast water <input type="checkbox"/> Scale and sludge from tank cleaning <input type="checkbox"/> Other (specify)			
Annex II (NLS) (*)	<input type="checkbox"/> Category X substance <input type="checkbox"/> Category Y substance <input type="checkbox"/> Category Z substance <input type="checkbox"/> Other			
Annex IV (Sewage)	<input type="checkbox"/>			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> E. Incinerator ashes <input type="checkbox"/> F. Operational waste <input type="checkbox"/> G. Animal carcasses (*) <input type="checkbox"/> H. Fishing gear (**) <input type="checkbox"/> I. E-waste <input type="checkbox"/> J. Cargo residues (Harmful to the Marine Environment, HME) (*) <input type="checkbox"/> K. Cargo residues (non-HME) (*)			
Annex VI (Air pollution related)	<input type="checkbox"/> Ozone depleting substances and equipment containing such substances <input type="checkbox"/> Exhaust gas cleaning residues			

(*) Not applicable to cruise/passenger ports

(**) Only in case the fishing port falls within the jurisdiction of the port authority and therefore is to be included in the PWMP

Detailed description of the fee system:

Section 9: Stakeholder consultation

Overview of stakeholders consulted during the development of this PWMP:

This stakeholder consultation was conducted:

- through meetings
- using a written procedure
- combination of meetings and written procedure
- other (please specify)

Section 10: Reporting of alleged inadequacies of PRF

Alleged inadequacies of PRF can be reported:

- to contact person in the port (+ contact details)
- using the IMO procedure and format (see *Consolidated guidance for PRF providers and users* (MEPC.1/Circ. 834/Rev.1))
- other (please specify):

Annex 2 Model of Port Waste Management Plan for fishing ports

Section 1: Identification of the port

Name of the port:
Address:
Geographical coordinates:
Type of port (several options possible):
<input type="checkbox"/> merchant seaport
<input type="checkbox"/> passenger port
<input type="checkbox"/> cruise port
<input type="checkbox"/> fishing port
<input type="checkbox"/> recreational port/marina
<input type="checkbox"/> other (please describe)

Section 2: Purpose of the PWMP

The overall purpose of the PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port, in order to protect the marine environment by reducing discharges into the sea of waste from ships, including cargo residues.

Its objectives are:

- To reduce illegal discharge of waste from vessels;
- To comply with legal duties with regard to waste management;
- To consult with port users, ship agents, operators, waste contractors and regulators in the development and implementation of waste management strategies and measures;
- To prevent the production of waste wherever possible; and
- To re-use or recycle waste wherever possible.

Section 3: Scope of the PWMP

Ships calling the port to which this PWMP applies (several options possible):

seagoing vessels international shipping
 inland navigation domestic shipping
 both both

Type of ships:

fishing vessels
 commercial fishing
 recreational fishing
 other (please describe)
 other (please describe)

Are there certain areas within the port outside the port authorities' jurisdiction:

no
 yes (please describe)

Section 4: Overview of available PRFs

PRF are available for the following types of waste (more than one option possible):

MARPOL Annex	Waste type	Type of PRF		
		Truck	Barge	Fixed (**)
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Other (specify)			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> F. Operational waste <input type="checkbox"/> H. Fishing gear <input type="checkbox"/> I. E-waste			

(**) Also drum/skip/container on the quayside. Please also add map indicating the exact location of the PRF(s)

List of available PRFs:

Information about the service provider	Name, address, phone, email, website Type of facility: <ul style="list-style-type: none"> – tank truck/portable tank – tanker or barge – fixed
Types of waste accepted	MARPOL Annex I-related (oily waste) <ul style="list-style-type: none"> – oily bilge water – oily residues (sludge) – other
	MARPOL Annex V-related (garbage) <ul style="list-style-type: none"> A. Plastics B. Food wastes C. Domestic wastes D. Cooking oil E. Incinerator ashes F. Operational wastes H. Fishing gear I. E-waste
Discharge restriction/limitations	<ul style="list-style-type: none"> – Minimum quantity (m³) – Maximum quantity (m³) – Maximum discharge rate (m³/h) – Other
Procedural information	<ul style="list-style-type: none"> – Availability of the reception facility – Minimum prior notice required (hours) – Charging system – Additional information (e.g. cleaning)

Section 5: Assessment of the need for PRF

MARPOL Annex	Waste type	Capacity (m ³)		
		Available capacity	Necessary capacity	Need
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Other (specify)			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> F. Operational waste <input type="checkbox"/> H. Fishing gear <input type="checkbox"/> I. E-waste			

Section 6: Cost recovery system

Is there a cost recovery system applicable for the delivery of waste from ships:

- No
 Yes

In case of yes:

MARPOL Annex	Waste type	Type of cost recovery system		
		Indirect	Direct	Combined
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Other (specify)			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> F. Operational waste <input type="checkbox"/> H. Fishing gear <input type="checkbox"/> I. E-waste			

Detailed description of the fee system:

Section 7: Stakeholder consultation

Overview of stakeholders consulted during the development of this PWMP:

This stakeholder consultation was conducted:

- through meetings
- using a written procedure
- combination of meetings and written procedure
- other (please specify)

Section 8: Reporting of alleged inadequacies of PRF

Alleged inadequacies of PRF can be reported:

- to contact person in the port (+ contact details)
- using the IMO procedure and format (see *Consolidated guidance for PRF providers and users* (resolution, MEPC.1/Circ. 834/Rev.1))
- other (please specify):

Annex 3 Model of Port Waste Management Plan for recreational ports

Section 1: Identification of the port

Name of the port:
Address:
Geographical coordinates:
Type of port (several options possible):
<input type="checkbox"/> merchant seaport
<input type="checkbox"/> passenger port
<input type="checkbox"/> cruise port
<input type="checkbox"/> fishing port
<input type="checkbox"/> recreational port/marina
<input type="checkbox"/> other (please describe)

Section 2: Purpose of the PWMP

The overall purpose of the PWMP is to improve the availability, adequacy and usage of reception facilities for waste from ships normally calling the port, in order to protect the marine environment by reducing discharges into the sea of waste from ships, including cargo residues.

Its objectives are:

- To reduce illegal discharge of waste from vessels;
- To comply with legal duties with regard to waste management;
- To consult with port users, ship agents, operators, waste contractors and regulators in the development and implementation of waste management strategies and measures;
- To prevent the production of waste wherever possible; and
- To re-use or recycle waste wherever possible.

Section 3: Scope of the PWMP

Ships calling the port to which this PWMP applies (several options possible):	
<input type="checkbox"/> seagoing vessels	<input type="checkbox"/> international shipping
<input type="checkbox"/> inland navigation	<input type="checkbox"/> domestic shipping
<input type="checkbox"/> both	<input type="checkbox"/> both
Type of ships:	
<input type="checkbox"/> recreational vessels	
<input type="checkbox"/> sailing boats	
<input type="checkbox"/> motor yachts	
<input type="checkbox"/> other (please describe)	
<input type="checkbox"/> other vessels (please describe)	
Are there certain areas within the port outside the port authorities' jurisdiction:	
<input type="checkbox"/> no	
<input type="checkbox"/> yes (please describe)	

Section 4: Overview of available PRFs

PRF are available for the following types of waste (more than one option possible):

MARPOL Annex	Waste type	Type of PRF		
		Truck	Barge	Fixed (**)
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Other (specify)			
Annex IV (Sewage)	<input type="checkbox"/> Sewage <input type="checkbox"/> Sewage from chemical toilets			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> I. E-waste			

(**) Also drum/skip/container on the quayside. Please also add map indicating the exact location of the PRF(s)

List of available PRFs:

Information about the service provider	Name, address, phone, email, website Type of facility: <ul style="list-style-type: none"> – tank truck/portable tank – tanker or barge – fixed
Types of waste accepted	MARPOL Annex I-related (oily waste) <ul style="list-style-type: none"> – oily bilge water – oily residues (sludge) – other
	MARPOL Annex IV (sewage) <ul style="list-style-type: none"> – sewage – sewage from chemical toilets
	MARPOL Annex V-related (garbage) <ul style="list-style-type: none"> A. Plastics B. Food wastes C. Domestic wastes D. Cooking oil I. E-waste
Discharge restriction/limitations	<ul style="list-style-type: none"> – Minimum quantity (m³) – Maximum quantity (m³) – Maximum discharge rate (m³/h) – Other
Procedural information	<ul style="list-style-type: none"> – Availability of the reception facility – Minimum prior notice required (hours) – Charging system – Additional information (e.g. cleaning)

Section 5: Assessment of the need for PRF

MARPOL Annex	Waste type	Capacity (m ³)		
		Available capacity	Necessary capacity	Need
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Other (specify)			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> I. E-waste			

Section 6: Cost recovery system

Is there a cost recovery system applicable for the delivery of waste from ships:

- No
 Yes

In case of yes:

MARPOL Annex	Waste type	Type of cost recovery system		
		Indirect	Direct	Combined
Annex I (Oil)	<input type="checkbox"/> Oily bilge water <input type="checkbox"/> Oily residues (sludge) <input type="checkbox"/> Other (specify)			
Annex V (Garbage)	<input type="checkbox"/> A. Plastics <input type="checkbox"/> B. Food waste <input type="checkbox"/> C. Domestic waste (e.g. paper/cardboard, rags, glass, metal, bottles, crockery, etc.) <input type="checkbox"/> D. Cooking oil <input type="checkbox"/> I. E-waste			

Detailed description of the fee system:

Section 7: Stakeholder consultation

Overview of stakeholders consulted during the development of this PWMP:

This stakeholder consultation was conducted:

- through meetings
- using a written procedure
- combination of meetings and written procedure
- other (please specify)

Section 8: Reporting of alleged inadequacies of PRF

Alleged inadequacies of PRF can be reported:

- to contact person in the port (+ contact details)
- using the IMO procedure and format (see *Consolidated guidance for PRF providers and users* (resolution, MEPC.1/Circ. 834/Rev.1))
- other (please specify):

Annex 4 Pre-assessment questionnaire for merchant seaports

1 Port operations and traffic

Please state the **number of ship calls** in the previous year (excluding vessels belonging to the port), and describe **forecast** of how traffic will develop the next 5 years:

Ship type	No. of calls in previous year	Estimate of traffic development (increase or decrease in %) in upcoming 5 years
Bulk		
Container		
Ro-Ro		
Ferries/passenger ships (non-cruise)		
Cruise ships		
Oil tanker		
Chemical/product tanker		
LNG/LPG		
Supply ships/barges		
MODU (mobile offshore drilling units)		
Other		

Please provide overview of **previous** and **next** ports of call (top 5):

Previous port	Number of calls
1.	
2.	
3.	
4.	
5.	

Next port	Number of calls
1.	
2.	
3.	
4.	
5.	

Please provide overview (share (%) in relation to total) of **handled goods during the previous year**, and provide **forecast** for the next 5 years:

Cargo type	Tonnage turnover (previous year)	Estimate of tonnage development (increase or decrease in %) in upcoming 5 years
Containers		
Dry bulk		
Liquid bulk (oil)		
Liquid bulk (chemicals)		
Other		

Please provide overview of GT of **ships** calling per type:

	< 5000 GT	5000 – 9.999 GT	10.000 – 14.999 GT	15.000 – 19.999 GT	20.000 – 24.999 GT	25.000 – 29.999 GT	30.000 – 69.000 GT	> 70.000 GT
container								
dry bulk								
liquid bulk (oil)								
liquid bulk (chemicals)								
cruise								
other								

Please confirm type of **port operations**:

Type	Yes (Y) or No (N)
Bulk terminal	
Container terminal	
Ro-Ro terminal	
Ferry/cruise/passenger terminal	
Oil/products (loading/unloading)	
Chemicals	
Gas terminal	
Anchorage place	
Other (please specify)	

2 Types of waste accepted by the port

Please confirm **types of waste accepted** by the port:

Type	Yes (Y) or No (N)	If only specific sub-types are accepted or not, please specify
Oily waste from engine room (MARPOL Annex I)		
Oily cargo residues (MARPOL Annex I)		
Noxious liquid (MARPOL Annex II)		
Sewage (MARPOL Annex IV)		
Garbage (MARPOL Annex V)		
Quarantine/catering waste		
Residues from dry bulk cargo including liquid form (MARPOL Annex V)		
Ozone Depleting Substances (MARPOL Annex VI)		
Scrubber waste (MARPOL Annex VI)		
Others (please specify)		

3 Waste reception facilities available in port for each waste type

Please indicate the total **number** of available facilities in the port, and **ownership** of the following port reception, treatment and final disposal facilities:

Facilities	Waste type	Total number of available facilities	Private external operators	Port authority
Collection	Oily waste			
	Sewage			
	Garbage			
	Other waste, incl. cargo residues			
Treatment	Oily waste			
	Sewage			
	Garbage			
	Other waste, incl. cargo residues			
Final disposal	Oily waste			
	Sewage			
	Garbage			
	Other waste, incl. cargo residues			

Please indicate the **collection method** for the following waste types, and for each provide info on **collection capacity** (in m³):

Waste type	barge	truck	direct pumping	skips/container	other
Oily bilge water (MARPOL Annex I)					
Oily residues (sludge)					
Oily tank washings					
Dirty ballast water (MARPOL Annex I)					
Scale and sludge from tank cleaning (MARPOL Annex I)					
Other (MARPOL Annex I)					
Noxious liquid (MARPOL Annex II):					
Type X					
Type Y					
Type Z					
Other substances					
Sewage (MARPOL Annex IV)					
Garbage (MARPOL Annex V)					
A. Plastics					
B. Food waste					
C. Domestic waste					
E. Cooking oil					
F. Operational waste					

Waste type	barge	truck	direct pumping	skips/container	other
G. Animal carcasses					
H. Fishing gear					
I. E-waste					
J. Cargo residues (HME)					
K. Cargo residues (non-HME)					
Quarantine waste					
Ozone Depleting Substances (MARPOL Annex VI)					
Scrubber waste (MARPOL Annex VI)					
Others (please specify)					

Please confirm location of **treatment** sites:

	Yes (Y) or No (N)
Facilities inside the port	
Oily waste	
Sewage	
Garbage	
Others – specify	
Facilities outside the port	
Oily waste	
Sewage	
Garbage	
Others – specify	

Are there **facilities** in the vicinity of the port for the **treatment of land-based** industrial and/or household waste? If yes, please specify.

	Yes (Y) or No (N)
Incineration plants	
Cement kilns	
Waste water treatment facilities	
Landfill sites	
Other	

4 Ship generated waste and cargo residues – notified and actual delivered

Please indicate the volumes of waste that were delivered in the port the last 5 years. Distinguish (if possible) between the volumes that were actually delivered to the port reception facility, and the volumes to be delivered that were indicated on the advance notification form.

Ship generated waste		Y-5	Y-4	Y-3	Y-2	Y-1
Annex I Oily waste (bilge, sludge and other oily waste) from engine room, m ³	Acc. to waste notification form					
	Actual delivered					
Annex IV Sewage, m ³	Acc. to waste notification form					
	Actual delivered					
Annex V All Annex V waste including garbage (excluding cargo residues), ton or m ³ (please specify)	Acc. to waste notification form					
	Actual delivered					
Annex VI (in m ³)	ODS delivered					
	Scrubber waste delivered					

Cargo residues		Y-5	Y-4	Y-3	Y-2	Y-1
Annex I Oily waste (dirty ballast and wash water), m ³	Acc. to waste notification form					
	Actual delivered					
Annex II NO _x - Liquid Subst., m ³	Acc. to waste notification form					
	Actual delivered					
Annex V Cargo residues from dry bulk cargos, incl. in liquid form, e.g. hold wash water, m ³	Acc. to waste notification form					
	Actual delivered,					

5 Advance waste notification procedure

When applicable in the port

Questions	Answers
Notification format used: <ul style="list-style-type: none"> – IMO (AWN) – Other 	
Who receives waste notification from calling ships/shipping agents?	
Who issues the receipt after ship waste handling?	
Is waste notification mandatory for all calling ships?	
Exemptions (which ships are exempted from waste notification) – how many?	
Copy of waste notification form (please attach or provide a link if different from the form in Directive's Annex II)	
Notification form received by email, fax (please state)	
Is there an e-system in place to where the notified info is inserted directly into the system (in digital form)	
Functions of the notification form (please explain): <ul style="list-style-type: none"> – Preparation of delivery – Monitoring – Invoicing – Statistics – Reporting – Other 	

6 Waste fee system in port

When applicable: please indicate the **principle** of the applied **fee system**, and **who is responsible** for it:

Principles of waste fee system	Please specify who is responsible
Indirect fee	
Direct fee	
Additional charges	

Please state/confirm the **fee calculation method** applied:

Method	
Per GT	<input type="checkbox"/>
Ship Type	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

Please confirm the **waste fee payment** (collection) method:

Entirely as part of port dues by port (no separate fee)	<input type="checkbox"/>
Separate waste fee collected by port	<input type="checkbox"/>
Directly between waste operator and shipping agent	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

Please indicate which **waste types** are included in the **indirect waste fee** (when applicable):

MARPOL Annex I	Oily waste from machinery space	<input type="checkbox"/>
	Other oily waste	<input type="checkbox"/>
MARPOL Annex V	Plastics	<input type="checkbox"/>
	Food waste	<input type="checkbox"/>
	Domestic waste	<input type="checkbox"/>
	Cooking oil	<input type="checkbox"/>
	Operational waste	<input type="checkbox"/>
	Fishing gear	<input type="checkbox"/>
	E-waste	<input type="checkbox"/>
Other waste (please specify)		<input type="checkbox"/>

Please specify if there are any **volume limitations** under the indirect waste fee paid or will the waste fee cover unlimited waste discharge?

Volume limitation under the indirect fee	Volume limitation (in m ³ or ton)
Ship generated waste <ul style="list-style-type: none"> – Oily waste from machinery space – Sewage – Garbage (incl. hazardous or not) – MARPOL Annex VI waste (ODS/scrubber waste) 	
Other (please specify)	

Please specify whether there are **additional charges** applied (e.g. outside office hours, weekends, holidays, not segregated or wrongly segregated garbage, low pumping rate etc.):

Additional charges		Please specify
Outside office hours	<input type="checkbox"/>	
Not segregated according to guidelines	<input type="checkbox"/>	
Insufficient pumping capacity	<input type="checkbox"/>	
Additional waste delivery beyond what is accepted under the indirect fee	<input type="checkbox"/>	
Other	<input type="checkbox"/>	

Please indicate whether there are possible **discounts** for **“green” ships** implemented in the fee system (e.g. onboard waste reducing equipment, waste treatment on board, management systems, etc.):

Waste fee discount	Yes (Y) or No (N)
Onboard waste reducing equipment	
Onboard waste treatment	
Waste management systems	
Other	

Please indicate whether there are **exemptions** for frequently and regularly calling ships (e.g. ferries and/or line traffic). If so, what are the conditions regarding “frequent and regular” (e.g. the ship should call your port at least once every two weeks)?

--

7 Monitoring, enforcement and inspection

Please describe the system in place for monitoring, targeting, inspection (e.g. who does, what is done, is there any e-system support?):

Please indicate whom the **responsible authority** is (ship waste handling/compliance) for:

Area	Responsible Authority
Enforcement	
Control	
Monitoring	

Please provide a short description of the procedures:

Area	Procedures
Enforcement	
Control	
Monitoring	

8 Other comments

Please state any other comments you may have.

Annex 5 Pre-assessment questionnaire for fishing ports

1 Traffic

Please state the **number and size of ship calls** in the previous year, and indicate forecast of how traffic will develop the next 5 years:

Type of fishing vessels	Size indication (based on GT, length, engine power, etc.)	No. of calls in previous year	Estimate of traffic development (increase or decrease in %) in upcoming 5 years
Small size			
Medium size			
Large size			

2 Types of waste accepted by the port

Please confirm **types of waste accepted** in the port:

Type		Yes (Y) or No (N)
MARPOL Annex I	Oily waste from engine room	
MARPOL Annex IV	Sewage	
MARPOL Annex V	Plastics	
	Food waste	
	Domestic waste	
	Cooking oil	
	Operational waste	
	Fishing gear	
	E-waste	
Other (please specify)		

3 Waste reception facilities available in port for each waste type

Please indicate the total number of available facilities in the port for collection, treatment and final disposal:

Facilities	Waste type	Total number of available facilities
Collection	Oily waste	
	Plastics	
	Food waste	
	Domestic waste	
	Cooking oil	
	Operational waste	
	Fishing gear	
	E-waste	
	Other (please specify)	
Treatment	Oily waste	
	Plastics	
	Food waste	
	Domestic waste	
	Cooking oil	
	Operational waste	
	Fishing gear	
	E-waste	
	Other (please specify)	
Final disposal	Oily waste	
	Plastics	
	Food waste	
	Domestic waste	
	Cooking oil	
	Operational waste	
	Fishing gear	
	E-waste	

Please indicate the **collection method** for the following waste types, and for each provide info on **collection capacity** (in m³):

Waste type	barge	truck	direct pumping	skips/container	other
Oily bilge water (MARPOL Annex I)					
Other (MARPOL Annex I)					
Garbage (MARPOL Annex V)					
A. Plastics					
B. Food waste					
C. Domestic waste					
E. Cooking oil					
F. Operational waste					
G. Animal carcasses					
H. Fishing gear					
I. E-waste					
Others (please specify)					

4 Waste fee system

When applicable: please indicate the **principle** of the applied **fee system**, and **who is responsible** for it:

Principle of waste fee system	Who is responsible
Indirect fee:	
Direct fee:	
Additional charges:	

Please confirm the waste fee payment (collection) method:

Entirely as part of port dues by port (no separate fee)	<input type="checkbox"/>
Separate waste fee collected by port	<input type="checkbox"/>
Directly between waste operator and shipping agent	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

Please indicate which waste types are **included** in the **indirect waste fee** (when applicable):

MARPOL Annex I	Oily waste from machinery space	<input type="checkbox"/>
	Other oily waste	<input type="checkbox"/>
MARPOL Annex V	Plastics	<input type="checkbox"/>
	Food waste	<input type="checkbox"/>
	Domestic waste	<input type="checkbox"/>
	Cooking oil	<input type="checkbox"/>
	Operational waste	<input type="checkbox"/>
	Fishing gear	<input type="checkbox"/>
	E-waste	<input type="checkbox"/>
Other waste (please specify)		<input type="checkbox"/>

Please specify if are there any **volume limitations** under the **indirect waste fee** paid or will the waste fee cover unlimited waste discharge?

Volume limitation under the indirect fee	Volume limitation (in m ³ or ton)
Oily waste from machinery space	
Other oily waste	
Plastics	
Food waste	
Domestic waste	
Cooking oil	
Operational waste	
Other (please specify)	

Please specify whether there are **additional charges** applied (e.g. outside office hours, weekends, holidays, not segregated or wrongly segregated garbage, low pumping rate etc.):

Additional charges		Please specify
Outside office hours	<input type="checkbox"/>	
Not segregated according to guidelines	<input type="checkbox"/>	
Insufficient pumping capacity	<input type="checkbox"/>	
Additional waste delivery beyond what is accepted under the indirect fee	<input type="checkbox"/>	
Other	<input type="checkbox"/>	

5 Monitoring, enforcement and inspection

Please describe the system in place for monitoring and inspection (e.g. who does, what is done, is there any e-system support?):

Please indicate whom the **responsible authority** is (ship waste handling/compliance) for:

Area	Responsible Authority
Enforcement	
Control	
Monitoring	

6 Other comments

Please state any other comments you may have.



GloLitter
partnerships

This Guidance Document is part of the GloLitter Partnerships Knowledge Products Series. The GloLitter Partnerships project is implemented by the International Maritime Organization (IMO) and the Food and Agriculture Organization of the United Nations (FAO). GloLitter assists developing countries in reducing marine plastic litter from the maritime transport and fisheries sectors.