Good Navigation Status

Guidelines towards achieving a Good Navigation Status

Gert-Jan Muilerman, Gudrun Maierbrugger (viadonau)
Henrik Armbrecht (Planco)
Karin de Schepper (Inland Navigation Europe)
Sim Turf (Vlaamse Overheid)
Richard van Liere, Martin Quispel (STC-NESTRA)

January 2018

EUROPEAN COMMISSION

Directorate-General for Mobility and Transport
Directorate D Waterborne
Unit D.3 Ports and Inland Navigation

MOVE-D3-SECRETARIAT@ec.europa.eu

European Commission
B-1049 Brussels

Good Navigation Status

Guidelines towards achieving a Good Navigation Status

Directorate-General for Mobility and Transport
Directorate D Waterborne

Study on support measures for the implementation of the TEN-T core network related to sea ports, inland ports and inland waterway transport

Lot 3 - Good Navigation Status in accordance with Article 15(3)b of the TEN-T guidelines

Europe Direct is a service to help you find answers to your questions about the European Union.

Freephone number (*)**:**

00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Luxembourg: Publications Office of the European Union, 2018

ISBN 978-92-79-81043-5
doi: 10.2832/148049

EXECUTIVE SUMMARY

In 2015 the European Commission DG MOVE published the Invitation to tender N° MOVE/B3/2015-224 concerning "Study on support measures for the implementation of the TEN-T Core network related to sea ports, inland ports and inland waterway transport". The consortium coordinated by STC-Group Holding BV with partners STC-NESTRA, viadonau, PLANCO, Inland Navigation Europe and Flemish Ministry of Mobility and Public Works, prepared a detailed technical proposal and was assigned the contract. The contract for this work was signed on 31st of December 2015 with a maximum duration of 24 months.

This study provides input on the notion of Good Navigation Status (GNS) in article 15.3 of the TEN-T Regulation 1315/2013 to be achieved (and thereafter preserved) by 31 December 2030 according to the article 38 of the Regulation. Moreover, in accordance with Article 54, the implementation of the core network shall be evaluated by the Commission by 31 December 2023. The GNS study also provides input for this evaluation and the possible revision of the TEN-T Regulation.

Besides desk research and expertise within the consortium, an important element was the involvement of a group of experts and stakeholders. Two pan-European expert group meetings took place (Rotterdam, Brussels) as well as four regional expert group meetings (Budapest, Klaipeda, Berlin, Strasbourg).

In the first phase of the study the work focused on the definition of the scope of Good Navigation Status and the concept. This was being investigated discussed, described and agreed upon. Elements to develop the GNS concept were based on:

- Literature study (amongst others CEMT and AGN documents, PIANC reports, NEWADA DUO and PLATINA II deliverables);
- A stocktaking and comparative analyses on the current approaches in Europe for setting standards for waterways;
- Identification of the user requirements as regards good navigation status;
- The analysis of the link between navigation standards (infrastructure dimensions, capacity) and the strength of IWT as a mode in the overall transport system.

Next, the GNS scope and concept was developed. The GNS concept consists of hard and soft components. Hard components are the measurable parameters such as the dimensions of waterway links and locks and the reliability of navigation as well as journey times and waiting times at locks. Soft components concern management aspects and navigation elements seen from a wider scope (e.g. information to users).

Notably the definition of the hard components did provide the basis to derive and define Key Performance Indicators and the monitoring approach for GNS. The set of KPIs includes local targets but also the minimum requirements according the TEN-T 1315/2013 regulation. This regulation prescribes a minimum CEMT class IV and at least 2.5 metre draught for the vessel and at least 5.25 metre height under bridges for navigation.

Key indicators derived are the navigation reliability and the waterway and lock dimensions. Also, future possibilities were addressed such as usage of AIS for measurement of journey times and passage times of locks as well as usage of echo sounders on-board of commercial vessels to signal bottlenecks for draught of vessels.

By means of an accelerated approach it was feasible to already integrate the GNS indicators in the TENtec OMC Glossary by May 2016. Subsequently another study was responsible for the collection of the data for the inland waterway transport network in Europe, including the collection of the parameter values for the relevant GNS indicators.

By using the TENtec data for the GNS indicators, the GNS Network Assessment was made. An overview was prepared of the score of indicators on a European level, illustrated by means of map and tables to present the methodology and preliminary findings. It has to be remarked though that the received TENtec data was not validated by Member States and our own research and pre-validation work made clear that there are strong limitations as regards the coverage and reliability of the data. A detailed assessment was made for the TENtec data. Results have been entered into the TENtec validation tool of the European Commission and also a separate report was delivered on the pre-validation findings. It was concluded that improvements will be needed in TENtec data coverage and reliability to enable a reliable GNS Network Assessment at future occasions.

Besides the GNS concept, a major result of the GNS study was the delivery of the Guidelines for reaching GNS (current document). These guidelines were developed based on the GNS concept, illustrating the process steps which are defined to achieve GNS taking into account the local circumstances and stakeholders. The GNS Guidelines provide clear examples on good practices for waterway management and proper involvement of stakeholders. The good practices were collected by the GNS consortium in cooperation with experts and were validated by the working group over summer 2017.

Finally, an important piece of work was the elaboration of the exemption criteria and process in relation to the minimum requirements for bridge height and draught on the TEN-T inland waterway network. Through desk research and consultation of experts (e.g. at regional workshops) and the GNS steering group, the positions and arguments were identified as regards the exemption process and criteria. Notably the collaboration with the DG ENV was important, in order to make a proper link with the environmental legislation such as the Water Framework Directive.

CONTENTS

1. INTRODUCTION

The manual at hand shall serve as guidance for waterway administrations on how to achieve and maintain a „Good Navigation Status" (GNS) on the European waterway network as required by the TEN-T Guidelines (Regulation (EU) No 1315/2013). The need for this guidance document was confirmed by the European Expert Group on GNS[1]. This document at hand was elaborated within the „Study on support measures for the implementation of the TEN-T Core Network related to sea ports, inland ports and inland waterway transport, LOT 3 – Good Navigation Status".

In view of the complexity of the topic, this manual focuses on selected issues:

- Illustration of the concept of Good Navigation Status
- Illustration of minimum standards of a process to achieve GNS
- Examples for selected soft components

At this stage the document does not address in detail the process for acquiring exemptions from minimum TEN-T article 15 requirements as regards draught and minimum height under bridges[2]. Nevertheless, some basic principles for guiding the discussion on this issue are proposed which are agreed upon with the European Commission. This topic shall be further elaborated and clarified, providing technical guidance to all concerned parties. It shall take into account the findings of the study as regards the first results of GNS Network Assessments, the state-of-play and roadmaps for achieving GNS.

Chapter 2 presents the GNS concept. Selected good practice examples for achieving and maintaining a Good Navigation Status as regards maintenance and management of fairways, locks and bridges are referred to in the main chapters and are presented in detail in the Annex of the manual.

The most effective and innovative elements that were encountered in the various good practices have been used for the elaboration of a model GNS process. This model is presented in Chapter 3 of this document and is based on discussions with experts and on identified good practices.

Chapter 4 presents subsequently examples of soft components as regards GNS which shall be seen in addition to the quantified monitoring of hard GNS components such as waterway dimensions, also seen in relation to the traffic intensity and available capacity.

[1] Please see the presentations and results of the expert group meetings: http://www.inlandnavigation.eu/what-we-do/good-navigation-status/

[2] See article 15.3.a of the 1315/2013 Regulation which states "*At the request of a Member State, in duly justified cases, exemptions shall be granted by the Commission from the minimum requirements on draught (less than 2,50 m) and on minimum height under bridges (less than 5,25 m);*"

The full descriptions of good practices for improving navigation conditions and achieving GNS are included in the Annex of this manual. The good practices in the Annex are complemented with a clarification of relevant basic vocabulary and technical issues related to waterway management and inland shipping.

2. DEFINITION OF GNS AND IMPLICATIONS

2.1. GNS definition

The following definition was developed during the study based on the desk research and consultation of the experts and stakeholders:

"Good navigation Status (GNS) means the state of the inland navigation transport network, which enables efficient, reliable and safe navigation for users by ensuring minimum waterway parameter values and levels of service".

Moreover, GNS is to be achieved considering the wider socio-economic sustainability of waterway management.

GNS for inland waterways part of the Trans-European Transport Network (TEN-T)

The waterways of international importance included in the TEN-T are intended to be part of a sustainable transport system serving the needs of the EU Internal Market. This concerns the waterways of the core and comprehensive TEN-T network, while for inland waterways the core network equals the comprehensive network.

The Good Navigation Status shall address the TEN-T network from the legal point of view (EU Regulation 1315/2013. Good Navigation Status has to be achieved (and thereafter preserved) by 31 December 2030 according to the article 38 of the Regulation. The following map presents the waterways which belong to the TEN-T Network:

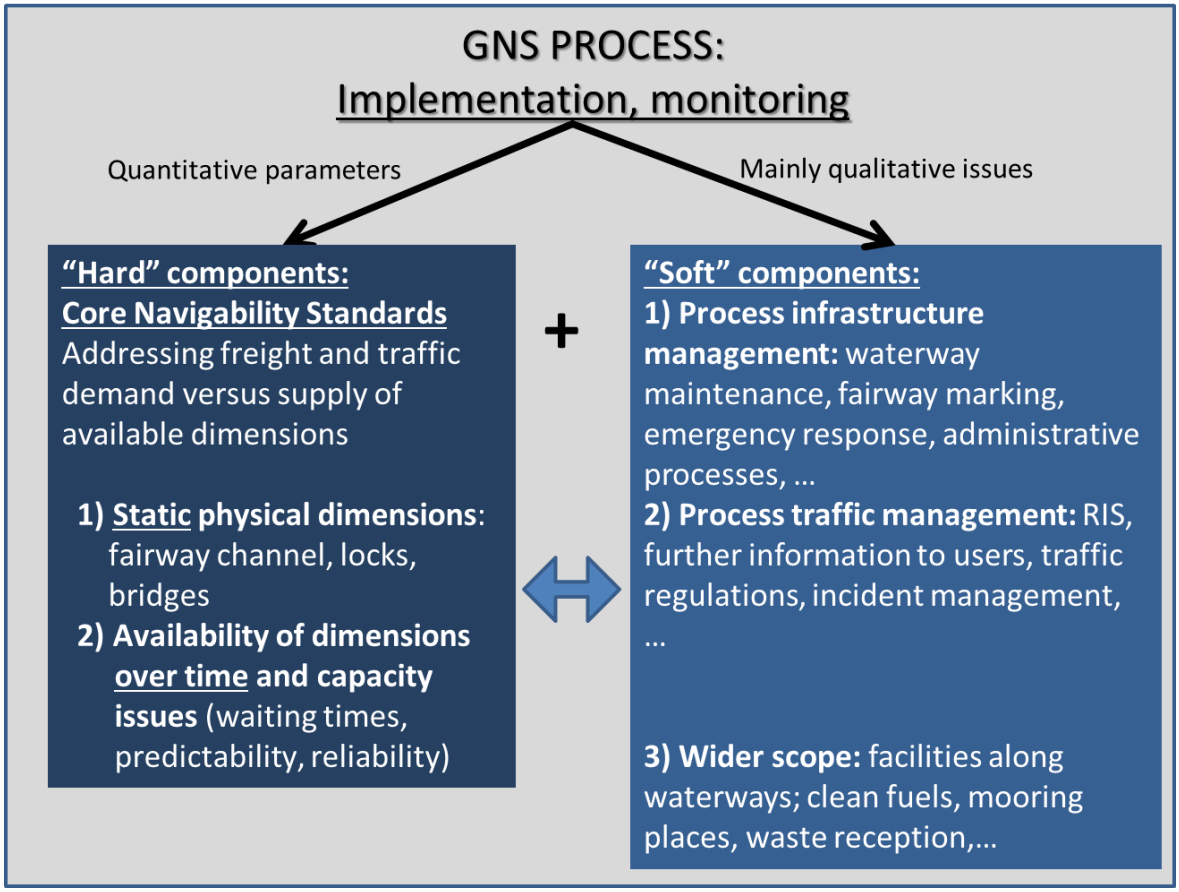
The GNS concept fully respects the competences of national authorities in line with the subsidiarity principle. The GNS concept aims to ensure a common approach for administrations sharing the responsibility for inland waterways of international importance.

It is clear that GNS is not limited only to the "Core Network Corridors", it has a wider scope. It does for example also include the (isolated) inland waterways in Sweden, Finland, Lithuania, Italy, Portugal and Spain. Moreover, although the GNS has no legal implications, it may also be useful and inspiring for smaller waterways (e.g. CEMT II and II class waterways) and for non-EU Member States. For the latter, the collaboration with UNECE is of relevance, notably the link to the SC.3 Working Party on Inland Navigation.

Finally, the concept is based on best practices and state of technology and, to a large extent, should be valid as well for inland waterways of international importance in EU neighbouring countries.

2.2. GNS components

The following scheme presents the components of GNS with the distinctions between hard and soft components:



It shall be noted that external developments shall be taken into account in the GNS process. This may be the development of transport demand (e.g. shifting freight flows

origin-destinations, growing/decreasing commodities, etc.), impact of climate change (changing water levels) as well as innovations which may lead to new possibilities to improve navigation on waterways and the waterway management (e.g. more advanced surveying and monitoring approaches).

2.2.1. Specification GNS "hard" components

- The "hard" components shall have the **following characteristics**:
  - Focus on physical waterway infrastructure as direct output of waterway management activities and measures
  - Coherent set of measurable quantitative indicators (presenting the parameter value) applicable to the entire TEN-T waterway network identified according to a common methodology making Good Navigation Status measurable and comparable on sections of the TEN-T waterway network
  - They are directly targeted by TEN-T Regulation and/or (trans)national agreements and regulations such as AGN (see for more information Annex I-B)
- The indicators for GNS "hard" components relate to the **physical waterway infrastructure** and its use. They will:
  - describe the **dimensions of the navigation channel in rivers, canals and lakes** (e.g. depth, width, height standards) and of **locks, ship lifts and bridges**, which are determining the vessel dimensions and will allow a comparison with the target parameter value (e.g. current draught versus target draught)
  - describe the **availability** of the navigation channel (e.g. closures, available draught during the year) and the availability and capacity of locks, ship lifts and moveable bridges

For GNS "hard" components, at the request of Member States, exemptions may be granted by the EC from the TEN-T minimum requirements: in case the target value on the draught (2.5 metres) and height under bridges (5.25 metres) cannot be reached because of justifiable reasons.

Concerning the "hard" components, it is important to create common understanding where the TEN-T minimum requirement, related to draught and height under bridges, apply. With reference to the terminology used at the CCNR (see table below and also CCNR 2016)[3] , the TEN-T requirements apply specifically to the **navigable channel**: the part of the waterway in which a targeted depth, width and vertical clearance (navigable cross-section) is maintained to enable continuous navigation.

	DE	NL	FR	EN
1.	Wasserstraße	Vaarweg	Voie d'eau	Waterway

[3] The CCNR Sécretariat proposed the following terminology for harmonisation across several languages (CCNR 2016)

2.	Fahrwasser	Vaarwater	Eaux navigables	Fairway
3.	Fahrrinne	Vaargeul	Chenal navigable	Navigable channel

In relation to the targeted depth, the TEN-T requirements explicitly mention the target value on the draught of the vessels, which is the vertical distance between the waterline and the lowest edge of the keel of a vessel. As regards "draught" for the minimum requirement in the TEN-T Guidelines (2.5 metres as mentioned above), this is seen as a value of least 2.5 metre of possible draught of the vessel while still being able to safely navigate on the section of the TEN-T Network. Local targets shall apply for the respective depth of the navigation channel, taking into account the appropriate safety margins between the bottom of the river, lake or canal and the keel of the vessel. For rocky bottoms, this will be a higher safety margin compared to soils that consist of clay or sand. For the Rhine for example an 'under keel clearance' is typically applied between 0 and 50 cm (see I-D).

Moreover, for developing realistic and attainable (local) targets and compliance to the TEN-T requirements for vertical dimensions, waterway administrations have to consider occurrences of variation in water levels and longitudinal and cross currents, in both rivers and canals. Water level fluctuations in waterways occur as a result of differences in discharge, tides, seasonal variations, wind setup, translation waves etc. These fluctuations affect the dimensions of free-flowing rivers and impounded (regulated) waterways, but also cause variations in canals with fairly fixed canal water level.

Regarding free-flowing river sections, target values should be related to reference water levels in these sections, in order to reflect the natural and statistical variations in water discharge (► see also proposed minimum GNS process in Section 3.3 – Step 0). The reference high and lower water levels (MHW and MLW) are of particular importance for the design of the waterway, which refer to the water levels at which the full functionality of the waterway is available to for inland navigation. Higher or lower water levels, relative to the determined reference water levels, may result into restrictions to height under bridges and waterway profile (even obstruction). When determining the reference water levels for a waterway, the probability, severity and duration of the restrictions must be taken into consideration, in case the water level exceed the range of reference water levels. The reference water levels, both high and low, are set by the water management authority and laid down in its management plan (► for examples of reference water levels on European free-flowing river sections and additional information on key vocabulary and definitions used in waterway management is referred to Annex I-A).

2.2.2. Specification GNS "soft" components

The "soft" components include both process-related **management aspects** of infrastructure (e.g. maintenance, marking) or of traffic (e.g. information to users), which contribute to an improved score on the indicator linked to the "hard" components. Moreover, the soft components are a compilation of processes and utilities that determine and affect the level of service on and along waterways. For example, improved maintenance processes shall provide a better value for the actual depth (available draught) of the navigation channel of the section. Another example is

the more accurate information and predictions about the water levels which allows ship-owners to increase the payload (transport efficiency).

Furthermore, soft components may optionally address **a wider[4] scope** of inland navigation infrastructure which is not directly related to navigation itself (e.g. facilities along waterways such as for clean fuel bunkering, waste disposal, resting places, car-lifts, shore-power, internet connections). For some of these elements also a legal reference is found in the TEN-T guidelines. Furthermore, it shall be remarked that port, terminal and handling facilities are of key importance to achieve a competitive inland waterway transport operation. However, in Article 15.3b Good Navigation Status is addressing Rivers, Lakes and Canals defined under (Article 14.1 a),b) and c)). Article 15.3b does not explicitly mention the status of related infrastructure, inland ports, associated equipment, telematic applications (RIS) or connections of the inland ports to the other modes in the trans-European transport network. It can therefore be concluded that from a legal viewpoint the focus shall be the quality of the fairway channel.

- GNS ”soft” components have the following characteristics:
  - Infrastructure and traffic management process components are important for GNS as they influence the level of ambition and achievement of the targets for the GNS ”hard” components (e.g. actual available draught and waiting times).
  - The impact of introducing GNS ”soft” components might vary from region to region, depending for example on whether infrastructure management processes are already in place or have to be newly introduced
  - Specific EU regulations apply for these components:
    - Implementation of standards set out in the RIS Directive on the comprehensive network (Article 15.3 c)
    - Implementation of the standards set out in the Clean Fuels Directive on the core network (Article 39.2 b)

”Soft” components are not always measurable in a quantitative manner on the TEN-T network at the level of specific sections. Some can be monitored by means of qualitative descriptions about processes covering multiple sections of the TEN-T network or even entire corridors. An example may be the description of the information systems in place to provide forecasts about the expected water level situation on the section of the waterway network.

2.2.3. Views of different user groups on GNS

Transport users general view

The most important requirements for users as regards GNS are:

- **reaching the existing targets for the physical waterway dimensions**. GNS shall contribute to strengthened **enforcement of agreed targeted dimensions standards** and classifications with reference to AGN, ECMT, Rhine Profile or national defined standards. This is in particular the case for certain countries along

[4] beyond navigation channel, locks, ship lifts and bridges

the Danube and also for the Elbe and Oder which suffer from a lack of draught. In particular, the draught is a critical issue for users, notably the shippers as this reduces the efficiency and raises the costs of transport by inland waterways. Furthermore, water level fluctuations in combination with lack of maintenance may give an unreliable performance on the available depth, resulting in lack of reliability of the section.

- **reliability of network** (24/7) and better forecasting is desired to ensure predictable navigation which addresses the predictability of the journey time. This can be broken down into waiting times at locks and bridges and also the available water levels and information about closures. In general the total travel time is of more importance than particular waiting times at locks.
- anticipating authorities undertaking long-term planning (e.g. Mosel Commission at the start) and streamlining procedures for works and authorities coordinating cross-border and 1 year in advance incl. consultation of transport users on closures for repair and maintenance

The users indicate that the focus shall be on the parameters of the fairway channel and providing sufficient capacity (e.g. locks) on major corridors. Bottlenecks are usually already known and need attention. A stronger participation by the transport industry is desired as regards planning processes of infrastructure works, maintenance and rehabilitation. Best practices shall be applied as well as cross-border coordination. Making Cost Benefit Analyses (CBA) is seen as a possible approach to find the optimum for the required physical parameters of the waterway dimensions such as the draught, height under bridges and the possible length and beam of vessels. First priority is to have the basic inland waterway infrastructure available and dimensions shall be ensured by means of monitoring, financing and enforcement. A next step is the accelerated harmonization of RIS to further optimise the use.

Specific viewpoints of user groups

Shippers

Shippers in particular are sensitive to the reliability, predictability and costs of inland waterway transport. If costs are becoming too high, they will switch to using other transport modes or make changes in their location of production or sourcing of materials. Therefore, the shippers / freight forwarders have a strong influence in the modal share of inland waterways.

Shippers acknowledge that maintenance of waterways and locks are indispensable but should cause minimal economic damage to business. This can be achieved in their view by:

- better coordination between waterway authorities across borders and regions (e.g. to prevent simultaneous works on parallel or alternative routes)
- a transparent planning of the works with recognition of the economic interests of stakeholders that depend on IWT services
- consultation of all involved stakeholders

Furthermore, shippers emphasise the need for:

- scripts, to accelerate the full availability of the waterway caused by an unforeseen incident such as an accident or sudden breakdown of infrastructure.

These scripts for accident/incident management should be at least available for 'weak spots' in essential waterway corridors, addressing also the swift communication with users to help them anticipate to mitigate the negative impacts of hindrance

- reliable ETA's, in order to allow them to plan the linked processes to the transport very efficient to ensure a swift supply chain

Box 1 – EXAMPLE: Stakeholder involvement in the Netherlands: Centraal Overleg Vaarwegen (COV)

The COV is a partnership in the Netherlands between the employers' organization EVO, the Association of Hydraulic Engineers (VVW) and inland shipping organizations and brings (potential) bottlenecks in the waterway network under the attention on national and regional governmental levels.

COV publishes yearly reports and recommendations on the status and quality of the Dutch waterway infrastructure covering:

- encouraging timely maintenance of waterways;
- broadening and deepening of fairways and ports;
- securing adequate service level for smooth navigation;
- adequate information and communication management to users
- securing adequate overnight accommodation, resting and waiting areas;
- minimizing adverse effects on shipping from measures for flood protection and water quality;
- minimizing impacts on businesses from long-term maintenance work on waterways or constructions.

For additional information see Annex V-A.

Freight shipping lines and ship owners/operators

Besides the above mentioned general requirements for users, the ship-owners/operators stress the need:

- to provide sufficient mooring places and car-lift jetties
- to provide accurate information about forecasted water levels
- for a better enforcement of the agreed standards and parameters for the waterway dimensions, in particular as regards the draught in relation to maintenance efforts

As regards the closure for repair and maintenance it was indicated by ship-owners that they rather have a longer duration of a closure (e.g. 10 days) for preventative maintenance which is announced a long time in advance, than shorter ad-hoc maintenance works that come as a surprise.

Concerning the required bridge clearance, it was indicated by the ship-owners/operators that for state-of-the-art container transport with high-cube containers the target should be 9.10 metres for 3-layer transport and 12 meters for 4-

layer transport. The standards for bridge height and container transport as defined by CEMT in 1992 should therefore be revised from their viewpoint.

Passenger transport

The passenger transport sector indicates that draught is a bit less relevant for them compared to freight transport vessels, since the draught of a passenger cruise vessel is about 1.5-1.7 metres. More relevant is the height under bridges, this may be an issue because passenger cruise vessels can have a height of 6.5 metres, which is more than the minimum requirement of 5.25 metres bridge clearance according to the TEN-T Guidelines.

Moreover, since the passenger cruise industry is mainly active in the summer period (March – October) it is suggested to avoid planned maintenance during this time of the year in order to avoid hindrance.

The passenger cruise industry also stresses the need for proper facilities in the ports (waste reception, access to the quay with buses, shore power, etc.) and the requirement to have minimum hindrance from waiting times at locks and closures.

2.3. Exemptions

The TEN-T Guidelines require that river, canals and lakes that are part of the TEN-T network comply with the minimum requirements for class IV waterways according to the CEMT, which prescribes the horizontal dimensions (width and length of the allowed vessel). In addition, the TEN-T Guidelines state that as regards the vertical dimensions at least 2,50 m draught and 5,25 m height under bridges shall be available.

The rationale for the minimum requirements is that IWT on the TEN-T network can only fulfil its transportation role when there is sufficient capacity for European cross-border traffic. Local waterway sections on the TEN-T network which do not have sufficient draught and height under bridges may prevent inland navigation from efficient and reliable and punctual services. Such bottlenecks may hamper the functioning of the TEN-T network and result in negative external costs undermining the full potential of inland waterway transport and its benefits for the EU Internal market.

Some sections of the inland waterways that have been included in the Annex I of the TEN-T Guidelines do not meet the specified minimum vertical dimensions. According to the TEN-T Guidelines, infrastructure improvements would be needed to ensure that those sections meet minimum draught and height under bridges by 2030 (all TEN-T waterways are part of the TEN-T core network).

Nevertheless, the TEN-T Guidelines foresee the possibility of exemptions for the minimum draught of 2.5 metres and 5.25 metres minimum height under bridges. That means that the sections in question can continue to be part of the TEN-T network even if they involve a limitation on transportation capacity.

The TEN-T Guidelines impose three procedural conditions to acquire an exemption for not reaching the minimum dimensions as regards draught and height under bridges:

1. The request for exemption has to be formulated and submitted to the European Commission by the concerned Member State

2. The concerned Member State has to "duly justify" the request
3. The European Commission has to approve the request.

As stated in the introduction, the specific procedure and details as regards exemptions need to be formulated and decided upon by the European Commission. However, the following description can be provided as an example how the exemptions could be seen and applied. This description is based on the stakeholder consultations and meetings with experts which took place during this study on GNS.

Nature of the exemptions

In principle, it is conceivable to distinguish between "temporary", "permanent" and "operational" exemptions. Such exemptions may be granted based on "ex ante" requests (e.g. structural/permanent exemptions). However, exemptions may also be relevant on the basis of ex post assessments. For example due to unforeseen circumstances, such as incidents which may blocking a link or bridge for a long time or due to long low water periods causing limited draught. The thresholds would need to be defined as regards when an exemption is needed, taking into account the added value of the exemption procedure in relation to the involved administrative burden.

For example the "Temporary" exemptions can be limited in time. The Member State responsible for the inland waterway section affected by limitations in draught and/or height under bridges may require time beyond 2030 to execute infrastructure maintenance or works needed in order to meet minimum requirements as regards draught or height under bridges. EC may grant a temporary exemption to bridge such a period.

In exchange, "Permanent" exemptions would apply to sections where there is an overwhelming physical impossibility, risk of serious and irreversible environmental damage or otherwise overriding public interest reasons to achieve the minimum requirements as regards minimum draught and height under bridges.

In addition, it is conceivable to consider "operational" exemptions, for example regarding certain periods of the year where minimum draught cannot be achieved because of meteorological and hydrological conditions (e.g. high water, low water, ice). Furthermore, incidents or infrastructure works may cause closures of inland waterways. These cases for "operational" exemptions can be identified and substantiated by means of the reference water levels applicable to the specific waterway stretch as well as thresholds for the duration of closures in relation to the cause or reason for the closure. Moreover, monitoring the dynamic draught levels and height levels under bridges as well the availability of the network (closures) can be input for ex post assessments to judge whether an exemption is needed. Possibly this ex post assessment can be done with TENtec data stemming from Notices to Skippers and Fairway Information Services.

Impact of the exemptions

The impact of the draught and height under bridges limitations shall be considered. In principle, the impact can be seen as:

- Small: limitations do not seriously affect the basic functioning of IWT operations;

- Medium: there are traffic restrictions, but IWT operations can still be performed
- High: limitations are a serious TEN-T bottleneck.

Criteria can be defined for the classification, for example by means of calculation of the costs of the limitation for the transport industry. Furthermore, feedback and input from transport user organisations (e.g. EBU, ESO, ESC) may be used to classify the impact. Such classification can also be related to priority setting, e.g. in relation to co-funding by the European Commission for rehabilitation works to make the network at the minimum standards as regards the draught and height under bridges.

Administrative matters to be considered

In connection with the procedure foreseen in the TEN-T Guidelines, the following matters would require attention:

(a) Identification of sections requiring exemptions

In advance of the final date for completion of the TEN-T core network (2030), waterways sections requiring exemptions for the draught and height under bridges should be identified based on the GNS network assessment and monitoring of depth of navigation channels and height under bridges. Limitations shall be identified and the impact on IWT operations shall be estimated (small, medium, high). Subsequently, the identification should clarify the nature of the required exemption (temporary, permanent, operational).

(b) Deadline for requesting exemptions

The concerned Member States should request the exemptions to the European Commission well in advance of the 2030 final date. This concerns ex ante assessments, notably as regards the permanent and temporary exemption types. All concerned parties that use the waterways sections in question (operators in cross-European trade, shipping companies, countries/regions linked to the waterways in question, etc.) should be adequately involved. Concerned parties may also provide input or validate the classification as regards the impact on IWT operations (small, medium, high).

(c) Elements supporting the request for the exemptions

Each waterway section is unique and the reasons for the exemptions would have to be examined on a case-by-case basis taking into account the local conditions.

Exemptions, depending on their nature (temporary, permanent, operational) would require, in principle, solid supporting justification on the basis of:

- Technical / engineering / hydro-morphological / hydrological explanations
- Environmental Impact Assessment
- Economic / Funding / Social arguments

(d) Examination and justification of the exemptions by the Commission

The responsibility of granting an exemption falls under the responsibility of the European Commission.

Each waterway section is unique and, probably, the exemptions and their impacts would have to be reviewed on a case-by-case basis by the European Commission.

The European Commission would have to consider possible conditions (e.g. time extensions, compensatory measures, alternative parameter targets to be achieved as regards draught and height under bridges).

(e) Information to third parties

Third parties affected by exemptions to minimum requirements in a particular section of the TEN-T network should be adequately consulted at the different stages of the process (examination of the request and final decision).

Recommendation

The completion of the TENtec database should allow identifying all inland waterways sections that, as of 2017, do not meet minimum requirements as regards the 2.5 metre draught and the 5.25 metre height under bridges.

The European Commission shall discuss with Member States and shall specify the thresholds and specific situation for which exemptions are needed from 2030 onwards. There are issues to clarify as regards the relation between the minimum draught of the vessel of 2.5 metre in relation to the minimum depth of the navigation channel, taking into account the safety margins. The same applies for the safety margin as regards height under bridges. Moreover, it is not realistic to demand full year availability of these minimum values on free-flowing rivers, due to natural fluctuation of the water levels in relation to weather conditions. Reference water levels shall be used. Furthermore, it shall be made clear for which situations exemptions are not needed, e.g. in case of regular closures for short periods for works or maintenance, for which the sector has been involved well in advance and cross-country coordination (e.g. River Commissions) has taken place.

The concerned Member States should decide whether or not an exemption in terms of the TEN-T Guidelines would be needed. The European Commission may check with the user organisations (e.g. EBU, ESO, ESC) to verify if the overview of requested exemptions is complete and whether the assessment of impact on the IWT sector is correct.

3. MINIMUM STANDARDS OF A PROCESS ON GNS DEVELOPMENT

The GNS concept shall include minimum standards for both the process and methodology for achieving "Good Navigation Status" in a systematic way for the sections of the TEN-T network. MS shall incorporate the GNS process in their waterway management plan. Mature countries may already have these processes. It makes no sense to repeat what is already there. Consequently, no specific GNS development plan is needed in order to avoid administrative burden. However, less mature countries may develop GNS development plans in order to prove that GNS is being implemented. Furthermore, such plans including GNS processes may be a pre requisite to apply for co-funding from the European Union for rehabilitation and upgrading works.

3.1. Scope of the GNS process: towards GNS in waterway management plan

As developed through the 1st pan-European expert group, the 4 regional workshops in fall 2016 and discussions with various stakeholders and as identified in previous task reports, the GNS process primarily focuses on the "hard" components, or the physical dimensions that make up the core navigability standards (navigation channel – width/depth, lock availability and bridges clearance) on the river, lake or canal.

Furthermore, in order to avoid unnecessary and unacceptable administrative burden for Member States and waterway managers, it is clear that it does not make sense to run again through a full-fledged GNS process on stable and mature waterway sections that already fulfil core navigation standards over a longer period of time. The GNS process and GNS development plan shall focus on the most relevant, critical and volatile issues. Especially sections that have a combination of the following situations shall be in focus of a GNS development plan:

1. **Free-flowing waterways**: variable width, depth or height dimensions usually occur on free-flowing river sections. These limitations (or rather their unpredictable variations) have a negative impact on the reliability and economic efficiency of inland waterway operations. Notably in case of poor maintenance, the set targets for the reference low water level will be compromised, causing insufficient depth on too many days to be able to use the possible draught of the vessel. As a consequence, inland waterway operators (and their customers) are faced with deteriorated load factors and fluctuating and high freight rates. In many cases fluctuation is due to unavoidable natural circumstances (lack of precipitation), but it may be aggravated due to lack of maintenance. Severe fluctuations of the available navigable channel depth reduce the attractiveness and competitiveness of inland waterway transport. If there is poor management or maintenance, specific attention shall be given to remedial measures.

2. **Sections with limited lock availability**: limitations in lock availability and capacity will in general lead to unpredictable delays and waiting times. This has a direct negative impact on economic efficiency and reliability of inland waterway operations. Consequently, the share or non-productive operational hours is raised and the on-time reliability of inland waterway transport –

usually one of the strongest competitive factors of IWT – is impaired. GNS measures may aim for increasing the capacity.

3. **Sections with too limited width, depth or height dimensions**: curve radii, width of canals and height of bridges (with generally stable dimensions) can be bottlenecks in certain corridors. The GNS process should be aimed at identifying such limiting infrastructure bottlenecks and produce solutions for their remediation.

A focus on these "hard" or physical components of the waterway infrastructure is legitimate, as these components are direct outcomes of any waterway management measures on the one side and have the largest economic impacts on inland waterway transport operations on the other side. User consultation is a key mechanism to identify bottlenecks in the infrastructure and to discuss the possible solutions.

3.2. Key characteristics of a GNS process

The proposed process to develop Good Navigation Status is viewed as a **continuous improvement cycle**. The proposed process should fulfil the main attributes of integrated waterway management (PLATINA, 2016):

- Targeted: Every waterway maintenance or management activity should be performed within the framework of defined targets, e.g. target values, levels of service, etc.
- Strategic: For a coordinated, effective and efficient achievement of targets, a specific waterway management strategy should be applied, aiming for achieving and maintaining GNS at least by the time-horizon 2030 and maintaining the status from 2030 onwards.
- Multi-disciplinary: Waterways are not only traffic routes but are characterized by a variety of other uses with sometimes conflicting interests.
- Participatory: Due to the multi-disciplinary character of waterways, participatory management is advisable in order to understand and respect the other uses of waterways. All relevant stakeholders should therefore be engaged in the planning process to achieve and maintain GNS.

In addition, discussions with stakeholders and waterway managers revealed that the GNS process should fulfil following additional requirements:

- Fact-driven: the process should create transparency for all involved parties, that is, (non)compliance with target values should be easily monitored by means of selected performance indicators.
- Minimum administrative burden: the process and reporting efforts should be minimised by means of using available data and digital sources to the maximum extent possible, possible supported by the EC providing funds to develop the data and interface with TENtec and the legislative backbone (e.g. RIS Directive). Furthermore, it should be pursued to harmonize available databases (e.g. UNECE bluebook, TENtec and national waterway databases) and mitigate multiple requests and delivery of similar data.
- GNS process as a means to an end: data collection and reporting is not a goal in itself: the GNS process should ultimately result in a well-functioning

European waterway system in line with the provisions of Regulation (EU) No 1315/2013, which is verifiable by monitoring the GNS KPIs on the TEN-T network and through feedback from transport users.

It is not the intention of the proposed GNS process to identify or re-define target dimensions for waterway sections at the start of each process cycle. The existing national and supra-national regulations and regimes provide in general a good starting basis for improvement cycles aimed at reaching already agreed targets values. Through the study it became clear that on many waterways meeting the current targets is already challenging (e.g. having sufficient draught on waterways such as the Danube, Elbe and Oder).

On the other hand, the proposed GNS process could provide guidance to waterway managers on how to determine adequate targets for navigation channel dimensions (also for waterways not meeting CEMT IV requirements). This shall be part of a long-term vision or a plan to implement a cyclical process for reaching and maintaining GNS, also based on stakeholder consultations. In this way, the GNS process contributes to improving and monitoring navigability conditions on a permanent basis, supported by waterway administrations experienced in long-term planning and working in cyclical processes.

The proposed GNS process contains six main steps, which are described in the following sections. Good practice elements for each of these steps – as identified through desk research, stakeholder interviews and the good practices described in the Annex to this report – have been used and integrated in the description of the model process below.

3.3. The six steps in the proposed minimum GNS process

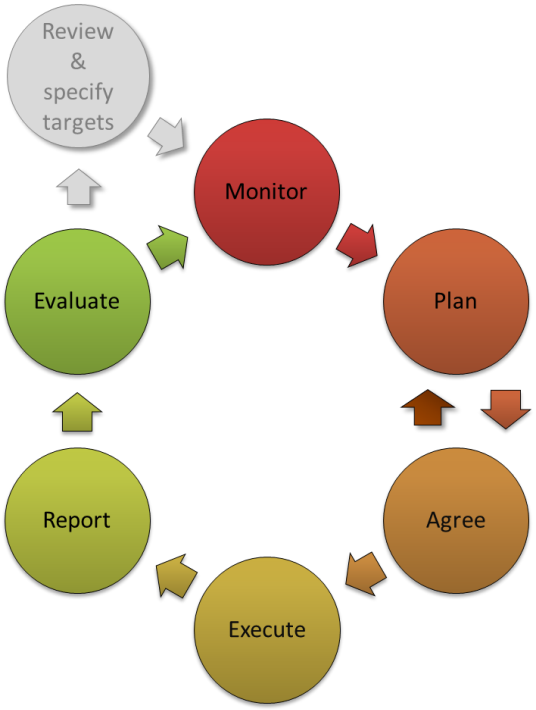
Based on the various good practice examples (as identified in the course of stakeholder consultations and based on desk research) the main elements of a minimum GNS process have been formulated and structured in six process steps.

Some of the proposed process steps are already part of the normal procedures in various countries. They therefore reflect usual practice in some countries and would be easily accepted by stakeholders in these countries, notably the waterway managers. A GNS Plan shall refer to these good practices and available documents and waterway management plans. The main added value of this process description is based on the fact that for the first time all process steps are consolidated into one cyclical process, inspired by the good practices and the best process elements encountered throughout Europe during the study. The proposed GNS process uses the best of both (or rather more) worlds.

The resulting GNS process shall normally be carried out in yearly cycles. As it is a cyclic process, the GNS process can basically start in any of the process steps (i.e. should not necessarily start in the monitoring phase). In any case, a description and evaluation of the status-quo is needed as an initial starting point. This may lead to a review of targets and specification (see grey circle).

Achieving GNS by 2030 will require deployment of a process which is characterised by the following six steps:

Step 0 | Review & specify targets



It is not the key objective of the proposed GNS process to identify or define new target dimensions for waterway sections at the start of each cycle. Target review and specification is therefore not included as a default, but as an optional, initial process step (if needed). Strategic in-house guidelines and targets, which pertain to fairway maintenance, are normally already in place and can be extracted from the relevant management and core processes of the waterway authority (as summarised in the Task 2 report). Only if overall waterway management targets are apparently lacking with a view to reaching GNS by 2030 (e.g. compared to TEN-T minimum standards on draught and bridge clearance) or if evaluation activities (Step 6) lead to the conclusion that waterway management targets need to be revised or refined, a **consultation** of stakeholders shall be initiated. This as input for the process to (re)define target values and to agree on a long-term vision to reach the (re)defined target values to achieve and maintain GNS (► Good Practice in Annex V-A, V-B and V-C).

A review of waterway management targets could also lead to the need for starting larger projects such as preparatory studies and construction of new lock chambers, construction of (parallel) canals, increasing bridge height, eliminating sharp bends, increasing width/depth of canals, et cetera.

As regards the targets for free-flowing river sections the target values shall be related to reference water levels in these sections. This is required to realistically reflect the natural and statistical variations in water discharge. These variations cause situations in which 365-day availability of target dimensions cannot be guaranteed with reasonable means. It is noted in this respect that Regulation (EU) No 1315/2013 already foresees "*paying particular attention to free-flowing rivers which are close to their natural state and which can therefore be the subject of specific measures*". This could also include the definition of refined target values for free-flowing sections, which are coupled to the reference water levels in these sections.

Step 1 | Monitor and analyse status of the waterway

The proposed GNS process is fact driven. Measuring and monitoring activities therefore make up a core process step.

Step 1a. Data collection

Topical data on the "hard" components, i.e. the physical status, of the waterway are collected in the first step for the TEN-T inland waterways, and optionally/voluntarily this may be extended to smaller waterways and non-EU waterways:

- Fairways: Analyse the closures for navigation of waterways and the current state of the navigation channel (depth/width) on the basis of hydrographic riverbed surveys. This shall include monitoring of hydrological structures and navigation channel marking in order to identify critical areas in the navigation channel (reduced depth and width or curve radius), and analyse availability of fairways (e.g. monitor closures through ice, floods, accidents, events, etc.
  It is recommended, where available, to use an digital interface between data abstracted from Notices to Skippers (NtS) and TENtec. A successful application will minimise administrative burden for the waterway manager as they only eed to approve the TENtec data. Approval will be a quick process in case the NtS data are complete and correct.

- Locks: monitor closures and waiting times at locks and lock availability, for instance through data from electronic lock dispatching tools. Again, NtS is the recommended source of information. In addition, AIS position data may be used for developing information on waiting and journey times, however, this may require a legal base on national level to do so and acceptance by ship owners.

- Bridges clearance: Monitor closures and bridge clearance values either through vertical sensoring systems or through calculations related to reference gauges.

For the successful application, TENtec data formats and sectioning shall be aligned as much as possible with the data structures used by the different waterway administrations. This avoids duplication of data collection efforts. Scripts will be

needed to prove a bridge between daily NtS messages for specific sections and objects and the aggregated data for TENtec on a yearly basis. It may be considered to expand such a monitoring instrument on a voluntary basis as well to Non-EU Member States and smaller waterways (e.g. CEMT II/III classified waterways).

Step 1b. Data analysis and identification of bottlenecks to reach GNS

Based on the analyses of collected data the most critical waterway sections in the particular year shall be identified. This may concern waterway sections with a long duration of (unexpected closures due to events – e.g. lock breakdowns) and navigation channels which do not reach the physical dimensions as targeted (e.g. draught). Ideally such assessment can be done by means of TENtec. Critical sections can be highlighted by means of maps. However, this will require of course a good quality of data and a good filling rate of the TENtec parameters.

The actual location of shallow sections, which do not meet the minimum standards (as defined in step 0), may vary from year to year and from week to week, especially in the free-flowing sections. For this reason, frequent river bed surveying activities shall be carried out, depending on the dynamic character of the particular stretches. Locks and bridges which cause the most critical limitations shall be identified through systemised data analyses (e.g. longest average waiting times, longest downtimes, strongest clearance limitations). In addition to measurements by official authorities (e.g. waterway-, RIS-, lock operators) feedback from transport users shall be organised regularly, in order to jointly identify and validate the most critical bottlenecks which shall be the starting point for making plans to eliminate / mitigate bottlenecks and to achieve and maintain GNS by the year 2030 latest.

Step 2 | Plan measures

At the end of Step 1 a list of bottlenecks or critical sections in the waterway network is identified. by the waterway managers and transport users in view of reaching GNS by 2030 latest. It shall take into account existing plans to improve the navigation conditions. Based on these monitoring results and analyses, the remedial and/or preventative actions and measures need to be defined, planned and presented in waterway management or GNS Plans prepared by Member States. In case of international waterways, this shall be done in close cooperation with international

coordination platforms such as River Commissions. These plans shall refer to already existing plans and programmes on regional/national level and on the level of river commissions and shall identify additional plans/measures (if needed). As regards the measures, the waterway development and respectively GNS plans shall have a particular focus on:

- Shortcomings in the network in view of compliance with the minimum standards according to TEN-T (2.5 metre draught, 5.25 bridge height)
- Measures to reach GNS with a request for co-funding from European programmes such as the Connecting Europe Facility,

Included measures may be the following, for example:

- Traffic management measures
    - Improving the navigation channel marking based on the traffic intensities and available dimensions of the fairway
    - Intensification of service times of locks and bridges
- Infrastructure maintenance measures
    - Navigation channel dredging (e.g. remove sediments from the fairway deep channel, dredging full width of the fairway)
    - Preventative maintenance of lock gates and chambers
- Infrastructure engineering measures
    - Adaptation of hydraulic structures (e.g. groynes or training walls)
    - Adapting or new-building of bridges and locks/dams
    - Adapting canals (e.g. width/depth expansion) or building new canals

Step 2a. Draft concept of measures

The remedial and/or preventative measures need to be specified and planned, so they can be presented and discussed with stakeholders (Step 3) and later be executed (Step 4). The draft measures for navigation channel maintenance shall describe the identification of location, timing, sediment type and cubature (m3) necessary to be dredged as well as location of site where dredged material shall be dumped back into the river. Lock maintenance activities need to be defined in the same fashion. The quantity structure of the measures (e.g. cubic metres to be dredged) should be determined. These calculations can be supported by computer-assisted waterway management tools (► Good Practice in Box 3 and Annex V-C).

With the aim to increase navigation channel availability, waterway authorities may choose between various possible options, which are characterised by different costs, impact on availability, realisation time, duration of impact, resulting costs and environmental impact and impact on other uses and stakeholders. Possible measures and the impacts can be visualised in the form of a decision tree or multi-criteria analysis using these elements. In order to identify the optimal measure for one section, all measures should be compared to the status quo ("zero alternative") as well as with each other. This information on the different options is shared with the

involved stakeholders, and thereby taking into consideration socio-economic output, financial analysis, social acceptance of projects, as prescribed in national procedures. This is done in order to set up a transparent and integrative planning process, with feedback loops and iteration between process steps 2 (plan measures) and 3 (agree on measures). The stakeholders to be officially involved (and to be granted the status of a party to the approval procedure) in the planning phase shall depend on national provisions and the scope of the project (e.g. navigation authorities, land-owners, national park authorities). Initial plans starting from the viewpoint of transportation interests, shall be adjusted to reach synergies and compromises.

A clear and important example in this respect is the close interaction that shall be organised with the environmental requirements and interests stemming from the EU Water Framework Directive (WFD) and the objective to reach Good Ecological Status on European waters.

Box 2 – Compliance and mitigation measures in relation to the Water Framework Directive

The Water Framework Directive is one of the most relevant Environmental Laws in relation to navigation of waterways, for which compliance may result in a conflict of interest with the objective for reaching GNS. According to Article 4.3 of the WFD, Member States may designate a water body as artificial or heavily modified when changes to the hydromorphological characteristics of that water body to reach good ecological status would have significant adverse effects on, amongst others, navigation (including port facilities). Moreover, if there is no significantly better environmental option available to replace the function of the artificial or modified characteristics of the water body, due to limited technical feasibility or disproportionate costs, the Member States may follow a step-wised approach, as included in the Common Implementation Strategy (CIS) Guidance document No. 4, in order to identify and designate a waterbody as heavily modified or artificial. Such designation and the reasons for it shall be specifically mentioned in the river basin management plans of Member States, to be drafted and reviewed every six years.

Although Heavily Modified Water Bodies (HMWBs) are not exempted from WFD environmental objectives, less stringent objectives do apply to improve the ecological performance and reaching Good Ecological Potential (GEP) on these designated water bodies. In case of maintenance measures or new projects that have adverse environmental effects on waterways, WFD procedures prescribe that Member States have to monitor the Ecological Status on their waterway network and provide plans to reach Good Ecological Status and implement measures that mitigate possible adverse environmental effects. Moreover, these mitigation measures are not only required for the WFD, but also to meet requirements of Environmental Impact Assessments and Habitats Directives.

In the inland navigation sector there is significant practical experience of delivering effective mitigation measures for adverse environmental effects of maintenance and new projects, measures such as: restoration / reconnection of floodplains; removal and replacement of rip-rap embankments with soft engineering solutions (nature friendly embankments); instalment of (by)passes for fish and sediment; sediment management (re-use of uncontaminated sediment); timing of works (phasing, seasonality); etc.

For more information, see CIS Guidance Document no. 4:
http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

Step 2b. Time and budget planning

The planning phase also includes a provisional time planning. The time needed for permission and approval procedures can normally be planned on the basis of previous experiences.

In particular as regards free-flowing sections, the time planning of the actual execution of works is highly dependent on actual water discharge, but in any case should be based on time series and statistical values (e.g. expected low water season) taking into account environmental aspects like protection of spawning grounds in spawning time, the migratory seasons for birds. Moreover, lock revision activities (especially preventative maintenance) should be planned in the low navigation season – on the Danube for example usually between October and March -, when passenger transport is generally lower. Consultation with transport industry and notification well in advance to transport users of the waterway is important to minimise the hindrance. It is important that the transport industry also makes active use of these opportunities to provide feedback on the time planning (► Good Practice in Annex IV-A to V-C).

Waterway maintenance measures such as adaptation of hydraulic structures and dredging are usually faced with quite narrow time windows (► Example Box 3):

- They are normally forbidden during spawning and breeding seasons
- They can normally only be carried out under middle/low water circumstances in free-flowing sections
- They should be completed shortly before the statistically expected low-water season, which differs per corridor and section, in order to be effective (the principle of proactive fairway maintenance). An example for the Danube is that the optimum time frame for the start of priority maintenance works is prior to the beginning of the low-water period in early autumn. This is based on the annual hydrological regime of the river.

In order to remain flexible within such tight time windows, lead times for all other process steps, which are not dependent on external circumstances, shall be kept as short as possible or shall be prepared well in advance.

Key success factors for the process of the coordination of lock maintenance are a good interaction of all stakeholders and a good exchange with the navigation industry. The industry representatives shall have the opportunity to make proposals for improvements in the scheduling of lock closures as for improvements of the inland waterway infrastructure in general. After consideration, the schedule shall be made binding for waterway authorities respectively managers and lock operators and be communicated well in advance to the transport users (e.g. 6 months in advance in case of closures with a duration of more than one day). Similar consultation and information processes with the navigation industry shall be in place for construction and new-building works (e.g. bridges) which may give hindrance to traffic.

The cost planning for physical interventions should be based both on historical experiences and on actual contractual prices (e.g. price per cubic metre, as defined in framework contracts). Cost calculations can be supported by computer-assisted asset management systems. Again different options may be developed with different costs. It may be considered to choose for a more expensive option in case the closure time

for navigation can be reduced, in order to save costs for the transport operators and shippers.

For any kind of decision process regarding the implementation of object (lock/bridge) or navigation channel maintenance measures, an assessment and estimation of possible condition development with and without measures is crucial. A comparison and optimization of all technically feasible measures as a result, e.g. in the form of a "measure decision tree", is therefore only possible if both costs and impacts (duration) are known. This approach is impact-oriented and clearly focuses on the improvement of object navigation channel availability. Measures with the lowest need for physical interventions and with the highest impact on target achievement are favoured.

Box 3 – EXAMPLE: Optimised planning of dredging works in Austria

Due to the hydro-morphological aspects of the Danube in Austria, the main challenge for viadonau as the competent waterway management authority is the year-round provision of internationally harmonised fairway parameters in the two free-flowing sections of the Danube waterway.

Seen from the perspective of the users of the waterway, an increased availability, predominantly of fairway channel depths, may lead to a higher utilization and lowered costs of inland navigation, as the possible draught loaded of the vessel fleet significantly influences the transport costs on the Danube and the competitiveness of Danube navigation as such. In practice, one extra centimetre of draught loaded on average enables an additional loading capacity of 7 to 14 tons. For a transport route between two ports with several critical locations on the route, in low-water periods the most shallow section will limit the maximum draught loaded whereas restrictions in fairway channel width may only lead to additional waiting times in case of critical vessel encounters.

In view of the characteristic discharge curves of the Danube river in Austria (cf. figure below), the optimum time frame for the start of urgent dredging works is the month of September. In order to be able to start with dredging measures already at the beginning of September, a hydrographical survey of all critical locations in both free-flowing sections is performed each year in July. Based on these survey results in combination with the general annual riverbed surveys from spring and the surveys from the monthly monitoring of critical locations, a main annual briefing meeting for dredging works was established at the beginning of August (cf. figure below). The main purpose of this meeting is the identification of those critical locations which show the highest priority in terms of maintenance interventions needed. In the meeting a prioritization of these locations is discussed and the current catalogue of critical locations is adapted accordingly.

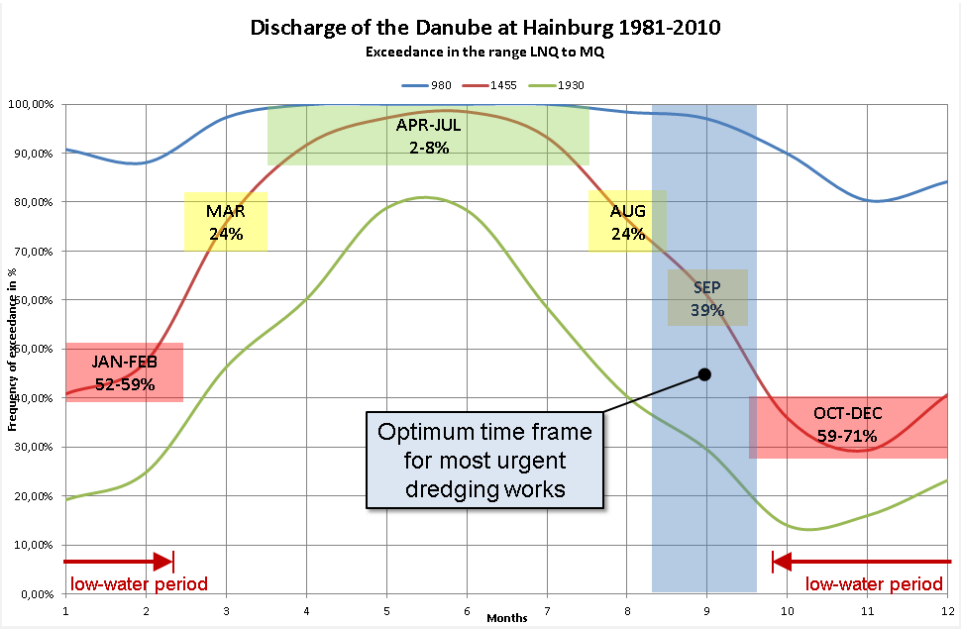


Figure: Frequency of exceedance of characteristic amounts of discharge at the Hainburg water gauge in the years 1981 through 2010 and inferred optimum time frame for most urgent dredging works.

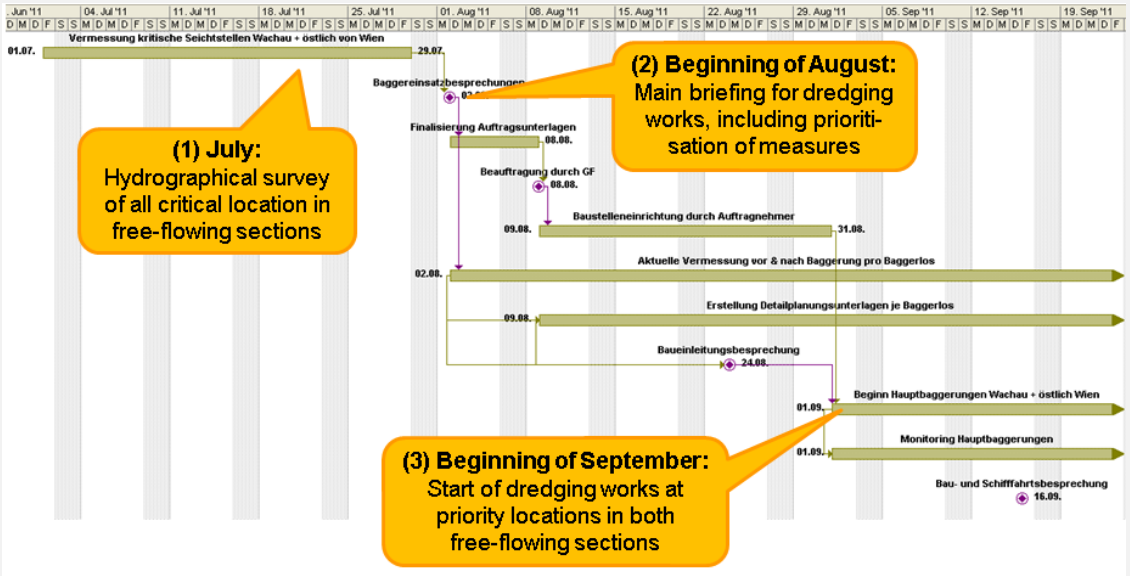
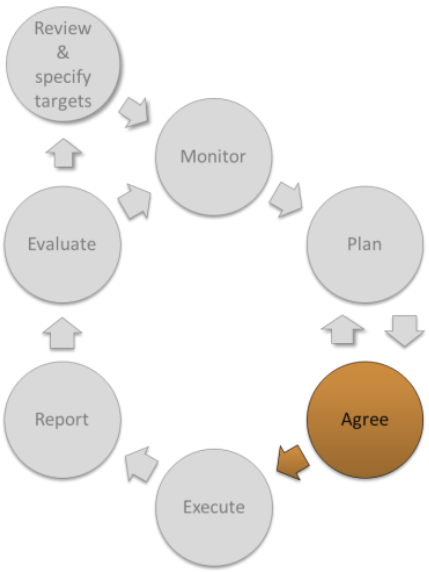


Figure: Sample schedule for prioritized dredging works

For additional information see Annex V-C.

Step 3 | Agree on measures



As mentioned, there is a close interaction between step 2 planning and step 3 for the agreement on measures. Stakeholder engagement and acceptance is key to the success of the GNS process. International waterways are a complex matter as they traverse numerous countries and touch multiple interests. Due to this, administrations in charge of maintaining these waterways for navigation need to include stakeholders at various levels and from multiple fields of expertise.

Step 3a. Develop measures with stakeholders (national user fora)

Especially critical waterway sections on which the different uses (e.g. ecology, flood protection, recreation) are conflicting or where the achievement of GNS is most heavily disputed will require a process in which all different stakeholders and interest groups are integrated, in order to come to commonly accepted solutions. Successful good practices on stakeholder engagement are characterised by regular, recurring and fact-based communication (usually once or twice per year) (► Good Practice in Annex V-A to V-C).

Stakeholders shall be informed on following issues based on information in the GNS plan:

- Present status of waterway and measures carried out in the previous period
- Present monitoring results (current status of waterway)
- Present proposed measures and their expected impacts
- Planned timing of measures

The inputs and feedback of stakeholders can thereby be used for adaptation of proposed measures (feedback loop to step 2) or for the prioritisation of measures which will be reflected in updates of the GNS plan. Setting priorities for measures on transport infrastructures basically involves a ranking, e.g. regarding the highest negative impact on infrastructure users, the worst condition compared to a target level of service or the highest monetary losses due to malfunction. Typical priorities

regarding navigation channel maintenance on free-flowing sections are for example given to measures on shallow sections with the lowest navigation channel depth at low water levels. Additional criteria may be the remaining navigation channel width with sufficient depth and/or the rate of sedimentation on critical bottlenecks based on an estimation of remaining time until the section cannot be passed.

The basic aim should be the integration of all relevant interests (shipping industry objectives, environmental objectives, fishery, etc.) into the design of measures, thus preventing later barriers and significantly reducing the amount of potential compensation measures. Integrated planning would therefore include:

- Integration of relevant stakeholders in the initial scoping phase of a measure (process step 2)
- Identification of integrated project objectives comprising inland navigation aims, environmental law and needs and the objectives of other uses of the river reach such as nature protection, flood management and fishery,
- Implementation of an integrated planning process to translate navigation and environmental objectives into concrete project measures thereby creating win-win results
- Conduct navigation and environmental monitoring prior, during and after project works, thereby enabling an adaptive implementation of the measures when necessary.

Good practice examples of integrated planning processes can be found in Germany and the Danube corridor (► Good Practice in Annex II-F and II-G).

Step 3b. Coordinate proposed measures with other waterway managers (on corridor level)

In cases of international waterway corridors, supra-national coordination on waterway management measures is crucial and shall be integrated in the process. Good practice examples for such coordination mechanisms can be encountered on the Danube and Rhine corridors (► Good Practice in Annex III-A and III-B). Coordination of waterway management measures among waterway managers at the corridor level should contribute to:

- Alignment of measures on waterway corridor level: creation of continuity of navigation and common levels of service for the waterway;
- Avoidance of longer disruptions of navigation (e.g. through lock closures at both sides of the border)
- Exchange of good practices among waterway managers (e.g. effective procedures to reach targets at a minimum of public budgets)

The existing Corridor Fora, macro-regional steering groups, or River Commission coordination groups can be used as a platform for multilateral coordination of waterway management activities at the corridor level.

Step 3c. Attain formal approval and permits on national level (if applicable)

Annual briefing meetings for maintenance works should be prepared, with the aim of attaining consensus with the navigation authority as to the necessary measures and to set out in writing a prioritisation of fairway management interventions.

Furthermore, regarding fairway maintenance measures, official notifications or licences are in some cases needed from the competent national authorities as pertaining to water law, environmental law (including an impact evaluation with regard to Natura 2000 areas), navigation law and (in some regions) national park law. The authorities responsible for checking environmental issues also have to comply with the goals of the legislative instruments of the European Union, e.g. the Water Framework Directive (WFD). The WFD requires Member States in Article 4.1(a) (i) to "implement the necessary measures to prevent deterioration of the status of all bodies of surface water" (► Good Practice in Annex II-E and Box 2).

In the course of attaining legal permission for waterway management measures (usually an iterative negotiation and hearing process), the various competent authorities consider user interests and usage aspects. The authorities usually involve official experts in judging the different effects of waterway management measures on other uses of waterways (e.g. fishery, ecology, recreation, nature reserve, drinking water, hydropower).

In principle, permits (water law, environmental law, navigation law, etc.) have to be requested from the authorities for every single physical intervention measure in the waterway, but long- or medium-term permits are generally preferred. An effectual notification always includes certain regulatory requirements as to how the maintenance works in question have to be performed (e.g. defining specific months in which no dredging is allowed because of disturbance of fauna and flora, specific water levels above/below which dredging is forbidden, or restrictions on the amount of dredged material to be dumped in the river at once). In some cases, long- or medium-term notifications are issued by the authorities, which may cover physical interventions over the period of several years, based on specific regulatory requirements for the approved maintenance works. In this case, permits for single measures do not have to be obtained.

Achieving a balance between the need for physical interventions for navigation and adequate environmental protection can be a challenge. But in many cases measures to achieve the needed depth, width, and clearance of the navigation channel can be designed in such a way as to minimise the impacts on important waterway functions or to even restore ecological functions. Mitigating measures are for example, the restoration of riverbanks through rip-rap removal, the establishment of stagnant water zones and gravel/sand structures, or the reconnection of side arms.

For regular maintenance works, the measures will be clear already. For big projects to structurally upgrade the waterway, the costs and benefits of measures shall be taken into account from a neutral and broad socio-economic perspective. This CBA approach shall focus on finding the optimum for the parameter values and services for the navigation quality, while taking into account the transport potential on the corridor. This CBA process may lead to higher local targets compared to the CEMT class IV minimum requirements. The CBA shall start from the viewpoint of navigation and potential transport development to build the case and subsequently take into account further relevant dimensions for the waterway such as other uses and environmental

legislation which may have an impact on the possible targets. Specifically, alignment with environmental objectives on waterways calls for 'win-win' solutions that are mutually beneficial for inland navigation and environment. The concepts of "Working with Nature", according to a Position Paper of PIANC (► Annex II-B), in which a proactive philosophy is emphasized to consider the project objectives first from the perspective of the natural system rather than from the perspective of technical design and therewith identifying win-win solutions rather than focussing on minimising ecological adverse effects

Step 4 | Execute measures

Step 4a. Carry out or subcontract agreed measures

In most European countries construction and maintenance activities are carried out by private contractors on the basis of framework agreements covering a time span of several years.

Most common maintenance work is dredging in order to reach the required levels of depth and width of the navigation channel. This is a key requirement for GNS, especially on the dynamic free-flowing sections (using reference water levels). Therefore, more attention is paid to the specific process of execution of dredging work under step 4a:

Lead times for general dredging works depend on the extent of the work (scale of construction setup, availability of equipment) and can last from several weeks to months. In addition, some waterway administrations have their own maintenance equipment available for emergency interventions, whereas other administrations lack such equipment completely. Especially the latter group is usually confronted with the results of a limited market of dredging companies, which may result in insufficient capability to perform necessary dredging activities and/or at high costs.

In some good practices encountered, multi-annual framework contracts have been set up for 50% of the maintenance measures, including a response time of maximum three weeks between the time of order and the start of the maintenance works on site. Multi-annual framework contracts are set for the duration of three years with an option of prolongation for up to two additional years. The remaining 50% of all annual

dredging works are individually tendered on the market if needed. This measure keeps the market open and counters tendencies of monopolization.

Before actually contracting an external service provider, it is advisable to specifically determine the importance of the tasks which are to be outsourced. In principle and with regard to the fairway maintenance cycle, the two core processes of monitoring and execution in waterway management may be outsourced. Monitoring refers to hydrographic riverbed surveying and water level measurements (hydrology), while execution relates to navigation channel dredging measures and making adjustments of the course of the navigation channel (works to change the channel marking by means of buoys, spears, etc.) according to plan. On the other hand, it has to be ensured that essential resources and competences (e.g. planning, analysis, quality control, coordination) in all steps of the maintenance cycle stay under direct control of waterway administrations. Only then will they be able to conform to their responsibilities of public administration and to provide the targeted infrastructure parameters to the users of the waterway.

Before actual start of the works a briefing meeting shall be carried out. A meeting is scheduled with the contractor in which the details for the measures are finalised. Usually the navigation authority should also be present at the briefing meeting. Details should include:

- area and chainage (river-km) of the maintenance and the placement site(s)
- target depth for maintenance sites,
- date of beginning and end of works,
- daily working hours,
- equipment deployed,
- responsibility to display navigational signs,
- relevant water gauge with reference water level and miscellaneous issues.

During the maintenance works, work safety supervision as well as ecological and local/technical site supervision should be carried out: If legal or ecological issues occur during the maintenance measures, they have to be clarified in cooperation with involved experts.

Generally, a hydrographic riverbed survey is to be performed before and after the end of the maintenance measure for the purpose of quality assurance and settlement of accounts. The contractor therefore has to notify the waterway authority in due time about the estimated end of the measure. For maintenance measures with a longer duration, an additional hydrographic survey can be performed during the implementation of the measure (►Good Practice in Box 3 and Box 10).

Step 4b. Inform stakeholders in real-time

In addition to the information that is provided in advance and in hindsight, selected stakeholders have to be informed on a real-time basis as well. River Information Services (RIS) are suitable tools and available for most inland waterways, notably Notices to Skippers[5]. These services may include the status of inland waterway infrastructure (fairway, bridge and lock parameters) or failures of aids to navigation. Skippers have to be informed about temporarily blockages of waterway sections or other types of infrastructure, maintenance works or other projects, current water levels and depth, ice formation and weather. Such messages are communicated to skippers via Notices to Skippers (NtS). The international NtS standard provides a standardised data format that can be used both for pull-services (e.g. publishing of notices on the Internet) or for push services (e.g. distribution by e-mail). In addition to RIS, online and mobile information services provide information on the status and availability of waterways (e.g. data on shallow sections, gauging stations, lock availability, bridge clearance, etc.). Also in the case of these real-time information sources, a corridor-wide service is preferred over national solutions (► Good Practice in Section 4.2.3).

Step 5 | Report outcomes

Step 5a. Document results of fairway management activities

The outcomes of fairway management measures have to be properly documented and reported. First of all, the work of possible contractors has to be monitored and controlled. The reports drafted by the (ecological and local) site supervision as well as the final hydrography survey of both the dredging and the dumping sites are analysed for this reason. In addition, information necessary for monitoring of performance indicators is collected. Data are not only processed nationally, but key performance

[5] More info on RIS: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV%3Al24239

data should also be transmitted to the TENtec database, in order to maintain a topical overview of the navigation status of the various European waterways.

Step 5b. Inform stakeholders ex post

National and local waterway authorities shall have the obligation to inform users about issues regarding the waterway that might influence safety and accessibility. The type of information and the transmission tools have to meet the requirements of manifold user groups (e.g. skippers/ captains, logistic service providers, waterway administrations, dredging companies). Information has to be accurate, up-to date and easy to access. In the best case it shall be available on one single online platform per transport corridor. In any case a cross-border and corridor-wide information approach is crucial.

User-oriented maintenance of the navigation channel aims at applying the best methods for transmitting relevant information to users and at getting the necessary information from them. This includes not only informing in the best way, but also consulting and integrating the users in the course of the maintenance process. It is crucial that decision-makers in politics as well as in the waterway administrations are willing to accommodate customer's expectations into the process.

Provision of continuous and target group-specific information on the state of the fairway to the users of the waterway and other stakeholders is key to the GNS process. For example, good practices from the Danube corridor have shown that regular and continuous ex post information on fairway management activities (e.g. dredging activities, fairway channel relocation, hydrographic surveying, lock revision activities) as well as their outcomes (e.g. number of days per month with fairway channel depth of more than 2,50 m, average waiting times at locks) contributes to enduring and committed stakeholder involvement in the GNS process.

In some cases, a minimum level of involvement is mandatory. According to the EU's "Guidance Document on Inland Waterway Transport and Natura 2000", maintenance dredging works which only maintain a certain state of infrastructure do not require a separate environmental assessment.

Step 6 | Evaluate measures

Step 6a. Ex post impact evaluation

The term "evaluation" is understood as the assessment of the effects that measures have to maintain or upgrade the status waterway with view to reaching GNS targets. This concerns for example the effects of fairway maintenance measures (i.e. maintenance dredging works or repositioning the course of the navigation channel) on the availability of targeted navigation channel indicators. When it comes to evaluation of width/depth dimensions, it is based on monitoring the hydro-morphological changes in the riverbed and the monitoring of ecological effects of measures. Regarding measures addressing lock availability and bridge clearance, mostly automated data sources (e.g. RIS/NtS) can be used to analyse and evaluate the developments over the past period.

An indispensable prerequisite for any evaluation of the effects of fairway maintenance activities is a sufficient number of hydrographic riverbed surveys, notably for the free-flowing sections. Only if a certain density (i.e. number, of bathymetric surveys) and a certain minimum quality of these measurements are available, the success of fairway maintenance activities can be evaluated. Thus, both the density and the quality of hydrographic surveys must comply with a certain minimum service level which is sufficient to enable an adequately accurate monitoring and evaluation of specific fairway maintenance measures. Only a systematic evaluation of bathymetric riverbed surveys in combination with a detailed analysis of factors influencing riverbed dynamics will enable an assessment and optimization of navigation channel maintenance measures. Hydrographic monitoring is a recurring process and is performed before, during, after, and in between of any fairway maintenance measure. These measurements usually also provide the basis for invoicing and payment of third party contractors.

An interesting development which may be considered to be integrated in future is the use of data collected from echo-sounder equipment from commercial vessels such as currently being developed and tested in projects PROMINENT and COVADEM. The transport industry may use such data and instruments to identify actual bottlenecks as regard available depth of the section and notify bottlenecks and share such information with the waterway authorities. Such direct user involvement shall help to increase the reliability of the waterway and may be an efficient way to collect data supporting more accurate maintenance works.

Other “hard” factor indicators, such as waiting times at locks, bridge clearance data, etc., can partly also be determined via electronic means (e.g. electronic lock log book based on AIS), possibly also supported by users (skippers) that are willing to share their AIS data anonymously for such purposes.

Step 6b. Carry out regular user satisfaction studies and define lessons learnt

In order to increase customer satisfaction, waterway administrations shall make use of consultative instruments. Anonymous user surveys help to evaluate their performance in connection with regular maintenance activities, or the provision of information, etc. Especially the status of the “soft” components shall be monitored through checklists and transport user consultations (see next chapter).

The results and experiences of the GNS cycle shall be summarised and documented in GNS plans, in order to serve as an input for a learning curve of both waterway managers and involved stakeholders.

3.4. Organisational approach for the GNS process

This section comments on the possible organisational setting in order to implement the GNS process in practice, while ensuring adequate coordination at the EU level, for the purposes of the functioning of the TEN-T waterways network.

It shall be noted that GNS is a new requirement introduced by the TEN-T Regulation 2013/1315. Administrations and stakeholders affected by the new requirement have to act and address the requirements consequently. The adaptation should not result in additional work load without added value, but rather on a possible change of working practices, on the basis of strengthened cooperation at river basin and European levels, where needed. It shall be noted that many waterway managers already have such GNS processes and cross-border coordination processes established. Additional processes and organisational structures may therefore not always be needed.

In a preliminary manner, the organisational requirements for implementing in practice the GNS process can be summarised in the following points, distinguishing the national level (level 1), the connected international waterways (level 2), the European level (level 3) and pan-European level (level 4):

National Level (level 1):

- A national body will be assigned in charge of the GNS process in each concerned Member State. Typically, this will be the national Ministry of Transport or administrations in charge of national inland waterways;
- The body contributes to the identification / implementation of infrastructure improvements, maintenance works, process traffic management, etc. ("hard" and "soft" GNS components);
- The body identifies sections where targets for the "hard" GNS components cannot be reached for physical or operational reasons and prepares the corresponding requests for exemptions to the minimum TEN-T infrastructure requirements;
- The national body establishes the waterway management plans or similar documents, incorporating the GNS processes. If needed a national GNS development plan is prepared, e.g. in case of processes not yet existing in national waterway management plans, in case of exemptions to be requested or in case of requests to the EU for co-funding of rehabilitation or upgrading projects. The body ensures proper involvement and consultation of stakeholders about service quality levels in the different sections of the IWW network and provides information;

Connected international waterways (level 2):

- A body in charge of international coordination of the GNS processes (normally the International River Commissions and/or coordination bodies of macro-regional strategies existing in the EU);
- The international body can act as platform for monitoring the effective achievement of GNS, coordinated cross-border actions and may propose measures adapted to international waterway in question;

- The international body provides technical advice to national authorities, may conduct GNS related studies for the river basin, etc.

European level (level 3)

- European Commission provides a database with up-to-date information on the GNS status of each IWT section in the TEN-T (TENtec system, see Box next page), which can be used as a basis for monitoring and network assessments for GNS.
- European Commission provides for a cooperation framework with national bodies, IWT industry sector representatives, international River Commissions (for example, by means of a formal "Expert Group"), supported by monitoring studies and network assessments (e.g. using TENtec data).
- Cooperation at EU level serves to update and further elaborate GNS Guidelines and evaluate, in due time, the progress achieved.
- In the cooperation framework, European Commission consults with the group proposals for granting exemptions.
- IWT infrastructure works needed for achieving / preserving GNS are identified and noted in the TEN-T Corridors Work Plans. EU Funding / Financing measures are envisaged for those works in the context of CEF / Regional Funds actions.

Pan-European level (level 4):

- UNECE may consider to support the GNS process by means of alignment between GNS development plans and TENtec with AGN and the Blue Book, thus avoiding double work.
- In particular, the coordination and alignment of the navigability standards between EU member States and neighbouring countries may be a topic to address at the UNECE platform. Seamless transport across the whole of Europe will also require coordination with non-EU Member States.

Box 4 – TENtec

TENtec is the European Commission's information system to coordinate and support the Trans-European Transport Network (TEN-T) policy. TENtec has two main functions:

1. The collation of technical, geographical and financial data to be used to inform policy-making and political decision-making processes related to TEN-T and its associated funding programme, the Connecting Europe Facility (CEF). The core TENtec modules deployed for these purposes are OMC (Open Method of Coordination) and iReport, both of which are accessible through the TENtec Private Portal;

2. Provision of technical support to the Innovation and Networks Executive Agency (INEA) and its grant management functions. This incorporates supporting the necessary workflows for issuing grant agreements after completion of the selection cycle for new projects, including proposal submission and reception, and the required web interfaces. The core TENtec modules deployed to meet these requirements are eSubmission services, Action Status Report, Project Follow-Up,

Evaluation and Grant Agreement.

In addition to its primary dual function, TENtec also enables the European Commission to easily compile information and create timely reports and maps. This benefits all parties involved in TEN-T project implementation processes, providing greater transparency, data quality and a systematic up-to-date overview of the budget execution and technical implementation for each TEN-T/CEF project.

Another important function of TENtec is its capacity to act as a bridge to the ministries of Member States and other key stakeholders (DG REGIO, DG ENV, EIB and neighbouring countries), including support for transport modelling of future policy and budgetary scenarios, briefings, the mapping of TEN-T/CEF co-funded projects and other layers such as alternative fuels and secure and safe parking.

TENtec also played an integral role in the Core Network Corridor studies, providing vital data collection services and compliance maps built upon selected technical indicators, based on the TEN-T Regulation.

As regards inland waterway infrastructure, detailed data is being collected for the years 2014 and 2015 as regards the waterways, locks, bridge as well as ports and alternative fuel infrastructure. Included are 35 parameters for the inland waterway links, 8 parameters for locks, 9 parameters for lock chambers and 6 parameters for bridges. A number of parameters does address hard components of GNS. This concerns information on the CEMT classification, data on the dimensions of the allowed vessels, data on the maintenance targets for the navigation channel, reference water levels, waiting times at locks, the reliability of the dimensions (e.g. draught), the height under bridges and into what extent the local targets and minimum TEN-T requirements have been reached.

In order to minimise the administrative burden, as much as possible available sources are used to fill TENtec with the values for the parameters. This included also usage of (aggregated) data extracted from Notices to Skippers, Fairway Information Services and ECDIS and RIS Index, which have a legal backbone through the RIS Directive. Moreover, many data are rather static and do not change on a year-by-year basis.

More information about TENtec:
https://ec.europa.eu/transport/themes/infrastructure-ten-t-connecting-europe/tentec-information-system_en

4. EXAMPLES FOR SELECTED SOFT COMPONENTS

This chapter provides examples found for soft components of GNS that do not necessarily have a direct quantitative impact on achieving the level of ambition and target objectives of hard components or are directly linked to EU legislation. The examples do however illustrate that the minimum standards of the GNS Process presented in the previous chapter (chapter 3) are based on ongoing good practices, as regards:

- Infrastructure management processes
- Traffic management processes
- Wider facilities

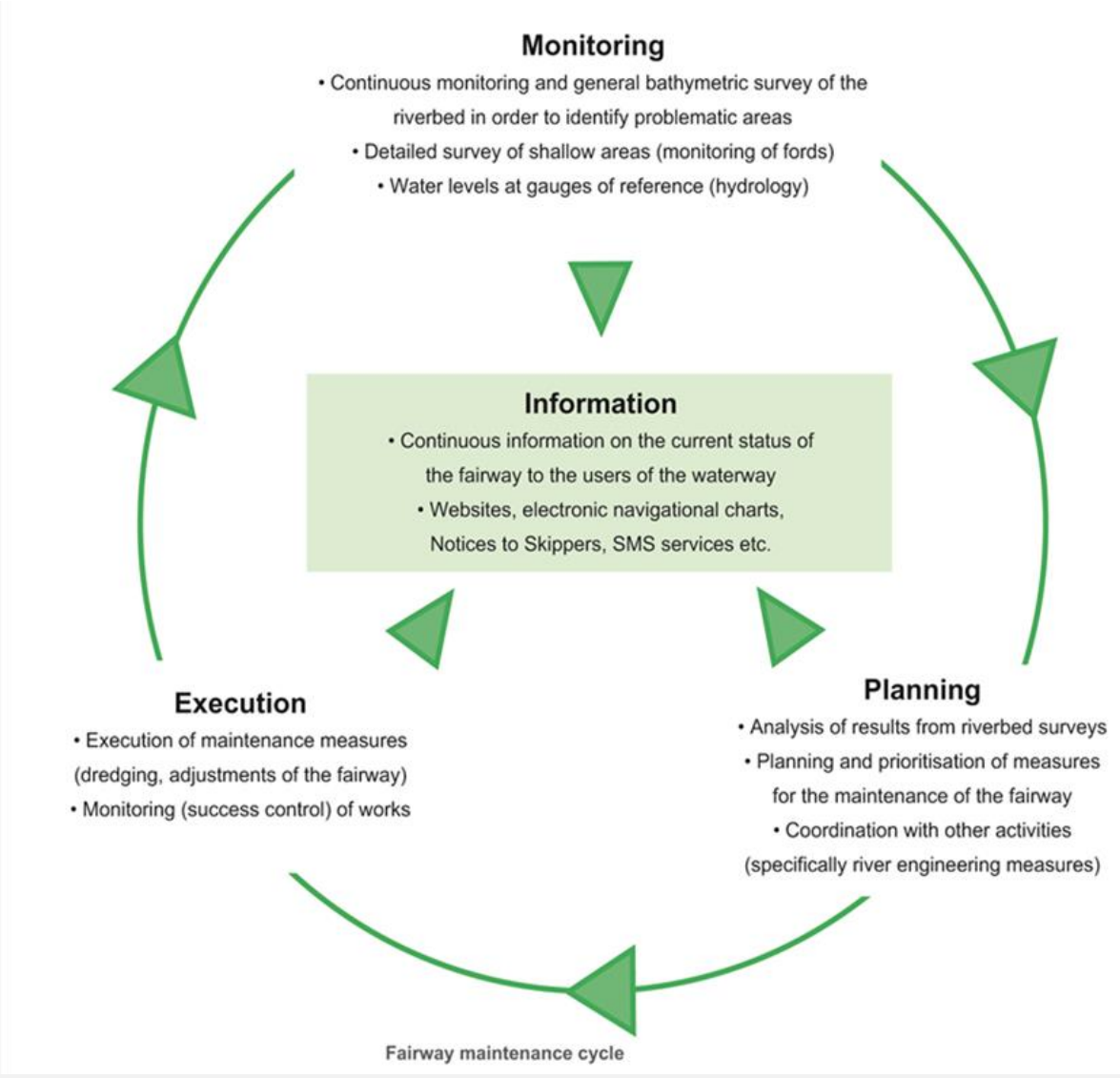
4.1. Infrastructure management processes

Continuous maintenance is key for competitive waterway infrastructure and to achieve and maintain Good Navigation Status. Works on waterways, either carefully planned or as a result of an unforeseen event, may have wide-spread effects such as causing obstacles for shipping, disturbing the river's discharge and sediment regime or waterway blockings. On waterway corridors in Europe, these effects are often relevant for more riparian states than the one implementing a measure, which could lead to critical situations if not well coordinated.

Obstructions of waterways cause serious economic impact to IWT enterprises and businesses depending on IWT supply chains. Especially the dynamic behaviour of free-flowing rivers, causing changes to the riverbed and river morphology, but also fixed infrastructure to regulate rivers and canals, therefore require asset management programs and profound maintenance planning. It is advisable to establish pro-active asset and maintenance management systems according to Plan-Do-Check-Act management cycle for continuous fairway maintenance and coordinate lock maintenance programs (► Box 5 and Annex IV-A to IV-D).

Box 5 – EXAMPLE: continuous maintenance cycle for fairway channel depth optimisation and stakeholder consultation

A river such as the Danube is a living system with continuous changes to the riverbed and its morphology. Locations of critical fairway channel sections can therefore change from week to week and from year to year. A typical "fairway maintenance cycle" should therefore be first and foremost based on continuous monitoring of the fairway. Each of the process steps in this cycle fulfils specific purposes which are interdependent: The availability of skilled staff, up-to-date sounding and dredging equipment, efficient methods for data collection and tools for targeted information transmission to the users of the waterway are all prerequisites for efficient and effective waterway maintenance on the Danube and its navigable tributaries.



For additional information see Annex V-C

4.1.1. (Cross-border) coordination of waterway management

As waterways are usually multinational systems, cross-border cooperation and coordination is an absolute necessity for sustainable development. Therefore, maintenance and construction work should be implemented following a "System thinking"-principle, which is the key to an integrated management of multifunctional and multinational waterways. This means that waterway corridors are considered as a system. Understanding how this specific system works or who plays which role in it supports a more effective and proactive waterway management strategy. Complex multinational waterway systems are characterized by a strong interaction between a large number of players and at times conflicting interests.[6]

[6] Source: Platina 2 D4.6 Good Practice Manual on Inland Waterway Maintenance

Although challenging, good practices in coordination of waterway management do exist in Europe. Regular Dutch-German exchange between the WSV and Rijkswaterstaat is an exemplary role model for a cross national cooperation on questions of waterway maintenance. It clearly shows how common standards and procedures can be set through a trust building bottom-up-process.

Another good example concerns the Fairway-project on the Danube, where the main goal to implement the "Fairway Rehabilitation and Maintenance Master Plan of the Danube and its navigable tributaries" in order to reach and ensure good navigation conditions throughout the year by providing a minimum level of service on the Danube corridor (► Good practice Annex III-A).

4.1.2. Considering the economic and environmental interests of stakeholders

Recognising the economic interests of the transport users at sector level that depend on IWT services choosing the right period of a year for the maintenance work is of importance for minimalizing the economic damage (including loss of business) for all involved users. Shippers request timely consultation, such as at least 12 months in advance, of these stakeholders to inform them about the maintenance works, impact for the use of the waterway and determining the period for the works that is acceptable for all.

A timely consultation will enable shippers and transport service providers to find alternate solutions and discuss the most suitable planning of the works with the waterway manager. Part of these discussions could also be the assessment of suitable alternative waterway routes. Of course, these alternative routes must be usable and thus simultaneous maintenance works in the routes must be prevented. Therefore, if alternative routes would encompass waterways of other managers, it is strongly recommended to have a mutual consultation between the relevant waterway managers.

Maintenance works are usually carried out in the framework of national navigation laws, water resources law and sometimes in the framework of National Park Acts. Stakeholders related to these legal provisions should be integrated in the planning process for waterway maintenance works at the earliest possible time.

Box 6 – EXAMPLE: Lock maintenance planning on the Moselle

The technical committee of the Moselle Commission consisting of delegates from France, Luxembourg and Germany determines fix dates for lock closure to carry out maintenance. The delegates belong to national waterway managers respectively authorities. In preparation of the planning the delegates have a dialogue with operators and shippers regarding the scheduling of lock maintenance. The technical committee considers different aspects for their proposed scheduling of lock closures. The interests of operators are considered in the planning. The lock closures are not scheduled in the peak season (e.g. holidays for passenger transport) and are coordinated with operators and industry along the Moselle River. Another important issue is the expected water level, as maintenance cannot be carried out at high water levels. Therefore, periods with low risk for high water levels are selected. Moreover, national public holidays are avoided to facilitate the execution of maintenance work with respect to employment law.

The proposal for closure dates is presented to delegates and adopted by the

plenary for several years ahead. With the adoption of proposed schedule, it becomes a formal act, which is binding for riparian states. The national waterway managers have to carry out maintenance work during the scheduled closure periods.

For additional information see Annex IV-B

For the reliability of the network it is paramount to inform and consult the sector on annual closures for repair and maintenance. Closures should be coordinated cross-border to avoid supply chain disruption. Here the good practice for the Moselle (see Box 6 above) may be followed, where information on scheduled works is shared years in advance. Another example on stakeholder consultation concerns the lock management on the Upper Rhine (see Box 7 below).

Box 7 – EXAMPLE: Lock management on the Upper Rhine

On the Upper Rhine where lock maintenance works are planned and coordinated involving multiple stakeholders of several members states. The French waterway authority VNF organises coordination meetings between the operator of French locks, the German waterway authority is operator of the Iffezheim lock, the Swiss Federal Office of Transport, the operator of Swiss locks and the industry. Possible issues raised during those meetings are discussed with the CCNR and after various consultation rounds between authorities and industry, the lock closure schedule is approved (For more information see Annex IV).

For additional information see Annex IV-A

Furthermore, waterway managers should be encouraged to concert with the IWT sector on a regular basis (e.g. multiple times a year). Therefore, the COV process (Centraal Overleg Vaarwegen: ► Box 1 and Good Practice Annex V-A), in the Netherlands as a good practice and similar processes involving users, engineers and waterway managers should be applied in other countries as well and for cross-border waterways within corridors.

Similar meetings between the waterway authority and stakeholders are organised in Austria (the so-called "Bau- und- Schifffahrtsbesprechung"). This meeting is organised twice per year (Spring and Autumn). Representatives of cargo shipping, passenger transport, logistics industry, private transhipment sites are invited together with the Supreme Navigation Authority and other authorities responsible for waterway maintenance (e.g. Verbund Hydro Power, public ports). At these occasions, the stakeholders are informed on planned, ongoing and planned waterway maintenance measures, as summarised in an ongoing catalogue of measures. Next to information of stakeholders, the main function of the briefing meeting is to receive feedback of waterway users on the planned measures: the planned activities for the upcoming year are presented and discussed with the waterway users. Plans and activities are adapted and prioritised according to this user feedback. Customer satisfaction is measured and evaluated regularly through standardised surveys.

4.2. Traffic management processes

Considering traffic management processes reference is made to relevant aspects that enable and increase efficient, reliable and safe navigation. This also includes some key elements from the RIS Directive related to traffic management, for which implementation of standards are set out in the RIS Directive 2005/44/EC[7].

4.2.1. Corridor management

Corridor Management is a next step in the development of River Information Services that are to improve safety, efficiency and reliability of inland navigation including positive effects on the protection of the environment (►Box 8 and Box 9).

More specifically, as regards locks it is believed that a proper problem analysis precedes corridor management. Working with slots for lock passage can push the problem down the chain while the entire route is of importance and should be linked to capacity and intensity.

The performance of individual locks needs to be analysed and optimized from a corridor perspective, also in view of the high capital cost to expand physical lock capacity. It is important to detect patterns of delays and incidents to ensure reliability before organizing the spread of traffic. This information is important to reduce waiting times and to be able to have a reliable Estimated Time of Arrival (ETA). Lock management also includes timely and regular maintenance to prevent breakdowns. A good example indicated by users is the lock maintenance along the Rhine, Main and Mosel where the locks are out of service for about 8 days in a row but the locks prove to be very reliable during the rest of the year (see also IV-A to IV-C).

As regards the operation of locks and bridges it is clear that limited operation can cause higher transport costs (excessive waiting times, longer round trips resulting in the need for more ships etc.). Users indicate that problems get serious when 24/7 operations, of business that depend on continuous supply and delivery of goods, are hampered. The impact will depend on the economic activity around the relevant waterway and therefore a differentiation needs to be made, taking into account the costs to provide 24/7 services and the related socio-economic benefits of such regimes. It needs to be explored on regional level into what extent industries and terminals can benefit from 24/7 operations (if not yet available). Furthermore, reliable ETAs is of key interest for shippers in order to allow them to plan the linked processes to the transport very efficient to ensure a swift supply chain and high utilisation of production plants and to reduce storage costs.

This not only concerns locks and bridges on large transport axis, but also attention should be given to service times for smaller locks and bridges. This could be organized very effectively, by centralizing the handling smaller locks/bridges from traffic control centres which are manned 24/7.

[7] For more information, see: www.ris.eu

Box 8 – EXAMPLE: CoRISMa

With CoRISMa, a number of Member States joined forces to show the possibilities of cross-border information exchange. The implementation of corridor management through River Information Services (RIS) aims to improve the reliability of inland navigation in transport chains, making voyage plans of inland vessels extremely trustworthy.

The CoRISMa project worked on linking national and regional IT applications to enable information exchange between Member States so EU corridor management becomes possible. With the deployment of River Information Services across Europe still ongoing, the project helps to gain overall understanding & support in EU countries with inland waterways for the benefits of implementation of corridor management. The advantages to authorities and users became tangible through the real-life pilots. They enable multimodal transport planners to plan waterway transport timely and efficiently in transport and logistics operations. This work will be continued to facilitate full implementation.

The CoRISMa pilots cover:

- cross-border fairway information;
- vessel positioning data exchange;
- traffic and lock planning;
- berth occupation or a parking app for ships.

Source: www.ris.eu and http://www.inlandnavigation.eu/news/transport/corisma/

Box 9 – EXAMPLE: RIS COMEX - RIS enabled Corridor Management Execution

Corridor Management as a concept aims at improving and linking existing RIS services on a route or network in order to supply RIS not just locally, but on regional, national and international level. Therefore, Corridor Management will realise support for route planning, voyage planning, transport management and traffic management which are at present, if at all, just available in fragments. In that respect "Corridor Management" is defined as information services among waterway authorities mutually and with waterway users and related logistic partners in order to optimise use of inland navigation corridors within the network of European waterways.

It is evident that this definition indicates that sharing of information between authorities is required and the cooperation of public and private partners is necessary to improve both the performance of inland navigation and the use of the existing infrastructure.

There the RIS COMEX project, a CEF funded multi-Beneficiary project aiming at the definition, specification, implementation and sustainable operation of Corridor RIS Services following the results of the CoRISMa study, aims for implementation and operation of cross-border River Information Services based on operational exchange of RIS data. These RIS-based Corridor (information) services shall allow for traffic management by the authorities and transport management by the logistics sector. They make use of available national infrastructure and services, berth occupation or a parking app for ships.

For additional information see http://www.riscomex.eu

4.2.2. Inland Vessel Traffic Services

Inland VTS are a service, implemented by a competent authority, designed to improve the safety and efficiency of vessel traffic and to protect the environment. The services have the capability of interacting with the traffic and of responding to traffic situations developing in the VTS area.

For example, on the Rhine, VTS comprises information services as well as other services, including a navigational assistance and a traffic organisation service. The CCNR has adopted the VTS Guidelines[8], which authorities are required to take into account in planning, establishing and operating vessel traffic services on the Rhine.

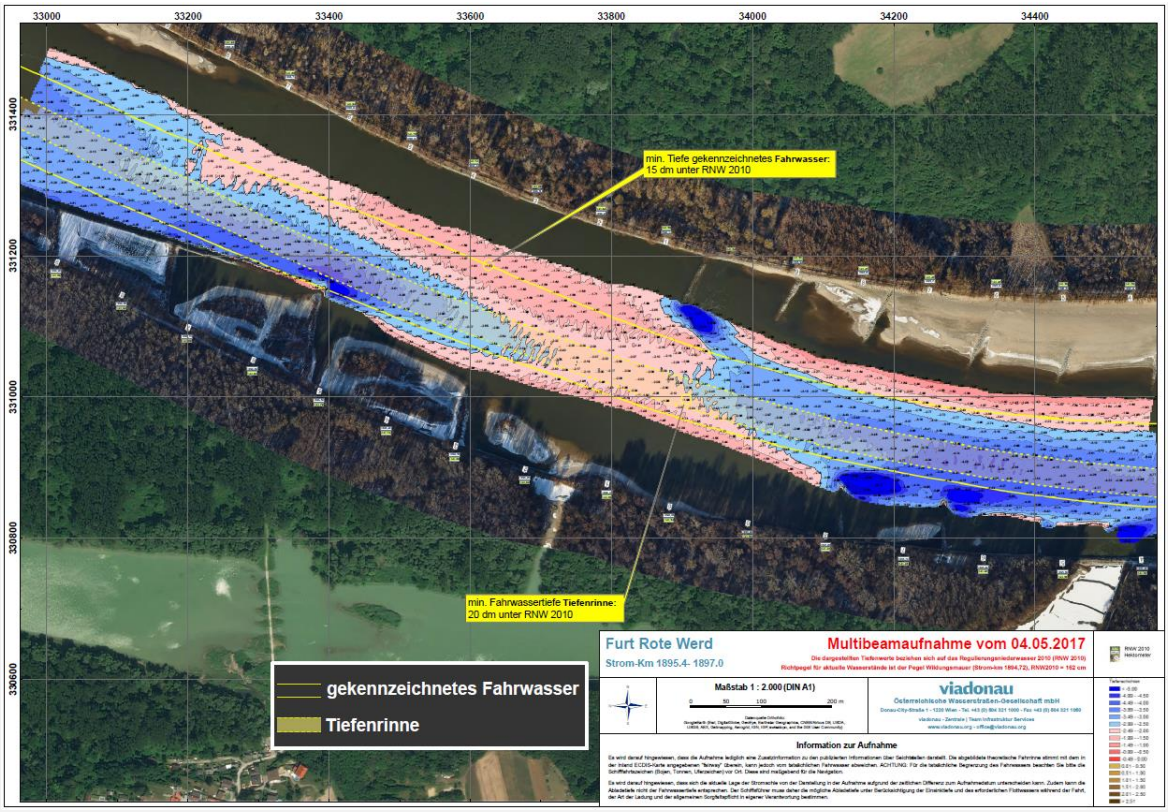
4.2.3. Information to users

Concerning safety margins, waterway users require reliable information on waterway dimensions related to e.g. water level forecast at links, bridges and locks to be able to determine clearances and minimize risks. Inland ECDIS is considered to share information with waterway users by means of individual applications installed on board on vessels (see for example Box 10).

Box 10 – EXAMPLE: Mapping and distribution of shallow section information on the Danube

Up to date information on shallow sections should be brought onboard to the end user (captains) as soon as possible. Such shallow section information is depicted on maps (containing the latest surveying results), which are available via dedicated websites (e.g. www.doris.bmvit.gv.at) or mobile apps (DoRIS mobile app). The navigation channel is clearly marked and available navigation channel depth in case of LNWL (RNW) is depicted according to a clear colour scheme. Blue areas meet the target value of 2.50m at RNW, whereas red areas would not. The lowest available navigation channel depth in the deep navigation channel (Fahrwassertiefe Tiefenrinne) is clearly marked on the map. Shallow section information together with actual water level data (gauging data), allows captains to make founded navigational and loading decisions. Based on a combination of these data, he/she can determine whether critical sections can be passed or not. In addition to these data, depth data for critical sections are also increasingly being integrated in the navigational charts on board (Inland ECDIS standard 2.3). The update rate of depth data of critical sections in Inland ECDIS is however currently too low to be of real value to waterway users (twice per year), given that shallow sections are highly dynamic. Topical depth information must nowadays be retrieved from separate information sources mentioned above.

[8] VTS Guidelines: http://www.ccr-zkr.org/files/documents/ris/vts_e.pdf (link to English version, also available in Dutch, French and German)



The status of the hard components of GNS for cross-border waterways, such as the Danube, is made available through websites such as the www.danubeportal.com. This includes an overview of shallow section information, gauging stations, ice reports, etc. The nationally available fairway data are shared among the waterway managers in a largely automated routine. This way, waterway users can efficiently retrieve relevant data on critical waterway sections through one portal.

Source: viadonau

An important issue for waterway authorities is to provide reliable information on bridge clearances. This differs country by country and signs and signposts are in some cases poorly maintained. A more harmonised presentation across Europe should be supported to avoid accidents. Furthermore, guidelines could indicate how much safety distance should be actually taken into account in respect to bridge clearance.

Although reliable information is required to make judgements, in the end the ship-owners decide for themselves for instance how much cargo is taken on board and what the maximum draught of the vessel can be in respect to water levels. For that reason, the information about forecasted water levels is seen as very important. For safe navigation, an under-keel clearance could be considered of 50 centimetres, although 30 cm is suggested as minimum safety margin. The specific clearance shall be determined on a local level.

As it comes to availability of waterways, users need to be timely notified in case of planned closures as well as incidents that may lead to partial of complete closure. This also concerns safety alerts related to e.g. ice formation or (extreme) water levels.

4.2.4. Incident management

Incident management refers to management of emergency and unexpected interruption of the navigation, such as (extreme) high water levels, ice formation, accidents, (extreme) low water levels, groundings, etc.

The RWS Guidelines (► see Annex II C) provides information on minimum requirements for notification of closures to users. To inform users and other stakeholders in a uniform manner, the degree of obstruction is communicated using one of six classes of obstruction, each with its own notification deadline for stakeholders and waterway users. These deadlines also apply to work by third parties and to events licensed by the waterway management authority. In the Rijkswaterstaat's 'Less Obstruction' programme elements are addressed such as clever planning, clever designs, operational traffic management and traffic information, coordination with stakeholders and proper announcements, regional collaboration with other waterway managers and maintenance contracting (e.g. a bonus/penalty scheme).

Partial or complete blockage of the waterway in connection with events is acceptable only in highly exceptional circumstances, after solutions to minimise obstruction to navigation have been sought in consultation with stakeholders. Furthermore, distinction is made between the category of waterways (trunk routes / main waterways / other waterways) as regards the acceptance of blockages. The cooperation with the stakeholder (users) ensures that the views and requirements of users are properly taken into account.

4.2.5. Administrative processes

From the perspective of users of inland waterways, but also shippers, waiting times it is important to minimize delays to ensure reliability of transport services. Waiting times at borders of non-EU countries or in ports due to administrative processes negatively affect the reliability of these services and therefore should be properly addressed.

It is encouraged to integrate electronic reporting and data exchange for administrative processes. Reference is made to the availability of electronic (international) data exchange system as part of EU Regulation 164/2010 (ERINOT, PAXLIST, BERMAN messaging)

4.2.6. Traffic regulations and navigation channel marking

Police regulations are in principle lie in the sole competence of Member States, but also have been delegated to intergovernmental organisations like the CCNR. The police regulations settle the markings and lights to display by vessels and convoys, the rules for meeting, crossing, overtaking and berthing of vessels as well as the waterway signs, the allowed dimensions of vessels and convoys and the water protection against pollution to keep by navigation. The observance of the rules by navigation is supervised by the national water polices of the Rhine riparian states. The regulations include maximum permissible dimensions of vessels on navigation channels on the Rhine and therefore the traffic regulations can be directly linked to the GNS hard components on TEN-T waterways.

On a pan-European front, the UN-ECE adopted a recommendation with a view to harmonising inland navigation rules. The rules arising from this recommendation constitute the CEVNI code. Furthermore, the code defines the signs and marking to be

used to facilitate inland navigation. Edition 5 of the CEVNI code was published in July 2015 in French, English and Russian[9].

With a view to further enhancing the harmonisation of police rules, the UN-ECE, the Central Commission on the Rhine, the Danube Commission the Moselle Commission and the Sava Commission have begun work on the development of a joint document.

Concerning fairway marking, the UNECE has adopted "Resolution No. 22, revised, Signs and Signals on Inland Waterways (SIGNI)[10], bringing it in line with the fourth revised edition of the European Code for Inland Waterways (CEVNI) as reflected in TRANS/SC.3/115/Rev.4

Box 11 – EXAMPLE: Marking of the navigation channel on the Rhine

Article 28 of the Revised Convention for Rhine Navigation stipulates that the contracting States will be active in maintaining the Rhine navigation channel and the towpaths. The States must, to the extent necessary, mark the channel by buoys. Each State bears the costs of maintaining the navigable channel along the section of the river concerning that State. Where the river serves as the border, each State shares half the costs.

See: http://www.ccr-zkr.org/12030100-en.html

4.3. Availability of facilities along waterways and in ports

In general the facilities along waterways are seen as optional items to be included in the GNS process. There is no legal base, since according to the TEN-T Guidelines GNS is prescribed on Rivers, Lakes and Canals and does not directly address facilities along waterways and in ports. However, some issues may be considered to include in the GNS process for reasons of efficiency, as for these items also plans need to be made, stakeholders and users need to be consulted, etc.

Examples which were highlighted as relevant by the GNS experts and are further elaborated in this chapter are:

- Mooring places
- Multimodal facilities
- Drinking water facilities
- Waste disposal facilities
- Access to internet
- Facilities for alternative fuels and shore-side power supply

[9] See: https://www2.unece.org/wiki/display/TransportSustainableCEVNIv5/CEVNI+-+Revision+5
[10] https://www.unece.org/fileadmin/DAM/trans/doc/2011/sc3wp3/ECE-TRANS-SC3-108r2e_01.pdf

Moreover, for several of these items there is also a legal base in the TEN-Guidelines (e.g. multimodal facilities, alternative fuels and short-side power supply). It may be efficiency to consolidate the monitoring and reporting together with the hard GNS components.

4.3.1. Mooring places

Sufficient mooring places for resting are important to support growth of traffic in inland waterways and safety requirements to minimize risk for incidents. For this reason, the GNS process can also address the quality and capacity of mooring places and car-lift facilities for safe transfer and exchange of personnel. In the Netherlands, such mooring facilities shall be available either every 30 kilometres of the waterway or every 2 hours sailing (RWS Guidelines).

As indicated in Box 8, the Corisma-project focussed, amongst others, on providing detailed information about berthing facilities for inland vessels. Real-time data regarding berth occupation and a booking app would become well received tools for waterway users.

Box 12 – EXAMPLE: Inland Shipping Berth Information System (BLIS)

In the Port of Amsterdam and Rotterdam you can check the current occupation of berths for inland shipping on a digital map. You can do so via the Inland Shipping Berth Information System (BLIS). The system helps you to avoid unnecessary shipping movements, reducing costs such as for fuel. BLIS originates from the "Blauwe Golf Verbindend project". In this project, various stakeholders work together in achieving a better exchange of information between waterway managers, waterway users and road traffic. In the future, it should also be possible to share information about opening hours of bridges and locks via this system. Additionally, all development will be integrated in an app.

See: http://blauwegolfverbindend.nl/kaart/

4.3.2. Multimodal facilities

Section 2 the TEN-T guidelines (Regulation (EU) No 1315/2013) includes requirements on inland waterways transport infrastructure. In article 15 of that section refers to multimodal facilities: „Member States shall ensure that inland ports are connected with the road or rail infrastructure".

Articles 27 to 29 of Section 6 of the TEN-T guidelines provide requirements and priorities for infrastructure for multimodal transport. Priority will be given to projects that include the following:

(a) providing for effective interconnection and integration of the infrastructure of the comprehensive network, including through access infrastructure where necessary and through freight terminals and logistic platforms;
(b) removing the main technical and administrative barriers to multimodal transport;
(c) developing a smooth flow of information between the transport modes and enabling multimodal and single-mode services to be provided across the trans-European transport system.

Although there is no direct link to GNS, for supporting intermodal transport by inland waterways in particular, it may be optionally be considered to include these topics as well in the GNS process.

4.3.3. Drinking water facilities

As an example the RWS Guidelines (see Annex II-C) has included provisions for availability of drinking water taps for inland waterway users. A drinking water tap may need to be provided if no other supply is available within a reasonable distance. The tap must not be combined with the car landing platform, as it would then be occupied too often, unless it were possible to moor up on both sides of the platform. Measures to prevent freezing, guarantee hygiene and prevent break-ins and vandalism must be considered when the tap is installed. The tap should be able to supply at least 3 m3 of drinking water an hour. To prevent break-ins and vandalism, it should be possible to pay using a mobile telephone, bank card, credit card or some other method not involving cash.

4.3.4. Waste disposal facilities

A good example is the CDNI. The collection, disposal and reception of inland ships‘ commercial waste containing oil and grease, waste from cargo and other commercial waste are subject to uniform regulations laid down by Germany, Belgium, France, Luxembourg, Switzerland and the Netherlands in the Ship Waste Decree (CDNI).

The decree identifies three types of waste:

1. **Ships’ waste containing oil and grease**:
   This category covers waste from the engine room such as bilge water, used oil, filters, used cleaning rags and used grease. This waste must be deposited (and a delivery receipt obtained) with a specialized collecting facility.

2. **Waste from cargo**:
   Cargo waste is generated during the transhipment and transport of dry and liquid cargo. The recipient or consignor of the cargo is responsible for the costs of cleaning the vessel’s holds and gangways after unloading. The handling facility should indicate where waste or washing water can be deposited.

3. **Other ships’ waste**:
   Other ships’ waste covers the following kinds of waste: domestic waste, domestic waste water, slops from the holds and tanks and all waste not containing oil, including small hazardous waste such as batteries. Sufficient waste containers for domestic waste should be available at berths of public ports and other (public) mooring places for overnight stays. Domestic waste containers should be monitored and emptied on a regular basis. Also contact details should be provided for reporting full containers.

The deposit facilities obviously require funding. This is provided based on the “polluter-pays” principle. The party causing (or potentially causing) waste in this case is the shipping industry. While the relevant types of waste occur on all ships, both the shipping industry and the environment stand to benefit from a well-functioning waste collection system and easily accessible facilities. The associated costs are consequently charged to the shipping industry. Specifically, as of 1 January 2011 every ship pays a disposal fee of €7.50 per 1000 liters of (tax-free) gas oil bunkered. The fee is the

same in every contracting country and for every vessel and entitles ships to deposit wastes free of charge.

Inspection regimes should be in place to monitor proper deposit of ships' waste and to check compliance with the environmental regulations and the Ship Waste Decree. Spills should be subject to a fine and contamination should be cleaned up at the expense of the party responsible.

Seagoing vessels can dispose of ships' waste at port reception facilities. As laid down in international legislation (UN/IMO/MARPOL73/78 and EU Directive 2000/59/EG), all seaports are obliged to facilitate adequate port reception facilities for ships' waste from seagoing shipping. A similar harmonized approach, or expansion of the CDNI code to be ratified in national legislation, could be introduced in remaining European countries.

Box 13 – EXAMPLE: CDNI - Overview of collection facilities for oil and grease waste: Inland Shipping Berth Information System (BLIS)

Source and additional information: http://www.cdni-iwt.org/en

4.3.5. Access to internet

Availability to reliable internet access (4G, 3G, Wi-Fi) along waterways and close to locks and mooring places is increasingly becoming a primary need of waterway users. Through internet users can retrieve fairway conditions, water level forecasts,

communicate ETA's, etc. RIS and related ITS services need to be further integrated in inland waterway transport chains, for which good coverage and access to Wi-Fi in ports is required. For this reason it helps skippers to navigate efficiently and safely on the TEN-T network. Therefore, this topic of internet availability may be considered to be included in the GNS process.

4.3.6. Facilities for alternative fuels and shore-side power supply

In 2013 the European Commission published the Clean Fuel Strategy. The aim of this strategy is to address the remaining barriers preventing the real breakthrough of alternative fuels: the high cost of vehicles, a low level of consumer acceptance and the lack of recharging and refuelling stations.

To lift these barriers, the European Commission proposes amongst others a package of binding targets on Member States for a minimum level of infrastructure for clean fuels such as electricity, hydrogen and natural gas (CNG and LNG), as well as common EU wide standards for the equipment needed.

Two of the proposed measures are of importance for inland ports[11]:

1. Obligation to provide publicly accessible LNG refuelling points for inland waterway transport in all TEN-T core inland ports by 2025 at the latest. The LNG refuelling points shall comply with the technical specifications that must be developed by end 2015.

2. Obligation to install shore side electricity supply for waterborne vessels in ports provided that it is cost-effective and has environmental benefits by end 2025.

LNG should be seen as transition fuel towards zero emissions opportunities. Bunker facilities are required to enable an expected future demand. Shore side electricity facilities are particularly required at locations where inland vessels are moored for longer periods of time, e.g. at mooring places for staying overnight for cargo vessels and passenger vessels. Especially the latter vessel types require a significant amount of electricity for the services provided on board.

In relation to sustainable navigation, it can be considered to include the topic of availability of shore-side power and bunker facilities for alternative fuels (notably LNG) in the GNS process.

[11] Source: https://ec.europa.eu/transport/themes/urban/cpt_en

ANNEX I. BASIC INFORMATION ON FAIRWAY PARAMETERS AND NAVIGABILITY

I-A Key vocabulary and definitions

In the process of developing Guidelines to achieve Good Navigation Status, it is required to mention and define key vocabulary used in inland waterway management and throughout this report.[12]

Asset Management

Systematic and coordinated activities and practices through which an organisation optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycles for the purpose of achieving its organisational strategic plan. It is the combination of management, financial, economic, engineering and other practices applied to its physical assets with the objective of providing the required level of service in the most cost-effective manner.

Basic asset management relies primarily on priorities which are usually established on the basis of financial return gained by carrying out the work rather than risk analysis and optimised decision making. The work is support by use of an asset register, maintenance management systems, job/resource management, inventory control, condition assessment and defined levels of service, in order to establish alternative treatment options and long-term cash-flow predictions.

In comparison to basic asset management, advanced asset management employs predictive modelling, risk management and optimised decision making techniques to establish asset life cycle treatment options and related long term cash-flow predictions.

Discharge

The volume rate of water flow, including any suspended solids (e.g. sediment), dissolved chemicals and/or biologic material which is given cross-sectorial area (Q = A x V, where A is cross sectional area (m2) and V is the mean velocity of water (m/s)).

Draught

The depth of a ship while in the water measured as the vertical distance between the waterline and the lowest edge of the keel.

Free-flowing river

Section of natural rivers which are not impounded due to barrages such as hydropower plants or lock facilities and where water levels can be subject to considerable fluctuations.

[12] Glossary based on the following sources: Good Practice Manual on Inland Waterway Maintenance; Dutch Waterway Guidelines, PIANC WG reports

Maintenance

All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal. Fixed interval maintenance is used to express the maximum interval between maintenance tasks. On-condition maintenance is where the maintenance action depends upon the item reaching some predetermined condition.

Navigation channel (or fairway channel)

The part of the waterway in which a targeted depth, width and vertical clearance (navigable cross-section) is maintained to enable continuous navigation (see CCNR 2016)[13].

	DE	NL	FR	EN
1.	Wasserstraße	Vaarweg	Voie d'eau	Waterway
2.	Fahrwasser	Vaarwater	Eaux navigables	Fairway
3.	Fahrrinne	Vaargeul	Chenal navigable	Navigable channel

Reference water levels

The reference high and lower water levels are of particular importance for the design of the waterway, these being the levels between which the full functionality of the waterway is available to shipping.

I-B Requirements of key legal regulations

The existing transnational legal framework for navigation channel-related provisions and minimum requirements are basically shaped by **the TEN-T Regulation (EU) No. 1315/2013 and the European Agreement on Main Inland Waterways of International Importance (AGN)**. However, it must be noted that AGN is not applicable for all EU Member States (e.g. not in Germany and France). In addition to those transnational provisions, river commissions and national guidelines and directives are applied in certain regions and countries. This document gives an overview of those existing and sometimes overlapping frameworks.

In Articles 15 and 39 of the **TEN-T Regulation (EU) No 1315/2013** on Union Guidelines for the Development of the Trans-European Transport Network the minimum inland waterway infrastructure requirements for core network inland waterways are described. The Member States have to comply with these requirements by 31 December 2030. Of particular relevance for GNS are the articles 15.3 (a), where the minimum infrastructure requirements are explicitly set and the possibility for exemptions lined out, 15.3 (b) that calls for implementation of Good Navigation

[13] The CCNR Secretariat proposed the following terminology for harmonisation across several languages (CCNR 2016)

Status, 15.3 (c) that calls for implementation of RIS. The minimum requirements on draught are generally defined at 2.50m. No width requirements are formulated in the TEN-T Regulation, however a reference is made to the CEMT 92/2 classification, which in turn defines minimal length and width of TEN-T waterways (min. Class IV). Minimum bridge clearance is set at 5.25m.

In 1996, the Inland Transport Committee of the United Nations Economic Commission for Europe (UNECE) adopted the **European Agreement on Main Inland Waterways of International Importance (AGN)**. The Agreement came into force in 1999. It constitutes an international legal framework for the planning of the development and maintenance of the European inland waterway network and ports of international importance. It is based on technical characteristics and operational criteria for inland waterways (specified in Annex III of the Agreement). To date, the AGN comprises 18 contracting parties (on the basis of ratification, acceptance, approval or accession). For free-flowing sections 2.50m draught is required for Class IV waterways on 240 days per year. For upstream sections this minimum value should be achieved on 300 days per year. Like in the TEN-T Regulation, the minimum bridge clearance is set at 5.25m in the AGN Agreement. No width requirements are formulated in the AGN Agreement. For those countries that effectively acceded the AGN, the provisions are binding in principle and some countries have made a reference to AGN in their national legislation. Consequences of not meeting the targets are however not defined or monitored.

For the Rhine, a reference to the Mannheim Act (1868) is appropriate, as it requires riparian countries to ensure a good navigation status on the most important inland waterway in Europe.

Classification of waterways and their interpretation

The regulation 1315/2013 Article 15 3(a) refers in the second subparagraph to minimum height under bridges while there is in the first subparagraph a direct reference to the ECMT classification. The reference to ECMT concerns the Resolution No. 92/2 ON NEW CLASSIFICATION OF INLAND WATERWAYS [CEMT/CM(92)6/FINAL] by the Council of Ministers meeting at Athens, on 11 and 12 June 1992. It shall however be noted that for classification of waterways the ECMT recommends to make the classification based only on the horizontal dimensions for vessels (the length and width of the vessel), the vertical ones (draught and height under bridges) are not applied to decide if a waterway section shall be categorised as for example class IV, V or VI.

It shall be noted that therefore waterway sections which are classified to higher classes than CEMT IV (based on the horizontal dimensions) can have limitations as regards the minimum requirements to have 2.5 metre draught for vessels and 5.25 metre height under bridges. Moreover, it shall be noted that the article 15.3(a) and the second subparagraph prescribe these values (2.5 and 5.25) for all European waterways which are part of TEN-T, therefore also addressing higher classes of waterways (Va,Vb,Via,VIb,VIc,VII).

The vertical dimensions are depending on the water level which can be fluctuating. ECMT 92/2 Resolution does not provide a recommendation on how to deal with such water level conditions. There is however a second footnote at the ECMT table that states: "The draught of an inland waterway must be specified with reference to local

conditions". This may be a link to water level fluctuations as well as the required safety distance between the vessel and the bottom of the navigation channel.

Moreover, in that same year 1992, the UN-ECE provided a document addressing the exact same topic: "CLASSIFICATION OF EUROPEAN INLAND WATERWAYS Resolution No. 30". This resolution was adopted by the UNECE Principal Working Party on Inland Water Transport on 12 November 1992 and became part of the AGN agreement that was signed and ratified by many countries. In this UN-ECE document it is acknowledged that it is desirable to have a unique classification of inland waterways in Europe. Therefore, it takes into account the classification table that was adopted within the European Conference of Ministers of Transport (ECMT) in June that year, which is the direct reference in Regulation 1315/2013.

The UN-ECE provides the following (additional) guidance to the ECMT table:

- The new system of classification of European inland waterways should provide for flexibility concerning the draught and bridge clearance values to be determined with due regard to local conditions
- The draught value for a particular inland waterway is to be designated according to the local conditions.
- On the waterways with fluctuating water levels, the value of the recommended draught should correspond to the draught reached or exceeded for 240 days on average per year.
- The value of recommended bridge clearance (525, 700 or 910 cm) should be ensured, even over the highest navigational level, where possible and economically reasonable.

Institutionalised river basin management

In addition to the AGN and the TEN-T Regulation, for some river basins well institutionalised transnational coordination systems as regards waterway management and development exist (notably on the Rhine, Danube, Moselle, Meuse, and Sava). However, it needs to be remarked that the governance systems are quite heterogeneous (e.g. some have direct regulatory powers, some provide recommendations and guidelines).

On a national level, sometimes the provisions of the AGN or the provisions of the applicable river commission are transposed into national law.

The table on the next page present summary of key characteristics of these different river-basin governance systems across various European countries. Subsequently the following table presents the basic fairway-related regulations in all European countries with TEN-T inland waterways as well as some third countries (Bosnia & Herzegovina, Serbia, Ukraine).

River basins	International River Commission	Legal status of provisions	Minimum fairway requirements (navigation channel; varying for different local conditions) – lowest value identified in official provisions/guidelines			
			Depth	*Width*	*Height*	*Temporal availability (days/year)*
Danube	Danube Commission	Recommendations	2.50m draught	50-180m	6.40-10.00m	343
Moselle	Moselle Commission	Binding	3.00m fairway depth (regulated sections)	40m	6.00m	365
Rhine	Central Commission for the Navigation of the Rhine	Binding	1.90-3.00m fairway depth	88-150m	7.00-9.10m	345
Sava	International Sava River Basin Commission	Binding	2.50m draught (up to 2.80m) for class IV sections	55m	7.00m	343
Elbe	-	not applicable	for free-flowing section Geesthacht – CZ: DE: 1.5m – 1.6m navigation channel depth; CZ: 1.9 m navigation channel depth of free-flowing section; 2.2 m draught of regulated section	not specified	not specified	-
Meuse	International Meuse Commission	recommendations	2.50m draught	not specified	5.25m	-
Oder	-	not applicable	Target for border section: 1.80 m navigation channel depth (90% respectively 80% availability); Klützer Querfahrt: 3.00 m navigation channel depth;	not specified	not specified	-
Scheldt	International Scheldt Commission	recommendations	2.50m draught	not specified	5.25m	-

I-C Reference water levels

Variations in water level and longitudinal and cross currents can occur in both rivers and canals. Water level fluctuations in waterways occur as a result of differences in discharge, tides, seasonal variations, wind setup, translation waves etc. These fluctuations affect the dimensions of free-flowing rivers and impounded (regulated) waterways, but also cause variations in canals with fairly fixed canal water level.

It is very important to choose the correct reference high and low water levels relative to the headroom and waterway profile, also considering future climate effects that may cause subsidence or raised water levels.

The reference high and lower water levels (MHW and MLW) are of particular importance for the design of the waterway, which refer to the water levels at which the full functionality of the waterway is available to for inland navigation. Higher or lower water levels, relative to the determined reference water levels, may results into restrictions to height under bridges and waterway profile (even obstruction). When determining the reference water levels for a waterway, the probability, severity and duration of the restrictions must be taken into consideration, in case the water level exceed the range of reference water levels. The reference water levels, both high and low, are set by the water management authority and laid down in its management plan.

Regulated River sections and Canals

Usually, for regulated rivers and canals, no reference water level is stated as the declared vessel draught is guaranteed all-year provided the waterway is open for navigation. The water levels may show little fluctuations, but the declared navigation channel depth respectively vessel draught are achieved as sufficient margins are foreseen. Reference water discharges volumes respectively operational water levels are relevant for operational issues to control water levels, but not for navigation regulation.

For commercial navigation, the reference high water level (MHW) is one of the following values:

- on **canals** and in the event of short-term water level variations, e.g. in tidal areas: the water level that is exceeded a certain percentage (e.g. 1%) of the time, measured over specific time period (e.g. 10 years).
- On **waterways with locks and/or weirs**, short-term but frequent changes in water level can occur as a result of translation waves propagated by sluicing, lockage or manipulations with weirs. These changes can involve several tens of centimetres and must be reflected in the vertical dimensions of waterway elements.

Free-flowing river sections

For inland waterways, these reference water levels are corresponding water levels at different cross sections which show the same annual percentage of higher and lower discharge deviation. Depending on the respective waterway, the average values are calculated over a reference period of several decades for inland waterways. Updates of reference water levels need to be performed regularly, e.g. every 10 years.

The following reference water levels may be used to indicate refence water levels for free-flowing river sections:

- LNWL (Lowest navigable water level) = the water level reached or exceeded a pre-defined number of days per year over a certain reference period (of several decades).
- MWL (Mean water level) = the average water level measured over a specific time period (e.g. several decades)
- HNWL (Highest navigable water Level) = the water level reached or exceeded pre-defined number of days in a year (i.e. 1% per year) over a certain reference period (of several decades).

Box 14 – EXAMPLE - Reference water levels on European free-flowing river sections

Within Europe, different regimes are in place as regards the reference low water level. On the Rhine tributaries, the water level is measured relative to the agreed low river discharge (OLR/GlW20), a level that is not exceeded on 20 days of a year based on a statistical analysis of water levels over a longer period of time.

On the Danube a similar statistical value is used, the so called RNW. This is the low navigable water level (LNWL) = the water level reached or exceeded at a Danube water gauge on an average of 94% of days in a year (i.e. on 343 days, not taking into days at which the discharge cannot be measured due to ice formation) over a reference period of several decades, usually 30 years.

There are other reference values applied for free-flowing rivers. At the river Oder for example a reference water level (EMW) is applied, which is based on the design discharges (m3/s). The target water levels refer to the exceedance of design water discharges with a probability of 80% (292 days) respectively 90% (328 days). Another example of lower targets for the number of days compared to Rhine and Danube regimes is the Po in Italy (section Cremona-Casalmaggiore) where a draught of 2.5 metres is targeted for 300 days per year, whereas currently the draught of 2.5 metres is ensured during 250 days per year.

Tidal waters

Water levels on inland waterways, situated close to the sea, there is a tidal influence from the fluctuation of the sea level. In tidal waters a water level associated with storm surges might be relevant, typically associated water levels are included in tide tables (e.g. for the Netherlands). High water levels in tidal areas are of considerably shorter duration than high water levels in upstream stretches of rivers, and the same applies to any associated obstructions.

For the reference high water level at locks on rivers or tidal waters, it is important to distinguish between:

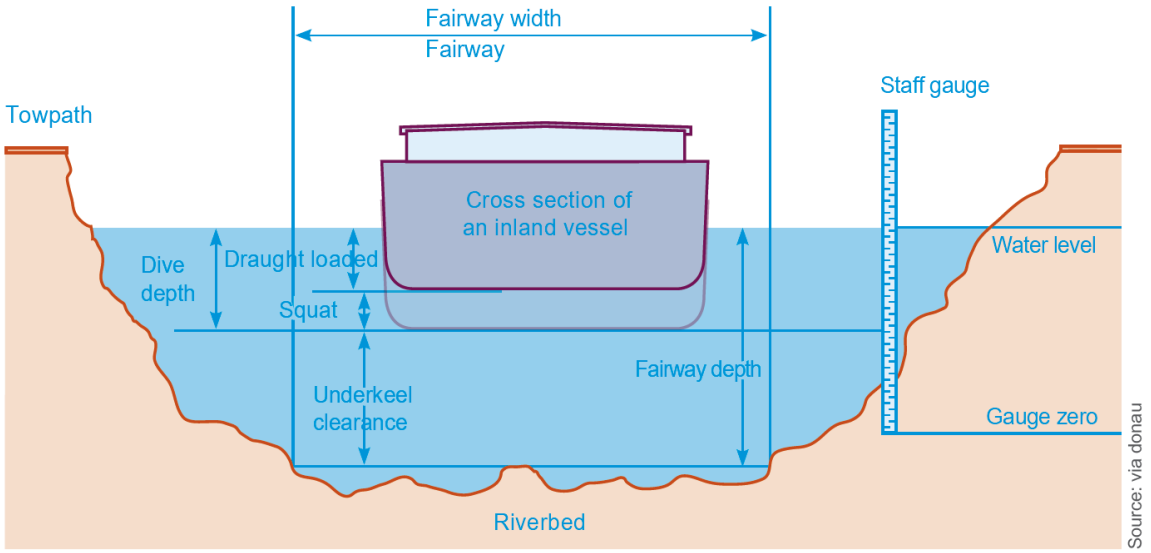
- elements that affect accessibility, such as the sill depth and headroom
- other less critical elements such as the height of the lock plateau and fenders

In the case of the first category of elements, the 1% exceedance criterion should be applied. For the second category, a 10% exceedance criterion may be used. The difference between 1% and 10% can amount to several metres on Dutch rivers.

In the transitional zone between the sea and upstream sections of rivers, a measure referred to as the agreed low water level (OLW) is used instead of the agreed low river discharge (OLR). This can also be found in the tide tables.

I-D Fairway depth, draught and height under bridges

The depth of the fairway navigation channel influences the possible draught of an inland vessel and thus the amount of cargo it can transport. Furthermore, the dynamic squat and a sufficient under keel clearance to the riverbed have to be considered to prevent groundings of vessels in motion (see Figure below). The term "squat" refers to the level to which a ship sinks while it is in motion as compared to its stationary condition. The dive depth of a ship equals the sum of its draught loaded (loaded vessels in stasis; velocity v = 0) and its squat (loaded vessel in motion; velocity v > 0)[14]



Fairway navigation depth and draught on regulated River sections and Canals

The ECMT table that states: "The draught of an inland waterway must be specified with reference to local conditions". This may be a link to water level fluctuations as well as the required safety distance between the vessel and the bottom of the navigation channel.

The draught of the vessel in stop (excluding squat) is the relevant water level parameter. The canal design rules in various Member States provide a sufficient

[14] Source: Via Donau

margin to guarantee the draught of the stopping vessel. For instance, the standard canal design for 2.80m vessel draught provides a water depth of 4m. This is in line with a general factor of 1.4 between canal depth and vessel draught.

Box 15 - Dutch Waterway Guidelines

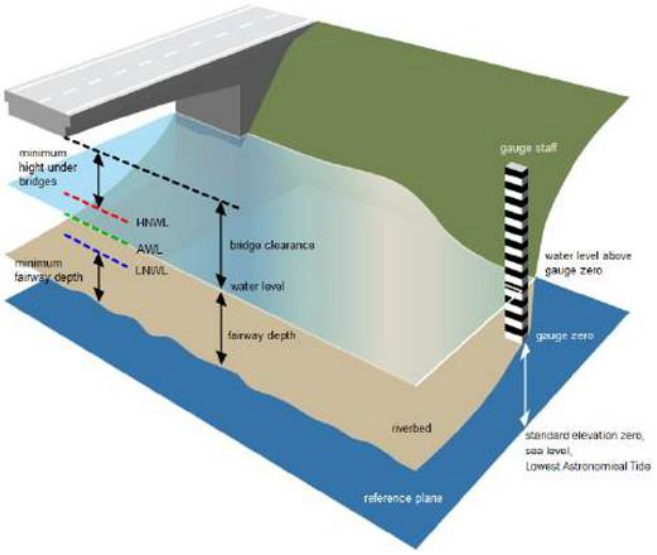
As regards the draught, with a normal profile, the depth of the waterway must be at least a factor 1.4 times the draught of the reference ship when laden and immobile, relative to the reference low water level. Where the waterway has a narrow or single-lane profile, the factor 1.3 applies. This depth must be present at all times.

Navigation channel depth and draught on free-flowing river sections

Water levels, in combination with data from hydrographic surveys, enable the calculation of navigation channel depths and are therefore of crucial importance for waterway users. However, there is also the practice that the permissible maximum draught for vessels are published and no calculation is then needed and the draught is legally defined.

In case there is no publication of the permissible maximum draught, the fairway navigation channel depth at a certain location can be calculated if the current water level at a nearby reference gauge and the minimum fairway navigation channel depth relative to the respective reference water level (e.g. low navigation and regulation level) are known. This methodology is common practice on e.g. the Danube and the Rhine (see for example Box 3 below).

Box 16 Calculation minimum fairway channel depth on the Danube



Water level above gauge zero

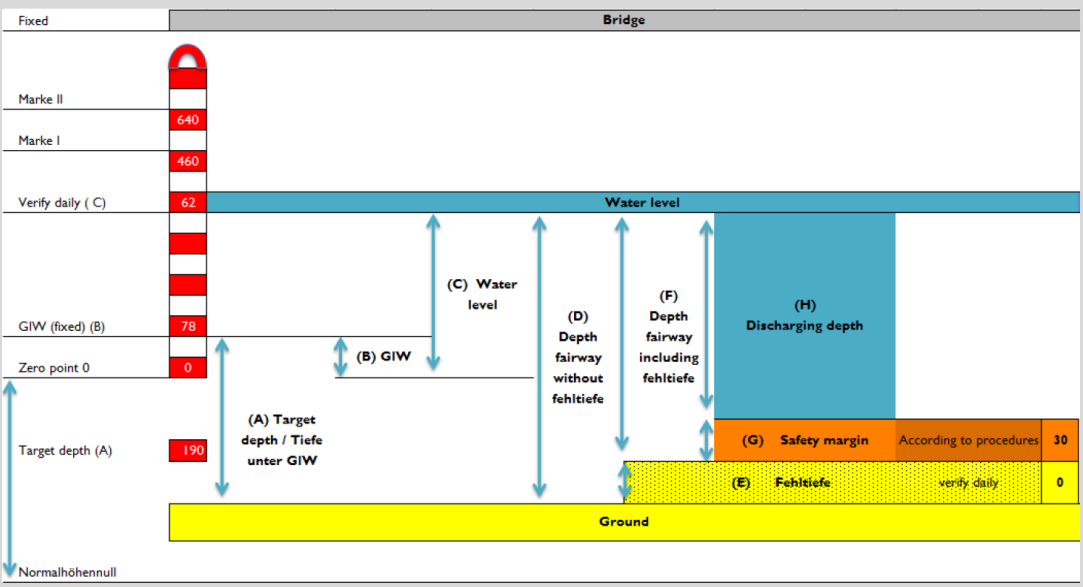
− Low navigation reference level

\+ Minimum fairway depth

= Current minimum fairway depth

Source: Xavax

Box 17 Calculation of available draught on the Rhine in Germany[15]



A specific **Target depth (A)** for the Rhine in Germany applies per river section with respect to the Gleichwertiger Wasserstand. These specifics indicate the target depth that the government sets opposing the Gleichwertiger Wasserstand, considering the agreed low water discharge.

from kmr to kmr	Routesection	Depth fairway at OLR
334,00 - 508,00	Iffezheim (locks) to Budenheim/Niederwalluf	2,10 m
508,00 - 557,00	Budenheim/Niederwalluf to St. Goar	1,90 m
557,00 - 592,20	St. Goar to Koblenz	2,10 m
592,20 - 763,00	Koblenz to Krefeld	2,50 m
763,00 - 952,00	Krefeld to Woudrichem (Rhine/Waal)	2,80 m

Gleichwertiger Wasserstand (B) is the tide position that is set during a longstanding period over an average of 20 days per year without ice (drift), which is adjusted every 10 years by the Central Commission for the Navigation of the Rhine to accommodate changes in the Rhine river bed.

Pegel	GIW 2012
Basel-Rheinhalle (CH)	499
Maxau	369
Speyer	241
Mannheim	160
Worms	72
Mainz	168
Oestrich	87
Bingen	100
Kaub	78

Pegel	GIW 2012
Koblenz	78
Andernach	93
Bonn	141
Köln	139
Düsseldorf	97
Ruhrort	233
Wesel	177
Rees	120
Emmerich am Rhein	84

Current **water levels (D)** (Pegel), and water level predictions for the coming days, are provided on the website of the German waterway control Wasser- und Schifffahrtsverwaltung des Bundes (WSV) **www.elwis.de**

Variation in the streambed of the river could cause that the target depth is not

[15] Source: http://www.platformzeroincidents.nl/

reached at certain locations. These **Fehltiefen (E)** are mentioned and available at the website of the Wasser- und Schifffahrtsverwaltung des Bundes (see above).

At certain loading-/discharging docks the depths can deviate from **available fairway navigation channel depth /available draught (F)** on Rhine based on current water levels. Information from local authorities is leading.

A safety margin should be considered between the bottom of the fairway navigation channel and the (laden) inland vessels, due to squat and possible inaccuracies in measurements of the Fehltiefe. Therefore a **Under Keel Clearance (G)** should be considered, typically of 0 – 50 cm

The water gauge is placed relative to the German reference Normalhöhennull **(NHN)**. This is the reference for measures in Germany. Germany uses the sea-level of the North Sea at Amsterdam as a zero-point on the scale, and has set the Normalhöhennull equal to the NAP (Normaal Amsterdams Peil, the Amsterdam Ordinance Level, normal height datum used to indicate and manage differences in water levels).

Example on calculating available draught at Kaub:

A	Target depth	190	cm	
B	GIW	78	cm	-
		112	cm	
C	Water level	62	cm	+
D	Depth fairway	174	cm	
E	*Fehltiefe*	0	cm	-
F	Depth fairway	174	cm	
G	Safety margin (UKC)	30	cm	-
H	Discharging depth	144	cm	

Provisions for draught of the navigation channel

In case the permissible maximum draught for vessels is not defined, the situation is less clear on how to approach and measure the 2.5 metres as prescribed in Regulation 1315/2013 Article 15 3(a) in the second subparagraph. The draught of the vessel cannot be measured by the waterway administrations; they can only measure the depth of the navigation channel. In order to transfer required draught to required fairway channel depth, a value is needed. However, there is no fixed value between the draught of the vessel and the required depth of the navigation channel, this value is specific for the waterway section in question and depending on the local conditions. Therefore, distinctions shall be made as regards the required keel clearance - the safety distance between vessel (including squat) and bottom of the fairway channel - taking into account the type of bed of the cross section of the waterway (sand vs rock). Consulted experts indicate that this may differ between 0 and 50 cm. This safety distance value (keel clearance) needs to be specified on local level by the waterway manager who has the know-how and data to make a solid judgement in relation to safety of navigation.

Provisions for bridge clearance

A safety margin has been set by ECMT at 30 centimetres for all waterway classes and takes account of the following factors:

a. inaccuracies in knowledge of the actual height above waterline
b. errors in reading the height scale beside the bridge

c. vertical movements of the vessel due to waves or to variation in the number of revolutions and/or speed

In addition, the ECMT Resolution 92/2 makes clear in the footnote 6 that the values for height under bridges are aimed on facilitating container transport:

"6. Adapted for container transport:

d. 5.25 metres for vessels carrying two layers of containers;
e. 7.00 metres for vessels carrying three layers of containers;
f. 9.10 metres for vessels carrying four layers of containers;

50 per cent of the containers may be empty, otherwise ballast must be used."

A growing trend in inland container transport is the utilization of high cube containers. In light of these developments the bridge clearances, adapted for container transport, should be reviewed. However, raising bridges in a network is highly expensive and the decision will usually be based on cost – benefit assessments. Anticipating high-cube containers is more easy to justify when assessing a general raise of bridges from two to three layer transport for example.

As regards the measurement of the minimum bridge clearance, the **reference high water level** is commonly applied in Europe.

ANNEX II. SELECTED MANUALS AND GUIDANCE DOCUMENTS

II-A PLATINA I and II Good Practice manuals on sustainable waterway planning and management

PLATINA I AND II – GOOD PRACTICE MANUALS ON SUSTAINANBLE PLANNING AND MANAGEMENT	Europe
Purpose and link to GNS	
Planning and maintenance of waterway infrastructure are essential elements for achieving a good navigation status. The pan-European projects PLATINA I and PLATINA II produced comprising manuals describing good practices in those fields as well as guidelines for implementation. The manuals are primarily targeted at waterway administrations.	
Content	**PLATINA I Good Practices in Sustainable Waterway Planning (2010)**
The manual shall be a guide to reconcile possible conflicting interests between protection and development of European rivers. The manual offers general advice on organising and implementing a balanced and integrated planning process of infrastructure interventions based on the early integration of stakeholders and taking into account the various different interests towards a river. The document takes into account, among others, the „Working with Nature" approach by PIANC, the Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin endorsed in 2007 by the International Commission for the Protection of the Danube river (see example VII). The manual was elaborated for the Danube region but shall also benefit other European river basins.	
Content	**PLATINA II Manual (2016)**
The manual seeks to support European waterway administrations in improving the fairway maintenance processes of free-flowing rivers. It illustrates an improved fairway maintenance cycle including the steps of monitoring the status of the fairway, planning and implementing the most suitable measures based on high-quality data, evaluating the impacts of measures and deriving possible improvements. Furthermore, informing of/communicating with the various actors involved in the appropriate manner is to be seen as a key element of such a cycle. 17 good practice examples from different steps of the process and different river corridors are analysed.	
Further information	
https://www.icpdr.org/main/publications/sustainable-waterway-planning-manual-published http://www.naiades.info/downloads/infrastructure/	

II-B PIANC Reports

PIANC REPORTS	World

Purpose and link to GNS

PIANC is a forum where professionals of various sectors provide expert advice on cost-effective, reliable and sustainable infrastructures to facilitate the growth of waterborne transport worldwide. The non-political and non-profit organisation was established in 1885.

There is a number of reports for various topics also relevant for GNS, e.g.

- PIANC Incom WG 25 - Maintenance and renovation of navigation infrastructure (2006)
- PIANC Incom WG 32 – Performance indicators for inland waterway transport (2011)
- PIANC Incom WG 129 - Waterway infrastructure asset maintenance management (2013)
- PIANC Position Paper „Working with Nature" (2011)

Content	PIANC Incom WG 25 - Maintenance and renovation of navigation infrastructure (2006)

The PIANC Working Group 25 has developed practical guidelines for identifying cost effective and timely solutions to navigation infrastructure asset management. By means of elaborating existing decision making tools, establishes guidelines, timing and methods for periodic inspections, and maintenance and repairs regimes during asset lifespan, the guidelines provide a systemic approach to develop or enhance existing asset management systems.

Based on an international consultation of implemented asset management systems for navigation infrastructure, a distinction is made between a basic or essential level of asset management and a more advanced approach. Furthermore, best practices are provided on prioritising infrastructural repairs.

The basic or essential level, and minimal standard to develop an Asset Management system for navigation infrastructure, included creating a hierarchical asset register, a simple life cycle approach, meeting existing levels of service and drawing up maintenance plans on the best available current inspection data. At the same time, financial and service performances are measured in order that trends can be monitored and long term predictions created.

An advanced approach can be developed, based upon data-collection and enhancement of a basic or essential system that considers detailed benchmarking of asset condition performance and historic costs, life cycle financial modelling, asset deterioration modelling, risk management techniques, optimised decision making and a fully integrated operation and maintenance programme. For this purpose assets could be categorized into facilities groups (e.g. water control facilities, etc.) with similar functions (see figure below) and be further distinguished into families (e.g. locks). A facility family could be further defined into objects (e.g. lock chamber walls, gates, etc.).

The condition of the facilities could be visualized in terms of physical state and strategic importance. The physical state determined the state of the asset in respect to its function, represented by the mechanical state of components and measures for operational safety. The strategic condition refers to the importance of

the asset. In terms of budget constraints and similar physical conditions, the facility which serves a higher (public) interest should receive higher priority in scheduling renovation works.

Content	PIANC Incom WG 32 – Performance indicators for inland waterway transport (2011)

The PIANC Manual on Performance indicators for inland waterway transport is focussed on developing a commonly accepted system for measuring and evaluating the performance of inland navigation in comparison to other transport modes. This requires information on capacity, reliability and applicability for intermodal transport, to be supported by a standardised set of performance indicators for inland navigation due to the following reasons:

- Common definitions, standards, and measurements to encourage industrywide adoption of harmonised performance indicators and best practices are missing.
- Shipping industry and forwarders are suffering from a lack of transparency in documentation.
- There is no effective utilisation of existing transport potentials and information exchange.
- Currently only a limited set of data is available for supporting transport activities and in a cross-national context neither a harmonised structure nor a common way of application is available.
- Currently performance indicators are only used on an individual- or company level for improvement of quality and benchmarking.

This PIANC Manual provides a standard set of performance indicators for users and actors. The recommended set allows emphasising the advantages of inland navigation to improve its acceptance in modern supply chains. Further it is intended to show actors how they can appropriately measure how well their performance comes up to their users' expectations and how to proactively improve the overall performance of inland navigation.

Performance indicators which are recommended within the Manual are aggregated into nine areas of application listed in the table below. The areas of application represent the different views on the performance of inland navigation. The reason for this distinction is that different users have different information needs and therefore the areas of application help to quickly find the required information. The aggregation of related views on performance allows the user to find related performance indicators focused on the required information. The respective areas of application are the following: Infrastructure; Ports; Environment; Fleet and Vehicles; Cargo and Passengers; Information and Communication; Economic Development; Safety; and Security.

Content	PIANC Incom WG 129 - Waterway infrastructure asset maintenance management (2013)

This report identifies international good practices by gathering input from international waterway organisations and provides practical guidelines for the potential uses of asset grading systems. The result is a tool to assist decision makers in prioritising investment on infrastructure maintenance and repairs and to optimise actions to give the most effective and sustainable solutions.

Owners and managers of navigational or hydraulic infrastructure constantly seek to balance limited financial and other resources with the need to ensure the continued

serviceability of their assets.

Waterway infrastructure is complex and consists of many different types of structures, such as navigation locks, quay walls, weirs,, etc. with both static and movable parts controlled by mechanical and electrical components. It is also very extensive, some covering thousands of kilometres and may cross the borders of different municipalities, provinces or even countries. Most of the infrastructure is unique and is designed and built in different periods, many of which have a very long life span. Because of that, they can sometimes stay in service for many years even without much inspection and maintenance. As such, Asset Management may be overlooked by organisations until the infrastructure reaches an advanced state of deterioration.

There is currently no generally accepted or standardised Asset Management System for waterway infrastructure. In general, it can be visualised as having three looping and interrelated processes that takes place at the strategic, tactical and operational levels. The Asset Management System must support all the activities and decisions at these three levels.

a) At the strategic or policy level, management is concerned about information at a very high level, such as present and projected capacities and overall performance level of the waterway or the overall transportation network, the annual maintenance budget as well as future funding requirements for renewing the assets.

b) At the tactical or maintenance level, management is concerned about the asset information in greater details, the performance level at the structure or sub-structure level, the inspection and monitoring programme, the assessment of the structure conditions, the required maintenance actions including costs and the prioritisation of maintenance actions based on the various constraints such as budget, resources, locations, etc.

c) At the operational level, the inspectors, whether internal or external, requires access to design data and drawings, historical inspection data, inspection procedures. They then input new data into the system in a unified and standardised manner to support decisions at the tactical level.

The Asset Management Systems in different countries, whether in use for many years or just under construction, often originate from completely different backgrounds and requirements. As a result, they may be quite different but all will share some common features. They include:

a) Systematic organisation of asset data, usually in a hierarchical format (see also WG 25);

b) Standardised inspection and assessment procedures to determine the condition of the assets;

c) Deterioration models (physical/mathematical, deterministic / probabilistic) to predict the future behaviour and/or remediation costs;

d) Budget planning and/or allocation based on asset conditions or risks.

Based on international best practices, the manual provides guidelines and key considerations on how to implement an Asset Management System.

Content	**PIANC Position Paper „Working with Nature“ (2011)**

In October 2008 PIANC has published a position paper on ‘Working with Nature’, which was revised in January 2011.

The concept of Working with Nature, which is explained in a PIANC Position Paper, calls for an important shift in thinking in our approach to navigation development projects to help deliver mutually beneficial, 'win-win' solutions. It promotes a proactive, integrated philosophy which:

- focuses on achieving the project objectives in an ecosystem context rather than assessing the consequences of a predefined project design; and
- focuses on identifying win-win solutions rather than simply minimising ecological harm.

In essence, adopting the Working with Nature philosophy means doing things in a different order. Instead of developing a design and then assessing its environmental impacts – an approach which inevitably revolves around damage limitation and is ultimately not sustainable – Working with Nature advocates the following steps:

1. Establish project need and objectives
2. Understand the environment
3. Make meaningful use of stakeholder engagement; identify win-win options
4. Prepare project proposals/design to benefit navigation and nature

The Working with Nature Position Paper is available in multiple languages on http://www.pianc.org/wwnpositionpaper.php.

Further information

Maintenance and renovation of navigation infrastructure (WG 25): http://www.pianc.us/workinggroups/docs_wg/incom-wg25.pdf

Position paper 'Working with Nature': http://www.pianc.org/wwnpositionpaper.php

Other reports and manuals: www.pianc.org

II-C Dutch Waterway Guidelines

DUTCH WATERWAY GUIDELINES	The Netherlands

Purpose and link to GNS

As regards the design and maintenance principles for inland waterway infrastructure there is a specific reference manual which is called the Rijkswaterstaat Waterway Guidelines. This report is based on the dimensions of the reference vessels for the ECMT classes as well as transport volumes and refers also to AGN.

The RWS Waterway Guidelines cover the mandatory transport engineering design for;

- waterways in CEMT classes I to VIb and recreational waterways;
- waterways without currents or with a longitudinal current up to 0.5 m/s (canals)
- waterways that are not primarily intended for sea shipping;
- waterways other than the shipping lanes in the North Sea or Wadden Sea

Content	Rijkswaterstaat Waterway Guidelines

The Waterway Guidelines provide a differentiated approach taking into account the different needs (e.g. from market demand) and the differences in vessel sizes and differences in the infrastructure. The Waterway Guidelines 2011 were supplemented in 2013/2014 by the requirements for Class VI waterways.

The design process is based on water system elements such as waterway sections, locks, bridges and harbours. The design process for a waterway or associated engineering works consists of the following stages:

- Determine the desired CEMT class, taking account of future developments
- Choose the motor cargo vessel, pushed convoy or coupled unit appropriate to the waterway class as the reference value for each aspect of the design of the waterway (every waterway class has a single reference to motor cargo vessel, pushed convoy and coupled unit). The most stringent requirement or a combination of several requirements (length, beam, draught, height etc.) should be the reference value for the waterway.
- Determine the waterway profile: the choice of normal, narrow, high-volume or single-lane profile depends on the expected volume of traffic. The normal profile is standard.
- Define the hydraulic parameters: it is particularly important to make the correct choice of reference high and low water level and verify that the longitudinal current in the area of application complies with the guidelines.
- Determine the wind conditions: is the waterway in a coastal or inland zone?
- Fill in the details on waterway sections, locks, bridges, harbours.
- Specify how objects are to be operated.
- Waterway markings can be found in the 2008 edition of the Shipping Signs Guidelines.
- Include management and maintenance in the design

Further information

https://www.rijkswaterstaat.nl/english/waterways/main-waterway-network/index.aspx

https://www.rijkswaterstaat.nl/english/waterways/index.aspx

II-D The Management and Development Plan for National Waters in the Netherlands

THE MANAGEMENT AND DEVELOPMENT PLAN FOR NATIONAL WATERS IN THE NETHERLANDS	The Netherlands

Purpose and link to GNS

The Management and Development Plan for National Waters describes the management of the national waters in the Netherlands for the period 2016 - 2021. The plan states the National Water Plan 2016-2021 and the National Policy Strategy for Infrastructure and Spatial planning in terms of the management and

the maintenance of the national waters in the Netherlands.

Content	National Water Plan 2016-2021

The Management and Development Plan for National Waters introduces a coordinated approach to the management of the national waters. It sets out a vison of the role and responsibilities of Rijkswaterstaat and the method of management and maintenance. The underlying principle is integral management as required by the National Water Plan. Rijkswaterstaat manages and maintains the national waters on the basis of a philosophy relating to catchments, transport corridors and national networks. Priorities are defined on the basis of a national perspective. Management and maintenance are not static: Rijkswaterstaat responds to changing circumstances, user requirements, new policy decisions, technological development and opportunities for collaboration. The Management and Development Plan for National Waters develops management, maintenance and construction into core tasks, user functions and areas. The core tasks include flood risk management, adequate water supplies, clean and healthy water, smooth and safe transport by water and a sustainable living environment.

One of the core responsibilities of Rijkswaterstaat is 'Smooth and safe transport by water', which covers the management of shipping traffic, and the management and maintenance of waterways and the associated civil engineering structures. By ensuring good accessibility, safe waterways and reliable shipping timetables, Rijkswaterstaat contributes to the efficient and sustainable transport of goods and passengers, while maintaining openings for leisure craft. This enhances the competitive position of the mainports and maritime sector. Management, maintenance and construction are based on national and international fairway corridors with the emphasis on seaport access and the main transport routes. The better use of the existing waterways – which also includes corridor-based traffic management - is the priority. Professional and recreational shipping play a full role in shipping movements and use the waterway network safely.

Further information

https://www.rijkswaterstaat.nl/water/waterbeheer/beheer-en-ontwikkeling-rijkswateren/beheer-ontwikkelplan-rijkswateren.aspx

II-E European Commission - Guidance documents on inland waterway transport and environmental legislation

GUIDANCE DOCUMENTS ON INLAND WATERWAY TRANSPORT AND EVIRONMENTAL LEGISLATION	European Commission

Purpose and link to GNS

The documents have been elaborated to provide guidance on how best to ensure that activities related to the development and management of inland waterways are compatible with EU environmental policy in general and nature legislation in particular.

Content	Guidance document on inland waterway transport and Natura 2000 (2012)

The document outlines the procedures to follow when carrying out an appropriate

assessment under Article 6 of the Birds and Habitats Directive. Clarification is provided on certain key aspects of this approval process in the context of inland waterway developments in particular. It focuses on the construction, maintenance and upgrading of infrastructure projects related to commercial inland waterway transport. It is targeted towards involved authorities, assessment consultants, NATURA 2000 site managers and other practitioners involved in the planning, design, implementation or approval of inland waterway plans and projects.

Content	**Ad hoc task group of DG Environment - Manual on implications of the water framework directive (WFD) (2017)**

The document shall cover the application of exemptions according to WFD 4(7) for new modifications to the physical characteristics of water bodies and for new sustainable human development activities. The interplay of article 4(7) with other relevant EU environmental Directives, including the Habitats Directive, the EIA and the SEA Directives as well as the Floods Directive as well as EU and international policies and funding mechanisms (Renewable Energies Directive, TEN-T, CEF etc.) will be covered.

Further information

http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

http://ec.europa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm

II-F Germany - „Rahmenkonzept Unterhaltung"

„RAHMENKOZEPT UNTERHALTUNG "	**Germany**

Purpose and link to GNS

In 2010, the German authority integrated environmental objectives of new legislation into operational guidelines for integrated waterway maintenance on national level. The recommendations for the management of maintenance and other measures at waterways were consolidated in the "Handbuch Umweltbelange" ("Handbook on environmental issues").

As regards GNS, the guidelines contribute to the coordination of navigation objectives with water management and environmental requirements of waterway maintenance. This coordination and the identification of synergies as well solutions for trade-offs is a valuable input for the GNS development. Water management and environmental requirements apply to all TEN-T waterways and may influence waterway maintenance. Therefore, requirements need to be considered for the GNS development and solutions for the successful coordination of conflicts between navigation and environmental objectives should be taken up. The "Handbook on environmental issues" and in particular the "Framework Concept for Maintenance" used for waterway management in Germany address this issue and give recommendations for procurement.

Content	**Part of the "Handbuch Umweltbelange", an extensive handbook on environmental issues related to federal waterways**

The Framework Concept for Maintenance ("Rahmenkonzept Unterhaltung"), which

serves as an operational framework document for waterway maintenance activities of the German Waterways and Shipping Administration (WSV), is part of the "Handbuch Umweltbelange", an extensive handbook on environmental issues related to federal waterways.

In the "Rahmenkonzept Unterhaltung", the WSV illustrated the new implications for inland waterway maintenance that result from the revised Water Resources Act and the federal waterways law. This refers to the additional water management related tasks for riverbed and shore. Also factual and territorial scopes of application were examined. The framework concept analyses transport-related tasks and water management/environmentally motivated ones, and identifies synergies and trade-offs between measures. The guidelines shall ensure that maintenance measures will be beneficial to both objectives. It contains practical examples for combined measures and ways to evaluate them. Also the need to prioritize measures due to financial constraints is addressed.

Further information

Federal Ministry of Transport and Digital Infrastructure
Robert-Schuman-Platz 1
53175 Bonn, Germany

http://www.bafg.de/DE/08_Ref/U1/01_Arbeitshilfen/handbuch_umwelt_bwastr.pdf

II-G „Joint Statement on Guiding Principles on the Development of Inland Navigation and Environmental Protection in the Danube River Basin" and its follow-up process"

JOINT STATEMENT ON GUIDING PRINCIPLES ON THE DEVELOPMENT OF INLAND NAVIGATION AND ENVIRONMENTAL PROTECTION IN THE DANUBE RIVER BASIN" AND ITS FOLLOW-UP PROCESS	Germany

Purpose and link to GNS

The „Joint Statement" is a guiding document for the maintenance of existing waterways and the development of future waterway infrastructure, focusing on the integration of ecology into waterway development.

Content	Joint Statement on Inland Navigation and Environmental Sustainability in the Danube River Basin

The International Commission for the Protection of the Danube River (ICPDR), the Danube Commission and the International Sava River Basin Commission started an intense cross-sectoral discussion process in 2007 and developed this document. It provides guidance to decision makers dealing with inland waterway transport and environmental sustainability as well as to waterway managers preparing relevant riverine environmental and navigation plans, programmes and projects. It addresses, first of all, structural interventions and measures on rivers serving IWT; non-structural.

The Joint Statement follow-up process is managed by the three commissions and has been going on since 2007. It is a platform for joint discussion of existing and

planned navigation projects on the Danube and the Sava.

The planning principles and criteria of the Joint Statement have been developed in the context of the Danube river basin but can be used as reference for other comparable river systems worldwide.

Further information

https://www.icpdr.org/main/activities-projects/joint-statement-navigation-environment

ANNEX III. CORRIDOR-WIDE COORDINATION OF WATERWAY INFRASTRUCTURE MAINTENANCE AND MANAGEMENT

III-A Fairway Masterplan for the Danube region

FAIRWAY REHABILITATION AND MAINTENANCE MASTERPLAN FOR THE DANUBE AND IST NAVIGABLE TRIBUTARIES	Danube and tributaries

Topic

The Danube waterway crosses 10 riparian countries. Considerable parts of the river are free-flowing, which results in a strongly changing morphological situation. Thus, there is a strong need for regular maintenance and rehabilitation activities, which need to be coordinated across national borders in order achieve a "Good Navigation Status" on the whole waterway. This coordination is done via the Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries.

Objectives

The Master Plan provides a framework for assessment of the current fairway situation, an overview of the measures taken as well as a basis for planning and implementing future measures and dimensioning the corresponding budget. The overall target is to achieve 2.5, fairway channel depth on 343 days of the year (Low Navigable Water Level) by implementing the measures described in the Master Plan. It is however not a legally binding plan, but has strong political backing and thus importance.

Background information

Waterway management authorities of the riparian Danube countries decided to pursue the harmonisation of their investment strategies and action plans with priority for critical bottlenecks and established the Master Plan in 2012. The Plan also includes the Non-EU countries Bosnia and Herzegovina, Serbia, Moldova and the Ukraine.

The assessment and activity planning takes place on the operational level of waterway administrations and is harmonized in a cross-border approach (within the framework of the Danube Region Strategy and the FAIRway Danube project). The Master Plan is backed by declarations on the level of transport ministers, which ensures the political support.

Description of activities

In 2012, the Danube riparian waterway administrations developed the Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries based on the joint project NEWADA duo within the Danube Region Strategy. The Master Plan comprises:

- Identification of the critical bottlenecks as regards maintenance and rehabilitation
- Yearly status overview of the critical locations and the hydrological situation

(No days on which 2.5m fairway channel depth was achieved/No of days with water levels above Low Navigable Water Level)

- Analysis of the underlying problems and identification of needed measures
- Cost assessment of needed measures (investment and operational)
- Identification of resulting financial gaps

In the following years, the Master Plan was regularly updated by "National Action Plans" within the project FAIRway Danube. The following aspects were added to the analysis:

- Environmental status of the Danube according to the river basin management plans
- Identification of most important bottlenecks by users and yearly verification of results
- Analysis of maintenance measures taken and planned (including surveying, maintenance dredging, fairway channel marking and environmental relevance of measures)
- Resulting cost
- Required and secured budget and (possible) financing sources

Users and stakeholders

- Waterway administrations (operational level)
- Transport Ministers (Declarations of support for the Master Plan/Action Plans)
- Transport Users (identification of key bottlenecks, yearly verification of results delivered by waterway administrations)
- Environmental stakeholders (proof-reading of Master Plan/Action Plans)
- Danube Region Strategy PA1a Steering Group – approval of Maser Plan/Action Plans)
- FAIRway Project Steering Committee – approval of Master Plan/Action Plans)

Key success factors and innovative aspects

The basis for the Master Plan has been elaborated jointly within a project by the involved waterway administrations. Also the non-EU countries have been involved. The plan is based on a long process ensuring commitment, even though it is as such not compulsory.

It comprises, for the first time in the region, a comprehensive and transparent overview of needs, measures, cost and budget in a cross-border corridor perspective.

The Master Plan is monitored on a yearly basis, involving a broad range of stakeholders, including transport users and environmental stakeholders.

The Plan has a strong political backing (supportive Declaration of the Transport Ministers) as well as its updates (Transport Ministers conclusions stating that continuing support will be granted in 2014 and 2016). In general, the plan took

project results (NEWADA duo) up to political level and its results are taken up in concrete projects (FAIRway) again. This way, the practical roots as well as practical implementation of a strategic framework are ensured. The Danube Region Strategy has proven as a good platform to provide these links.

Time frame and status

2012 – Creation of Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries and signature of supporting Luxembourg Declaration by the Danube Transport Ministers

As of 2014 – yearly updates of the Master Plan via National Action Plans

2014 and 2016 – Conclusions of Transport Ministers declaring continuing support to Master Plan as well as providing the necessary budget

2015 – 2020 FAIRway Danube project taking over the updates of the Action Plans and partly implementing the outlined measures

Lessons learned

Although the Master Plan is no legally binding instrument, the commitment of the riparian states is very high. The 2016 Action Plans were signed by all riparian states but one (which is active on operational level). It proved very positive that the riparian waterway administrations were involved in the elaboration process (including definition of targets) right from the start via the project NEWADA duo. This enables strong commitment.

The yearly verification of results by the transport users also proved successful. The perception of the Master Plan among the users is positive. It has not become a solely top-down instrument.

The involvement of non-EU countries and countries that are not FAIRway project partners is ensured by the Danube Region Strategy. This platform provided a solid link to the political level.

The Master Plan as a political document resulted from a CEE-project on operational level. The Master Plan results were again taken up by the FAIRway Danube project under the CEF funding scheme. The measures outlined in the Master Plan are (partly) implemented within FAIRway. This process is a successful example of linking the operational and political level, preparing the basics for political decisions and taking strategies back to the ground again.

Requirements for implementation in other Member States

- Developing ownership with the involved parties (joint elaboration process and definition of targets). Also get transport users and environmental stakeholders on board)
- Create a solid link between operational to political level and ensure political commitment
- The output of the Master Plan needs to be taken up by projects in order to ensure implementation.
- Get users (transport, environment) on board.

Further information/contact
http://www.fairwaydanube.eu/national-action-plans/ www.danube-navigation.eu

III-B Coordination of maintenance works on the Rhine

COORDINATION OF MAINTENANCE WORKS ON THE RIVER RHINE	Rhine

Topic

Works on a river may have wide-spread effects such as causing obstacles for shipping, disturbing the river's discharge and sediment regime or waterway blockings. On an international waterway like the Rhine, these effects are often relevant for more riparian states than the one implementing the measure, which could lead to critical situations if not well coordinated.

Objectives

In order to minimize negative effects of works in or along the Rhine and to coordinate the further development of the waterway infrastructure, the Central Commission for Navigation on the Rhine (CCNR) has established an efficient, compulsory transnational coordination process

Background information

The Central Commission of the Rhine ("CCNR") finds its basis in the "Mannheimer Akte/Revidierte Rheinschifffahrtsakte" of 1868. It is an international organisation comprising the five Member States Germany, Belgium, France, the Netherlands and Switzerland, which are supported by a Secretariat. The Central Commission was created to ensure the freedom of navigation on the Rhine to ensure prosperity of navigation and a high level of safety for navigation and its environment. Cooperation is enacted with 11 European Observer States, other river commissions and international bodies.

The Member States of the CCNR draw up resolutions which must be adopted by their members via unanimous vote during plenary meetings (usually 2 times a year). The resolutions are binding on its Member States. The plenary meeting's resolutions are prepared by dedicated committees and working parties.

Further rights and duties of several states regarding the Rhine as waterway are ruled in the Treaty of Versailles (Versailler Vertrag), "Vertrag zwischen der Bundesrepublik Deutschland und der Französischen Republik über den Ausbau des Oberrheins zwischen Basel und Strasbourg" (1956) and "Vertrag über den Ausbau des Rheins zwischen Kehl/Straßburg und Neuburgweier/Lauterburg" (1969).

The waterway classes of the Rhine and thus the targeted waterway-related parameters are defined by the standards of the European Conference of Ministers of Transport (ECMT) in 1992 (ECMT classes). The Rhine riparian states have adopted these standards.

Description of activities

Articles 28 and 29 of Mannheimer Akte require that states sharing their borders along the bank of the Rhine exchange information of construction and maintenance projects which may affect shipping conditions. This exchange takes place within the dedicated "Committee for infrastructure and environment" (IEN) which it is assisted by its specialised Working Group (IEN/G).

The work of the committees and working groups are prepared by the Secretariat and the national delegations. Further stakeholders (e.g. observer states, industry representatives) may take part as well.

Activities of the Committee for infrastructure and environment (IEN) are:

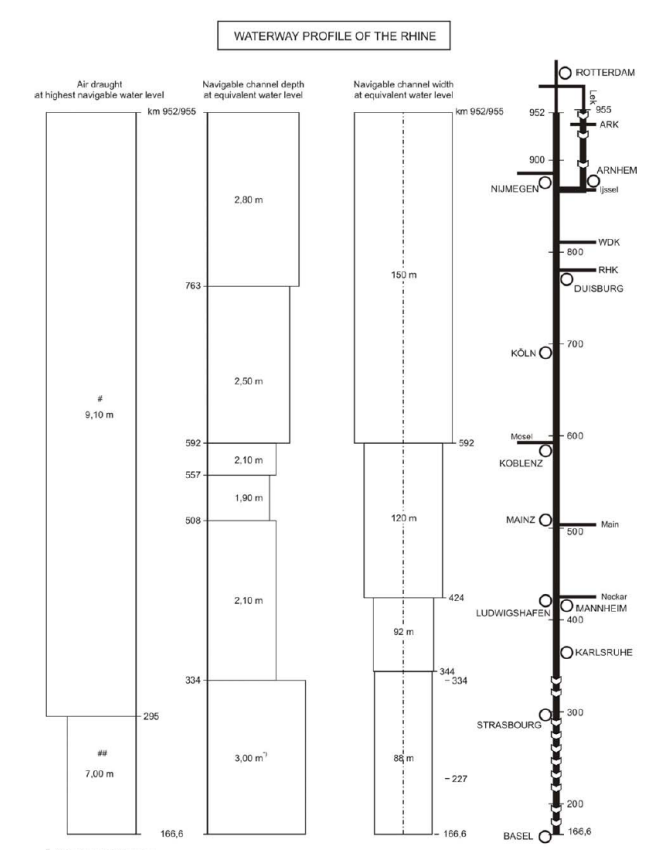
- Monitor, analyse and discuss any works on the Rhine which might affect navigation,
- Investigate navigation incidents with respect to how they might be related to the waterway infrastructure
- Monitor implementation for the Rhine of the Water Framework Directive and the Habitats Directives. Monitor the list of Natura 2000 zones affecting the Rhine waterway;
- Participate in activities to prevent significant negative impact on navigation in the context of implementing the FFH and WF Directives.
- Cooperate with the ICPR (International Commission for the Protection of the Rhine)
- Monitor the physical characteristics of the waterway Rhine: Bridge heights and vertical clearance, navigation channel profile
- Monitor works carried out on locks, bridges and other waterway-related infrastructure
- Assess navigation on the Rhine with respect to effects of climate change
- Analyse interruptions of navigation and propose measures adopted to reduce them
- Determine equivalent water level
- Deal with cross-cutting issues related to the environment as well as basic questions concerning the sustainable development of inland navigation

The Member States are obliged to inform the CCNR about construction and major maintenance projects on the river. The activities are examined concerning their effects on the waterway system during the meetings of the Committee and Working Group on Infrastructure and Environment which usually meet twice a year. The Central Commission has also agreed on minimum requirements and recommendations for the technical design of structures along the Rhine, which serve to evaluate construction and maintenance measures and as criteria for decisions on approving structures along the Rhine. After discussion in the committee, the measures that have been identified as affecting navigation significantly need to be approved unanimously during the CCNR Plenary Session. This procedure ensures that plans and progress of all construction and major maintenance projects are collected, discussed and agreed on centrally. The examination of the projects and their approval by the Central Commission follow standardised and agreed upon procedures.

The CCNR compiles the data and publishes it on its website. Furthermore, a graphic is produced ("Navigation channel profile") showing the main parameters of the waterway between Basel and Rotterdam (see Figure B I).

The "waterway profile" of the Rhine provides information on the air draught at highest navigable water level and the fairway channel depth and width at equivalent water level along the Rhine between Basel and Rotterdam (river-km 166 to river-km 952/955). In case of short-term restrictions of fairway parameters, there are several web portals on which users can get the necessary information (e.g. Avisbat (Voies Navigable France), Vaarweginformatie (Rijkswaterstaat) or the German ELWIS system see Good Practice Example M in Chapter 7.5.1).

Figure B I: Longitudinal waterway profile of the Rhine



Source: Central Commission for Navigation of the Rhine

Users and stakeholders

Directly involved in the coordination process:

- CCNR Member States: Germany, France, The Netherlands and Switzerland; although not a riparian state, Belgium, as a CCNR Member State, does now participate in the IEN committee and its working group.
- The CCNR "Committee on infrastructure and environment" and its working group and discussion platforms/working bodies and the CCNR Plenary Session as deciding panel. The CCNR Member States are represented in all these bodies.

- The CCNR Secretariat as supporting body.

If necessary, cooperation is enacted with:

- CCNR Observer States: Austria, Bulgaria, Luxembourg, Hungary, Poland, the Czech Republic, Republic of Serbia, the Slovak Republic, Romania, the United Kingdom, Ukraine.
- European Commission, UNECE
- River Commissions for the Danube, Moselle and the Sava, International Commission for the Protection of the Rhine
- External experts, environmental stakeholders, industry representatives

Key success factors and innovative aspects

The exchange of information between the riparian states coordinated by the CCNR has a long tradition and is ruled by several treaties. There is a legal obligation to exchange information on planned and ongoing works, and the procedures that regulate this exchange have proven to be efficient. The established communication structures secure close and effective integration of the national delegations, representatives of the industry, external experts and the CCNR Secretariat.

Furthermore, most of the projects of the committees and working parties are drawn up on the basis of consensus, which makes effective decision-making possible despite the unanimity rule that applies to the plenary meeting.

A key success factor is also the coordinated illustration of fairway parameters via the waterway profile. The profile is updated if necessary

Time frame and status

This process of finding consensus has been effective since adoption of the Mannheim Convention in 1868 until today. Two meetings of the Committee and two working group meetings take place per year and may be convened more frequently, if necessary. The Plenary Sessions take place twice a year. Plans of measures are usually made for a period of two years

Lessons learned

Complex interaction needs agreed upon and standardized processes. Reaching consensus and establishing coordinated work plans across national boundaries can benefit from a solid legal basis. However, an efficient central body, a strong wish for cross border cooperation and mutual trust seem to be the main success factor of such cooperation.

Integrating all relevant stakeholders at the right stage is a key prerequisite as well. The Rhine is a good example for an existing and functional cooperation.

In addition, the waterway profile graphic has proven useful as coordinated and clear display of the general shipping conditions along the Rhine.

Requirements for implementation in other Member States

The legal set-up of such a coordinating system is dependent on the specific legal conditions of the affected states. No direct transfer of this system developed by the CCNR is possible. However, a regulated process of mutual information by the Member States, joint discussion and joint adoption of activities in order to

implement the best measures from a systematic viewpoint is recommended, regardless of their political systems and financial status.

Further information/contact

www.ccr-zkr.org

Source: PLATINA II Manual on Waterway Maintenance, p.23

ANNEX IV. LOCK MANAGEMENT CONCEPTS

IV-A Lock management Upper Rhine

COORDINATION AND SCHEDULING OF LOCK CLOSURES AT THE UPPER RHINE	Rhine
Topic	
Lock management – coordination of planned lock maintenance and related closures	
Objectives	
Minimisation of adverse effects such as congestion and delay caused by closure of lock chambers for planned maintenance	
Background information	
Regular lock maintenance is required to ensure the functionality of lock chambers. Lock maintenance usually requires the closure of lock chambers which may lead to congestion, delays and even disruption of navigation. VNF organized the meetings to coordinate lock closures at the Upper Rhine already in 2004. It is unknown, when this process was actually started. Since 2013, the CCNR take note of the agreed closure times of the locks. So, in the framework of the CCNR a coordination has been established by interaction of French and German waterway authorities, lock operators and industry stakeholders. The coordination of maintenance works at one lock aims to avoid parallel closure of both chambers, which would lead to a complete disruption of navigation. Coordination of parallel maintenance work and related chamber closures at subsequent locks aim to minimise congestion and delay for operators travelling along the Upper Rhine. This will also minimise the adverse impact on IWT in logistic chains. The coordination meetings were initiated in 2013, following to the request of the navigation industry to shorten and to optimise lock closures, when long time closures of French locks at the Upper Rhine for extensive maintenance were planned. After the establishment of coordination meetings, the CCNR delegates of the committee for infrastructure and environment decided in 2013 to start discussing the outcome of the coordination of lock closure on a regular basis and present every year a list with the schedule of lock closures for the following year to the plenary for approval (Resolution 2013-II-22). The engagement of the CCNR regarding the coordination of lock closure scheduling is based on: • Support of the prosperity of inland navigation according to article 45 of the Mannheim Document (avoidance of possible economic disadvantages for inland navigation resulting from lock closures) • Coordination of Rhine riparian states regarding planned construction and maintenance work which have impact on navigation in the framework of the CCNR according to article 29 of the Mannheim Document • Procedures for the determination of conditions and requirements for constructions at the River Rhine in the framework of the CCNR	

Description of activities

The French waterway authority VNF organises bi-annual informal coordination meetings. VNF invites the relevant stakeholders including waterway authorities, lock operators and the industry to the coordination meeting. The coordination aims to minimise disruptions and adverse impact on the industry resulting from lock closures. As a result of the discussion, the scheduled lock closures are determined.

The French delegation transmits the minutes of the coordination meeting and a list with the planned lock closures to the CCNR secretary. These documents will be discussed by the CCNR committee for infrastructure and environment.

Tasks of the committee for infrastructure and environment related to the coordination of lock closures are

- to follow the regular scheduling of coordination meeting and to support them, if required
- to check the schedules for lock closure on plausibility and potential for optimisation regarding inland navigation
- The discussion of lock closures at the CCNR in the committee for infrastructure and environment gives the navigation industry again the opportunity to comment the schedule for planned lock closures.
- The final schedule for planned lock closures in the following year acknowledged by the committee for infrastructure and environment is presented each year to the CCNR plenary in autumn and approved

Users and stakeholders

The French waterway authority VNF organises the coordination meetings. VNF invites the operator of French locks EdF, the Waterways and shipping office Freiburg as German waterway authority and operator of the Iffezheim lock, the Swiss Federal Office of Transport, the operator of Swiss locks and the industry to the coordination meetings.

The outcome of the coordination meetings are on the agenda of the CCNR committee for infrastructure and environment, where again the industry has the opportunity to comment the schedules for lock closure. Additionally, the lock closures are addressed in the continuous discussion of authorities with the industry. Finally, the lock closure planning is on the agenda in the CCNR plenary for approval.

Key success factors and innovative aspects

Key success factors for the process of the coordination of lock closures are a good interaction of all stakeholders and a good exchange with the navigation industry. A continuous exchange with the industry also between the scheduled meetings contributes to a successful coordination of lock closures. The industry should have the opportunity to make proposals for improvements in the scheduling of lock closures as for improvements of the inland waterway infrastructure in general. For the participation and contribution of the industry it is important to address its needs and to stick to the adopted schedule of lock closures as far as possible. The schedule should be binding for waterway authorities respectively managers and lock operators.

Time frame and status
The coordination meetings take place on a regular basis. Since 2015, the coordination meetings are scheduled twice a year, one each in spring and autumn. Before, only one meeting per year was scheduled in autumn. The scheduled lock closures are planned for the following year and approved by the CCNR plenary in autumn each year.
Lessons learned
The industry is interested in short and coordinated lock closures to minimise the adverse impact such as congestion as much as possible. The establishment of meetings for the coordination of lock closures with waterway authorities and lock operators as well as the industry contributes to an optimisation of lock closures and a limitation of the adverse impacts on navigation. Continuous exchange between authorities and the industry can further optimise waterway and lock management. The exchange and consideration of industry needs improve the understanding of the industry for scheduling of closures by authorities / operators. Based on the approved schedule operators and industry are aware of the lock closure schedule a long time before and are able to prepare for the restrictions of navigation (e.g. adaptation of operation / production if suitable).
Requirements for implementation in other Member States
The willingness of waterway authorities and lock operators for an exchange with operators and industry as well as an understanding of their needs is required for an implementation. This includes that contributions from the industry should be considered carefully and only be neglected, if there are good reasons. Upon approval and publication, the planning needs to be binding for waterway authorities and lock operators and later changes should be avoided. In particular, for international rivers with several riparian states and stakeholders a platform such as a river commission might be needed.
Further information/contact
Central Commission for Navigation on the Rhine 2, Place de la République F-67082 Strasbourg http://www.ccr-zkr.org/13020400-de.html (resolutions of the annual CCNR autumn plenary include the resolution on lock closure schedule for the following year)

IV-B Lock management Moselle

COORDINATION AND SCHEDULING OF LOCK CLOSURES AT THE MOSELLE	Moselle
Topic	
Lock management – coordination of lock maintenance and related closures	

Objectives

Minimisation of adverse impacts caused by restrictions and disruption of navigation caused by closure of lock chambers for planned maintenance

Background information

Regular lock maintenance is required to ensure the functionality of lock chambers. Lock maintenance usually requires the closure of lock chambers which at the Moselle lead to disruption of navigation as the majority of Moselle locks consists of only one chamber. In the 1990s, the Moselle Commission started to fix dates for closure of navigation in advance to allow lock inspection and maintenance. Since then, all Moselle locks are closed every year for eight respectively ten days. This was required due to the increasing traffic and related safety requirements. Before this, navigation was closed only on public holidays. As the locks were still in good condition at this time with less traffic at the Moselle one day per week was sufficient for lock maintenance.

The Kondominium (German-Luxembourg section) is closed for eight days. Two additional days of closure are planned for the French section. This is well coordinated as the two additional days will be the day before and after the closure of the German-Luxembourg section.

The users value the advanced long-term planning of closures, as operators and shippers can better accommodate it in their planning and production.

Description of activities

The technical committee of the Moselle Commission consisting of delegates from France, Luxembourg and Germany determines fix dates for lock closure to carry out maintenance. The delegates belong to national waterway managers respectively authorities. In preparation of the planning the delegates have a dialogue with operators and shippers regarding the scheduling of lock maintenance. The technical committee considers different aspects for their proposed scheduling of lock closures. The interests of operators are considered in the planning. The lock closures are not scheduled in the peak season (e.g. holidays for passenger transport) and are coordinated with operators and industry along the Moselle River. Another important issue is the expected water level, as maintenance cannot be carried out at high water levels. Therefore, periods with low risk for high water levels are selected. Moreover, national public holidays are avoided to facilitate the execution of maintenance work with respect to employment law.

The proposal for closure dates is presented to delegates and adopted by the plenary for several years ahead. With the adoption of proposed schedule, it becomes a formal act, which is binding for riparian states. The national waterway managers have to carry out maintenance work during the scheduled closure periods.

Users and stakeholders

The technical committee and its member states delegates discuss the scheduling of lock closures with operators and industry. Operators and industry will benefit from the long-term planning, as they are better able to prepare for the closure and adapt operation / production to prepare for the closure of navigation. The delegates represent national waterway managers respectively authorities and will bring in the national interests.

Key success factors and innovative aspects
The long term planning and binding adoption of plans for member states are key success factors. The plans should consider all relevant aspects and be discussed with operators and industry to identify closure dates with the least impact on the industry. Lock closure schedules which consider industry interests and are fixed for many years ahead will limit the adverse impact of the disruption of navigation due to lock maintenance to a minimum.
Time frame and status
Locks are closed for maintenance once a year for eight respectively ten days. The dates are determined many years in advance by the Moselle Commission, e.g. in 2017 the dates for closures are fixed until 2025.
Lessons learned
The discussion of lock closure schedules for necessary maintenance work with operators and industry and the binding long-term planning of closures by responsible authorities minimise the adverse impact for inland waterway transport.
Requirements for implementation in other Member States
Flexibility and willingness to schedule lock inspection and maintenance in advance for a long period of time is required. Resources to carry out maintenance work at the scheduled time need to be available. An exchange with operators and industry and understanding of their needs by waterway managers and authorities is required. The long-term planning needs to be binding for waterway managers / authorities. In particular, for international rivers with several riparian states and stakeholders a platform such as a river commission might be needed.
Further information/contact
Moselle Commission, Franz-Ludwig-Straße 21 D-54290 Trier

IV-C Danube example lock management

IMPROVEMENT OF MAINTENANCE AND OPERATION OF LOCKS ALONG THE AUSTRIAN DANUBE	Austria
Topic	
Improvement of maintenance and operation of locks along the Austrian Danube	
Objectives	
The waiting times at locks in Austria for commercial vessels are reduced by optimising lock maintenance works and lock traffic management based on customer needs	

Background information

The 9 Danube locks in Austria are in the possession of the VERBUND Hydro Power GmbH, which is thus responsible for lock maintenance. Controlling and monitoring of vessel traffic at the locks as well as scheduling of locking sequences is the task of the Austrian waterway management company viadonau which is owned by the Austrian Federal Ministry of Transport, Innovation and Technology. Close cooperation of the stakeholders is thus needed to run operation and maintenance of locks efficiently.

Description of activities

Based on an agreement between the Austrian Federal Ministry of Transport, Innovation and Technology and the Verbund Hydro Power AG, an optimised maintenance concept for the locks along the Austrian Danube is being implemented since 2008/09. This includes a scheme for minimising the time needed for lock maintenance and an agreement on compensation of the resulting extra cost. The main aspects of the scheme are the shifting of maintenance works to the time frame from November to March - the low traffic season – which results in fewer obstacles to vessel traffic. Furthermore, a concept for speeding up unplanned repair works was implemented.

Based on an agreement between the Austrian Federal Ministry of Transport, Innovation and Technology and the Verbund Hydro Power AG, an optimised maintenance concept for the locks along the Austrian Danube is being implemented since 2008/09. This includes a scheme for minimising the time needed for lock maintenance and an agreement on compensation of the resulting extra cost. The main aspects of the scheme are the shifting of maintenance works to the time frame from November to March - the low traffic season – which results in fewer obstacles to vessel traffic. Furthermore, a concept for speeding up unplanned repair works was implemented.

In addition, Austria implemented an electronic Lock Management System (LMS) as part of the Austrian RIS system in 2009, which serves as management application for lock operation. It is connected to the national DoRIS system, the national ERI infrastructure, the European Hull Database and the German LMS and enables

- Management and visualization of vessel/convoy data
- Logging of all locking and shift events (vessel/convoy data, locking times, comments, etc.)
- Logging of hydro meteorological data
- Management of operational lock status
- Lock facility failure logging
- Mail and warning management
- Automatic creation of reports to support operation and for statistical purpose

Thus, the LMS supports an efficient and transparent daily management of lock operations and also feeds the statistical database on inland navigation in Austria.

These improvements in lock maintenance/repair and daily lock operation resulted in an average waiting time of vessels at locks of 33,20 minutes in 2016 while 8,87% of all vessels needed to wait.

Users and stakeholders

VERBUND Hydro Power GmbH (owner of locks, responsible for maintenance)

Viadonau - Austrian waterway management company (controlling and monitoring of vessel traffic at the locks, scheduling of locking sequences)

Austrian Federal Ministry of Transport, Innovation and Technology (owner of viadonau)

Users of Danube navigation

Key success factors and innovative aspects

The relevant players came together and set up a legal agreement on organising and financing maintenance and repair works at locks. This agreement was oriented on the needs of the shipping sector.

Furthermore, the organisation scheme is supported by an electronic data management system which enables improved daily lock operation.

That way, viadonau has been able to improve the capacity utilisation of locks on the Austrian Danube over the whole year and improved attractiveness of inland navigation towards its customers

Time frame and status

The maintenance scheme was developed in 2007 and implemented as of 2008/2009. The traffic database was introduced in 2009 and is under current improvement.

Lessons learned

It is key to get the relevant players for lock maintenance, repair, operation and traffic management as well as the financing parties on the table and to set-up a legally stable framework. Furthermore, a main aspect is the consideration of customer needs. In addition, River Information Services should be elaborated as far as possible to enable further optimisation of traffic management.

Requirements for implementation in other Member States

The coordination structure for the legal framework needs to be set up in a special way for each Member State due to different legal obligations. In addition, the various implementation stati of RIS in the various Member States need to be taken into account.

Further information/contact

via donau – Österreichische Wasserstraßen-Gesellschaft mbH

office@viadonau.org

IV-D Lock maintenance in Flanders

LOCK MAINTENANCE FLANDERS	Belgium
Topic	
Lock maintenance in Flanders	
Objectives	
The Flemish inland waterway network consists of 131 locks, managed by the Flemish waterway managers. The objective of their maintenance programme is to present the locks in the best possible condition to their users, so that they can make use of it in optimal circumstances.	
Background information	
The locks in Flanders are very diverse with regard to the size of the lock and their date of construction. The Flemish waterway managers have locks that were built very recently, but they also have locks that were built in early 1900. The way to maintain the big diversity of locks is therefore very different from lock to lock (depending on the size and date construction) and challenging. The waterway managers have different maintenance techniques with regards to door constructions, propulsion mechanisms, lock gear and control systems for a variety of locks.	
Description of activities	
The maintenance programme starts from an inspection programme. The inspection programme focuses both on the architectural, mechanical as well as on the electromechanical aspects of the locks. Based on the results of the inspection programme, it will be determined which construction works needs to be conducted first. Depending on the sort of maintenance works that has to be done, the maintenance works are outsourced or can be done in-house, depending from the sort of maintenance works that needs to be done. Outsourcing is done through specific tenders or maintenance contracts. The Flemish waterway manager, *De Vlaamse Waterweg*, has his own maintenance division. That means that they are capable to do the necessary maintenance works when required. The sort of maintenance works that needs to be done varies from structural, mechanical to electromechanical maintenance works. Within the maintenance division of the *De Vlaamse Waterweg* there is a sub division that is 24/7 standby to do the necessary repair work on the locks.	
Users and stakeholders	
The Flemish inland waterway network is not only used by commercial shippers, but also by recreational shippers. The most important stakeholders of the Flemish waterway network are the staff of the Flemish waterway managers, companies alongside the waterways, civilians, politicians, …	
Key success factors and innovative aspects	
A well-organized inspection programme, ongoing monitoring of the locks and the capability to do the necessary repair work as quickly as possible are the most important success factors for a good maintenance of the locks. In addition to the	

above-mentioned success factors it is also very important to have the necessary in- house know how with regard to the various aspects of a lock.

Time frame and status

The following aspects needs to be part of a well-organized maintenance programme:

- On-going monitoring of the locks (almost on a daily basis)
- Every 15 years the lock needs to be drained, in order to have a full inspection of the lock and to do the necessary maintenance and renovation works

Lessons learned

1. The Flemish waterway managers are convinced that it's necessary to have each lock drained every 15 years. At almost all of those full inspections under-water damage at the lock has been established. The good news is that in almost all of these cases the under –water damage was repairable.
2. It's very important to have the necessary in-house know how about the different aspects of a lock. A good maintenance of the locks starts with a good monitoring of the locks. The monitoring of the locks starts with the locks operator, therefore it's important that the lock operator has the necessary know how of the lock. When the lock operator detects a certain problem, a prescribed procedure is put in place in order to resolve the problem as quickly as possible.

Requirements for implementation in other Member States

It is important that an organisation has a structure that allows her to implement the same working method with regards to the maintenance of locks as the Flemish waterway mangers do.

Further information/contact

Dirk Verhoeven, afdelingshoofd Maintenance, De Vlaamse Waterweg
dirk.verhoeven@vlaamsewaterweg.be

Eddy Vervoort, directeur Maintenance, De Vlaamse Waterweg
eddy.vervoort@vlaamsewaterweg.be

ANNEX V. USER INVOLVEMENT PROCESSES

V-A COV

CENTRAAL OVERLEG VAARWEGEN (COV)	The Netherlands

Topic

Smooth, efficient and safe navigation for operators and users

Objectives

The COV promotes the common interests of waterway users related to waterway infrastructure in the Netherlands and campaigns for quality waterway infrastructure that benefits economy and society.

- The mission of the COV is to achieve and ensure that freight over water can operate in a smooth, efficient and safe way on all national navigable waterways without infrastructural bottlenecks. Maintenance of waterways and constructions is increasingly important because many infrastructure works were built in the 19th and 20th centuries.
- COV aims at having impact on waterway policies and related budgets. COV pursues an active advisory role and influences the decision on improvements by advising ministers and MPs, provincial and regional bodies which are responsible for wet infrastructure and mobility issues. In cooperation with the Inland Shipping Promotion Council they organize visits to the inland waterways and vessels to illustrate the case.

Background information

N/A

Description of activities

COV undertakes a national lobby but also supports regional lobbies with arguments. (Potential) bottlenecks in the waterway network are analysed and necessary adaptations, improvements and required maintenance are mapped.

COV publishes yearly reports and recommendations on the status and quality of the waterway infrastructure covering:

- encouraging timely maintenance of waterways;
- broadening and deepening of fairways and ports;
- securing adequate service level for smooth navigation;
- adequate information and communication management to users
- securing adequate overnight accommodation, resting and waiting areas;
- minimizing adverse effects on shipping from measures for flood protection and water quality;
- minimizing impacts on businesses from long-term maintenance work on waterways or constructions.

Each year, the information and data are updated.

The reports do not claim a scientific basis, but are rooted in practical experience from users.

The regional branches are surveyed for a first list which is followed by national work sessions. The regional results cover industrial waterborne opportunities for shippers to move cargo by water but requiring infrastructure works, critical periodic waiting times for vessels (annual average waiting times mask certain bottlenecks), recognised priorities etc.

The expert national representatives analyse the regional reports and compile this into a national overview making a strategic assessment on the basis of feasibility and prioritisation.

Practically, annual exchanges are organised with respectively the Minister of Infrastructure and Environment, Director General of Mobility and the Director of Maritime Affairs as well as with provincial and regional waterway managers.

Users and stakeholders

Centraal Overleg Vaarwegen is a partnership between the employers' organization EVO, the Association of Hydraulic Engineers (VVW) and inland shipping organizations, the Central Bureau for Rhine and Inland Shipping (CBRB) and Royal BLN Schuttevaer. In addition, the Dutch Association of Inland Ports is member. In total, more than 23,000 companies are represented from inland shipping and logistics, engineering and trade & industry.

Key success factors and innovative aspects

All key stakeholders are gathered at national and regional level analysing, defining and documenting together their current and future needs as users of the waterway network.

The annual work has resulted in the development and maintenance of a good working relationship with national and regional politicians, policy makers, implementing organisations and cooperating parties.

Time frame and status

Since 1989, annual exchanges take place with waterway authorities and reports about the network are published.

Lessons learned

The COV has shown that it is feasible, efficient and productive to align interests of various representative bodies for in order to establish a joint lobby towards the Government and water administrations to increase budgets for improvement to the Inland Waterway infrastructure.

Requirements for implementation in other Member States

Representative bodies, sometimes with different viewpoints or interests, should be open to join forces to find common ground and cooperate in the lobby towards national administrations.

Further information/contact

Royal BLN Schuttevaer
Scheepmakerij 320, NL - 3331 MC Zwijndrecht
+ 31 78 78 20 565
www.bln.nl

V-B Association VBW

ASSOCIATION VBW (EXCHANGE OF SECTOR EXPERTS FROM ADMINISTRATION AND INDUSTRY)	Germany/Rhine/ Europe

Topic

The Association for European Inland Navigation and Waterways (VBW: Verein für europäische Wasserstraßen und Binnenschiffahrt) as platform for exchange of authorities and industry and joint engagement on IWT sector development

Objectives

The objective of VBW is the strengthening of inland navigation. The networking and dialogue of experts from administration and industry should facilitate sharing of knowledge and exchange of views. The informal dialogue between experts and exchange is very beneficial to strengthen the sector. This allows to exchange views on these topics and to contribute to a joint understanding of challenges and requirements. This will facilitate the consideration of user interest in infrastructure, regulative and technological development by the administration. Moreover, harmonisation and standardisation are important issues for the VBW. All the activities will contribute to strengthening inland navigation conditions.

Background information

The registered association VBW is a platform for expert discussion on sector development. It brings together experts from administrations and industry. Members of the institution include administrations, enterprises and natural persons. The member structure is international with a focus on riparian states of the Rhine such as in particular Germany and the Netherlands.

The VBW work covers a wide range of IWT sector issues. Technical committees and task groups have been established in different fields.

Description of activities

The focus of VBW work is on operational issues both at administrative and operator level. This is a distinction to interest groups, which have a focus on political level. Activities are planned annually in a working programme adopted by board and advisory committee.

Major work and exchange is carried out by technical committees and task groups. Technical committees have been established for the working areas barges, inland

waterways & ports, inland waterway transport law and transport economics. Task groups exist regarding telematics and driving dynamics of inland vessels.

The VBW with its regular events and the committees/groups addresses a wide range of relevant topics for the IWT sector and launch a discussion among its members representing all relevant areas of the IWT sector. This includes an exchange of administrative and industry experts. The discussion will contribute to a common understanding within the sector and positively influence the performance of sector. It is associated with the extensive networking opportunities, which VBW offers to its members and the IWT sector. Apart from intangible/informal achievements through the discussions, the VBW will prepare statements and publications to communicate results of the work. This is related to its role as authentic and neutral provider of IWT sector information. VBW is involved in IWT projects and commission studies related to its work. The VBW cooperate with the German Port Technology Association.

- Recent topics of VBW work include
- Conditions for container transport on inland waterways
- Emissions and alternative propulsion systems of inland vessels
- Restructuring of user charges in the German waterway network
- Shore based power supply for barges
- Acceleration of infrastructure procurement
- International comparison of infrastructure project procurement

Users and stakeholders

The VBW has more than 200 members including authorities, enterprises and natural persons. With this member structure the association comprises a wide range of IWT stakeholders from all relevant areas of the sector. A key activity is the discussion of experts from administration and operators in technical committees and task groups.

Key success factors and innovative aspects

The informal exchange on expert level with limited connection to political discussions and decisions is a key factor. The focus is on areas under sole responsibility of administrative level and operators. This facilitates the dialogue of sector institutions and strengthens the inland navigation conditions. It provides a platform for cooperation between administration and operators and better allows considering other views in procurement/decision making.

The focused work on expert level in technical committees and task groups provide valuable input for the sector development.

Time frame and status

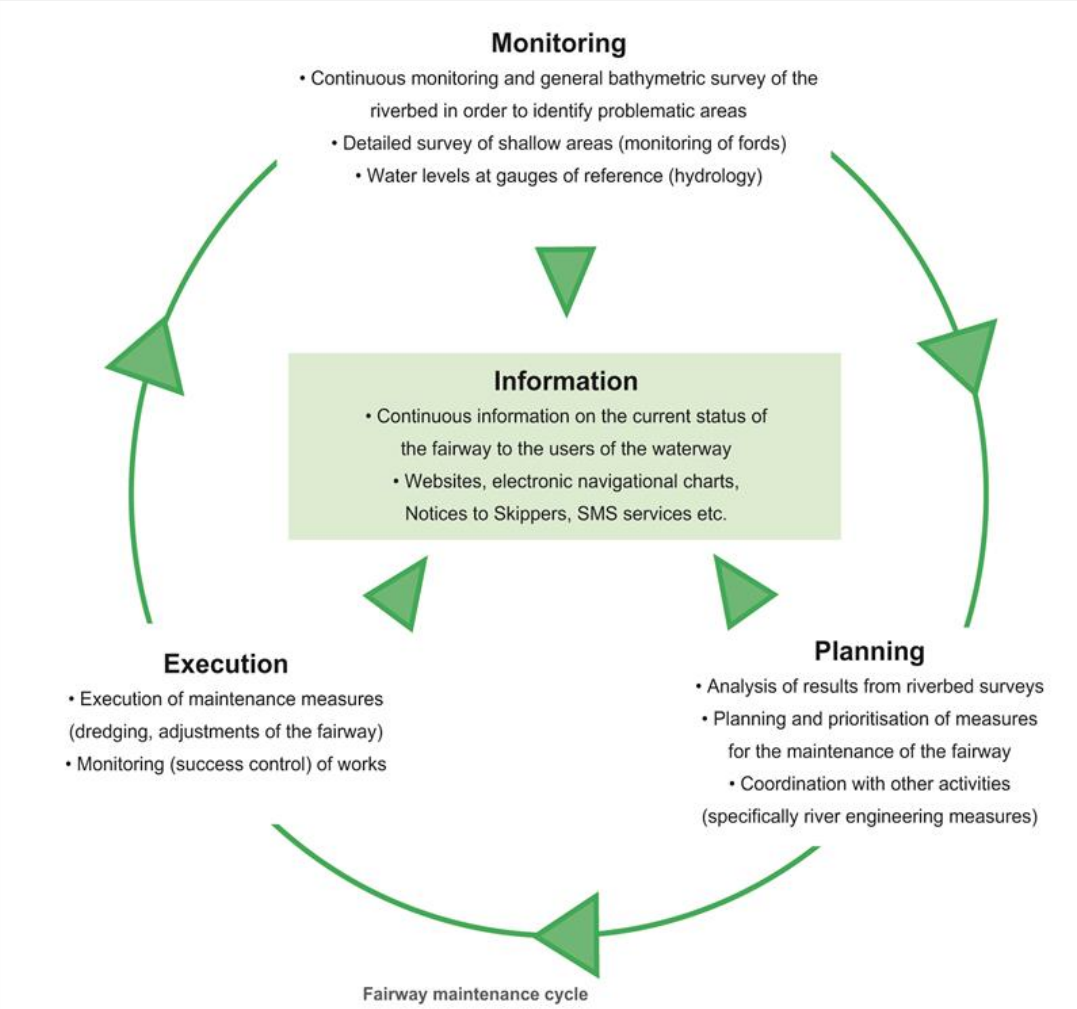
The VBW with its office in Duisburg organise frequently events to address current IWT sector issues. Meetings of technical committees and task groups take place usually twice a year. Frequently, the VBW publish its newsletter as well as statements and publications on certain issues.

Lessons learned
A platform for discussion of IWT sector development covering experts from administration and operators contribute to strengthen the IWT sector position. The informal exchange facilitates the identification of a joint position considering other views. As a result, conclusions for different fields with respect to IWT such as in particular waterway management can be drawn. This contributes to strengthening inland navigation conditions.
Requirements for implementation in other Member States
For implementation in other member states it is required to establish a comparable platform with a wide coverage of IWT sector stakeholders including administration and operators. A promising solution might be the development of existing platforms such as local associations. For the implementation, the willingness of administration experts to participate is necessary. The work should take up current issues and be rather informal. The focus should be on expert level and the link to the political area should be limited. This would contribute to successful exchange on strengthening inland navigation conditions and the IWT sector.
Further information/contact
Verein für europäische Binnenschiffahrt und Wasserstraßen e.V. Haus Rhein Dammstraße 15-17 47119 Duisburg www.vbw-ev.de

V-C Stakeholder engagement in waterway management

BAU- UND SCHIFFFAHRTSBESPRECHUNG AUSTRIA	Austria
Topic	
Stakeholder engagement in waterway management	
Objectives	
Customer-oriented waterway management and improved fairway conditions for inland waterway transport on the Austrian Danube.	
Background information	
A river such as the Danube is a living system with continuous changes to the riverbed and its morphology. Locations of critical fairway channel sections can therefore change from week to week and from year to year. A typical "fairway maintenance cycle" should therefore be first and foremost based on continuous monitoring of the fairway. Each of the process steps in this cycle fulfils specific purposes which are interdependent: The availability of skilled staff, up-to-date sounding and dredging equipment, efficient methods for data collection and tools for targeted information transmission to the users of the waterway are all prerequisites for efficient and effective waterway maintenance on the Danube and its navigable	

tributaries.



Due to the hydro-morphological aspects of the Danube in Austria, the main challenge for viadonau as the competent waterway management authority is the year-round provision of internationally harmonised fairway parameters in the two free-flowing sections of the Danube waterway.

Seen from the perspective of the users of the waterway, an increased availability, predominantly of fairway channel depths, may lead to a higher utilization and lowered costs of inland navigation, as the possible draught loaded of the vessel fleet significantly influences the transport costs on the Danube and the competitiveness of Danube navigation as such. In practice, one extra centimetre of draught loaded in average enables an additional loading capacity of 7 to 14 tons. For a transport route between two ports with several critical locations on the route, in low-water periods the most shallow section will limit the maximum draught loaded whereas restrictions in fairway channel width may only lead to additional waiting times in case of critical vessel encounters.

In view of the characteristic discharge curves of the Danube river in Austria (cf. figure below), the optimum time frame for the start of urgent dredging works is the month of September. In order to be able to start with dredging measures already at the beginning of September, a hydrographical survey of all critical locations in both free-flowing sections is performed each year in July. Based on these survey results in combination with the general annual riverbed surveys from spring and the surveys from the monthly monitoring of critical locations, a main annual briefing

meeting for dredging works was established at the beginning of August (cf. figure below). The main purpose of this meeting is the identification of those critical locations which show the highest priority in terms of maintenance interventions needed. In the meeting a prioritization of these locations is discussed and the current catalogue of critical locations is adapted accordingly.

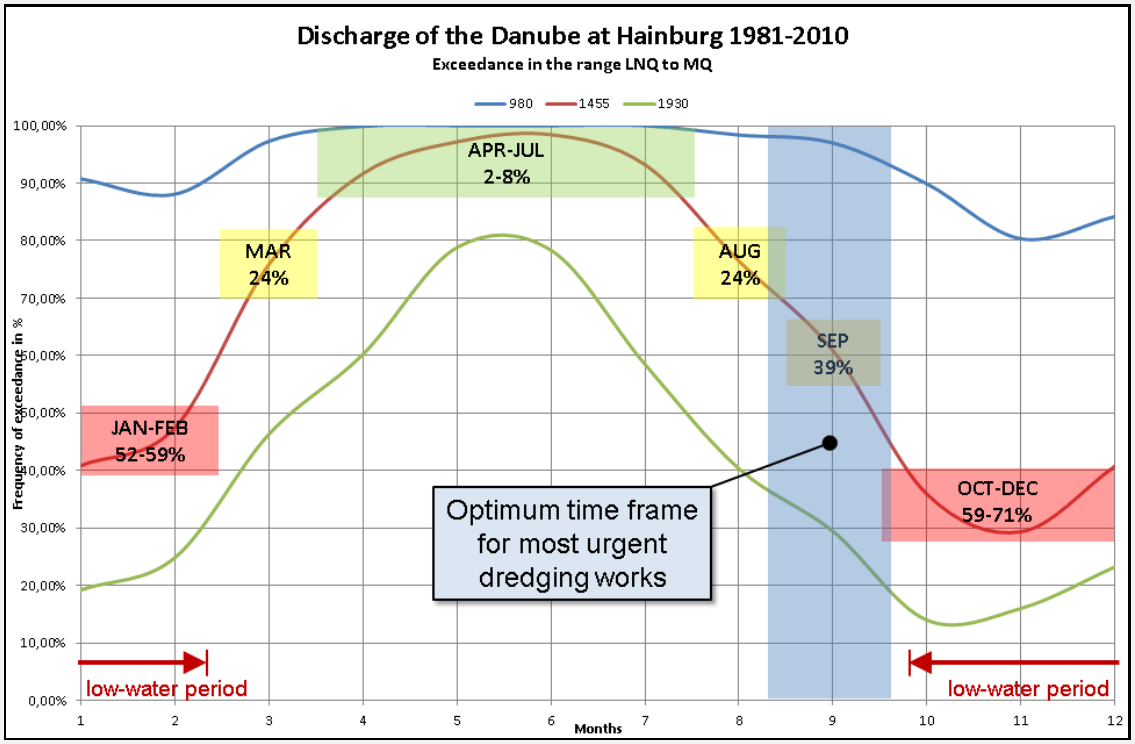


Figure: Frequency of exceedance of characteristic amounts of discharge at the Hainburg water gauge in the years 1981 through 2010 and inferred optimum time frame for most urgent dredging works.

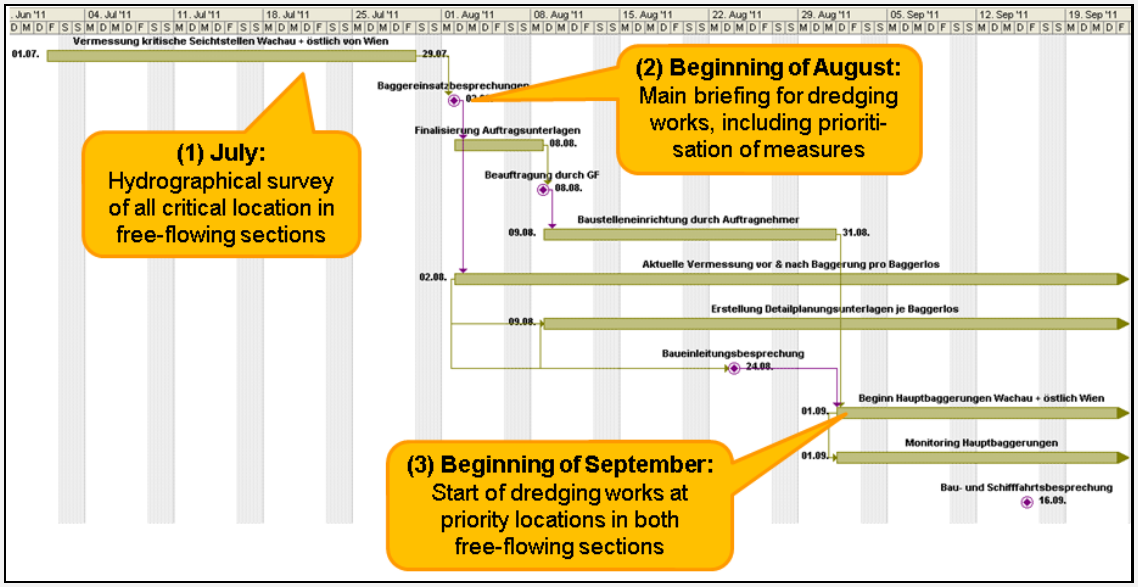


Figure: Sample schedule for prioritized dredging works

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- One copy:
  via EU Bookshop (http://bookshop.europa.eu);

- More than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries
  (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm)
  or calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- Via EU Bookshop (http://bookshop.europa.eu)

MI-01-18-273-EN-N

doi. 10.2832/148049