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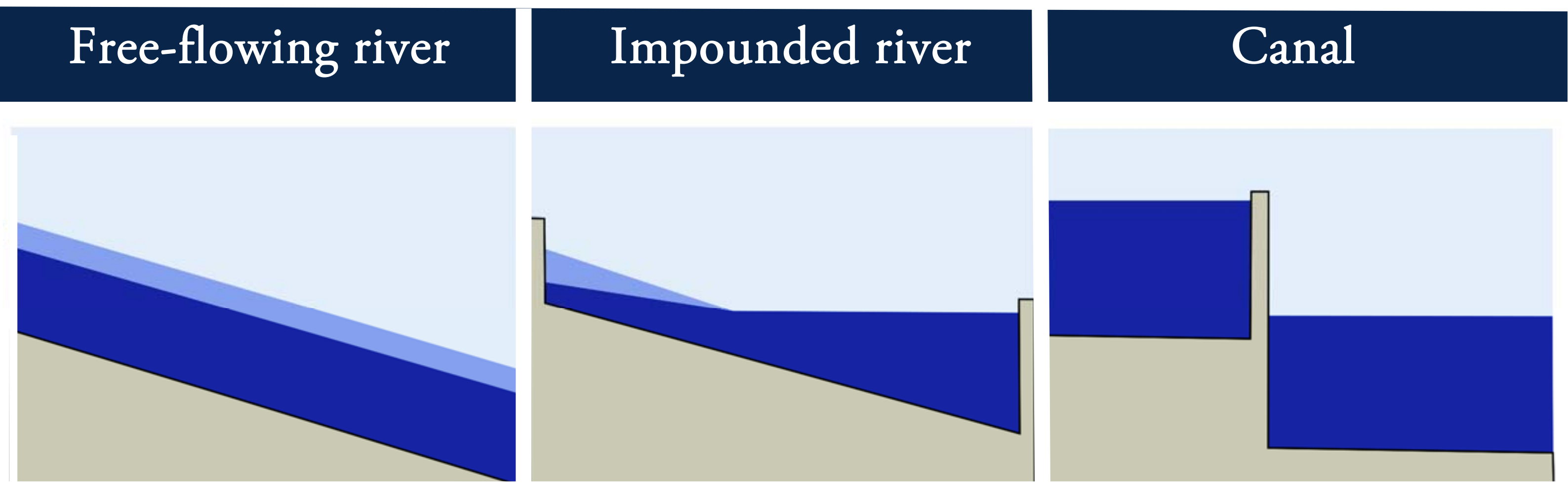
Umfangreiche Anlage

- **zu Protokoll 22:**

  An freifließende und staugeregelte Flüsse und Kanäle angepasste Ziele für die gute Befahrbarkeit (Good Navigation Status (GNS))

Proposals for appropriate GNS objectives for rivers and canals

Conclusions and recommendations of the Correspondence Group in support of achieving the Good Navigation Status and setting up appropriate objectives for rivers and canals



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0. Summary

The experts brought together by the correspondence group propose the following objectives for the Good Navigation Status (GNS) which are considered appropriate for free-flowing and impounded rivers and canals. (See also Annex 1 “GNS for free-flowing and impounded river sections” and Annex 2 “GNS for canals”.)

GNS shall improve the use of inland navigation in the Trans-European transport core-network corridors as set out in Part I of Annex I to the TEN-T regulation and shall contribute to the sustainable development.

GNS also encourages Member States, where hydro-morphologically and economically feasible, to upgrade their waterway infrastructure which is also a key element of the European Commission’s TEN-T inland waterway policy.

This proposal for a GNS comprises three different GNS, namely A, B and C. It takes into account local differences in surface water characteristics and particularly in hydro-morphology. In general, GNS A means more favourable navigation conditions than GNS B or GNS C. However, in many cases, it is for hydro-morphological or other reasons not possible to reach GNS A or GNS B for a certain section.

This approach shall lead to better maintenance of waterway infrastructure and avoids inefficient use of financial means for infrastructure upgrades. It is based on the idea, that today on many European rivers, maximum depth is already realised for all kinds of navigation conditions. This maximum is a function of physical conditions and resources available for waterway maintenance. Thus, a better maintenance of waterway infrastructure and better availability of waterway parameters at least counterbalance if not overweigh the benefit of deepening of navigable channels.

Free-flowing and impounded river sections:

Good Navigation Status	Navigable channel depth			Bridge clearance			Locks and movable bridges
	Navigable channel depth	Reference water level[*6]	Availability	Headroom[*5] recommended for standard container transport	Reference water level[4]	Availability	Availability[*2]
	[m]		[days per year]	[m]		[days per year]	[days per year]
GNS A	≥ 2.80	Hydrostatic/ Reference low water level	343[*3]	≥ 9.10	Highest navigable water level	360	365 (24/7)
GNS B	≥ 2.50	Hydrostatic/ Reference low water level	343	≥ 7.0	Highest navigable water level	360	365 (24/7 upon request)
GNS C	≥ 2.50	Hydrostatic/ Reference low water level	[300/290][*7]	≥ 5.25	Highest navigable water level	360	365 (minimum 16 hours per day)

Table 1: GNS for free-flowing and impounded river sections

Canals:

Good Navigation Status	Draught			Bridge clearance			Locks and movable bridges
	Draught	Reference water level	Availability[*2]	Headroom[*5] required for standard container transport	Reference water level	Availability[*3]	Availability[*4]
	[m]		[days]	[m]		[days per year]	[days per year]
GNS A	≥ 3.0	Lowest operating water level	360	≥ 9.10	Highest operating water level	365	365 (24/7)
GNS B	≥ 2.80	Lowest operating water level	360	≥ 7.0	Highest operating water level	365	365 (24/7 upon request)
GNS C	≥ 2.50	Lowest operating water level	360	≥ 5.25	Highest operating water level	365	365 (minimum 16 hours per day)

Table 2: GNS for canals

Note:

The Belgian experts abstained from supporting the report for the reason that the proposal for more appropriate GNS objective was made in their understanding tailor fit to the existing status of the inland waterway network and that the opportunity to create a more ambitious GNS concept was missed.

The German expert suggested after the final meeting to adapt the availability for the minimum requirements from 280 days to 260 days and for the GNS C from 300 days to 290 days since the recalculation has shown that his approval in the last meeting was based on incorrect data for the Rhine in the German section.. Today, the minimum requirements of 2.50 m navigable channel depth in the sector Östrich are achieved on 262 days per year on average (calculated according to the methodology of the calculation of the equivalent water level or GlW (Gleichwertiger Wasserstand)). The target should be to ensure that the minimum requirements are already met today for the Rhine, one of Europe's most important and successfully operated waterways.
After realisation of the planned upgrades in the Middle Rhine valley, a fairway depth of 2.50 m will be available 294 days per year on average in the sector Östrich. The aim should be to reach GNS C with the upgrade measures in the Middle Rhine.

The authors of the report suggest to further discuss GNS C and the minimum requirements for free-flowing rivers in the NAIADES GNS sub-group. For the discussion the open question is of importance in which time period which of the targets must be bindingly implemented in the future.

1. Background

In the Regulation on Union guidelines for the development of the Trans-European Transport Network (TEN-T) (EU Regulation No 1315/2013) the following objectives for rivers and canals are set out in Art. 15 (3):

- Rivers, canals and lakes comply with the minimum requirements for CEMT class IV waterways
- Minimum requirements on draught, not less than 2,50 m
- Minimum height under bridges, not less than 5,25 m.
- Rivers, canals and lakes are maintained so as to preserve good navigation status, while respecting the applicable environmental law.

However, the requirements for draught as mentioned in the TEN-T regulation do not take into account a keel/safety clearance. Hence, a careful distinction needs to be made it has to be carefully distinguished between the terms draught, usually used on canals, and navigable channel depth, used on free-flowing and impounded rivers.

The Good Navigation Status is a concept to improve the European waterways to be part of a sustainable transport system serving the needs of the EU Internal Market. The European Commission aims with its TEN-T policies to promote and strengthen the competitive position of inland waterways in the transport system, and to facilitate its integration into the intermodal logistics chain.

In 2015, the European Commission asked a consortium of consultants to define the "Good Navigation Status" concept together with the member states, river commissions and users before the end of 2017. The elaborated study[1] provides input on the interpretation of the notion of Good Navigation Status in Art. 15.3 of the TEN-T regulation. Regional workshops were held in 2016 in Berlin, Strasbourg, Budapest and Klaipeda and two additional working group meetings were organised in Rotterdam and Brussels. The outcome was a concept for the Good Navigation Status comprising so called “hard” and “soft” GNS components, GNS indicators based on TENtec data and minimum standards of a process on GNS development as well as the following definition of GNS:

“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”

However, EU Member States experts highlighted at the second GNS workshop in Brussels[2] that the objectives set by the TEN-T regulation were not suitable for free-flowing rivers such as the Rhine, the Danube and the Sava and suggested three goals for a further development of the GNS concept and for a possible revision of the TEN-T regulation:

- Objectives for rivers, canals and lakes shall be adapted in light of hydrology and morphology
- Draught or respective fairway depth and minimum bridge clearances shall be defined in relation to a reference water level
- Regional navigation shall be considered in the definition of regional objectives.

In addition, economic criteria such as benefit/cost ratio of inland waterway upgrades need to be taken into account.

In 2017, the European Commission acknowledged the Member States request for more appropriate objectives for rivers and canals and proposed to the CCNR to set up a correspondence group on this matter. The Correspondence Group, which met for the first time on 18 June 2018, supports the understanding and achievement of the Good Navigation Status.

1 Guidelines towards achieving a Good Navigation Status – Study (https://publications.europa.eu/en/publication-detail/-/publication/7980f36c-3eca-11e8-b5fe-01aa75ed71a1)

2 Meeting Report - Second meeting of pan-European Working Group on Good Navigation Status Brussels 12 July 2017 (http://www.inlandnavigation.eu/what-we-do/good-navigation-status)

The developed proposals for more appropriate objectives for rivers and canals within the TEN-T network, for example for draught or respective fairway depths, bridge clearances and availability of infrastructure, may be considered in a possible future revision of the Regulation on Union guidelines for the development of the Trans-European Transport Network (EU Regulation No 1315/2013).

The Correspondence Group limited itself to work on the hard GNS components only.

2. Working Method

Experts from nine EU Member States and representatives of the Danube Commission, the International Commission for the Sava River Basin and the Central Commission for the Navigation of the Rhine participated in the Correspondence Group. Output of the Correspondence Group and individual statements by the group or its members express expert opinion and no official position from Member States or river commissions. The Correspondence Group worked on the basis of agreements which were largely supported by all members of the group.

The Correspondence Group met four times in Brussels and Strasbourg. At its first meeting, questions regarding the understanding of the Good Navigation Status were developed and answered by all national experts. These answers together with statements from the Danube Commission, the International Sava River Basin Commission and the Central Commission for the Navigation of the Rhine were then integrated into a synthesis to identify common positions and contradictory statements.

Based on the key conclusions of this synthesis, the Correspondence Group agreed at its second meeting on cornerstones for the development of more appropriate objectives, taking into account that

- objectives for rivers, canals and lakes shall suit hydrology and morphology,
- navigable channel depth and minimum headroom under bridges shall be defined in relation to reference water levels and
- regional particularities shall be better considered.

The Correspondence Group, considering the above cornerstones, came to the key conclusion that one set of waterway parameters for a GNS is not sufficient and a more sophisticated approach is needed. Hence, the Correspondence Group further developed the idea of a GNS concept with three GNS, in which all three GNS are of equal importance but consist of different waterway parameters, suited for different conditions of major European waterways.

In its fourth and final meeting, the Correspondence Group agreed on the further developed concept, adopted the report on proposals for appropriate GNS objectives for rivers and canals and suggested to the members of the correspondence group to promote the implementation of the further developed GNS concept nationally and with the European Commission.

After the fourth meeting, the Belgian experts expressed that they abstain from final approval of the draft report for the reason that this proposal for more appropriate GNS objective was made in their understanding tailor fit to the existing status of the inland waterway network and that the opportunity to create a more ambitious GNS concept was missed.

The German expert suggested after the final meeting to adapt the availability for the minimum requirements from 280 days to 260 days and for the GNS C from 300 days to 290 days since the recalculation has shown that his approval in the last meeting was based on incorrect data for the Rhine in the German section. Today, the minimum requirements of 2.50 m navigable channel depth in the sector Östrich are achieved on 262 days per year on average (calculated according to the methodology of the calculation of the equivalent water level or GlW (Gleichwertiger Wasserstand)). The target should be to ensure that the minimum requirements are already met today for the Rhine, one of Europe's most important and successfully operated waterways.
After realisation of the planned upgrades in the Middle Rhine valley, a fairway depth of 2.50 m will be available 294 days per year on average in the sector Östrich. The aim should be to reach GNS C with the upgrade measures in the Middle Rhine.

The authors of the report suggest to further discuss GNS C and the minimum requirements for free-flowing rivers in the NAIADES GNS sub-group. For the discussion the open question is of importance in which time period which of the targets must be bindingly implemented in the future.

3. Fundamentals for appropriate objectives

3.1 Terminology

A common terminology is proposed to assure a common understanding of issues already addressed such as draught and navigable channel depth. In addition to the terminology already proposed in the Guidelines on GNS, further terms are proposed in the figure below.

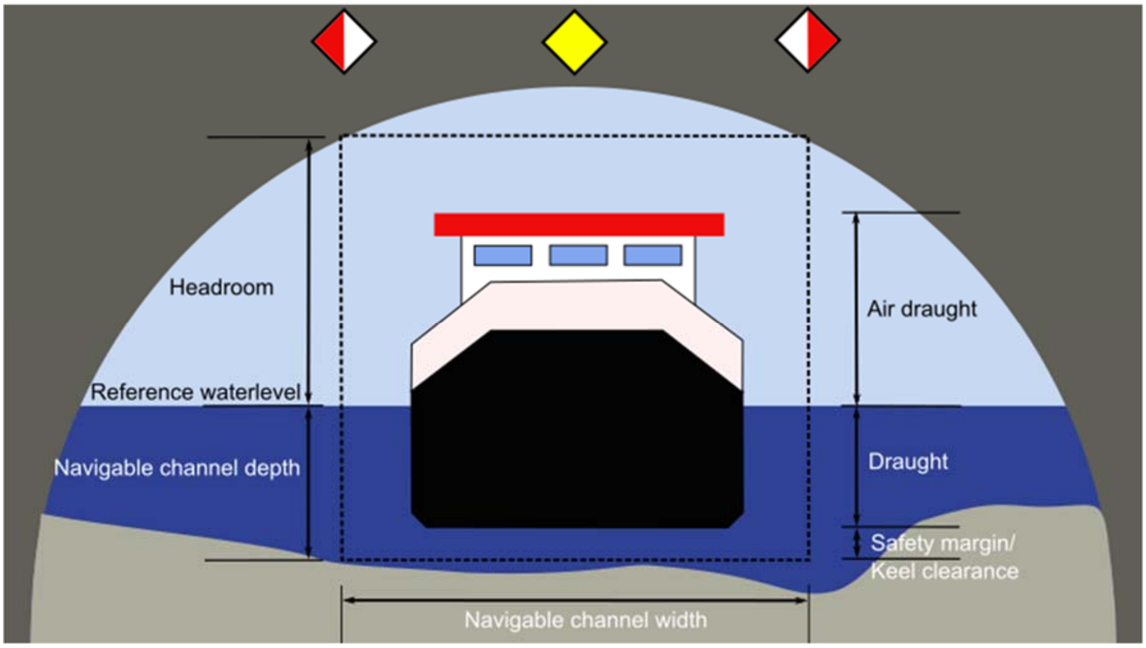


Figure 1: Terminology

3.2 Hydrological characteristics

The Correspondence Group agreed on a common understanding on the different hydrological characteristics of waterways (see also figure below):

Free-flowing rivers have a variable water level. Hence, navigable channel depth and headroom under bridges have to be referenced to a suitable reference water level and are thus also variable.

Canals have water levels, which can be considered almost constant. However, in practice upper and lower operating water levels do exist. Draught and headroom under bridges have to be referenced to the proper water level but can be considered as almost constant.

Impounded rivers may have both, canal and free-flowing river characteristics. In this case, in general the upper part of the impounded section has a variable water level. At the lower part of the section, the water level is in general controlled by a weir and thus almost constant. However, this characteristic may also depend on the discharge. Hence, different water levels need to be assessed, modelled and the appropriate water level needs to be taken into account for referencing draught and headroom under bridges.

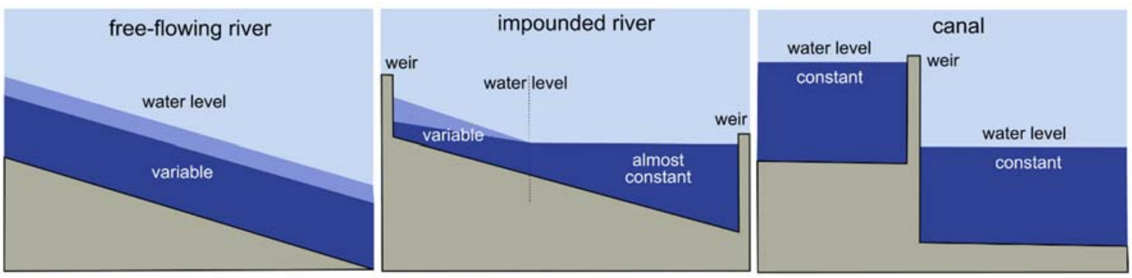


Figure 2: Water levels

4. Development of Objectives

4.1 Common understanding of the GNS

The GNS concept consists of hard GNS components, which are also referred to as core navigability standard and soft GNS components. The Correspondence Group agreed on the criteria navigable channel depth/draught, headroom under bridges and availability of infrastructure for the hard GNS components. For proper implementation of these hard GNS components, reference water levels are required.

4.2 Minimum Requirements

The minimum requirements on draught (not less than 2,50 m) and on minimum height under bridges (not less than 5,25 m) are stipulated in Art. 15 (3) of the TEN-T regulation. Experts agreed that the minimum requirements are not part of the GNS, since GNS is more than just fulfilling the minimum requirements. However, the minimum requirements are part of a concept towards achieving GNS on European inland waterways. The TEN-T regulation stipulates the minimum requirements in letter a) of Art. 15 (3), the obligation to preserve GNS can be found in letter b) of the same article. Hence, it can be reasonably assumed that EU lawmakers wanted to distinguish between minimum requirements and GNS.

No reference was made in the TEN-T regulation regarding availability of draught. In the context of the elaboration of the GNS Guidelines document, it was suggested to interpret this provision as 2.50 m on 365 days per year. However, no free-flowing river in Europe can provide a draught of 2.50 m over 365 days per year. Variable water levels in free-flowing river sections cause situations in which 365-day availability cannot be guaranteed with reasonable means. Hence, refined target values for free-flowing sections are needed and minimum requirements should be adapted.

Experts propose a value for minimum requirements as 2.50 m on [280/260] days per year. A navigable channel depth of 2.50 m on [280/260] days could be achieved on major European waterways such as the Rhine (see also figure 3 on “Available navigable channel depth at Maxau, Oestrich, Kaub, Andernach and Emmerich”) and the Danube. However, some free-flowing waterway sections on the Elbe, Oder and Sava might still fail to comply with these lower requirements and might therefore be subject to derogations.

4.3 Objectives

<u>Navigable channel depth/draught</u>
On free-flowing and impounded river sections navigable channel depth shall be used for GNS and for canals permissible draught. A rationale for implementation of navigable channel depth on free-flowing rivers is the fact that depth can be measured easily by waterway administrations and that it is clearly related to infrastructure. To calculate available fairway depth, a reference low water level is required. On the Rhine for example, this reference water level is the equivalent water level or GlW (Gleichwertiger Wasserstand). On the Sava River the reference water level is low navigable water level. Navigable channel depth or respectively draught is of particular importance for dry cargo bulk and liquid cargo transport.

<u>Headroom under bridges</u>
The headroom of a bridge is defined as the vertical distance between the lowest part of the superstructure and the water level below. For the calculation of headroom under bridges, a reference high water level is required. This reference water level shall be the highest navigable water level.

Headroom under bridges is of utmost importance for efficient container traffic. The original ISO standard container is 2.59 m high, 2.44 m wide and 12.19 m (40 feet) long. Gradually, more types of containers are developed: two types to be mentioned here are the high cube container (2.89 m high) and pallet wide container (2.50 m wide) being the most relevant.

At present all newly produced containers are high cube containers as it is the new standard. When considering the lifetime of a container of 20 years, the containers being transported worldwide in the near future will be only high cube containers.

The transport of high cube containers, which are 30 cm higher than standard ISO containers, is possible with the existing target values for bridge clearance (5.25 m, 7 m and 9.10 m) with the use of ballasting. In many cases, the use of ballasting is also required for the transport of standard containers at present. If the development of target values for bridge clearance without the use of ballasting is considered necessary, a set of recommended values is proposed based on the preliminary results of PIANCs working group WG179 on CEMT classification. This report recommends for the transport of 2, 3 or respectively 4 layers of high cube containers without the use of ballasting a headroom of 6.00 m, 8.65 m and 11.20 m as target values based on measurements carried out by Rijkswaterstaat in 2014. However, not all bridges on impounded river or canal sections can be adapted to these bridge clearances for economical or technical reasons. Nevertheless, transport of high cube containers is possible.

Good Navigation Status	Bridge clearance		
	Headroom recommended for high cube container transport	Reference water level	Availability
	[m]		[days per year]
GNS A	11.20	Highest navigable/ highest operating water level	365
GNS B	8.65	Highest navigable/ highest operating water level	365
GNS C	6.00	Highest navigable/ highest operating water level	365

Table 3: Recommended headroom target values for transport of high cube containers

<u>Availability of infrastructure</u>

Availability of infrastructure is crucial for navigation and hence a criterion for a GNS. Cross-border IWT has to be guaranteed. Availability of infrastructure has a direct relation with the needs of the transport market. A lock availability of 24 hours, 7 days per week plays a significant role in optimising the use of infrastructure and the competitiveness of inland waterway transport. However, the criterion might be subject to further research on waterway sections with low traffic during certain times.

Experience has shown that economically viable shipping on free-flowing rivers, for instance on the Rhine, does not necessarily require the same water depth every day of the year. In times of low water there is restricted navigability and additional vessels are made available to cope with the transport demand. Hence, the fleet size also depends on estimations of how many vessels have to be available during low water seasons. Nonetheless, shipping companies can manage economically as long as there are “balancing periods” with more favourable depth conditions. Thus, a number of days could be determined on which a certain navigable channel depth is achieved or exceeded that allows an economically viable draught for navigation.

<u>Reference water levels</u>

Reference water levels need to be implemented (both high and low water) on European waterways. Setting uniform rules for calculation of reference water levels might be difficult or even impossible. However, these water levels do not need to be elaborated following identical rules. Natural conditions can and should be taken into account. Already existing reference levels such as on the Rhine, the Danube and the Sava should be respected in order to continue proven practices providing real benefits to stakeholders and to not interrupt long-term continuity of data collection and calculation methodology. In coastal waters effects of tidal changes also need to be taken into account.

4.4 Practice Example on Rhine economic development, infrastructure parameters and lessons learned

For the development of GNS objectives, the Correspondence Group studied the example of the Rhine.

The infrastructural parameters for the Rhine's navigable channel are laid down in CCNRs waterway profile of the Rhine, which was agreed upon at CCNRs committee for infrastructure and environment (see Annex 3.).

Transport on the Rhine is a success story even though the Rhine has according to the objectives as laid down in the TEN-T regulation a significant bottleneck at its Middle Rhine section. Between Rhine-km 508 and Rhine-km 557 only a navigable channel depth of 1.90 m at equivalent water level (Gleichwertiger Wasserstand (GlW)) is available for navigation at an average of 345 days per year. The figure below shows the available depth of the navigable channel at the gauge stations Maxau (GlW 2.10 m) Östrich (GlW 1.90m), Kaub (GlW 1.90 m), Andernach (GlW 2.50 m) and Emmerich (GlW 2.80 m).

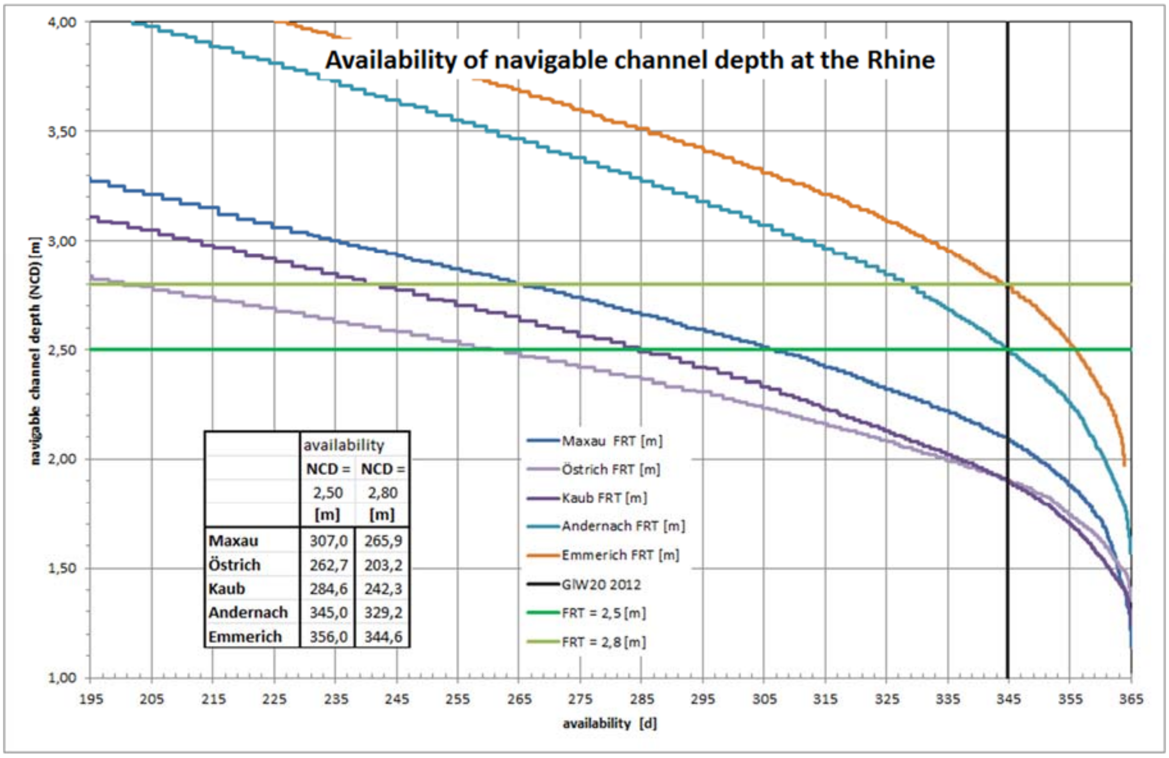


Figure 3: Available navigable channel depth at Maxau, Östrich, Kaub, Andernach and Emmerich

Considering the required draught of 2.50 m and assuming a safety clearance of 30 cm, a navigable channel depth of 2.80 m would be mandatory to fulfil the TEN-T requirements on draught. As an example, at the Middle Rhine, a navigable channel depth of 2.80 m is available on approximately 200 days a year (see also figure 3.). Even with lower navigable channel depth, the Rhine remains by far the most important European basin, offering safe and efficient navigation conditions for reliable and environmentally friendly waterway transport. Thus, a draught of 2.50 m (or respectively a navigable channel depth of 2.80 m) as stipulated in Art. 15 (3) of the TEN-T regulation is neither a realistic objective, nor is it a prerequisite for economic success of Rhine navigation to have the stipulated depth of 2.50 m available during 365 days per year.

It can be concluded that other factors are of higher or at least equal relevance for the success of increasing transport volume in inland navigation than sufficient draught and headroom under bridge only. These other factors need to be considered when discussing the waterways' potential role in a sustainable transport system.

For the governance of Rhine navigation infrastructure, the CCNR developed three important instruments in a bottom-up approach:

I. The waterway profile of the Rhine
II. The minimum requirements and recommendations for the technical design of structures along the Rhine
III. The procedures for laying down the conditions and requirements for structures along the Rhine

These three instruments lay down the infrastructural parameters for the Rhine sections agreed between the Member States, such as navigable channel depth and width as well as headroom under bridges all referenced to low or respectively high reference water levels.

A coordinated development of waterborne economy however is only possible, if Member States agree on certain principles and share common visions for the economic development of river basins, as the Rhine riparian states have already done for 200 years, resulting in successful waterborne businesses on the Rhine.

5. Conclusions by the Correspondence Group

GNS shall focus on vertical dimensions only, since horizontal dimensions such as navigable channel width depend on local geography and to avoid any incoherency with existing regulation. For lock chamber length reference can be made to CEMT classification. Despite the understanding that GNS shall not focus on horizontal dimensions, the Correspondence Group recommends a navigable channel width enabling two-way-traffic on inland waterways.

On free-flowing and impounded river sections, navigable channel depth is referred to instead of draught, because actual depth in these sections is very dependent on the particular local situation. Unlike canals, rivers can have sandy or gravelly river bottoms, which are subject to dynamic changes and thus to changes in available depth. Hence, waterway administrations publish an available minimum navigable channel depth instead of a permissible draught.

To adapt the GNS better to the hydro-morphological characteristics of free-flowing rivers and to take into account local and regional navigation as well as inland waterway market development, the criteria should not be limited to just one set of waterway parameters, such as on draught (not less than 2.50 m) or on headroom (not less than 5.25 m), but should offer more flexibility. Hence, the further developed GNS concept shall provide three different GNS, subsequently addressed as GNS A, GNS B and GNS C. This approach also takes into account, that a further development of the inland waterway network is envisaged by the European Commission. So, upgrades in the TEN-T network can be easily monitored by assessing the waterway parameters or the specific GNS. This also helps to show to the sector and to the public effects of invested money in the network.

The economic development along river basins not only depends on factors like available draught and headroom, but on other factors such as availability and maintenance of infrastructure and IWW markets, as already mentioned earlier. If there is no IWW market that requires a high headroom under bridges, a Good Navigation Status can still be required for dry bulk cargo or liquid goods and achieved by fulfilling GNS on draught or respectively navigable channel depth. Hence, the further developed concept also distinguishes between the criteria draught/navigable channel depth, headroom under bridges and respectively availability of infrastructure, resulting in double respectively triple criteria GNS.

A free-flowing river can be of GNS A, B or C for navigable channel depth independent of GNS A, B or C for headroom under bridges. On canals and impounded river sections, a third criterion “Availability” is added, taking into account the importance of availability of ship locks and movable bridges. Canals and impounded rivers have in application of this concept a three criteria GNS, such as GNS AAA or GNS BAC.

On larger rivers, sectioning might be necessary according to rivers’ hydro-morphological characteristics. Sectioning shall be based on navigable channel depth, or respectively draught as primary criteria, and should not be too detailed but shall comprise larger units. For each individual section, a different GNS might apply.

In the case where criteria for the appropriate GNS cannot be met due to hydro-morphological characteristics of the concerned waterway every project aiming to improve navigation conditions in order to get closer to GNS shall be eligible for appropriate European funding.

General note:
The data given in this report reflects experience over a 30-year period on water levels. If low water scenarios occur more often in future, this data will change.

5.1 Free-flowing and impounded river sections

For free-flowing and impounded river sections, navigable channel depth is proposed as a criterion. Considering already implemented values on European rivers, like Rhine and Danube, for GNS C, a minimum depth of 2.50 m is proposed reached or exceeded on average [300/290] days per year, for GNS B 2.50 m and for GNS A 2.80 m reached or exceeded on average 343 days per year. The navigable channel depth shall be referenced to a reference low water level, which shall be available on average 343 or respectively [300/290] days per year. At free-flowing rivers, the navigable maximum possible channel depth is subject to a hydro-morphological determined threshold and cannot be increased over this maximum.

GNS C has a navigable channel depth of 2.50 m, being lower than the channel depth corresponding to the minimum requirements on draught of 2.50 m as stipulated in Art. 15(3) of the TEN-T regulation. If the recommendations in regard to availability of a navigable channel depth of 2.50 m on 290 days per year is applied, the Rhine achieves GNS C even at its lowest sections at Kaub and Östrich after completion of the upgrade project “Abladeoptimierung Mittelrhein”.

Good Navigation Status	Navigable channel depth		
	Navigable channel depth	Reference water level[*6]	Availability
	[m]		[days per year]
GNS A	≥ 2.80	Hydrostatic/ Reference low water level	343[*3]
GNS B	≥ 2.50	Hydrostatic/ Reference low water level	343
GNS C	≥ 2.50	Hydrostatic/ Reference low water level	[300/290][*7]

Table 4: Navigable channel depth on free-flowing and impounded river sections

The proposal for objectives on headroom under bridges takes into account that on most days per year on free-flowing river sections, the highest navigable water level, which is usually the water level to which headroom is referred to, is not exceeded and a larger headroom is available. The proposed values of 5.25 m, 7.0 m and 9.10 m are those required for the transport of 2, 3 or respectively 4 layers of standard containers and are based on the CEMT 92 recommendations. Transport of high cube containers on free-flowing river sections is also possible at most times during a year, since highest navigable water levels are exceeded on a few days per year only and thus almost all the time a larger headroom is available.

On impounded rivers, reference water level might be variable or constant depending on the characteristic of the impounded section and the bridges’ location within. If a bridge is in an area with constant water level, the same characteristics apply as for canals. If the water level is variable, characteristics are more similar to free-flowing rivers. This characteristic has to be taken into account 365 days a year when determining the headroom .

Good Navigation Status	Bridge clearance		
	Headroom*5 recommended for standard container transport	Reference water level4	Availability
	[m]		[days per year]
GNS A	≥ 9.10	Highest navigable water level	360
GNS B	≥ 7.0	Highest navigable water level	360
GNS C	≥ 5.25	Highest navigable water level	360

Table 5: Headroom under bridges on free-flowing and impounded river sections

For impounded river sections, in addition to navigable channel depth and headroom, availability of infrastructure is proposed as a third criterion. For GNS A, locks and movable bridges shall be available on 365 days a year, 24 hours a day. For GNS B, an availability on 365 days per year on 24 hours is proposed; however, locks and movable bridges can be closed for example during nighttime or at weekends but shall be made available for navigation on the basis of prior requests by skippers. For GNS C, an availability of 365 days per year, 16 hours a day is proposed, taking into account that inland navigation does not run 24 hours a day not an all European waterways and waterborne businesses may have already adapted. For availability, maintenance works announced in advanced and police measures are not taken into account.

Good Navigation Status	Locks and movable bridges
	Availability*2
	[days per year]
GNS A	365 (24/7)
GNS B	365 (24/7 upon request)
GNS C	365 (minimum 16 hours per day)

Table 6: Availability of locks and movable bridges on impounded river sections

5.2 Canals

For canals, draught is suggested as a criterion on depth. For the GNS A, B and C, already implemented values are proposed. For GNS C, a draught of 2.50 m, for GNS B 2.80 m and for GNS A 3.0 m. The respective draught shall be available 360 days per year at hydrostatic or respectively operating water level. Times for maintenance works that are planned and announced in advance (e.g. lock closures) and police measures shall not be taken into account when calculating the availability, since draught of the waterway remains available, although locks might be closed.

Good Navigation Status	Draught		
	Draught	Reference water level	Availability *2
	[m]		[days]
GNS A	≥ 3.0	Lowest operating water level	360
GNS B	≥ 2.80	Lowest operating water level	360
GNS C	≥ 2.50	Lowest operating water level	360

Table 7: Draught on canals

Unlike on free-flowing rivers, headroom under bridges on canals is determined by an almost constant operating water level. The indicated headroom is thus available 365 days per year.

For transport of standard containers, values based on the CEMT 92 recommendations are proposed for GNS A (9.10 m), GNS B (7.0 m) and GNS C (5.25 m).

Good Navigation Status	Bridge clearance		
	Headroom *5 required for standard container transport	Reference water level	Availability *3
	[m]		[days per year]
GNS A	≥ 9.10	Highest operating water level	365
GNS B	≥ 7.0	Highest operating water level	365
GNS C	≥ 5.25	Highest operating water level	365

Table 8: Headroom on canals

For canals, in addition to draught and headroom, availability of infrastructure is proposed as a third criterion. For GNS A, locks and movable bridges shall be available 365 days a year, 24 hours a day. For GNS B, an availability on 365 days per year on 24 hours is proposed; however, locks and movable bridges can be closed for example during nighttime or at weekends but shall be made available for navigation on the basis of prior requests by boat masters. For GNS C, an availability of 365 days per year on 16 hours a day is proposed, taking into account that inland navigation does not run 24 hours a day on all European waterways and waterborne businesses may have already adapted. For availability, maintenance works announced in advance and police measures are not taken into account.

Good Navigation Status	Locks and movable bridges
	Availability*4
	[days per year]
GNS A	365 (24/7)
GNS B	365 (24/7 upon request)
GNS C	365 (minimum 16 hours per day)

Table 9: Availability of locks and movable bridges on canals

6. Examples on application of proposed GNS

6.1 Rhine

The further developed GNS concept is based on a 2-criteria or respectively 3-criteria approach. To apply the concept on the Rhine, at first, a sectioning is required. For this, reference is made to the already implemented sectioning of the Rhine and the values stipulated for each section (see also Annex 3.). The Rhine from Km 166.6 to 334 is considered an impounded river section, so the table in Annex 2 applies. From Rhine-Km 334 it is free-flowing, so the table in Annex 1 applies. In a next step, the GNS for the individual section and criteria were identified according to the respective tables.

Rhine-Km		Navigable channel depth		Headroom		Availability	
From	To	value	GNS	value	GNS	value	GNS
166.6	295	3.0	A	7.0	B	365/24/7	A
295	334	3.0	A	9.1	A	365/24/7	A
334	508	2.10	C	9.1	A		
508	557	1.90	-	9.1	A		
557	592	2.10	C	9.1	A		
592	763	2.50	B	9.1	A		
763	955	2.80	A	9.1	A		

Table 10: GNS on the Rhine

As result, the Rhine, for example from Rhine-Km 295 to 334 has a GNS “AAA”, whereas from Rhine-Km 334 to 508 it has a GNS “CA”.

7. Outlook

The European Commission mandated the Commission Expert Group on inland waterway transport (NAIADES II Implementation Group) to set-up a sub-group on GNS. At its third meeting, the NAIADES II Implementation Group agreed in principal on the terms of reference for the GNS sub-group.

This GNS sub-group, in which experts of the Correspondence Group will also participate, could take up the proposals on the so-called hard GNS components or core navigability standards as laid down in this report. It must be pointed out to the GNS sub-group that the Correspondence Group focused on the hard GNS components, that the soft GNS components need to be further elaborated and that this report represents expert opinion.

Annex 1

GNS for free-flowing and impounded river sections[1]

Good Navigation Status	Navigable channel depth			Bridge clearance			Locks and movable bridges
	Navigable channel depth	Reference water level[*6]	Availability	Headroom[*5] recommended for standard container transport	Reference water level[4]	Availability	Availability[*2]
	[m]		[days per year]	[m]		[days per year]	[days per year]
GNS A	≥ 2.80	Hydrostatic/ Reference low water level	343[*3]	≥ 9.10	Highest navigable water level	360	365 (24/7)
GNS B	≥ 2.50	Hydrostatic/ Reference low water level	343	≥ 7.0	Highest navigable water level	360	365 (24/7 upon request)
GNS C	≥ 2.50	Hydrostatic/ Reference low water level	[300/290][*7]	≥ 5.25	Highest navigable water level	360	365 (minimum 16 hours per day)

*1 Sections should be determined in a way to ensure uniform navigable channel parameters within. Sections should also be of significant length to limit their number.
*2 Not taking into account regular preanounced maintenance works and police measures such as closures due to accidents, floods or ice.
*3 Availability based on Danube RNW (94 % of days = 343 days).
Availability of impounded sections may vary between 343 and 365 depending on their characteristic .
*4 Different definitions for highest navigable water level need to be respected. At the German Rhine, HSW is derived from protection of flood preotection infrastructure like dams.
At the Danube, the water level reached or exceeded at a Danube water gauge on an average of 1% of days in a year over a reference period of several decades (30 years).
*5 At most times, on free-flowing rivers a higher bridge clearance is available, so transport of 2, 3 or 4 layers of high cube containers is possible .
On impounded river sections, a higher bridge clearance might be available, depending on location of the bridge in and charactertistic of the impounded section.
*6 For example at the Rhine "equivalent water level" (GlW) or at the Danube "low navigable water level" (RNW).
*7 Could not be discussed to the end by the correspondence group.

Annex 2

GNS for canals[1]

Good Navigation Status	Draught			Bridge clearance			Locks and movable bridges
	Draught	Reference water level	Availability[*2]	Headroom[*5] required for standard container transport	Reference water level	Availability[*3]	Availability[*4]
	[m]		[days]	[m]		[days per year]	[days per year]
GNS A	≥ 3.0	Lowest operating water level	360	≥ 9.10	Highest operating water level	365	365 (24/7)
GNS B	≥ 2.80	Lowest operating water level	360	≥ 7.0	Highest operating water level	365	365 (24/7 upon request)
GNS C	≥ 2.50	Lowest operating water level	360	≥ 5.25	Highest operating water level	365	365 (minimum 16 hours per day)

*1 Sections should be determined in a way to ensure uniform fairway parameters within. Sections should also be of significant length to limit their number.

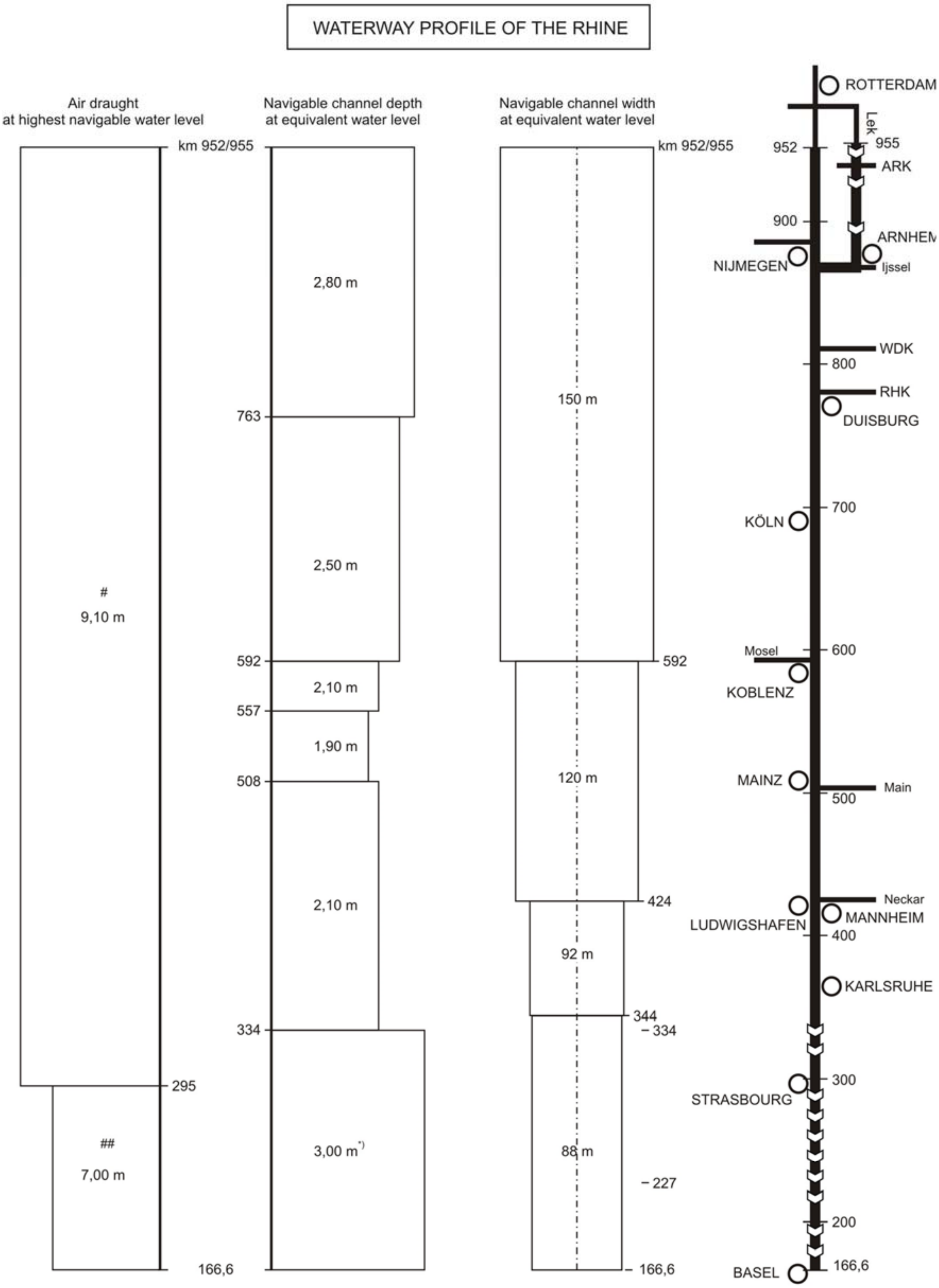
*2 Depth available over 360 days per year, although waterway might be closed temporarily due to lock maintenance works.
Water level might also depend on some canals on natural inflow.

*3 Bridge clearance available 365 days per year, although temporarily limited due to lock maintenance works or localy limited due to bridge maintenance works.

*4 Not taking into account regular preanounced maintenance works and police measures such as closures due to accidents, floods or ice.

*5 At canals, only indicated bridge is clearance available. Figures represent values required for transport of 2, 3 or 4 layers of standard ISO containers.

Annex 3



*) Guaranteed water depth

\# 1. At the Josef-Kardinal-Frings-Brücke (Südbrücke Düsseldorf, Rhine km 737,10) the air draught of the bridge at HNWL is 8,61 m.
2. At the Kniebrücke Düsseldorf (Rhine km 743,57) the air draught of the bridge at HNWL is 8,82 m.
3. At the road bridge Rheinhausen - Duisburg-Hochfeld (Rhine km 775,29) the air draught at HNWL is 8,88 m.
4. At the road bridge Bonn-Beuel (Kennedy-Brücke Bonn, Rhine km 654,94) the air draught of 9,10 m above HNWL is only available over a width of 115 m.
5. At the road bridge Köln-Deutz (Rhine km 687,93) the air draught of 9,10 m above HNWL is only available over a width of 94 m.

\## At the Europabrücke (Rhine km 293,48) the air draught of the bridge at HNWL is 6,79 m.