VANDALISM AND EXTERNAL THREATS TO PORT AND IW INFRASTRUCTURE

TERMS OF REFERENCE

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1. Background

Ports and Inland waterways (IW) require appropriate infrastructure to ensure safe, reliable and continuous navigation. Waterway administrators, authorities and operators are responsible for ensuring that this infrastructure, together with its associated elements and systems, is adequately managed and maintained so that it can perform its intended functions and provide the required level of service.

These elements and systems are subject to deterioration and wear and tear resulting from use and the passage of time. Maintenance programs should therefore combine preventive and corrective activities aimed at preserving infrastructure performance, addressing emerging deficiencies and restoring the required service conditions when failures or damage occur. Such programs should be planned and implemented to maintain the highest practicable level of service while ensuring the safety, reliability and continuity of navigation operations.

However, damage to waterway infrastructure may be caused not only by regular navigation activities or natural degradation (such as corrosion). The intervention of third parties unrelated to IW activities can also adversely affect some component elements of the waterway infrastructure and the normal functioning of the processes necessary to ensure navigation. Among these interventions, vandalism is considered the principal External Threat, given its potential to damage infrastructure, disrupt operations, and compromise the continuity and reliability of navigation services.

These types of interventions, hereinafter referred to as "External Threats" (ET), are defined as harmful actions not specific to planned navigation activities on navigable waterways, carried out by third parties, whether intentional or unintentional. Although vandalism constitutes the main focus, the concept of External Threats is broader and encompasses other forms of third-party intervention that may adversely affect waterway infrastructure or its operation.

In response to External Threats, Waterway Administrators, Operators and Infrastructure managers must react by repairing, modifying, or even redesigning waterway infrastructure, its environment, or some of its operational processes to reduce the negative effects of these threats. These unplanned reactions may lead to unwanted increases in maintenance costs and times, but may also affect the navigation itself.

Examples of what may be considered an External Threat (these examples are not exclusive, others may arise) are :

- Acts of Vandalism: Acts (intentional), which aim to cause damage by itself or, in other cases, theft of elements for subsequent reuse or sale.

- Interaction with other activities near the Waterway: External industrial, productive, or recreational (sports) activities that for some reason may cause damage to the infrastructure.
- Actions of occasional visitors: It has been seen in other PIANC reports that waterways fulfill important social functions (recreation, tourism, historical value) attracting occasional visitors or tourists that may cause damage intentionally or not. In such a case, actions or redesigns may need to be envisaged to avoid detrimental actions on the infrastructure generated in these situations.
- Misuse of infrastructure: activities associated with navigation, but for other purposes. This may be the example of houseboats in prohibited places, which generate interference in the operation or damage/modifications to the infrastructure.

In the development of the study, External Threats caused by other living beings (animals, plants, etc.) may also be considered, as well as other harmful interventions unrelated to planned navigation activities. The convenience and relevance of including such cases will be assessed throughout the development of the work, according to their potential impact on the infrastructure and the processes necessary to ensure navigation.

2. Objectives

The objective of the Working Group will be to gather and document experiences from Waterway Administrators, Operators, Infrastructure Managers and other relevant stakeholders concerning incidents involving External Threats affecting the infrastructure and operating systems of navigable waterways in different parts of the world. Particular attention will be given to cases involving vandalism, which is expected to constitute the most frequent and significant type of External Threat considered in the study. However, the collection of experiences will not be limited to vandalism, and other forms of external intervention that may affect waterway infrastructure or its operation will also be considered. The objective will be to identify the nature and characteristics of these threats, the elements affected, the circumstances in which they occurred, and their effects on the safety, availability, reliability and continuity of waterway operations.

The possible consequences associated with these External Threats will then be analysed through the development of case studies. Particular attention will be paid to the measures adopted by Waterway Administrators, Operators and Infrastructure Managers to prevent, mitigate or respond to such events. These measures may include physical and infrastructural interventions, operational procedures, monitoring and surveillance systems, maintenance practices, organizational arrangements, or other strategic actions. Both successful and unsuccessful measures will be documented and assessed, with the aim of identifying the factors that may have contributed to their effectiveness or limitations. The analysis will therefore seek not only to identify what measures have been implemented, but also to understand the conditions under which they have or have not been effective.

Based on the analysis and comparison of the case studies, the Working Group will discuss and develop strategies aimed at preventing, mitigating or reducing the negative effects of External Threats on navigable waterways. These strategies may include recommendations for the redesign or adaptation of infrastructure, changes to operational procedures and practices, and broader strategic or organizational measures. Where relevant, combinations of these approaches will be considered, recognizing that the effectiveness of mitigation may depend on the interaction between physical infrastructure, operational management and strategic planning. The final objective will be to identify transferable lessons and propose practical

strategies that can assist Waterway Administrators, Operators and Infrastructure Managers in improving the resilience of waterway infrastructure and operations against External Threats.

While vandalism is expected to be the most frequent and potentially consequential type of External Threat addressed in the study, the scope of the work will extend beyond vandalism to other external actions that may adversely affect waterway infrastructure or operations. At the same time, the report will exclude acts of terrorism and highly organized criminal activities, as these events involve specific security, intelligence and risk-management considerations that fall outside the intended scope of the Working Group. The study will therefore focus primarily on external threats of a non-terrorist and non-highly organized criminal nature, with particular emphasis on vandalism and other forms of third-party intervention that can be addressed through infrastructure, operational and strategic measures.

It will also exclude issues related to cybersecurity, a topic already addressed in TG 204.

3. Earlier reports to be reviewed

- WG 236: Sustainable Management of the Navigability of Natural Rivers
- WG 241: Crisis Management of Accidents in Navigation Hydraulic Structures
- WG 203: Sustainable Inland Waterways – A Guide for Inland Waterway Managers on Social and Environmental Impacts
- TG 204: Awareness Paper on Cybersecurity in Inland Navigation
- WG 139: Values of Inland Waterways
- WG 25: Maintenance and renovation of navigation infrastructure

4. Intended product

The intended product will be a technical paper providing a structured compilation and analysis of relevant international experiences involving External Threats to waterway infrastructure and operating systems. The paper will include case studies covering, in particular, incidents of vandalism, as well as other relevant forms of external intervention, describing the nature of the threat, the infrastructure or operational systems affected, the consequences observed, and the responses adopted by Waterway Administrators, Operators and Infrastructure Managers. Particular attention will be given to both successfully and unsuccessfully addressed critical situations, with the objective of identifying lessons learned and factors that may contribute to the effectiveness or failure of the measures implemented.

Based on the analysis and comparison of the case studies, the paper will identify and discuss mitigation measures and approaches adopted in different waterways. These measures will be considered from an integrated perspective, including infrastructure and design solutions, operational measures, monitoring and maintenance practices, and strategic or organizational approaches. The objective will be to determine, to the extent possible, which measures have proved effective, under which circumstances, and what limitations or unintended consequences may have been identified. The analysis will provide a basis for developing recommendations and strategies aimed at preventing, reducing or mitigating the impacts of External Threats, with particular emphasis on measures that may be transferable or adaptable to other waterways and operational contexts.

The report should also address the need to raise awareness of External Threats as a relevant consideration throughout the life cycle of waterway infrastructure. These threats are not

always adequately considered during infrastructure planning and design, bidding processes, preparation of tender documents, definition of technical requirements, or the assessment and allocation of infrastructure maintenance budgets. By documenting their potential consequences and the resources required to address them, the paper will highlight the importance of incorporating the risk of External Threats into decision-making processes at an early stage, rather than treating the resulting damage only as an unforeseen maintenance or operational issue.

The intended product should enable readers to recognize the potential significance of External Threats through documented examples and case studies, assess the possible consequences for infrastructure performance, safety, availability and continuity of operations, and identify appropriate courses of action. In particular, it should provide a practical basis for evaluating action plans, preventive and mitigation measures, infrastructure adaptations, operational procedures and the resources required to implement them. Ultimately, the paper should contribute to improving the resilience of waterway infrastructure by transforming the experience gained from different waterways into lessons, strategies and recommendations that can support future planning, design, operation and maintenance decisions.

5. Working Group membership

The Task Group should include authorities, members and users representing:
- Port and harbour authorities,
- Inland Waterway managers and authorities;
- National Transportation authorities;
- Manufacturers of infrastructure elements and facilities;
- Security agencies or institutions.

6. Target Audience

External Threats are not usually considered as a specific aspect of waterway preventive and corrective maintenance programs. In many cases, maintenance contracts, technical specifications and budget allocations do not adequately account for the potential damage caused by third parties, particularly through acts of vandalism, theft of infrastructure components or other harmful interventions unrelated to planned navigation activities. As a result, the costs, time requirements and operational consequences associated with these events may be underestimated or treated as unforeseen maintenance issues.

The report should therefore be addressed primarily to waterway administrators, operators, infrastructure managers, maintenance contractors and infrastructure concessionaires. It should also be of interest to authorities and organizations involved in the planning, design, procurement, maintenance and operation of inland waterway infrastructure, as well as to other relevant stakeholders responsible for ensuring safe, reliable and continuous navigation services.

By providing documented experiences, case studies and practical mitigation strategies, the report will support these stakeholders in recognizing External Threats as a relevant consideration throughout the infrastructure life cycle. It will also help them assess the potential consequences of such events and incorporate appropriate preventive, corrective and

mitigation measures into maintenance programs, technical requirements, contracts, operational procedures and budget planning.

7. Relevance

The report of this Working Group will be useful in reducing the negative effects of External Threats on waterway infrastructure and operating systems and, where possible, preventing their occurrence or limiting their consequences. By documenting experiences from different waterways, the study will contribute to a better understanding of the nature of these threats, the elements and activities they may affect, and the measures that can be adopted to prevent, mitigate or respond to them.

Particular attention will be given to vandalism, which is expected to constitute the principal External Threat addressed by the study, while also considering other forms of third-party intervention that may adversely affect infrastructure or navigation operations. The comparison of successful and unsuccessful experiences will help identify the circumstances under which particular measures have proved effective, as well as their limitations, unintended consequences and potential applicability in other contexts.

As External Threats are not usually addressed systematically in maintenance programs, the report may also serve as a trigger for incorporating these risks into maintenance schedules, technical specifications, contracts and budget allocations. Considering these issues at an early stage may help waterway administrators and infrastructure managers avoid unforeseen interventions, reduce maintenance costs and times, and minimize disruptions to navigation.

Ultimately, the report will provide a practical basis for improving decision-making throughout the life cycle of waterway infrastructure. By transforming experience from different waterways into transferable lessons and strategies, it will contribute to strengthening the resilience, safety, availability, reliability and continuity of inland waterway infrastructure and operations.

8. Relevance to Countries in Transition

For countries in transition, the results of this report may be particularly relevant for several reasons.

First, in some of these countries, waterway infrastructure may be more exposed to acts of vandalism, particularly theft of infrastructure components and other intentional interventions. Such events can deteriorate navigation conditions, compromise the safety and reliability of waterway operations, and require additional corrective or mitigation measures. The consequences may be especially significant where infrastructure is aging, resources are limited, or the capacity to respond rapidly to damage is constrained.

Second, the report may help raise awareness among authorities, infrastructure managers and maintenance contractors of the importance of considering External Threats when preparing maintenance contracts, technical requirements and investment plans. Maintenance budgets in countries in transition are often subject to significant constraints, making it particularly important to anticipate potential risks and allocate available resources efficiently.

The experiences documented in the report may provide valuable guidance for identifying cost-effective preventive and mitigation strategies, adapting infrastructure and operational procedures, and avoiding solutions that have proved ineffective or unsuitable under comparable circumstances. Access to lessons learned from other waterways may also reduce

the need to develop responses through trial and error, thereby limiting unnecessary expenditure and shortening recovery times.

In this context, the report will contribute not only to improving the protection and resilience of inland waterway infrastructure, but also to supporting more efficient maintenance planning and the sustainable use of limited financial and technical resources. Its recommendations may be particularly useful where the prevention of damage and the selection of appropriate mitigation measures are essential to maintaining safe and continuous navigation services.

9. Relevance to Climate Change

Strategies to prevent, mitigate or resolve the negative effects of External Threats will be considered within a framework that promotes environmental protection, the responsible use of resources and, where appropriate, the implementation of green technologies and sustainable solutions compatible with the activities necessary for the maintenance and operation of inland waterway infrastructure.

Although the principal focus of the Working Group is on External Threats, rather than on climate change itself, the measures proposed may contribute indirectly to climate-related objectives. Preventing damage, extending the service life of infrastructure, reducing the need for repeated repairs and avoiding unnecessary replacement of components may help limit material consumption, energy use and the environmental impacts associated with maintenance activities. Similarly, strategies that improve the durability, adaptability and resilience of infrastructure may support more efficient responses to changing environmental conditions.

The study will also consider, where relevant, the interaction between waterway infrastructure and the surrounding environment and society. Since inland waterways often fulfil social, recreational and tourism functions, mitigation strategies should seek to balance the protection of infrastructure and the continuity of navigation with the responsible use of these spaces. Measures that are environmentally and socially compatible may help reduce conflicts between navigation activities, maintenance requirements and other uses of the waterway environment.

Accordingly, the report may identify opportunities to integrate environmental considerations into the planning, design, maintenance and operation of waterway infrastructure, while ensuring that proposed strategies remain technically feasible and compatible with the safety and performance requirements of inland navigation.