# Exploitation Strategy

**Output 5.3 of Interreg Baltic Sea Region project NOAH**

*Protecting the Baltic Sea from untreated wastewater spillages during flood events in urban areas*

## Contents

## Introduction

The NOAH project aims to protect the Baltic Sea from untreated wastewater spillages during flood events in urban areas. For this purpose, actions such as holistic urban planning and real-time control of urban drainage systems are carried out. The project focuses on developing a decision support system for urban development that can be widely shared and used in the Baltic Sea region. To reach the experts of the field, the general public and other stakeholders, the project puts special effort on project communication and dissemination of the project results in various ways.

Effective communication is the basis of project cooperation and essential to ensure the achievement of the goal of the NOAH project: protecting the Baltic Sea. The work package 5 (WP5) covers the full scope of the project's communication activities, including the dissemination and exploitation of project results. It involves not only the WP5 leader SAMK, cooperating closely with the project lead partner TalTech, but all partner organizations of the NOAH project.

The activity *5.3 Exploitation of the NOAH concept* focuses on the utilization of the NOAH solutions, firstly in the project's partner and pilot cities (Rakvere, Haapsalu, Ogre, Liepaja, Jurmala, Pori, Söderhamn and Slupsk), and secondly, the dissemination of the knowledge for enabling the use of the solutions in other cities in the Baltic Sea region and beyond. This output *5.3 Exploitation strategy* brings together the project outcomes for disseminating them beyond the project partnership and timeline, ensuring the sustainability of the results.

This report was compiled in project period 6, in December 2021 (the activity was extended due to the project prolongation resulting from the COVID-19 pandemic).

# 1 Overview of the activity

The dissemination of the project results – to target groups and in cooperation with the key stakeholders – is in key role when aiming at sharing project achievements and tools outside the project community, for the benefit of all societies in the Baltic Sea region. Successful exploitation demands structured data of the project activities, thorough reporting, functioning networks and well-planned communication. SAMK is the leading partner of the communication and exploitation activities, but each partner organization is responsible for fulfilling their role in ensuring the results to be documented, disseminated and exploited within their network and range of stakeholders locally.

The exploitation is based on the NOAH output 4.1 *Feasibility and policy analysis*. Knowing the laws and regulations of the BSR countries, taking into account that they vary even on regional and local level, gives an insight to how the results of projects like NOAH can be implemented and adjusted as part of the everyday processes of urban planning and stormwater management. Ensuring a clear bond between the economic, environmental and social aspects of the NOAH results strengthens the possibilities of the exploitation activities.

In the process of creating the NOAH concept, the methods of stormwater management, spatial planning and Real-Time Control (RTC) of urban drainage systems were tested as a holistic entity in selected NOAH pilot areas. The project's main achievements include the pilot investments, with the use of RTC technology, the hydraulic modeling and furthermore the development of the Extreme Weather Layer (EWL) methodology, which enables the creation of dynamic data interlinkages for analyzing flood risks in urban areas. All these results were collected into the project handbook, which gives an overview of the entire NOAH concept. The main results and the handbook are discussed in chapters 2-4 in this report. For disseminating the project achievements, communication actions were carried out widely in NOAH channels, with the help of visual tools that convey the information in a clear-cut and practical manner. A special addition in the NOAH project in disseminating the results was the Stakeholder Representative Panel, described in chapter 6 in this document.

Summary of the main exploitation activities:

- Providing a briefing on project investments in pilot cities.
- Communicating the use of Real-Time Control (RTC) technology in pilot areas.
- Creating an overview of the Extreme Weather Layer (EWL).
- Providing a tool for composing a cost-benefit analysis of the NOAH concept in urban planning.
- Creating and promoting the main output of the project, the NOAH Handbook.
- Establishing the NOAH Stakeholder Representative Panel for ensuring the transnational value to be transmitted outside the project partnership.

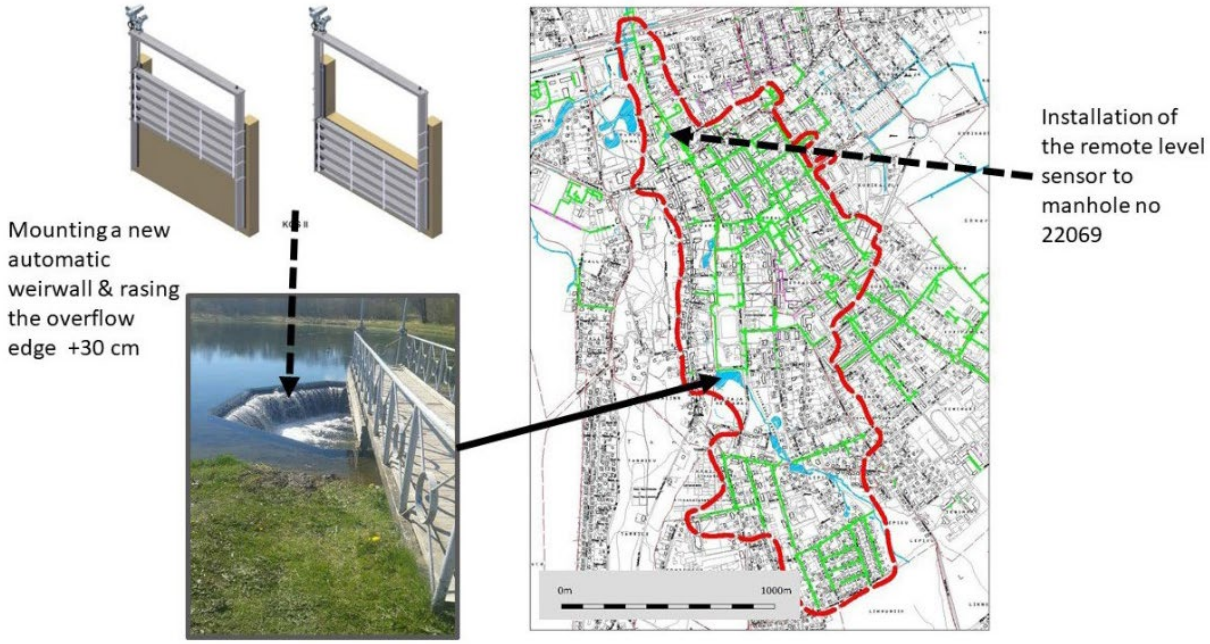
## 2 The use of Real-Time Control in NOAH pilot areas

Within NOAH, project investments were carried out in six municipalities in the Baltic Sea region, in the project pilot sites of Rakvere, Haapsalu, Jurmala, Ogre, Liepaja and Slupsk. The aim of the pilot activities was to test and implement a set of solutions which as the NOAH concept are scalable to any urban area in the Baltic Sea region.

The work package 3 (WP3) initiated the work with the investments by acquiring data from the pilot sites' urban drainage systems (NOAH output 3.1 Taking control of the Urban Drainage System), and analyzed the present drainage systems and evaluated the locations with Real-Time Control (RTC) potential (NOAH output 3.3 Implementing RTC in urban areas in the Baltic Sea region).

The practical pilot implementation of the RTC technology was carried out with the installation of necessary additional sensors (measurement stations) and actuators (gates) to fill control gaps in the systems of the selected pilot areas. The objective of the installations was to demonstrate the advantages of RTC in an urban drainage system that allows to accumulate excessive water in the system and thus prevent combined sewer overflows (CSO) and wastewater treatment plant bypasses (WWTPBP) – reducing discharges of untreated wastewater into the Baltic Sea.

The installations were selected for each NOAH pilot site separately – considering the challenges and needs regarding stormwater management and the possible benefits of the RTC solution for that specific area. In Rakvere, Estonia, it was decided based on the model of the area that the best results would be achieved by installing a water level sensor in the city center together with an automatic weirwall and overflow edge in the nearby pond (picture 1 and picture 2).




*Picture 1. Technical plan for the RTC installation in the NOAH pilot site in Rakvere, Estonia.*

In Rakvere, the RTC installation gives the possibility to control the discharge from the upstream pond to the city center pipeline by using the smart weirwall system, which is controlled by the data sent from the water level sensor in the downstream system. With carefully planned and executed investments, as in Rakvere, the adjustability of the stormwater system can be significantly increased – decreasing sewer overflows and thus spillages of wastewater into surrounding water bodies. The complete report of the investments carried out in the NOAH pilot sites can be found in the NOAH output 3.4 Pilot investments in partner municipalities.

The progress of the NOAH investments from the planning phase all the way to the construction and installation and finally the testing and use of the solutions was carefully documented throughout the project in reports and photos. To disseminate the gathered knowledge, information was consistently shared to stakeholders via the project website, social media channels, newsletter and events. Especially the project website was built with the aim to offer all project results and achievements in a clearly structured and visually appealing way. The website contains the basic information of the NOAH pilot sites, the framework for implementing the investments, and the activities and results presented in text, photos, and special videos composed to describe the results of the actions in each NOAH pilot site.

## 3 Extreme Weather Layer (EWL)

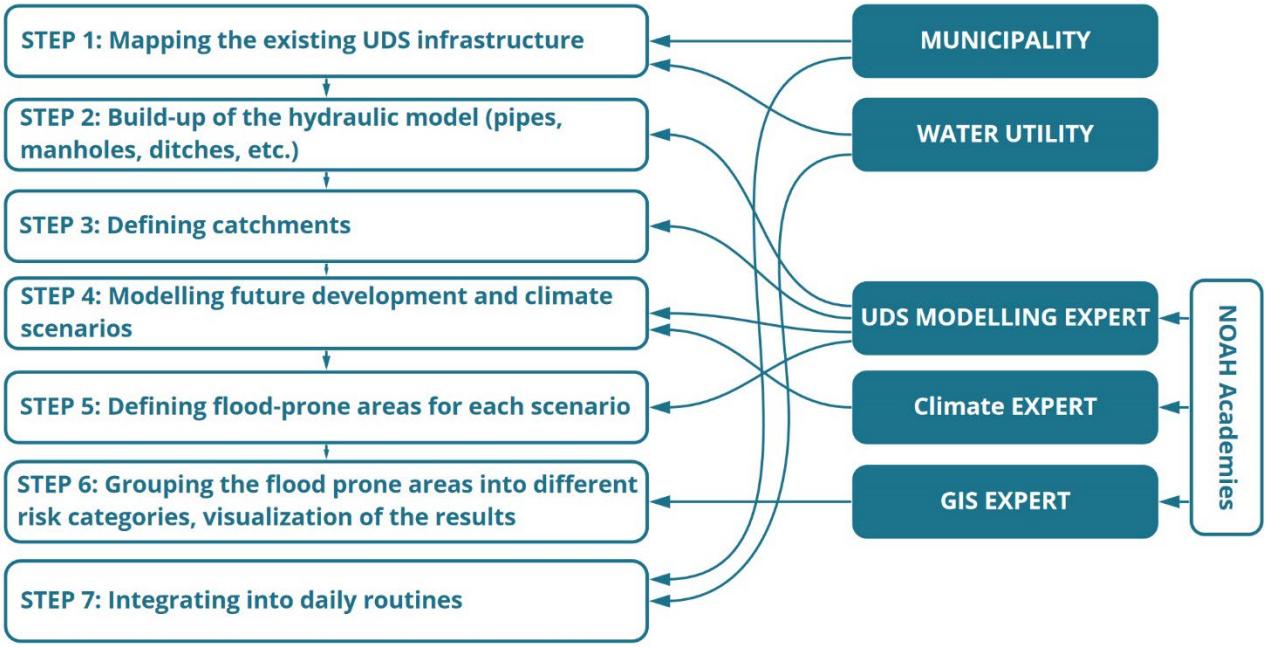
The Extreme Weather Layer (EWL) is a methodology created in the NOAH project for spatial planning and flood risk mitigation in urban areas. It is built on the model of an existing stormwater system and is a combination of hydraulic modelling, climate scenarios and other urban planning datasets. The EWL helps experts to prepare for future challenges in the field of water management and to develop the climate-resilience in urban areas. With the assistance of the new planning layer, the most suitable solutions for flood mitigation can be implemented in the areas with the highest flood risk. The flood-prone areas can be viewed on the EWL map in either catchment-view or plot-view, flood risks displayed in traffic light colors, ranging from no risk to high flood risk (picture 3).


*Picture 3. The EWL map of the NOAH pilot site Söderhamn in catchment-view, displaying the flood risks in traffic light colors, according to the RCP4.5 which is a moderate climate change scenario.*

With the help of the EWL, the effects of new solutions can be analyzed – how new developments, whether constructions, greenery or new stormwater solutions, change the flooding risks on plot-level, district-level or city-level in the selected area.

The EWL tool is created for each urban area individually. It is based on the hydraulic model of the urban drainage system (UDS), unique for each city, and the geographic information system (GIS) data of the city, also unique. The EWL is the methodology for combining the model and GIS so that the flood prone areas can be analyzed. The

steps for creating the EWL are described below in picture 4. Further information on the EWL methodology can be found in the NOAH output 2.4 Report in pilot implementation of Extreme Weather Layer.



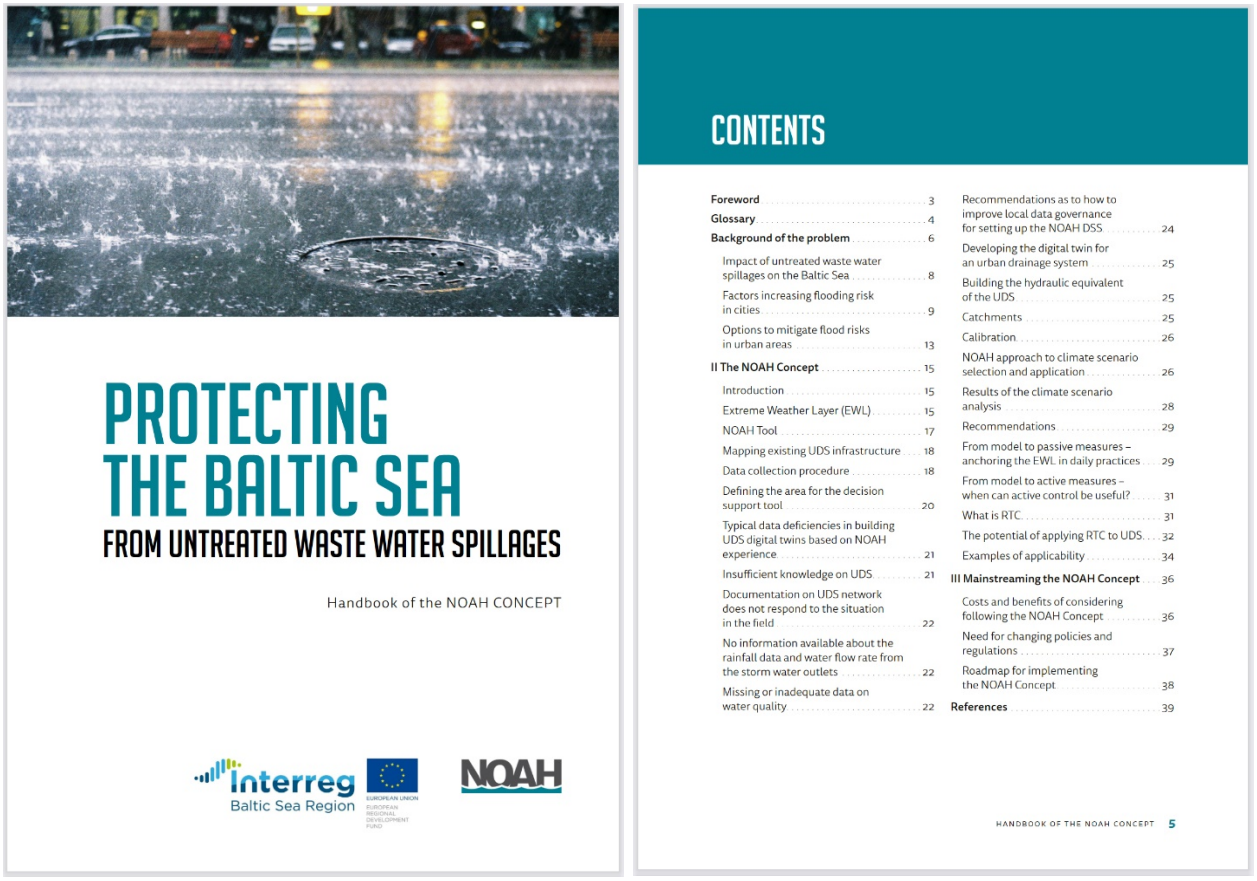

To disseminate the outcomes of the new EWL methodology to stakeholders, the data was documented in written and visual format. Special emphasis was also put on presenting the EWL in suitable seminars and conferences throughout the project lifespan to give a broader view of the methodology, and especially of the possibilities it can offer to urban areas in the entire Baltic Sea region.

Again, the NOAH project website holds and provides all the information of the achievement in one location and aims to serve target groups after the project implementation phase, as well. From the communication perspective, not only showcasing this type of multidimensional solution serves the target groups – to be disseminated efficiently, it needs to be explained and illustrated, as well. As the aim is to offer a solution that is scalable to any urban area in the Baltic Sea region, the NOAH project puts special effort in providing diverse and in-depth material of the EWL methodology, available for stakeholders in written reports, user manuals, graphic illustrations and videos.

# 4 NOAH Handbook

For communicating and disseminating the entity of the NOAH concept, a NOAH Handbook was created and compiled as part of the work package 4 (WP4). The handbook gives an overview of the complex challenge of reducing the risk of pluvial floods in urban environments. The handbook explains the background of the problem and introduces options to solve it. More specifically, the handbook provides an overview of what the role of the NOAH Concept is in preventing and controlling urban floods and proposes steps that local municipality governments and water utilities can take to follow the concept. Lessons learned are also described in the handbook, which makes it a valuable source of information for stakeholders in various fields.

The handbook is a collaborative output that utilizes all the gained knowledge of the project partnership. The document is available as a printed booklet and in digital format as the NOAH output 4.3 Handbook of the NOAH concept. It is the main result of the project, and an asset in the dissemination of the project results – especially after the project lifespan as the aim is to introduce the NOAH concept to urban planners and stormwater experts in the Baltic Sea region.




*Picture 5. Cover and contents of the NOAH Handbook.*

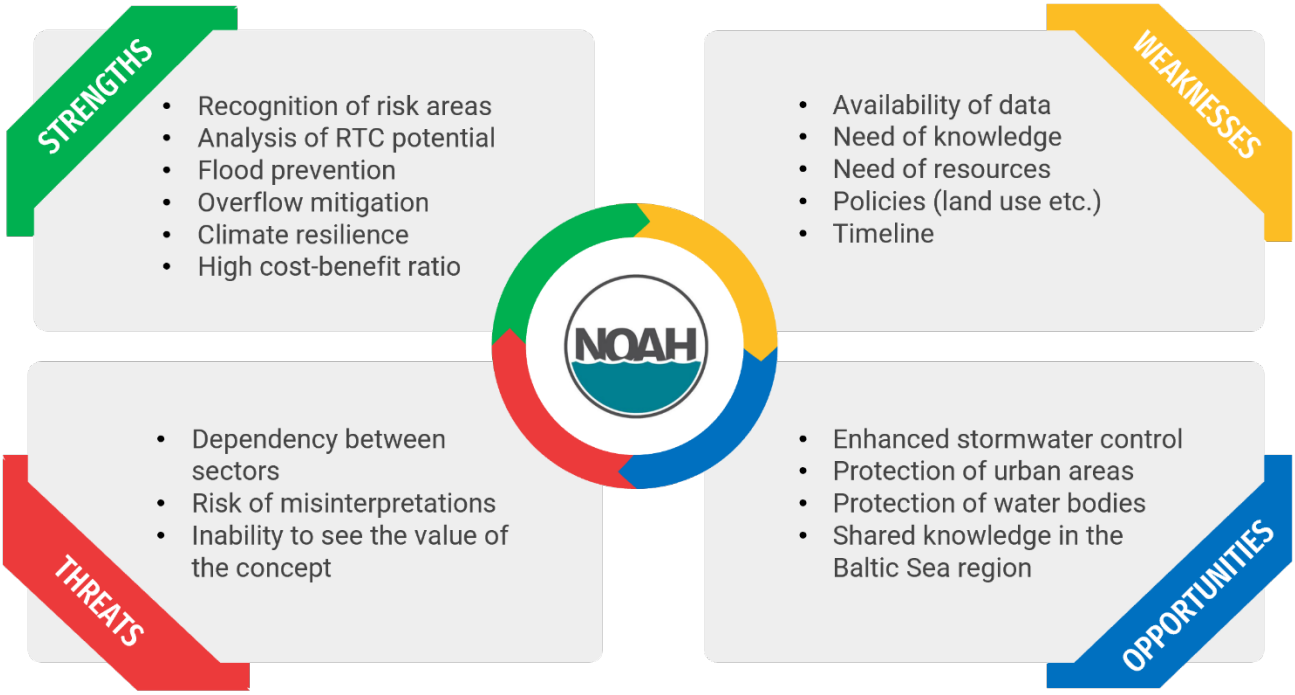
# 5 Cost-benefit analysis of the NOAH Concept

Cost-benefit analysis (CBA) is a tool for decision-making. It provides a systematic approach for comparing potential benefits and costs of a given activity to the costs of other resources, such as time or money. Accordingly, it can be considered as an analytical tool which gives an overview of economic pros and cons in decision-making processes. CBA has been used in projects for estimating e.g. flood risks in many countries that need specific consideration of economic efficiency related to risk reduction. CBA is an effective tool to support policy makers in choosing between several risk mitigation alternatives.

Obviously, extreme weather events, floods, and their magnitude are very hard to predict. But the NOAH concept with the tools for analyzing the potential of RTC solutions of urban drainage systems, and with the Extreme Weather Layer (EWL) methodology can bring significant advantages into the simulation of extreme weather events and the prevention of their impacts on urban areas. The main goal is to take action beforehand with enhanced planning and mitigation measures.

In most cases, creating the CBA for a specific activity can be challenging. Especially when trying to reduce a risk of a natural disaster or human behavior which always includes direct and indirect impacts. Being prepared and making preventative action is the key element and thus, using appropriate data, tools or methods becomes important. When assessing the introduction of the NOAH Concept, for example, taking account all the aspects, advantages and disadvantages, of the entity is a vast task. And yet, municipalities balancing between acquiring new technologies and finding the resources for using them, need to get acquainted with the benefits and costs before proceeding with the action.

One way to evaluate different criteria and benefits of an investment, method or action is through a SWOT analysis. It is a widely used method that can be used as one type of tool for the cost-benefit analysis, giving an insight into the practical benefits and demands of a novelty. The SWOT analysis makes it easy to see and comprehend possible strengths, weaknesses, opportunities and threats of a specific subject or action. Picture 6 presents an example of a SWOT analysis regarding the advantages and disadvantages of introducing and applying the NOAH concept. Municipalities, or other actors interested in the use of the concept, can utilize and shape the SWOT according to their own situation and needs when evaluating the implementation of the concept in their own stormwater management.




*Picture 6. Example of a SWOT analysis for considering the introduction of the NOAH Concept.*

To support the process of evaluating the implementation of the NOAH concept, the template for the analysis is available in PDF format on the project website: SWOT template.

## 6 NOAH Stakeholder Representative Panel

A special practice and tool in the NOAH project for disseminating project results and reaching stakeholders was the Stakeholder Representative Panel. It was established to efficiently reach the stakeholders especially outside the project partnership. The main aim of the panel was to ensure the transnational value of the project to be verified and documented in project communication.

The panel came together in online meetings regularly, approximately every 4-6 months. The panel members – from Denmark, Sweden, Finland, Russia, Estonia and Lithuania – are experts of water management and sustainability development in the Baltic Sea region (table 1). Project outputs, and finally the NOAH concept, was introduced to the Stakeholder Representative Panel for discussion and joint development.

| **Name** | **Organization** |
|---|---|
| Ivar Annus<br>*leader of the BSR NOAH project* | Tallinn University of Technology, Estonia |
| Hanna Rissanen (chair of SRP)<br>*BSR NOAH communication manager* | Satakunta University of Applied Sciences, Finland |
| Teija Järvenpää / Ollipekka Kivin (secretary of SRP)<br>*BSR NOAH communication expert* | Satakunta University of Applied Sciences, Finland |
| Miriam Feilberg<br>*Senior advisor* | Danva - Danish Water and Wastewater Association, Denmark |
| Agnieszka Ilola<br>*Communications Coordinator* | Union of the Baltic Cities, Secretariat of Sustainable Cities Commission, Finland |
| Kirsti Jylhä<br>*Docent, Senior Research Scientist* | Weather and Climate Change Impact Research, Finnish Meteorological Institute, Finland |
| Samaneh Seifollahi<br>*Postdoc. Research Fellow, Water Resources Management* | Dept. of Physical Geography, Stockholm University, Sweden |
| Irina A. Shmeleva<br>*Associate Professor* | ITMO University, Saint Petersburg, Institute, of Sustainable Development Strategy, ISDS, Russia |
| Jurate Siugzdaite<br>*Professor* | Lithuanian University of Health Sciences, Lithuania |

*Table 1. Members of the NOAH Stakeholder Representative Panel.*

The members of the panel brought significant input into the project developments with their expertise. Important project aspects were discussed and evaluated jointly. With the presence of the panel members from different countries, especially Russia and Lithuania that were not NOAH partner countries, the goal was to disseminate the project results efficiently in the Baltic Sea region, beyond the project scope.

# 7 Conclusions

Documenting, evaluating, and communicating project results in a complex and transnational project like NOAH demands thorough planning, expertise and cooperation. For the exploitation of the gained knowledge and results, determined work on the visibility of the project is needed – through communication actions inside and outside the project community, via the main communication channels of the project.

Throughout the project, the goal was to reach actors in the field of stormwater management and to introduce them new tools developed in the NOAH project. The aims of disseminating the NOAH results could be summarized as follows: 1) increasing the institutional capacity of utilities to have better control of sewage overflows, 2) improving their understanding of the processes for installing smart stormwater technology, and 3) anchoring NOAH results and the NOAH Concept into the daily routines of municipalities and water utilities.

By overtaking project communication measures such as creating the NOAH Handbook, establishing the Stakeholder Representative Panel for the project and providing plenty of textual and visual information of the project results, the exploitation of the NOAH Concept was made accessible and applicable. Due to the Covid-19 pandemic, networking and meeting stakeholders face-to-face for seminars and trainings decreased significantly, which may have an effect on the exploitation rate of the NOAH concept. However, the work among the NOAH partners and stakeholders continues after the project lifespan as the stormwater experts continue to work for more efficient actions in stormwater management. Cooperation and shared efforts are the keys in protecting the Baltic Sea.