Contract REFORM/SC2021/085

STRENGTHENING WATER MONITORING IN HUNGARY

FINAL REPORT

22.11.2023.

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The context and background of the project

The context and background of the project

The aim of the two workstreams and the structure of the finished tasks

I. Workstream: The agricultural utilization of dredged sludge

- Accumulated sludge reduces transport capacity and reservoir volume of watercourses, and it is also responsible for water quality deterioration.
- According to the regulation and practice effective when the project was started dredged sludge was considered and treated as waste, although it could be used in agriculture under appropriate circumstances.

The goal of the workstream is to support the establishment of the necessary background for the agricultural utilization of dredged sludge.

- Mapping of a framework for the agricultural utilization of dredged sludge
- Cost-benefit analysis on the agricultural utilization of dredged sludge and recommendations on financing opportunities
- Preparing a GIS analysis for the agricultural utilization of dredged sludge
- Creating communication materials for farmers to promote the use of dredged sludge

II. Workstream: Improvement of water monitoring

- Efficient and sustainable water governance requires a comprehensive water monitoring framework.
- The aim of the workstream is to support to decrease the fragmentation of water management databases and information systems used by the involved organizations and authorities.

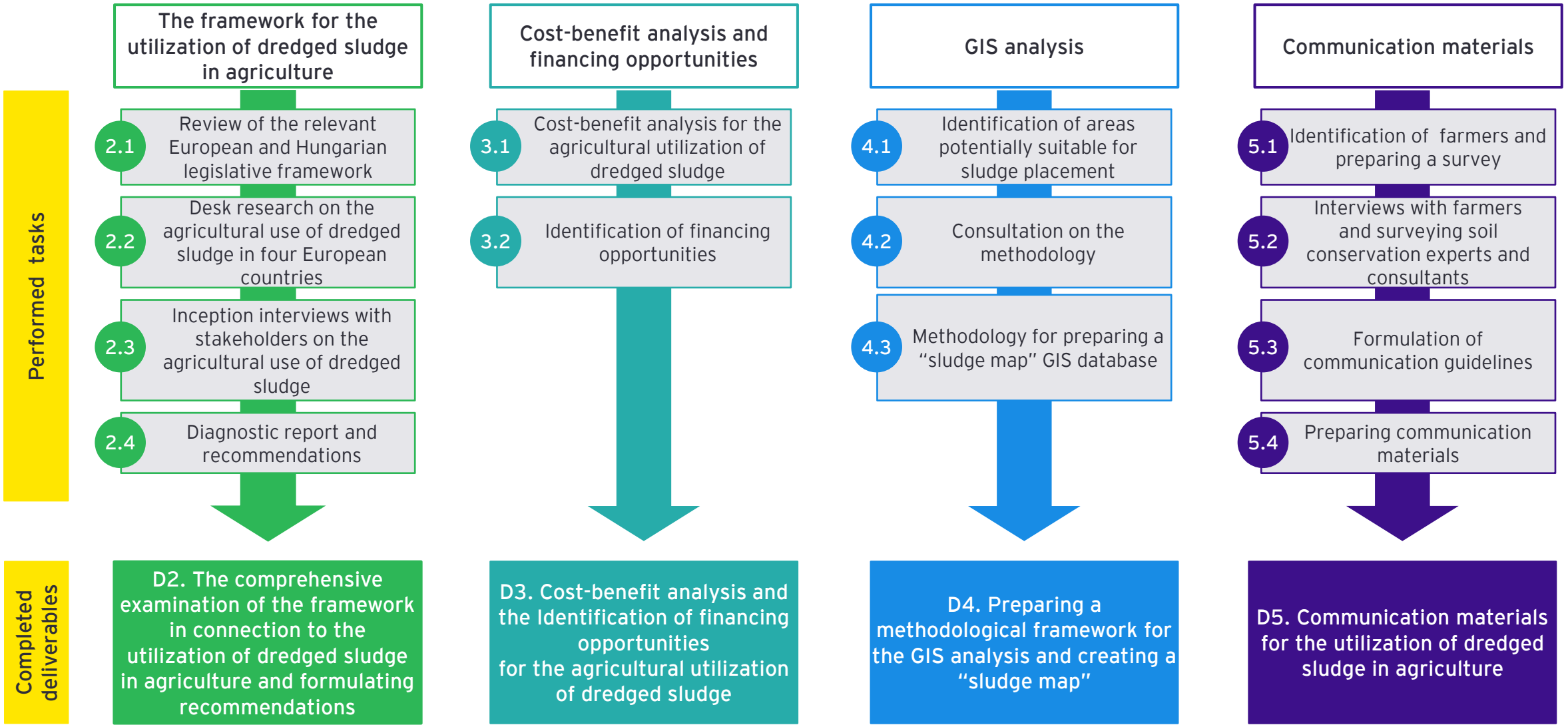
The goal of the workstream is to connect existing and operating databases with attention to the consistency of data quality.

- Diagnosis of the current situation of water monitoring and institutions
- Formulating policy options and recommendations on the development of Hungarian water monitoring and river basin management
- Preparation of an Action Plan supporting the implementation of the preferred policy options and recommendations
- Overview of available European programs for financing opportunities to support the development of the water monitoring framework

Presentation of the results of the Agricultural utilization of dredged sludge workstream

The workstream regarding the utilization of dredged sludge in agriculture

The workstream consists of four* deliverables, broken down to several tasks as presented below



*The first deliverables of the project were the initial report on the project plan.

The comprehensive examination of the utilization of dredged sludge in agriculture framework and formulating recommendations

2.1

Performed Tasks	Goal of the task	The results of the performed tasks
Review of the relevant European and Hungarian legislative framework	Presenting the Hungarian and European Policy Framework for the utilization of dredged sludge from surface waters	▶ During the examination of the related strategic objectives of the European Union, we established that the use of dredged sludge can be implemented in the spirit of circularity, in the light of soil protection, biodiversity protection and agricultural production rules, but the establishment of specific rules falls within the competence of the member states. ▶ In Hungary with the 2021 amendment of the Agricultural Land Protection Act, the legislation introduced the concept of dredged sludge into the legal system and authorized the government to create the related rules. During our analysis of the related regulations, we identified the limitations, and the solutions resulting from the conclusions were used in the process of formulating conceptual proposals.
Desk research on the agricultural use of dredged sludge in four European countries	The aim is to present the practice of the utilization of dredged sludge in agriculture in four European states (Czechia, Netherlands, Spain and Finland)	▶ From the countries included in the analysis, only Czechia and the Netherlands regulate in detail the agricultural utilization of the dredging materials from surface waters, including placement conditions and requirements, that covers the entire process from dredging through sampling and examination to licensing.
Inception interviews with stakeholders on the agricultural use of dredged sludge	Coordination of aspects to the agricultural utilization of dredged sludge	▶ As the conclusions of the interviews conducted during the task, we took into account the public health, nature conservation, legal, procedural and agroprofessional aspects of the agricultural utilization of dredged sludge during the formulation of our conceptual proposals.
Diagnostic report and recommendations	Based on the tasks completed so far, the identification of the limits of the agricultural utilization of dredged sludge and the formulation of proposals	▶ In the diagnostic report, as a synthesis of the tasks carried out so far, we drew attention to the need to clarify the status of the dredged sludge, define the rules for placement (conditions and related procedures), and include the dredged sludge in the related support structure. ▶ In order to support policy planning, we formulated a proposal regarding the process of agricultural utilization of dredged sludge.

The framework for the agricultural utilization of dredged sludge
Results of the comprehensive investigation (1/2)

2.1

Problems to be solved	Recommended solutions	Related process elements
The time windows for dredging and utilisation can differ significantly from each other.	We recommended the preliminary planning and communication of the dredging, as well as the establishment of an active and continuous relationship with the affected farmers, professional organizations, and local actors.	Long term planning
Although the legislation at the start of the project allowed for the agricultural utilization of dredged sludge, at the same time, many questions of legal interpretation and application arose, which prevented the wide spread of the practice of sludge placement.	In order to resolve the identified legal limitations, we proposed: ▶ The unification of the legal interpretation and application of the law regarding the type of dredging; ▶ Clarification of the ownership of the dredged sludge; ▶ Clarification of the waste status of dredged sludge; ▶ Enabling the temporary storage of dredged sludge.	Planning of the utilisation
According to the legal definition of dredged sludge, the sludge categories determine the conditions of use and the related procedure. At the beginning of the project, however, the rules for determining the category of sludge were not fixed.	▶ In order to prepare dredged sludge for direct agricultural use, it is necessary to determine the procedural and professional parameters of the related process elements. ▶ It is necessary to record the procedural conditions for determining the sludge category. ▶ It is necessary to define the professional parameters related to the treatment of dredged sludge.	Preperation of sludge for direct agricultural utilisation

The framework for the agricultural utilization of dredged sludge
Results of the comprehensive investigation (2/2)

2.1

Problems to be solved		Recommended solutions	Related process elements
At the beginning of the project, neither the tests nor the associated limit values were recorded, on the basis of which the conditions for the utilization of dredged sludge on agricultural land can be determined; nor the procedural rules that regulate the placement process.	→	▶ It is necessary to record the generally applicable professional parameters related to the direct agricultural use of dredged sludge. ▶ It is recommended to record the general procedural rules of direct agricultural use in a regulation and the details in a guide.	Direct agricultural utilisation
In order to protect our soils and waters, it is of primary importance that the placement of dredged sludge is done professionally, and that it is monitored by the relevant authorities, and that a record is made of the placement, which can form the basis of an investigation on the long-term effects of the dredged sludge.	→	It is recommended to keep a record of the qualitative and quantitative characteristics of the dredged sludge, as well as to monitor the effects of the sludge.	Follow-up

Framework for the agricultural utilization of dredged sludge
Recommendations in connection with the process of agricultural utilization

2.1

Long-term planning

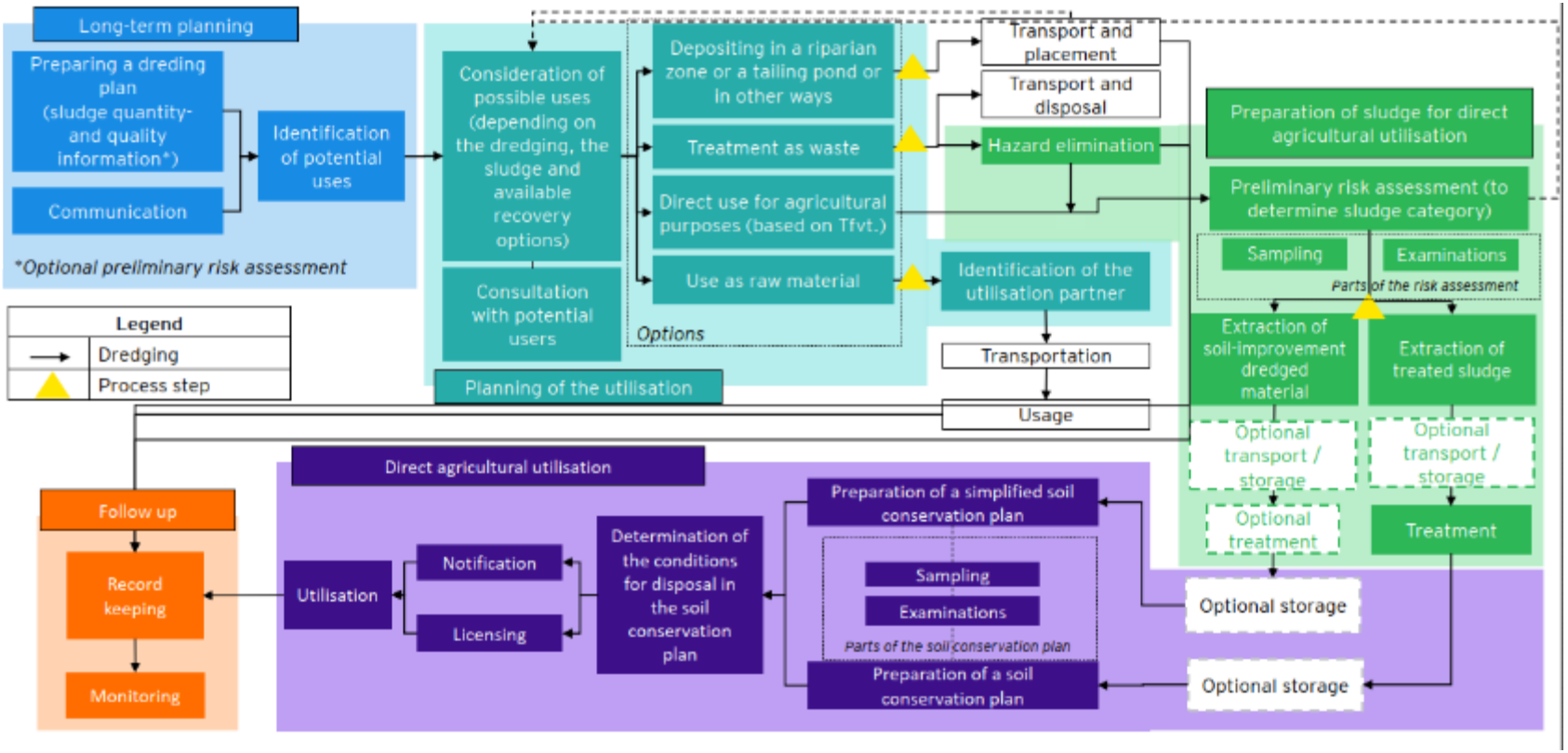
The direct agricultural use of sludge requires the coordinated cooperation of many actors, which can be promoted by transparent, long-term planning.

Follow-up

After the placement, the authorities must check whether it was carried out in accordance with the regulations.
In addition, the long-term effects of sludge can be examined through the register.

Planning of the utilization

Before the specific dredging, it is necessary to consider the possible uses. In each case, the use and placement depends on the characteristics of the sludge and the purpose of the dredging.



Preparation of sludge for direct agricultural utilization

In the case of direct agricultural utilization, it is necessary to check the category of sludge, since it will determine the procedure of utilization on farmland.

Direct agricultural utilization

During the direct agricultural utilization of dredged sludge, it must be ensured that the use complies with the nature protection, water protection, soil protection, health and food safety rules in all respects.

Cost-benefit analysis and the Identification of financing opportunities for the agricultural utilization of dredged sludge

2.2

Performed Tasks		Goal of the task	The results of the performed tasks
	Cost-benefit analysis for the agricultural utilization of dredged sludge	The purpose of the analysis is to examine whether the agricultural utilization of dredged sludge pays off financially and socially	▶ Based on the results of the analysis, it can be concluded that the most effective use of dredged sludge is for arable crops, other crops (vegetables, fruit, grapes), as well as for lawn planting and replanting. ▶ The benefits of the agricultural utilization of dredged sludge are influenced by the nutrient content, organic matter content of the dredged sludge, and its ability to compensate for erosion. ▶ Cost savings can be achieved for farmers due to the saving of artificial fertilizer - and, where applicable, organic fertilizer.
	**Identification of financing opportunities**	The purpose of the analysis is to identify the direct and indirect financing possibilities for the agricultural utilization of dredged sludge	▶ According to the regulations in force at the time of the analysis, both direct and indirect support of dredged sludge can be implemented, but several prerequisites must be met. ▶ It is necessary to develop implementing rules related to the agricultural utilization of dredged sludge, to assess the environmental impact of the direct utilization and to examine the advantages and disadvantages arising in connection with the utilization.

The results of cost-benefit analysis
General level

2.2

General level 1: Preliminary screening of utilization options		
Subject of investigation:	**Method:**	**Result:**
Considering all utilization possibilities	Multi-aspect evaluation: matching with goals, feasibility	Agricultural utilization possibilities to be further investigated at level 2

General level 2: Ranking of agricultural utilization opportunities		
Subject of investigation:	**Method:**	**Result:**
Agricultural utilization possibilities to be further investigated after pre-screening	Multi-criteria evaluation: comparing costs and effects	Ranked agricultural utilization opportunities

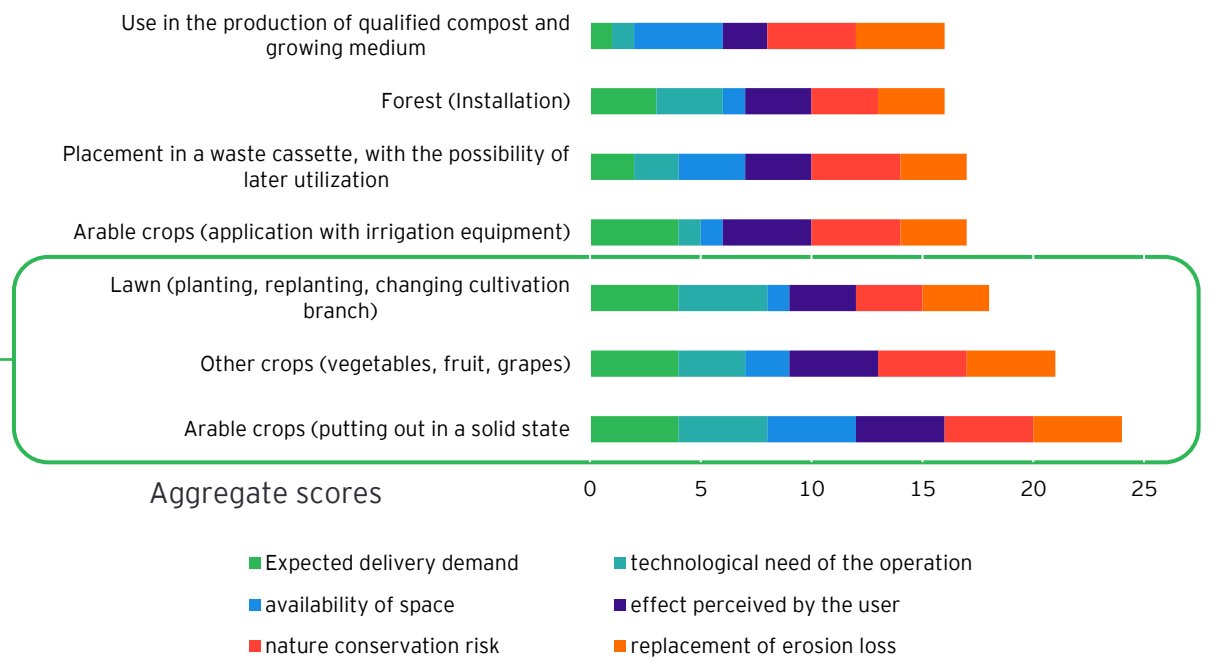
General level 3: Identification of effective agricultural utilization opportunities based on nutrient use and availability

It is advisable to choose one of the first three utilization options, however, if the conditions for the preferred placement methods are not met, the other utilization methods can also be used.

Discarded from further investigation

- Mine, landfill reclamation (only as a surface barrier layer)
- Filling of inland ditches, filling of eroded areas
- Partial filling of mine ponds, creation of a state close to nature
- Habitat reconstructions
- Landscaping and leveling of water routes
- Basin arrangement
- Development of islands, mainland, coastal protection
- Use as a building material or for the production of building materials

Ranking of agricultural utilization opportunities based on score



The results of cost-benefit analysis
Creating an algorithm

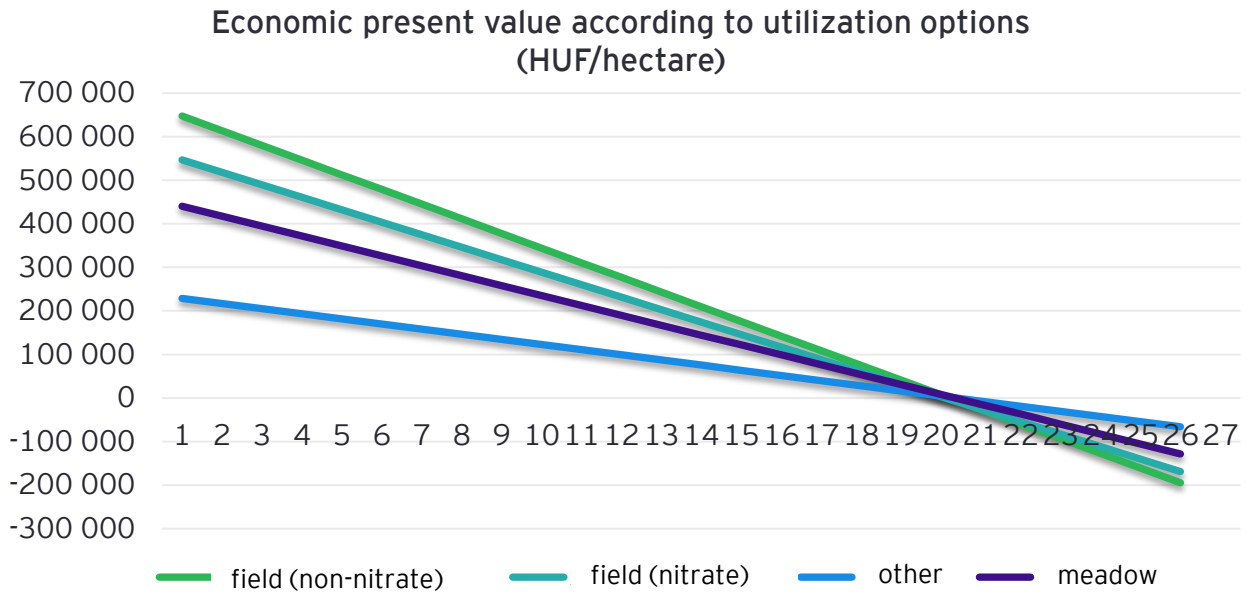
2.2

General level 3: Identification of effective agricultural utilization opportunities based on nutrient use and availability		
Subject of investigation:	**Method:**	**Result:**
Agricultural utilization options with different nutrient use and availability	Cost-benefit analysis	Effective agricultural utilization options depending on nutrient use and availability

Benefit	Cost
▸ Substitution of fertilizer (nutrients, organic matter) ▸ Replacement of erosion loss ▸ Delivery externalities	▸ Preparation, monitoring ▸ Dredging, utilization ▸ Transport

Sample area level

- In the case of transport up to 20 km, a positive social impact is expected for all utilization options.
- In the case of the same distance up to 20 km, the highest benefit is expected in the case of non-nitrate-sensitive arable land, while the smallest effect is expected in the case of the utilization of other cultures.
- Beyond 20 km, the results are reversed.



The results of cost-benefit analysis
Sample area level

2.2

Sample area level 1: optimalization of agricultural utilization		
Subject of investigation:	Method:	Expected result:
Effective agricultural utilization opportunities available in the given area (GIS map plots)	Cost-benefit analysis	Ranked agricultural utilization opportunities per parcel available in the sample area

Sample area level 2: evaluation of agricultural utilization		
Subject of investigation:	Method:	Expected result:
The ranked agricultural utilization possibilities available in the sample area per parcel	Cost-benefit analysis, feasibility	Optimal mix

Advanced case	Financing	Keszeg-ér, HUF/ha	Ős-Dráva, HUF/ha
Operations related to dredging		800-900	700-800
Dredging with direct beaching	it can be charged to land users at level 3	800-900	700-800
Coastal strip work area, restoration	it can be charged to land users at level 3	5-10	5-10
Use operations		400-500	300-400
Soil testing	it can be charged to land users at level 2	50-100	50-100
Creating a temporary storage space	it can be charged to land users at level 2	10-50	10-30
sieving sludge	it can be charged to land users at level 2	100-200	100-200
placing on the area by spreading	it can be charged to land users at level 1	30-70	30-70
incorporation	it can be charged to land users at level 1	10-20	10-20
post-monitoring	it can be charged to land users at level 2	30-60	20-50
delivery with loading	it can be charged to land users at level 2	50-100	20-60
Nutrient use – savings	Financial savings	HUF/ha	HUF/ha
nutrient intake of agricultural land		500-600	400-500
fertilizer use with delivery	savings that occur primarily for land users	100-200	100-200
Organic fertilizer use with delivery	savings that occur primarily for land users	300-400	300-400

*Due to the sensitivity of the data on cost the figures can only be published using ranges.

The current financing schemes do not include support for the direct utilization of basin sludge

2.2

Possible support tool		Non-refundable	Refundable	Conclusions related to the placement of dredged sludge
CAP Strategic Plan grants	Agri-Environmental Scheme payments (AKG)	✓		In order for the activity to be supported, it is necessary to prepare a general environmental impact assessment.
	Support for Organic Farming (ÖKO)	✓		
	Agro-ecological Programme (AÖP)	✓		Currently, the use of soil improvement/yield-increasing products that contain dredged sludge can be supported.
State-supported devices	Credit (KAVOSZ)		✓	The cost of the agricultural utilization of dredged sludge can be financed directly for the producers.
	Guarantee (AVHGA)		✓	It may be relevant for companies that play a role in the process of agricultural placement of dredged sludge.
Dedicated state support	KEHOP+, RRF, CAP, budget	✓		To finance goals relevant to state and public administration institutions, such as: ▶ Creation of a multi-stakeholder, thematic governmental cooperation platform; ▶ A market information platform for matching supply and demand; ▶ Support for attitude formation and education; ▶ Creating a monitoring function.
Direct EU subsidies	LIFE	✓		LIFE can best help exploit the possibilities inherent in long-term cooperation and joint development, in which cases financing the use of dredged sludge in accordance with the regulation of Tfvt. is available not only for direct agricultural use, but also for the investigation, development and creation of other uses.

Preparing a methodological framework for the GIS analysis and creating a "sludge map"

2.3

Performed Tasks		Goal of the task	The results of the performed tasks
	Identification of areas potentially suitable for sludge placement	Selection of sample areas on which the methodology of geospatial analysis can be tested	▶ Based on preliminary consultations and interviews, five areas were identified that are suitable for presenting the results of the GIS analysis. ▶ During the narrowing of the sample areas, several aspects were considered, as a result of which the area around Győr and the location of the dredging of the Ős-Dráva were selected. Dredging works were recently carried out at the two sites, and the available data helped in the precise delineation of the sample areas.
	Consultation on the methodology	Recording of expectations related to the „sludge map" created as a result of the geospatial analysis	▶ As a result of the consultations, the goals of the geospatial analysis were determined, we assessed the data needs and the range of available data, and determined the list of map layers to be used for the geospatial database.
	Methodology for preparing a "sludge map" GIS database	Recording the steps of the geospatial methodology and preparing the „sludge maps" in the selected sample areas	▶ The methodology summarizes the steps required for geospatial analysis, describes in detail the methodology for performing the steps, and then presents the results in the sample areas. ▶ During the development of the methodology, the limitations and usability frameworks were determined, and the schedule for the introduction of the system was also outlined.

Geospatial analysis
The criteria system of the GIS methodology

2.3

Aspects:

- Surface coating – Arable / Lawn / Orchard
- Nature conservation
  - Protected area – Natura 2000 (SPA, SCI), SAC), local protected areas, ex-lege protected areas, national protected areas
- Soil types
- Dredged sludge quality (based on long-term planning risk assessment)
- Quantity of dredged sludge
- Sensitive areas (nitrate sensitive, nature conservation, water base protection areas)
- Terrain model
- Domestic borders
- Groundwater depth
- Road network (categorized) – Motorway / Arterial road / Public road / Dirt road
- Protective distance
- Effective transport distance

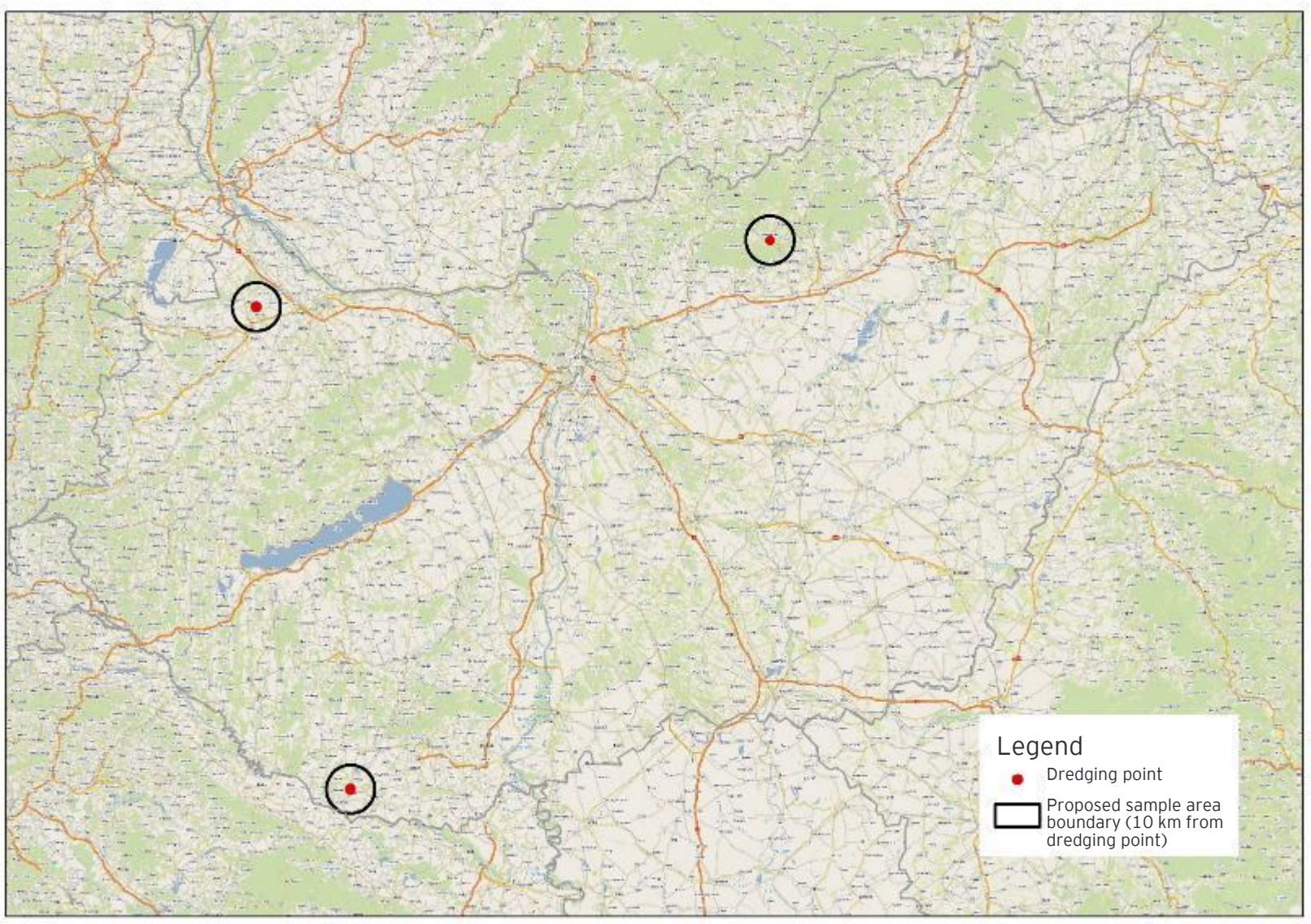
Geospatial analysis
Aspects of selection of the sample area

2.3

Recommendation	Explanation
Have a variety of topography (flat area and hillier area)	▸ Erosion loss is expected to be greater in the case of a more varied topography, so it is easier to examine soil replacement needs.
Mixed agricultural use in the area (arable field, meadow-pasture, forest, etc.)	▸ The use of dredged sludge for agricultural purposes is different for different utilizations, so it is recommended to select an area with several utilization characteristics.
Have a nearby residential area	▸ A protective distance must be kept from inhabited areas, in order to apply this, it is recommended that the sample area also touches inhabited areas.
Former dredging site is an advantage	▸ Primarily, in order to support the CBA analysis, it is an advantage if actual dredging data is available from the given sample.

Geospatial analysis
Selected sample areas for testing the methodology

2.3



Geospatial analysis
Availability of GIS data

2.3

Aspect	Database	Availability
Surface coating	NÖSZTÉP – Ecosystem map	Yes
Nature conservation	Natura2000, National protected ecological network zone, Ramsari, SEVESO, groundwater, karst	Yes
Soil types	DOSoReMI	No
Soil erosion	Erosion sensitive areas	Yes
Sensitive areas	Nitrate-sensitive areas, nutrient-sensitive areas	Yes
Terrain model	Hydrodem	Yes
Domestic borders	OSM	Yes
Road network	OSM, dirt roads are only partially included	Partially
Mepar plots	Blokk2022	Yes
Groundwater level	Fk_vizek	Yes

Geospatial analysis
Purpose and role of GIS map

2.3

General purpose: Support for the agricultural utilization of dredged sludge

Function 1: Delineation of areas potentially suitable for agricultural use

Geospatial analysis
Purpose and role of GIS map

2.3

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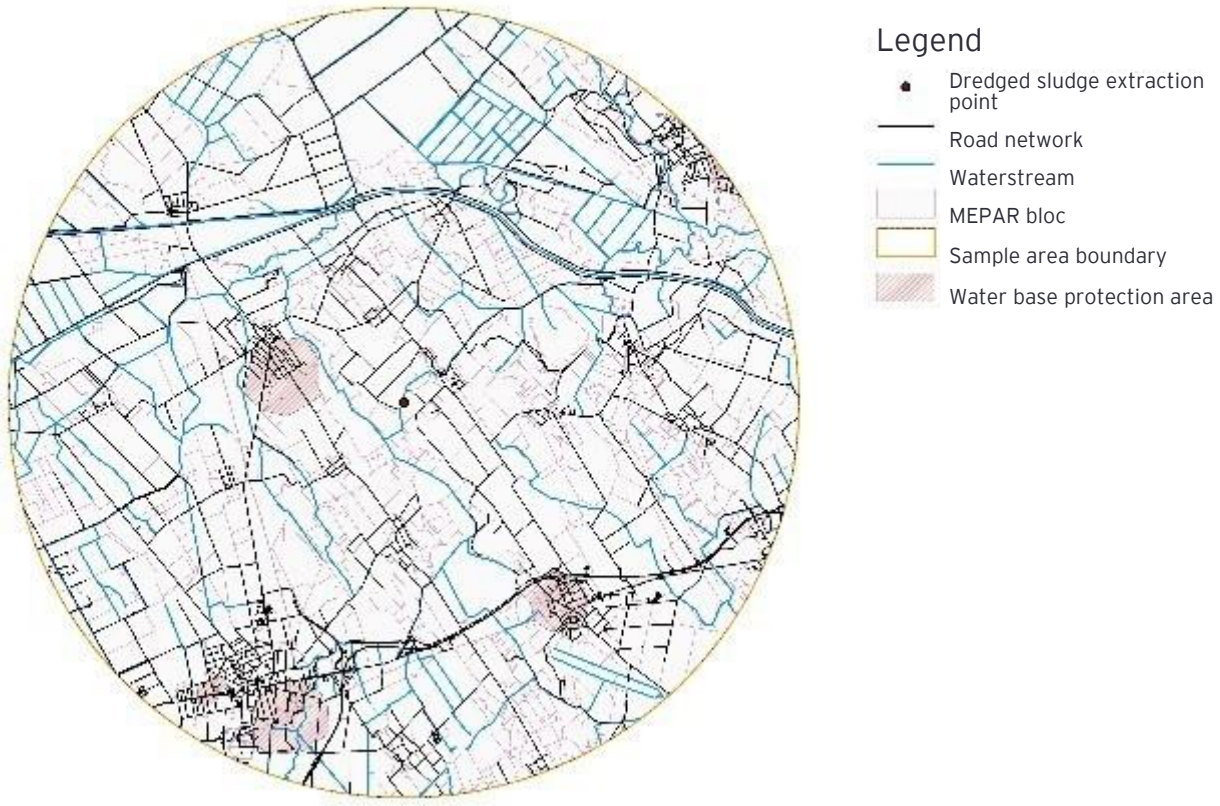

Geospatial analysis
Purpose and role of GIS map

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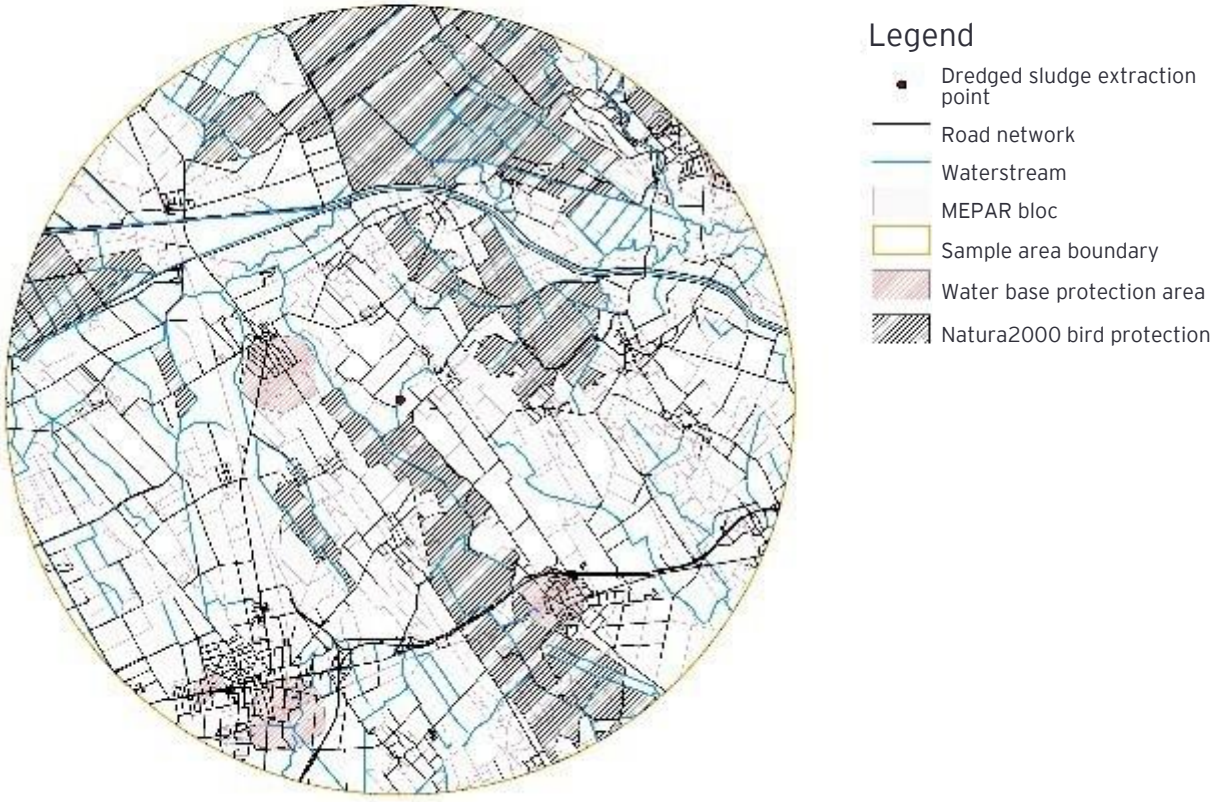

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Purpose and role of GIS map

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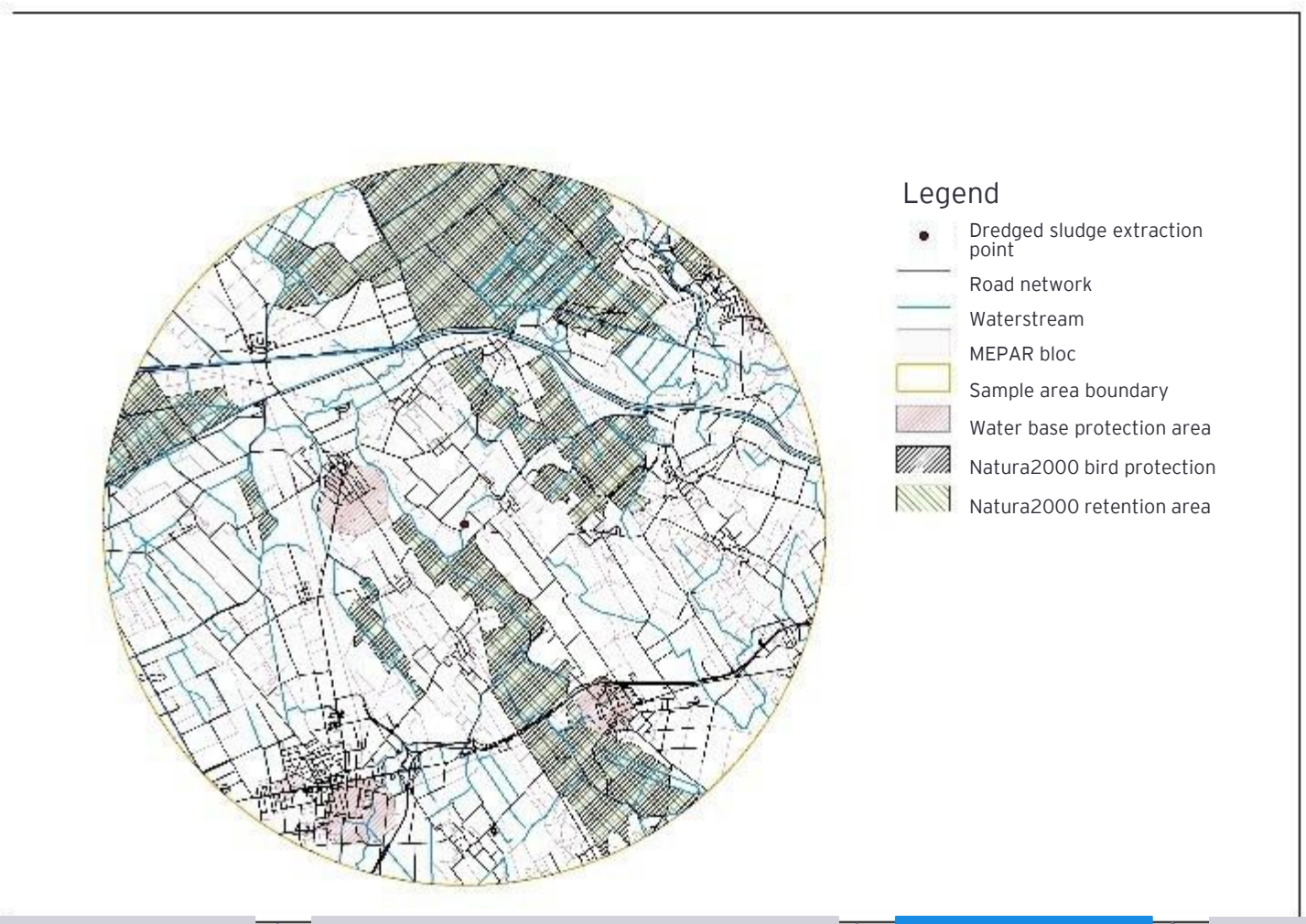

Geospatial analysis
Purpose and role of GIS map

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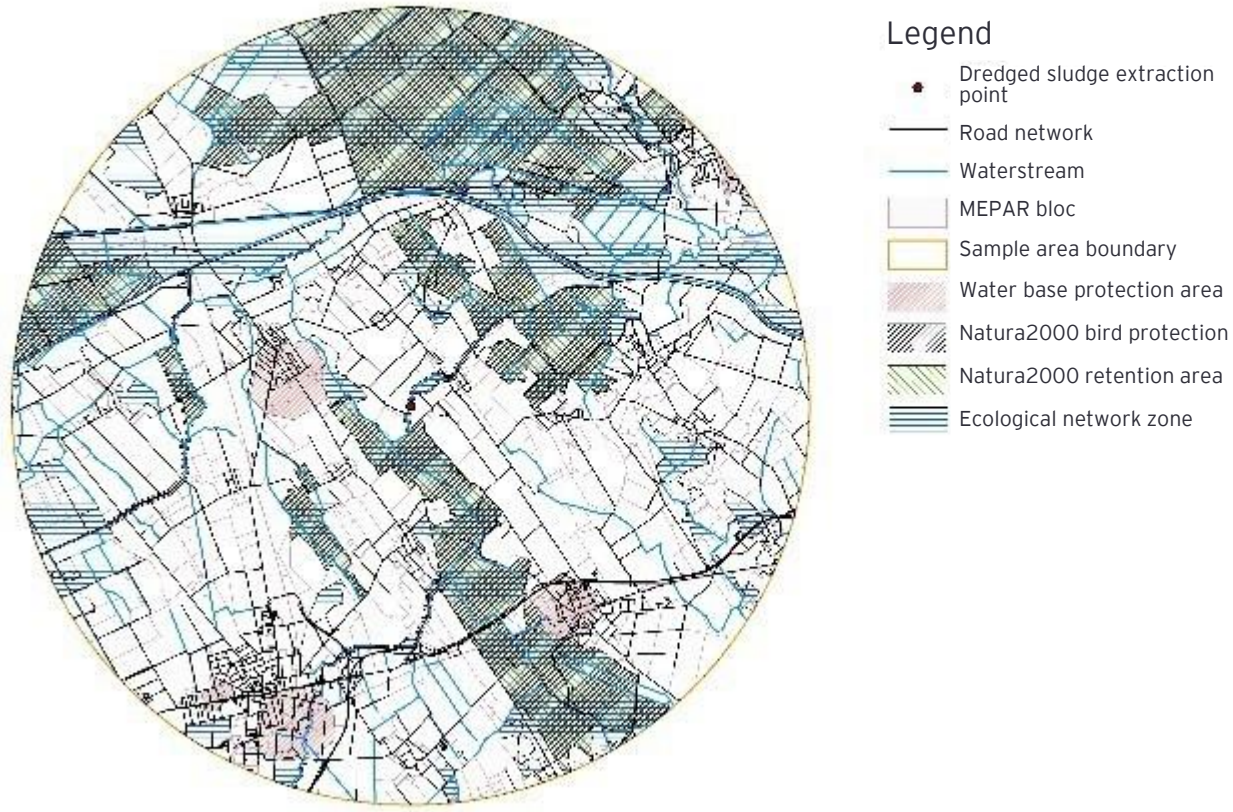

Geospatial analysis
Purpose and role of GIS map

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General purpose: Support for the agricultural utilization of dredged sludge

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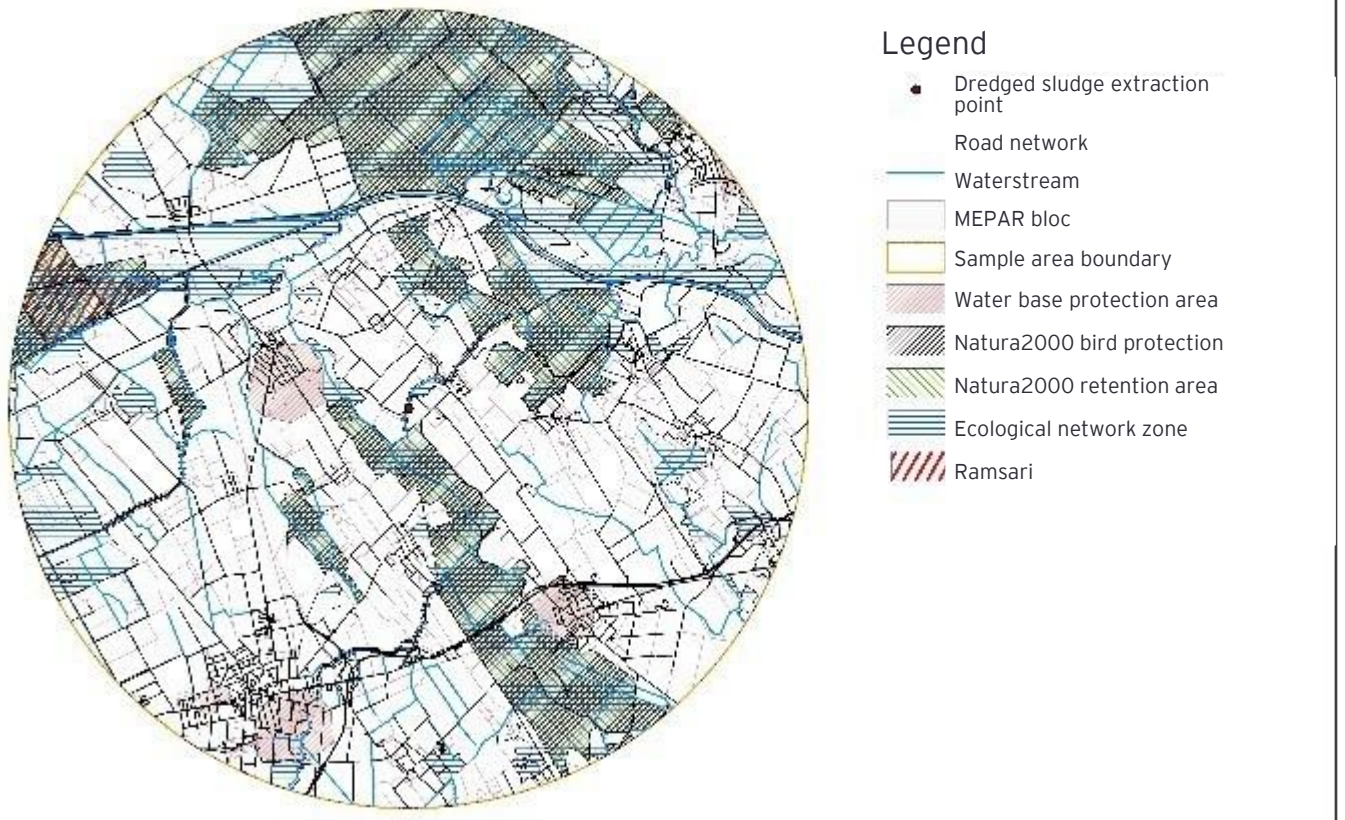
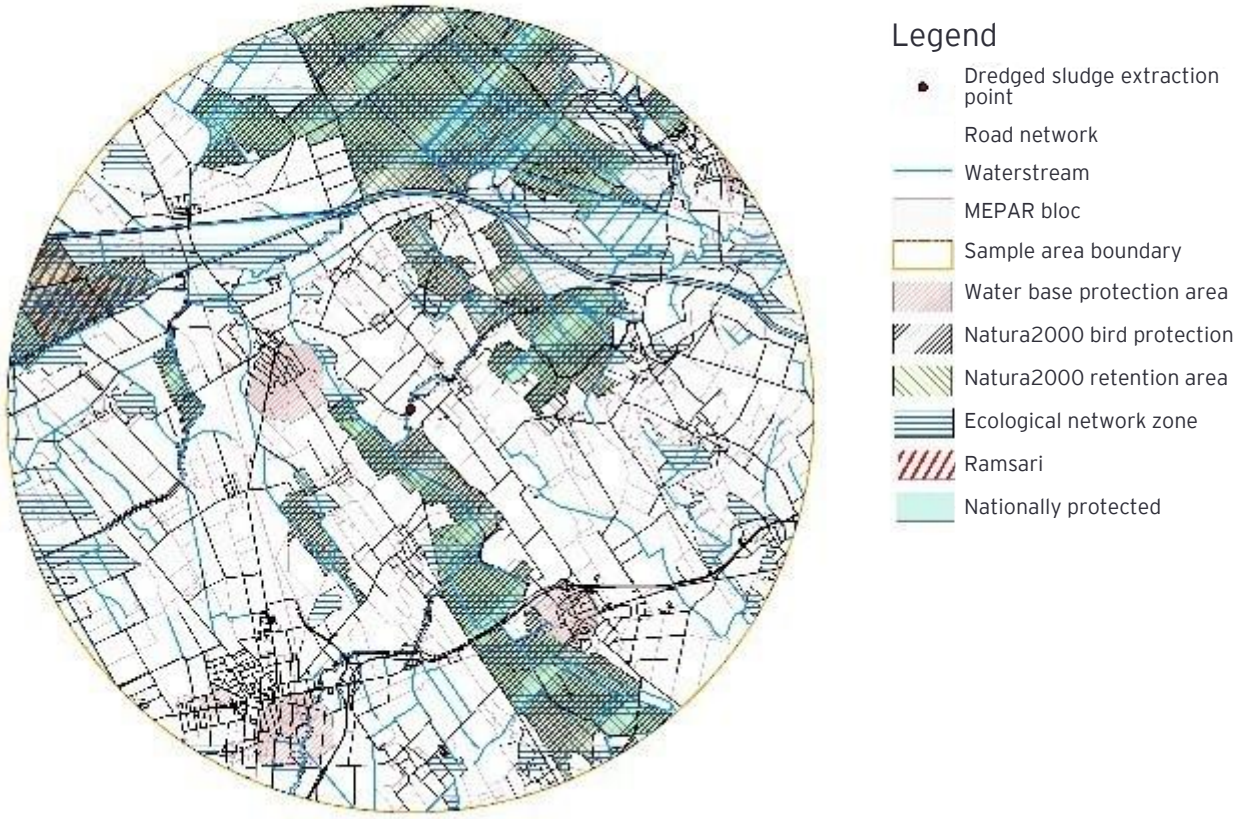


Geospatial analysis
Purpose and role of GIS map

2.3

General purpose: Support for the agricultural utilization of dredged sludge

Function 1: Delineation of areas potentially suitable for agricultural use



Geospatial analysis
Purpose and role of GIS map

2.3

General purpose: Support for the agricultural utilization of dredged sludge

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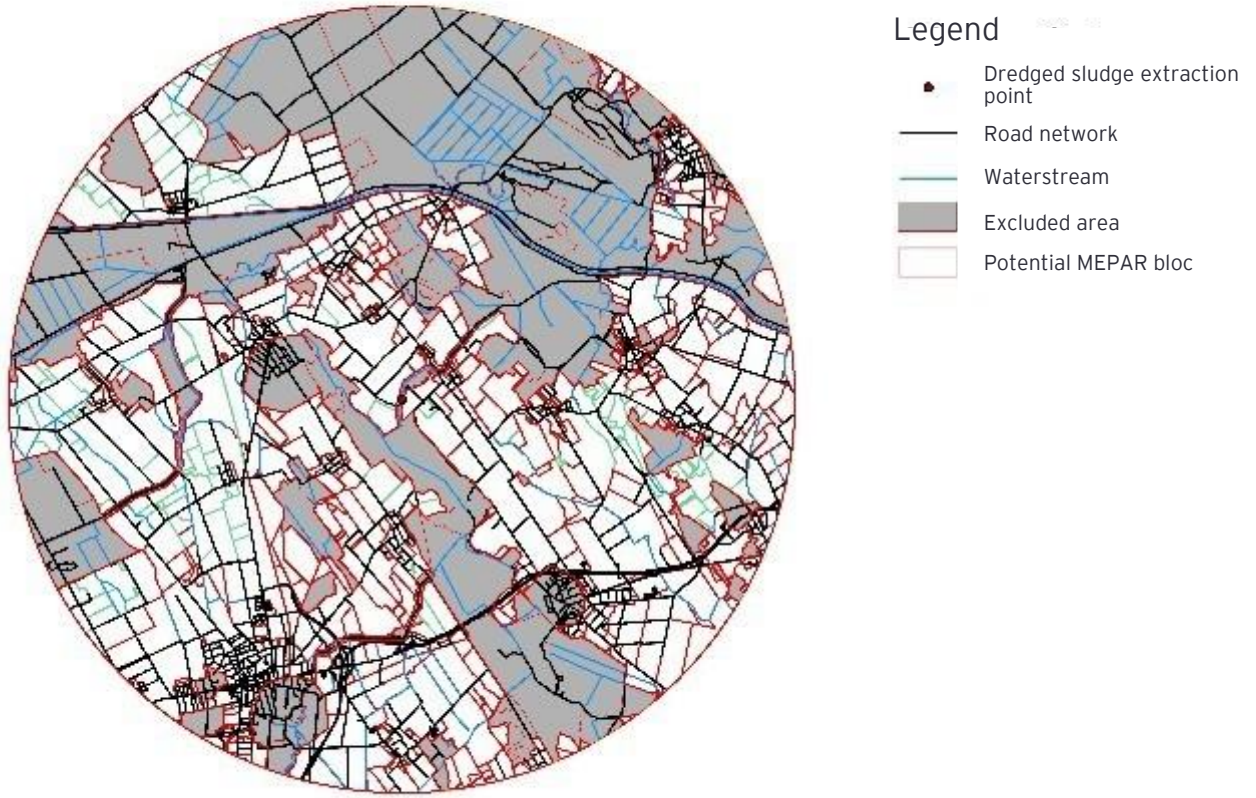


Geospatial analysis
Purpose and role of GIS map

2.3

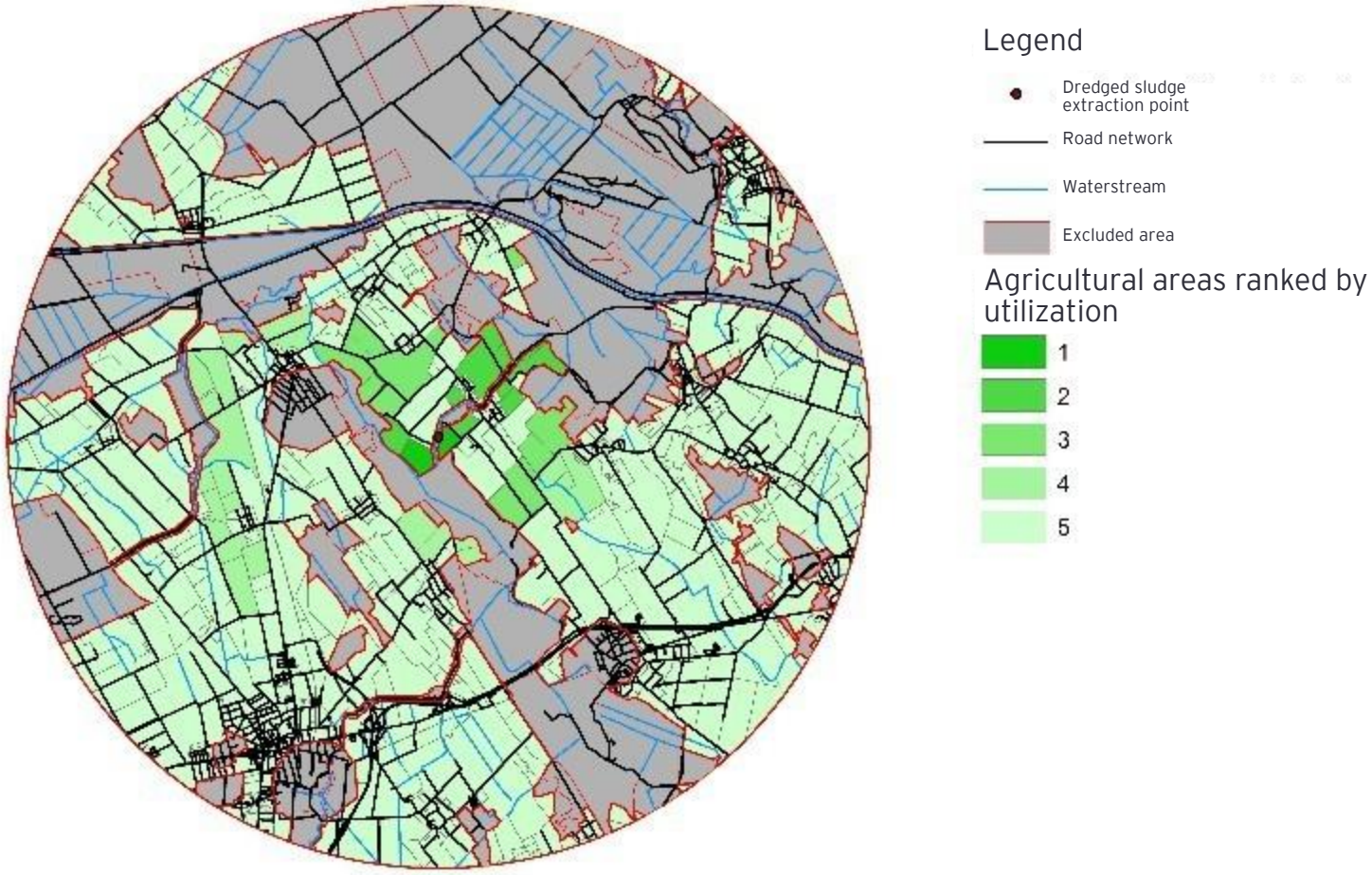
Function 2:

- Decision support for long-term planning
  - Identification of areas suitable for efficient agricultural use
  - Determination of optimal mix

Function 3:

- Data provision to farmers and those engaged in dredging activities
  - Where should it be placed: determining the optimal mix based on specific data and soil expert opinion
  - Support for soil science expert opinion - soil conditions, / slope

Mix selected based on required area size



Geospatial analysis
Purpose and role of GIS map

2.3

Function 2:

- Decision support for long-term planning
  - Identification of areas suitable for efficient agricultural use
  - Determination of optimal mix

category	area
2	35 16611
1	23 78929
1	40 36507
2	21 35418

Mix selected based on required area size

Function 3:

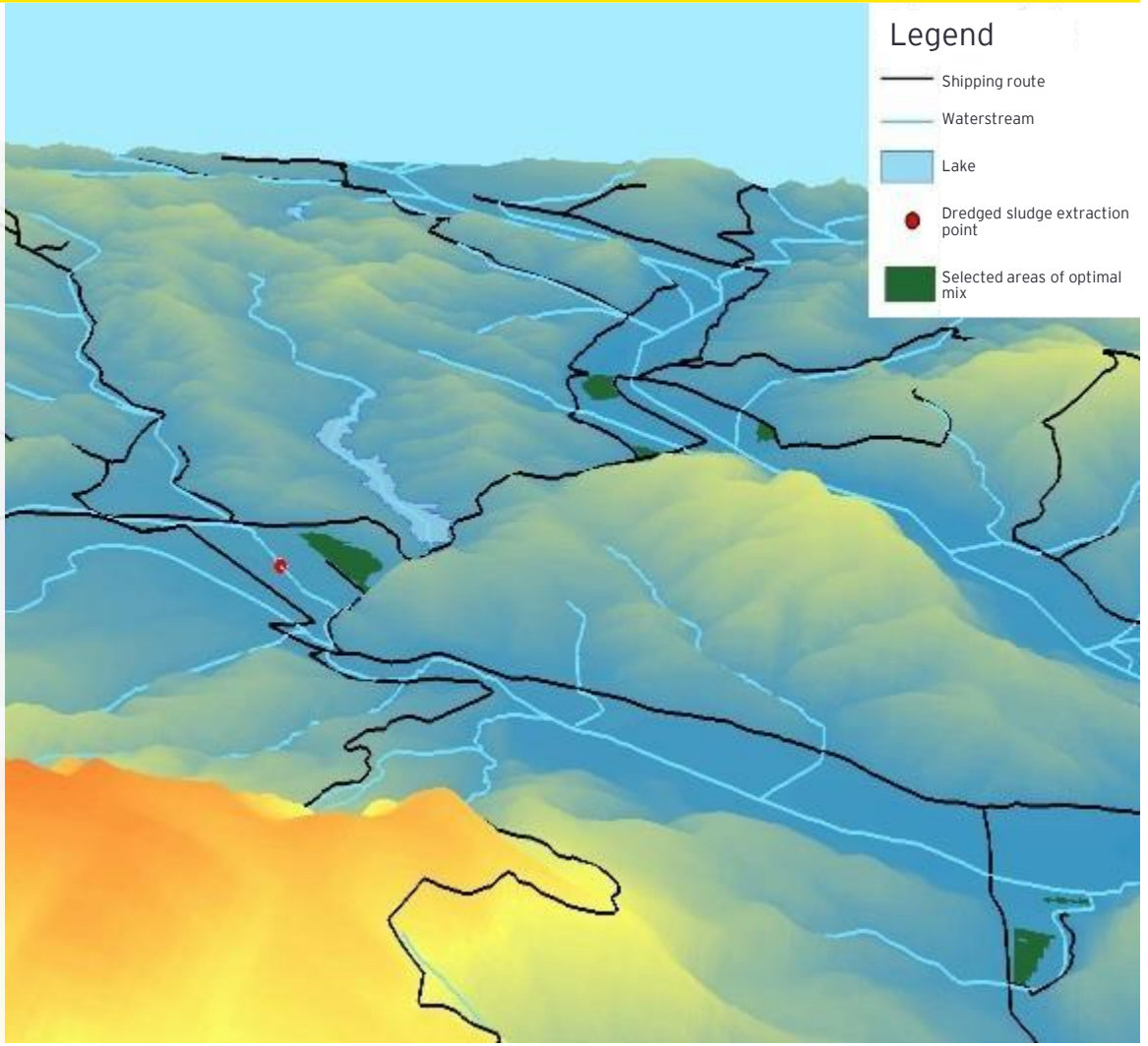
- Data provision to farmers and those engaged in dredging activities
  - Where should it be placed: determining the optimal mix based on specific data and soil expert opinion
  - Support for soil science expert opinion - soil conditions, / slope

Geospatial analysis
GIS map methodological process

2.3

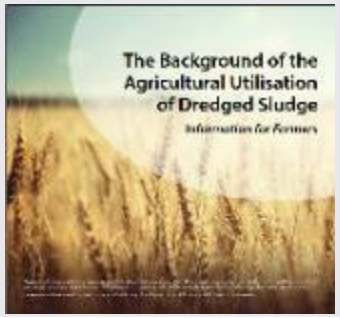
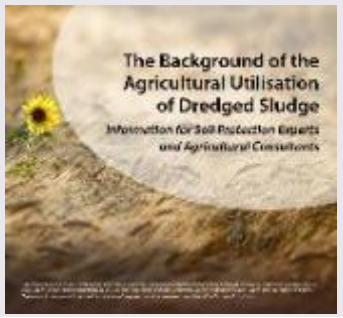
- Determining the starting point (where the sludge is)
- 10 km screening from the point (economical delivery based on cost-effectiveness analysis)

  (Can be expanded if necessary)
- Exclusion of protected areas, areas of other exclusionary reasons defined in the methodology (protected areas, inhabited areas, roads, railways, industry, even from real estate registers, e.g. national defense, MÁV, etc.)
- The remaining area is the potential application site
  - Conducting a GIS study based on an efficiency algorithm
  - Compilation of an efficiency mix based on the regional ranking and the amount to be applied
  - Specifying a route (optimal transport route calculation)
- Filtering categorized into blocks based on an optimal mix, e.g.:
  - Slope category
  - Surface covering
  - Soil type



Communication materials for the utilization of dredged sludge in agriculture

2.4

Performed Tasks	Goal of the task	The results of the performed tasks
Identification of farmers and preparing a survey	Preparation of the steps of information gathering by establishing the range of respondents and the topics of the questions	▶ A farmer was identified who had previously used dredged sludge on his land. We also identified farmer meetings where we could ask the farmers related questions. ▶ The questionnaire for soil protection experts and consultants was developed in close cooperation with the Chamber of Agriculture and Nébih.
Interviews with farmers and surveying soil protection experts and consultants	Understanding the attitude of farmers to soil management practices in general and specifically to the agricultural use of dredged sludge	▶ During the data collection, we assessed the previous experiences and expectations related to dredged sludge, as well as the possible advantages and disadvantages of using dredged sludge.
Formulation of communication guidelines	Formulation of main guidelines for farmers, soil protection experts and consultants on the utilization of dredged sludge	▶ Based on the data collection carried out in the previous deliverable, the government decree on the rules for the use of soil improvement dredge materials and treated dredge sludge on farmland, and the cost-benefit analysis completed in phase 3.1 of the project, we formulated the communication guidelines for farmers, soil protection experts and consultants.
Preparing communication materials	Summary of information related to the agricultural utilization of dredged sludge	 

The focus of the communication materials was determined by the results of the survey with agricultural consultant and soil protection experts and the farmer interviews

2.4

Conclusions of the survey

- It is necessary to place more emphasis on the legal background and the benefits of using dredged sludge;
- The complexity of the licensing process related to use should be reduced;
- For farmers, practical aspects (e.g. logistics, application technology, costs, distance, official procedures) are most important when considering the use of dredged sludge;
- Farmers are mostly concerned about the economic implications of using dredged sludge (increasing administrative burdens, availability of subsidies, difficulty in compatibility with CAP subsidies).

Conclusions of the farmer interviews

- Agricultural use requires serious (manual and mechanical) resources, the means of which are not available to all farmers;
- The biggest problem for them currently is the retention of precipitation and the rising fertilizer prices;
- Farmers do not have adequate knowledge about the possibility of agricultural utilization of dredged sludge, therefore they consider it important to provide extensive information;
- One interviewed farmer has had (positive) experience (in fruit growing) in the field of using dredged sludge; based on what he said, it significantly improved the structure of the soil and increased its ability to retain precipitation.

We prepared communication materials for 2 target groups, farmers, soil protection experts and agricultural consultants, with the following content:

- The background for the development of the regulation on the agricultural utilization of dredged sludge
- Legal framework
- Definitions
- Procedure to be followed and documents appearing in the procedure
- Possible benefits, costs and possible risks related to the agricultural utilization of dredged sludge and dredging
- The process of placement by indicating the documents appearing in the process and the actors involved
- Determining the amount of dredged sludge that can be applied to farmland and the method of use
- Requirements for the agricultural use of dredged sludge
- Questions and answers

Presentation of the results of the strengthening water monitoring workstream

The strengthening water monitoring workstream

The workstream consisted of compiling several professional documents with unique content, structured according to the following tasks

Performed tasks

Current water monitoring system, data collection necessary for the preparation of the RBMP

- 6.1 Scanning and presenting the organizations and institutions related to RBMP monitoring
- 6.2 Inception interviews with the organizations and institutions identified
- 6.3 Identification of international good practices and gap analysis
- 6.4 Diagnostic report on water monitoring and evaluation framework

Completed deliverables

D6. Data collection related to the preparation of the RBMP and diagnostic report on the current situation of monitoring activities on water

Policy options and recommendations related to the preparation of the RBMP monitoring

- 7.1 Formulation of policy options and recommendations
- 7.2 Preparation of an Action Plan supporting the implementation of the preferred policy options
- 7.3 Overview of European available programs for financing opportunities related to water monitoring
- 7.4 Organization of a workshop to present and promote the findings to the stakeholders

D7. Formulation of policy proposals and recommendations to develop an effective and integrated water monitoring framework and information system

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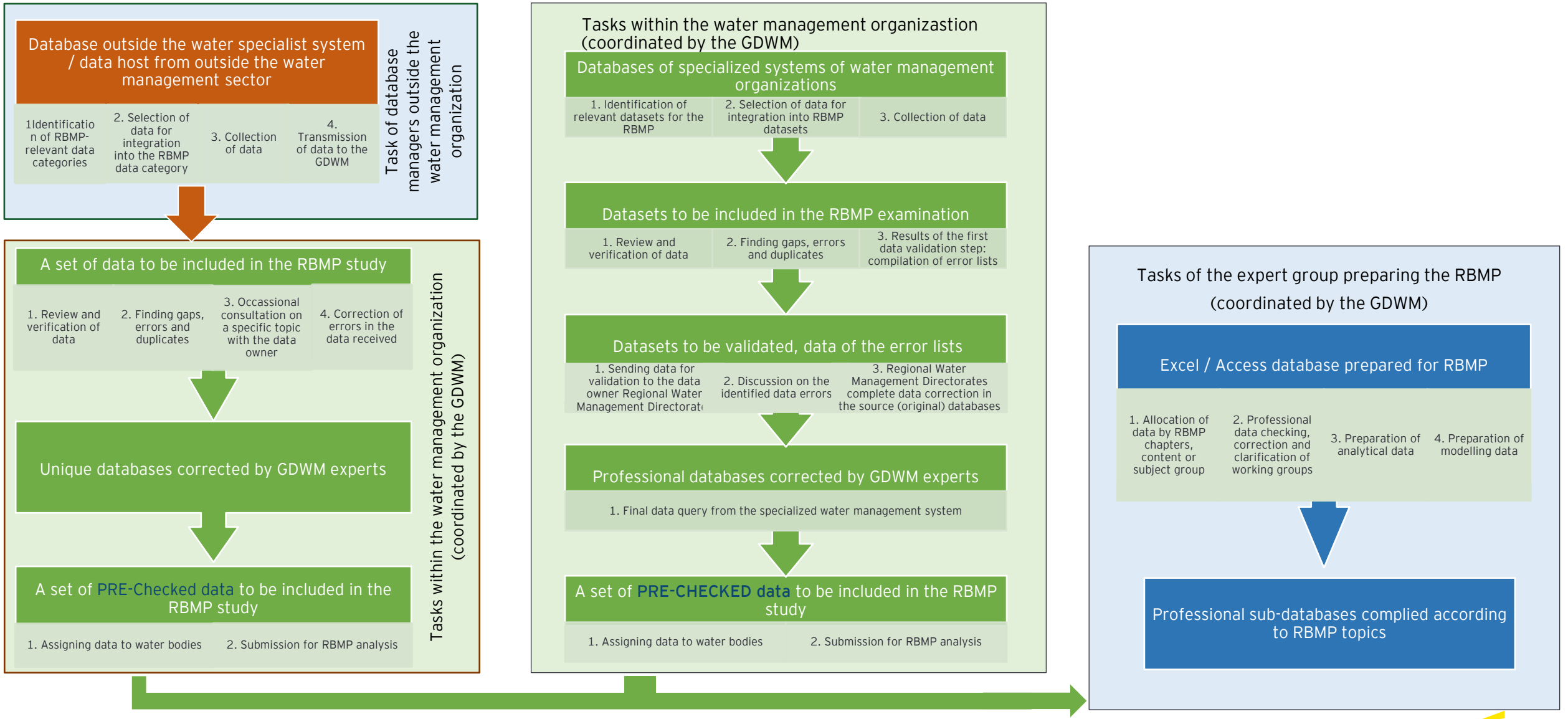
A Diagnostic report on the current monitoring activities

3.1

Performed Tasks	Goal of the task	The results of the performed tasks
Scanning and presenting the organizations and institutions dealing with water monitoring	Identification and presentation of the interest groups of monitoring domestic waters	▶ We identified the actors of the domestic water monitoring system and evaluated them in terms of their expertise in water policy, ability to assert interests, the main role they played in the preparation and implementation of the water monitoring system, and their impact on water monitoring. ▶ We have identified the databases related to monitoring, as well as indicated the role of the databases, their data manager, and the source of the data. ▶ Database survey of more than 20 professional organizations, first round interviews
Inception interviews with the organizations and institutions identified	Getting to know the experiences of the identified actors regarding the water monitoring system	▶ We got to know and presented the structure of the systems related to water data management, the experiences of data collection practices, the data quality control process, the characteristics of data transfer procedures, the frameworks and experiences regarding the use of data, the data circles relevant to RBMP and the processes of data transfer, as well as it's difficulties of development. ▶ Comprehensive examination and presentation of nearly 40 databases ▶ Second round interviews
Identification of international good practices and gap analysis	Getting to know European good practices and identifying factors that can be implemented regarding Hungarian conditions	▶ The Bulgarian and Estonian water monitoring systems, the International Committee for the Protection of the Danube, and the Eionet network were presented in the analysis.
Diagnostic report on water monitoring and evaluation framework	Presentation of the current operation of the water monitoring system based on the experience of the previous tasks	▶ In the analysis, we reviewed the related legal environment, evaluated the databases related to water monitoring, as well as international good practices. ▶ Exploration of data requirements for RBMP preparation, understanding the necessary time commitment, planning the steps and processes of data collection, and familiarization with the parties involved in the planning.

RBMP preparation process in the case of databases operating outside the water organization

3.1



Main challenges in data management related to the preparation of RBMP

3.1

- Several possible data sources are not known, the inclusion of which would be relevant
- Data comes from many different databases and data sources
- Data management is strongly segmented, which requires the application of different principles
- The results of the content control of data are mostly unknown to organizations outside of water affairs
- Incorrect data is also available incorrectly during the next data transfer
- The data is transferred in different ways and formats
- There are also conflicting data, the treatment of which can be clarified with significant work by experts
- There is a lack of data in some subject areas
- Considerable working time of several experts is occupied by receiving, collecting, organizing and checking the data
- Data collection process lasting a long time (at least a year).

Formulation of policy proposals and recommendations (1/2)

3.2

Performed Tasks		Goal of the task	The results of the performed tasks
	Formulation of policy options and recommendations	Based on a comprehensive analysis of the current operation of the water monitoring system, formulating proposals regarding the development of the system	▶ We formulated policy and legal proposals and recommendations for the development of the domestic water monitoring system, and primarily for the development of monitoring related to the preparation of River Basin Management Plans. ▶ The proposed monitoring plan includes the exploration and identification of the data to be included in the VGT planning, the delineation of the data migration process steps, the control of the quality of the data in several task steps, according to different principles. The proposal includes the aspects of the construction of the VGT gap database and the additional analysis, reporting and evaluation options based on it. The documentation of the current VGT report can be compiled based on the content principles of the VGT evaluation and VGT result databases that rely on the gap database. ▶ The regular data collection with VGT monitoring also provides the opportunity to compile additional professional documents, reports, decision preparation materials, and ITV.
	Preparation of an Action Plan supporting the implementation of the preferred policy options	Assignment of tasks and their schedule in addition to the proposals	▶ We developed a detailed Action Plan to help the implementation of the accepted policy proposals and recommendations, in which the conditions and steps for starting the implementation, the necessary IT support, and further actions based on the proposed VGT monitoring step were delineated for the phases of VGT monitoring development. The Action Plan includes the risks and steps delineated to mitigate them, the proposed responsible organization for the given implementation stage and the time period within which the preparation of the given stage of the VGT is recommended.

Formulation of policy proposals and recommendations (2/2)

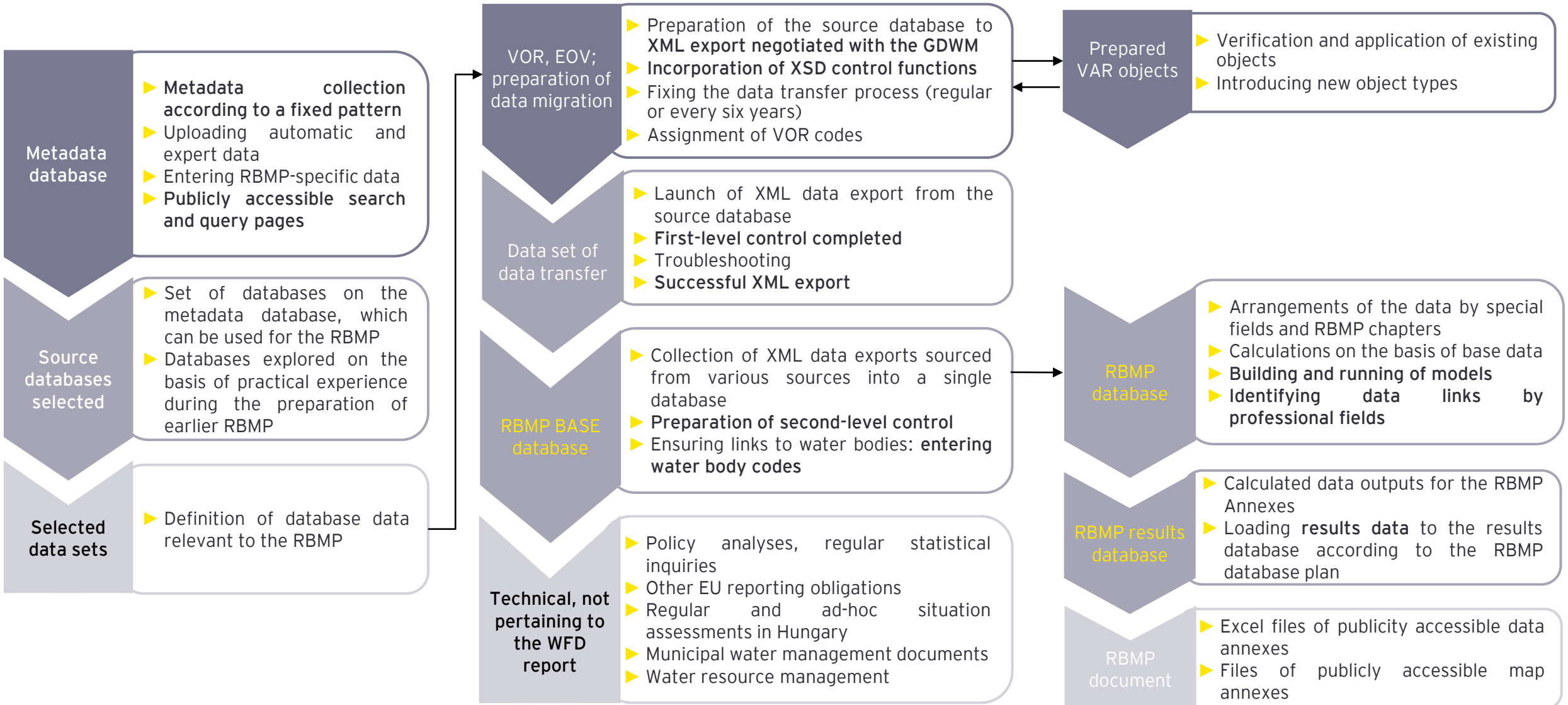
3.2

Performed Tasks		Goal of the task	The results of the performed tasks
	**Overview of European available programs for financing opportunities**	Overview of the programs supporting the establishment of the water monitoring system in Hungary	▶ Based on the results of previously completed tasks, in order to support the development of the monitoring system and the implementation of the task steps defined in the Action Plan, we mapped the potential financing opportunities provided by the European Union through document analysis and research.
	**Organization of a workshop to present and promote the findings to the stakeholders**	Overview of workstream tasks and results	▶ This workshop serves to present the results of the workstream.

Recommended development steps

Overview of the process of the proposed RBMP monitoring system

3.2



Development of metadata, metadata database; delimitation of data migration databases

3.2

Exploration and selection of source databases and data relevant to the RBMP based on metadata

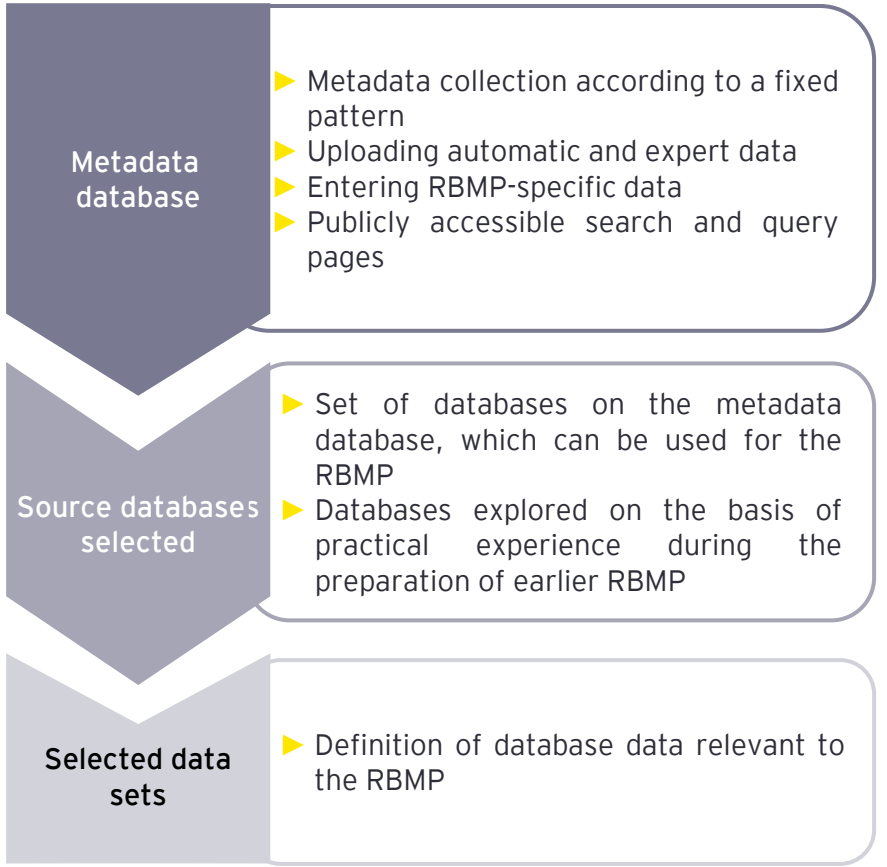
- Designation of well-defined data sets in the data acquisition process
- Examination of new databases and their data
- Possibilities of integrating individual data and results (e.g.: results of programs, projects)
- Mandatory completion of a metadata sheet, regular updates, open data and publicly searchable database
- Compliance with legal regulations related to the tasks.

Source databases for RBMP data collection, data included in data migration

- Based on metadata, the relevant data ranges can be delimited
- Previous professional experience

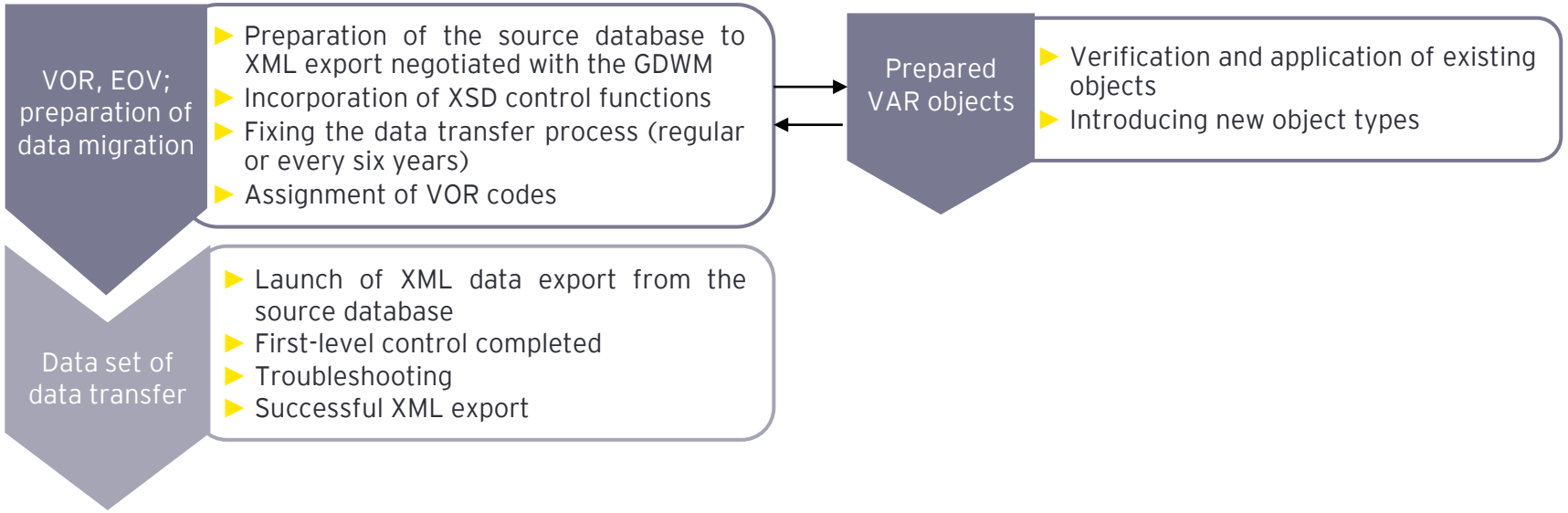
It is recommended to automate several steps of the regular data transfer process.

- Built-in, programmed controls in the data export from the source database (deficiencies, unit of measurement, identification codes, etc.)
- Professional programmed control in the data import process (contradictions, outliers, etc.)



Data migration support

3.2



Definition of a common identifier to support regular data transfer: **Introduction of common identifiers for specialist systems outside the water organization to support monitoring**

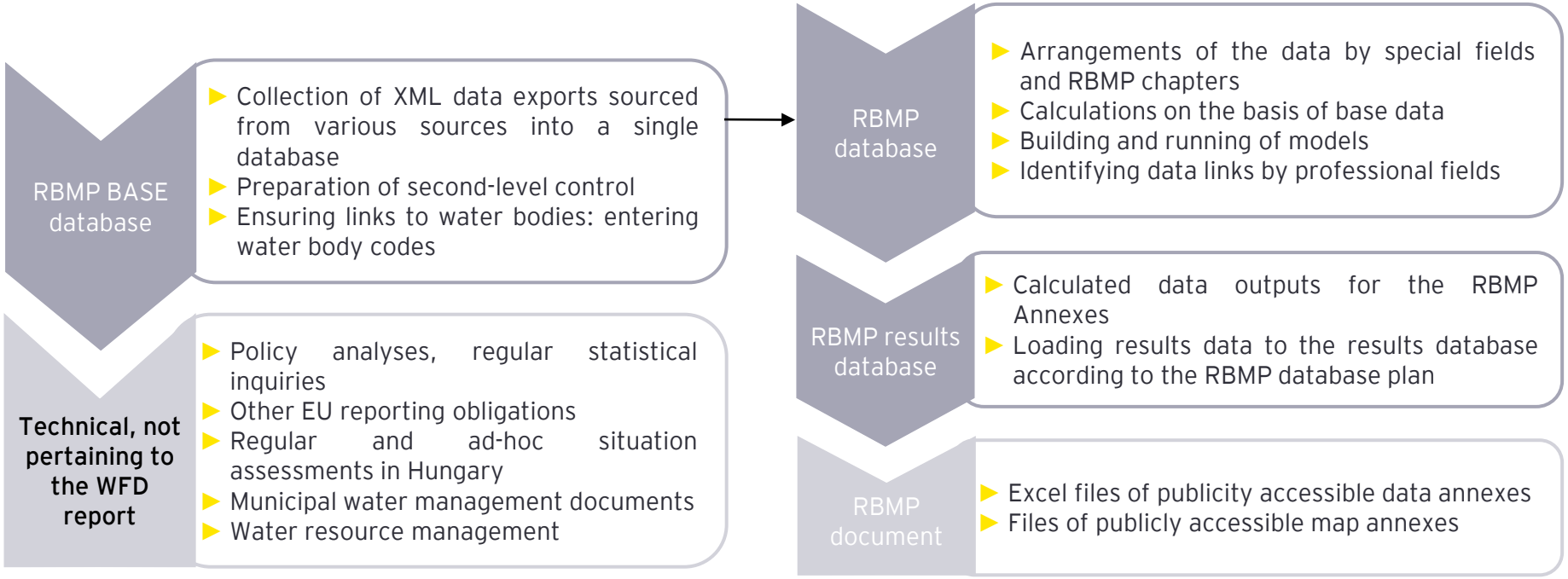
- *Preparation of source databases for common identifiers*
- Preparing VAR to use the new identifiers

According to the RBMP monitoring, different development tasks can be planned based on the frequency of data transfer:

- ***Data transfer every six years:*** no permanent connection to VIZIR - source databases affected by individual data transfer;
- Databases involved with ***regular connection*** and data transfer to VIZIR
  - to support water planning tasks;
  - with application programming interface (API) development, regular data exchange in a fixed format provided via a web interface.

IT and methodological support

3.2



IT support principles:

- Data export in a uniform format (XML support), fixed migration steps;
- Professional data delimited from the point of view of RBMP;
- Built-in automatic checks;
- Multi-level validation process
- Uniform identification codes;
- Data export time is fixed;
- Data to aid territorial identification (EOV, settlement name, etc.).

Methodological support tools:

- Data verification (using XSD): when data is transferred and loaded into VIZIR (automatic formal and professional corrections)
- Application of statistical tools in data quality control and analysis processes, introduction of the use of Big Data, AI tools;
- Artifical Intelligence use:
  - Data validation, data interpretation and missing data substitution
- Application of GIS tools, introduction of EOV coordinates;
- Reporting modules adapted to regular reporting needs.

General advantages of recommended RBMP monitoring

3.2

- Freeing up expert time
- It can be incorporated and used in the current RBMP preparation, evaluation and analysis process
- Improving the quality of data that can be used for analysis
- Organizing previous data into a monitoring system supports the tracking of changes
- Application of more complex analysis options, on the basis of which additional water management challenges, opportunities, and solutions can be identified
- In addition to VGT compilation, additional documents, analyses, decision preparation materials, WISE document, ITTV, etc. can be complied.
- The development process consisting of several modules and delimited task steps provides the opportunity to connect to additional water resource management models
- Providing a public interface for expert data requests and general information
- Fulfillment of EU and other international data reporting obligations

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