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Brief Description	The current document is a guide for the HYDROUSA Consortium to identify, evaluate, respond, monitor and control the risks that may arise during the project's implementation. Furthermore, it aims to provide appropriate contingency planning to mitigate the impact of these risks if the latter occur.
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EXECUTIVE SUMMARY

This document aims to provide a guide for identifying, evaluating, responding, monitoring and controlling the potential risks that may arise during the project's implementation. Furthermore it aims to provide appropriate contingency planning to mitigate the impact of these risks if the latter occur.

In particular, this document describes the whole process for managing risk, defining responsible organizations and describing analytically the method of risk monitoring. Most of the potential risks presented in this document have already been identified and examined during the grant preparation phase. This deliverable records for each of the risks information on the likelihood of their occurrence and their possible impact on HYDROUSA activities. Moreover, additional risks have been identified and are presented since the project's initiation (i.e. first 8 months). The latter were highlighted in the recent Quarterly Reports submitted to the Coordinator (CO) by the Work Package leaders. Quarterly Reports are submitted, as they name would suggests, every three months for the duration of the project. The Quarterly Report template includes some sections on the progress of each work package, identified issues, emerging risks, dependencies with other WPs, and communication activities that take place within the three-month reporting period. In this way, the project CO and the Technical Manager (TM) have the opportunity to monitor the evolution of the existing risks and the recently-identified ones. The Quarterly Report template is given in Annex of this document.

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ABBREVIATIONS

CO	Coordinator
Executive Committee	ExC
Project Officer	PO
Steering Committee	SC
Technical Manager	TM
Work Packages	WPs
Work Package Leaders	WPLs



1. INTRODUCTION

Risk management is an ongoing process throughout the lifetime of a project and involves the process followed for risk mitigation. More specifically, this process involves identifying, analysing, monitoring, controlling, mitigating and reporting the potential risks.

This document describes in detail the procedures followed for the identification, management and monitoring of risks, which may cause various impacts on the project. This process is continuous, and the risk assessment will be updated throughout the life-time of the project. The current document is the Risk Management Plan, which describes the factors that have been observed as a potential risk for the implementation of HYDOUSA's project activities. Moreover, this plan determines the estimated impact of the risks and the means of mitigating them through appropriate contingency planning. Finally, the process of monitoring the identified risks is also defined in order to reduce the likelihood of the occurrence of the risks but also their impact if these they arise.

2. RISK MANAGEMENT PROCESS

2.1 Responsibilities

As described in the Consortium Agreement developed and signed by all partners at the beginning of the project (Month 1) between the project partners, the Coordinator (CO) and the Technical Manager (TM) are responsible for the risk management and contingency planning activities of the project. However, all partners should be involved in this process, while each risk is assigned to specific partner(s). The Work Package leaders will be responsible for monitoring and reporting the risks within their Work Packages (WPs). Work Package Leaders (WPLs) will ensure the identification and management of the risks of their WP and they should immediately inform the CO when a risk occurs. If new risks are identified, they should be reported to the CO. The risks will be reported in the Risk Assessment Table, which also includes the mitigation actions and contingency plan.

The achievement of the project's goals (including deliverables and milestones) will be monitored on a continuous basis by the CO and the TM. If these are not (fully) met, the WPLs will be asked to explain the reason and to propose measures to alleviate this situation. If a technical goal cannot be achieved in its entity the technical gap will be evaluated and where possible quantified. The Steering Committee (SC) will decide whether this is still acceptable for the work activity to continue or whether other courses of action are required. In the unlikely event of a technical goal being unachievable and required to be dropped in the interest of the project as a whole the EC Project Officer (PO) will be consulted.

2.2 Risk Management Process

Figure 1 illustrates the process followed to address the risks that may occur during the project, regardless of the project's management level (Strategic, Executive and Operational).



Figure 1. Risk Management Process

2.2.1 Risk Identification

Within the Grant Agreement, the HYDROUSA project team has identified some potential risks and mitigation measures, which are listed in Table 1 of this document and in Section 1.3.5 on Critical Implementation Risks and Mitigation Actions. These have been recorded in EC portal, so as to be subject to updating on a regular basis. The following issues are considered as tools for identifying the potential risks:

- Analysis of deliverables and milestones status
- Analysis of WP progress
- Regular communication between the CO, TM and the WPLs

The Risk management register should contain the following information: risk number, nature of threats, description and likelihood, WP affected and proposed risk management mitigation measures.

2.2.2 Risk Assessment

The exposure to each potential risk is estimated using the risk matrix of Figure 2. Concerning each of the risks, the CO in collaboration with the TM and the WPLs will estimate the probability of risks and the level of their impact in project implementation (Low/Medium/High/Critical).

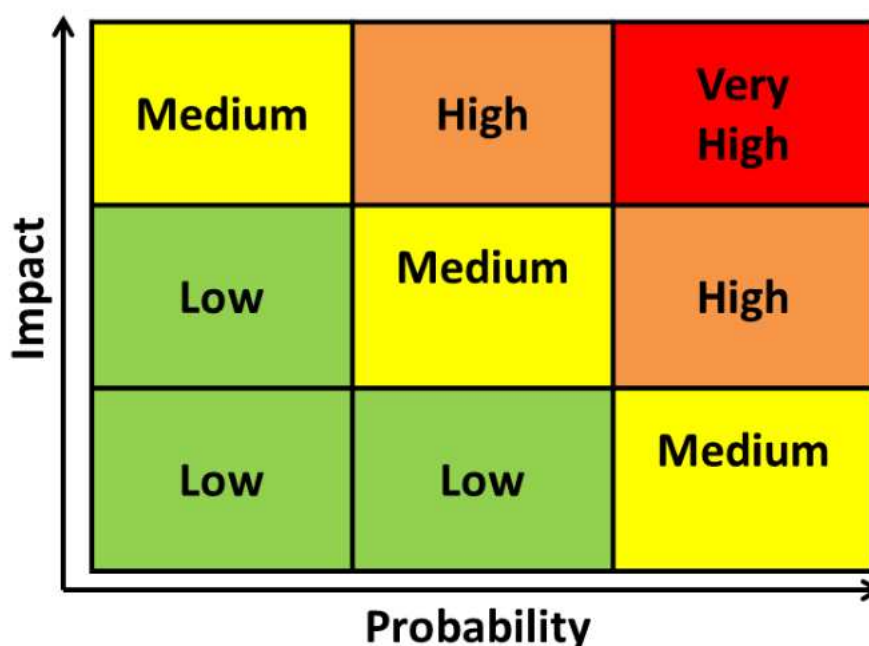


Figure 2. Risk Matrix

2.2.3 Risk response

After identifying and assessing the potential risk, the organization/person responsible for risk management (as described in Part 2.1), should apply measures to prevent potential threats that may have an impact on the project's implementation. The strategies are briefly outlined below:

- **Avoid:** Seeking to eliminate uncertainty and the factors that cause the risk
- **Mitigate:** Reducing the probability and/or severity of the risk when it has already been identified



Furthermore, three response strategies will be considered in cases where risks are transformed into project opportunities:

- **Exploit:** Eliminating the risk uncertainty by making the opportunity definitely happen in those cases where its occurrence would have a positive effect on the achievement of project objectives.
- **Share:** Allocating ownership to a third party who is best able to handle the opportunity for maximizing the probability of occurrence, and increasing its potential benefits
- **Enhance:** Increasing probability and/or impact, identifying and maximizing key risk drivers.

2.2.4 Monitoring, Controlling and Reporting

The risk monitoring process is an ongoing process that should be implemented throughout the project and is carried out as follows:

1. Each risk described in Table 1 and Table 2, as well as the new risks that may occur during the lifetime of the project, are assigned to a partner for monitoring.
2. In case of an alteration of the risk status or level, the Responsible Partner should report this directly to the TM and the CO. The CO and TM will assess the risk and, in cooperation with the responsible partner, will implement the contingency plans.
3. The risks identified as "critical or high" will be monitored additionally by the HYDROUSA Coordination Team.
4. All WPLs report the progress at the end of each quarter. The Quarterly Reports include sections on the progress of each WP and on issues that have been identified and should be resolved. In the Quarterly Reports, potential risks are determined by taking a RAG state (Red, Amber, and Green, corresponding to High, Medium, and Low, respectively). The template of the Quarterly Report is attached in Annex 1. Quarterly reports are submitted to the project CO for evaluation and their final form is available for review by all partners on the HYDROUSA Google Drive. Moreover, the WPLs have defined internal milestones in their WPs, so as to control the progress of the project at the WP level; the milestones outlined above are shown in the quarterly report presented in Annex 1. Furthermore, every 6 months an assessment of each activity will be carried out to monitor whether it runs behind the project timetable.
5. The Project CO organizes Executive Committee (ExC) meetings on a bi-monthly basis, where the issues that may have arisen are included in the agenda as a separate subject, so that they can be discussed and solved.
6. Meetings of the SC (including one representative of each partner) take place every 6 months, where possible risks can be reviewed.



3 RISK MANAGEMENT REGISTER

The following tables list both the risk identified by the Consortium before the official start of HYDROUSA project and the risks identified during the first 8 months of the project's implementation.

Table 1. Risks already identified in HYDROUSA Grant Agreement

Risk No	Risk Type	Description	WPs Affected	Probability	Impact	Proposed risk management mitigation measures- Responsible
1	Installations and assets integrity	Theft	2, 3, 4, 5	Low	Medium	Systems installed in the partner premises (Monitored by NTUA (HYDRO1), MINAVRA (HYDRO2), DEL (HYDRO3&4), TINOS (HYDRO5) and ELT (HYDRO6))
2	Installations & assets integrity	Distribution losses due to pipe/ monitoring failures	2, 3, 4, 5	Low	High	Maintenance and control of pipe/monitoring systems (Monitored by NTUA (HYDRO1), MINAVRA (HYDRO2), DEL (HYDRO3&4), TINOS (HYDRO5) and ELT (HYDRO6))
3	Contamination and pollution	Contamination of reclaimed water by bacteria	2, 4	Medium	High	Check performance of UV (Monitored by NTUA (HYDRO1) and ELT (HYDRO6))
4	Contamination and pollution	System affected negatively by air pollution	2, 5, 6	Low	Medium	Monitoring the water quality continuously (Monitored by DEL (HYDRO3&4) and ELT (HYDRO6))
5	Contamination and pollution	Pathogens, pests reducing overall crop yields and productivity; local farmers apply chemical pesticides to combat this	4, 6	High	High	Bio-active compounds; bio-technical methods; natural pest control; include plants attracting natural enemies of pests (Monitored by ISOF)



6	Contamination and pollution	Soil-borne diseases that need to be identified and addressed	4, 6	High	High	Comprehensive soil analysis before planting; natural control (Monitored by ISOF & AGENSO)
7	Contamination and pollution	Organic crops being affected by cross-contamination from traditional crops in the area	4, 6	High	High	Buffer-zones (Monitored by ISOF)
8	Contamination and pollution	Limitation of the analytical methodology for certain micropollutants	4, 6	Medium	High	New methodology developed for selected compounds and most common crops (Monitored by ICRA)
9	Permissions and Construction	Delays in system construction	2, 3	Low	High	Early ordering of equipment (Monitored by MINAVRA (HYDRO1&2), DEL (HYDRO3&4), PLANET (HYDRO5) ELT (HYDRO6))
10	Permissions and Construction	Delays in acquiring permissions	2,3,4,5,6	Medium	High	Start procedure to obtain licenses immediately (Monitored by NTUA)
11	Policy and Legislative issues	Policy context is a major barrier against the HYDROUSA water loops	6, 7	High	High	The HYDROUSA partners are involved in the ongoing innovation deal on water reuse, so a fast track to deal proposal and implementation can be expected (Monitored by UNIVPM & NTUA)
12	Policy and Legislative issues	National/local legislation and policy context in local language	6, 7	High	High	Local stakeholders are engaged and budget is planned for translation (Monitored by UNIVPM)
13	Operational	Difficulty on designing the ICT infrastructure to fully support all of the sources	5, 6	Low	Medium	AGENSO will contact partners responsible for a component or a data source. Detailed specification of components and data source is drafted to make it easy to be used (Monitored by AGENSO)
14	Operational	Delay on development of HYDROUSA's network, data repository, API or monitoring and controlling platform	5, 6	Low	Medium	Contact other researchers/companies for support; or use third party components during the construction delay period (Monitored by AGENSO)



15	Operational	Delay in the implementation of treatment process train (supposedly first campaign in the 2 nd year and the second the 3 rd year)	5, 6	Low	Medium	The two sampling campaigns will be both performed in the 3 rd year (Monitored by MINAVRA (HYDRO1&2), DEL (HYDRO3&4), PLANET (HYDRO5) ELT (HYDRO6))
16	Operational	Some of the selected compounds will not appear in any samples of any site in the 1 st sampling campaign	5, 7	Medium	Medium	These compounds will not be analysed in the 2 nd sampling campaign and, when possible, substituted with other ones (Monitored by ICRA)
17	Operational	Inferior performance of the treatment systems	5	Medium	High	Replace problematic/defective component, after operating conditions to improve performance (Monitored by MINAVRA (HYDRO1&2), DEL (HYDRO3&4), PLANET (HYDRO5) ELT (HYDRO6))
18	Access to accurate Data and Information: Robustness of models and analysis	Lack of appropriate, accurate and suitable data from plants (real-time and historical data)	6	Low	High	Early evaluation of monitoring and control and data management systems. Use of ad-hoc data acquisition and manual data acquisition (Monitored by UBRUN)
19	Access to accurate Data and Information: Robustness of models and analysis	Inter-operability issues could cause delays problems with data integration.	6	Medium	Medium	Regulations already in place in other countries (Greece, Italy) will be taken into account. (Monitored by SATIS & AGENSO)
20	Access to accurate Data and Information: Robustness of models and analysis	Incompleteness of the data retrieved to perform the business plan	8	High	High	Gathering Consortium expertise, interviews and surveys with industry players, experts and end-users, several secondary sources (Monitored by SEMIDE)
21	Access to accurate Data and Information: Robustness of models and analysis	Business Plan reveals failure of market potential	8	Medium	High	Address the exploitation of the solution road to market through replicability and interaction with users and decision makers (Monitored by SEMIDE)



22	Access to accurate Data and Information: Robustness of models and analysis	Agro and eco-tourism activities are not financially viable	8	Medium	High	Consider initial cooperative as start-up incubator (Monitored by ELT)
23	Dissemination activities	Low involvement of stakeholders in events	9	Low	High	Use extensive network of IHA and project partners to mobilize stakeholders; Carry out interviews to pinpoint the problem of low engagement; revise dissemination plan and introduce new dissemination and communication activities (Monitored by IHA)
24	Project Management and Control	Permit is rejected	2, 3, 4, 5, 6, 7	Low	Very High	The team is experienced in obtaining licencing. In case the permit for the area is not granted we will relocate the site (Monitored by NTUA)
25	Operational	The weather conditions in the two years are not favourable to carry out successful agricultural experimentation	4	Medium	High	The demo sites are in 5 different locations with diverse micro-climate conditions. The crops are irrigated based on the HYDROUSA water treatment systems and water reservoirs, which will eliminate the effect of dry season conditions. (Monitored by NTUA and ALCN)
26	Operational	Local partners responsible for the daily monitoring and management of the trials have not had the experience to carry out agricultural trials.	4	Medium	Medium	The coordination team has previous experience and collaboration with the local partners, which ensures a smooth cooperation and execution of the experiments. ISOF has long experience with organic crop experimentation, which will ensure good management of the trials. In case of additional expertise needed in specific areas, such as diseases, weeds or pests, the coordination team will be in contact with experts from the specific domains from the Agricultural University of Athens, which has very good ties with the CO (Monitored by ISOF & AGENSO)



27	Operational	Not sufficient monitoring of the agricultural demo sites, which can result in not having representative results	4	Low	High	Under Task 5.4, monitoring sensors will be placed in the demo sites and the developed platform will be implemented to monitor and track all farming practices. This will ensure a digital monitoring of the cropping system to avoid any bad practices. (Monitored by AGENSO)
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Table 2. Further risks identified during the first 8 months of the project

Risk No	Risk Type	Description	WPs Affected	Probability	Impact	Proposed risk management mitigation measures
28	Dissemination activities	No of participating stakeholders in the co-creation workshops; Small representation and harvest of input - not reaching satisfying input to our key question	4,5,9	Low	Very High	Apply diverse methods of reaching out and collecting input - personal interviews, questionnaires, focus groups (Monitored by IHA)
29	Dissemination activities	Very diverse target audiences, different interest into the project from different stakeholders	9	Low	Medium	Build personal relationships; get actively involved with the local partners and start building the first core of the project (Monitored by IHA)
30	Operational	Delay in evaluation maps for the agroforestry sites	4	Medium	High	Site visit in demo sited during March, 2019 (Monitored by ISOF & AGENSO)
31	Operational	Delay in soil analysis report	4	Low	Low	Expert meeting/workshop (couple of agroforestry design) (Monitored by ISOF)



32	Operational	Lack of appropriate field data – overestimating the technology capabilities or functionalities	6	Low	High	Simulation of data, estimations and assumptions. Use scientific methods for model V & V caused by inaccurate or missing data. Data simulation (e.g. Monte Carlo simulations), Heuristic (experience, interviews, surveys, and knowledge based evaluations) (Monitored by SATIS)
33	Operational	Producers, target consumers and project partners engagement do not provide data at the right time and interval	6	Low	Medium	Clearly communicate with parties involved of the logic, type, extent of the data required to generate the models for the sustainability assessment (Monitored by UBRUN)
34	Operational	Start-up: Delays in System proper operation	2,3,5,6	Low	High	Mobilise personnel and ensure support from technology providers during start-up (Monitored by NTUA (HYDRO1), MINAVRA (HYDRO2), DEL (HYDRO3&4, PLANET (HYDRO5), ELT (HYDRO6))
35	Operational	Results are not representative from the monitoring of the pollution and food safety due to high temporal variability of micropollutants profile on the demo scale	5,6	Medium	Medium	Plan the sampling campaigns so that to capture the pollution profile during different operational conditions of the system (Monitored by ICRA)

The following Figure shows the project's risk matrix by month 8.

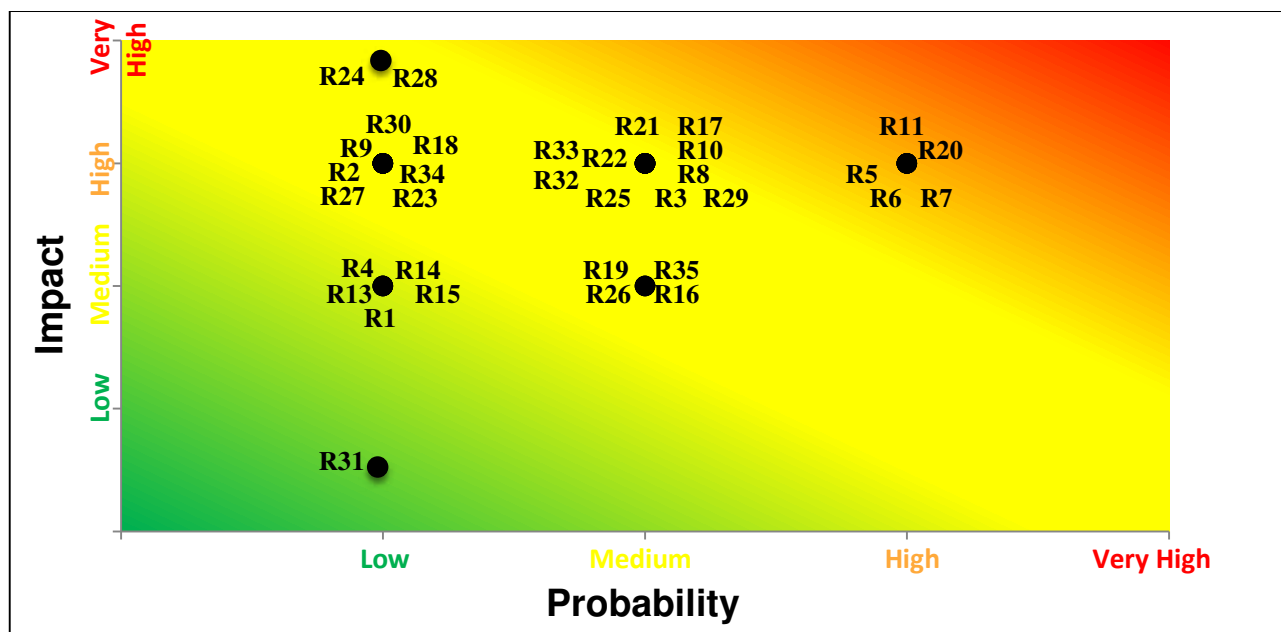


Figure 3. Risk Plot – to be used by the HYDROUSA Consortium as a guide for the assessment and monitoring of identified risks



4 ANNEX 1

Example template of the quarterly reports for the HYDROUSA project

Document Information

Work Package Quarterly Reports	
Work Package Number	
Work Package Title	
Lead Beneficiary	
Work Package start date	

Deliverable No	Title	Due date

RACI Table for WP

Organization	WP1			
	T1.1	T1.2	T1.3	T1.4
NTUA	R-A	R-A	A	R-A
ALCN	C	C	C	C
UBRUN	C	C	C	C
MYKONOS	I	C	C	I
UNIVPM	C	C	C	C
SEMIDE	C	C	C	C
HUSD	I	C	C	I
ISOF	C	C	C	C
IRIDRA	I	C	C	I
PLANET	I	C	C	I
WssTP	I	C	C	I
ICRA	I	C	C	I
ASA	I	C	C	I
AGENSO	C	C	C	C
RADKE	I	C	C	I

ELT	I	C	C	I
IHA	C	C	C	C
CWP	I	C	C	I
DEL	I	C	C	I
BIOV	I	C	C	I
PLENUM	I	C	R	I
MINAVRA	I	C	C	I
LESVOS	I	C	C	I
TINOS	I	C	C	I
AERIS	I	C	C	I
SATIS	I	C	C	I
MEMIRA	I	C	C	I

R = Responsible (person working on activity)

A = Accountable (person with decision authority)

C = Consult (key stakeholder who should be included in decision on work activity)

I = Inform (needs to know of decision or action)

Table of Internal Milestones for WP

Internal Milestone No.	Title	Due date	Status/Action
IM2.1			
IM2.2			
IM2.3			
IM2.4			

Progress to date on WP including deliverables and milestones

Summary of progress made.

First Quarter

RAG status (for progress)

Red R= activity not going to plan needs remedial action

Amber A= activity experiencing some problems but still on track.

Green G= everything going according to plan.

(Please fill in the corresponding colour and write the capital letter)



Issues identified that need to be solved <i>(Explanation of the issue who is responsible and the date this will be resolved)</i>	
Dependencies with other WPs Any issues with known dependencies? Any new dependencies between the work packages?	
Budget <i>How it work package managing the spend vs forecast? Is it on track?</i>	
Risks (Include both high level project risk and work package risks) <i>What risks have been identified?</i> <i>What is the Impact & likelihood of the risk materialising?</i> <i>Include an action update – description of what is being completed.</i> <i>Responsible person and date the action is required.</i>	
RAG status (for progress) Red R= Likely to happen Amber A= Could happen Green G= Unlikely to happen	(Please fill in the corresponding colour and write the capital letter)
Outstanding actions <i>Include a description of the action. Who is responsible for completing the action, what support or decision are needed from others and by what date.</i>	
Stakeholder engagement activity since last report	
Communication activity since last report	
WP planning for the next 3 months	