GeoERA

Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe

Technical review report for project HOVER

This report is part of a project that has received funding by the European Union's Horizon 2020 research and innovation programme under grant agreement number 731166.

INTRODUCTION

Technical review report is part of GeoERA's Monitoring and evaluation process for co-funded projects (*hereinafter: project*). The aim of a technical review is to assess the work carried out under the project over a certain period and provide recommendations. Such technical review evaluates the project reports and deliverables, the proper use of resources, the management of the project and the expected impact.

Technical review report consists of four sections, each representing one level of monitoring and/or evaluation of the project:

Level	Monitor / Reviewer	Input	Aim
1 – Monitoring of progress indicators	Monitoring and reporting officer (GeoZS)	MPPR* FPPR**	Monitoring of the effectiveness of implementation of selected projects with respect to finance, time and administration.
2 – Scientific review	Reviewers (GeoZS)	Submitted deliverables MPPR FPPR	Quality review of the deliverables and review of achieving scientific and professional goals.
3 – Review of the theme progress	Theme coordinators	MPPR FPPR	Review of achieving theme objectives.
4 – GeoERA Progress evaluation	Stakeholder Council member(s)	Sections 1 and 2 of this report Review meetings	Overall project progress and general recommendations.

*MPPR = Midterm Project Progress Report (see PI doc no 2)
**FPPR = Final Project Progress Report (see PI doc no 2)

Monitoring and evaluation process:

M0 = End of reporting period
M1 = Submitted (Final) Project progress Report (MPPR / FPPR)
M2 = 1 – Monitoring & 2 – Evaluation
M3 = 3 – Evaluation of the theme progress
M3 = (Final) Review Meeting & 4 – Progress evaluation

Each project will be reviewed twice: for first project period M1-M18 – Technical review report, and second project period M19-M36 – Final review report.
Technical review report is based on Horizon 2020 templates but adopted to GeoERA needs. Technical reviews of projects shall be carried out on a confidential basis.

GENERAL INFORMATION

ERA-NET Cofund Grant Agreement:	731166
ERA-NET Cofund acronym:	GeoERA
Call identifier:	H2020-LCE-2016-2017/H2020-LCE-2016-ERA
Project full title:	Hydrogeological processes and Geological settings over Europe controlling dissolved geogenic and anthropogenic elements in groundwater of relevance to human health and the status of dependent ecosystems
Project acronym:	HOVER
Project reference number:	GeoE.171.013
Project topic:	Groundwater
Project specific topic:	GW1-Drinking water, human and ecosystem health
Lead partner:	BRGM Bureau de Recherches Géologiques et Minières (The French Geological Survey)
Project website:	https://geoera.eu/projects/hover8/

☒ Technical review report
☐ Final review report

Period covered	01/07/2018 – 31/12/2019
Review meeting date	14.02.2020

Contributor:	Role:	Approved on:
Barbara Simić	Monitoring and reporting officer	01.03.2020
Maja Ilić	Monitoring and reporting officer	02.03.2020
Jure Krivic	Scientific reviewer	02.03.2020
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Marija Krivic	Scientific reviewer	10.03.2020
Klaus Hinsby	Theme coordinator	01.03.2020
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Andree Bolduc	Stakeholder Council member	26.03.2020

1 LEVEL 1 – MONITORING OF PROGRESS INDICATORS

In this section the project is monitored "remotely" on the basis of the respective reports. This part is filled in by Monitoring and reporting officer with aim to monitor the effectiveness of implementation of the selected projects with respect to finance, time and administration, based on submited MPPR and FPPR.

	Yes	Partially (comment needed)	No
PROJECT MANAGEMENT			
Has the MPPR / FPPR report been submitted on time?	☒		☐
Have there been any changes in project partnership?	☐		☒
Has the project management been performed as required?	☒		☐
Has the collaboration between partners been effective?	☒		☐
Do you identify evidence of underperforming partners, lack of commitment or change of interest of any partners?	☒ (see comment)	See comment no.1	☐
DELIVERABLES and MILESTONES			
Have the planned deliverables for the period been submitted on time according to timeline in Project Agreement?	☐	See comment no.2	☒
Have the planned deliverables for the period been completed (from MPPR / FPPR, sheet 4)	☐	See comment no.3	☒
Have any changes to deliverables occurred (type/ dissemination level)? (from MPPR / FPPR, sheet 4 and 5)	☒	See comment no.4	☐
Have planned milestones been achieved for the reporting period? (from MPPR / FPPR, sheet 4)	☒		☐
Have the project partnership identify any difficulties achieving any of the deliverables / milestones?	☐		☒
DEVIATIONS (from MPPR / FPPR, sheet 5)			
Has the project partnership identify any deviations that will not affect projects outputs?	☒		☐
Have any deviations occur on the project, with impact on project outputs?	☐		☒
In case of deviations, have the project adopted corrective measures?	☒		☐
DISSEMINATION, COMMUNICATION			
Has the project adopted its dissemination plan?	☒		☐

Have the planned dissemination activities been completed for the reporting period? (from MPPR / FPPR, sheet 6)	☒		☐
Have the partners' disseminated project results and information adequately?	☒		☐
Is the project following dissemination plan?	☒		☐
Is the project interacting in a satisfactory manner with other GeoERA projects?	☒		☐
Is the project interacting in a satisfactory manner with national/international bodies?	☐	NA	☐

FINANCE			
To the best of your estimate, have the resources used been utilised for achieving the project? (according to MPPR / FPPR, sheet 9)	☒		☐
To the best of your estimate, have the resources used been in a manner consisted with the principle of economy, efficiency and effectiveness? *	☒		☐
Are there any major deviations in the budget consumptions from the financial plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☒	See comment no.1	☐
Are there any major deviations in the Person - Months consumptions from the plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☒	See comment no.1	☐
Are any budget modifications for the project needed? (from MPPR / FPPR, sheet 5)	☐		☒

***The principles of economy, efficiency and effectiveness** refers to the standard of "good housekeeping" in spending public money effectively. Economy can be understood as minimising the costs of resources used for an activity (input), having regard to the appropriate quality and can be linked to efficiency, which is the relationship between the outputs and the resources used to produce them. Effectiveness is concerned with measuring the extent to which the objectives have been achieved and the relationship between the intended impact and the actual impact of an activity. Cost effectiveness means the relationship between project costs and outcomes, expressed as costs per unit of outcome achieved.

Comments (highlighting the project progress) / deviations / recommendations:

Comment no.1: One partner, Czech Geological Survey CGS declared no activity in the first reporting period. The partner will be actively involved in the second period.
Comment no.2: In the first reporting period 16 deliverables were due:
8 deliverables were submitted in time
4 deliverables were submitted with eligible delay (amendment 1)
2 deliverables are pending (to be submitted till the end of January)
2 deliverables are delayed into the second reporting period (to be amended)
Commen no.3: Two deliverables are pending, to be submitted till the end of January 2020:
D6.1a Database for concentrations of groundwater age indicators, estimated mean ages and age distributions, vulnerability classes and associated guidance

D6.2 Collection of use cases including good practice guidance and age indicator sampling guide
Comment no.4: Changes to deliverables:
D2.2a: postponed from M8 → M9
D5.1: postponed from M12 → M13
D6.1b: postponed from M12 → M15
D8.1: postponed from M12 → M17
D6.1a: postponed from M18 → M32
D6.2: postponed from M18 → M24
The changes have no impact on the project outputs.

Project HOVER addresses groundwater management issues related to drinking water, human and ecosystem health across Europe in relation to both geogenic elements and anthropogenic pollutants by data sharing, technical and scientific exchange between European GSOs. The project is very ambitious and the largest in the groundwater theme in terms of funding.
In the first reporting period the project achieved most of its goals with minor deviations mainly due to discussions on data properties. The partnership is numerous and various, every discussion and coordination are therefore time consuming.
The dissemination and exploitation plan are adopted, although no specific indicators are set, so a comparison between planned and achieved numbers is not possible. The partnership estimates they reached a little over 25.000 people through various online media and publications, which is quite high reach compared to other GeoERA projects.
Cooperation with other GeoERA projects is adequate, mainly with GIP-P, RESOURCE, TACTIC and VoGERA.
Overall financial consumption at the end of first reporting period is 32 %, which is quite low. The project has some delays with deliverables, catching up with activities should also result in higher expenditure.

The project set very ambitious objectives, the numerous and differed consortia poses a managerial challenge with achieving the results. The main challenge recognized is how to accelerate activities in the second period with no reduction in quality of project deliverables. The project lead is expected to provide good support to partners with implementation of project activities and open communication with GeoERA secretariat, GW theme coordinator and GeoERA Monitoring team. General recommendation to Project lead is to check the finalized activities and financial consumption of partners mid-year 2020. In case the project and financial status does improve until then, other solutions should be sought with active support with the aforementioned.

Recommendation to the project is to:
- pay attention to the work implementation and deviations from the project plan – try to tackle deviations as soon as you can to minimize the consequences on the project plan;

- keep track of the communication and dissemination activities and try to count or estimate the number of people reached with these activities. The same is applicable for the meetings.
- remind project partners that may not be experienced in European funds, to use the support provided to the project by the GeoZS Monitoring team and get familiar with rules and obligations that these funds require.

Overall assessment of the project:

☐ 5 - **Overachiever** (the project has achieved all objectives and goals for the period and has even exceeded expectations)

☐ 4 - **Excellent progress** (the project has fully achieved its objectives and goals for the period)

☒ 3 - **Good progress** (the project has achieved most of its objectives and goals for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has achieved some of its objectives; however corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or is not at all on schedule)

Summary of dissemination activities (detailed activities are annexed to this report):

Activity	Target audience	Number of people reached
Publications	Non-EU institution	>300
Publications	Scientific community	>200
Events	Policy makers	>300
Events	Scientific community	710
Meetings	Policy makers	50
Meetings	Scientific community	22
Media	Scientific community	>100
Media	General public	>24.000
		~25.682

Are the dissemination activities adequate? (link to GeoERA WP5)

☐ 5 - **Overachieved** (the projects dissemination activities have exceeded expectations)

☒ 4 - **Excellent** (the projects dissemination activities have fully achieved its expectations)

☐ 3 - **Good** (the projects dissemination activities are adequate; however, some additional activities are needed)

☐ 2 - **Acceptable** (the projects dissemination activities need corrective actions; additional activities are needed)

☐ 1 - **Unsatisfactory** (the project has failed to disseminate)

Cummulative financial statement:

	Person months	Total eligible costs	Reimbursement rate	GeoERA contribution	In-kind contribution
Plan	423,5	2.999.814	29,7%	890.945	2.108.869
1st period consumption	169,65	964.122,25	29,7%	285.877,55	678.244,70
2nd period consumtion					

2 LEVEL 2 – SCIENTIFIC REVIEW

In this section the project is reviewed ”remotely” on the basis of the respective reports. This part is filled in by reviewer with aim to review the quality of the deliverables and review of achieving scientific and professional goals. Scientific review is based on submitted deliverables and reported Impact statement in MPPR/FPPR.

Impact statement (from MPPR / FPPR, sheet 8):

Increase public and political awareness regarding groundwater vulnerability issues; improve groundwater management at EU scale; harmonization of data and methods at EU scale; provide support for the implementation of the water framework and groundwater directive; provide full access to results and data for further exploitation - The project was presented in various international conferences (see 6.) for scientific community - These presentation had lead up to now to iudentify possible links with an international initiative on groundwater quality proposed by UNEP (global water quality alliance) and links with the new IAH groundwater quality commission - One of the impact was alos to bring people together to share their experinece in mapping at large scale GW quality aspects

Expected impact (from Project Agreement):

The results of WP3 are of importance – first of all – for water management. There will be an international exchange about different approaches concerning special groundwater. WP3 will deliver a WMS (web Map service) which is not only interesting for the water management of bottled mineral water, but also for the beverage industry (at the AQUA 2015 - International Hydrogeology Congress in Rome it was criticised by a representative of a European association of mineral water producers that there do not exist a pan European overview on mineral water). Furthermore, an overview on medical springs and spas could be of interest for tourism industry and health service. The work package will also increase political and public awareness of health issues related to groundwater quality permitting, by developing and mapping indicators, a quick overview on a homogeneous way of the sectors with high concentration of toxic or adverse effect dissolved elements. Delineating the range of concentration of elements of natural origin over European aquifers will be of great support for the implementation of the water framework and groundwater directive in giving a homogeneous basis for deriving at national level the threshold values to be used in the evaluation of the chemical status and the risk evaluation. Based on indicators and maps best practices in GW management recommendation will be proposed on i) data quality monitoring, ii) data treatment, iii) delineation of indicators in relation to geological families and case studies of specific GW exploitation in areas of high natural background level would be compiled. The development of a framework for groundwater ecosystem assessment (WP4) will provide information on presence of degraded bacteria and potential degradation activity and reduce costly monitoring of contaminants at the GW-SW interface in future. Evaluating the potential degradation of the surface water (rivers, humid zones...) due to groundwater, requested by the WFD and helping management of drinking water wells are quite complex and need a great

amount of data. Looking for indicators such as bacteria is one of the tools with good application perspectives at basin scale.

The proposed work under WP5 should lead to the development of better groundwater protection strategies through establishing travel times for nitrate and pesticides from infiltration to recharge and discharge zones, and thus the time lag between measures and trend reversal and the recovery of water quality. This will assist stakeholders in the evaluation of measures including NVZ (nitrate vulnerable zone) designations.

This data is also needed at the time of making the evaluation of the efficiency of programme of measures to reduce impact of pollution pressure associated to diffuse agriculture. Indeed, delay between the application of corrective actions and the decreasing trend of contaminant concentrations in groundwater makes difficult not only the confirmation of the efficiency of measures but also the awareness of stakeholders.

Geological and hydrogeological settings will also be the entry point to classify the samples in age intervals (WP6) as an indicator of the susceptibility/vulnerability of the aquifers to contamination from human activities on the surface, elevated toxic geogenic elements in deeper aquifers and overabstraction. This information, combined with other indicators, is of great importance for better groundwater protection strategies. The project will aim at demonstrating the use of groundwater age distributions for design and assessment of monitoring programmes, pollution trends and history and the evolution of groundwater quality (chemical status).

The main outcome of the project idea developed under WP7 will be harmonized assessment products for groundwater vulnerability to pollution. The main deliverables are maps that can be used in groundwater management, subsurface spatial planning and environmental decision-making processes both at least national and regional scales, and at a cross-border scale. The project will result in methodological harmonization and the establishment of data interoperability at Cross Border, Pan European optionally national scales. More in detailed the project will permit to contribute to national and EU general activities in fulfilling the objectives of the WFD, and to national and regional authorities in environmental assessment and strategic and regional planning; support European-level strategic assessment, planning and forecasts and provide coherent, pan-European dataset for testing the impact of policy changes (e.g. intensified agriculture or reduced nutrient application) on groundwater.

The WP8 will help European countries to identify ECs of high concern regarding global pan-European settings and adapted to local specific contexts and knowledge and will:

- allow wide access to reliable data to support decision making such as groundwater protection
- New challenges in sampling and analytical methodologies developments regarding the increase of the number of substances of interest and the need for streamlining the ECs monitoring across Europe
- A key outcome will be an overview of GW monitoring status of ECs across Europe. Collected ECs occurrence data will be supplied to the European Commission Data Base IPCHEM.
- The development of novel methods to link EC presence with anthropogenic activities, environmental conditions and co-occurring tracers will help to identify hot spots regarding GW contamination by ECs.
- Identify what are the chemical properties that can be used to estimate the leaching potential of ECs to GW and to evaluate how to take into account usage data in risk assessment procedure

supporting the implementation of the GW "watch list", definition of pollutants of concern and subsequent consideration for Annex I and II revision, further work is required to ensure effective monitoring is undertaken that is consistent across the EU and enables long term protection of GW, human health and GW dependent ecosystems. Overall impact of this GeoERA initiative is the compilation and delivery of armonized, interoperable and comparable geoscientific information, contributing to national and EU general activities in fulfilling the objectives of the WFD. The degree of harmonization depends on data availability, scale of investigation and applied methodology. The improved databases and visualization tools proposed related to thermal and mineral water distribution, natural background levels and related indicators, vulnerability assessment, on groundwater age tracers and indicators currently existing in EU member states are some of the products that will be produce at pan-European scale for supporting health and environmental issues related to the quality of groundwater. Also, best practice guidance from demonstration projects will be proposed in different hydrogeological settings to support harmonized management strategies and most widely: - to apply statistical data treatment related to the development and mapping of indicators - to define the best methodology to organize and visualize data collected - to test and develop new techniques for estimating age distributions of groundwater bodies - to monitor key parameters with reference to environmental context, geological setting and risk Assessment.

Evaluation of deliverables

Deliverables list status			
No.	Title	Status (Approve/ Reject)	Comments
D.1.3a	Cumulative expenditure report 2018	Approved	/
D.2-1	Data Management Plan	Approved	/
This deliverable provides a first version of the HOVER Data Management Plan. It is structured according to the guidelines of the Overall GEOERA Data Management following Horizon 2020 FAIR Data and Management Plan. Since GIP-P did not yet provide recommendations and EGDI will furtherly develop, this report could be updated in the future.			
D.2-2a	Data description and requirements for the GeoERA Information Platform / EGDI	Approved	/
D.2-2a	Definition of data requirements for GIP based on GIPrecommendations	Approved	/
D.2-2b	Provision of data for upload and testing of GIP second version		Pending – to be submitted till end of January
D.2-3a	Communication, dissemination and exploitation plan	Approved	/
D.3-1	Database for concentrations of dissolved elements and	Approved	See below

	associated parameters and harmonized terminology to define thermal and mineral water (Database and associated technical report		
There are several ways of characterizing natural mineral and thermal waters available in world-wide literature, but their official definition still might be open to discussion. The results from conducted questionnaire are very interesting and suggest that the majority of countries define a thermal water by a minimum temperature of 20 °C. On the other hand, there are several countries where definitions by temperature don't exist or some other minimum temperatures are present. Our opinion is that a common recommendation for thermal water classification based on the data collected by the participating countries would be a useful result and therefore we suggest that the project team evaluates which definition is most appropriate at the Pan European scale. Moreover (in our opinion), it would be a significant added value of this project (work package) to publish the results of pan European overview on thermal waters (and mineral waters), particularly focusing on their definition.			
D.3-2	A litho-geological classification system based on the capacities of rocks to release elements to GW including development of the methods in some EU countries	Approved	See below
Grouping geological formations depending on their potential of mineral release in order to evaluate geological factors controlling occurrence and distribution of dissolved elements in groundwater can be very challenging. The most common BRIDGE methodology used to determine background values is based on upper percentile values and therefore the anthropogenic influence can significantly affect the distribution of chemical concentration in groundwater. Significant differences in the chemical concentrations found in different types of aquifers were tested with nonparametric statistical Kruskal-Wallis and Pairwise Wilcoxon test. It is not clear from the submitted document if there were any transformation and standardization applied on data. We suggest that such information is presented in the accounted reports, so please keep this in mind in the project continuation. Only in this way it is possible to ensure the verifiability of the results.			
D.4-1	Characterization of field sites based on existing and measured data as input to task	Approved	/
D.5-1	Atlas of geological/hydrogeological settings found across Europe with selected type sites	Approved	/

D.5-2	Datasets with characterization of the settings relevant for agrochemical transport		Pending – to be submitted till end of January
D.6-1a	Database for concentrations of groundwater age indicators, estimated mean ages and age distributions, vulnerability classes and associated guidance		Delayed into the next period
D.6-1b	A classification system based on groundwater age distributions defining shallow and deep aquifer vulnerability classes indicating the risk of pollution and elevated concentrations of geogenic elements	Approved	/
D.6-2	Collection of use cases including good practice guidance and age indicator sampling guide		Delayed into the next period
D.7-1	Comparison of internationally commonly applied index methodologies for assessing the vulnerability of the upper aquifer to pollution	Approved	See below

a) It is written in the report that the goal of WP7 is to prepare vulnerability maps at the Pan European (1:1.5 Mio), supra-regional (1:1.5 Mio), national/cross-border (1:250k) and optionally national scale, each referring to the potential vulnerability to pollution of the uppermost aquifer. The difference between Pan European and supra-regional map is not clear.

b) DRASTIC method was selected for assessing groundwater vulnerability to pollution in non-karst areas at the pan-EU and transboundary regional scale in selected pilot areas. Moreover the COP method was established, a parametric system model applicable to different climatic conditions and different types of carbonate aquifers, i.e., diffuse and conduit flow systems (Vias et al., 2006). Using DRASTIC method only for non-karstic areas at pan-EU (1:1.5 Mio) scale might be discussable. Our opinion is that the DRASTIC method can be used also for karstic environment at the pan-EU scale using appropriate ratings. The results would be more consistent. In case of transboundary regional scale in selected pilot areas the situation is different, in that case respectively it would be much more appropriate to use adopted method for karst environment (e.g. COP method). If that already is case please explain that in report mroe cleary.

c) DRASTIC weighting and rating scheme is presented in Annex 1. A net recharge scheme suggest 5 classes with 0-51 mm/a, 51-102 mm/a, 102-178 mm/a, 178-254 mm/a and 254+ mm/a. Those ranges are approximately equal as suggested by Aller

et al. (1987). Since the average net recharge in some countries is higher that 254 mm/a we suggest a more clear explanation why choosing such values.			
D.8-1	Critical review report of European monitoring results for organic emerging contaminants	Approved	

Has the quality as a whole been achieved according the objectives? Has the project as a whole been making satisfactory progress?

☐ 5 - **Overachiever** (the project has achieved all objectives and goals for the period and has even exceeded expectations)

☒ 4 - **Excellent progress** (the project has fully achieved its objectives and goals for the period)

☐ 3 - **Good progress** (the project has achieved most of its objectives and goals for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has achieved some of its objectives; however corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or is not at all on schedule)

Comments (highlighting the project progress) / deviations / recommendations:

The HOVER project aims to gain and improve the understanding of the groundwater quality controls as the main drinking water resorurce in Europe using the combined expertise and data held by member states. The project will address groundwater management issues related to drinking water, human and ecosystem health across Europe in relation to both geogenic elements and anthropogenic pollutants by data sharing, technical and scientific exchange. The project comprises 8 work packages, from which two are coordination based (WP1 and WP2), while other 6 are technical WPs. One WP consider natural geogenic processes and four are focousing on anthropogenic contaminants. WP6 is focused on groundwater age distribution considering both geogenic and anthropogenic water types.

Most of the WPs develop specific deliverables. 7 technical and 5 coordination deliverables were subbmited and are included in scientific review. In general it can be conculded that the derivelable reports are very good, clear and follow the project agreement. Based on the rewiew of submitted reports we can estimate that the progress of the project is good. There are some minor recommendations/questions which might help to improve the results but do not affect the approval of the scientific part of the HOVER project.

3 LEVEL 3 – REVIEW OF THE THEME PROGRESS

In this section the project is reviewed ”remotely” on the basis of the respective reports. This part is filled in by Theme coordinator with aim to review the achieved scientific goals in accordance with theme objectives, on the basis of Sheet 3 in MPPR / FPPR – Project contribution to GeoERA project.

Project contribution to GeoERA project (from MPPR / FPPR, sheet 3):

The technical and scientific fundamentals of the HOVER project are the geological knowledge and comprehensive understanding of the hydrogeological processes involved in the transfer of organic and inorganic elements of natural and anthropogenic origin to the groundwater resources. Project findings are designed to increase political and public awareness and improve groundwater management at the EU scale. Thus, information and communication technologies involved will allow producing databases, maps and web service tools at pan-European scale that will be made available for a large public through the Information Platform. As specified in the Groundwater Specific Research Topics of the GW1 (GEOERA joint call document N°9), the HOVER project addresses groundwater management issues, drinking water, human and environmental health, linked to the presence and spatial variability of high concentrations of geogenic elements and the vulnerability to anthropogenic impacts for nutrients (mainly nitrate), pesticides and emerging contaminants. In addition it provides information, which are relevant for assessing the vulnerability of groundwater resources towards pollution from the surface including groundwater age distributions and vulnerablility maps.

Theme objectives:

To provide groundwater data, information and decision support tools for the long-term protection, sustainable management and improvement in groundwater resources across Europe, taking into account societal challenges and EU policies, based on innovative methodologies to tackle diversity of hydrogeological settings and scales (regional to pan-European). Jointly developing harmonized and effective tools and methodologies for monitoring, modelling, data management, reporting and visualization will improve the understanding of groundwater systems at regional to pan-European scales. Cross-border, regional and pan-European examples of the most important and widely applicable data will be showcased on the Geoscience Information Platform, and may be visualized and downloaded together with e.g. data on competing interests for geo-energy and raw materials in a specific region. Importantly, GeoERA provides the possibility of compiling and analysing geo-energy, groundwater and raw materials data in advanced 3D geological and geophysical modelling, interpretation and visualisation software.

The ambition is to provide data and tools for the development of a globally leading groundwater information platform

Has the project as a whole achieved the objectives and expected impact of the theme?

☐ 5 - **Overachiever** (the project has achieved greater impact on project theme and/or other themes than expected)

☐ 4 - **Excellent progress** (the project has fully achieved its objectives and goals towards the theme as expected)

☒ 3 - **Good progress** (the project has achieved most of its impact towards the theme for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has minor impact; corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or is not at all on schedule and/or has no impact on the theme; corrective actions are required)

Comments / deviations / recommendations:

The HOVER project is the largest GeoERA groundwater project in terms of funding and it is the project closest to European water policies providing highly relevant data and information for the implementation of the Water Framework, Groundwater and Drinking water directives. Hence, the project considers complex and diverse issues related to chemical status assessments based on e.g. drinking and ecosystem requirements, and the interaction between groundwater and surface water, and it will ultimately provide a significant amount of valuable data on both geogenic (natural) groundwater and natural background levels as well as groundwater contaminated with nitrate, pesticides and emerging contaminants. Such data are needed for the implementation of the Water Framework Directive and assessment of the efficiency of the program of measures and to ensure good status of European groundwater bodies in the future.

The Groundwater quality has not only implications for drinking water and human health, but also for industry, agriculture and the biodiversity of groundwater dependent terrestrial and associated aquatic ecosystems. Major parts of European groundwater bodies do not currently comply with good status objectives of the EU

directives and associated guidances, and many will not in 2027 according to assessments. Hence, improved data on the groundwater vulnerability towards pollution from the surface and the history and fate and travel times of contaminants in the subsurface is highly warranted.

Some activities of HOVER especially in WP6 on groundwater dating and estimation of travel time distributions, which are lead by the GeoERA groundwater theme coordinator are delayed. The reason for this is partly time-consuming responsibilities related to the communication between the groundwater projects and the information platform project, the general coordination among projects and the dissemination of GeoERA groundwater activities on conferences and social media.

It is, however, also a result of new opportunities that ultimately will improve the final product of the activities. This is the case both for the collection of use cases of groundwater dating studies across Europe, where additional studies has been announced and the development of a common structure for a European tracer database. The latter opened up for new collaboration with the USGS that currently is making the same efforts, leading dating laboratories in Germany and Switzerland, and the IAEA on development of a common global standard for reporting and storing data on environmental tracers in groundwater.

Additional funding from Innovation Fund Denmark made collaboration with globally leading groundwater dating laboraties possible in task 6.4. About 30 water supply wells were sampled during the summer of 2019 and the data from these will primarily provide valuable data for task 6.4. Planning and conducting the field activities already in June-August 2019, resulted in additional delays to task 6.1 and 6.2, but the delayes are not critical to the project, and the delays will improve the final products for the information platform. The field work e.g. initiated collaboration with WP8 as some of the water supply wells were also sampled for the analysis of emerging contaminants (e.g. veterinary antibiotics).

Although there has been delays in several work packages, the WPs has generally delivered according to the project plan, and no critical delays have been identified.

4 LEVEL 4 – GEOERA PROGRESS EVALUATION

In this section the project is reviewed on the Review meetings, where projects present their overall progress and achievements. This section relates to particular project, broader impact of GeoERA as a whole on policies will be covered at the Final Review meeting with questionnaire and interview with Evaluator.

Based on technical review summaries provided by Sections 1 – 3 of this report, and project presentation on the (Final) Review meeting:

Has the project as a whole been making satisfactory progress according to your own understanding and expectations of the GeoERA project?

☐ 5 - **Overachiever** (the project has exceeded expectations)

☐ 4 - **Excellent progress** (as expected)

☒ 3 - **Good progress** (minor recommendations given below)

☐ 2 - **Acceptable progress** (below expectations; minor corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed; corrective actions are required)

Overall comments for the project (overall recommendations, modifications, corrective actions, or re-tuning the objectives to optimize the impact or keep up with the State of the Art, re-focusing, or a simple praise)

Stakeholder one feedback:
HOVER is a very ambitious project, and the number of participants make it difficult to progress rapidly. However, it can be seen that progress is made, and likely accelerating in the second half of the project.
I have few comments, one which is picky, to make sure that cross-border the issue of a common vertical datum is resolved, otherwise groundwater might end up flowing in the wrong direction. I encourage of course to llok at deliverables from other countries for the production of atlases, for example, or data management. I spoke of GIN enough during the meeting, and for atlases, I would like to point out some publications by the Geological Survey of Canada. Of note, the Milk River aquifer Atlas (transboundary with the US) :
(https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/downloade.web&search1=R=302719)
Or the Nanaimo atlas :
https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/downloade.web&search1=R=298868
Or the Chaudière River Atlas
https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/downloade.web&search1=R=292860

And there are a few others as well.

Good job!

Stakeholder 2 feedback:
The HOVER project is expecting to deliver outputs to support European water policies implementation (e.g. Water Framework, Groundwater and Drinking water directives, Priority Substances list, etc…) at the GeoERA countries scale.
The harmonized data and tools provided by HOVER will be of high importance for a more efficient implementation of the EU policies, but also to national ones. So, there are a lot of high expectations on the final outputs and their access for the Implementation Policy tools.

The contribution of "small partners" will therefore be crucial for reaching this Pan-European dimension as announced in the project Description of Action, which might need increased connections during the second phase of the project.

In some WPs, the contribution of international partners is foreseen/expected. Some clarifications about the level and quality of their inputs would be appreciated to assess the progress (or absence of) of HOVER.

As mentioned during the online presentation, the laboratory testing planned in WP8 (with quite limited number of GeoERA partners involved, below the current pre-requisite) should definitively be connected with the current NORMAN lab test which strictly follows the best practices protocol in this domain. This will allow to benefit from their exercise.

A closer cooperation between HOVER and DRASTIC (and possibly the other GeoERA GW projects) should be also considered, in particular on the methods reviewed in WP7. They are facing the same challenges (e.g. validation of results, application at case studies, harmonisation) and therefore may support each other for solving them.

The Data Management Plan should include a GDPR chapter for covering all types of exchanges of personal data as foreseen in HOVER (e.g. surveys mentioned in some activities, event registration, database management) and the rights of data owners (e.g. access to personal data relating to owners; update personal data or correct any mistakes in your personal data; complaints, …).

Finally, the Communication – Dissemination – Exploitation Plan (specific deliverable) should be further developed in particular on the exploitation part:

- The proposed actions are mainly related to dissemination (not exploitation).

- as the project intends to provide access to data (groundwater background levels, groundwater contamination by different sources / substances), the question of the ownership of the data should be addressed.
- It also partly relies on a repository developed by an EU funded project which is now closed. Therefore, its sustainability is not ensured.

Annex 1: Review meeting list of participants

Name	Role	Organisation
Tessa Witteman	GeoERA coordinator	Netherlands Organisation for Applied Scientific Research
Barbara Simić	Monitoring and Reporting Officer	Geological Survey of Slovenia
Jasna Šinigoj	Scientific Reviewer	Geological Survey of Slovenia
Jure Krivic	Scientific Reviewer	Geological Survey of Slovenia
Luka Serianz	Scientific Reviewer	Geological Survey of Slovenia
Dominique Darmendrail	Stakeholder council member	Water JPI
Andrée Bolduc	Stakeholder council member	Geological Survey of Canada
Laurence Gourcy	Project manager	The French Geological Survey
Jens Aamand	Project member	Geological Survey of Denmark and Greenland
Margarita Sanabria	Project member	Geological Survey of Spain
Mathew Ascot	Project member	British Geological Survey
Daniel Elster	Project member	Federal Institute for Geosciences and Natural Resources, Germany
Stefan Broda	Project member	Federal Institute for Geosciences and Natural Resources, Germany

Annex 2: Communication and dissemination activities

Please select activity	Subcategory	Date	Target audience	Number of people reached	Short name of project participant	Author(s)	Link (if applicable)
EVENTS	CONGRESS	sep.19	SCIENTIFIC COMMUNITY	500	GEUS	K. Hinsby	IAH Malaga
EVENTS	CONGRESS	02.maj	POLICY MAKERS	> 300	GEUS,	K. Hinsby et al.	https://www.unece.org /index.php?id=50179
EVENTS	MEETINGS	20-24 May 2019	SCIENTIFIC COMMUNITY	10	GEUS, TNO	K. Hinsby	IAEA 2019
EVENTS	CONFERENCE (tele-conference)	7-12 April 2019	SCIENTIFIC COMMUNITY	100	GEUS	K. Hinsby et al	EGU 2019
EVENTS	CONGRESS	8-10-January 2020	SCIENTIFIC COMMUNITY		GEUS	K. Hinsby	NGWM Oslo
EVENTS	CONGRESS	9-12 Sept 2019	SCIENTIFIC COMMUNITY	100	BRGM	L. Gourcy	GQ2019
MEDIA	ONLINE MEDIA	Facebook blogs (GeoERA groundwater group)	> 3000	continuous	GENERAL PUBLIC		https://www.facebook.com/ Geoera-Groundwater-486223845208811/
MEDIA	ONLINE MEDIA	HOVER webpage	>1000??	continuous	GENERAL PUBLIC		https://geoera.eu/projects /hover8/
MEDIA	ONLINE MEDIA	LinkedIn posts (personal profile)	> 5000	continuous	GENERAL PUBLIC		https://www.linkedin.com /in/klaus-hinsby-0883688/detail/recent-activity/
MEDIA	ONLINE MEDIA	Researchgate	>100	continuous	SCIENTIFIC COMMUNITY		https://www.researchgate .net/project/HOVER-a-GeoERA-Groundwater-project
MEDIA	ONLINE MEDIA	Twitter posts (personal profile)	> 5000	continuous	GENERAL PUBLIC		https://twitter.com/khi1960

Annex 2: Communication and dissemination activities

MEDIA	ONLINE MEDIA	Wordpress blog	>10000 (with the associated posts on the other media)	continuous	GENERAL PUBLIC		https://geoera-groundwater .com
MEETINGS	Workshop	10.10.2018	Policy makers and scientific	50	BRGM, GEUS, and more EGS	L. Gourcy	CIRCA
MEETINGS	Internal project meeting	06.03.2019	SCIENTIFIC COMMUNITY		PGI, LBGR, BGR		
MEETINGS	Internal project meeting (videoconference)	04.07.2019	SCIENTIFIC COMMUNITY		WP7 Karst Working group		
MEETINGS	Internal project meeting (videoconference)	25.09.2019	SCIENTIFIC COMMUNITY		WP7 Karst Working group		
MEETINGS	Internal project meeting (videoconference)	05.11.2019	SCIENTIFIC COMMUNITY		WP7 Karst Working group		
MEETINGS	Meeting with national body	04.12.2019	SCIENTIFIC COMMUNITY		NERC	M. Ascott et al	Internal NERC stakeholder meeting
MEETINGS	Internal project meeting	03.-04.04.2019	SCIENTIFIC COMMUNITY		All WP7 Participants		
MEETINGS	Internal project meeting	17.-18.10.2018	SCIENTIFIC COMMUNITY		All WP7 Participants		
MEETINGS	Internal project meeting	20/6/19, 20/9/19, 26/11/2019	SCIENTIFIC COMMUNITY		All WP5 Participants	M. Ascott et al	
MEETINGS	Internal project meeting	22.-23.10.2019	SCIENTIFIC COMMUNITY		PGI, LBGR, BGR		

Annex 2: Communication and dissemination activities

MEETINGS	Internal project meeting	26.-27.11.2019	SCIENTIFIC COMMUNITY		All WP7 Participants		
MEETINGS	Internal project meeting	7-8 March 2019	SCIENTIFIC COMMUNITY		all WP leaders	10	
MEETINGS	Internal project meeting	29 August 2018	SCIENTIFIC COMMUNITY		WP3 leader and task leaders	6	
MEETINGS	Internal project meeting	21-22 February 2019	SCIENTIFIC COMMUNITY		WP3 leader and task leaders	6	
MEETINGS	Internal project meeting	15-16 avril 2019	SCIENTIFIC COMMUNITY		WP8 leader and task leaders		
PUBLICATIONS	TECHNICAL REPORT	30.01.2019	SCIENTIFIC COMMUNITY		All WP7 Participants	S. Broda et al	D7.1 Report
PUBLICATIONS	TECHNICAL REPORT	01.08.2019	SCIENTIFIC COMMUNITY		All WP5 Participants	M. Stuart et al	D5.1 Report
PUBLICATIONS	TECHNICAL REPORT	30.01.2020	SCIENTIFIC COMMUNITY		All WP5 Participants	H.P. Broers et al	D5.2 Report
PUBLICATIONS	ABSTRACTS	22.10 Oral Presentation at "Hydrologidagen"	Odense, dk		NON-EU INSTITUTION (national, regional, local)	> 100	http://hydrologidag.dk/media/21533/joergen-tulstrup-geus-introduktion-til-faelles-europaeisk-geologisk-informationsplatform.pdf
PUBLICATIONS	ABSTRACTS	24.10.2019 Oral presentation at "the Groundwater days"	Lund, se		NON-EU INSTITUTION (national, regional, local)	> 200	https://www.slideshare.net/SGU_Sverige/klaus-hinsbythegeo-eraprogramfocusingongroundwaterprojects

Annex 2: Communication and dissemination activities

PUBLICATIONS	ABSTRACTS	08.01.2020 Oral presentation at NGWM2020	Oslo, no		SCIENTIFIC COMMUNITY	> 100	https://www.geologi.no /images/NGWM20/ Abstractvolume_NGWM 20.pdf
PUBLICATIONS	ABSTRACTS	Poster at EGU2019	Vienna	07.04.2019	SCIENTIFIC COMMUNITY	>100	https://meetingorganizer .copernicus.org/EGU2019 /EGU2019-18215.pdf