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

Technical review report for project VoGERA

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:	Vulnerability of Shallow Groundwater Resources to Deep Sub-surface Energy Related Activities
Project acronym:	VoGERA
Project reference number:	GeoE171.015
Project topic:	Groundwater
Project specific topic:	GW4 – Contribute to Groundwater management and interactions with Energy and Mining in rural and urban areas
Lead partner:	NERC (UKRI) UK Research and Innovation (British Geological Survey)
Project website:	http://geoera.eu/projects/vogera/

☒ Technical review report

☐ Final review report

Period covered	01/07/2018 – 31/12/2019
Review meeting date	07.02.2020

Contributor:	Role:	Approved on:
Barbara Simić	Monitoring and reporting officer	26.02.2020
Maja Ilić	Monitoring and reporting officer	26.02.2020
Andrej Lapanje	Scientific reviewer	27.02.2020
Jasna Šinigoj	Scientific reviewer	11.03.2020
Matija Krivic	Scientific reviewer	10.03.2020
Klaus Hinsby	Theme coordinator	26.02.2020
Dominique Darmendrail	Stakeholder Council member	27.03.2020
Andree Bolduc	Stakeholder Council member	27.03.2020

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 submitted 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?	☐	See comment no.1	☒
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)		☒
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)	☒		☐
Have any changes to deliverables occurred (type/ dissemination level)? (from MPPR / FPPR, sheet 4 and 5)	☐		☒
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?	☒		☐

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)	☐		☒
Are there any major deviations in the Person - Months consumptions from the plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☐		☒
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 minimizing 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: In July 2019 project manager Sian Loveless stepped down and Marco Bianchi took over the role. It does not appear that the transition caused any deviations from the project plan or confusion among project partners.
Comment no.2: In the first reporting period 8 deliverables were due:
7 deliverables were submitted in time
1 deliverable was submitted with delay
The delay has no impact on project outputs, it is a report from the project workshop.

The Project is aimed at improving the scientific understanding of the vulnerability of shallow groundwater from deep sub-surface industrial energy-related activities

including geothermal energy production, unconventional oil and gas exploitation, sub-surface storage, and disposal of wastes.
In the first reporting period the project finalized all planned activities and deliverables according to the Project plan. Only one deliverable D2.5 is marked as delayed, because the report has been submitted well after the deliverable deadline. This delay should be included in the next project amendment.
Communication and dissemination plan have been adopted and followed. The communication with scientific community is acceptable, meetings with other GeoERA projects were not specified in the report. At the review meeting the project team reported on more communication and dissemination activities, e.g. publications, than reported in the midterm project progress report. At the meeting the recommendation was given to update the list of communication and dissemination activities, which has not been done till the date of this report approval by the monitoring team.
Overall financial consumption at the end of first reporting period is 28 %, which is quite low. According to the project plan, the majority of activities will be done in the second reporting period, consequently the financial consumption will increase.
Project management structure is well defined. Project Lead faced a challenge with project partner GEOINFORM due to changes in project management on both sides. The issue has been resolved with help of GeoERA coordinator.

Recommendation to the project is to:

- 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.

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
Event	Scientific comunity	500
Event	General public	27
Meeting	EU institution	/
Media	General public	/
		527

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	51,04	430.969,00	29,7%	127.998,00	302.971,00
1st period consumption	16,56	121.260,83	29,7%	36.014,47	85.246,36
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):

Due to the nature of the VoGERA project there are planned and expected to be multiple beneficiaries of the project resulting in the expected impacts. So far, the outcomes of the project have generated the following impact:

- Research activities also improved the cooperation and communication between national/regional sub-surface research institutes and European stakeholders that deal with groundwater resource management.

- The deliverable 3.1 “Technical report on evidence for potential pathways for groundwater contamination from subsurface energy activities and investigation/ data collection plan technical report” improved knowledge-sharing across Europe, in particular in relation to intercalibration procedures and standards for geophysical and monitoring equipment used for sub-surface characterization and designing investigations to assess groundwater vulnerability to deep sub-surface industrial activities. The beneficiaries of this knowledge are sub-surface research institutes and other research communities, but also regional and local authorities and stakeholders such as drinking water supply companies can benefit from the increased understanding of the geology at the pilot sites.

- The deliverable 4.1 “Expanded diagrams of conceptual models identifying potential pathways for energy activity in the deep sub-surface and shallow groundwater vulnerability” presents conceptual models of groundwater vulnerability to deep sub-surface energy activities and possible contamination pathways. These models harmonized understanding and management of the groundwater vulnerability. The beneficiaries are Sub-surface research institutes and groundwater resource managers in relation to energy, Groundwater Directive and EU Energy Policy. Institutes may also benefit from a common understanding of groundwater vulnerability from deep sub-surface activities and will be able to use these in communication with the public.

The VoGERA WP2 coordinates dissemination, communication and the relationship with the GeoERA Information Platform (GIP). VoGERA adheres to the overall dissemination, communication and exploitation plan of the GeoERA project. Results have been disseminated via the wider GeoERA network. Results of the project were presented to the groundwater scientific and consultancy community at European and International conferences (2019 IAH Congress in Malaga, Spain and 2020 EGU General Assembly in Vienna).

Expected impact (from Project Agreement):

Due to the nature of the VoGERA project there are planned and expected to be multiple beneficiaries of the project resulting in the expected impacts mentioned in the Scientific Scope and those not mentioned in the Scientific Scope. The table below describes how the beneficiaries will use or benefit from the project and will have impact for them. Improved sub-surface spatial planning by groundwater managers and decision-makers will depend on the applicability of conceptual models and vulnerability assessment approaches, therefore it will be vital to understand stakeholder needs. In addition, the impact will be sensitive to the current legislation and regulation regarding these technologies and use of the deep sub-surface for energy related activities and the necessity to take other factors into account when making decisions. Achieving the expected impacts will necessarily rely on the engagement of policy makers and regulators from a range of different countries and their willingness to implement any developed methodologies or conceptual understandings. Theoretically, a greater understanding of the issues at hand should provide decision-makers with the confidence to allow development of these industries under the right circumstances, however, there is a large amount of negative public opinion surrounding some of these activities and therefore this may have an influence on the achieved impacts of the project. By consulting with stakeholders during the project there is greater likelihood that the outcomes will meet their needs and be presented in a way that maximizes use. In addition, WP2, and the responsibility for dissemination and communication will be led by VMM who perform a regulation role therefore there is guaranteed input and interaction with a stakeholder from at least one country.

Evaluation of deliverables

Deliverables list status			
No.	Title	Status (Approve/ Reject)	Comments
D1.1	Kick-off meeting summary	Approve	/
D1.4	Cumulative Expenditure report	Approve	/
D2.1	Data management plan	Approve	See below
This deliverable provides a first version of the VoGERA 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.			
D2.2	List of prioritized Information Products for the GIP	Approve	/
D2.4	Communication plan	Approve	/
D2.5	Workshops for stakeholders	Approve	/

D3.1	Technical report on evidence for potential pathways for groundwater contamination from sub-surface energy activities and data collection plan	Approve	See below
This deliverable presents Technical report on evidence for potential pathways for groundwater contamination from subsurface energy activities and investigation/ data collection plan technical report. In the chapter three the relevant subsurface energy activities and potential pathways for shallow groundwater resources contamination are listed. For all the listed activities the literature overview of their potential impacts is summarized. The main part of the report consists of the description of the Hungarian, United Kingdom, Dutch and Belgian pilot areas. For each pilot area description consists from 5 subchapters (Introduction of the pilot area, Available infrastructure, Available information, Information gap and Data Collection plan). **Remarks:** In the literature overview of potential risks for shallow groundwater from subsurface energy activities I miss documented cases of the incidents and its impact on groundwater in Europe onshore. I think that it would be useful to show the examples of ''bad practises''. Do the researchers from the project group has the knowledge of such incidents in Europe? Whether such cases are publicly exposed at al or in Europe we don't have such cases? Probably this information could be gathered in the continuation of work for pilot areas, if exist. The colleagues from MBFSZ have a lot more info that reported, since they conducted several projects in the past in this pilot area. One interesting recent paper is Wellbore cement alteration during decades of abandonment and following CO2 attack – A geochemical modelling study in the area of potential CO_2 reservoirs in the Pannonian Basin (Szabo-Krausz, Z. et al., 2019 https://doi.org/10.1016/j.apgeochem.2019.104516). **Opinion:** Very good overview of processes and possible contamination pathways from deep sub-surface to shallow groundwater resources. The scope of the project and definitions are clear and understandable. I would appreciate if some incident cases would be shown since we learn the most from past mistakes.			
D4.1	Expanded diagrams of conceptual models identifying potential pathways for industrial activity in the deep sub-surface and shallow groundwater vulnerability	Approve	See below
This deliverable summarized the conceptual framework for vulnerability characterisation of shallow groundwater to deep sub-surface energy activities. Conceptual models are presented for a range of sub-surface energy activities (conventional oil and gas, shale gal, coal bed methane, geothermal energy, energy and gas storage), and a range of geological and hydrogeological settings across Europe. **Remarks:** On Page 27 of 37, please replace km with m in the sentence:			

Target depths may be in excess of 2 km (e.g. Cornwall, England) or < 1000 km, such as the Weardale Granite, England.
Please uniform the use of °C now you have XX°C or XX° C, we usually use XX °C.
Opinion: I found this deliverable as very good foundation for the development for risk and vulnerability assessments in the sub-surface in the subsequent phase for the four pilot areas. I really like the graphical presentation of different geological settings in combination with different deep sub-surface energy activities. I think that we will see these pictures a lot in upcoming years.

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:

VoGERA (Vulnerability of shallow groundwater resources to deep sub-surface energy-related activities) aim is to understand the processes occurring from subsurface energy activities which are potentially harmful for shallow groundwater resources and to identify the potential pathways between deep energy activities, and shallow groundwater to develop conceptual models of shallow groundwater vulnerability due to deep subsurface energy activities. The conceptual models will be developed for different sub-surface energy activities, and for a range of geological and hydrogeological settings across Europe.
The project has 4 work packages, first and second are mandatory, WP 3 deals with Process understanding and WP 4 deals with methodology for assessing the risks and vulnerability.
The scientific outputs will be designed to support evidence-based decision making and an integrated approach to management of groundwater vulnerability and associated hazards across Europe in relation to deep sub-surface activities. The information and knowledge gained as part of the project will also be made readily accessible to all stakeholders, including the public, to increase awareness of where groundwater is vulnerable, the reasons for this and how it the ways in which vulnerable groundwater

can be protected whilst at the same time allowing responsible use of the sub-surface for the benefit of European citizens and the economy.
In the time of the midterm project progress review eight deliverables are available for review.

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 VoGERA Project Proposal addresses a component of the GW4 SRT – Contribute to Groundwater Management and Interactions with Energy and Mining in Rural and Urban areas. The proposal intentionally does not cover all topics under the GW 4 call, but has selected topics to yield a compact, well-focused research project.

In recent years there has been increasing interest in the use of the deep sub-surface for energy related activities in Europe, due to concerns for energy security and a demand to meet international targets to cut greenhouse gas emissions and increase the supply of energy from renewables (as defined in the European Commission’s ‘2020 climate and energy package’). Sub-surface energy-related industries include conventional and unconventional oil and gas exploitation, geothermal energy and sub-surface storage. These industries may impact the sub-surface by introducing new chemicals (potential pollutants), disturbing/mobilizing existing natural contaminants within rocks, or by changing the permeability structure of the rock (introducing new pathways). These represent additional hazards which may impact groundwater and subsequently ecosystems and human health. However, the vulnerability of groundwater to these hazards is not uniform and varies depending on the geological and hydrogeological setting in addition to the industrial processes and risk management measures being applied.

It is necessary to understand and manage the hazards and risks associated with potentially harmful activities in order to meet the environmental objectives of the EU Water Framework Directive (2000/60/EC) and Groundwater Directive (2006/118/EC) i.e. protect groundwater for future generations. Groundwater protection has traditionally focused on safeguarding water resources from hazards at (or near) the surface. As a result, the risks from near-surface activities are relatively well understood and managed. The controversy surrounding the shale gas industry development in Europe has highlighted the lack of information and systematic practices across the EU for managing a range of hazards to groundwater from energy related activities in the deep sub-surface. This has led to significant public concern about the possible impacts of some of these activities. In response, a number of European Member States have announced bans on the extraction process of hydraulic fracturing (e.g. France and Ireland) and more countries have moratoria on the industry until more is known about the potential hazards and risks. Only a handful of Member States, including Poland and parts of the UK (England) are already in the incipient stages of development. On the other hand, other energy related activities in

the deep sub-surface (e.g. geothermal, nuclear waste disposal, conventional hydrocarbons and Carbon Capture and Storage) are either well-established or being actively encouraged across more states, since it is recognized that use of these technologies can both boost national economies and/or directly help to achieve international climate change goals – fewer concerns have been voiced about the impact of these sub-surface industries on groundwater. Since considerations for practitioners assessing groundwater vulnerability are likely to be comparable across these sub-surface industries there is a clear requirement for a consistent, unbiased, approach based upon the best possible knowledge available. The VoGERA project would thus be timely in its undertaking responding to these rapidly developing industries and subsequent public pressure currently confronting many European Member States. A European wide approach to assessing groundwater vulnerability to these activities will allow for a consistent advancement of these industries.

The scientific outputs from VoGERA will be designed to support evidence-based decision making and an integrated approach to management of groundwater vulnerability and associated hazards across Europe in relation to deep sub-surface activities. The information and knowledge gained as part of the project will also be made readily accessible to all stakeholders, including the public, to increase awareness of where groundwater is vulnerable, the reasons for this and how it the ways in which vulnerable groundwater can be protected whilst at the same time allowing responsible use of the sub-surface for the benefit of European citizens and the economy.

Opportunities for collaboration have been identified with the following GeoERA projects:

• RESOURCES: VoGERA will provide additional data for Belgian and Dutch pilot areas on hydraulic properties and groundwater quality.

• HOVER: Methodological guidance is being developed, for example on groundwater age assessment.

• GeoConnect3D: Map of thermal anomalies and geomanifestations could be indicative for vertical flowpaths in Belgian and Dutch pilot site. Results from VoGERA pilot sites may feed back into GeoConnect3d to be included in the database.

• HIKE: Links with the EU fault database, to understand fault locations and behaviors and share data generated within VoGERA.

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 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.

VoGERA focuses on the vulnerability of groundwater resources to deep energy related activities and hence has links to some of the geoenergy projects.

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 VoGERA project is the smallest project with just six partners collaborating on a very focused objective with rather simple requests to the information platform i.e. primarily a project report and publication database accessible via maps on EGDI and keyword searches. The work continues as planned according to the project description and is expected to continue doing that. There may even be a chance of increasing the rating to level 5 at the final review at the end of the project, but this is yet too early to say.
Related transboundary studies in VoGERA and RESOURCE both involving partners from especially TNO, The Netherlands and WMM, Belgium may ultimately provide some additional synergy benefits and products for the information platform.

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:
This project with quite limited resources addresses a critical issue, the increasing use of the subsurface and the related potential risks. The different case studies are related to different subsurface uses (shale gas, hydrogeothermal, CSS …)

It has achieved a lot and produced very interesting outputs. It should consider some possibility of maturation of some of its outputs, such as:

- The vulnerability concept replication conditions (as the number of cases studied is limited)
- The conceptual framework to be developed on the differences of the sources of risks and to be further discussed with policy-makers and stakeholders from different EU countries (e.g. the weighting factors may differ due to various perceptions).

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

- It partly relies on a repository developed by an EU funded project which is now closed. Therefore its sustainability is not ensured.
- And mainly on the EGDI exploitation plan, which is in fact quite limited.

Remark to GEOERA coordination and evaluation teams:
Finally, the envisaged combination of deliverables may require an amendment!

Stakeholder 2 feedback:
This may be the smallest project, but it tackles an issue which resonates far beyond Europe. I am pleased to see some international (across continents) collaboration as I know some GSC researchers were in touch with the project lead. It will be very interesting to compare results from this project with very similar projects in North America, and in Canada in particular. Being able to understand how the geology in the intermediate zone serves as a seal between either productive units or units where various substances may be disposed of, and the shallow groundwater is paramount in the management of the subsurface.

Good job!

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
Andrej Lapanje	Scientific Reviewer	Geological Survey of Slovenia
Klaus Hinsby	Ground Water theme coordinator	Geological Survey of Denmark and Greenland
Andrée Bolduc	Stakeholder council Member	Geological Survey of Canada
Dominique Darmendrail	Stakeholder council member	Water JPI
Marco Bianchi	Project manager	British Geological Survey
Rob Ward	Project member	British Geological Survey
Çis Slenter	Project member	Flanders Environment Agency
Wilem Zaadnoordijk	Project member	Netherlands Organisation for Applied Scientific Research

Annex 2: Communication and dissemination activities – version 1

Please select activity	Subcategory	Date	Target audience	Number of people reached	Short name of project participant	Author(s)	Link (if applicable)
MEETINGS	Meeting with international body	sep.18	EU INSTITUTION		Griet Heuvelmans	Griet Heuvelmans	pesentation at CIS werkgroep C (groundwater). To reach EU stakeholders
EVENTS	WORKSHOP	nov.18	GENERAL PUBLIC	27	all	Cis Slenter	
EVENTS	CONGRESS	sep.19	SCIENTIFIC COMMUNITY	500	all	BIANCHI Marco, ZAADNOORDIJK Willem, LOVELESS Sian, BEERTEN Koen, SLENTER Cis; ROTÁR-SZALKAI Ágnes, HINSBY Klaus; MALLIN-MARTIN Daniel, WARD Robert	IAH poster
MEDIA	ONLINE MEDIA	planned every two month to keep stakeholders up-to-date	GENERAL PUBLIC		all	Cis Slenter	