Sub-areas Interim Report pursuant to Section 13 StandAG

As per 28/09/2020

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List of abbreviations

^{14}C	Carbon-14
^{3}H	Tritium
ArcGIS	ArcGIS is the generic term for various geoinformation system software products by ESRI
Art.	Article
AtG	Act on the Peaceful Utilisation of Atomic Energy and the Protection against its Hazards (Atomic Energy Act)
BASE	Federal Office for the Safety of Nuclear Waste Management
BBergG	Federal Mining Act
BfS	Federal Office for Radiation Protection
BGBl	Federal Law Gazette
BGE	Bundesgesellschaft für Endlagerung mbH
BGR	Federal Institute for Geosciences and Natural Resources
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
CO_2	Carbon dioxide
DBE	Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH
DSK	German Stratigraphic Commission
ECZ	Effective containment zone
EDZ	Evacuated damaged zone
EinwirkungsBergV	Mining Regulation on Impacted Areas (EinwirkungsBergV)
GeolDG	Act on state geological surveys and on the transmission, permanent storage and public provision of geological data as well as the accessibility of geological data for public duties (Geological Data Act – GeolDG)
GOK	Ground surface
IA code	Identified area code
InSpEE	Information system salt structures: planning basis, selection criteria and estimation of the potential for the construction of salt caverns for the storage of renewable energies (hydrogen and compressed air)
K-Drs.	Commission printed paper

NaCl	Sodium chloride
NBG	National Citizens' Oversight Committee
No.	Number
Para.	Paragraph
S.	Sentence
StandAG	Act on the search and selection of a site for a repository for high-level radioactive waste (Site Selection Act – StandAG)
STD	Stratigraphic Table of Germany
TUNB project	Subsurface potentials for storage and economic use in the North German Basin. Within this project, a geological 3D model of the North German Basin is being developed by the State Geological Surveys and the Federal Institute for Geosciences and Natural Resources (BGR) as project management agency. https://www.bgr.bund.de/DE/Themen/Nutzung_tieferer_Untergrund_CO2Speicherung/Projekte/Nutzungspotenziale/Laufend/TUNB.html
UVPG	Environmental Impact Assessment Act

Glossary

The document "BGE glossary for the site selection procedure (BGE 2020af) contains a glossary that applies to all reports (currently only available in german).

https://www.bge.de/fileadmin/user_upload/Standortsuche/Wesentliche_Unterlagen/Zwischenbericht_Teilgebiete/20200928_Glossar.pdf

Please Note:

This document is a translation of the original German version of the "Zwischenbericht Teilgebiete" from the 28th September 2020 (BGE 2020g) and is for information purposes only. Please refer to the German version for citation. In case of differences between the versions, the German version applies. Supporting documents are not necessarily translated.

1 Summary

In 2013, the German Bundestag and Bundesrat passed a law to restart the search for the site with the best possible safety for a repository for the high-level radioactive waste produced in Germany. The “Commission on the Storage of High-level Radioactive Waste”, consisting of representatives of science, the German Bundestag and Bundesrat as well as associations, worked until 2016 on a concept for the site selection procedure based on the white map of Germany. For this purpose, the Commission developed rules, criteria and formulated requirements on a repository for high-level radioactive waste. The legislator passed the “Act on the search and selection of a site for a repository for high-level radioactive waste” (Site Selection Act – StandAG) in May 2017, which was based on the findings of the Commission.

The Site Selection Act describes the principles of the Site Selection Procedure as science-based, participative, transparent, self-questioning and learning. The search area will be narrowed down increasingly over the course of three phases: starting with the entire federal territory, then surface exploration site regions and subsurface exploration of sites, and finally a proposal for a repository site offering the best possible safety to accommodate high-level radioactive waste. The Bundesgesellschaft für Endlagerung mbH (BGE) is responsible for the site selection procedure as the German Waste Management Organisation. In this Interim Report, the BGE is presenting first results outlining sub-areas in preparation for defining the site regions.

In accordance with Section 1(3) StandAG, the BGE is taking into consideration for the final disposal the host rocks of rock salt, claystone and crystalline rock within the framework of the work pursuant to Section 13 StandAG.

Section 13 StandAG describes sub-areas as those areas in Germany where favourable geological conditions can be expected for the safe final disposal of high-level radioactive waste in one of the three host rocks. They are identified by the application of the legally stipulated requirements and criteria set out in Section 22 StandAG (exclusion criteria), Section 23 StandAG (minimum requirements) and Section 24 StandAG (geoscientific weighing criteria). With this Sub-areas Interim Report, the BGE is making a contribution to engender the necessary public interest in the issue of final disposal and the site selection procedure. The Sub-areas Interim Report provides the basis for the Conference on Sub-areas and encourages participation. Hence, publication of the Sub-areas Interim Report lays the foundation to start the formal public involvement process at a stage that is sufficiently early to enable influence on the work and the findings of the site selection procedure.

In order to ensure transparency in the decision-making process, this Interim Report and the supporting documents present the findings and all facts and considerations that are relevant to selection.

The site selection procedure was launched in September 2017, and the BGE has started to work on it. Enquiries were sent to the competent federal and state authorities to obtain the data sets required to apply the legally stipulated geoscientific requirements and criteria throughout Germany. This Interim Report and its supporting documents describe the methods and their development. The general public and experts were involved in the process of preparing the application methods. In addition, the BGE discussed its application methods in public during online consultations that were held between November 2019 and August 2020. Some of the information obtained during these discussions prompted an adjustment of the application methods.

During the process of identifying the sub-areas, a first step involved excluding areas that are unsuitable as repository sites for high-level radioactive waste according to the legally defined exclusion criteria pursuant to Section 22 StandAG. The exclusion criteria include large-scale vertical movements, active fault zones, influences from current or past mining activities, seismic activity, volcanic activity and young groundwater age. The rules set out in Section 22(1) StandAG state that an area is classified as unsuitable as soon as one of the defined exclusion criteria applies.

The next step involved an assessment of the remaining areas to determine which ones meet the minimum requirements of Section 23 StandAG. First of all, rock formations were identified which contain claystone, rock salt and crystalline host rock types relevant to repositories. The minimum requirements refer to the hydraulic conductivity of the rock, the thickness of the effective containment zone, the minimum depth of the effective containment zone (i.e. its distance to the earth's surface), the assumed minimum area of the repository and the preservation of the barrier effect. "Identified areas" that satisfy none of the exclusion criteria according to Section 22 StandAG and all of the minimum requirements pursuant to Section 23(2) StandAG were obtained as a result of these two steps.

In the third step, these identified areas are evaluated according to the geoscientific weighing criteria defined in Section 24 StandAG in regard to their favourable overall geological situation and hence their suitability as a repository site for high-level radioactive waste. The geoscientific weighing criteria described in Annexes 1 to 11 (to Section 24) StandAG are used as evaluation benchmarks. These eleven criteria refer to the

- transport of radioactive substances by groundwater movements in the effective containment zone;
- configuration of the rock bodies;
- spatial characterisability;
- long-term stability of the favourable conditions;
- favourable geomechanical properties;
- tendency to form fluid pathways;
- gas formation;
- temperature compatibility;
- retention capacity in the effective containment zone;
- hydrochemical conditions; and
- protection of the effective containment zone by the overburden.

Generic repository concepts were taken into account during the stages of work to ensure that, in the final outcome of safety-related considerations, areas with an overall favourable overall geological situation are designated as sub-areas.

Within the framework of Section 13 StandAG, a total of 90 sub-areas with an area of approx. 240,874 km² are identified which are expected to have favourable geological conditions for the final disposal of high-level radioactive waste (cf. Figure 1). These sub-areas overlap in places, as they are located in different geological units. If the overlap in some sub-areas is taken into account, an area of approx. 194,157 km², i.e. approx. 54 % of the national territory in Germany, is designated as a sub-area and constitutes the starting point for the next steps in the site selection procedure.

In this context, nine sub-areas with a surface of approx. 129,639 km² are identified in claystone host rock (cf. Figure 2). A total of 74 sub-areas with a surface of approx. 30,450 km² were identified in rock salt host rock. Of these sub-areas, 60 are located in steep rock salt formations and 14 sub-areas are in stratiform, i.e. flat, rock salt formations (cf. Figure 3). A total of seven sub-areas with a surface of approx. 80,786 km² were determined in crystalline host rock (cf. Figure 4).

The Gorleben salt dome has not been included as a sub-area based on the geoscientific weighing criteria according to Section 24 StandAG. The provision set out in Section 36 para. 1 s. 5 no. 1 StandAG shall therefore apply, and the Gorleben salt dome is excluded from the procedure. The BGE will therefore no longer consider the Gorleben salt dome in its continued work on proposals for siting regions.

Within the framework of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany were assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG). A presentation of these areas and a recommendation for further action in this regard are therefore unnecessary.

The sub-areas represent – taking into account the findings of the Conference on Sub-areas – the search area for the BGE to prepare proposals for siting regions that are eligible for surface exploration in Phase II. These siting regions will be proposed to the Federal Office for the Safety of Nuclear Waste Management (BASE). A decision on these proposals by the federal legislature then brings Phase I of the site selection procedure to a conclusion according to Section 15 StandAG.

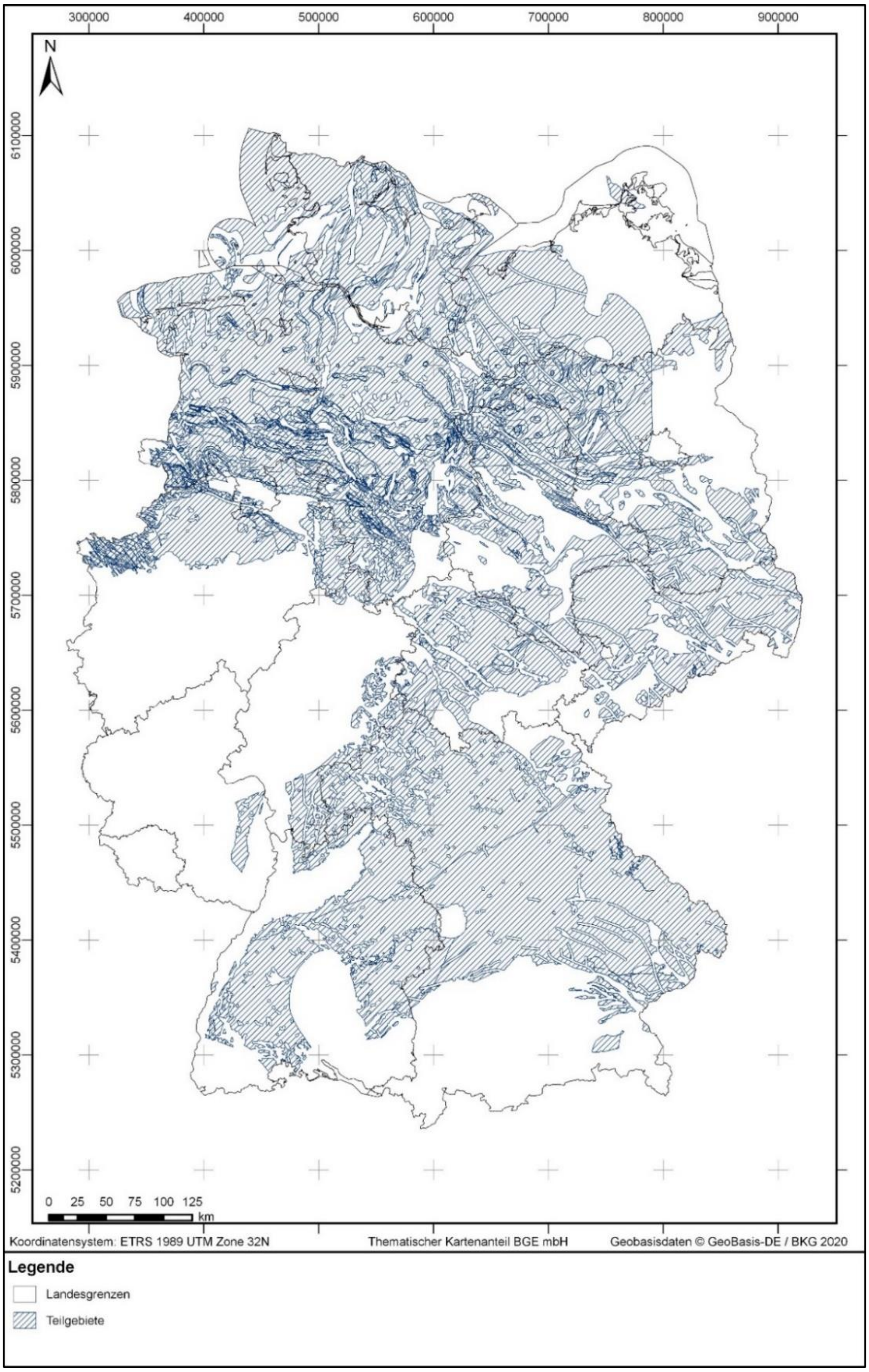

Figure 1: *Overview map of the sub-areas.*
The sub-areas were determined based on stratigraphic units, which is why several sub-areas occasionally overlap in this map diagram.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Teilgebiete = Sub-areas.

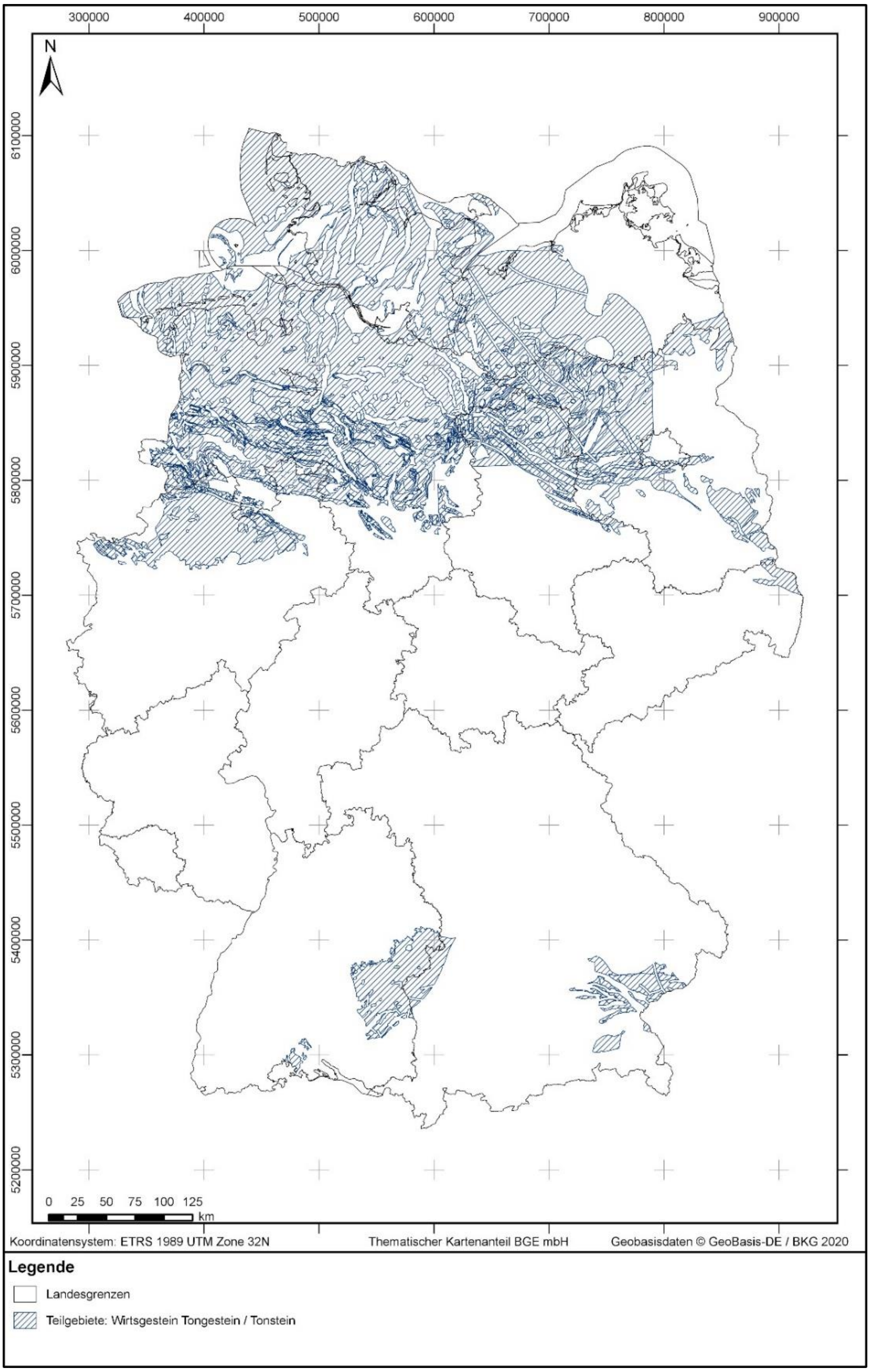

Figure 2: Overview map of the sub-areas in claystone host rock.
The sub-areas were determined based on stratigraphic units, which is why several sub-areas occasionally overlap in this map diagram.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Teilgebiete: Wirtsgestein Tongestein / Tonstein = Sub-areas: Host rock claystone / clay rock.

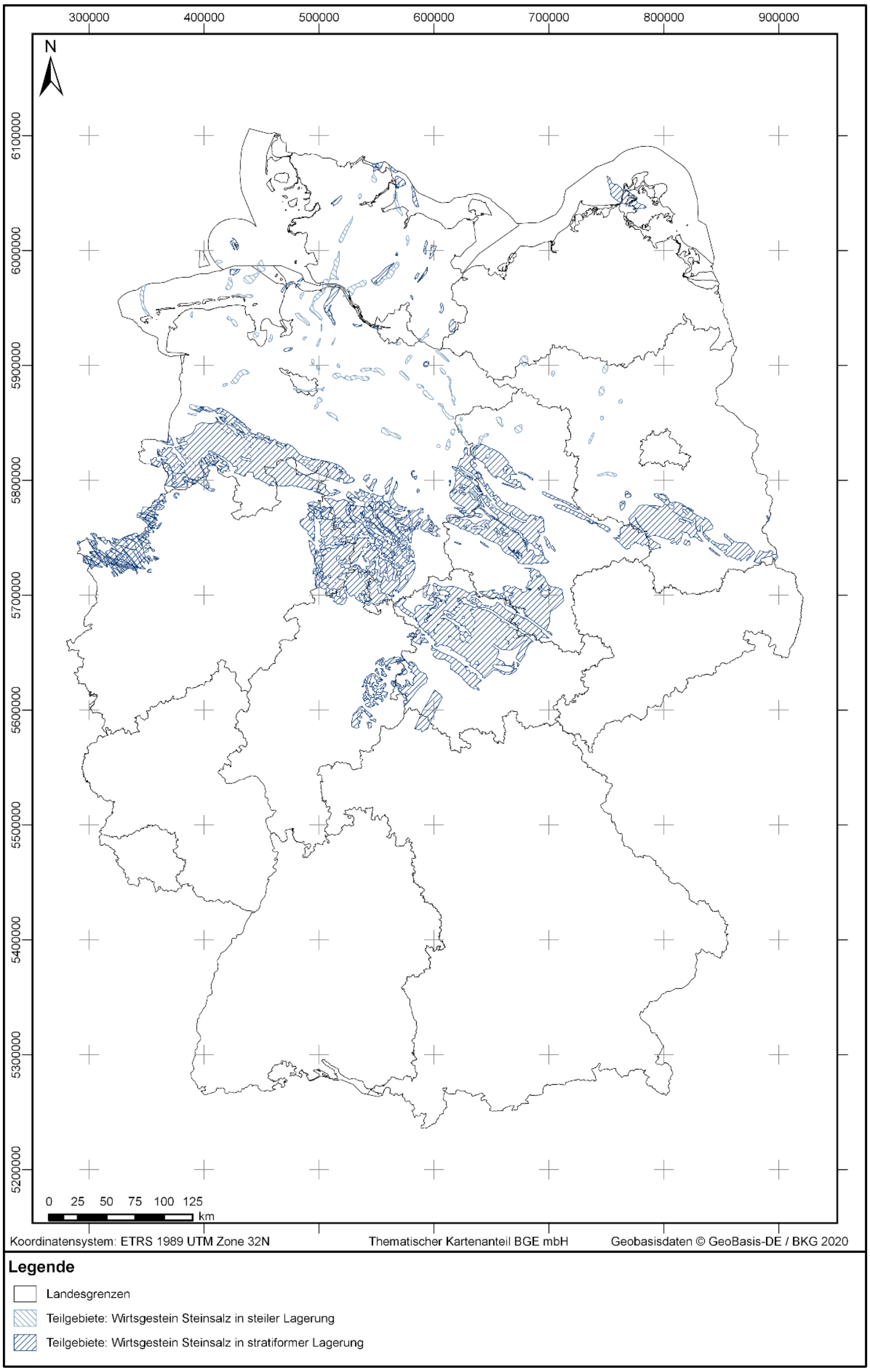

Figure 3: *Overview map of the sub-areas in rock salt host rock.*
The sub-areas in rock salt host rock were indicated separately based on stratigraphic units, which is why several sub-areas occasionally overlap in this map diagram.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Teilgebiete: Wirtsgestein in steiler Lagerung = Sub-areas: Host rock rock salt in steep formations; Teilgebiete: Wirtsgestein in stratiformer Lagerung = Sub-areas: Host rock rock salt in stratiform formations.

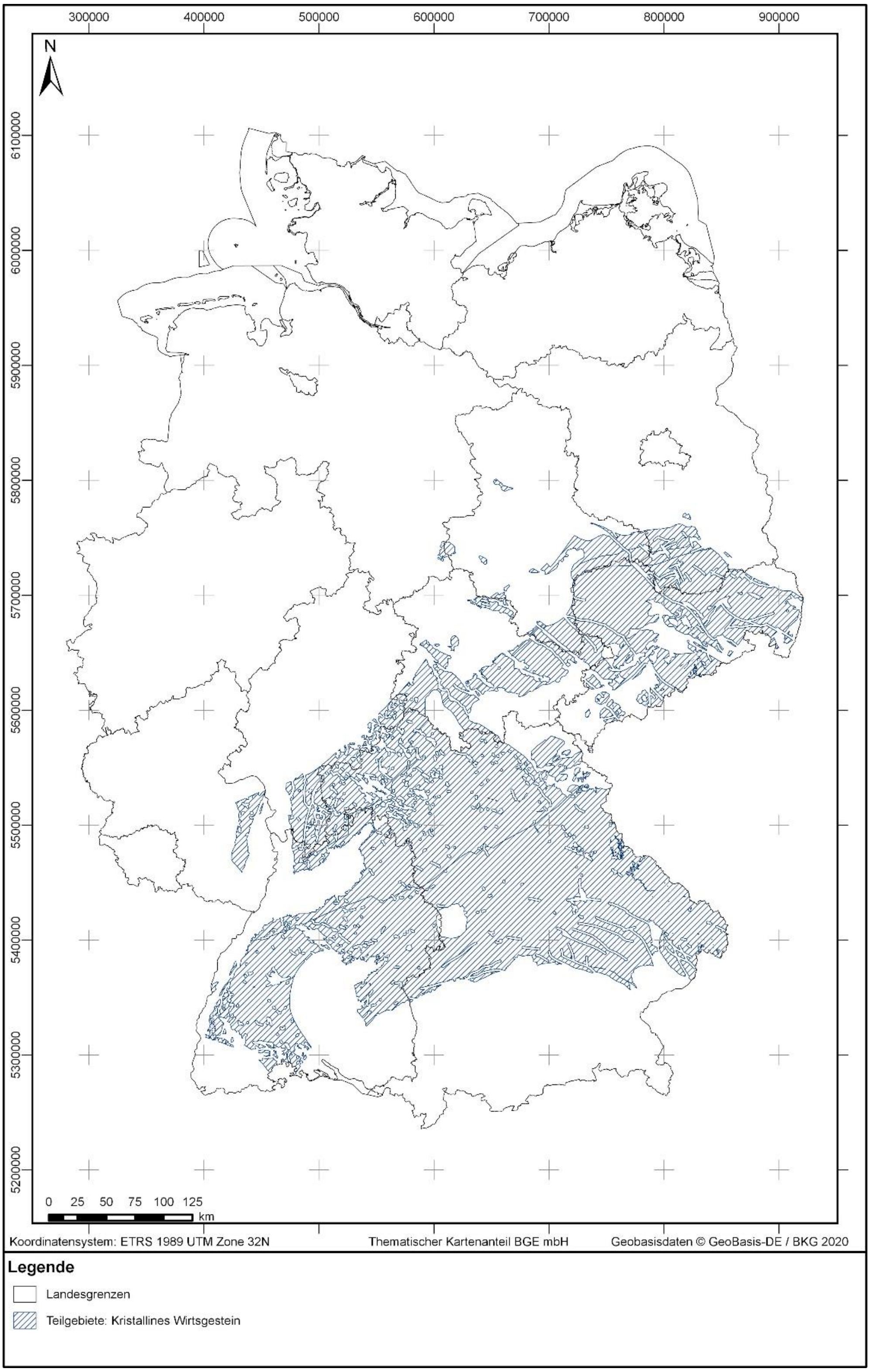

Figure 4: *Overview map of the sub-areas in crystalline host rock on the territory of the Federal Republic of Germany.*
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Teilgebiete: Kristallines Wirtsgestein = Sub-areas: crystalline host rock.

2 Introduction

2.1 Occasion

The Bundesgesellschaft für Endlagerung mbH (BGE) was established within the portfolio of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) on September 21st 2016 based on the Act on the rearrangement of organisational structures in the field of radiation protection and radioactive waste disposal of July 2016.

The site selection procedure itself is performed in accordance with the Site Selection Act (StandAG). The original version of the Act on the search and selection of a site for a repository for high-level radioactive waste (StandAG 2013) of July 23rd 2013 (Federal Law Gazette (BGBl.) I p. 2553) was repealed on May 16th 2017 following evaluation by the Bundestag. The new version of the Act on the search and selection of a site for a repository for high-level radioactive waste, Art. 1 of the Act of May 5th 2017 (BGBl. I p. 1074), largely entered into force on May 16th 2017. The most recent amendments to the Site Selection Act were made by Section 247 of the ordinance of June 19th 2020 (BGBl. I p. 1328) and entered into force on June 27th 2020.

The duties of the federal government according to Section 9a para. 3 s. 1 Atomic Energy (AtG) were assigned to the Bundesgesellschaft für Endlagerung mbH (BGE) pursuant to Section 9a para. 3 s. 2 AtG on April 25th 2017. The BGE is therefore the German Waste Management Organisation for the site selection procedure according to Section 3 para. 1 StandAG. The site selection procedure started officially on September 5th 2017. The Waste Management Organisation is obliged, pursuant to Section 13 StandAG, to publish its initial interim results in the Sub-areas Interim Report.

Annex 1 contains the text of sections 1, 12, 13, 22, 23, 24 and 36 of StandAG and the corresponding passages from the explanatory memorandum on the draft law (BT-Drs. 18/11398).

2.2 Purpose and objective

This document is the interim report in accordance with Section 13 para. 2 s. 3 StandAG. It sets out the results of applying the exclusion criteria according to Section 22 StandAG, the minimum requirements according to Section 23 StandAG and the geoscientific weighing criteria according to Section 24 StandAG for the identification of sub-areas.

Identification of sub-areas pursuant to Section 13 StandAG is based on data made available to BGE by the competent federal and state authorities in response to data queries according to Section 12 para. 3 StandAG. The facts and considerations that are relevant to identifying the sub-areas are presented in the form of supporting documents (cf. Figure 5) appended with the Sub-areas Interim Report. The generic repository concepts from BGE (2020am) were taken into consideration in the identification of sub-areas.

To ensure that the process of obtaining the results is comprehensible, summarised documents supporting the results and cited secondary documents are published in addition to the results themselves (cf. Figure 5). The Sub-areas Interim Report is a summary of the methods set out in the supporting documents in regard to application of the criteria and requirements pursuant to sections 22 to 24 StandAG and the relevant data.

In the course of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany could be assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG). A presentation of these areas and a recommendation for further action in this regard are therefore unnecessary.

With this Sub-areas Interim Report, the BGE is making a contribution to engender the necessary public interest in the issue of final disposal and the site selection procedure. The Sub-areas Interim Report provides the basis for the Conference on Sub-areas and encourages participation. Hence, publication of the Sub-areas Interim Report lays the foundation to start the formal public involvement process at a stage that is sufficiently early to enable influence on the work and the findings of the site selection procedure.

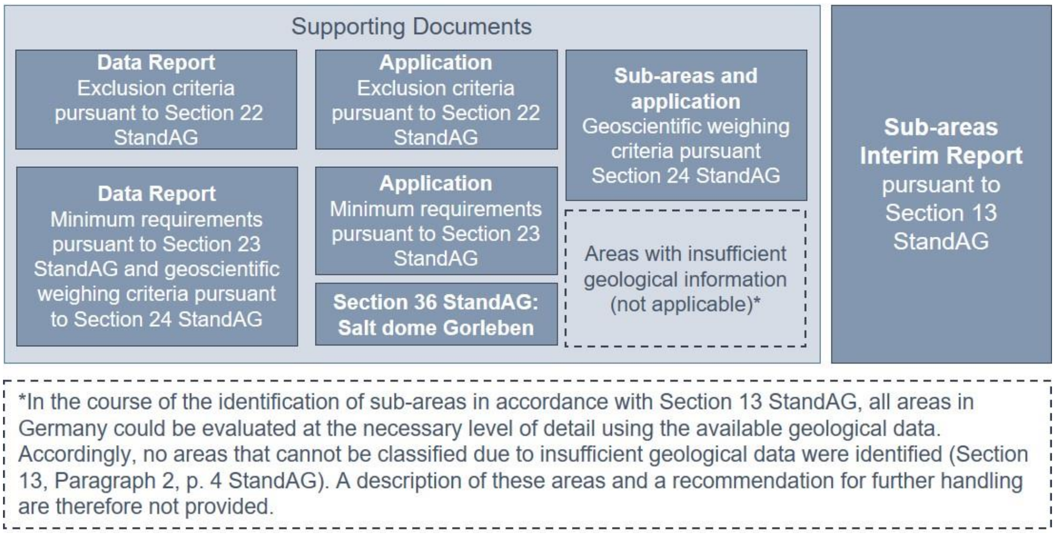

Figure 5: Overview of the individual components included in the Sub-areas Interim Report

2.3 Delimitation

The process to identify sub-areas pursuant to Section 13 StandAG does not involve any preliminary safety assessments pursuant to Section 27 StandAG; neither does it include the application of planning scientific weighing criteria listed in Annex 12 (to Section 25) StandAG (e.g. distance from current developments in residential and mixed-use areas). According to StandAG, they will not take place until Phase I, Step 2 of the site selection procedure.

The identified sub-areas themselves are not a direct basis for enshrinement in law and represent merely “work in progress”. They are the basis for initiating the formal public involvement process in the form of a conference on sub-areas that will be convened specifically for this purpose. The BGE will take the findings of this conference into consideration in the preparation of its proposed siting regions for surface exploration pursuant to Section 14 StandAG. These proposals for siting regions will in turn form the basis for enshrinement in law pursuant to Section 15 StandAG.

3 The site selection procedure

The site selection procedure is a multi-stage process (cf. Figure 6) that is divided into three phases. The findings of each phase and the consequent specifications by the legislator determine the concrete scope of work for the following phase.

Phase I takes place in two steps. Step 1 involves identifying the sub-areas pursuant to Section 13 StandAG where favourable geological conditions can be expected for the safe final disposal of radioactive waste. This takes place by applying the geoscientific criteria and minimum requirements defined in sections 22 to 24 StandAG.

The BGE will then publish the identified sub-areas in the form of an interim report. Among other things, this interim report on the sub-areas will bring together all principles that were developed in order to apply the criteria and minimum requirements, and will provide detailed explanations on data retrieval, data delivery and data homogenisation for application of the criteria and minimum requirements. The interim report aims to present those sub-areas that are identified as having favourable geological conditions for the safe final disposal of radioactive waste.

The Waste Management Organisation will submit the Sub-areas Interim Report to the BASE after publication. After receiving the report, the federal office is required to convene a conference on Sub-areas in accordance with Section 9 para. 1 s. 1 StandAG. The conference on Sub-areas is the first format within the site selection procedure – which is based on the principle of continuous participation – and is intended to enable public involvement at the earliest possible date before siting regions are selected.

Step 2, Phase I involves identification of regions for surface exploration pursuant to Section 14 StandAG, based on the previously identified sub-areas and the outcomes of deliberations during the conference on Sub-areas. For this purpose, representative preliminary safety assessments will be carried out for each sub-area in accordance with Section 27 StandAG, before the geoscientific weighing criteria are applied once again in order to identify favourable regions. The primary objective of applying the scientific weighing criteria within the planning process is to narrow down large areas that may potentially be suitable for a repository site. They can also be used for a comparison between areas that are deemed to ensure equivalent safety (Section 25 s. 1 and 2 StandAG). Moreover, exploration programmes will be prepared for surface exploration of the siting regions. This Step 2 in Phase I begins directly after publication of the Sub-areas Interim Report.

The BGE summarises the proposal for the siting regions for surface exploration, together with reasons, the results of the conference on Sub-areas and the exploration programmes for the identified sites, and forwards this to the BASE, which examines the BGE proposal. The federal legislator then makes a binding decision in this regard and defines the scope of work for Phase II.

Phase II of the site selection procedure involves surface exploration of the regions defined by law pursuant to Section 16 StandAG. This is carried out in accordance with the exploration programmes prepared for each site. Optimised, preliminary safety assessments will be carried out on the basis of the exploration results. Analyses of socio-economic potential will be performed for each siting region. In addition, the comparative analysis and weighing procedure is carried out once again in accordance with the statutory exclusion criteria, minimum requirements, geoscientific weighing criteria and the scientific weighing criteria for the planning process. The BGE also prepares exploration programmes and assessment criteria for subsurface exploration and comprehensive, preliminary safety assessments at each site. The BGE transfers the proposal for the siting regions selected for subsurface exploration, including reasons, to the BASE. The federal legislator then makes a binding decision in this regard and defines the scope of work for Phase III.

Implementation of Phase III involves subsurface exploration of the previously defined sites, with downstream comparison of their merits. The BGE carries out these programmes within the sites specified by the federal legislator on the basis of the exploration programmes for subsurface exploration prepared by the BASE. The BGE uses these investigation results to conduct comprehensive preliminary safety assessments and prepares the documents for the environmental impact assessment pursuant to Section 16 of the Environmental Impact Assessment Act (UVPG), before the criteria and requirements pursuant to Sections 22 to 24 StandAG are applied once again. Application of the planning scientific weighing criteria for the planning process listed in Annex 12 (to Section 25) StandAG is carried out according to Section 25 StandAG.

On the basis of these results, the BGE then submits to the BASE a proposal for the site with the best possible safety in regard to the construction of a repository for high-level radioactive waste. The BASE examines the BGE proposal, including the underlying site comparison of at least two sites. Based this examination result and under consideration of all private and public interests and the results of the involvement procedure, the BASE assesses which site offers the best possible safety and submits this to the BMU (Section 19 StandAG). The federal government then submits the site proposal to the federal legislator as a draft law. The final objective of the site selection procedure is reached when the federal legislator decides on a site. The StandAG earmarks 2031 as a date for defining a site.

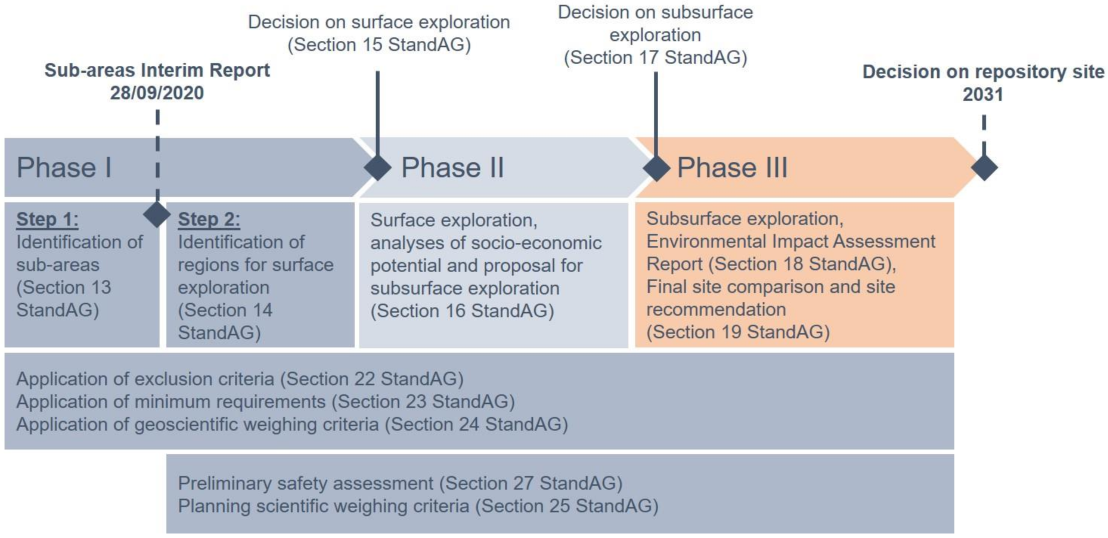

Figure 6: Flowchart of the site selection procedure

3.1 Principles of the iterative site selection procedure

Pursuant to Section 1 para. 2 StandAG, the site selection procedure uses a participative, science-based, self-questioning and learning procedure to identify a site offering the best possible safety to accommodate a facility in Germany for the final disposal of high-level radioactive waste produced in Germany according to Section 9a para. 3 s. 1 Atomic Energy Act (AtG).

With the foundation of BGE, the competencies of the previous companies, the Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH (DBE), the Asse-GmbH and a large part of the former department for the Safety of Nuclear Waste Disposal in the Federal Office for Radiation Protection (BfS) were united under one roof.

The BGE was appointed as the German Waste Management Organisation for the site selection procedure according to Section 3 StandAG upon delegation of federal duties according to Section 9a para. 3 s. 1 AtG. Cooperating with a large number of partners, it can now contribute its experience and competence to this novel and iterative procedure to propose a site offering the best possible safety to accommodate a facility in Germany for final disposal of high-level radioactive waste produced in the Federal Republic of Germany according to Section 9a para. 3 s. 1 Atomic Energy Act.

Section 1 para. 2 s. 2 and 3 StandAG defines the site with the best possible safety as being the one – based on the total number of sites determined in each phase according to the authoritative requirements set out in StandAG – that is identified in the course of the iterative and comparative procedure described in the StandAG and which ensures the best possible safety for the permanent protection of humans and the environment from ionising radiation and other harmful effects of this high-level radioactive waste for a period of one million years. Included herein is the avoidance of unreasonable burdens and obligations for future generations.

3.1.1 Participative procedure and transparency

The site selection procedure begins with the "white map" of Germany. The BGE starts by excluding areas according to the exclusion criteria defined by law and by identifying areas that meet the minimum requirements defined by law. Safety-oriented application of the geoscientific weighing criteria to these areas leads to a further differentiation with regard to the basic suitability of the geological subsoil for the final disposal of high-level radioactive waste.

This interim report contains the sub-areas that offer favourable geological properties.

The BGE shares the comments expressed by Klaus Töpfer, former Federal Minister and Co-Chair of the National Citizens' Oversight Committee (NBG), that the principle of the white map does not begin on paper, but rather in the minds of the persons and institutions involved. Aside from eschewing fixed expectations regarding the results, our work must be characterised by a process of continuous self-questioning to assure that we prepare our proposals openly and without prejudice or bias. Furthermore, we apply the principles of continuous improvement as expected of a learning organisation.

3.1.2 Science based procedure

Adhering to a science-based procedure, the BGE performs its tasks based on frank scientific discourse and a high degree of professional competence and scientific judgement. The aim is to eschew fixed expectations and to adopt a self-reflective approach in order to achieve a maximum level of neutrality. The BGE is committed to ensuring the transparency of its scientific findings. Methods of obtaining results, relevant interim results and the principles applied to all work are therefore documented. Based on the defined issues, resilient findings are developed with the aim of achieving reproducibility. The inherent uncertainties of observations are evaluated and the bases for evaluation disclosed, assuming that doing so is lawful. The BGE quality assurance system, which is adapted to the specific requirements of each task, ensures that the work fulfils scientific standards. Aside from knowledge of mechanisms and contexts within natural sciences and technology, the interdisciplinary work also addresses social and legal issues.

All science oriented procedures are based on the continuous identification and consideration of current advances within science and technology. Gaps in knowledge can be identified – and research performed to close them – through the early inclusion of new scientific findings, technical innovations and social changes.

The science based procedure aims to ensure efficient, systematic completion of tasks according to high quality standards. For this reason, BGE intends to preserve its technical and scientific competence in the field of site selection in the long term and is therefore looking for national and international cooperation partners. In addition, it builds meaningful networks with scientific institutions, plays a significant role in committees and working groups and participates in national and international research projects. Open-ended, scientific questions are used to develop a strategic research plan for implementation of the site selection procedure, which is then carried out either by in-house research or using external research contractors. Where possible, the findings are published in peer reviewed journals in order to assure and preserve the high quality of research results.

Communicating scientific findings in a generally understandable way is the objective at all times. The BGE will therefore present its scientific findings to the interested public as well. Communication of the results will also identify the limits of current knowledge and prevailing uncertainties.

3.1.3 Positive error culture and lessons learned

As the German Waste Management Organisation, the BGE bases the standards it applies to its work on Section 1 para. 2 StandAG, which describes site selection as a participative, science based, transparent, self-questioning and learning procedure. In order to fulfil the standards, BGE bases its management system and especially its error culture on these principles.

We therefore require, as the BGE, a certain error tolerance in order to implement the site selection procedure. Error tolerance – defined as the ability of a person to tolerate their own mistakes and those of others – is a benchmark for how a company deals with mistakes made by its employees and organisational units and how it harnesses them to foster resilience. In regard to the site selection procedure, there ishardly any experience on which the BGE could base its approach. Hence, it will be necessary to make decisions that include a measure of uncertainty. Making mistakes is permitted in principle, provided they are dealt with transparently. The adage that “you learn from mistakes” is problematic in a science based procedure. Many people, both inside and outside the organisation, are primarily concerned with their reputations, so mistakes can tarnish their image and dent their willingness to embrace innovative approaches.

When communicated openly, we view mistakes in a positive light in principle. We believe that “*anyone can make mistakes”*, regardless of their hierarchical level. Transparent management of past mistakes allows us to learn, as well as to continuously improve our methods and technical approaches. In order to flourish, a positive error culture must be to encourage a trusting environment in which everyone feels confident enough to communicate their mistakes transparently. Not only will open communication enable assessment and mitigation of the consequences, it also allows the development of collaborative solutions along the lines of lessons learned.

This means, specifically:

It is OK to get things wrong sometimes! Heads do not roll here if you make an incorrect decision. No one should be afraid of making mistakes; after all, they present an opportunity for everyone to learn. Appreciation is a vital key to ensuring that every team member continues to contribute new ideas, even when mistakes have been made. This is also in line with BGE’s underlying values, which are enshrined in the mission statement that was introduced in 2020.

Errors and mistakes are not always primarily due to incorrect processing, but are more commonly the outcome of an immature approach that allowed things to be easily overlooked or forgotten. Knowledge acquired from experience, and hence the insight to do things differently, is the basis for continuous learning in our field. Constantly questioning our actions and, above all, reviewing situations in which an error has occurred enables us to identify room for improvement, which can then be put into practice through suitable measures. This is why we look for internal and external partners to receive feedback who help us to scrutinize our work and our actions and who provide valuable food for thought for improvements.

The task of selecting a site by 2031 is a unique challenge that will only be achievable by adopting and practising a positive error culture. Included in this is the willingness of all stakeholders to accept and actively encourage criticism and suggestions at all times. Professional networking, the initiation of research projects, a continuously evolving knowledge management and the willingness to apply new knowledge help to counteract uncertainties/absence of knowledge and to foster a learning organisation.

As the BGE, we are tasked with carrying out the site selection procedure according to StandAG, which is a novel, highly complex and scientifically demanding undertaking. We will only succeed in this task if our entire organisation embraces the principle of a self-questioning and learning procedure as set out in Section 1 StandAG. “We perceive ourselves as a learning organisation and see errors as a fundamental part of learning.” With this in mind, we are delighted to put our work up for discussion in order to identify optimisation potential and to continue developing our work with the assistance of many experts. In doing so, we are consistently and openly willing to admit mistakes and to continue on our path of development. Our ultimate aim in this regard is to propose a site with the best possible safety for the final disposal of radioactive waste.

3.1.4 Principle of reversibility

The site selection procedure is reversible, pursuant to sections 12 et seq. StandAG (Section 1 para. 5 s. 1 StandAG). According to Section 2 no. 5 StandAG, this reversibility is a mechanism by which the ongoing procedure can be redirected for the purpose of correcting errors. A change of direction during the ongoing procedure may occur, for example, due to new and beneficial technical possibilities or a need to adapt the original plan (BT-Drs. 18/11398, p. 48).

The explanatory memorandum to the StandAG explains that the definition of reversibility was introduced in response to a recommendation of the Repository Commission. Among the reversibility conditions, the Repository Commission also includes the possibility that setbacks may occur during the site selection procedure (K-Drs. 268, p. 235).

3.2 Geo data and information

The data required to apply the criteria and requirements pursuant to Sections 22 to 24 StandAG is obtained by means of data deliveries from the competent federal and state authorities. Pursuant to Section 12 para. 3 s. 2 StandAG the necessary geo data that is in the possession of the state authorities shall be made available to the Waste Management Organisation by the state authorities without charge for the purposes of the site selection procedure; this also applies to data that is subject to third-party rights. It follows, therefore, that the BGE shall designate sub-areas on the basis of existing data. New data in the form of explorations will not be obtained until later stages of the procedure.

3.3 Section 36 StandAG: How the BGE will deal with the Gorleben site

Section 36 para. 1 s. 4 StandAG states that the fact that findings from the previous exploration are available for the Gorleben site may not be included in the comparative assessment, nor may the fact that infrastructure for exploration has already been created for the Gorleben site.

A significant amount of knowledge already exists in regard to the Gorleben salt dome due to its many years of consideration as a potential repository site and the research conducted in this context. Nonetheless, the BGE's evaluation of the Gorleben site only used available information to the extent that it was needed to evaluate the Gorleben – Rambow salt dome and others or to evaluate the salt host rock in steep deposit at the current phase of the site selection procedure. At no point does the availability of more data for the Gorleben salt dome, compared to other sites, play any role in the procedure to identify sub-areas.

Furthermore, the issue of whether partial or complete exploration infrastructure is available in any of the areas played no role whatsoever in the evaluation during work on preparing the interim report on sub-areas. For this reason, the situation in Gorleben in this respect was not considered at any point in the procedure to identify the sub-areas, let alone included in the evaluation.

For detailed information on how the BGE deals with the Gorleben salt dome, refer to the supporting document "Section 36 Gorleben salt dome – summary of existing studies and results in accordance with section 22 to 24 StandAG within the framework of identifying sub-areas pursuant to Section 13 StandAG" (cf. BGE 2020p).

4 Identification of sub-areas pursuant to Section 13 StandAG

The following chapters describe how the exclusion criteria (Chapter 4.2), the minimum requirements (Chapter 4.3) and the geoscientific weighing criteria (Chapter 4.4) for identification of the sub-areas pursuant to Section 13 StandAG were applied. Generic repository concepts, based on the various host rock configurations, were used to identify the sub-areas (BGE 2020p). The individual results from applying the criteria and requirements are presented in addition to the development of the respective application method and the data basis used. The contents described here summarise the respective supporting documents (cf. Figure 5). For detailed information, refer to the following supporting documents:

- Application of the exclusion criteria according to Section 22 StandAG (BGE 2020h)
- Data report on exclusion criteria according to Section 22 StandAG (BGE 2020i)
- Application of minimum requirements according to Section 23 StandAG (BGE 2020j)
- Sub-areas and the application of geoscientific weighing criteria according to Section 24 StandAG (BGE 2020k)
- Data report on minimum requirements according to Section 23 StandAG and geoscientific weighing criteria according to Section 24 StandAG (BGE 2020j)

Section 36 StandAG contains special provisions for handling the Gorleben salt dome during the site selection procedure. How the BGE approaches the topic at the current stage of the site selection procedure is defined in more detail in the supporting document:

- Section 36 Gorleben salt dome – summary of existing studies and results in accordance with section 22 to 24 StandAG within the framework of identifying sub-areas pursuant to Section 13 StandAG (BGE 2020p)

Within the framework of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany could be assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG).

4.1 Definitions of terms and explanations

The following sections 4.1.1 to 4.1.4 define the terms "Effective containment zone", "claystone host rock", "salt host rock" and "crystalline host rock" as they are used in the identification of sub-areas pursuant to Section 13 StandAG. Furthermore, Chapter 4.1.5 explains how the maximum search depth is determined.

The contents described in the following chapters 4.1.1 to 4.1.5 summarise the corresponding chapter in the supporting document BGE (2020j).

4.1.1 Effective containment zone (ECZ)

Section 2 no. 9 StandAG defines the term of "effective containment zone" as the part of a rock formation which, in regard to repository systems that are essentially based on geological barriers and in connection with the technical and geotechnical seals, ensures safe containment of the radioactive waste in a repository.

The Site Selection Act (StandAG) does not contain recommendations or specifications concerning rock types that are suitable to create an effective containment zone. With the aim of identifying a site with the best possible safety for the final disposal of high-level radioactive waste over a period of proof of one million years, the BGE, as the German Waste Management Organisation, is looking for rock sequences that exhibit the necessary properties to form the geological barriers as defined above.

Geological barriers are geological units that impede or prevent the spread of radionuclides. In physical terms, this means that the necessary geological units must show a corresponding retention capacity for radionuclides with long-term safety implications. With regard to the period of proof, adequate homogeneous expansion of these rock sequences in both horizontal and vertical directions is necessary in order to maintain these properties.

Phase I, Step 1 of the site selection procedure involves identifying the sub-areas pursuant to Section 13 para. 1 StandAG where favourable geological conditions can be expected for the safe final disposal of radioactive waste. Phase I includes neither a specific description and spatial localisation of the effective containment zone nor of the matching storage areas. Designation of an effective containment zone and the corresponding potential storage areas (Section 2 no. 10 StandAG) requires more comprehensive knowledge of the site that can only be obtained during the iterative site selection procedure, which begins with Phase II of the site selection procedure.

4.1.2 Claystone host rock

Claystone host rock is a sedimentary rock formed in the geological past by the transport and depositing of clay minerals, but also minerals such as quartz, carbonates, etc., whose grain sizes are predominantly less than 0.002 mm. These sediments are formed by a weathering process acting on magmatic, metamorphic or existing sedimentary rocks. The weathering products are carried away by wind, water and other forces, transported and deposited elsewhere. Selective depositing according to grain size is caused by the transport medium losing its transport force – the smallest particles are "carried along". Water (rivers, lakes and seas) is the primary transport medium for clay. This is why clay deposits mainly form in seas and lakes, but also at calmer points in rivers. From a geological perspective, the deposits examined here formed many millions of years ago. At that time, a standing body – or bodies – of water existed for several million years at the current deposit areas. Deposits comprising large quantities of these sediments in sequential layers create an overburden pressure which causes the sediments to solidify. This produces sedimentary rocks. Solidification processes that take place under comparatively low pressure and temperatures are called diagenesis.

The BGE uses the term "host rock claystone" to describe both plastic clays and clay rocks that solidified in a diagenetic process as described above. Section 23 para. 5 no. 1 StandAG states that the effective containment zone of a repository system must possess low hydraulic conductivity of the rock with k_f values of less than 10^{-10} m/s. Moreover, there must be no insight or data that cast doubt on the preservation of the barrier effect pursuant to Section 23 para. 5 no. 5 StandAG.

As a potential host rock for the final disposal of radioactive waste, claystones exhibit a number of favourable properties which mainly relate to their fine- or fine-grained texture and mineralogical composition. The low conductivity for gases and liquids and the high retention capacity of radionuclides that are relevant to long-term safety must be emphasised in particular. It follows, therefore, that claystone is a suitable long-term geological barrier.

Among the less favourable properties of claystone as a potential host rock is their irreversible loss of retention capacity when exposed to excessive temperatures.

In the following, claystone formations are defined as rock formations that are composed predominantly of claystone, but also contain other subordinate rocks such as sandstones or carbonate rocks. Claystone formations are therefore not exclusively characterised by clays; clay-marl and marl-clay formations are also included as the representatives of the continuous series limestone-marl-clay that predominantly consist of clay. Argillaceous slates, which are metamorphic rather than sedimentary clay rocks that do not possess the favourable properties mentioned above, are not included in the claystones that are of relevance to repositories.

4.1.3 Rock Salt host rock

From a geological perspective, rock salt host rock is a sedimentary rock formed by the evaporation of seawater or inland water. Consisting mainly of sodium chloride ($NaCl$), this host rock has a number of properties that enable or favour the final disposal of high-level radioactive waste. High thermal conductivity is among the properties of rock salt as potential host rock. This enables rapid dissipation of the decay heat generated by the high-level radioactive waste. Moreover, when exposed to pressure, rock salt exhibits plastic properties that allow the closure of cracks and cavities in the rock caused by "creep" and means that the formation can withstand horizontal and/or vertical movements of the surrounding rock without fracturing. Furthermore, rock salt is hydraulically sealed and hence impermeable to gases and liquids.

The less favourable properties of rock salt as potential host rock include high water solubility and the low retention capacity of radionuclides which are relevant to long-term safety.

Salt host rock is encountered firstly in stratiform, i.e. flat, formations and secondly in steep formations, e.g. in the form of salt domes. Stratiform deposits date back to the original formation as a result of seawater evaporation several million years ago. Especially in the north of Germany, massive rock salt deposits were deposited in the Zechstein. Zechstein is a geological succession that began around 257 million years ago and lasted for approximately 6 million years. Evaporation caused the formation of rock salt layers during this period, which were over 1,000 m thick in places. Stratiform salt rock deposits were formed by evaporation during other periods as well. In turn, other sediments with a thickness of up to several 1,000 m formed above these deposits over the course of geological succession. The sediments located above exerted a considerable overburden on these salt deposits. But this pressure is not evenly distributed, and there are, for various reasons, zones containing lower-density deposits. The salt in these "weak zones" is able to rise due to the higher pressure in the adjacent zones and the plastic (ductile) properties of the salt. This leads to the formation of salt diapirs, i.e. salt domes. This process is known as salt tectonics or halokinesis (cf. Figure 7).

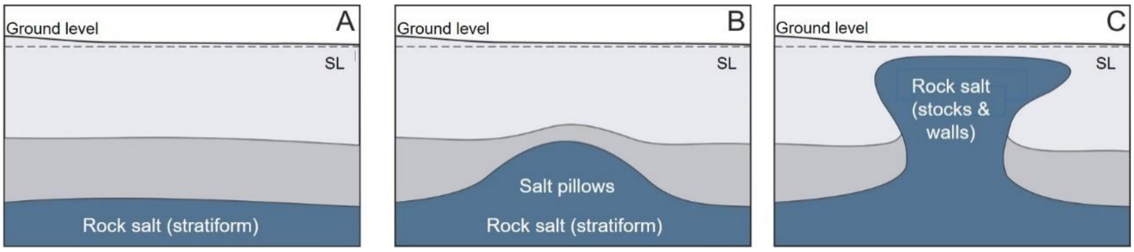

Figure 7: Stages of halokinesis: Rock salt in stratiform deposit (A), salt pillows (B), rock salt in steep deposit, salt diapirs or salt domes (C)

Salt pillows form during the first stage of halokinesis (B). They are classified as the host rock “rock salt in a stratiform deposit” in the site selection procedure. The layers located above the rock salt are breached as halokinesis progresses. This leads to the formation of salt diapirs (salt domes or salt walls). These formations are classified as the host rock “rock salt in a steep deposit” in the site selection procedure. At the same time, parts of the layers above are dragged upwards as the uplift continues, and the salt layers in the salt diapir itself are folded as well.

The rock salt in the salt dome is significant for the final disposal of radioactive waste, as set out in Section 1 para. 3 StandAG. Without precise knowledge of the internal arrangement of the salt structure, the folds in the deposited layers mean that it is impossible to tell where exactly – and to what extent – the preferred rock salt layers are located in the salt dome. At present, this applies only to a few of the thoroughly explored salt domes in Germany.

4.1.4 Crystalline host rock

The terms “crystalline” and “crystalline rock” used in Section 23 StandAG are replaced in the following by the term “crystalline host rock”. The BGE uses the term “crystalline host rock” to group both plutonites, also called deep-seated rocks, as well as highly regional metamorphic rocks, which are expected to exhibit favourable properties for the final disposal of high-level radioactive waste.

Plutonites are magmatic rocks that form due to the cooling of magma at great depth in a process of slow crystallisation (solidification, during which the minerals take on their crystalline form). The magma crystallises almost completely due to the slow cooling process. Once formed, the rocks possess a characteristic, fully crystalline structure in which crystals belonging to the various mineral phases are usually visible to the naked eye. Well known examples of plutonic rocks are granites, diorites and gabbro. Plutonites reach the earth's surface through later tectonic uplift and erosion of the overlying layers.

Metamorphic rocks are rocks that are formed by metamorphosis (transformation) of other rocks when exposed to elevated pressures and temperatures. This is caused by various processes such as regional tectonic activities or the intrusion of magma. Highly regional metamorphic rocks have been exposed to relatively high pressures and temperatures.

Mineral transformations occur (formation of new mineral phases), without fully melting the original rock.

The favourable properties of these two crystalline host rock types in terms of final disposal include their high strength, low water solubility and high thermal stability with regard to the decay heat generated by the repository packages. Provided they form a compact, undisturbed and therefore non-fractured rock, the retention capacity for radionuclides that are relevant to long-term safety is another positive property of this host rock.

Compact, undisturbed rock complexes consisting of plutonites or highly regional metamorphic rocks possess the aforementioned favourable properties in regard to their suitability as host rock for a repository according to StandAG and hence fulfil the minimum requirements according to Section 23 para. 5 StandAG. Microcracks and fracture networks in the rocks can increase hydraulic conductivity of the rock and reduce the barrier effect and are less favourable for final disposal. An evaluation of the areas in regard to these aspects will require site-specific explorations. These minimum requirements are considered to be satisfied at the current stage of the site selection procedure.

The BGE does not classify vulcanites, rocks with low to medium, regional metamorphic stress and high-pressure and contact metamorphites as crystalline host rocks according to Section 23 para. 1 s. 1 StandAG. The reason for this is that these rocks, for the most part, do not fully exhibit the properties required to be rated as favourable for the final disposal of radioactive waste. The glass fraction in vulcanites, for instance, makes them susceptible to weathering. Furthermore, they often have pore cavities that connect when the rock becomes weathered, which may act as pathways for gases and liquids.

4.1.5 Maximum search depth

The BGE is introducing the term of “maximum search depth” at the current phase of the site selection procedure. This is a depth that is introduced from the perspective of long-term safety and technical feasibility.

On the one hand, it is reasonable to assume that more favourable conditions for the long-term, safe confinement of radioactive waste stored in repositories will be encountered as the depth of the storage area increases. The reasons for this include a reduced relevance of potential exogenous impact on the effective containment zone or storage area at a greater distance from the surface, as well as a more pronounced decoupling of near-surface aquifers.

On the other hand, as the depth of the storage area increases, the technical feasibility of the repository reaches its limits due to the rock’s greater temperature and pressure at lower depths. This effect is amplified by the introduction of heat by the waste packages for final disposal.

Without defining a maximum depth, there would be grounds for concern that, if the criteria and minimum requirements are applied from a strictly formal perspective in the weighing process, favourable sub-areas would be displaced by seemingly more favourable ones that are, in fact, infeasible for repository construction.

The maximum search depth is therefore set at 1,500 m.

4.2 Exclusion criteria according to Section 22 StandAG

4.2.1 Principle of applying the exclusion criteria

During the process of identifying sub-areas pursuant to Section 13 StandAG, the BGE will, in a first stage, apply throughout Germany the exclusion criteria defined in Section 22 StandAG on the basis of the data made available by the competent federal and state authorities according to Section 12 para. 3 StandAG. The application principles set out in Section 22 para. 1 StandAG state that an area is classified as unsuitable as a repository site as soon as one of the defined exclusion criteria applies. The legal text of Section 22 StandAG and an excerpt from the explanatory memorandum to the draft law (BT-Drs. 18/11398) are found in Annex 1 “Legal bases”.

The aim of applying the exclusion criteria is therefore to identify areas in which at least one of the exclusion criteria listed in Section 22 para. 2 StandAG is fulfilled. These areas will no longer be considered as potential sites for a high-level radioactive waste repository as the procedure progresses. As a rule, all exclusion criteria are applied nationwide, independently and in no specific order, even if one of these criteria has already been satisfied. If new information on individual areas becomes available in the course of the procedure (from Phase I, Step 2), new excluded areas may also emerge – or existing excluded areas may increase in size – as the site selection procedure continues. Application of the exclusion criteria pursuant to Section 22 para. 2 StandAG takes place in recurring cycles in each of the three phases of the site-selection procedure.

The contents described in the following chapters 4.2.2 to 4.2.8 summarise the corresponding chapter in the supporting document “Application of the exclusion criteria according to Section 22 StandAG”.

4.2.1.1 Development of the application methods

Development of the criteria-based application methods began in the second half of 2017 and forms the basis for application of the exclusion criteria pursuant to Section 22 StandAG. Since development of the application methods first began, many highly constructive discussions with technical experts and the competent federal and state authorities have yielded a continuous development of the application methods. In some places, application of the methods uncovered temporary methodical challenges, which were resolved by new approaches on the part of BGE team and suitable application tests. An example of these challenges was the development of criteria-based application methods that permit nationwide, uniform application, despite the highly heterogeneous nature of the data in regard to location reference systems and attribute designations, as well as limited data availability in a digital form.

An online consultation of these methods with the public took place in the first half of 2020 during development of the criteria-based application methods for Step 1, Phase I of the site selection procedure (BGE 2020ae). Over a period of at least six weeks in each case, this process allowed the interested public to critically examine the published application methods for the individual exclusion criteria and to engage in discussion with the BGE. After the online consultation, some of the aspects discussed in this setting led to a revision of the methods, which demonstrates that the BGE embodies and appreciates the learning character of the site selection procedure. An example of this is the further development of the application method for the exclusion criterion “Influences from current or past mining activities – drillings”, which was revised with the help of constructive comments provided in the online consultation. In regard to this application method, the BGE had initially intended to define a horizontal exclusion radius of 25 m around the drilling path for depths of 300 m and more. The online consultation on this exclusion criterion yielded the comment that an exclusion radius of 25 m around the drilling path should also be applied in the vertical direction. This would mean that the area relevant to the repository would already be affected by drilling to a depth of 276 m below ground surface, which is why the exclusion criterion should also reflect this depth. The BGE agreed with this comment and adapted the method for applying the criterion “mining activity – drilling” accordingly.

Continued development of the criteria-based application methods for the exclusion criteria pursuant to Section 22 StandAG cannot be ruled out as the iterative site selection procedure and the knowledge obtained in this context progress.

4.2.2 Exclusion criterion “large-scale vertical movements”

The exclusion criterion of “large-scale vertical movements” is defined in Section 22 para. 2 no. 1 StandAG and states that an area is no longer suitable as a repository site if average large-scale geogenic uplift of more than 1 mm per year should be expected over the period of proof of one million years.

A positive prognosis cannot be guaranteed with regard to the safety of a repository in areas with such high rates of uplift. This is due to the connection between the occurrence of large-scale vertical movements and the consequent increased erosion in the overburden (BT-Drs. 18/11398, p. 68).

Vertical movements of the Earth’s surface are caused by changes in the isostatic equilibrium between the lithosphere (the Earth's crust and outer part of the upper mantle) and the underlying astenosphere, the malleable part of the Earth’s mantle. Isostatic adjustments may be triggered by changes in the thickness of the Earth’s crust during rock formation processes or mass changes on the Earth’s surface due to erosion and glaciation. Dynamic convection motion in the Earth’s mantle can also lead to vertical movements of the overlying lithosphere (Teixell et al. 2009).

The different regions of Germany were affected by large-scale vertical movements to varying degrees in the geological past. Until the beginning of the Upper Cretaceous about 100 million years ago, Germany was characterised by subsidence movements in northern Germany and a relatively steady situation in southern Germany, which formed a stable platform over large parts of the Mesozoic (from 252 to 66 million years) (Feist-Burkhardt et al. 2008). The stress regime in Germany changed at the beginning of the Upper Cretaceous period, which had tectonic effects in northern and central Germany in particular. Until the beginning of the Upper Cretaceous, these regions – as part of the North German Basin – predominantly experienced elongation and subsidence. Regional blocks such as the Harz Mountains were pushed and raised along former dip-slip faults. On average, 1,000 m was lost in the Harz Mountains inside of one million years due to the erosion of stone on the Earth's surface as a result of this uplift (Kley & Voigt 2008; von Eynatten et al. 2008). Uplift and denudation rates have not reoccurred in this magnitude in Germany since the start of the Cenozoic (66 million years ago), with the exception of the central part of the Alps. In the Cenozoic, large-scale vertical movements are mainly related to the uplift of the Alps and the formation of the Upper Rhine Graben since the Eocene (56 to 34 million years), as well as the relatively recent uplift movements of the Eifel region in the Quaternary (since 2.6 million years). The following Figure 8 shows exemplary movements of the Earth's crust in Germany over the various geological periods.

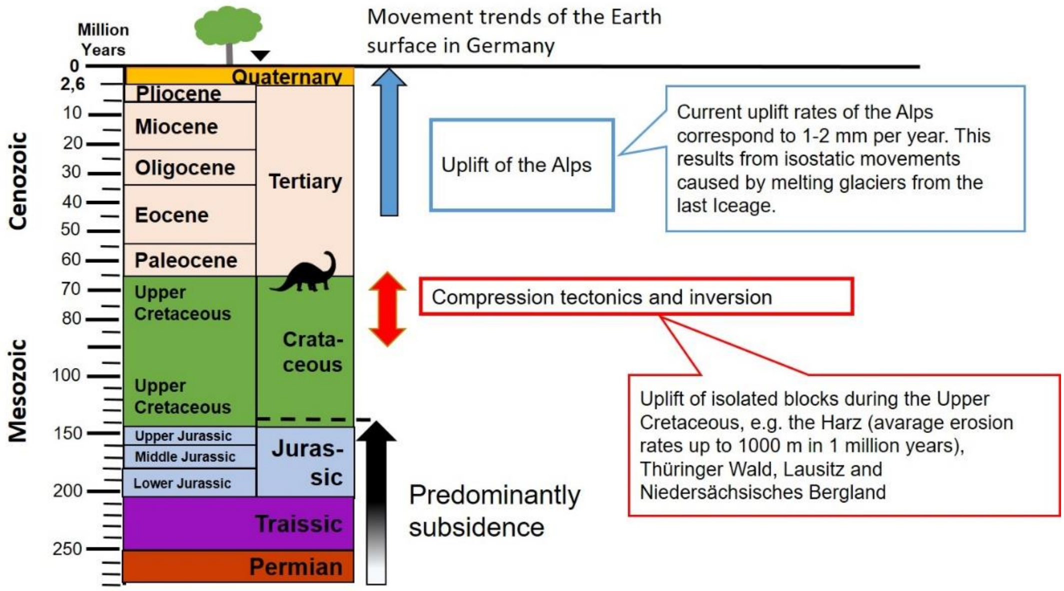

Figure 8: *Schematic diagram showing exemplary movements of the Earth's surface in Germany*

The measurement of current vertical movements on the Earth's surface is carried out using geodetic methods in the form of levelling measurements or satellite-based measurements, which are used to determine elevation differences of the Earth's surface over the respective measurement period. Geoscientific methods such as the mapping of known marker horizons (e.g. river terraces or coastal paleo-environments) or the use of radiometric dating methods are suitable for recording longer observation periods. Radiometric dating methods can be used, for instance, to measure erosion rates and to reflect a region's average erosion rates over the last 10,000 to 100,000 years (von Blanckenburg 2005).

During the data queries submitted to the federal and state authorities, the BGE requested data concerning current large-scale uplift rates and forecasts for regions in which large-scale uplift rates can be expected in the next one million years, including the expected uplift periods. The BGE also asked for information on area designations, causes/genesis of uplift, related references and any information on where uplift is not expected or cannot be predicted. In response to the data queries, the federal and state authorities mainly provided references to publications and their partly digitised background data. Measurement data on current uplift rates was also provided in some cases. The federal and state authorities do not have data concerning the ability to predict large-scale vertical movements.

The BGE commissioned a study on the prognosis of large-scale vertical movements over a period of proof of one million years (Jähne-Klingberg et al. 2019). Four different future scenarios have been developed for the occurrence of uplift events in Germany within the next one million years, based on geological history. Using the present data basis and the current understanding of geological processes, none of these future scenarios ultimately indicate that uplift rates in excess of 1 mm per year should be expected in Germany over a period of proof of one million years.

In regard to the application of the exclusion criterion of large-scale vertical movements, the BGE concurs with the assessment put forward by Jähne-Klingberg et al. (2019). This means that no excluded areas are identified based on this exclusion criterion.

4.2.3 Exclusion criterion "active fault zones"

The exclusion criterion "active fault zones" is defined in Section 22 para. 2 no. 2 StandAG and states that an area is not suitable as a repository site if geologically active fault zones that may affect the repository system and its barriers are present in the rock areas that are considered as repository zones, including an adequate buffer zone. In addition, Section 22 para. 2 no. 2 StandAG defines active fault zones as fractures in the rock strata of the upper earth's crust, such as faults with significant rock displacement, as well as extensive disruption zones of tectonic origins where movements have demonstrably or in all probability occurred in the period from the Rupelian stage to the present day, so within the last 34 million years. Atectonic or aseismic processes, that is, processes that cannot be derived from tectonic processes or are not due to seismic activities and which may produce similar consequences for the safety of a repository as tectonic disturbances, must be treated as active fault zones.

In regard to their development processes, the atectonic and aseismic processes listed in Section 22 para. 2 no. 2 sentence 3 StandAG differ greatly from the tectonic fault zones. This is why the tectonic fault zones and the atectonic or aseismic processes are dealt with in separate chapters. The tectonic fault zones listed in Section 22 para. 2 no. 2 StandAG are dealt with in Chapter 4.2.3.1, and the atectonic and aseismic processes are addressed in Chapter 4.2.3.2.

4.2.3.1 Exclusion criterion “active fault zones” – tectonic fault zones

In geology, the term fault describes a discrete area or zone where the original bedding of a rock body is separated and the adjacent rocks are displaced relative to each other (Fossen 2011). The occurrence of geological faults should be seen as a mechanical response to the prevailing stress regime in the subsoil. They are created by mechanical forces such as extension (tensile force), compression (compressive force) and shear, which are caused by plate tectonic processes and are reduced by movements along geological faults in the form of dip slip, strike slip or lateral slip (Figure 9). On the one hand, the orientation of the stress field therefore determines the direction of the fault’s movement (e.g. dip slip or strike slip). On the other hand, movements can only take place at existing faults if their spatial position in the subsoil matches the orientation of the prevailing stress field.

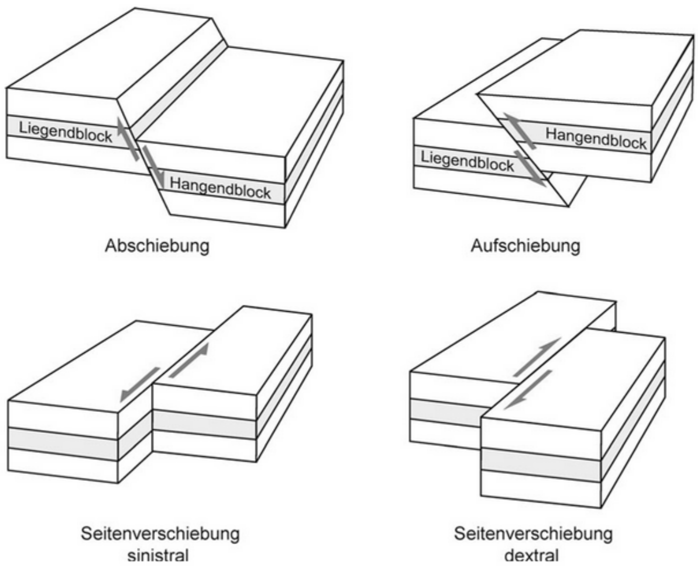

Figure 9: Schematic diagram of the main fault types (Reuther 2012). Translation of terminology used in figure: Liegendblock = Footwall; Hangendblock = Hanging wall; Abschiebung = Normal fault; Aufschiebung = Reverse fault; Seitenverschiebung sinistral = Strike-slip sinistral; Seitenverschiebung dextral = Strike-slip dextral.

The spatial dimension of geological faults differs greatly and ranges from millimetres, e.g. an offset between crystal grains, to fault zones with an offset of many kilometres. As a rule of thumb, the length of a fault will increase with its offset (Kim & Sanderson 2005; Torabi & Berg 2011). In addition, faults with a larger offset form an area with fractured rock, which is called the fracture zone and is located on both sides of the fault surface (Faulkner et al. 2010; Fossen 2011; Choi et al. 2016). In this case, the fault core and the fracture zone are described as the fault zone.

Even if geological literature has not established a clear distinction between a geological fault and fault zone, one difference is that fault zones are, as a rule, accompanied by the formation of fracture zones around the fault core. This requires at least some movement along the fault zone and therefore indicates the regional or supra-regional character of a fault zone compared to the more local character of a geological fault. The wording contained in Section 22 para. 2 no. 2 StandAG should be interpreted in this way. Accordingly, application of the exclusion criterion “active fault zones” addresses tectonically induced faults with significant rock displacement and extensive fracture zones.

In simplified terms, tectonic development over the last 66 million years in Germany can be divided into two phases of increased tectonic activity, which are related to the change in the prevailing main direction of stress from north-south to northwest-southeast (Reicherter et al. 2008). The first phase took place during the late Eocene and early Miocene (cf. Figure 10). The European Cenozoic Rift System (including the Rhone Rift Valley and the Upper Rhine Graben) were formed during this period by east-west expansion and subsidence of the Molasse Basin due to northward movement of the Alpine deformation front (Dèzes et al. 2004; Reinecker et al. 2010). The second phase began in the Late Miocene with the onset of the still prevalent northwest-southeast direction of stress. Acting on the fault zones of the Lower Rhine Bight running from northwest to southeast, this change in the main direction of stress initiated the principal phase of subsidence leading to the formation of the geological subsidence area in the west of North Rhine-Westphalia (Knufinke & Kothen 1997).

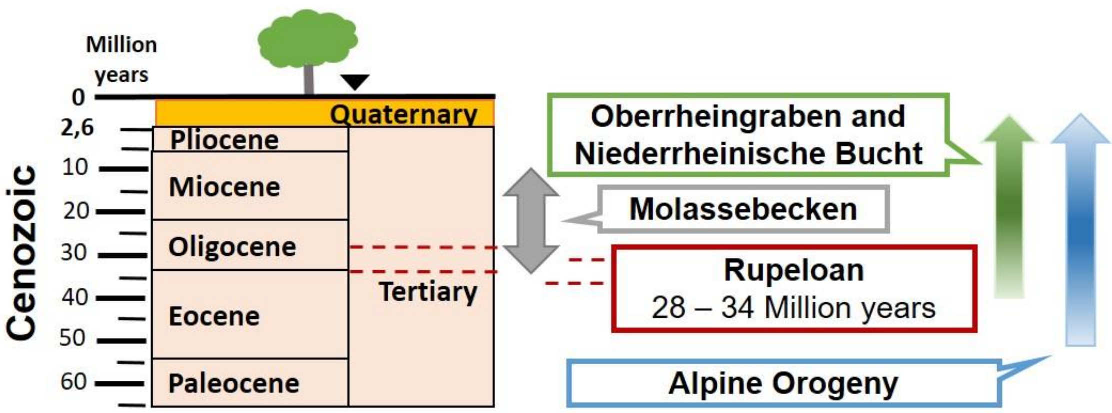

Figure 10: Schematic diagram of Germany’s geologic timescale in regard to the significant tectonic structures and temporal classification of the Rupelian

The BGE submitted data queries to the federal and state authorities concerning active fault zones. In addition to the coordinates of the fault zones, the BGE also requested information from the authorities about their activity period, the spatial position of the fault surfaces, the offset and the names of the fault zones. The data transferred by the federal and state authorities mainly consists of digitised geological and tectonic maps. They contain information about the fault zones, which charts their course on the Earth’s surface in the form of fault traces. Information obtained from scientific studies, dissertations and project reports was also provided on active fault zones; it related to the commercial exploitation of the deeper subsoil, e.g. for geothermal energy or carbon dioxide (CO_2) storage. In general, the federal and state authorities did not transfer datasets concerning the spatial situation of fault zones.

The first step involved reviewing the contents of the datasets and assessing whether they contain information that would narrow down the period of fault activity. However, information of this kind is not available in most of the datasets, as the federal and state authorities often do not possess relevant data. The BGE was therefore able to derive proposals for the activity of fault traces over the last 34 million years in approx. 1.6% of the fault traces either from the dataset itself or from the individual cover letters accompanying the data deliveries.

Besides evaluation of the datasets with fault zones which were considered active by the federal and state authorities, two further points were added to the method for applying this exclusion criterion, so that the application method is based on three methodological approaches:

1) evaluation of the proposals with activity assessments for fault zones submitted by the State Geological Surveys
2) identification of fault zones that displace rock units with a maximum age of 34 million years
3) demarcation of tectonically active, large-scale structures

The fault zones assessed as active by the federal and state authorities were checked by the BGE with regard to their technical plausibility and compared with the current knowledge obtained from scientific literature. Information on fault zones whose activity over the last 34 million years appears uncertain (e.g. if the authorities state that fault zone activity is suspected but cannot be proven) will not be used to identify excluded areas. Furthermore, the assessments were deemed plausible if the application methods mentioned in points 2) and 3) produced the same result.

By identifying fault zones that displace rock units with a maximum age of 34 million years, the BGE is attempting to identify active fault zones using a standardised data basis for all of Germany. By doing so, the datasets, which tend to refer to specific regions or federal states, can be completed. The data basis is therefore the geological overview map of Germany in a scale of 1 : 250,000 (BGR 2019).

Another approach involves designating active fault zones in tectonically active, large-scale structures. The BGE uses the term tectonically active, large-scale structures, e.g. geological rift systems in Germany, which have been demonstrably active over the last 34 million years. It is reasonable to expect that numerous active fault zones will be encountered within these structures especially. The large-scale tectonic structures defined in the supporting document BGE (2020cb) should not be interpreted as excluded areas, but rather as a basis for discussion and a tool for the designation of active fault zones in

Germany. In some cases, the BGE used 3D models obtained from scientific projects for tectonically active, large-scale structures such as the Upper Rhine Graben. This procedure also enables the identification of fault zones that may not appear on geological maps due to sediment cover on the surface.

Potential inconsistencies at the state borders in regard to the course of the fault and its activity classification are taken into account for datasets that refer only to one federal state. A fault zone ends at a state border in some rare cases. In this case, its activity is transferred to the fault zone that continues into the neighbouring federal state.

The BGE uses this comprehensive application method to identify excluded areas for active fault zones, with due consideration of a buffer zone of 1,000 m on both sides (cf. BT-Drs. 18/11398, p. 68). Identification of sub-areas pursuant to Section 13 StandAG does not include any case-by-case assessments of the individual fault zones with regard to the extent of offset or the width of the fracture zones. Excluded areas are determined based on the general buffer zone around fault zones that are classified as active. They are projected vertically from ground surface into all depths that are relevant for a repository site. Where information on the spatial position of the fault surface is available, the buffer zone is applied parallel to the inclined fault surface. In order to present this three-dimensional information on a map, the resulting volume along the fault surface is projected vertically onto the Earth's surface and shown in Figure 11 as "projected excluded areas".

A different method is applied to fault zones that are located in the overburden of salt structures (e.g. salt walls and salt diapirs). Given that keystone faults are limited to the overburden of salt structures, the effective barrier will be preserved for a salt structure (Stück et al. 2020). The exclusion criterion is deemed to be satisfied for the affected area in the overburden of a salt structure if the fault zones have been active within the last 34 million years and the top of the salt structure is 300 m below ground surface. This means that no excluded areas are identified which are completely above the minimum depth of the effective containment zone, which is 300 m below ground surface.

Where shallow salt deposits occur, the exclusion criterion is applied in the same way as to areas without salt deposits. This is based on observations from salt mining, where fault zones in the adjacent rock formation have also led to pronounced, in some cases mechanical, fracture deformations in the salt itself (Herbert & Schwandt 2007). Fault zones in the adjacent rock formations can therefore lead to hydraulic conductivity in the carbonate and sulphate rocks of the saliferous system and encourage salt solution influx (Herbert & Schwandt 2007).

The excluded areas shown in Figure 11 were obtained from application of the exclusion criterion "active fault zones". Of the approx. 600,000 fault segments received and analysed by BGE during the data queries, 46,338 faults segments were identified that had experienced movements over the last 34 million years. The excluded areas shown in Figure 11 are equivalent to the projected exclusion volume on the Earth's surface. A colour distinction is made between excluded areas that are based either on vertical exclusion volumes (dark blue) or on exclusion volumes that were projected onto the Earth's surface due to inclined fault surfaces (light blue).

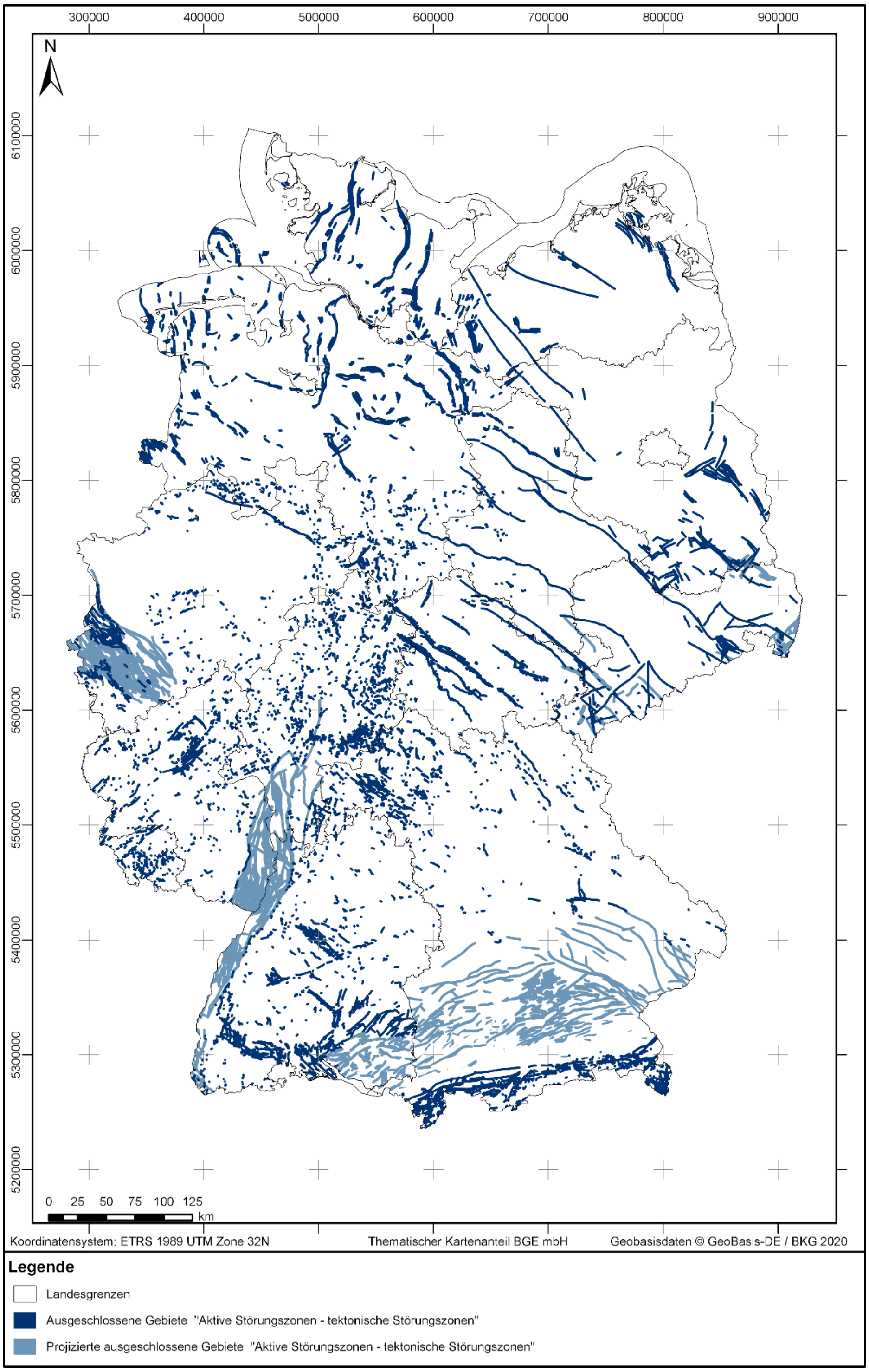

Figure 11: *Excluded areas based on application of the exclusion criterion “active fault zones – tectonic fault zones”.*
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Ausgeschlossene Gebiete “Aktive Störungszonen – tektonische Störungszonen“ = excluded areas „Active fault zones – tectonic fault zones“; Projizierte ausgeschlossene Gebiete „Aktive Störungszonen – tektonische Störungszonen“ = projected excluded areas „Active fault zones – tectonic fault zones“.

4.2.3.2 Exclusion criterion “active fault zones” – atectonic fault zones

In regard to their development processes, the atectonic and aseismic processes differ greatly from the tectonic fault zones, which is why they are treated separately at this point. Section 22 para. 2 no. 2 StandAG states that atectonic and aseismic processes should also be taken into consideration, in addition to active fault zones whose formation and activity can be attributed to tectonic processes. As with tectonic fault zones, the formation of atectonic or aseismic processes may be associated with fracture deformation of the rocks at depths that are relevant to repositories and which may impair the long-term safety of a repository.

In geology, the term atectonic refers to deformations that do not result from endogenous tectonic processes (forces acting from within the Earth). The term aseismic, on the other hand, describes processes in which no proven seismic activity has occurred in the form of earthquakes. The following will only use the term atectonic due to its clear technical classification. Atectonic processes are, for example, phenomena in which dissolution processes in the subsurface create cavities which, above a certain magnitude, collapse and cause the overlying rock to fracture. In this regard, dissolution processes in carbonates (e.g. limestone) are described as karstification and as leaching or subrosion in salts and sulphates (e.g. gypsum). Subsidence may occur on the Earth’s surface when the cavities collapse, for instance in the form of sinkholes, dolines or subrosion sinks. However, atectonic processes also include deformation resulting from compaction processes of unconsolidated sediments, landslides due to slope instability and deformations of the subsoil caused by traversing glaciers (Murawski & Meyer 2010). Another example of atectonic processes are impact events in which meteorites strike the earth, causing the formation of impact craters and rock fragmentation in the subsoil (Stück et al. 2020).

With regard to the area relevant to the repository, which begins at depths greater than or equal to 300 m below ground surface, atectonic processes that act at these depths are of particular importance. They are impact events, subsidence or collapses above dissolution cavities. Meteorites strike the Earth’s surface with incredible force, which means that these events may completely destroy an area that is relevant as a repository site.

In Germany, impact events of this kind around 14.8 million years ago (Vidal 1974; Schmieder et al. 2018) created the Nördlinger Ries and Steinheim impact craters with diameters of 26 km (Stöffler et al. 2013) and 3.8 km respectively (Buchner & Schmieder 2013) (Hüttner & Schmidt-Kaler 1999). The Steinheim crater basin is located in the Swabian Alb, while the Nördlinger Ries is about 42 km further northeast (Buchner & Schmieder 2013) in the border area between the Swabian Alb and the Franconian Alb. Research boreholes that investigated the Ries crater in the nineteen-seventies show heavily crushed rock down to a depth of 1.2 km (Gudden 1974; Vidal 1974).

Karst and subrosion processes may create access pathways for fluids and damage the area that is relevant as a repository site by rupturing dissolution cavities. Germany has a large number of karst areas that can be divided into seven regions on the basis of the karstified stratigraphic (temporal classification) and lithological (rock sequence) units according to Kempe (2005) and Pfeffer (2003):

1) Weserbergland and the area around the Münsterland Basin,
2) Rhenish Slate Mountains and the Harz Mountains,
3) Fringe areas of the Variscan orogeny (strongly eroded remnants of a mountain formation in the earlier half of the Palaeozoic (cf. Figure 10),
4) the region between Hanover, Halle and Basel,
5) the Franconian Alb,
6) the Swabian Alb,
7) the Bavarian Alps.

Prinz & Strauß (2011) provide a comprehensive overview of rocks that are susceptible to karstification, the classification of their geological formation and their regional distribution in Germany. Germany's most expansive unbroken karst regions, also the ones with the largest number of caves, are the Franconian and Swabian Albs (Kempe 2005). According to Krawczyk et al. (2019), there are several hundred sinkhole events in Germany each year. The most frequent sinkholes, which are caused by dissolution processes in carbonates, occur in the Paderborn Plateau. One of the best known sinkholes in Germany that was caused by sulphate dissolution processes is the South Harz Zechstein Belt. Subrosion-induced sinkholes are particularly widespread in the Werra-Fulda Basin and are caused by the leaching of Zechstein salts (Prinz & Strauß 2011). Sinkholes in north Germany are mostly found on salt plateaus (Krawczyk et al. 2019). The northern Münsterland area is characterised by numerous subrosion pipes in the "Heilige Feld" region. This is caused by leaching of the Münder marl (Upper Jurassic-Lower Cretaceous) (Dölling & Stritzke 2009).

In the second specific data query concerning the exclusion criteria according to Section 22 StandAG in February 2018, the BGE requested data from the federal and state authorities on linear and expansive objects relating to atectonic processes. Additional queries were submitted about atectonic processes in late 2018, including a request to transfer data on non-endogenous tectonic rock deformations such as subsidence and collapse above dissolution cavities, landslides and deformations of rocks due to glacial action. Data concerning the activity and the depths at which these atectonic processes originated were of particular interest.

The competent federal and state authorities transferred information on around 200,000 atectonic events throughout Germany. As for tectonic fault zones, the data basis for atectonic processes is highly heterogeneous. The data comes from geological maps, tectonic maps and hydrogeological maps, among other sources. Other data made available to the BGE on atectonic processes is based on subrosion cadastres and publications and reports on various projects, which relate to research into karstification and other geological hazards, among other things.

No data was transferred to the BGE in response to its queries in regard to the impact events outlined above. Therefore, the BGE vectorised the outlines of the Nördlinger Ries and Steinheim meteorite craters directly from the hydrogeological map of Bavaria, using a scale of 1 : 100,000 (LfU 2019) and the geological map of Baden-Württemberg in a scale of 1 : 50,000 (LGRB 2015).

To prepare for implementation of the application method, the BGE eliminated the data supplied by the federal and state authorities that came with the indication that the information is suspect or unverified. Information on the depth of formation was used to divide the data into atectonic processes with formation depths greater than and less than 300 m below ground surface. The purpose of this is to distinguish between structures close to the surface and those that affect the area that is relevant as a repository site. Transmitted formation horizons were translated into the necessary formation depths using 3D models of the subsoil.

For atectonic processes whose depth of formation or impact depth is known or was calculated by the BGE and is located at least 300 m below ground surface, the excluded areas were determined in the same way as for tectonic fault zones by adding a buffer zone of 1,000 m to the individual atectonic processes. Exclusion applies to all depths that are relevant for repository sites if karstification phenomena in carbonates, leaching processes of shallow salts or impact events (meteorite craters) are present. In case of subrosion phenomena on salt domes and salt pillows, exclusion is carried out up to the top of the salt layer, as the dissolution processes primarily take place locally and in the uppermost area of the salt structure (Buurman 2010).

Excluded areas were identified based on 582 atectonic processes in total. Of these, two are due to impact craters and the rest relate to sinkholes and depressions caused by dissolution processes. The excluded areas identified because of atectonic processes are shown in Figure 12.

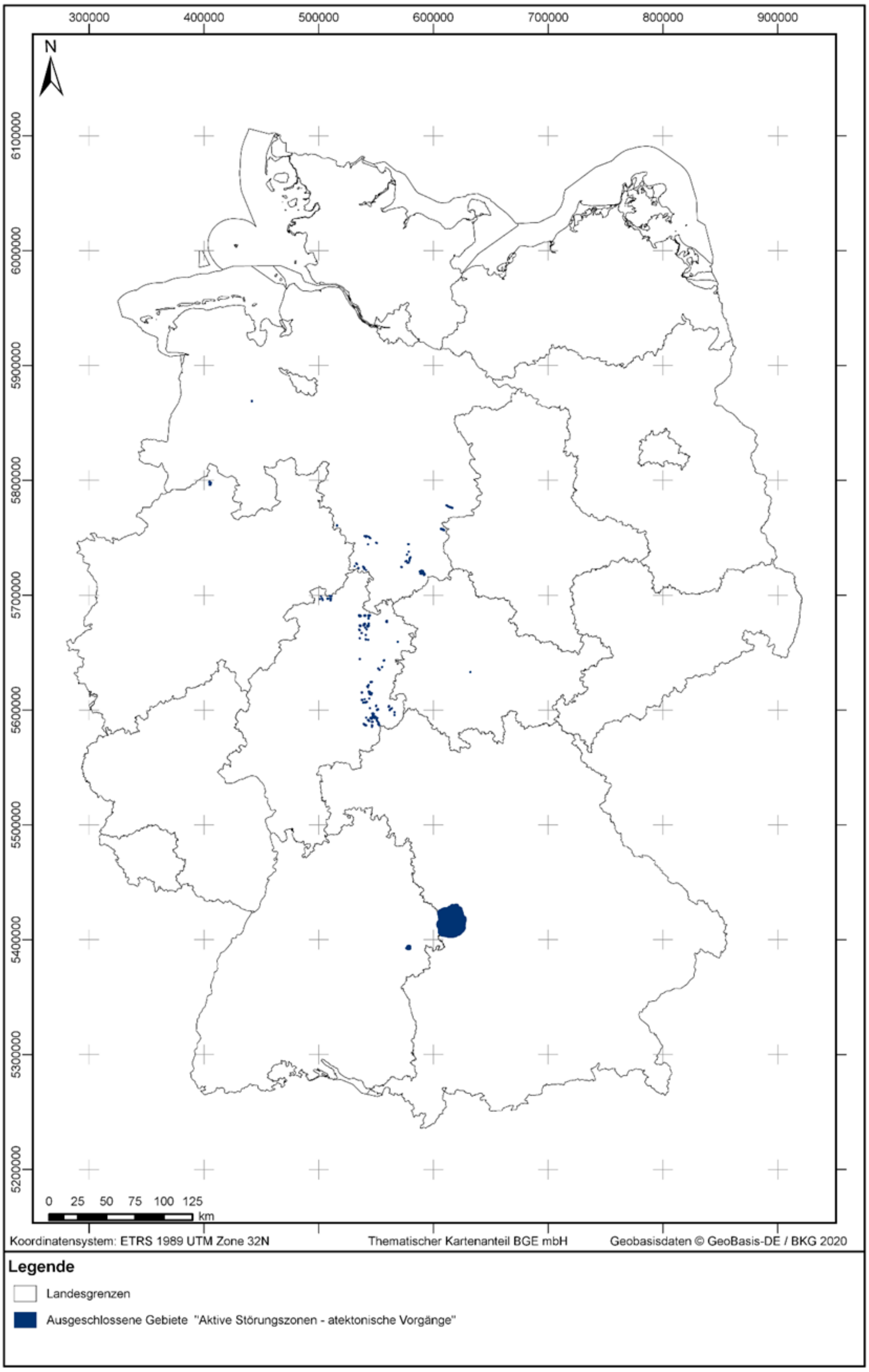

Figure 12 *Excluded areas based on application of the exclusion criterion active fault zones – atectonic or aseismic processes.*
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete "Aktive Störungszonen – atektonische Vorgänge" = excluded areas „Active fault zones – atectonic processes".

4.2.4 Exclusion criterion “influences from current or past mining activities”

The exclusion criterion of influences from current or past mining activities is defined in Section 22 para. 2 no. 3 StandAG and states that an exclusion must apply if the rock mass has been damaged by current or previous mining activities in such a way that negative impacts on the stress state and permeability of the rock mass in the area of a designated effective containment zone or designated repository zone should be expected; it must be demonstrable that existing historical boreholes do not impair the containment function of the barriers of a repository that ensure safe confinement.

The exclusion criterion “influences from present or past mining activities” summarises the three types of mining (Reuther 1989) as civil engineering, opencast mining and borehole mining. Given that the procedures for mines and boreholes differ sharply, starting with the collection and storage of data to application of the exclusion criterion, boreholes are dealt with in Chapter 4.2.4.1 and mines are addressed separately in Chapter 4.2.4.2.

Pursuant to Section 22 para. 3 StandAG, the consequences of measures for the exploration of potential repository sites shall not be taken into account when applying the criterion under paragraph 2 number 3*.* Accordingly, the mining activities carried out in the Gorleben salt dome that relate to explorations of potential repository sites and the resulting surface and subsurface infrastructure are disregarded when applying the exclusion criterion “influences from current or past mining activities” (cf. BGE 2020p).

4.2.4.1 Influences from current or past mining activities – boreholes

Initially, all boreholes are treated equally when applying the exclusion criterion “influences from current or past mining activities”. No distinction is made between boreholes which serve the purpose of mining activities and other boreholes within the meaning of Sections 2 and 127 of the Federal Mining Act (BBergG). During Phase I of the site selection procedure, boreholes are grouped based on their final depth. Boreholes are relevant to application of the exclusion criterion “influences from current or past mining activities” if they partly or fully penetrate the area that is relevant as a repository site, namely in a range of between 300 m and 1,500 m below ground surface.

A borehole is a vertical or inclined drilling which is driven from its starting point by mechanical means. In addition to their use in the search for and exploration of mineral resources, boreholes play an important role, for example, in the construction of wells or in subsoil investigations and mine planning (Düring 1983).

The drilling procedure mechanically, hydraulically, thermally and/or chemically influences the rock in the environment of the borehole, which may lead to crack formation in the vicinity. According to the literature, the impact zone in which the rock may be permanently damaged by the drilling process can generally be estimated at approx. 1 m around the borehole (Gudmundsson 2011; Zoback 2009). It is important to note, however, that this damage zone depends strongly on the properties of the surrounding rock and the type or use of the borehole and can be considerably larger, for example due to hydraulic stimulation or compression. German law stipulates that boreholes must be dismantled at the end of their service life. In this regard, filling measures must be carried out to prevent further damage to the surrounding rock.

As part of the data query for the exclusion criterion “influences from current or past mining activities”, the BGE asked the federal and state authorities to transfer drilling data for a depth range of 100 to 1,500 m (starting at 300 m in a later data query) below ground surface, as well as details concerning the starting and end point of drilling, the length, course, designation, use and condition of the borehole. Based on these data queries, the BGE now has a highly heterogeneous data basis relating to boreholes that extend from master drilling data (starting point and borehole length) to detailed documentation of the drilling itself. In total, data on approx. 250,000 boreholes with a depth greater than 100 m was delivered to the BGE, including around 50,000 boreholes with a final depth in excess of 275 m. A drilling path (description of the spatial position) is provided or can be inferred from the available information for only approx. 15 % of these boreholes; this would be useful to identify possible deviations from the planned drilling course.

The application method states that a buffer zone should extend around the drilling path in a radius of 25 m. This should take into account possible positional inaccuracies of the borehole, as well as potential damage to the adjacent rock. In this context, it is not possible to rule out that larger areas of damage may occur under certain circumstances. However, they are not taken into consideration in Phase I, Step 1 of the site selection procedure.

The excluded areas shown in Figure 13 are 2D representations of 3D objects in the subsoil. The designation as an “excluded area” indicates that the areas shown on the 2D map correspond to the actual excluded area in the subsoil. Starting from the depicted areas, the excluded area extends vertically through the entire section that is relevant as a repository site (cf. Figure 13). By contrast, the “projected excluded area” is a 2D depiction of a 3D object in the subsoil. The depiction of the “projected excluded area” on the map (cf. Figure 13) indicates that an excluded area is located in the subsoil at the marked point on the map, and that its spatial location can only be visualised using 3D software. Excluded areas and potential space for host rocks within the depth range that is relevant as a repository site are present in the subsoil of these marked areas (cf. Figure 13).

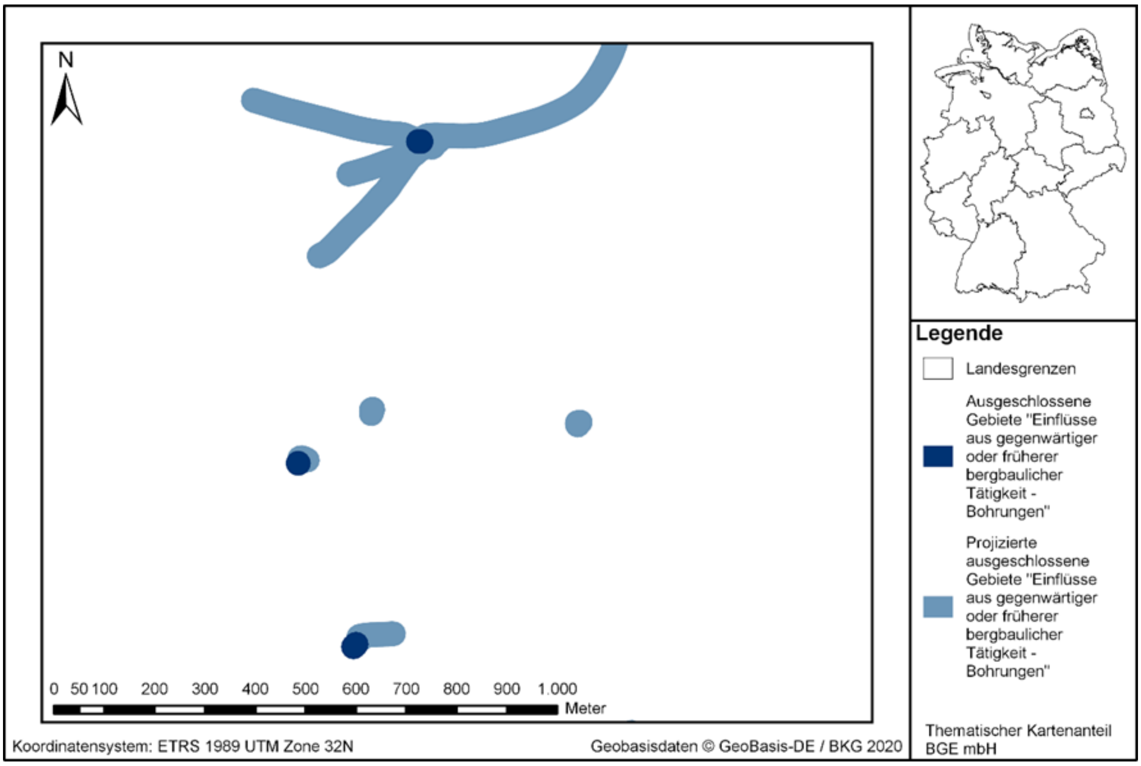

Figure 13: Example for the visualisation of excluded areas around vertical, articulated and directional boreholes.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete "Einflüsse aus gegenwärtiger oder früherer bergbaulicher Tätigkeit – Bohrungen" = excluded areas „Influences from current or past mining activities – boreholes"; Projizierte ausgeschlossene Gebiete „Einflüsse aus gegenwärtiger oder früherer bergbaulicher Tätigkeit – Bohrungen" = projected excluded areas „Influences from current or past mining activities – boreholes".

Application of the exclusion criterion "influences of current and past mining activity – boreholes" leads to the designation of 48,549 boreholes as excluded areas. These drilling datasets originate from the BGE's internal database of the supplied nationwide drilling data, with a total of 248,473 datasets. They reflect those that fully or partially penetrate areas that are relevant as a repository site. The excluded areas identified on this basis are shown in Figure 14 in a greatly enlarged form relative to the map in Figure 21. The reason for this magnification is that a radius of 25 m around the borehole is not visible on the map format selected here.

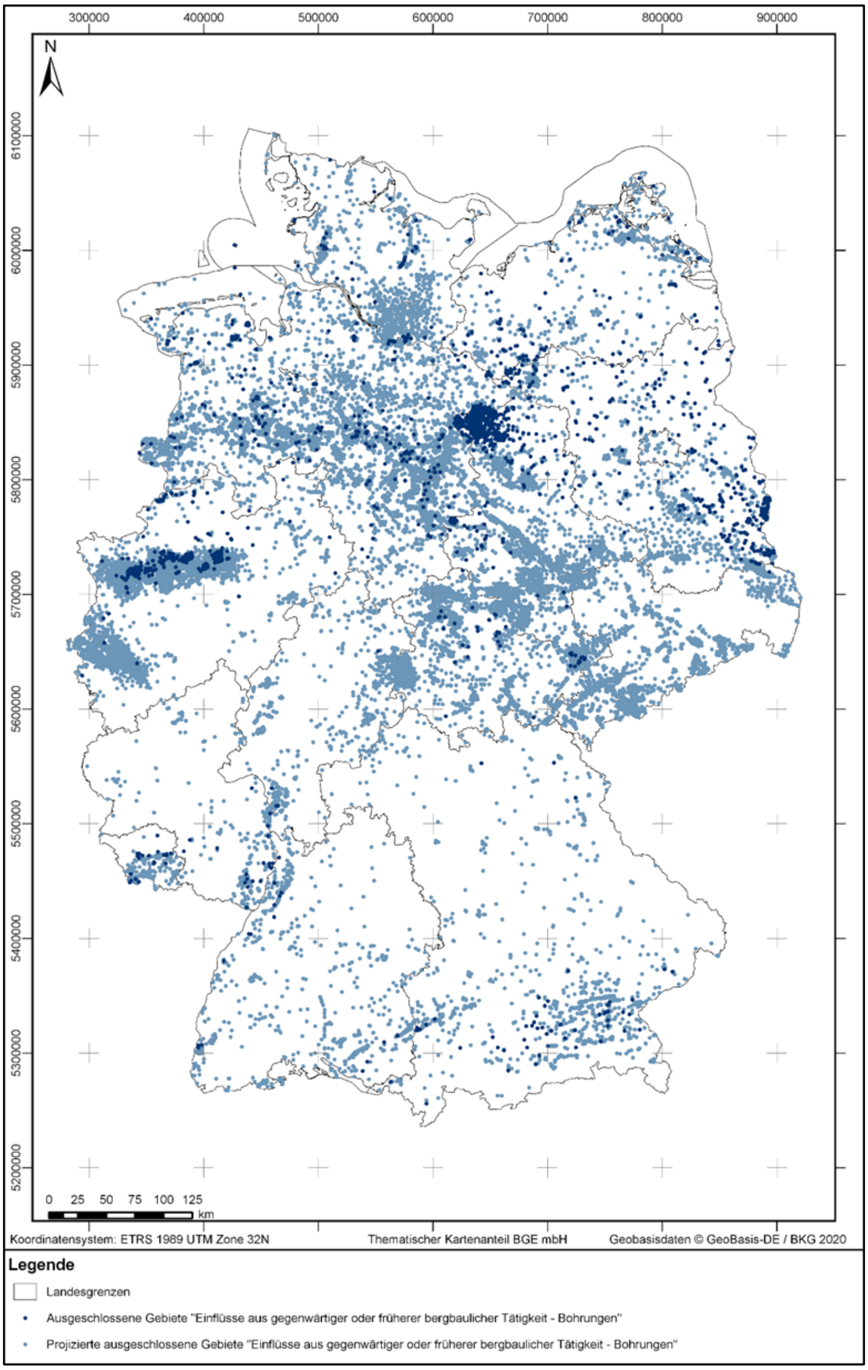

Figure 14: Excluded areas after application of the exclusion criterion “influences from current or past mining activities – boreholes”.
NB: The identified excluded areas shown on the map are greatly enlarged to permit their visualisation on the selected map format.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete „Einflüsse aus gegenwärtiger oder früherer bergbaulicher Tätigkeit – Bohrungen” = excluded areas „Influences from current or past mining activities – boreholes“; Projizierte ausgeschlossene Gebiete „Einflüsse aus gegenwärtiger oder früherer bergbaulicher Tätigkeit – Bohrungen” = projected excluded areas „Influences from current or past mining activities – boreholes“.

4.2.4.2 Influences from current or past mining activities – mines

Further to Chapter 4.2.4.1, the mines and caverns to be classified under the exclusion criterion “influences from current or past mining activities” are examined in greater detail below.

According to Section 22 para. 2 no. 3 StandAG, areas are identified for exclusion that are expected to have negative influences on the stress state and permeability of the rock due to mining activities. The first step in this process is to analyse the excavated mine workings at the mine or cavern cavity in question.

Mining activities comprise the prospecting, exploration and extraction of mineral resources (Reuther 1989). In addition to the extraction of solid raw materials by surface mining (above ground) or subsurface mining (underground), cavern storage facilities in salt domes are also dealt with to identify excluded areas. A cavern is a large artificial underground cavity created by the extraction of salt, which is then used predominantly to store oil and gas. The excavation of cavities changes the stress, which can reduce the barrier effectiveness of the rock formation surrounding the cavity (area of influence) and may even cause crack formation and create potential fluid pathways.

The development of storage spaces for fluid raw materials (e.g. crude oil) and porous reservoirs usually takes place using boreholes that start at the surface, without creating a subsurface cavity. Therefore, the BGE will only consider these boreholes in Phase I, Step 1 of the site selection procedure, so that the spatial expanse of the affected rock formations will not be discussed in detail.

The following information, among others, was requested from the state authorities in order to identify excluded areas: designation of the mining activity (or mine), indication of the maximum depth (e.g. deepest level) and the boundary of the maximum lateral expanse of the mine workings projected to the surface, including their impact on the surrounding rock. In this regard, the final updated data query requested information only on mines and caverns that reach a depth of at least 300 m below ground surface.

The data was not available in a completely digitised form in several cases. Hence, the BGE started in autumn 2019 to expand the digital datasets by performing digitalisation work in the archives of the mining authorities. Among other things, the depths of mining activities were determined and the mine workings and areas of influence of mining activities georeferenced and vectorised for the federal states of Baden-Württemberg, Bavaria, Brandenburg (including Berlin), Hesse, Mecklenburg-Western Pomerania, Lower Saxony (including Schleswig-Holstein, Hamburg and Bremen), Rhineland-Palatinate, Saxony, Saxony-Anhalt and Thuringia. The work dealt with around 3,700 mines and caverns in total.

The identification of excluded areas is based on the lateral expanse of influenced areas. They were determined using two different methods, due to the sometimes highly heterogeneous data situation in Germany. Firstly, the designated influenced areas identified by the state authorities were adopted. They are predominantly impacted areas in accordance with or based on the mining ordinance on impacted areas (EinwirkungsBergV). This involves the depiction of changes on the surface, i.e. fractured deformations of the rock, which extend from the underground cavity to ground surface. Where the state authority does not possess any of the required information on an impacted or influenced area, the BGE adds the data using a defined procedure based on geometric information. The basis in this regard is the largest lateral expanse of the mine workings or cavern cavity as shown in Figure 15.

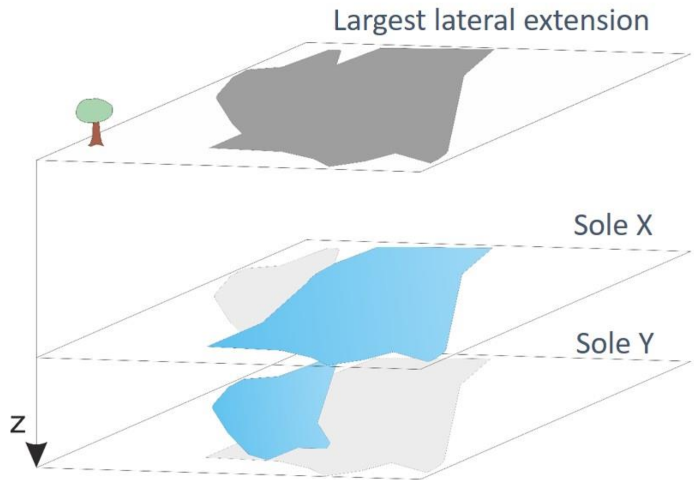

Figure 15: *Graphic representation for determination of the maximum lateral expanse of a mine*

Starting from the deepest point of the mine cavity, a funnel-shaped body is formed along the perimeter of the mine workings with the aid of a limiting angle of 76.5 degrees towards the ground surface (cf. Figure 16). The BGE defined the limiting angle as a uniform measure for all mines and caverns; it corresponds to the steepest of the impact angles listed in the mining ordinance on impacted areas (EinwirkungsBergV). The lateral exclusion area determined in this way is also projected vertically downwards over the entire depth range that is relevant as a repository site.

The area of the lowest point of the mine is used as a reference to describe the lateral expanse and maximum depth of open-cast mines.

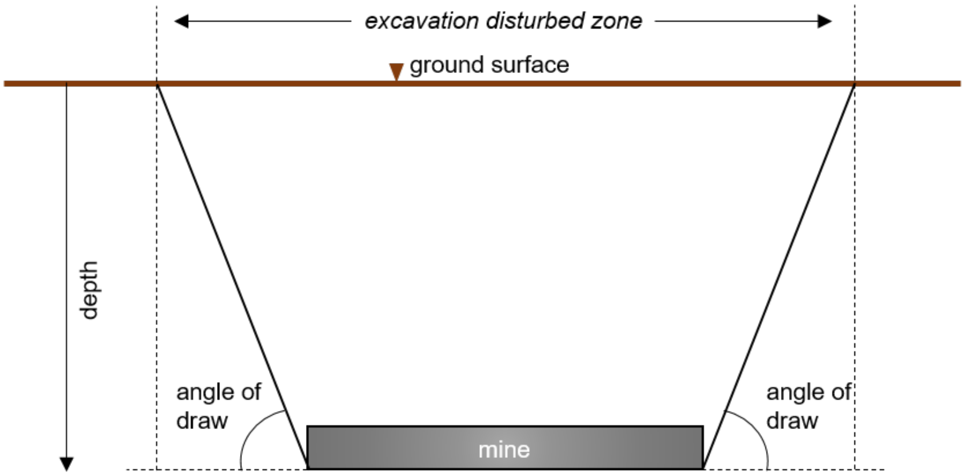

Figure 16: Schematic diagram of the designated influenced area around the largest lateral expanse of the mine, based on the depth and limiting angle

Coal mining in North Rhine-Westphalia

Evaluating the data situation and data volume on the coal mining regions in North Rhine-Westphalia requires a methodological approach that differs from the application method described above.

Home to approx. 4,400 km^2, the Ruhr region is considered the largest centre of coal mining in Germany. The rock formations exposed to mining experience far-reaching overlaps and mutual influences due to the dense spatial concentration of mines located in this region.

The separate application method states that the coal mines in North Rhine-Westphalia will be digitally recorded using “mine map perimeters”. On a digital map, they exclusively indicate the boundaries of analogue maps on which the mine workings are shown. Superimposing and connecting all the map edges belonging to a mine create an area of overlapping rectangles that covers the lateral expanse of the mine in question. However, the distance between the mine map perimeter and the actual lateral expanse of a mine is variable and ranges from several metres to a few kilometres.

In order to avoid overestimating the excluded areas for coal mining in North Rhine-Westphalia, the geometric relationship between the influenced area and the mine map perimeters was analysed during development of the method, based on a random sample of five mines.

For this purpose, the influenced areas in the respective mine were determined on the basis of a numerical and analytical procedure. The results obtained in this way for four of the five mines show that a significant overestimate of the identified excluded areas should not be expected (BGE 2020w). By contrast, an overestimate may occur in places for coal mines that are close to the surface or for facilities that are relatively small, compared to other coal mines in North Rhine-Westphalia. As a result, BGE has decided to use mine map perimeters of the coal industry in North Rhine-Westphalia for the application method “influences from current or past mining activities”.

BGE's portfolio mines

The BGE's portfolio mines considered here include the Morsleben repository, the Konrad repository and the Asse II mine. They are presented in the following Figure 17 and are excluded areas pursuant to Section 22 para. 2 no. 3 StandAG.

The excluded areas in the portfolio mines are identified individually. This separate procedure is described in BGE (2020h); the reason is that long-term safety assessments that in some cases include a substantial part of the surrounding rock are an essential aspect for planning permission and/or operation of BGE portfolio mines.

Konrad repository

The excluded area "Konrad" is identical with the model area described in the long-term safety analysis of 1986 and amounts to 657 km². The model area is defined with regard to the modelled groundwater movement in the area of the Konrad repository and the resulting dispersion paths for radionuclides. The plan approval decision for Konrad adopted the model area as an area under consideration in which interactions between repository waste and its surroundings are possible (Niedersächsisches Umweltministerium 2002).

This influenced area of the Konrad repository, as identified in the plan approval procedure, corresponds to the excluded area as shown. The reason for this procedure is that the measures required for the exploration of siting regions or sites may have repercussions on the findings of the safety assessments for Konrad. This applies in particular to issues concerning long-term safety, which may have to be reassessed. The complexity of safety assessments and downstream, periodic safety reviews for a repository for high-level radioactive waste become significantly more complex as a result.

Asse II mine

The excluded area for the Asse II mine extends for about 4 km in the salt structure's longitudinal direction and for about 1 km in a transverse direction. This comprises the salt perimeter, including a buffer zone in the overburden, running from north to south. The approximate model boundaries in the hydrogeological overburden model are used for the boundaries to the west and east.

These boundaries are characterised by exfiltration areas with potential significance for the spread of mine solution and the transport of pollutants in the overburden; they are therefore used to identify the excluded area.

Morsleben repository

The excluded area for the Morsleben repository is identical with the corner points of the protected area in the permanent operation approval (SAAS 1986) and covers approx. 11 km².

Appendix 3 part II no. 4.2 of the permanent operating approval for the Morsleben repository stipulates that the aforementioned protected area must be observed for third-party mining operations, as well as for hydrological and water management measures, in the area of the Bartensleben and Marie mines. Irrespective of the actual impact on the Morsleben repository or its potential implications, the approval declares this area is to be protected.

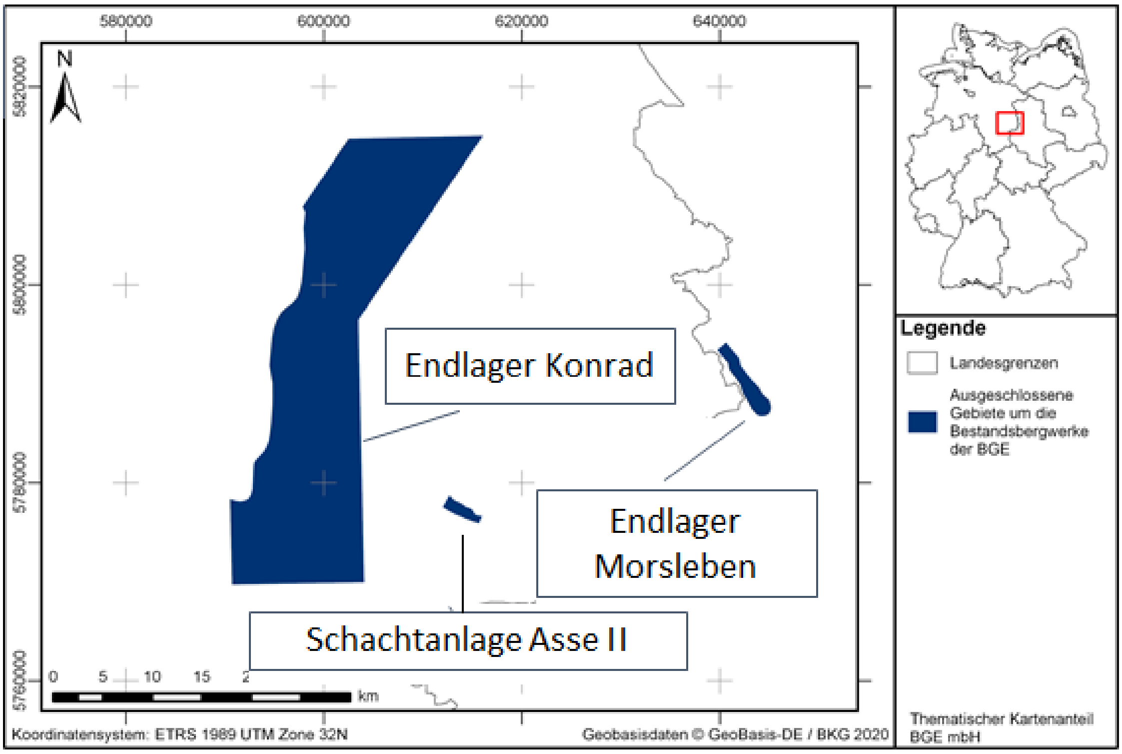

Figure 17: *Cartographic depiction of the excluded areas around the BGE's portfolio mines.*
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete um die Bestandsbergwerke der BGE = excluded areas around BGE's portfolio mines; Endlager Konrad = Konrad repository; Endlager Morsleben = Morsleben repository; Schachtanlage Asse II = Asse II mine.

Using the information available to the BGE, 686 mines and caverns throughout Germany with a total surface space of roughly 6,823 km^2 were identified as excluded areas following application of the exclusion criterion "influences from current or past mining activities", as shown in Figure 18.

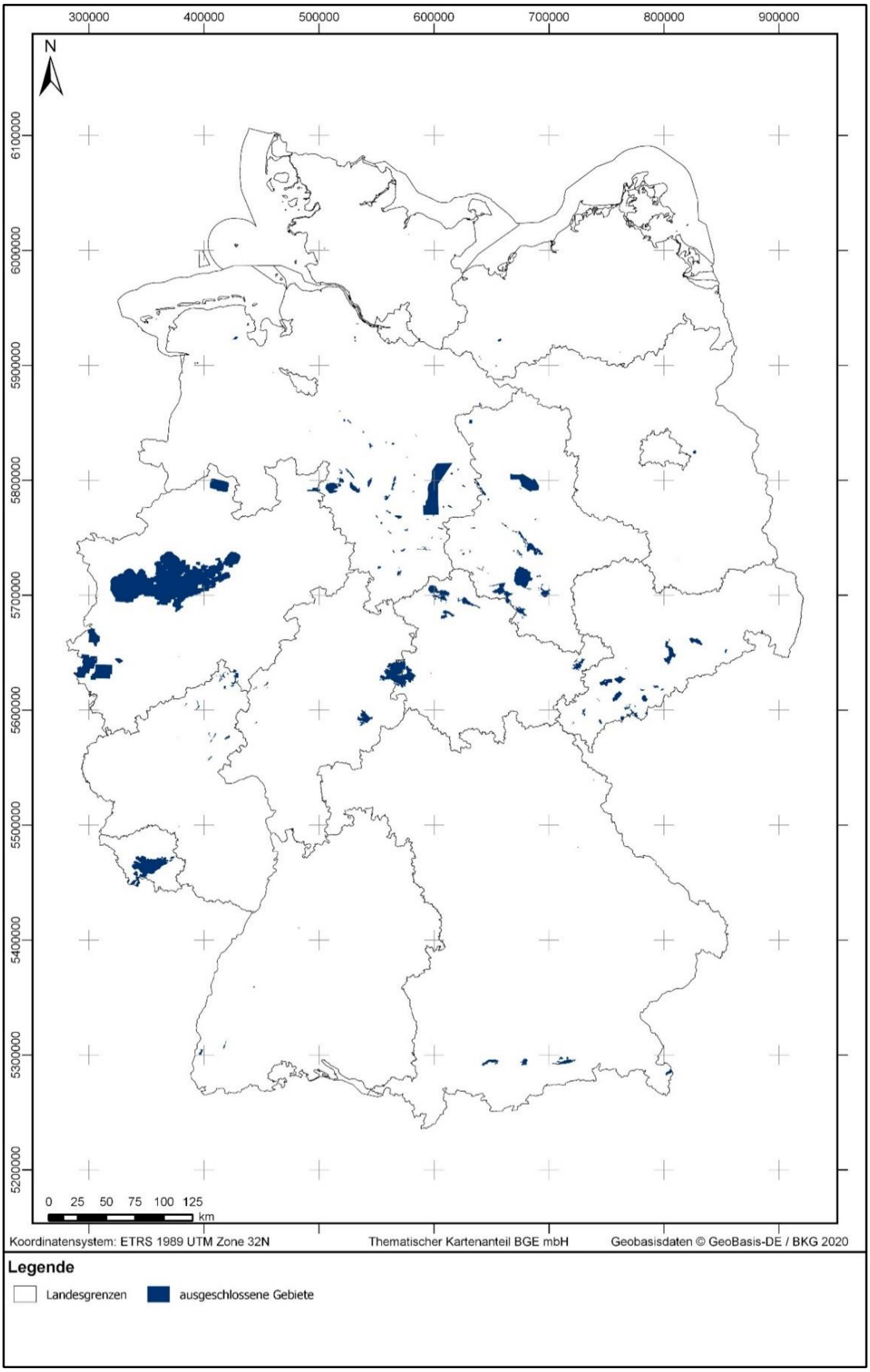

Figure 18: *Excluded areas after application of the exclusion criterion "influences from current or past mining activities –mines". Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete = excluded areas.*

Noted mining activities

In addition to the excluded areas, other mines and caverns were identified in three federal states for which the underground cavities were excavated down to the depth range that is of relevance to a repository site, but whose data situation is inadequate to perform the application method. For this reason – and for purely informational purposes – “noted mining activities” are shown in the following Figure 19. Another 13 mines and cavern fields exist in Thuringia and Lower Saxony. A table with more detailed information in this regard is found in the supporting document BGE (2020h, Chapter "vorgemerkte bergbauliche Tätigkeiten").

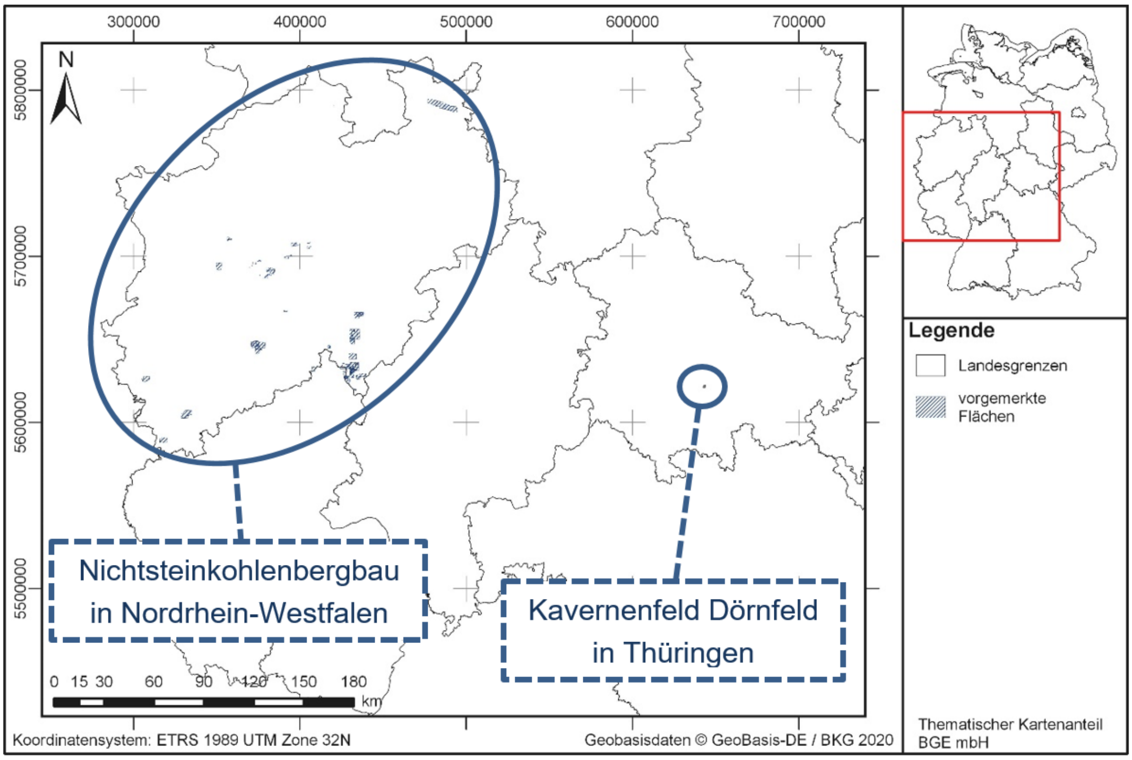

Figure 19: *Map depiction of noted excluded areas.*
The map shows the mine map perimeters in North Rhine-Westphalia and the boundaries of the exploration and mining licence for the Dörnfeld cavern field in Thuringia. The large oval shape on the left-hand side and the larger circle on the right-hand side of the map are for illustrative purposes only and have no significance in regard to the noted mining activities.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Vorgemerkte Flächen = noted mining activities; Nichtsteinkohlebergbau in Nordrhein-Westfalen = Non-coal mining in North Rhine-Westphalia; Kavernenfeld Dörnfeld in Thüringen = Dörnfeld cavern field in Thuringia.

4.2.5 Exclusion criterion "seismic activity"

The exclusion criterion of "seismic activity" is defined in Section 22 para. 2 no. 4 StandAG and states that an area is no longer suitable as a repository site if the local seismic hazard is greater than in seismic zone 1 according to DIN EN 1998-1/ NA:2011-01.

This exclusion criterion is used to identify areas for exclusion where seismic activities are expected to occur that may affect the safety of a repository (BT-Drs. 18/11398, p. 68). The term seismicity describes the geographical, temporal and energy distribution of earthquakes in an area (Murawski & Meyer 2010). These earthquakes can be evaluated – for instance in regard to frequency or severity – using seismic measuring stations or seismometers. Natural earthquakes are caused predominantly by movements of the Earth's crust due to tectonic plate displacements. This causes blocks of rock to shift jerkily along fault zones, resulting in rupture and the spread of ground vibrations (Grünthal 2004; Press & Siever 2008). The earthquake spreads outwards from the hypocentre in concentric waves that move through the subsoil. The hypocentre is the point in the subsoil (cf. Figure 20) where displacement of the rock blocks starts and from which the earthquake waves are propagated (Murawski & Meyer 2010; Press & Siever 2008). In contrast, the epicentre of an earthquake represents the vertical projection of the hypocentre to the surface of the Earth.

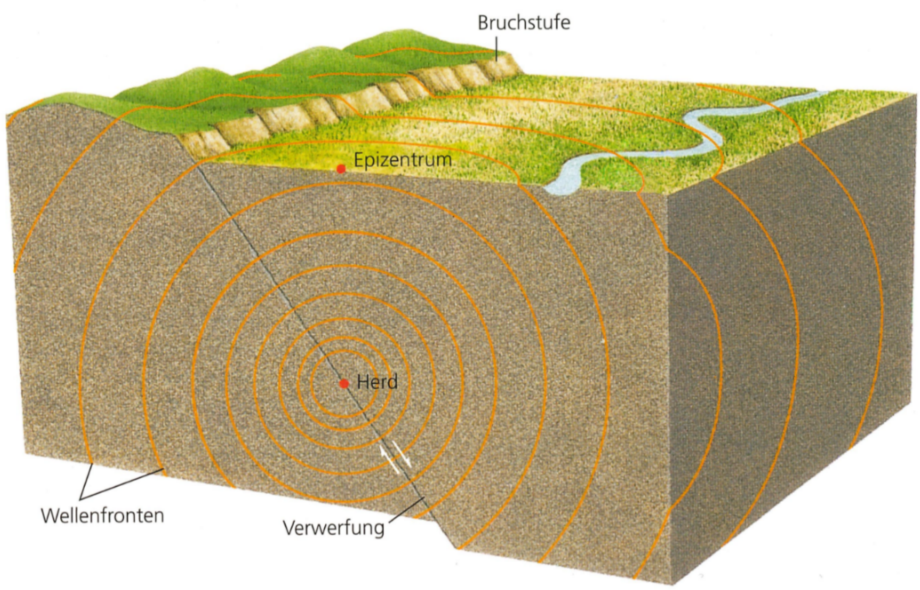

Figure 20: Propagation of seismic waves from the source of the earthquake (Press & Siever 2008).
Translation of terminology used in figure: Bruchstufe = Fault scarp; Epizentrum = Epicentre; Herd = Hypocentre; Verwerfung = Fault; Wellenfronten = Wavefront.

Earthquakes can be evaluated using the scales that are most frequently used in Germany to classify earthquake intensity. The scales used in Germany include the macroseismic intensity scale and the magnitude scale. Macroseismic intensity is a measure of the strength of the tremors and their effects on people or buildings (Grünthal 2004). The European Macroseismic Scale (EMS), which is now mandatory in Germany, has twelve divisions, in which the twelfth one indicates the greatest impact (Grünthal 1998). The seismic zones presented in DIN EN 1998-1/NA:2011-01 – which is used as the basis to apply the exclusion criterion of seismic activity – classify areas according to their seismic hazard, which is determined by the classification of intensity intervals and reference peak values for ground acceleration. According to DIN EN 1998-1/NA:2011-01, the calculation of seismic zones uses a design basis earthquake which, with its specified intensity and a recurrence period of 475 years, will, with a probability of 10 %, be exceeded once on average within 50 years. The seismic zones according to DIN EN 1998-1/NA:2011-01 are shown in Table 1 in regard to their macroseismic intensity. Areas within seismic zone 0 and areas outside a seismic zone, e.g. northern Germany, are classified as areas with very low seismicity (intensity less than or equal to 6.4). Earthquakes with an intensity of 7 (greater than seismic zone 1) cause significant damage to buildings, such as cracks in the masonry and collapsing chimneys, whereas tremors with lower intensities cause little or no damage to buildings. Compared to surface structures, the effects of earthquakes on underground structures are estimated to be lower in general (AkEnd 2002).

Table 1: Seismic zones and classification of intensity intervals according to DIN EN 1998-1/NA:2011-01

Seismic zone (DIN EN 1998-1/ NA:2011-01)	Explanation
0	The macroseismic intensity interval of 6.0 to 6.4 is reached or exceeded with a probability of 10 per cent in 50 years of service life.
1	The macroseismic intensity interval of 6.5 to 6.9 is reached or exceeded with a probability of 10 per cent in 50 years of service life.
2	The macroseismic intensity interval of 7.0 to 7.4 is reached or exceeded with a probability of 10 per cent in 50 years of service life.
3	The macroseismic intensity of an earthquake reaches at least 7.5 with a probability of 10 per cent in 50 years of service life.

Seismicity is comparatively low in Germany; in addition, the country has not yet experienced any earthquakes of catastrophic magnitudes (intensity greater EMS VIII), neither should any be deemed likely for the future based on the current knowledge of the tectonic situation. Nonetheless, seismicity is elevated in individual regions of Germany, compared to other parts of Europe. Particularly noteworthy in this regard are the foothills of the Alps, the Swabian Alb and the areas around Tübingen to the north, parts of the Franconian Alb, the Vogtland and areas to the north, the Lower Rhine Bight, the Upper Rhine Graben, parts of the Black Forest and the central Rhine Valley (Grünthal et al. 2018b). Earthquakes occur in Germany at depths of 5 – 20 km (Grünthal 2004).

In its data query of August 2017, with a second clarifying data query in February 2018, the BGE asked the federal and state authorities for information on areas in which seismic activities are to be expected that are to be classified in seismic zone 2 or 3 according to DIN EN 1998-1/NA:2011-01. The data provided by the federal and state authorities was highly heterogeneous, and the data supplied by the federal states affected by earthquakes usually contained thematically related information (e.g. seismic events from earthquake catalogues), but only in a few cases the information that had specifically been requested. In response, the BGE decided to vectorise the excluded areas directly from the “Map of Seismic Zones” in DIN EN 1998-1/NA:2011-01.

All areas with a local seismic hazard (according to DIN EN 1998-1/NA:2011-01) above seismic zone 1 are selected and projected into all depths that are relevant for a repository site in order to apply the exclusion criterion on seismic activity, as specified in Section 22 para. 2 no. 4 StandAG. The solid body identified in this way is the excluded area. Based on application of the method, the areas cover five regions in Germany. These are located in the Lower Rhine Bight to the west of Cologne in North Rhine-Westphalia, in the Vogtland region on the border between Thuringia and Saxony, in the Alpine foothills of Bavaria and in the Black Forest, Baden-Württemberg, in the Swabian Alb around Tübingen and in the Alpine foothills on Lake Constance (cf. Figure 21). The excluded areas cover a surface of between 130 km^2 and 5,500 km^2, respectively.

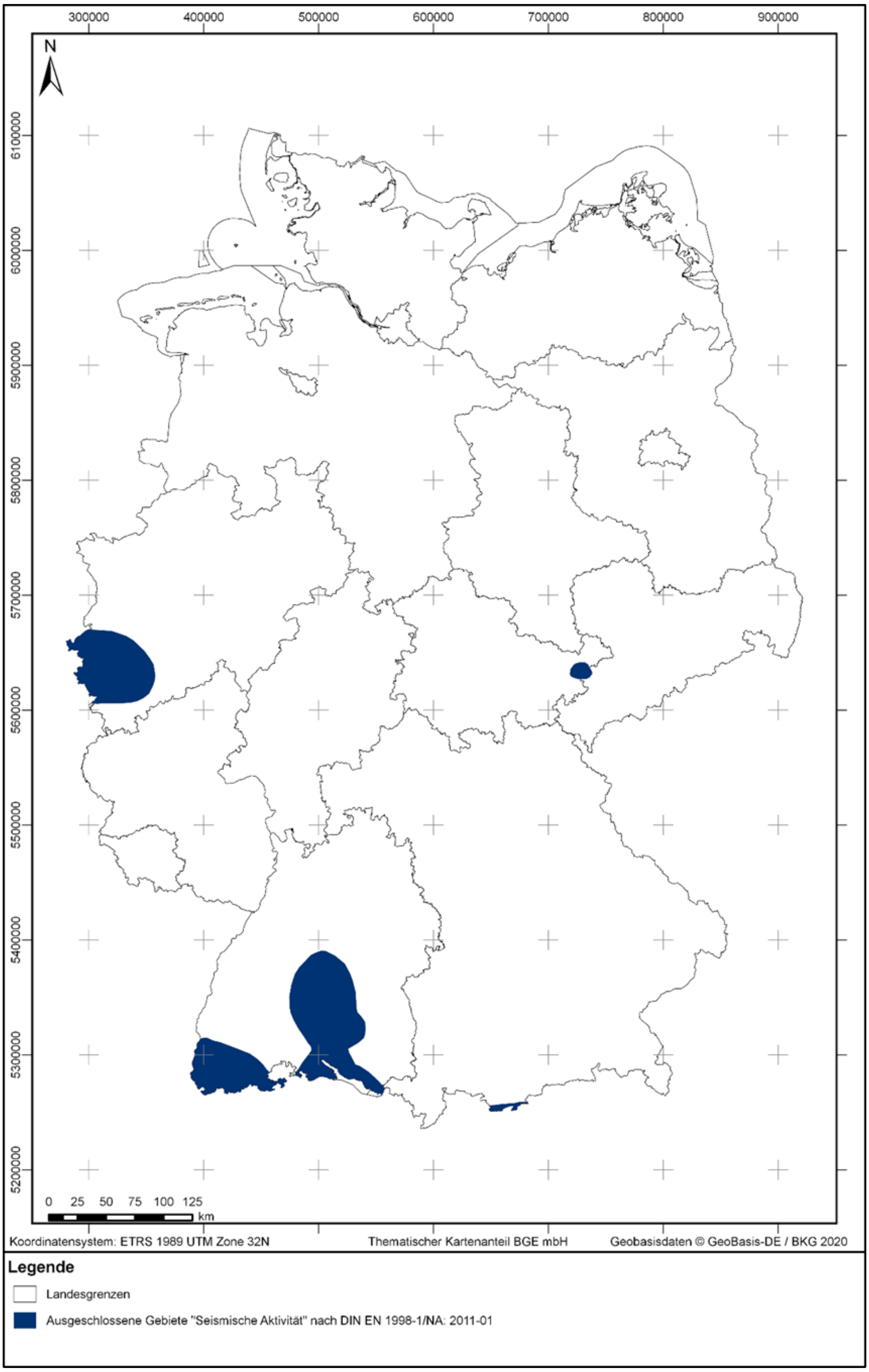

Figure 21: Excluded areas after application of the exclusion criterion "influences of seismic activity".
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete "Seismische Aktivität" nach DIN EN 1998-1/NA:2011-01 = excluded areas "Seismic activity" according to DIN EN 1998-1/NA:2011-01.

In regard to application of the exclusion criterion "seismic activity", the Site Selection Act refers to the National Annex to DIN EN 1998-1 (DIN EN 1998-1/NA:2011-01). This fixed reference to the National Annex assigns this document the same order of priority and quality as the StandAG. Hence, pursuant to Section 22 para. 2 no. 4 StandAG, application of the exclusion criterion takes place on the basis of DIN EN 1998-1/ NA 2011-01.

Scientific insight into probabilistic seismic hazard analysis has progressed in the meantime, however. Based on a reassessment of Germany's seismic hazard (Grünthal et al. 2018a, 2018b), the National Annex to DIN EN 1998-1 is currently undergoing a revision procedure that is not yet complete. A draft version dated May 2020 is available (DIN EN 1998-1/NA:2020-05).

A comparison of the differences between the respective data bases, calculation methods and seismic engineering parameters in the current DIN EN 1998-1/NA:2011-01 and the findings of Grünthal et al. (2018a, 2018b), as well as the current draft of the new National Annex (DIN EN 1998-1/NA:2020-05) is provided in a report by the Federal Institute for Geosciences and Natural Resources, which was commissioned by the BGE (Kaiser & Spies 2020).

We will take the new National Annex into account in the site selection procedure as soon as it has entered into force and all necessary conditions are met.

4.2.6 Exclusion criterion "volcanic activity"

The exclusion criterion of "volcanic activity" is defined in Section 22 para. 2 no. 5 StandAG and states that an area is no longer suitable as a repository site if Quaternary volcanism is present or future volcanic activity can be expected over the period of proof of one million years.

Volcanism refers to all processes and manifestations associated with the emission of hot, liquid rock (magma) and gases at the Earth's surface (Murawski & Meyer 2010). A basic distinction is made between explosive eruptions, e.g. explosive ejection of magma, and effusive eruptions, which are characterised by a slow flow of magma (Martin & Eiblmaier 2002).

Volcanic activity is expressed on the Earth's surface in many ways. The best known volcanic types include stratovolcanoes, such as Fuji in Japan, and shield volcanoes, such as Mauna Loa in Hawaii. In stratovolcanoes, highly viscous (thick) magma forms steep slopes, while the low-viscosity (thin) magma emitted from shield volcanoes creates very flat slopes (de Silva & Lindsay 2015). Another known type of volcano is the caldera (crater), which forms when the roof on an emptied magma chamber collapses. Examples include the Yellowstone, the Teide on Teneriffa and the Lake Laach volcano in the Eifel (Schmincke 2013).

Cinder cones and maar are the most common forms of volcanoes in Germany. Cinder cones form within a short period and are usually active for less than one year. This type of volcano has steep flanks and a crater-shaped summit. The term “maar” describes a funnel that forms after a powerful explosion when rising magma comes into contact with groundwater (Schmincke 2013). In Germany, there is evidence of volcanic activity in various places during the recent geological history (Meschede 2018). The Quaternary (2.6 million years ago until today) and Tertiary (66 – 2.6 million years ago) volcanic fields are located in the Eifel, Westerwald, Vogelsberg, Rhön, Eger Graben and in some southern regions of Baden-Württemberg.

The exclusion criterion of volcanic activity also stipulates a prediction of expected future volcanic activity within the period of proof of one million years. In a study commissioned by the BGE, May (2019) describes the possibility of estimating the probability of future volcanic activity in Germany from a qualitative perspective, based on a number of indicators specified in the report. According to May (2019), it is currently not possible to make quantitative predictions of the outbreak frequency over the next one million years based on our present understanding of the process. Continued activity of Quaternary volcanic areas in the Eifel and in the Vogtland-Oberpfalz region is considered probable, since the activity period of several million years for the Tertiary volcanic fields can also be assumed for the Quaternary fields (May 2019).

In the data query of August 2017 and the subsequent clarification in early 2018, BGE requested the State Geological Surveys of the federal states and the BGR to provide information about areas in which, on the one hand, volcanic activity has taken place or is taking place since the beginning of the Quaternary and, on the other hand, volcanic activity is expected within the next one million years. Only a few federal states submitted data on Quaternary volcanic activity, and none of them had made a prediction of future volcanic activity over the period in question.

In order to identify excluded areas, the BGE decided to update the data basis on Quaternary eruption centres in Hoth et al. (2007, p. 43) and to compile a list of Quaternary eruption centres on the basis of Duda & Schmincke (1978), Büchel & Mertes (1982), Mrlina et al. (2009), Meyer (2013), Hofbauer (2016), Rohrmüller et al. (2018), Lange et al. (2019) and May (2019).

In order to ensure that application of this exclusion criterion takes into account the subsurface damage area affected by a new volcanic eruption (approx. 1 km^2) and the surface areas that may be impacted by pressure waves and lava flows, etc. (Freundt & Schmincke 1986; Jentzsch 2001), a buffer zone of 10 km is added around the volcanic eruption centres in accordance with the recommendations by AkEnd (2002), the final report by the Commission on the Storage of High Level Radioactive Waste (K-Drs. 268) and the explanatory memorandum to the draft law (BT-Drs. 18/11398, p. 69).

The safety radii around the volcanic centres overlap considerably in places, which means that the identified excluded areas (Figure 22) each depict the maximum expanse of these security radii. The areas designated in this way cover 4,446 km^2 in the Eifel and 222 km^2 in the German part of the Eger Graben. The BGE assumes that the excluded areas obtained through the procedure outlined above are more likely to be underestimated than overestimated in terms of their surface. For example, a potential spatial displacement of future volcanic activity is not taken into consideration in the aforementioned 10 km buffer zone. A resilient assessment of these future processes is not possible based on the current data and literature.

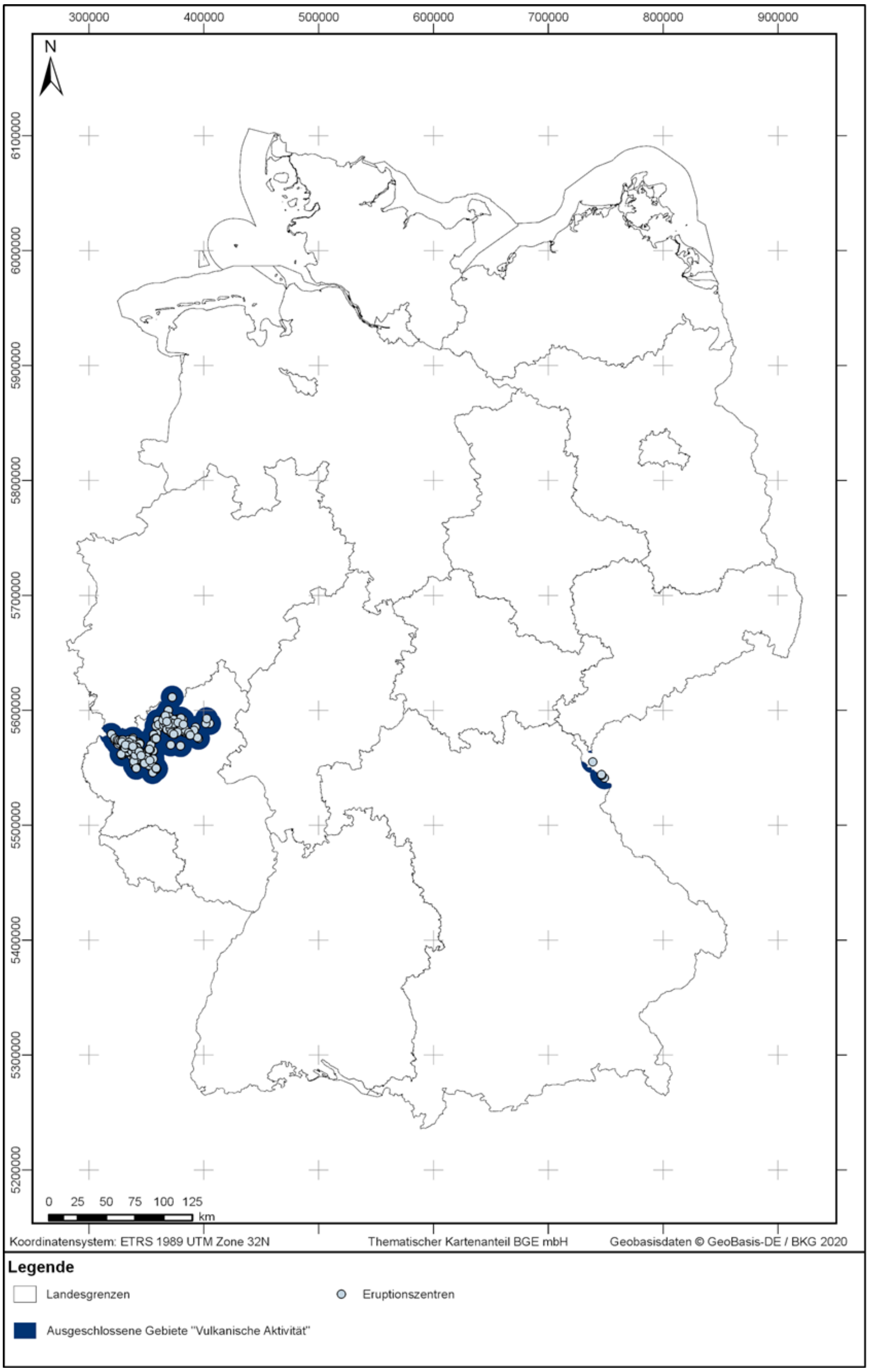

Figure 22: Eruption centres (grey) and excluded areas (blue) after application of the exclusion criterion "volcanic activity".
It should be noted that the depiction of the eruption centres in this map merely indicates their location and does not represent the actual size of the Quaternary eruption centres.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Eruptionszentren = eruption centres; Ausgeschlossene Gebiete „Vulkanische Aktivität" = excluded areas „Volcanic activity".

4.2.7 Exclusion criterion “groundwater age”

The exclusion criterion “groundwater age” is defined in Section 22 para. 2 no. 6 StandAG and states that an area is not suitable as a repository site if young groundwater has been found in rock areas that may be taken into consideration as effective containment zones or storage areas.

Groundwater is water that enters the subsoil by means of infiltration/sinking processes, fills rock cavities in a closed system and moves predominantly due to gravity (Murawski & Meyer 2010). The Water Management Act (Wasserhaushaltsgesetz - WHG) defines groundwater as subsurface water in the saturation zone that is in direct contact with the soil or subsoil (Section 3 no. 3 WHG). As a result, all water encountered at depths that are relevant for a repository site can be considered groundwater in principle.

The exclusion criterion “groundwater age” is based on the work of the Selection Procedure for Repository Sites' workgroup (AkEnd 2002) and the Repository Commission (K-Drs. 268), according to which the occurrence of young groundwater in deep areas that are relevant for repository sites is indicative of this groundwater participating in the active hydrological cycle and that it is therefore in direct exchange with the Earth’s surface and hence with the biosphere. In principle, groundwater can be very old (even millennia) (Appelo & Postma 2005; Hölting & Coldewey 2019; Neukum et al. 2020), whereby “groundwater age” can be interpreted as the period since the groundwater first formed. The Site Selection Act itself does not contain a definition of the term “young groundwater”. In contrast, the explanatory memorandum to the draft law (BT-Drs. 18/11398, p. 69) does provide indications, stating that the concentration of the radioactive isotopes tritium (^{3}H) and carbon-14 (^{14}C) in the groundwater can be used as an evaluation basis for the exclusion criterion “groundwater age”. Both of these isotopes are produced naturally by cosmic radiation in the Earth’s atmosphere. In addition, nuclear weapons testing in the middle of the last century released significant amounts of tritium and carbon-14 as well. The exclusion criterion "groundwater age" can be interpreted to mean that the mere presence of tritium or carbon-14 in groundwater leads to exclusion (AkEnd 2002).

In response to the data queries of August 2017 and February 2018, the BGE received both, notifications that no data was available, as well as a set of data and additional information for applying the exclusion criterion. These resources were mainly individual measuring points for ^{3}H and/or ^{14}C with information on their spatial position, measurement results and, if applicable, additional information.

Pursuant to Section 22 para. 2 no. 6 StandAG, the exclusion criterion of groundwater age refers directly to the effective containment zone or the storage area. Given the absence of information on geographical expanse when the exclusion criterion was applied, a large-scale exclusion of areas on the basis of the exclusion criterion would not be appropriate. For this reason, the identification of sub-areas pursuant to Section 13 StandAG with regard to the exclusion criterion of groundwater age only involves a selective identification of excluded areas on the basis of the measuring points that were provided along with information on ^{3}H and/or ^{14}C contents. Detection of ^{3}H and/or ^{14}C triggers exclusion in this case. All sampling points for groundwater at a depth of 300 metres below ground surface are boreholes or mines. It follows, therefore, that these areas were already excluded based on the exclusion criterion “influences from current or past mining activities” (Section 22 para. 2 no. 3 StandAG). Given that the method is applied only selectively, an additional exclusion does not take place at this time in the application of the exclusion criterion for groundwater age. All data points leading to exclusion were correlated with boreholes.

After applying the exclusion criterion of groundwater age, a total of 58 data points and 96 lines (with sampling area) were identified in Germany within the framework of Section 13 StandAG. The results are shown in Figure 23. Data points and lines forming the excluded areas are located in Schleswig-Holstein, Hamburg, Lower Saxony, North Rhine-Westphalia, Hesse, Saxony, Bavaria and Saarland. In a few cases, there were superimposed data points and lines due to more than one measurement with detection of ^{3}H and/or ^{14}C at one and the same location and at the same depth.

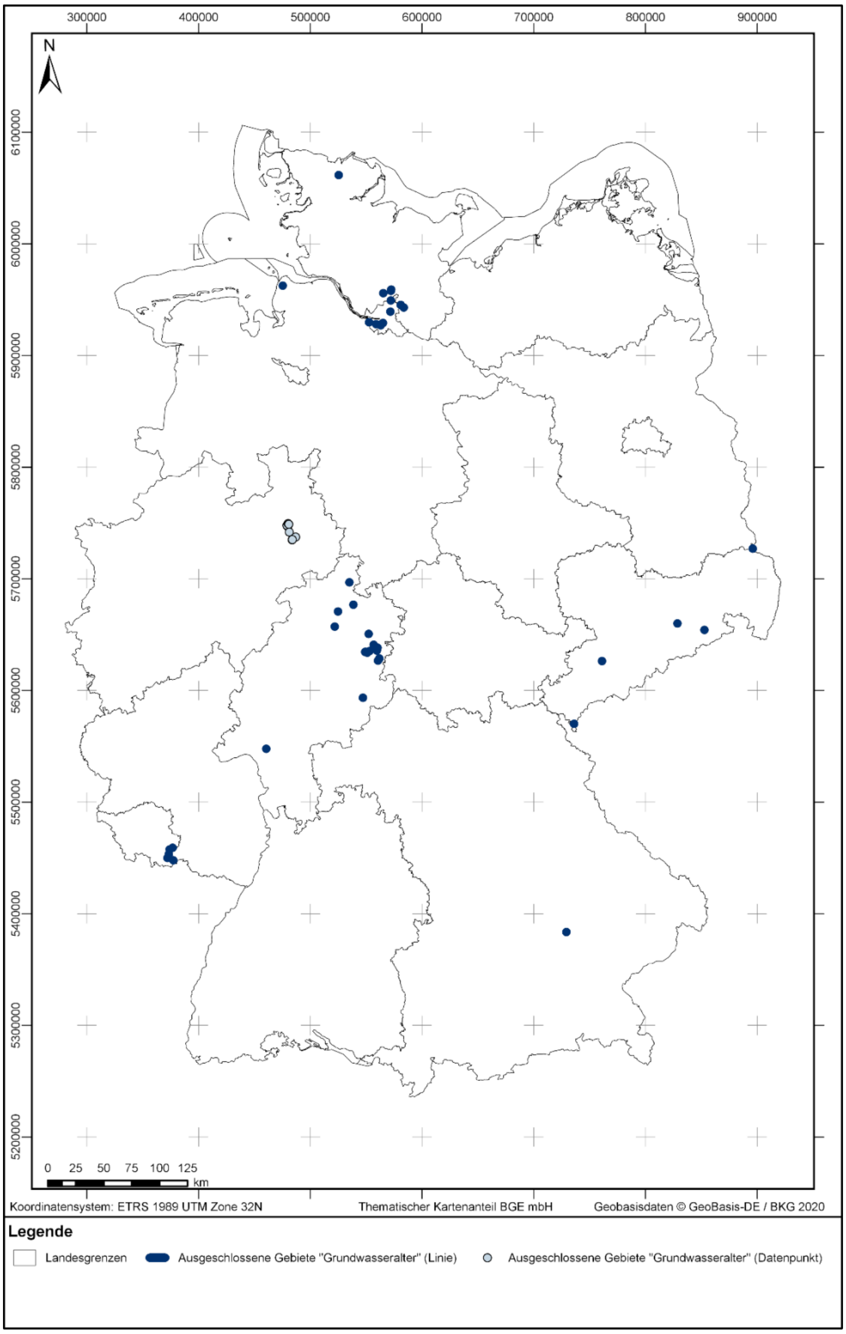

Figure 23: *Overview map of the excluded areas identified by application of the exclusion criterion for groundwater in Phase I of the site selection procedure.*
In total, 58 data points (grey) and 96 lines (blue) were identified, which form the excluded areas. A sampling area must be stated for lines. It should be noted that the depiction of excluded areas in this map is not to scale to allow visualisation in the map format used.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossende Gebiete “Grundwasseralter” (Linie) = excluded areas „Groundwater age (Line)“; Ausgeschlossende Gebiete “Grundwasseralter” (Datenpunkt) = excluded areas „Groundwater age (data point)“.

4.2.8 Identification of excluded areas within the framework of Section 13 StandAG

The following Figure 24 shows the excluded areas that were identified by applying the exclusion criteria under Section 22 para. 2 nos. 1 to 6 StandAG to the whole of Germany. The excluded areas for boreholes and groundwater age, which were identified by applying the exclusion criteria "influences from current or past mining activities – boreholes" and "groundwater age", are not visible in Figure 24 due to the relatively very small surface areas. For reasons of legibility, they are strongly enlarged and shown in Figure 14 and Figure 23.

During application of the exclusion criteria, all areas in Germany were assessed in the necessary depth using the available geological data during Step 1, Phase I of the site selection procedure. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 no. 4 StandAG). A presentation of these areas and a recommendation for further action in this regard are therefore unnecessary.

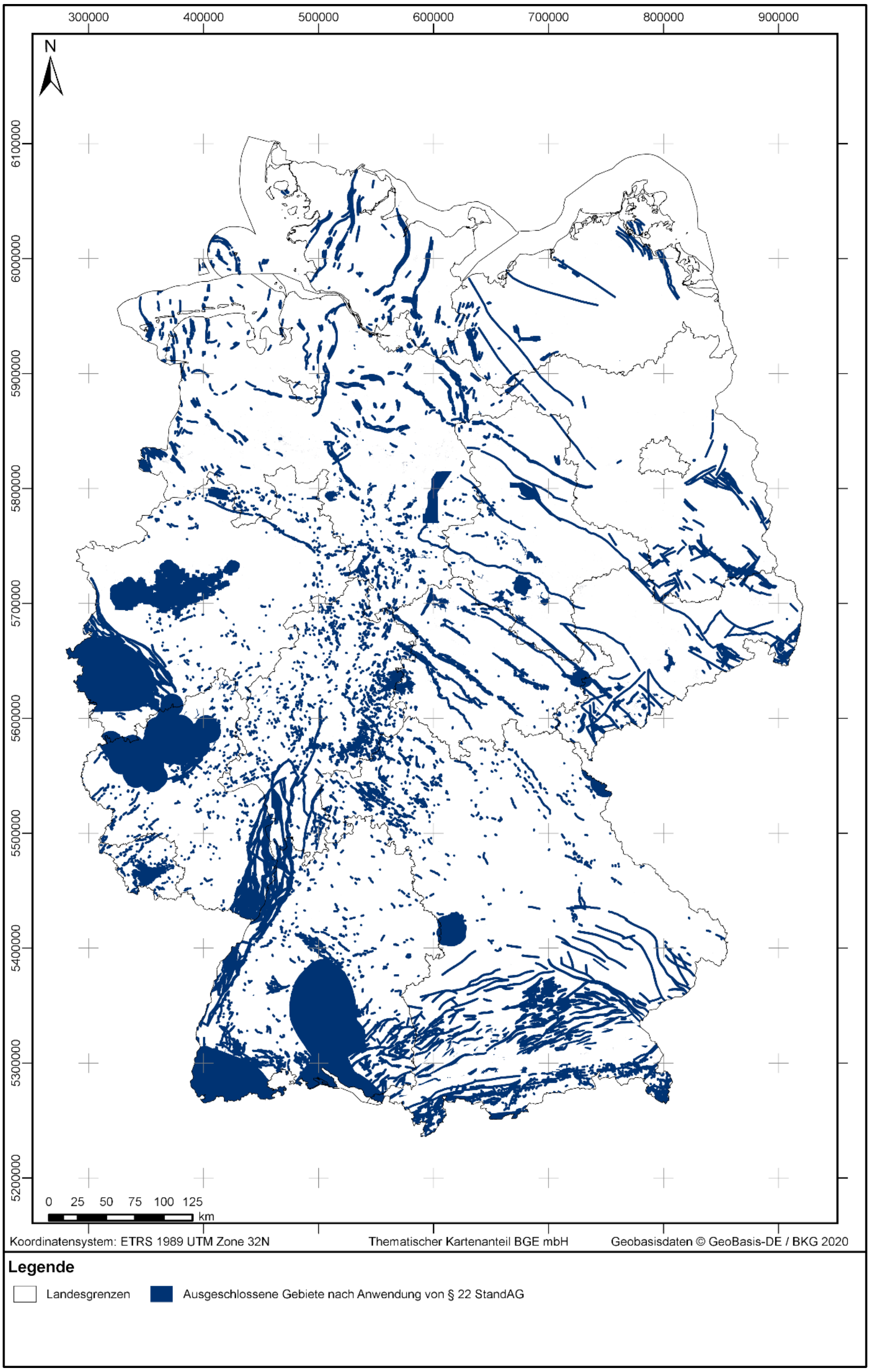

Figure 24: True-to-scale overview map of the excluded areas identified by application of the exclusion criteria according to Section 22 StandAG. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Ausgeschlossene Gebiete nach Anwendung von §22 StandAG = excluded areas after application of the exclusion criteria according to Section 22 StandAG.

4.3 Minimum requirements according to Section 23 StandAG

After completion of the exclusion criteria in accordance with Section 22 StandAG, a second step involves applying the minimum requirements defined in Section 23 StandAG to the areas not identified as excluded areas. Application of the minimum requirements will yield identified areas that satisfy the minimum requirements. The minimum requirements are applied on the basis of the data made available by the competent federal and state authorities according to Section 12 para. 3 StandAG. Pursuant to Section 23 para. 1 StandAG, the host rocks of rock salt, claystone and crystalline rock can be taken into consideration for the final disposal of high level radioactive waste (cf. chapters 4.1.1 to 4.1.4).

Where the necessary data for applying the minimum requirements does not become available until a later phase of the site selection procedure, the respective minimum requirements shall be deemed fulfilled to the extent that this can be expected on the basis of the currently available data (Section 23 para. 3 s. 1 StandAG). This approach permits a closer assessment of potentially eligible areas at a later stage of the site selection procedure, even if little data is currently available. According to Section 23 para. 3 s. 2 StandAG, fulfilment of each minimum requirement must be demonstrated for each specific site no later than upon submission of the site proposal, which comes at the end Phase III of the site selection procedure.

If an effective containment zone is not possible for an area in crystalline host rock (Chapter 4.1.4), it is also possible to submit an alternative concept for safe containment that is predominantly based on geotechnical and technical barriers.

The contents described in the following chapters 4.3.1 to 4.3.5 summarise the supporting documents BGE (2020j).

4.3.1 Data basis

Step 1, Phase I of the site selection procedure involves determining the identified areas in accordance with Section 13 para. 2 StandAG on the basis of the geological data provided by the competent federal and state authorities. Data received until 01/06/2020 was taken into consideration.

Several queries concerning a variety of data were sent to the competent authorities. A suitable tool was made available to the competent federal and state authorities prior to the first data query for application of the minimum requirements in March 2018, as was the case for the exclusion criteria as well (BGE 2018a). The federal and state authorities sent data in all kinds of formats in response to these data queries. Once received, the data was documented, reviewed and organised in database systems. The data includes 3D geological models, information from boreholes (e.g. bore logs), thematic maps (e.g. geological maps, thickness maps) and reports on research projects and studies.

Current 3D models of the geological structure of the subsoil in the states are used as a vital basis for applying the minimum requirements (cf. Figure 25). Geological 3D models visualise the distribution of rocks and tectonic structures in the subsoil. The federal and state authorities have regional 3D models of the geological subsurface for approx. 65 % of Germany. These models are the product of comprehensive scientific evaluation and interpretation of various geological data (e.g. borehole data, profile sections, geological maps, reflection seismics) by the individual National and State Geological Surveys.

A comprehensive geological 3D model of the deep subsoil of northern Germany is being created within the “Subsurface Potentials for Storage and Economic Use in the North German Basin” project (“TUNB”) by the BGR in cooperation with the State Geological Services of the north German federal states. A preliminary work in progress version of the geological 3D model was submitted to the BGE as the Waste Management Organisation at the end of May 2020. Given that the current phase of site selection is very advanced and the geological 3D model of the TUNB project – as presented – is only a preliminary work in progress, this model will only be taken into account in the further course of the procedure once it has been finalised (BGE 2020l).

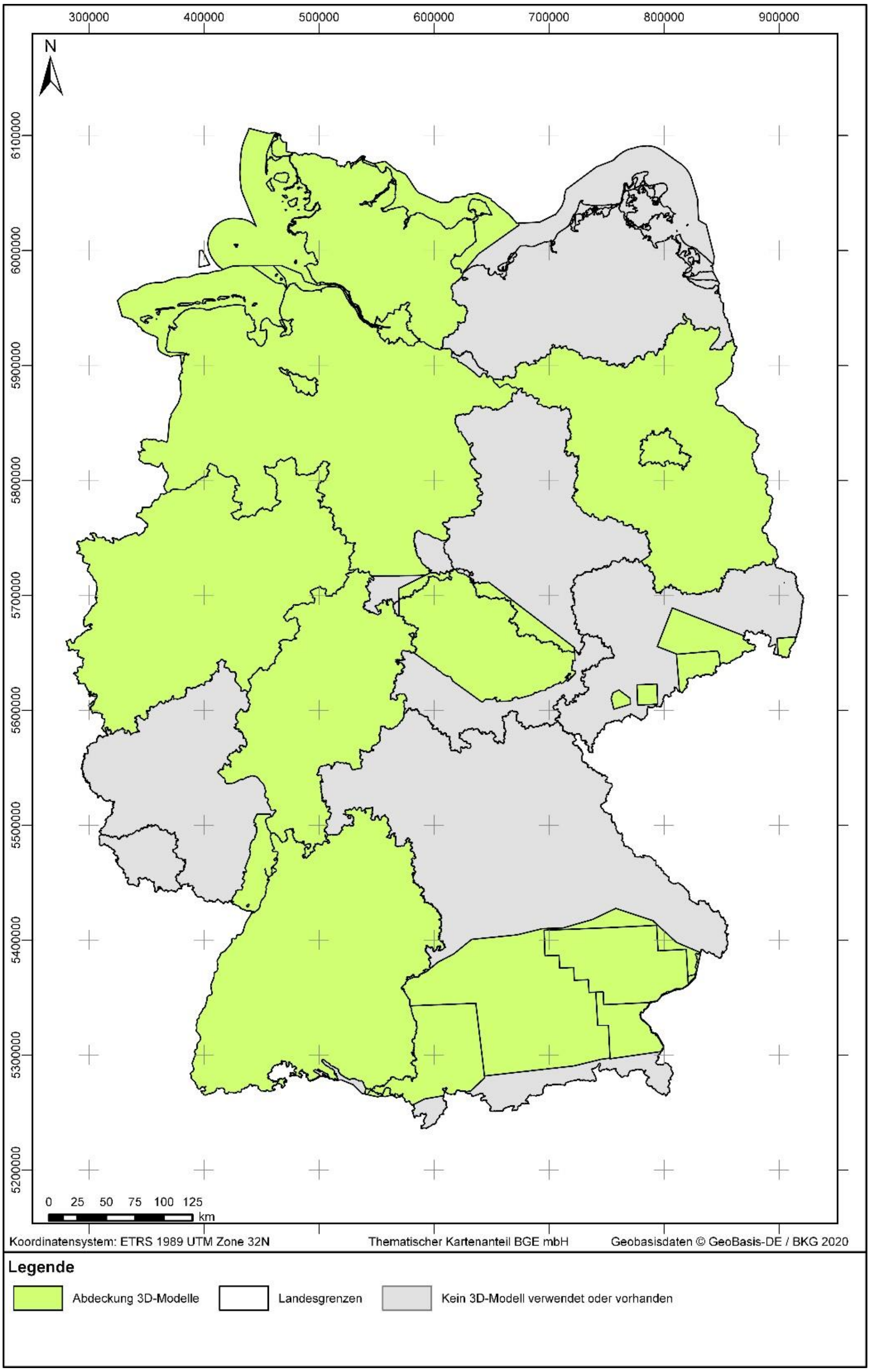

Figure 25: Germany-wide overview on coverage by the 3D models used (green). Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Abdeckung 3D-Modelle = coverage of 3D-models; Landesgrenzen: State borders; Kein 3D-Modell verwendet oder vorhanden = No 3D-modell used or available.

4.3.2 Application method for the minimum requirements

Prior to application of the minimum requirements pursuant to Section 23 StandAG, rock formations are identified and inventoried which are composed of the host rock types of claystone, clay rock (cf. Chapter 4.1.2), rock salt (cf. Chapter 4.1.3) and crystalline rock (cf. Chapter 4.1.4). This takes place on the basis of the data made available by the federal and state authorities, as well as other publicly available information (cf. Chapter 4.3.1).

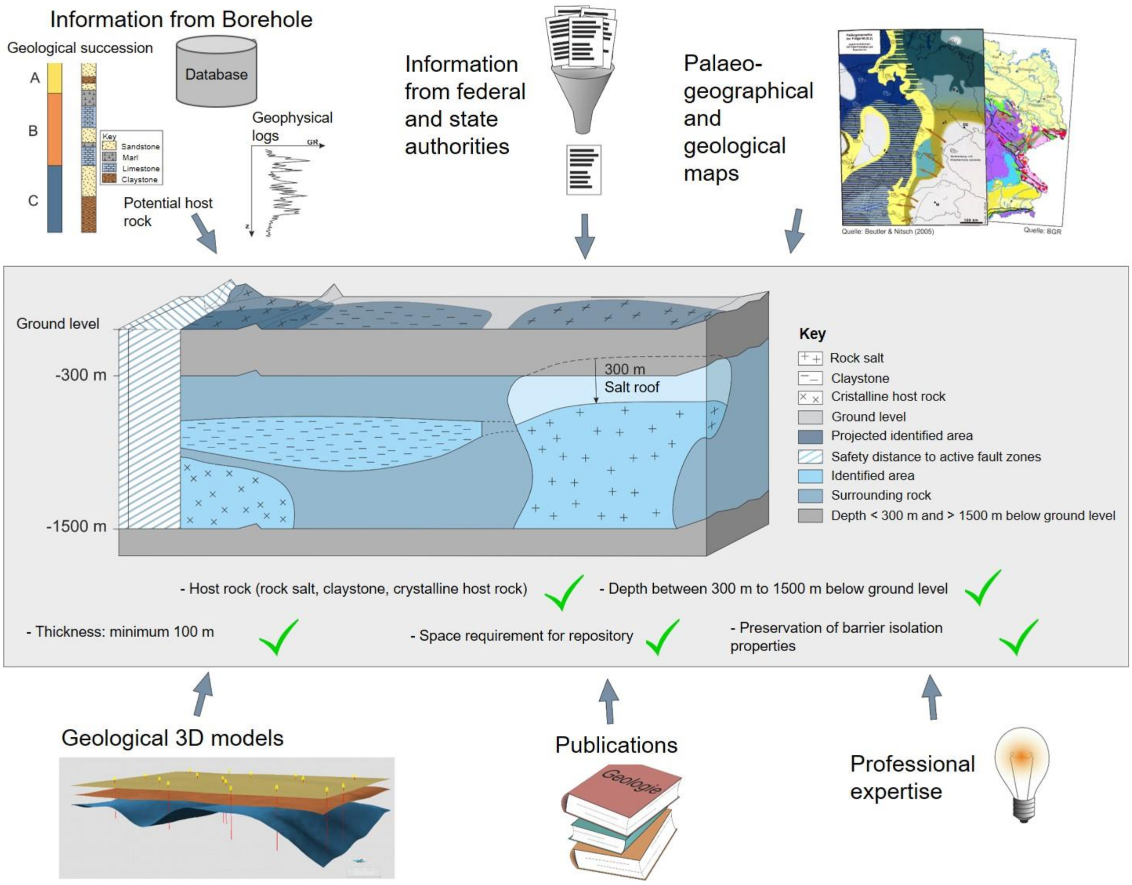

Figure 26: Schematic diagram of data and knowledge input for the determination of identified areas

Technical literature and reference works are used to review all stratigraphic units, crystalline petrography and stratigraphy for rock units that are relevant for use as repositories (cf. Figure 26). This enabled the identification of stratigraphic units in various regions, which were then examined to ensure that they meet the minimum requirements of Section 23 para. 5 nos. 1 to 5 StandAG.

Section 23 para. 2 StandAG stipulates that all minimum requirements must be satisfied. However, in order to take account of the data situation and data availability in this early phase of the site selection procedure, Section 23 para. 3 StandAG permits the assessment that a minimum requirement has been satisfied on a provisional basis if the current data situation indicates that it is likely to be satisfied in the end. Accordingly, if little or no data on a particular area is available for the examination of some or all of the minimum requirements and the generally accepted knowledge of the rock properties does not militate against the satisfaction of these minimum requirements, these areas are also designated as identified areas.

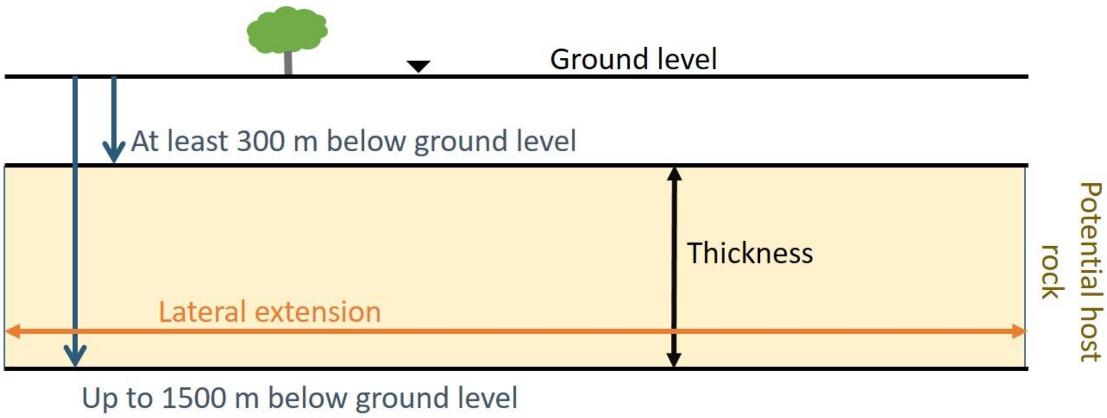

Figure 27: Schematic diagram to examine the minimum requirements in regard to the thickness, lateral extension and depth of potential host rocks

The generic repository concepts from BGE (2020am) were taken into consideration in the application of the minimum requirements. Information for the identification and designation of rock bodies/sequences that are relevant for repository sites, as well as their distribution, can be obtained from various sources. In particular, this includes drilling data (e.g. bore logs, borehole measurements), geological and other thematic maps, geological cross-sections and geological 3D models, as well as explanations and descriptions in technical literature. The Stratigraphic Table of Germany (STD) (German Stratigraphic Commission 2016) was used for initial evaluation so as to be able to use this data in a purposeful manner. The STD combines stratigraphic (geological, temporal) information with regional and lithological (rock-specific) information. It provides an overview of which substances were deposited in which regions of Germany and when, i.e. which significant geological events occurred, when they happened and where.

The purpose of evaluating the STD was therefore to investigate which of the different regional stratigraphic units – depending on their dominant primary constituents – contains a rock sequence with the rock types that are relevant for repository sites and where they occur in Germany. In addition, information on lithology and thickness is recorded, as well as on other relevant or available properties – in particular from regional publications by the federal states and reference works by the German Stratigraphic Commission (DSK) and sub-commissions. This produces a compilation of all stratigraphic units, which appear likely to contain a rock sequence with the corresponding rock types that are relevant for a repository site and are suitable for examining the minimum requirements. The results from this evaluation were recorded in inventory tables (BGE 2020l, Part 4, Annex 1).

These inventory tables (BGE 2020l, Part 4, Annex 1) are used to narrow down the claystone deposits, rock salt deposits and crystalline rock deposits with regard to their suitability as rock formations that are relevant for a repository site in later stages of the site selection procedure. Lithological and petrographical descriptions are used to narrow down the list of deposits. In particular, the relevant parameters in this regard are hydraulic conductivity of the rock and other characteristics that are associated with the task as an effective containment zone or host rock. Any available information concerning a barrier effect is also taken into consideration. As stipulated in Section 23 para. 3 StandAG, the minimum requirement set out in Section 23 para. 5 no. 5 StandAG is deemed to be satisfied on a provisional basis at this stage of the site selection procedure if no knowledge is available in the respective distribution areas, or if there is no available knowledge that would cast doubt on the preservation of the barrier effect. The following Table 2 provides an overview of the potentially suitable rock formations that are relevant for a repository site, as obtained from the inventory tables (BGE 2020l, Part 4, Annex 1).

Table 2: Overview of potentially suitable rock formations that are relevant for a repository site

Rock formation	Petrography (dominant primary component)
Rock salt sequences (flat/steep deposits)	Rock salt Halite Halitite Banded salt Fibrous salt (primary)
Claystone sequences	Clay/clay rock Clay/clay rock with very few inclusions Clay/clay rock, silty, i.e. sandy or carbonate Marl claystone, marly clays Saliferous clay Clay marlstone
Crystalline rocks	Plutonites and highly metamorphic rocks such as granite, gneiss, migmatite, pegmatite, metamorphic quartzite

With regard to the minimum requirement “thickness of the effective containment zone” according to Section 23 para 5 no. 2 StandAG, the stratigraphic units that are relevant for a repository site and the potentially relevant rock sequences contained therein were also evaluated on the basis of the available data and values from technical literature and were then classified in regard to their suitability.

Units or rock sequences containing rock types that are relevant for a repository site, but whose thickness is significantly less than 100 m based on data research and generally accepted findings, will be disregarded.

A stratigraphic unit or a specific area (rock sequence) of a stratigraphic unit is only identified as a rock type that is relevant for a repository site if it can be expected to fulfil the minimum requirements with regard to hydraulic conductivity, known preservation of the barrier effect and if there are no clear indications of insufficient thickness (cf. Figure 28). The colour coding to designate suitability in the inventory tables (BGE 2020l, Part 4, Annex 1) indicates this with the evaluation “potentially suitable”. The rock sequences in the inventory tables (BGE 2020l, Part 4, Annex 1) for claystone and rock salt with the evaluation “suitability questionable” are merely documented.

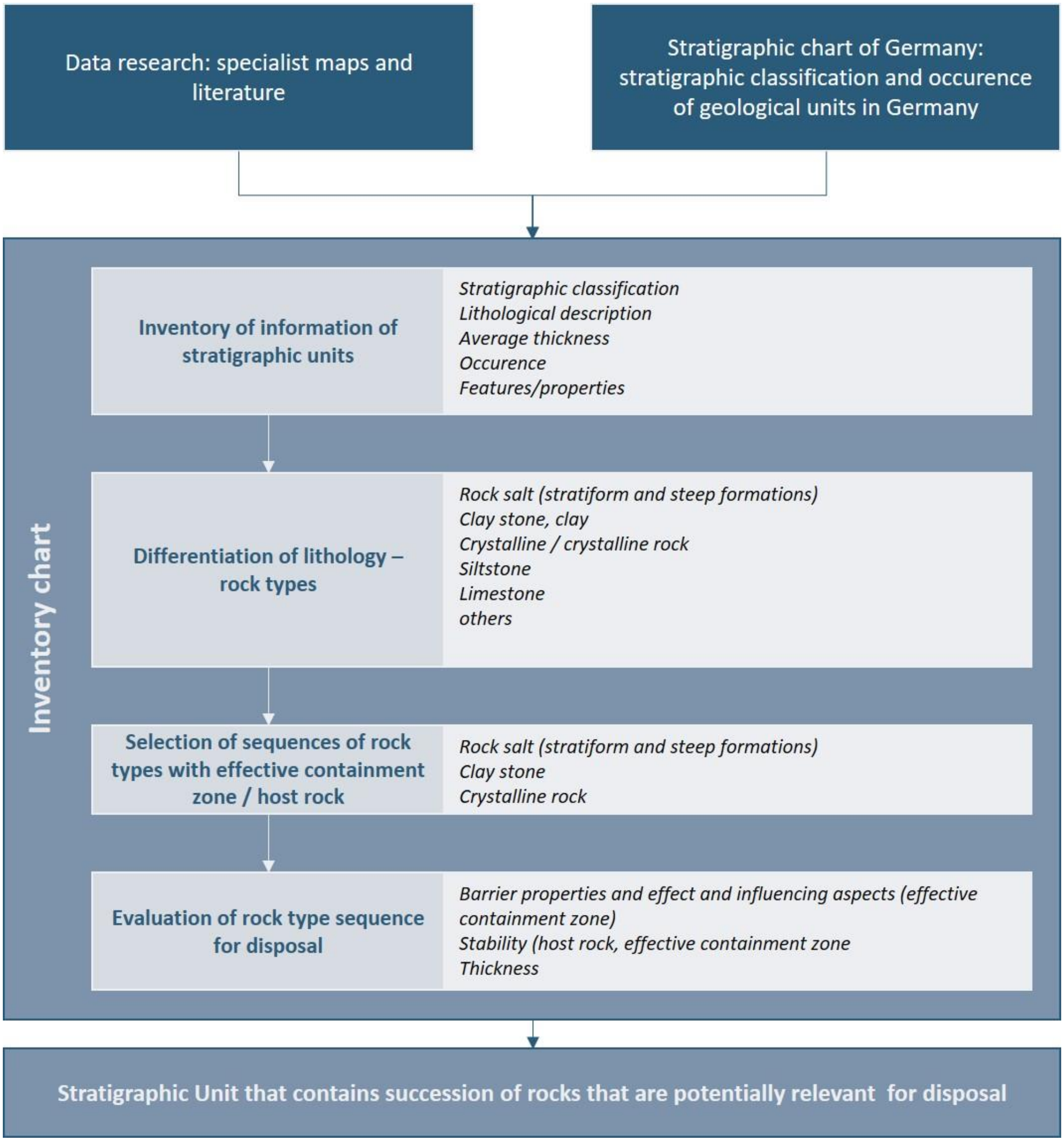

Figure 28: Summary of the procedure to identify rock types and sequences that are relevant for repository sites

The information on stratigraphic units is based on publications addressing specific regions; they differ greatly in regard to the level of detail in the lithological descriptions.

As a rule, the geological 3D models of the federal and state authorities and the available thematic maps do not provide the level of stratigraphic detail as in the information on rock sequences that are relevant for a repository site which can be derived from the Stratigraphic Table of Germany. This means, for instance, that while a 3D model may state Keuper as the finest degree of classification, the Stratigraphic Table of Germany subdivides the Keuper into considerably more detailed units to narrow down rock sequences that are relevant for a repository site even further. The consequence for the processing of minimum requirements is that although the geological 3D models or thematic maps show the stratigraphic unit containing a rock sequence that is relevant for a repository site, the sequence itself cannot be delimited in greater detail on the basis of the available data. This leads to overestimating the thickness and expanse of the rock layers that are relevant for a repository site.

4.3.3 Concept for application of the minimum requirements on the basis of the available data

A method to apply the minimum requirements was painstakingly developed on the basis of various approaches. The result meets the requirements of transparency and takes into account the heterogeneous nature of the current and available data obtained from the individual federal states. Based on the nationwide identification of rock sequences that are relevant for a repository site, the final processing concept is subdivided into two steps, one that addresses individual federal states, and the other that applies across state boundaries (cf. Figure 29). Technical implementation for application of the minimum requirements according to Section 23 StandAG is based exclusively on the provided and other available data.

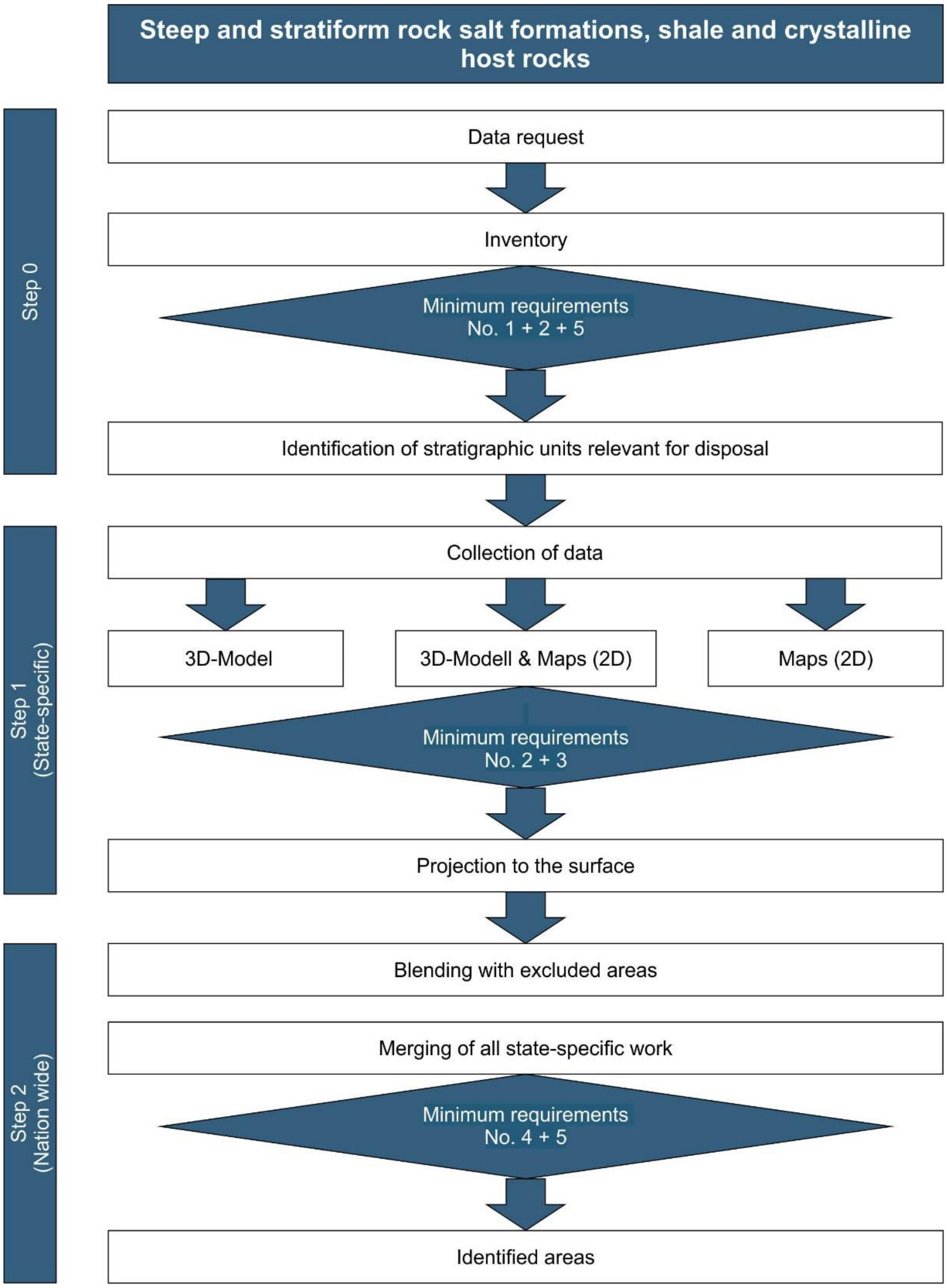

Figure 29: *Depiction of the work steps to apply the minimum requirements for the determination of identified areas. The minimum requirements are numbered according to Section 23 para. 5 StandAG.*

The minimum requirement for "*hydraulic conductivity of the rock*" according to Section 23 para. 5 no. 1 StandAG and for "*preservation of the barrier effect*" according to Section 23 para. 5 no. 5 StandAG are checked in work step 0 (cf. Figure 29) on the basis of the descriptions in the technical literature. Depending on the information or data situation, the principle of Section 23 para. 3 StandAG is taken into account here, whereby the minimum requirements are deemed to be satisfied insofar as this can be expected on the basis of the available data. In addition, work step 1 (cf. Figure 29) of the process uses the borehole information to check whether the lithological sequence can be classified as possessing the necessary hydraulic conductivity of the rock in accordance with Section 23 para. 5 no. 1 StandAG.

The prepared geological information is used to check the minimum requirements concerning the thickness and minimum depth of the effective containment zone according to Section 23 para. 5 nos. 2 and 3 StandAG, in addition to the identification and determination of distribution of rock formations that are relevant for repository sites. This is followed by work step 2 (cf. Figure 29), in which the results of applying the minimum requirements to the individual, analysed rock formations that are relevant for repository sites in each federal state are compiled at a national level. Areas that fulfilled at least one exclusion criterion in accordance with Section 22 StandAG are then removed from the nationwide results of applying the minimum requirements. The products of the work steps for application of the minimum requirements as shown in Figure 29 are then the identified areas pursuant to Section 13 para. 2 s. 1 StandAG

In addition to the premises relating to the available data basis, this procedure must also consider the special provisions set out in Section 23 para. 4 StandAG. This applies in particular to repository concepts in connection with crystalline host rock. In accordance with the provisions of the law, the minimum requirement of Section 23 para. 5 no. 1 was not applied. The specified requirement under Section 23 para. 5 no. 3 StandAG for an effective containment zone was taken into account for the individual host rocks.

Depending on the data situation, a methodical distinction is made between 2D and 3D models as the available data during application of the minimum requirements. Moreover, the particularities of the relevant rock types and their configurations are addressed, although this does not influence the basic processing sequence. In the first case, processing in work step 1 (cf. Figure 29) is either 2D or 3D, i.e. based on thematic maps or 3D geological models. Individual processes and queries in work step 1 differ for the various rock and deposit types.

The work is performed in two dimensions for the areas in Germany in which the BGE does not possess a geological 3D model. Information from thematic maps and bore logs from drilling operations, as well as technical literature, are used for this purpose. This information is applied to conduct a site-specific examination to determine whether potential host rocks are present and whether they can be considered suitable in terms of their thickness and lateral expanse (cf. Figure 27).

Borehole information is used as evidence during processing and application of the minimum requirements, in order to check general satisfaction of the minimum requirements.

Table 3 provides a general summary of the various data bases and procedures used in applying the individual minimum requirements. The products of the work steps for application of the exclusion criteria according to Section 22 StandAG and the minimum requirements according to Section 23 para. 5 nos. 1 to 5 StandAG are the identified areas.

Table 3: General summary of the data used for each minimum requirement and the working method

Minimum requirement	Data basis	Applied working method
Section 23 para. 5 no. 1 StandAG Hydraulic conductivity of the rock	Technical literature, borehole information in places	• Evaluation of the data basis, transfer of the information to the area/space if no local disparity should be assumed. • This minimum requirement is deemed to be satisfied, depending on the available data and the absence of indications that cast doubt on compliance with the minimum requirement for hydraulic conductivity of the rock.
Section 23 para. 5 no. 2 StandAG Thickness of the effective containment zone	Geological 3D model, thickness maps, in some cases borehole information/bore logs, technical literature	• In 3D models, the thickness results from the difference between the upper and lower boundary, the rock formation that is relevant for a repository site or the stratigraphic unit. Alternatively, the information may originate from thickness maps. • In this regard, the upper and lower boundaries are formed by the natural layer boundary and/or also by the restrictions on the depth of the effective containment zone according to the minimum requirement pursuant to Section 23 para. 5 no. 3 StandAG and the maximum search depth of 1,500 m.
Section 23 para. 5 no. 3 StandAG. minimum depth of the effective containment zone	Geological 3D model, depth contour maps, in some cases borehole information/ bore logs	• Ground surface, minus 300 m. • In the case of rock salt in a steep deposit, the minimum requirement is taken into account by projecting the salt dome surface 300 m downward.
Section 23 para. 5 no. 4 StandAG. Surface of the repository	Geological 3D model, thematic maps such as facies and distribution maps of stratigraphic units; results of examinations no. 1 to 3	• Maximum expanse of the coherent distribution of the areas created by 2D or 3D processing for the respective rock formation with relevance for a repository site.

Minimum requirement	Data basis	Applied working method
Section 23 para. 5 no. 5 StandAG. Preservation of the barrier effect	Technical literature, data	• Where there is clear evidence or data that the preservation of the barrier effect appears doubtful, the minimum requirement was considered not to have been satisfied.

4.3.4 Application of the minimum requirements – claystone host rock

The following describes how the minimum requirements according to Section 23 para. 5 StandAG are applied to claystone host rock. The supporting document “application of the minimum requirements according to Section 23 StandAG” contains a detailed description of the processing and challenges.

Section 23 para. 5 no. 1 StandAG, hydraulic conductivity of the rock;

The hydraulic conductivity of the rock k_f in an effective containment zone must be less than 10^{-10} m/s; insofar as direct evidence cannot yet be provided in the reasoning of the proposals in accordance with sections 14 and 16, it is necessary to demonstrate that the effective containment zone consists of rock types to which a hydraulic conductivity of less than 10^{-10} m/s can be assigned.

- In the current phase of the site selection procedure, it is assumed that claystone, based on its known properties, possesses an adequately low hydraulic conductivity.

Section 23 para. 5 no. 2 StandAG, thickness of the effective containment zone:

The rock formation that is designated to accommodate the effective containment zone must possess a thickness of at least 100 metres.

- The smallest stratigraphic unit in the 3D geological models provided by the federal government and states – and which are used as the basis for applying the minimum requirement “thickness of the effective containment zone” (Section 23 para. 5 no. 2 StandAG) – is often thicker than the unit that predominantly consists of claystone.
  The entire stratigraphic unit was considered if the claystonesequence that is relevant for the repository site only makes up a part of the considered stratigraphic unit and does not form it completely. It follows, therefore, that the units identified as a relevant sequence also contain rock formations that do not satisfy the minimum requirements. Overall, there are indications that claystone of this stratigraphic unit can be encountered in a sufficient thickness.

Section 23 para. 5 no. 3 StandAG, minimum depth of the effective containment zone:

The surface of an effective containment zone must be at least 300 metres below ground surface. To eliminate the possibility that the integrity of the effective containment zone may be compromised by decompaction if an effective containment zone is to be designated in clay rock, the overburden must be expected to be sufficiently thick even after the aforementioned exogenous processes have occurred.

- A cross-section 300 m below ground surface is created to apply this minimum requirement. Claystone formations whose surface is located below this horizon therefore fulfil this minimum requirement. Areas that extend higher are cut off along this projected horizon.
- Based on the currently available data and the processing detail, it is not possible to answer the question of decompaction caused by exogenous processes at present. As a rule, this minimum requirement is considered satisfied pursuant to Section 23 para. 3 StandAG until such time as relevant data becomes available.

Section 23 para. 5 no. 4 StandAG, area of the repository:

An effective containment zone must have an area expansion that enables construction of the repository.

- StandAG does not indicate any specific surface area for the repository. A area of at least 10 km^2 is specified for claystone in the explanatory memorandum to the draft law (BT-Drs. 18/11398, p. 71). The maximum expansion of the potential host rock is determined using the available 3D geological models or 2D maps. All formations that possess an area of 10 km^2 and more satisfy this minimum requirement.

Section 23 para. 5 no. 5 StandAG, preservation of the barrier effect:

There must not be any available findings or data that cast doubt on the integrity of the effective containment zone, in particular on compliance with the geoscientific minimum requirements for hydraulic conductivity of the rock, thickness and expanse of the effective containment zone over a period of one million years.

- Where there is clear evidence or data that the preservation of the barrier effect appears doubtful, the minimum requirement was considered not to have been satisfied. This minimum requirement is considered satisfied in all other cases, until such time as relevant data becomes available.

4.3.5 Application of the minimum requirements – rock salt host rock

4.3.5.1 Rock salt in a steep deposit

The following describes how the minimum requirements according to Section 23 para. 5 StandAG are applied to rock salt host rock in a steep formation. The supporting document “application of the minimum requirements according to Section 23 StandAG” contains a detailed description of the processing and challenges.

Section 23 para. 5 no. 1 StandAG, hydraulic conductivity of the rock;

The hydraulic conductivity of the rock k_f in an effective containment zone must be less than 10^{-10} m/s; insofar as direct evidence cannot yet be provided in the reasoning of the proposals in accordance with sections 14 and 16, it is necessary to demonstrate that the effective containment zone consists of rock types to which a hydraulic conductivity of less than 10^{-10} m/s can be assigned; satisfaction of the criteria can also be demonstrated based on the layers overlying the storage area.

- In regard to rock salt host rock, the BGE assumes that the known properties of rock salt guarantee an adequately low hydraulic conductivity of the rock.

Section 23 para. 5 no. 2 StandAG, thickness of the effective containment zone:

The rock formation that is designated to accommodate the effective containment zone must possess a thickness of at least 100 metres.

At the current stage of the procedure, this minimum requirement is deemed to be satisfied by all steep salt structures that possess a thickness of at least 100 m.

Section 23 para. 5 no. 3 StandAG, minimum depth of the effective containment zone:

The surface of an effective containment zone must be at least 300 metres below ground surface. If an effective containment zone is to be designated in a steep deposit of rock salt, the Salzschwebe above the effective containment zone must possess a thickness of at least 300 metres.

The application of this minimum requirement is divided into the following three work steps:

- The maximum search depth for rock salt is also set at 1,500 m. Therefore, a cut-off point is first placed at a search depth of 1,500 m or at the base of the zechstein (if it was shallower than 1,500 m).
- The maximum depth is 300 m below ground surface. A second cut-off point is therefore placed at a depth of 300 m.
- In addition, a Salzschwebe of at least 300 m above the effective containment zone must also be maintained for rock salt in a steep deposit in order to meet this minimum requirement. This applies irrespective of whether the culmination of the salt dome is above or below the minimum depth of 300 m.

Section 23 para. 5 no. 4 StandAG, area of the repository:

An effective containment zone must have an area expansion that enables construction of the repository.

- StandAG does not indicate any specific area for the repository. As a precautionary measure, an area of at least 3 km^2 is specified for salt host rock in the explanatory memorandum to the draft law (BT-Drs. 18/11398, p. 71). The maximum expansion of the potential host rock is calculated using the available 3D geological models in a depth range of 300 m to 1,500 m and then projected to the surface. All structures with a surface area of 3 km^2 and more therefore meet the minimum requirement.

Section 23 para. 5 no. 5 StandAG, preservation of the barrier effect:

There must not be any available findings or data that cast doubt on the integrity of the effective containment zone, in particular on compliance with the geoscientific minimum requirements for hydraulic conductivity of the rock, thickness and expanse of the effective containment zone over a period of one million years.

- Where there is clear evidence or data that the preservation of the barrier effect appears doubtful, the minimum requirement was considered not to have been satisfied. This minimum requirement is considered satisfied in all other cases, until such time as relevant data becomes available.

4.3.5.2 Rock salt in a stratiform deposit

The following describes how the minimum requirements according to Section 23 para. 5 StandAG are applied to rock salt host rock in a stratiform formation. The supporting document “application of the minimum requirements according to Section 23 StandAG” contains a detailed description of the processing and challenges.

Section 23 para. 5 no. 1 StandAG, hydraulic conductivity of the rock;

The hydraulic conductivity of the rock k_f in an effective containment zone must be less than 10^{-10} m/s; insofar as direct evidence cannot yet be provided in the reasoning of the proposals in accordance with sections 14 and 16, it is necessary to demonstrate that the effective containment zone consists of rock types to which a hydraulic conductivity of less than 10^{-10} m/s can be assigned; satisfaction of the criteria can also be demonstrated based on the layers overlying the storage area.

- In regard to rock salt host rock, the BGE assumes that the known properties of rock salt guarantee an adequately low hydraulic conductivity of the rock.

Section 23 para. 5 no. 2 StandAG, thickness of the effective containment zone:

The rock formation that is designated to accommodate the effective containment zone must possess a thickness of at least 100 metres.

- The smallest stratigraphic unit in the 3D geological models provided by the federal government and states – and which are used as the basis for applying the minimum requirement "thickness of the effective containment zone" (Section 23 para. 5 no. 2 StandAG) – is often larger than the unit in which the host rock formation is located. As a result, it is possible that the actual host rock formation may no longer possess the necessary thickness and that identified areas may be determined that do not consistently satisfy this minimum requirement.
  In order to continue narrowing down these areas, or if no 3D models are available, thematic maps, e.g. paleo-geographic maps and thickness maps, are used to show the distribution and/or thickness of the salt formations. Furthermore, information from boreholes are mainly used as evidence that the minimum requirement is satisfied.
  This minimum requirement is deemed satisfied if 3D models, thematic maps or boreholes indicate a minimum thickness of 100 m.

Section 23 para. 5 no. 3 StandAG, minimum depth of the effective containment zone:

The surface of an effective containment zone must be at least 300 metres below ground surface.

- A cross-section 300 m below ground surface is created to apply this minimum requirement. Stratiform rock salt formations, whose surface is located below this horizon, therefore fulfil this minimum requirement. Areas that extend higher are cut off along this projected horizon.

Section 23 para. 5 no. 4 StandAG, area of the repository:

An effective containment zone must have an area expansion that enables construction of the repository.

- StandAG does not indicate any specific area for the repository. An area of at least 3 km^2 is specified for salt host rock in the explanatory memorandum to the draft law (BT-Drs. 18/11398, p. 71). The maximum expansion of the potential host rock is calculated using the available 3D geological models in a depth range of 300 m to 1,500 m and then projected to the surface. All structures with a surface area of 3 km^2 and more therefore meet the minimum requirement.

Section 23 para. 5 no. 5 StandAG, preservation of the barrier effect:

There must not be any available findings or data that cast doubt on the integrity of the effective containment zone, in particular on compliance with the geoscientific minimum requirements for hydraulic conductivity of the rock, thickness and expanse of the effective containment zone over a period of one million years.

- Where there is clear evidence or data that the preservation of the barrier effect appears doubtful, the minimum requirement was considered not to have been satisfied. This minimum requirement is considered satisfied in all other cases, until such time as relevant data becomes available.

4.3.6 Application of the minimum requirements – crystalline host rock

The following describes how the minimum requirements according to Section 23 para. 5 StandAG are applied to crystalline host rock. The supporting document "application of the minimum requirements according to Section 23 StandAG" contains a detailed description of the processing and challenges. Within the framework of applying the minimum requirements, Section 23 para. 1 s. 2 StandAG states in regard to crystalline host rock, that for crystalline host rock, an alternative concept to an effective containment zone that places significantly higher demands in the long-term integrity of the container is possible under the conditions of safe containment stipulated under para. 4.

Section 23 para. 4 StandAG states that where it is foreseeable that an effective containment zone cannot be designated in an area that nevertheless is suitable for a repository system based essentially on technical or geotechnical barriers, evidence must be provided instead of the minimum requirement under paragraph 5 number 1 that the technical and geotechnical barriers can ensure the safe containment of radionuclides for one million years. The evidence must be provided at the latest in the reasoning for the proposal according to Section 18 para. 3. In this case, the minimum requirements set out in numbers 2 to 5 of paragraph 5 apply mutatis mutandis to the storage area.

This means that the minimum requirements according to Section 23 para. 5 nos. 2 to 5 StandAG must be applied, whereas – according to Section 23 para. 5 no. 1 StandAG – safety considerations can be dealt with by means of technical and geotechnical barriers for repositories in crystalline host rocks without effective containment zones. Section 23 para. 5 no. 1 StandAG states furthermore that a hydraulic conductivity of the rock of k_f less than 10^{-10} m/s can also be demonstrated by the layers overlying the storage area. The effective containment zone is formed by the layers overlying the storage area in this case.

In total, the following repository concepts apply to crystalline host rock:

1. The crystalline rock forms the storage area and the effective containment zone.
2. The crystalline rock forms the storage area, while technical and geotechnical barriers create the effective containment zone.

3. The crystalline rock forms the storage area, while the effective containment zone is formed by the layers overlying the crystalline rock.

These feasible repository concepts for crystalline host rock place different demands on the geological situation and rock properties, as well as on the technical and geotechnical barriers.

In areas with crystalline host rock, a distinction is not made between the repository concepts listed above during application of the minimum requirements for the identification of sub-areas pursuant to Section 13 StandAG. It follows, therefore, that – within the framework of Section 13 StandAG – areas in crystalline host rock are being sought that satisfy the minimum requirements according to Section 23 para. 5 no. 2 to 5 StandAG. In accordance with the legal specifications, the minimum requirement "hydraulic conductivity of the rock", Section 23 para. 5 no. 1 StandAG, is not applied, as a differentiation between the various conceivable repository concepts for crystalline host rock does not make sense, given the current level of detail.

Section 23 para. 5 no. 2 StandAG, thickness of the effective containment zone:

The rock formation that will accommodate the effective containment zone must possess a thickness of at least 100 metres; in the case of host rock bodies containing crystalline material of lesser thickness, proof of safe containment for the affected rock section may also be provided by the interaction between the host rock and geotechnical and technical barriers in the presence of low hydraulic conductivity; a subdivision into several such rock sections within one repository system is permissible.

- A thickness of at least 200 m for a repository in crystalline host rock is specified in accordance with the expert report "Surface requirements for a repository for heat-generating high-level radioactive waste" by DBE TEC (2016). This includes the necessary buffer zone for construction of a repository, which must ensure adherence to the buffer zone in both a horizontal and vertical direction.
- The depth and surface morphology of crystalline host rock formations are largely known. In Germany, crystalline rock units usually form the bedrock with unknown depth.
- The minimum requirement is satisfied if the thickness of 200 m assumed above is reached.

Section 23 para. 5 no. 3 StandAG, minimum depth:

The surface of an effective containment zone must be at least 300 metres below ground surface.

- A cut-off point 300 m below ground surface is placed to apply this minimum requirement. This minimum requirement is satisfied if crystalline host rock is found at depths of under 300 m.

Section 23 para. 5 no. 4 StandAG, area of the repository:

An effective containment zone must have an area expansion that enables construction of the repository.

- StandAG does not indicate any specific area for the repository. An area of at least 6 km^2 is specified for crystalline host rock in the explanatory memorandum to the draft law (BT-Drs. 18/11398, p. 71). The maximum expansion of the potential host rock is determined using the available 3D geological models on the basis of the thickness of 200 m as assumed above. All rock formations with a surface area of 6 km^2 and more therefore meet this minimum requirement.

Section 23 para. 5 no. 5 StandAG, preservation of the barrier effect:

There must not be any available findings or data that cast doubt on the integrity of the effective containment zone, in particular on compliance with the geoscientific minimum requirements for hydraulic conductivity of the rock, thickness and expanse of the effective containment zone over a period of one million years.

- Where there is clear evidence or data that the preservation of the barrier effect appears doubtful, the minimum requirement was considered not to have been satisfied. This minimum requirement is considered satisfied in all other cases, until such time as relevant data becomes available.

4.3.7 Identified areas within the framework of Section 13 StandAG

After application of the exclusion criteria, the minimum requirements are applied to the remaining areas with host rock formations in the subsurface that are relevant for repository sites. As a result of the application of the minimum requirements there are identified areas that meet the minimum requirements. A further step involves applying the geoscientific weighing criteria to determine the sub-areas among these identified areas.

As a result of applying the minimum requirements pursuant to Section 23 StandAG, a total of 181 identified areas were determined under Section 13 StandAG (cf. Tabelle 4, Figure 30); they possess an aggregate surface area of approx. 248,470 km². These identified areas extend across the entire territory of the Federal Republic of Germany. They overlap in places and cover an area of around 197,486 km² in Germany.

Tabelle 4: Number and surface area of the identified areas

Host rock	**Number Identified areas**	**Surface (km²)**
Claystone	**12**	**131,094**
Rock salt, of which		
• stratiform formations:	23	32,104
• steep formations:	139	4,486
Rock salt, total	**162**	**36,590**
Crystalline host rock	**7**	**80,786**
Identified areas, total:	**181**	**248,470**

For claystone host rock, a total of twelve identified areas have been determined through application of the minimum requirements under Section 23 StandAG within the framework of Section 13 StandAG. The total surface area of identified areas in claystone is approx. 131,094 km². These are spread over several federal states and are located in geologically different units, which means that they overlap in places geographically. The identified areas in claystone host rock are shown in Figure 31.

In regard to the application of the minimum requirements pursuant to Section 23 StandAG, a total of 23 identified areas have been determined for the host rock stratiform rock salt, while a total of 139 identified areas have been identified for rock salt in steep deposits. The total surface area of identified areas in stratiform rock salt is approx. 32,104 km². These are spread over several federal states and are located in geologically different units, which means that they overlap in places geographically. The total surface area of the identified areas in the host rock configuration of rock salt in steep deposits is approx. 4,486 m². They are predominantly located in north Germany and spread southwards until south of Berlin. The identified areas in rock salt host rock are shown in Figure 32.

Seven identified areas with a total area of approx. 80,786 km^2 have been determined for crystalline host rock within the framework of Section 13 StandAG, based on the methodical application of the minimum requirements as described above. These are largely crystalline complexes belonging to the Variscan orogeny. The identified areas in crystalline host rock are shown in Figure 33.

Within the framework of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany could be assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG). A presentation of these areas and a recommendation for further action in this regard are therefore unnecessary.

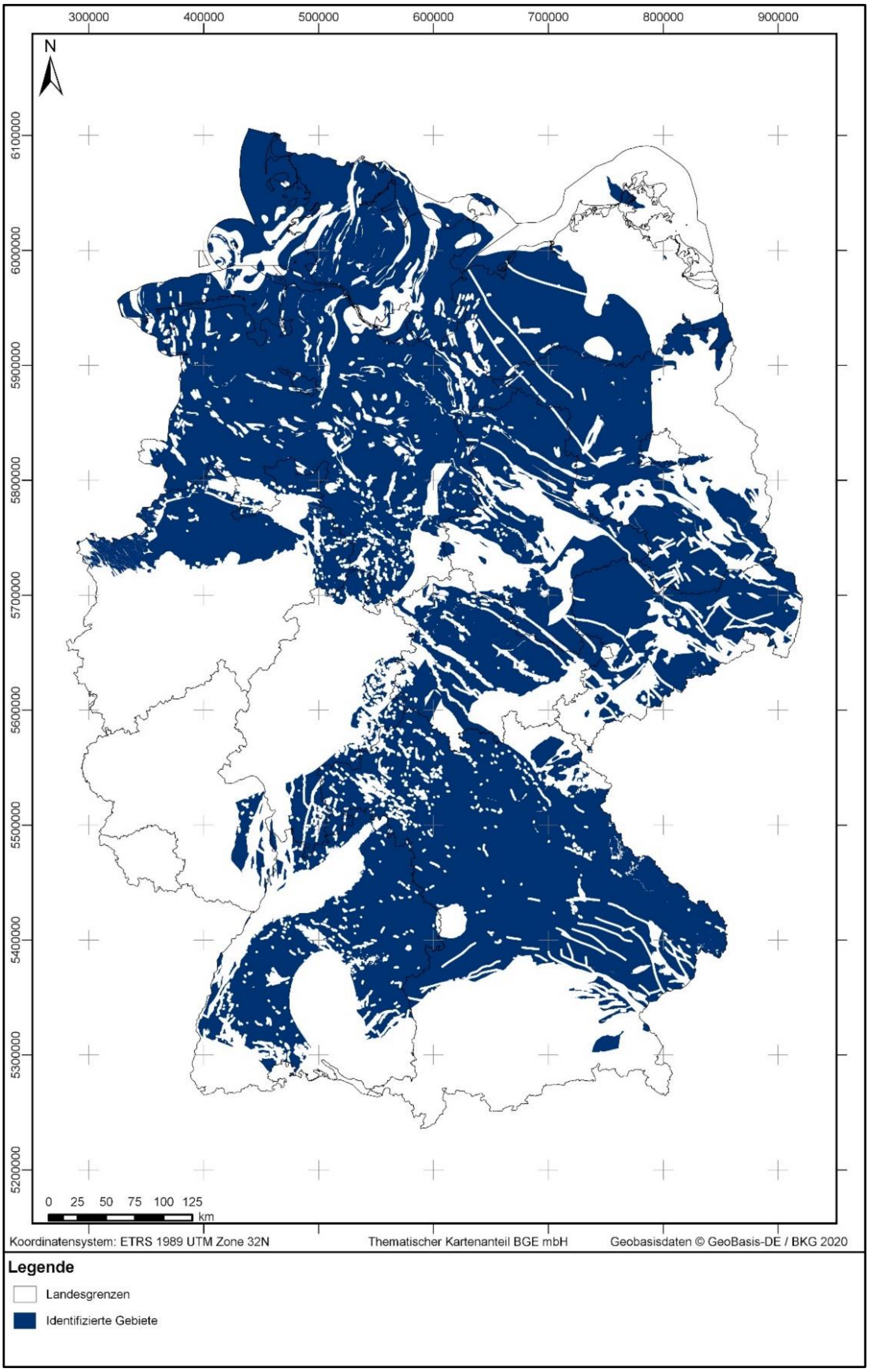

Figure 30: *Overview map of the identified areas.*
The identified areas were determined based on stratigraphic units, which is why several identified areas occasionally overlap.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Identifizierte Gebiete = Identified areas.

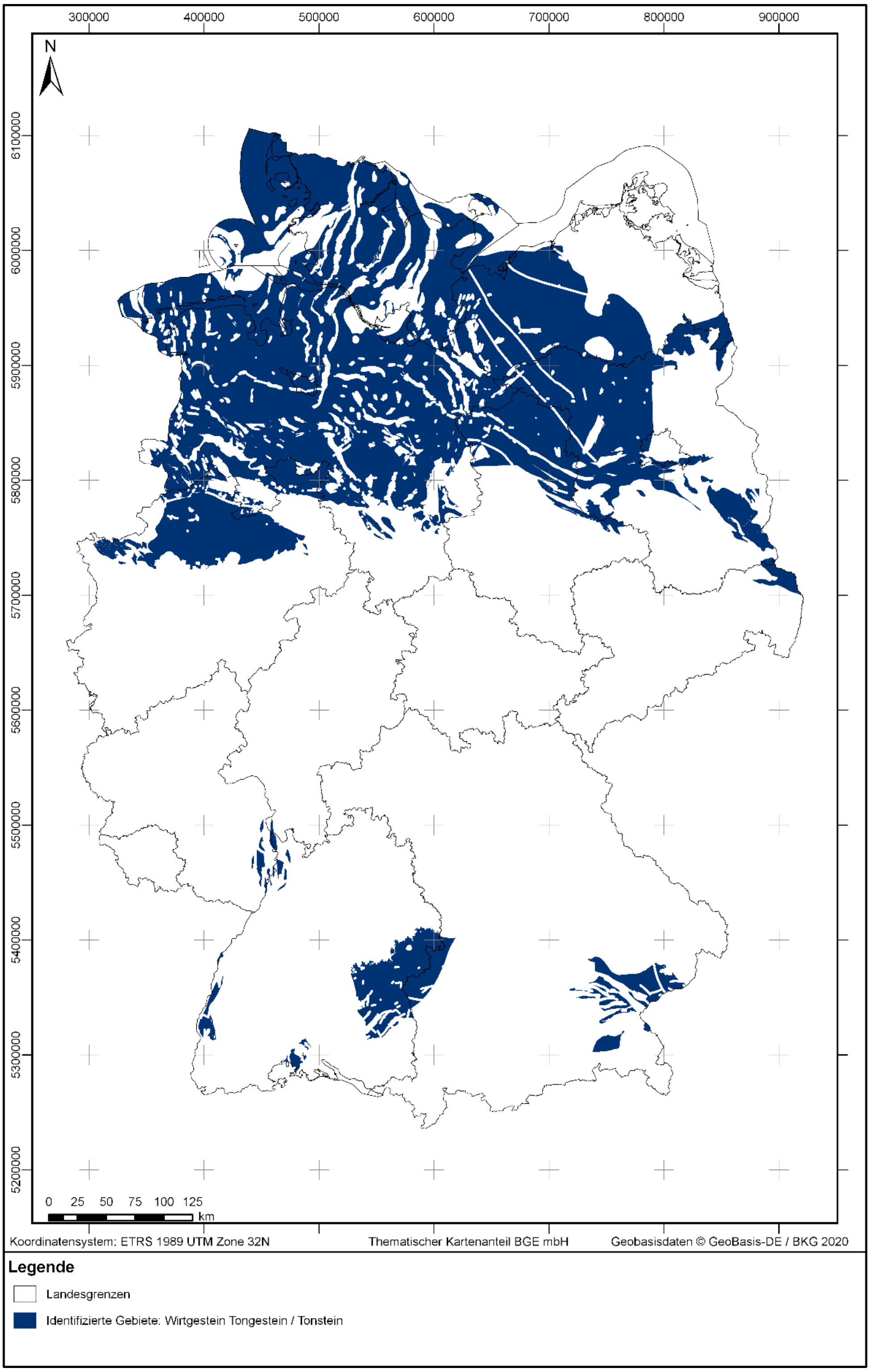

Figure 31: *Overview map of the identified areas in claystone host rock. The identified areas were determined based on stratigraphic units, which is why several identified areas occasionally overlap. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Identifizierte Gebiete: Wirtsgestein Tongestein / Tonstein = Identified areas: Host rock claystone / clay rock.*

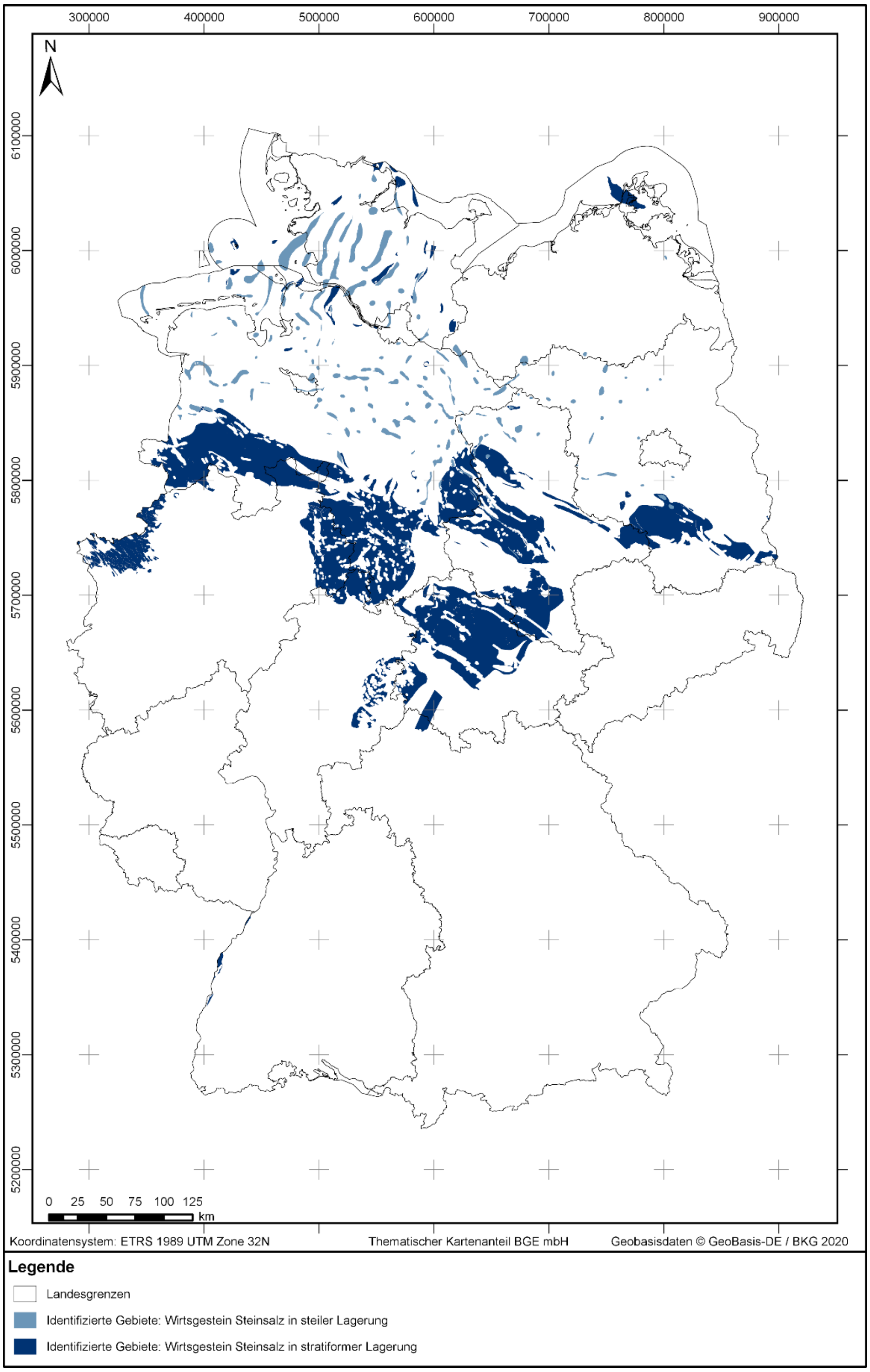

Figure 32: *Overview map of the identified areas in rock salt host rock. Several identified areas in stratiform rock salt overlap in places, as they were designated separately according to stratigraphic units. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Identifizierte Gebiete: Wirtsgestein Steinsalz in steiler Lagerung = Identified areas: Host rock rock salt in steep formations; Identifizierte Gebiete: Wirtsgestein Steinsalz in stratiformer Lagerung = Identified areas: Host rock rock salt in stratiform formations.*

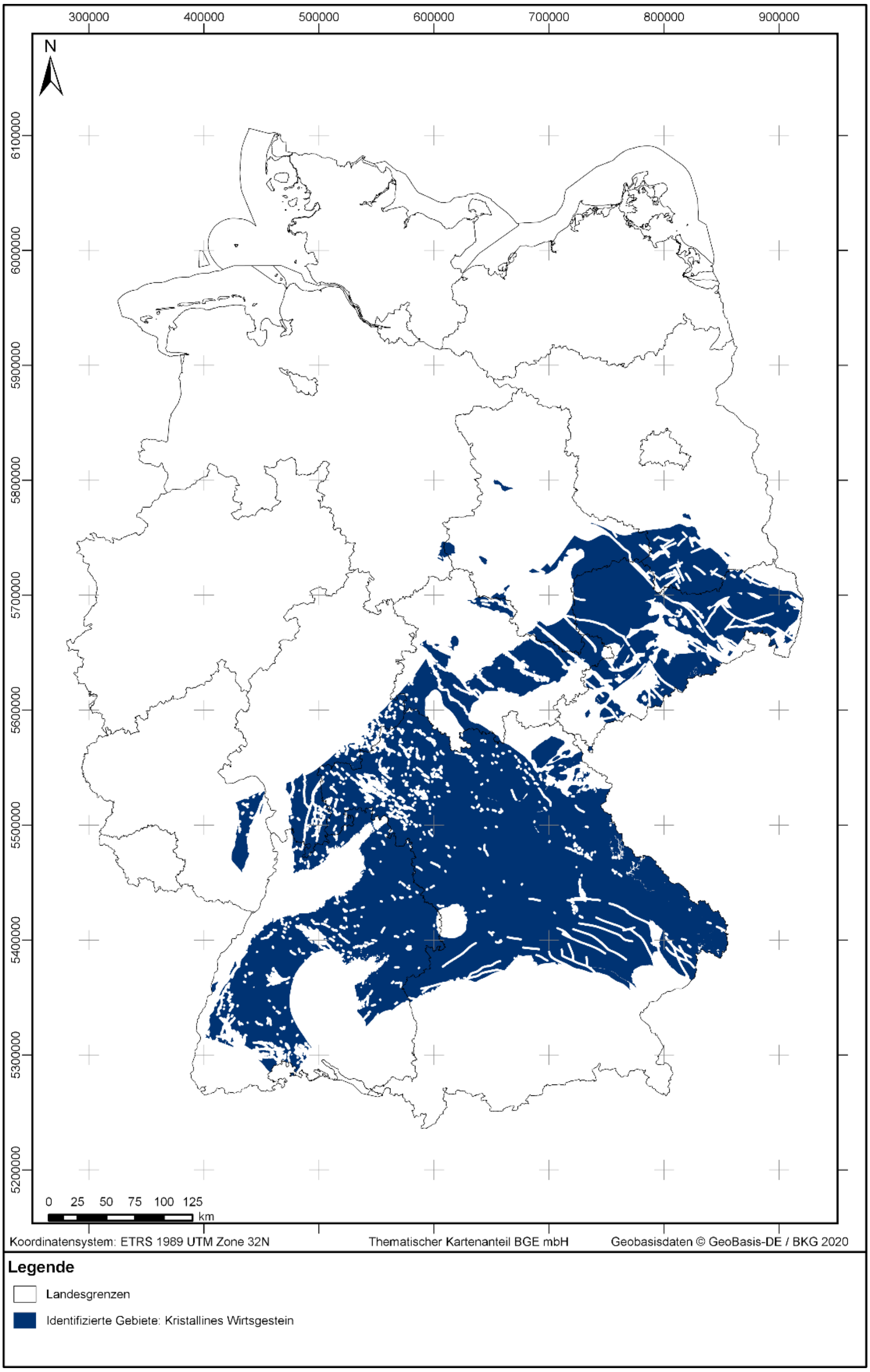

Figure 33: Overview map of the identified areas in crystalline host rock on the territory of the Federal Republic of Germany.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Identifizierte Gebiete: Kristallines Wirtsgestein = Identified areas: crystalline host rock.

4.4 Geoscientific weighing criteria pursuant to Section 24 StandAG

In the final step of work to identify sub-areas – after applying the exclusion criteria (Section 22 StandAG) and the minimum requirements (Section 23 StandAG) – the BGE applies the geoscientific weighing criteria to the 181 identified areas in accordance with Section 24 StandAG. As the outcome of this application, the BGE identifies sub-areas where favourable geological conditions can be expected for the safe final disposal of radioactive waste (Section 13 para. 1 StandAG).

The purpose of applying the geoscientific weighing criteria is to enable comparative evaluation [of the previously identified areas] in regard to their suitability as repository sites. For this purpose, it is necessary to determine during a process of verbal argumentation which identified areas possess a favourable overall geological situation for the safety of the repository site (K-Drs. 268). According to Section 24 para. 1 StandAG, the favourable overall geological situation is determined after a process of weighing the results with reference to all weighing criteria. The criteria listed in Section 24 para. 3 to 5 StandAG, which are described in Annexes 1 to 11 (to Section 24), are used as evaluation benchmarks.

In regard to the special case of crystalline host rock described in Section 23 para. 1 s. 2 StandAG, a mathematical calculation of the probable containment capacity of the technical and geotechnical barriers must be carried out according to Section 24 para. 2 Stand AG, instead of applying the criterion in Annex 2 (to Section 24 StandAG). Pursuant to Section 24 para. 2 StandAG, the geoscientific weighing criteria set out in Annexes 1 and 3 to 11 (to Section 24) StandAG that relate to the effective containment zone, are applied to the corresponding storage area in this special case. The generic repository concepts from BGE (2020am) were taken into consideration in the application of the geoscientific weighing criteria.

The annexes to Section 24 StandAG provide eleven criteria with their characteristics that are relevant to evaluation, the evaluation parameters or indicators for the criteria and the respective evaluation groups. The standard term “indicator” will be used in the following instead of the terms “evaluation-relevant property of the criterion” and “evaluation factor, i.e. criterion indicator”, which are mentioned in Annexes 1 to 11 (to Section 24) StandAG. The indicators are classified based on rating groups, which – with the exception of three criteria – are divided into the groups “favourable”, “conditionally favourable” or “less favourable”. The exceptions here are the criteria for Annexes 3, 4 and 11 (to Section 24) StandAG; in their case, the rating group “less favourable” is replaced by the rating group “unfavourable”. The only rating group for the indicators in criteria 5, 8 and 10, in places also 9, of the annexes (to Section 24) StandAG is “favourable”. Qualitative descriptions or numerical values are provided for the rating groups in order to classify the individual indicator. StandAG leaves it at the discretion of the Waste Management Organisation to determine how the overall evaluation of the respective criteria should ultimately be obtained after classification of the indicators in the respective rating groups. The summarised evaluation of each identified area is produced by weighing up the results of all weighing criteria (Section 24 para. 1 s. 2 StandAG). In this regard, no single weighing criterion is sufficient to prove or exclude a favourable overall geological situation (BT-Drs. 18/11398, p. 71).

The contents described in the following chapters 4.4.1 to 4.4.5 summarise the supporting documents BGE (2020k).

4.4.1 Data basis

Application of the geoscientific weighing criteria pursuant to Section 24 StandAG in Step 1, Phase I (Section 13 StandAG) of the site selection procedure takes place on the basis of the geological data provided by the competent federal and state authorities pursuant to Section 12 para 3 StandAG, as is the case when applying the exclusion criteria (Section 22 StandAG) and the minimum requirements (Section 23 StandAG). For evaluation of the eleven criteria (Annexes 1 to 11 (to Section 24) StandAG), the indicators can either be evaluated directly or must be derived from geological data.

Data obtained from queries concerning the exclusion criteria and the minimum requirements was used for application of the geoscientific weighing criteria according to Section 13 StandAG.

In addition, another data query concerning the geoscientific weighing criteria was sent to the federal and state authorities in 2019. In addition to information on faults, the query referred to geomechanical properties, thermal properties of the host rocks and hydrochemical properties of the deep waters. During 2020, there were enquiries concerning data from the 2019 query, as well as further enquiries, e.g. on the internal construction (arrangement of structures and layers within a salt dome) of double saliferous strata or erosion structures.

To a large extent, application of the geoscientific weighing criteria refers to a storage area and effective containment zone that are unknown at this point in the site selection procedure. This meant that targeted queries referring to specific regions were not yet possible for all of Germany.

The results of the data review showed that, as expected, only some of the data required for application of the geoscientific weighing criteria is available in this early phase of the site selection procedure. The data obtained from the 2019 sampling concerning the faults and the information provided in 2020 in response to requests form a basis for the current application of the geoscientific weighing criteria.

Moreover, the data processed during determination of the identified areas, e.g.

- the surface areas of the identified areas as 2D polygons (including, if available, information on the respective thickness and depth) and
- the modelling protocols (BGE 2020j, 2020l) for specific federal states and across state boundaries, were used in order to apply the geoscientific weighing criteria.

The modelling protocols (BGE 2020j, 2020l) document the exact procedure for applying the minimum requirements in accordance with Section 23 StandAG and hence contain important information for application of the geoscientific weighing criteria. Detailed information on the individual data queries and data deliveries, which took place within the framework of Section 13 StandAG, is found in the supporting documents BGE (2020i) and BGE (2020l).

The datasets and knowledge of the investigated areas will grow with the acquisition of fresh insight over the course of the staggered site selection procedure. This will enable a further narrowing down of the areas as the site selection procedure moves forward. The BGE is tasked with submitting a proposal to the BASE at the end of Phase III (Section 18 para. 3 StandAG).

In some cases, suitable assumptions are made based on current knowledge in order to apply the geoscientific weighing criteria according to Section 13 StandAG. The gap between the available site-specific data and the data required for evaluation of the eleven criteria contained in the annexes (to Section 24) StandAG is closed using reference datasets for each specific host rock (BGE 2020b). This means that substantiated values contained in scientific literature for the corresponding reference datasets can be used for evaluation of the eleven criteria and their indicators if no or insufficient information is available on specific areas. This guarantees the weighing up of results for all eleven criteria, as stipulated in Section 24 para. 1 p. 2 StandAG. As the site selection procedure moves forward and more knowledge is acquired, the assumptions in the corresponding reference datasets can be successively replaced with information relating to specific areas.

Within the framework of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany could be assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG).

4.4.2 Application method

As described earlier in Chapter 4.4.1, detailed information for the specific areas is required for application of the geoscientific weighing criteria. This kind of information on specific areas is not available at the current stage of the site selection procedure, which is why the BGE prepared reference datasets for application of the geoscientific weighing criteria within the framework of Section 13 StandAG (BGE 2020b). These reference datasets contain host rock-specific compilations of literature values for the properties required in order to evaluate the indicators; they therefore enable an evaluation of the respective criteria and indicators set out in the individual annexes (to Section 24) StandAG (cf. Table 5).

Figure 34 provides a schematic overview of the procedure for applying the geoscientific weighing criteria. It indicates that the following takes place for each identified area:

1) an evaluation of the indicators on the basis of the evaluation groups according to the criteria/Annexes 1 to 11 (to Section 24) StandAG (cf. Chapter 4.4.3)

2) an evaluation of the criteria in Annexes 1 to 11 (to Section 24) StandAG on the basis of the indicator ratings (cf. Chapter 4.4.3)
3) a summarised evaluation for each identified area (cf. Chapter 4.4.4) and determination of the results of the geoscientific weighing criteria (cf. Chapter 4.4.4)

Based on this summarised evaluation, identified areas are designated sub-areas if they can be expected to possess a favourable overall geological situation for the final disposal of radioactive waste.

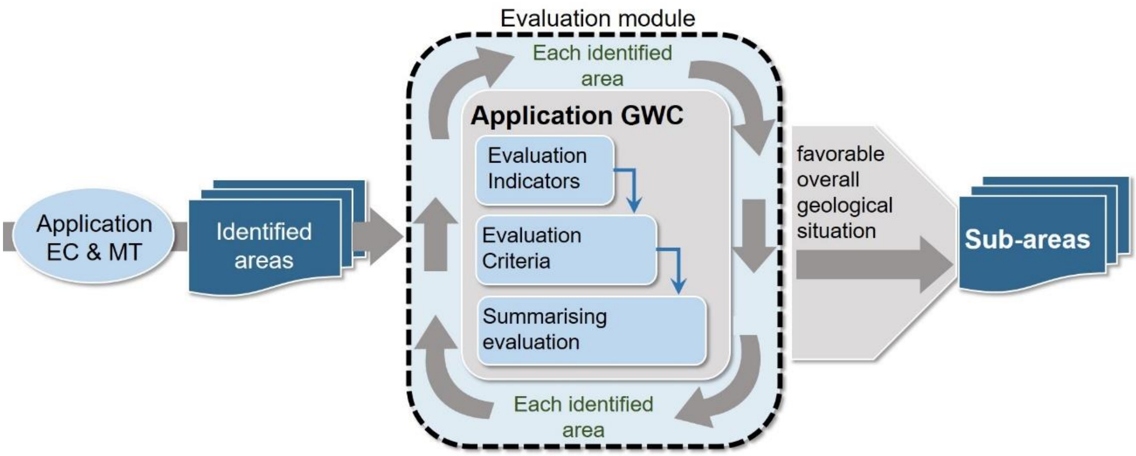

Figure 34: Procedure for applying the geoscientific weighing criteria (Section 24 StandAG) in order to determine the sub-areas based on the identified areas (Section 13 StandAG)

The application of the geoscientific assessment criteria – or in other words, the evaluation process for each identified area – is carried out using the specially developed evaluation module. This evaluation module provides the BGE experts with interactive assistance and guides them through the evaluation process. An application guide (BGE 2020a) provides BGE experts with detailed instructions on precise handling of the evaluation module and the evaluation process for each indicator, each criterion and the summarised evaluation. The evaluation module and application guide (BGE 2020a) ensure that the process of evaluating the identified areas adheres to the same scheme and the same scale of evaluation, thereby improving objectivity and achieving the maximum comparability of results. Furthermore, the evaluation module enables comprehensive documentation of the individual evaluation steps and in doing so actively contributes to the principle of transparency within the site selection procedure according to Section 1 para. 2 s. 1 StandAG.

The identified areas are classified as “favourable”, “less favourable” or “unfavourable” areas. The geoscientific weighing criteria evaluate the totality of each identified area.

In this regard, application of the geoscientific weighing criteria for identification of sub-areas pursuant to Section 13 StandAG adheres to the following application principles:

- In order to ensure a standardised approach, the evaluation is performed by the same BGE expert on a certain number of indicators for all identified areas with one host rock.
- The geoscientific data provided by the responsible federal and state authorities on the basis of Section 12 para. 3 StandAG, data processed by the BGE, reference datasets based on literature and reference works are used as the evaluation basis for the identified areas.
- According to Section 24 para. 1 S. 2 StandAG, the favourable overall geological situation is determined after a process of weighing the results with reference to all weighing criteria. In the current stage of the procedure, this work is to be carried out with reference datasets for the individual host rocks[1] (BGE 2020b) if data relating to the specific area is not available. The reference data is selected in such a way that they are in the upper range[2] of the host rock's physically possible capacities. In this context, the upper range means that known, very favourable properties are assumed for the individual host rock. This ensures that an evaluation carried out in Phase I, Step 1 of the site selection procedure will not be improved by an influx of information in subsequent phases and instead will merely remain the same or deteriorate.
- All evaluations are substantiated during verbal discussions. The reasoning applied must take all of the used sources into account.
- StandAG only defines the rating group "favourable" for the indicators in Annexes 5, 8 and 10 and partly Annex 9 (to Section 24) StandAG. These indicators are therefore evaluated using the rating groups of "favourable" and "not favourable"[3].
- The rating group "unfavourable" in StandAG appears in this form in the evaluation, but is equated with the rating group "less favourable" during evaluation of the criteria.

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[1] The RESUS project (Mönig et al. 2020) used current knowledge to specify which assignments of the individual indicators to the rating groups stipulated by StandAG should be expected for the host rocks in question. These indications were discussed by the BGE while preparing the reference datasets and taken into account where appropriate.

[2] The upper range does not mean a maximum value, rather a value in the 75 to 90 percentile bracket in regard to the physical properties.

[3] "Favourable" means that the condition defined in the relevant annex is satisfied. "Not favourable" means that this condition has not been met; this should not be confused with "unfavourable".

- In most cases, the indicators for the geoscientific weighing criteria refer to the effective containment zone or the storage area. The spatial extent of the effective containment zone will not be derived by model calculations until during the preliminary safety assessments and as a result of the explorations. The evaluation therefore refers to a rock formation that would be able to accommodate an effective containment zone or a storage area, until such time as they have been specified. It follows, therefore, that at this stage of the procedure, the indicators for the identified areas are evaluated on the basis of the respective rock sequence or formation that is relevant for a repository site and that are designated during application of the minimum requirements.

As a rule, the geoscientific weighing criteria are applied according to the same principles in later stages of the site selection procedure. However, as knowledge of the specific area accumulates, the data basis with regard to quantity and quality will improve and therefore the number of criteria or annexes (to Section 24) StandAG that can be evaluated on an area-specific basis will increase. Even the application method for the geoscientific weighing criteria can continue to develop as the procedure progresses and along the lines of a learning process.

4.4.3 Evaluation of the indicators and criteria

Application of the geoscientific weighing criteria is based on both site-specific data and on assumptions using the reference datasets for particular host rocks (BGE 2020b). The following chapters 4.4.3.1 to 4.4.3.11 describe the respective procedure and data basis to apply the geoscientific weighing criteria within the framework of Section 13 StandAG for each criterion according to Section 24 StandAG and each host rock configuration.

Table 5: Overview of the procedure for each criterion, including the corresponding indicators (Annex to Section 24 StandAG), and for each host rock configuration

Annex to Section 24 StandAG	Procedure for host rock salt in a steep deposit	Procedure for crystalline host rock	Procedure for claystone host rock and stratiform rock salt
Annex 1 (to Section 24 para. 3) Criterion for evaluating the transport of radioactive substances by groundwater movements in the effective containment zone	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock
Annex 2 (to Section 24 para. 3)	individual evaluation based on area-specific data	individual evaluation based on area-specific data	individual evaluation based on area-specific data

Annex to Section 24 StandAG	Procedure for host rock salt in a steep deposit	Procedure for crystalline host rock	Procedure for claystone host rock and strati-form rock salt
Criterion for evaluation of the rock formation configu-ration			
Annex 3 (to Section 24 para. 3) Criterion for evaluation of the spatial characterisabil-ity	individual evaluation based on area-spe-cific data	Reference dataset for crystalline host rock	individual evaluation based on area-spe-cific data
Annex 4 (to Section 24 para. 3) Criterion for evaluation of the long-term stability of the favourable conditions	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	individual evaluation based on area-spe-cific data
Annex 5 (to Section 24 para. 4) Criterion for evaluation of the long-term stability of the favourable geome-chanical characteristics	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock
Annex 6 (to Section 24 para. 4) Criterion for evaluation of the tendency to form fluid pathways	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock
Annex 7 (to Section 24 para. 5) Criterion for evaluation of gas formation	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock
Annex 8 (to Section 24 para. 5) Criterion for evaluation of the temperature compati-bility	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock
Annex 9 (to Section 24 para. 5)	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock

Annex to Section 24 StandAG	Procedure for host rock salt in a steep deposit	Procedure for crystalline host rock	Procedure for claystone host rock and strati-form rock salt
Criterion for evaluating the retention capacity in the effective containment zone			
Annex 10 (to Section 24 para. 5) Criterion for evaluation of the hydrochemical circum-stances	Reference dataset for rock salt host rock	Reference dataset for crystalline host rock	Reference dataset for claystone host rock and rock salt host rock
Annex 11 (to Section 24 para. 5) Criterion for evaluation of protection of the effective containment zone by the overburden	individual evaluation based on area-spe-cific data	individual evaluation based on area-spe-cific data	individual evaluation based on area-spe-cific data

An evaluation of the criteria in Annexes 2 and 11 (to Section 24) StandAG is always car-ried out individually on the basis of area-specific data.

With the exception of the identified areas in crystalline host rock, an individual evaluation can also be carried out based on definite site-specific data for the criterion specified in Annex 3 (to Section 24) StandAG. In regard to the criterion in Annex 4 (to Section 24) StandAG, an individual evaluation is performed in the claystone host rock and in the stratiform rock salt host rock configuration on the basis of area-specific data for the iden-tified areas.

According to Section 24 para. 1 StandAG, the favourable overall geological situation is determined after a process of weighing the results with reference to all weighing criteria. Accordingly, corresponding evaluations must be prepared for each of the eleven criteria set out in Annexes 1 to 11 (to Section 24) StandAG before a summarised evaluation of all eleven criteria for each of the identified areas is performed, including a verbal delib-eration to weigh up the criteria. The verbal deliberation takes place on the basis of geo-scientific arguments. This forms the basis for both the final evaluation of each criterion (Annexes (to Section 24) of the StandAG) and for the summarised evaluation, which is the product of applying the geoscientific weighing criteria to each identified area. The outcome of this process is that each identified area is rated either “favourable” or “not favourable” in regard to the geological overall situation. Pursuant to Section 13 StandAG, the areas that were designated as having a favourable overall geological situation in the final summarised evaluation of the geoscientific weighing process were designated as sub-areas.

The individual methods for evaluating the criteria, their indicators and the preparation of the summarised evaluation are explained below, based on the individual annexes (to Section 24) StandAG. Detailed information on the methodology are contained in BGE (2020a). BGE (2020k) contains further information on the implementation. The bases of the reference datasets and the compilation of values from literary sources are described in BGE (2020b). Reasons for evaluations that took place on the basis of these reference datasets are provided in BGE (2020k).

4.4.3.1 Annex 1 (to Section 24 para. 3) StandAG

Annex 1 (to Section 24 para. 3) StandAG deals with "the criterion for evaluating the transport of radioactive substances by groundwater movements in the effective containment zone", which is assigned five indicators by the StandAG; refer to the excerpt from the StandAG in Annex 1. Evaluations of the indicators and the criterion as a whole are based on the reference datasets that are specific to the host rocks (cf. BGE 2020b, 2020k).

4.4.3.2 Annex 2 (to Section 24 para. 3) StandAG

Annex 2 (to Section 24 para. 3) StandAG deals with "the criterion for evaluating the rock formation configuration", which is assigned five indicators for claystone[4] by the StandAG and four indicators for other host rocks; refer to the excerpt from the StandAG in Annex 1. The processed data from application of the exclusion criteria and minimum requirements pursuant to sections 22, 23 StandAG was used to evaluate the indicators.

In total, it was possible to add area-specific data to three of the four indicators for this criterion (three of the five for clay host rock).

Figure 35 is a diagram of the corresponding indicators for "barrier thickness [m]", "depth of the upper boundary of the required effective containment zone [m below ground surface]" and "surface extent for the given thickness (multiple of the minimum area required)". Evaluation of these indicators was based on information from the modelling protocols (BGE 2020j, 2020l), the geomodels and the information exported from them concerning the thickness and depth of the matching identified areas and the surface areas in ArcGIS.

[4] StandAG states that the *"head source"* indicator must be applied to clay rock (cf. Annex 2 (to Section 24 para. 3) StandAG). It is assumed that the indicator must be applied to claystone host rock as a rule.

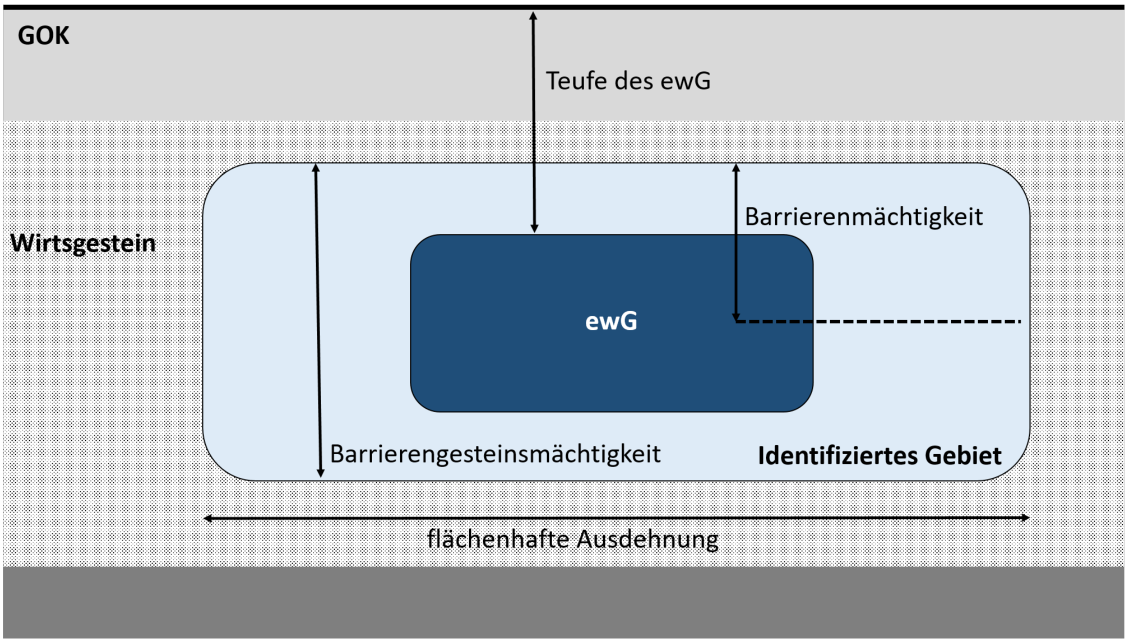


Figure 35: Schematic representation of the indicators "barrier thickness", "depth of the upper boundary of the required effective containment zone" and "areal extension".
The diagram is modified according to Alfarra et al. (2020, p. 143).
Translation of terminology used in figure: GOK = Grundlevel; Teufe des ewG = Depth of effective containment zone; Wirtsgestein = Host rock; Barrierenmächtigkeit = Barrier thickness; ewG = ECZ; Barrierensteins-mächtigkeit = Thickness of barrier rock; Identifiziertes Gebiet = Identified area; flächenhafte Ausdehnung = areal extension.

It is assumed at present that the "degree of enclosure of the storage area by an effective containment zone" is always complete. Hence, the indicator was evaluated as "favourable" for all identified areas in all host rocks. A final evaluation of the identified areas in claystone based on the indicator "exclusion of water-carrying layers in the direct proximity to the effective containment zone/host rock body on an area causing high hydraulic head" is not meaningful at present due to a lack of detailed information. All identified areas are therefore assigned a "favourable" rating at this time.

The configuration of rock bodies with relevance to safety is an early identifiable characteristic of a favourable overall geological situation and is particularly important at the current stage of the site selection procedure (BT-Drs. 18/11398). The overall evaluation of this criterion for each identified area is based on the worst rating from the indicators of "barrier thickness [m]", "depth of the upper boundary of the required effective containment zone [m below ground surface]" and "surface extent for the given thickness (multiple of the minimum area required)".

4.4.3.3 Annex 3 (to Section 24 para. 3) StandAG

Annex 3 (to Section 24 para. 3) StandAG deals with "the criterion for evaluating the spatial characterisability", which is assigned four indicators by the StandAG; refer to the excerpt from the StandAG in Annex 1. The evaluation of the identified areas in the rock salt and claystone host rocks was carried out individually on the basis of information obtained in the course of applying the exclusion criteria and minimum requirements, as well as in technical literature. Evaluation of the identified areas in the crystalline host rock was based on the corresponding reference dataset for crystalline host rock (BGE 2020b, 2020k).

Evaluation of the indicators for Annex 3 (to Section 24 para. 3) StandAG

a) Claystone host rock and stratiform rock salt
   Evaluation of the criterion in Annex 3 to Section 24 StandAG for identified areas in clay host rock and stratiform rock salt is based on the geological overviews from the modelling protocols (cf. Chapter 4.4.1) and additional information from technical literature.

   All citations on which the evaluation is based, as well as a brief summary of the reasonings, are documented in the evaluation module and in the annexes of the supporting document BGE (2020k). Moreover, BGE (2020k, Annex 4 and 5) also contains the detailed written reasoning for the evaluations.

b) Rock salt in a steep deposit
   The evaluation of the indicators “variability range of the rock type characteristics in the repository zone", “spatial distribution of the rock types in the repository zone and their properties” and “rock formation (rock facies)” in Annex 3 (to Section 24 para 3) StandAG was carried out for the identified areas in the host rock configuration of rock salt in steep deposit on the basis of the internal structure types as defined in the InSpEE-DS project (Fleig and Röhling 2019).

   During the evaluation, a check was performed using the internal structure type classification to determine whether the identified area is located in a host rock configuration of rock salt in steep deposits, which is a pure zechstein saliferous system, or a double saliferous system, which includes both zechstein saliferous systems and oberrotliegend saliferous systems.

   The indicator “extent of the tectonic overprint of the geological unit” was rated equally for all identified areas on the basis of salt dome genesis. All citations on which the evaluation is based and the reasonings are documented in the evaluation module and in the annexes of the supporting document BGE (2020k).

Evaluation of the criterion according to Annex 3 (to Section 24 para. 3) StandAG for the host rocks rock salt and claystone

This criterion was then evaluated for the identified areas in the host rocks of claystone and rock salt using the indicator with the poorest rating. The same procedure was applied for identified areas in rock salt host rock in a steep deposit. The indicator “extent of the tectonic overprint of the geological unit” is not authoritative for evaluation of the criterion, as it was rated uniformally for all identified areas in rock salt host rock in steep formations.

4.4.3.4 Annex 4 (to Section 24 para. 3) StandAG

Annex 4 (to Section 24 para. 3) StandAG deals with “the criterion for evaluating the long-term stability of the favourable conditions”, which is assigned three indicators by the StandAG; refer to the excerpt from the StandAG in Annex 1. Evaluation of the indicators and the criterion itself was carried out individually for identified areas in claystone host rock and in stratiform rock salt host rock. The data basis was information obtained in the course of applying the exclusion criteria and minimum requirements, as well as in technical literature. For the identified areas in crystalline host rock and in rock salt host rock in steep formations, evaluation of the indicators and the criterion as a whole was carried out based on specific reference datasets for each host rock (BGE 2020b, 2020k).

Evaluation of the indicators according to Annex 4 (to Section 24 para. 3) StandAG for claystone host rock and stratiform rock salt

Evaluation of the three indicators was based on the geological overviews and summaries from the state-specific and state-wide modelling protocols (cf. Chapter 4.4.1), with added information obtained from technical literature where necessary.

Given that all indicator evaluations are based on the same data and the individual indicators interact directly with each other, the evaluation of each identified area was predominantly the same. All citations on which the evaluation is based, as well as a brief summary of the reasonings, are documented in the evaluation module and in the annexes of the supporting document BGE (2020k). Moreover, BGE (2020k, Annex 4 and 5) also contains the detailed written reasoning for the evaluations.

Evaluation of the criterion according to Annex 4 (to Section 24 para. 3) StandAG for the host rocks of claystone and stratiform rock salt

In response to the evaluation of this criterion of those identified areas with clay host rock and stratiform host rock salt, the focus is placed on the temporal change in geological characteristics that is important for the long-term stability of favourable conditions. Evaluation of this criterion corresponds to an evaluation of the indicator with the worst rating.

4.4.3.5 Annex 5 (to Section 24 para. 4) StandAG

Annex 5 (to Section 24 para. 4) StandAG deals with “the criterion for evaluating the favourable geomechanical conditions”, which is evaluated using two indicators; refer to the excerpt from the StandAG in Annex 1. Evaluation of the criterion and its indicators is based on the reference datasets that are specific to the host rocks (BGE 2020b, 2020k).

4.4.3.6 Annex 6 (to Section 24 para. 4) StandAG

Annex 6 (to Section 24 para. 4) StandAG deals with “the criterion for evaluating the tendency to form fluid pathways”, which is evaluated using six indicators; refer to the excerpt from the StandAG in Annex 1. Evaluation of the indicators and the criterion as a whole is based on the reference datasets that are specific to the host rocks (BGE 2020b, 2020k).

4.4.3.7 Annex 7 (to Section 24 para. 5) StandAG

Annex 7 (to Section 24 para. 5) StandAG deals with “the criterion for evaluating gas formation”, which is evaluated using one indicator; refer to the excerpt from the StandAG in Annex 1. Evaluation of the indicator and the criterion as a whole is based on the reference datasets that are specific to the host rocks (BGE 2020b, 2020k).

4.4.3.8 Annex 8 (to Section 24 para. 5) StandAG

Annex 8 (to Section 24 para. 5) StandAG deals with “the criterion for evaluating the temperature tolerance”, which is evaluated using two indicators; refer to the excerpt from the StandAG in Annex 1. Evaluation of the indicators and the criterion as a whole is based on the reference datasets that are specific to the host rocks (BGE 2020b, 2020k).

4.4.3.9 Annex 9 (to Section 24 para. 5) StandAG

Annex 9 (to Section 24 para. 5) StandAG deals with “the criterion for evaluating the retention capacity in the effective containment zone”, which is evaluated using four indicators; refer to the excerpt from the StandAG in Annex 1. Evaluation of the indicators and the criterion as a whole is based on the reference datasets that are specific to the host rocks (BGE 2020b, 2020k).

4.4.3.10 Annex 10 (to Section 24 para. 5) StandAG

Annex 10 (to Section 24 para. 5) StandAG deals with “the criterion for evaluating the hydrochemical circumstances”, which is evaluated using five indicators; refer to the excerpt from the StandAG in Annex 1. Evaluation of the indicators and the criterion as a whole is based on the reference datasets that are specific to the host rocks (BGE 2020b, 2020k).

4.4.3.11 Annex 11 (to Section 24 para. 5) StandAG

Annex 11 (to Section 24 para. 5) StandAG deals with “the criterion for evaluating protection of the effective containment zone by the overburden”, which is assigned three indicators by the StandAG. Evaluation of the indicators took place using ArcGIS, based on the processed data from application of the exclusion criteria and minimum requirements pursuant to sections 22, 23 StandAG. Information on the situation of the Quaternary base, faults and atectonic processes were also used for the evaluation.

<u>Evaluation of the indicators “covering of the effective containment zone with rocks to inhibit the groundwater, distribution and thickness of rocks in the overburden that inhibit the groundwater” and “distribution and thickness of rocks in the overburden of the effective containment zone to inhibit erosion” according to Annex 11 (to Section 24 para. 5) StandAG</u>

Given that comprehensive information on the structure of the overburden is not available at the current stage of the site selection procedure, the evaluations within the framework of Section 13 StandAG were carried out on the basis of the stratigraphic horizons existing in the overburden. The following principles were applied:

- The legislator classifies the first 100 m of the overburden as not worth protecting (Section 21 para. 2 StandAG). Therefore, identified areas with a minimum depth of the host rock of less than 100 m below ground surface were rated “unfavourable”.
- In principle, the Quaternary, which is the youngest unit in the geological history of the Earth, is not considered to possess groundwater or erosion-inhibiting properties.
- Based on the “criterion for evaluation of the rock formation configuration*”* (Annex 2 (to Section 24 para. 3) StandAG), a thickness of at least 150 m is defined as a *thick* overburden with the capacity to inhibit erosion and groundwater. Insofar as the distance between the surface of the host rock and the Quaternary base is less than 150 m, the corresponding identified area was classified as “conditionally favourable”. The identified area was classified as “favourable” if the overburden was equal to/greater than 150 m.

Rock salt was treated differently to the other host rocks, as it is soluble in water. The decisive factor for the evaluation of rock salt is a selective occurrence of “unfavourable” conditions, whereas for crystalline host rocks and claystone an expansive incidence of “unfavourable” conditions is key to the evaluation. As a rule, crystalline host rocks are considered to inhibit both groundwater and erosion. This is taken into account accordingly in the summarised evaluation.

Evaluation of the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”.

An initial estimation of the presence of relevant structural complications in the overburden can be made on the basis of the current data within the framework of Section 13 StandAG.

For the evaluation, an examination equivalent to the one described above was first carried out for the indicators “coverage with rocks to inhibit the groundwater” and “distribution and thickness of rocks to inhibit erosion”. Where the minimum depth of the host rock surface lies inside the first 100 m below ground surface, the identified area was rated “unfavourable” for this indicator. Similarly, the identified area was rated “unfavourable” for this indicator if the host rock surface intersects the Quaternary base. Here as well, selective occurrence for rock salt and expansive occurrence for crystalline host rock and claystone are decisive for the evaluation.

Another examination was carried out on the identified areas that were not rated “unfavourable” by the first approach; it was carried out on the basis of the data provided in regard to faults, karst structures, subrosion or sinkholes. The identified area was assigned the rating “conditionally favourable” for this indicator if structural complications were identified during this examination. This took into account the datasets on fault zones classified as relevant by the exclusion criteria, as well as additional datasets on keystone faults and others that were provided to obtain data for the geoscientific weighing criteria.

Evaluation of the criterion according to Annex 11 (to Section 24 para. 5) StandAG

As a result of evaluating this criterion, all identified areas were rated individually on the basis of area-specific data. The criterion comprises indicators which independently address protection of the effective containment zone by the overburden. Accordingly, all indicators were considered using the same scale, so that the indicator that ultimately received the worst rating was decisive for overall evaluation of the criterion.

4.4.4 Summarised evaluation

The summarised evaluation involved rating each identified area on the basis of the evaluations of the geoscientific weighing criteria, including the indicator evaluations. This summarised evaluation took the form of a verbal deliberation. The competent BGE working group was made up of BGE experts, some of whom were not directly involved in the actual evaluation process for quality assurance reasons. In the end, the evaluations produced by applying the geoscientific weighing criteria, the verbal deliberations and the citations used in this context (literature, data) are available for all identified areas as comprehensive records in the evaluation module. The areas with an anticipated “favourable overall geological situation” (Section 24 (1) StandAG) were designated as sub-areas.

4.4.5 Results of the geoscientific weighing criteria

The results from applying the geoscientific weighing criteria are documented in detail in the evaluation module. The generic repository concepts from BGE (2020am) were taken into consideration in an adequate depth in the application of the geoscientific weighing criteria. Reports containing these results will be published. These reports are part of the supporting document “sub-areas and the application of geoscientific weighing criteria according to Section 24 StandAG” (BGE 2020k).

As stated earlier in Chapter 4.4.3, the criteria listed in Annexes 1, 5 to 10 (to Section 24) StandAG were applied to the identified areas using specific reference datasets for the individual host rocks (BGE 2020b). Evaluation of the weighing criterion specified in Annex 3 (to Section 24 para. 3 StandAG) was also based on the corresponding reference dataset for identified areas in crystalline host rock (BGE 2020b). In addition, evaluation of the criterion for rating the long-term stability of the favourable conditions, which is standardised in Annex 4 (to Section 24 para. 3 StandAG) was carried out using a reference dataset for identified areas in steep rock salts (BGE 2020b).

The results of applying the geoscientific weighing criteria in Annexes 2 and 11 (to Section 24 of the StandAG) to the identified areas are described in detail in the supporting document “sub-areas, application of geoscientific weighing criteria pursuant to Section 24 StandAG” (BGE 2020k). This applies also to the results obtained from applying the geoscientific weighing criteria in the following annexes to Section 24 StandAG.

- Annex 3 (to Section 24) StandAG for identified areas in clay host rock and stratiform rock salt
- Annex 4 (to Section 24) StandAG for identified areas in clay host rock and in the host rock configuration stratiform rock salt

The evaluations for Annexes 3 and 4 (to Section 24 para. 3 StandAG) were carried out individually for each identified area on the basis of area-specific information obtained from applying the exclusion criteria, minimum requirements or literature values.

The Gorleben salt dome has not been included as a sub-area based on the geoscientific weighing criteria according to Section 24 StandAG.

Within the framework of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany could be assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG).

5 Identified sub-areas pursuant to Section 13 StandAG

The sub-areas are obtained through application of the exclusion criteria, the minimum requirements and the geoscientific weighing criteria. They represent the preliminary result that was achieved in Step 1, Phase I and which is documented in this Sub-areas Interim Report.

Evaluation of the identified areas (cf. Chapter 4.3.7) based on the geoscientific consideration criteria yielded 90 sub-areas which can be expected to exhibit a favourable geological overall situation for the final disposal of radioactive waste, which together cover an area of around 240,874 km² (cf. Table 6, Figure 36). These identified areas extend across the entire territory of the Federal Republic of Germany. If the overlap in some sub-areas is taken into account, an area of approx. 194,157 km², i.e. approx. 54 % of the national territory in Germany, is designated as a sub-area and constitutes the starting point for continued efforts in the site selection procedure.

Table 6: Number and surface area of the identified sub-areas

Host rock	Number of sub-areas	Surface in km²
Claystone	**9**	**129,639**
Rock salt, of which • stratiform formations: • steep formations: **Rock salt, total**	 14 60 **74**	 28,415 2,034 **30,450**
Crystalline host rock	**7**	**80,786**
<u>Sub-areas, total:</u>	**<u>90</u>**	**<u>240,874</u>**

For claystone host rock, a total of nine areas with a favourable overall geological situation are identified through application of the geoscientific weighing criteria within the framework of Section 13 StandAG. The total surface area of sub-areas in claystone is approx. 129,639 km^2. These are spread over several federal states and are located in geologically different units, which means that they overlap in places geographically (cf. Figure 37).

In regard to rock salt host rock, a total of 74 sub-areas are identified within the framework of Section 13 StandAG that are indicative of a favourable overall geological situation. For the different configurations in rock salt host rock, there are a total of 60 sub-areas in steep rock salt formations and 14 sub-areas in stratiform rock salt. These are spread over several federal states and are located in geologically different units, which means that they overlap in places geographically. The total surface area of the sub-areas in the host rock configuration of rock salt in steep deposits is approx. 2,034 km^2. The sub-areas in rock salt host rock are shown in Figure 32.

In regard to crystalline host rock, a total of seven sub-areas are identified within the framework of Section 13 StandAG that are indicative of a favourable overall geological situation for the final disposal of radioactive waste. These are largely crystalline complexes belonging to the Variscan orogeny (cf. Figure 39) with a total surface area of approx. 80,786 km^2.

The Gorleben salt dome has not been included as a sub-area based on the geoscientific weighing criteria according to Section 24 StandAG. The provision set out in Section 36 para. 1 s. 5 no. 1 StandAG shall therefore apply, and the Gorleben salt dome is excluded from the procedure. The BGE will therefore no longer consider the Gorleben salt dome in its continued work on proposals for siting regions.

Within the framework of identifying sub-areas in accordance with Section 13 StandAG, all areas in Germany were assessed in the necessary depth using the available geological data. Accordingly, there were no areas that cannot be classified due to insufficient geological data (Section 13 para. 2 s. 4 StandAG). A presentation of these areas and a recommendation for further action in this regard are therefore unnecessary.

The following chapters 5.1 to 5.3 briefly describe the individual sub-areas in regard to their characteristics and the results of the geoscientific weighing pursuant to Section 24 StandAG. The contents described in these chapters summarise the supporting documents BGE (2020k) and BGE (2020j). The results of applying the geoscientific weighing criteria on the individual identified areas are presented in the supporting document BGE (2020k) (which also includes the identified areas that were not designated as sub-areas).

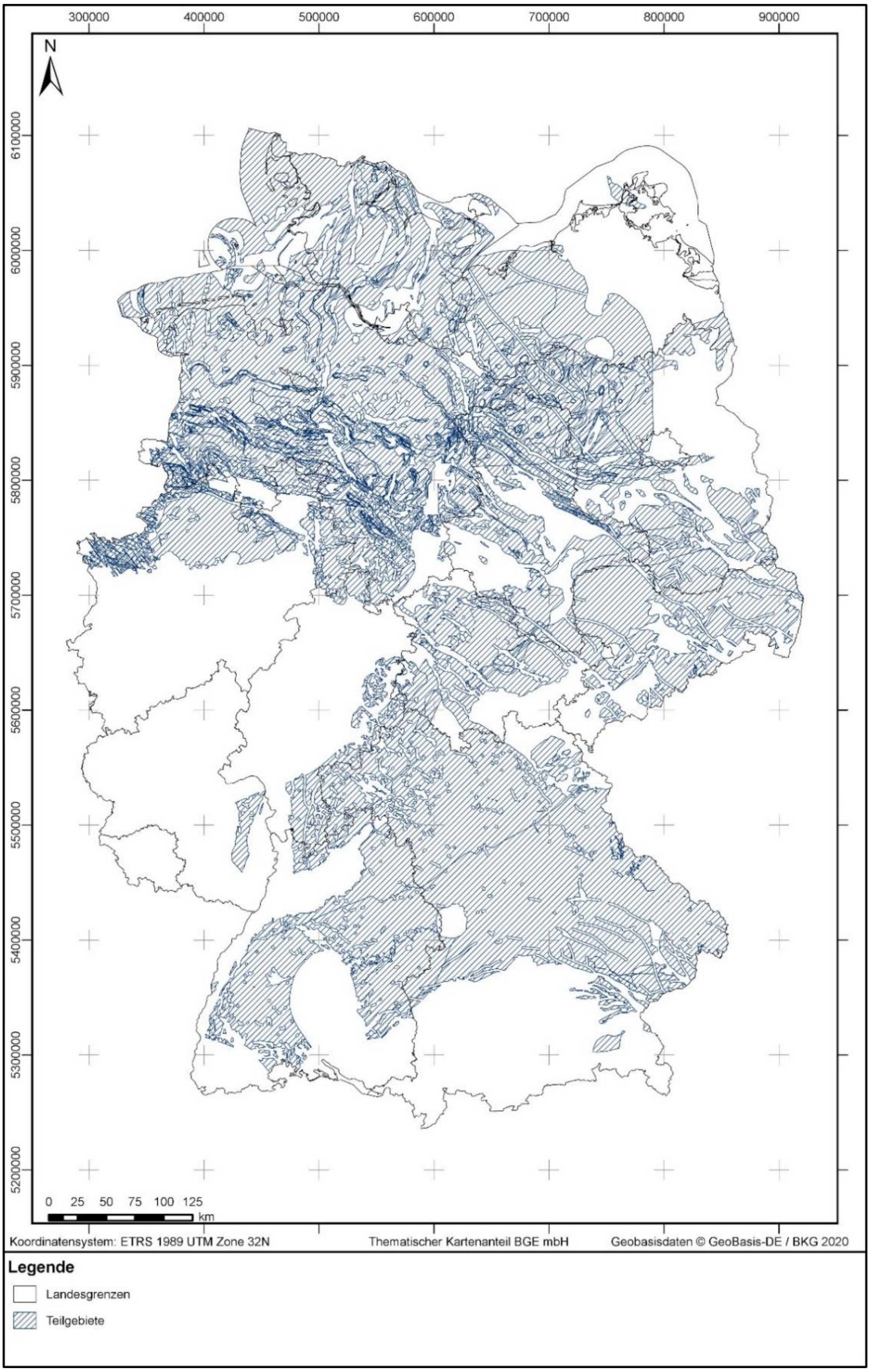


Figure 36: *Overview map of the sub-areas.*
The sub-areas were determined based on stratigraphic units, which is why several sub-areas occasionally overlap in this map diagram.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen: State borders; Teilgebiete = Sub-areas.

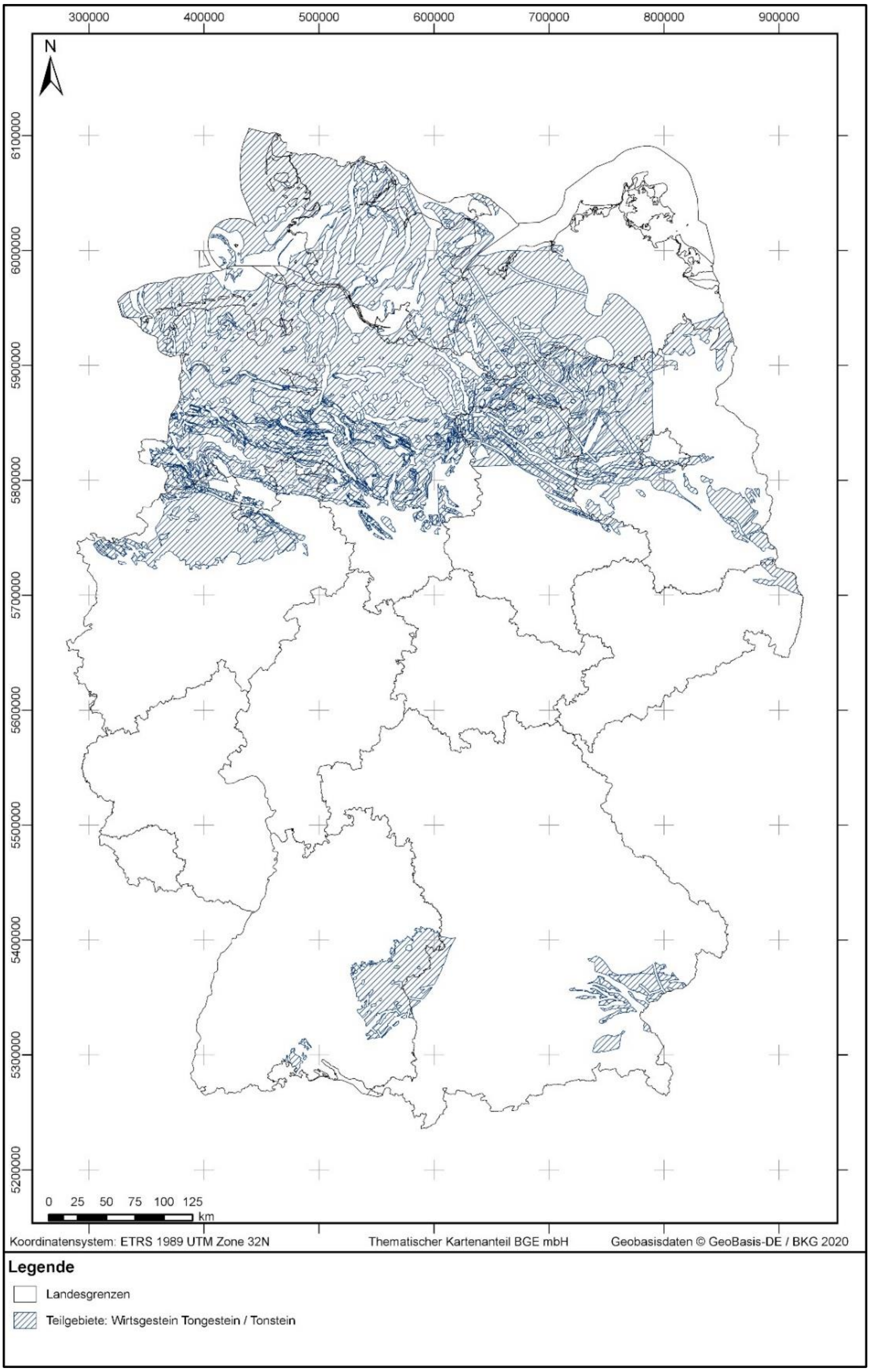


Figure 37: *Overview map of the sub-areas in clay host rock.*
The sub-areas were determined based on stratigraphic units, which is why several sub-areas occasionally overlap in this map diagram.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Teilgebiete: Wirtsgestein Tongestein / Tonstein = Sub-areas: Host rock claystone / clay rock.

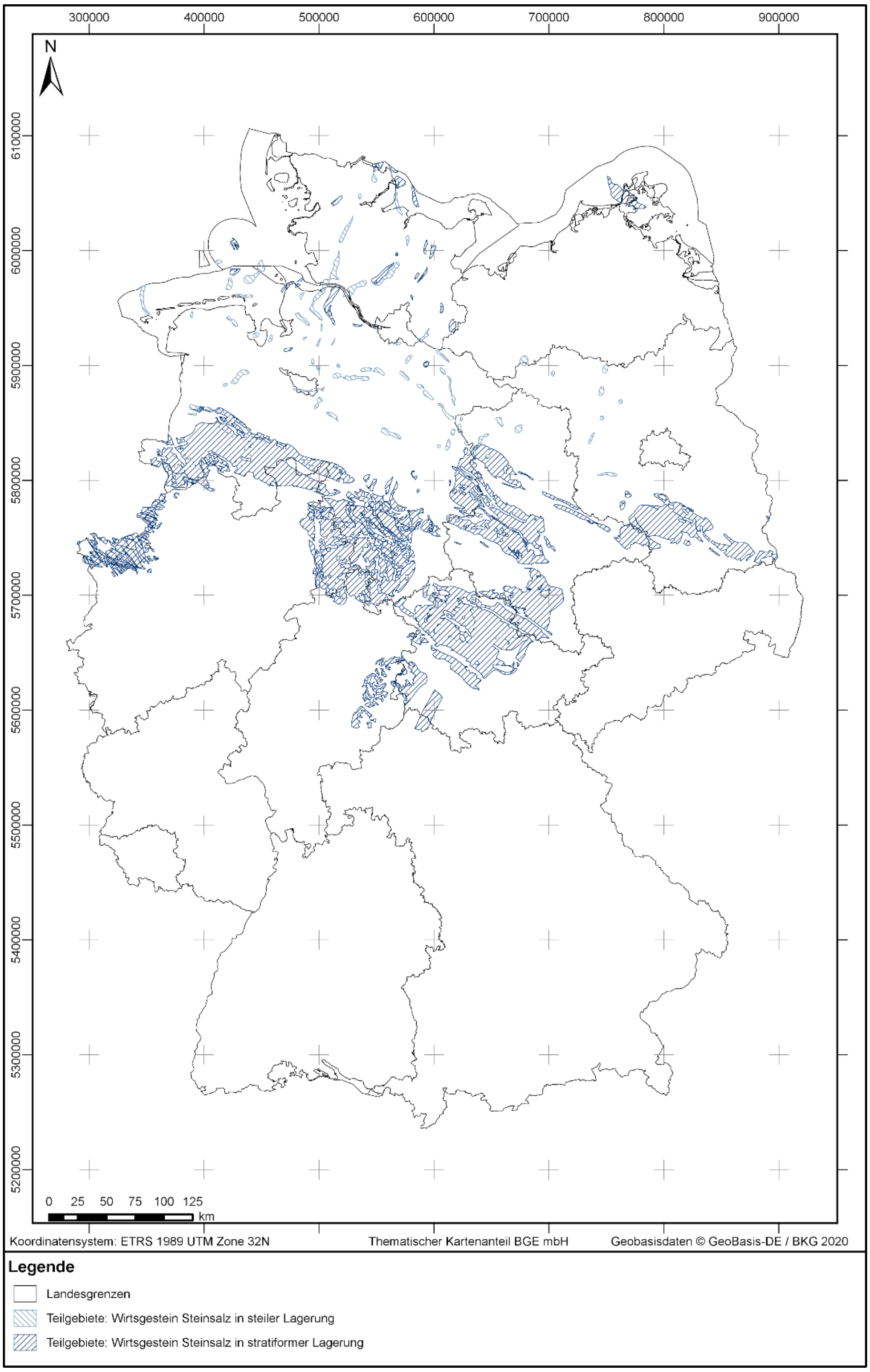


Figure 38: Overview map of the sub-areas in salt host rock.
The sub-areas in salt host rock were indicated separately based on stratigraphic units, which is why several sub-areas occasionally overlap in this map diagram.
Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Teilgebiete: Wirtsgestein in steiler Lagerung = Sub-areas: Host rock salt rock in steep formations; Teilgebiete: Wirtsgestein in stratiformer Lagerung = Sub-areas: Host rock salt rock in stratiform formations.

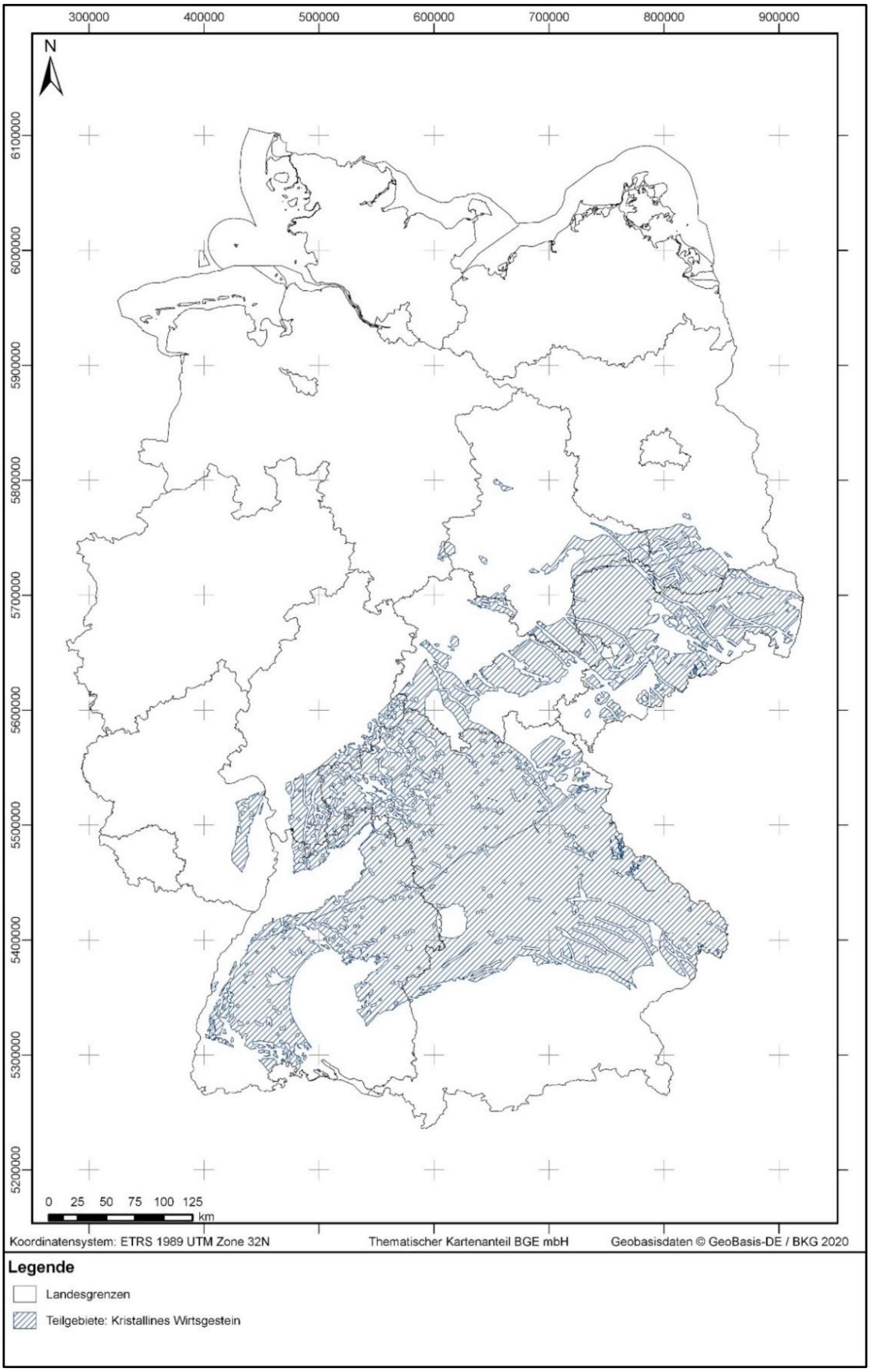


Figure 39: *Overview map of the sub-areas in crystalline host rock on the territory of the Federal Republic of Germany. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Geobasisdaten = Geobasis data; Landesgrenzen = State borders; Teilgebiete: Kristallines Wirtsgestein = Sub-areas: crystalline host rock.*

5.1 Sub-areas in claystone host rock

5.1.1 Sub-area 001_00TG_032_01IG_T_f_jmOPT

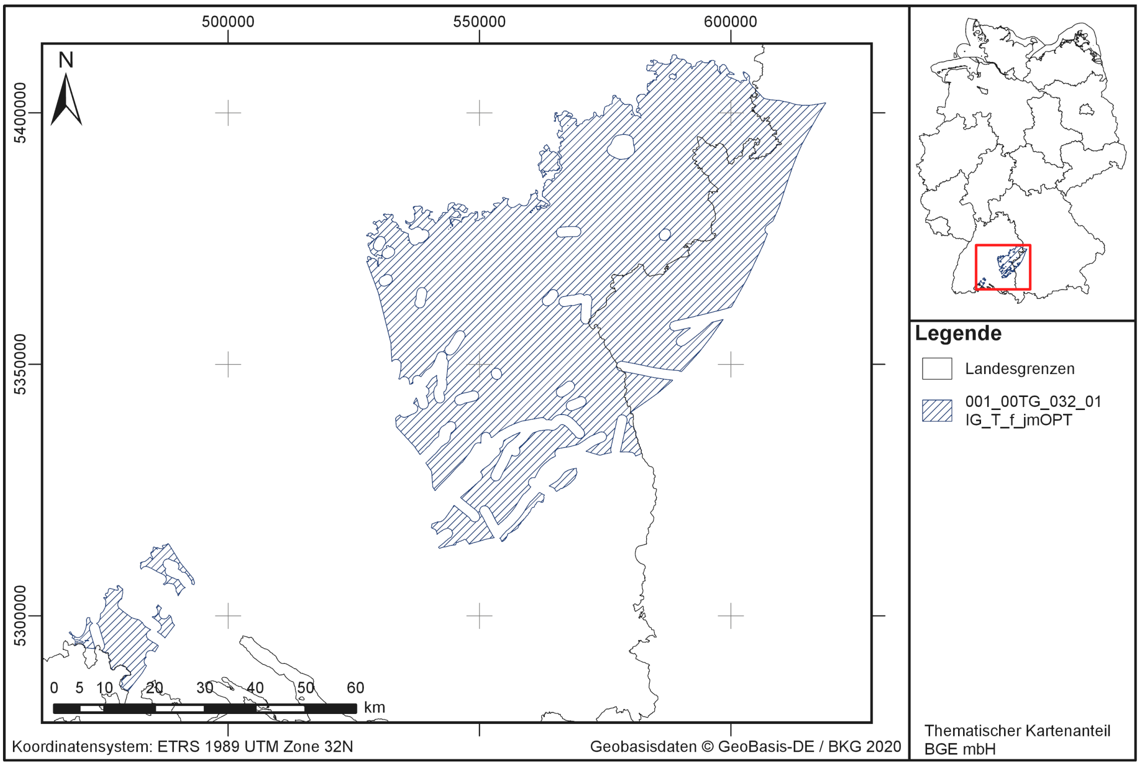


Figure 40: Overview map of the sub-area 001_00TG_032_01IG_T_f_jmOPT. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

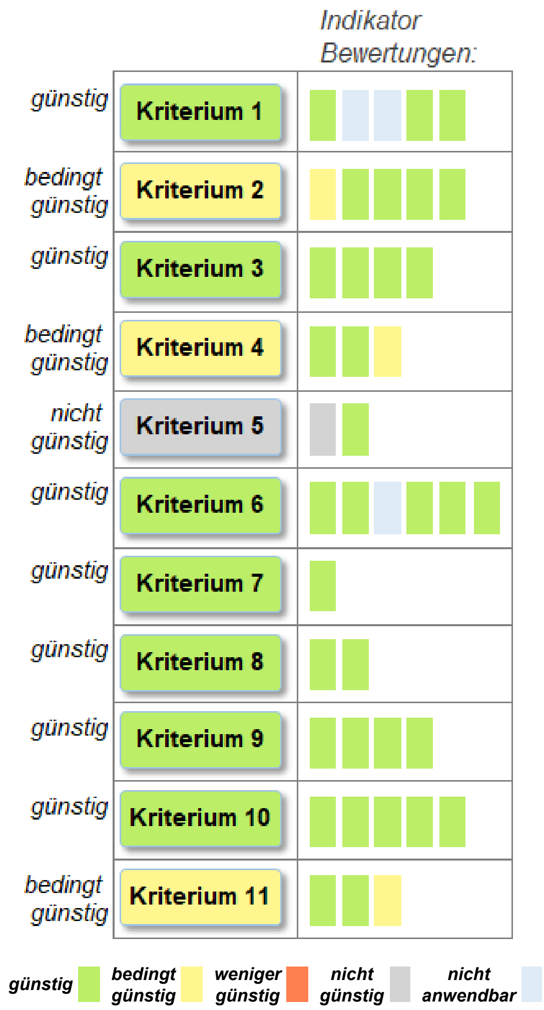
Table 7: Characteristics of the sub-area 001_00TG_032_01IG_T_f_jmOPT

Characteristics of the sub-area 001_00TG_032_01IG_T_f_jmOPT	
IA code	032_01IG_T_f_jmOPT
Host rock type and configuration	Claystone
Geographic location	The sub-area extends across areas in the federal states of Baden-Württemberg and Bavaria.
Surface area	4,241 km²
Geological characteristics	The sub-area dates back to the Middle Jurassic stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 300 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 8: Result of the geoscientific weighing criteria for the sub-area 001_00TG_032_01IG_T_f_jmOPT.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The "criterion for evaluation of the rock formation configuration" was rated "conditionally favourable" based on the "barrier thickness [m]" indicator. The "criterion for evaluation of the spatial characterisability" was rated "favourable". The "criterion for evaluation of the long-term stability of favourable conditions" was rated "conditionally favourable" based on the indicator "time period in which the hydraulic conductivity of the rock in the effective containment zone has not changed significantly". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". The conditionally favourable rating of the indicator "time period in which the hydraulic conductivity of the rock in the effective containment zone has not changed significantly" is due to the fact that a significant karst aquifer from the Upper Jurassic is located above the Middle Jurassic in the identified area. Karstification influenced increasingly deeper areas during the Miocene and Pliocene (Hoth et al. 2007; Geyer et al. 2011). There are no karstified sequences above the Middle Jurassic in the south of the identified area (Geyer et al. 2011). Moreover, the southern part of the identified area also has a section manifesting both a conditionally favourable thickness and a favourable depth. This part of the identified area is also large enough to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.2 Sub-area 002_00TG_044_00IG_T_f_tUMa

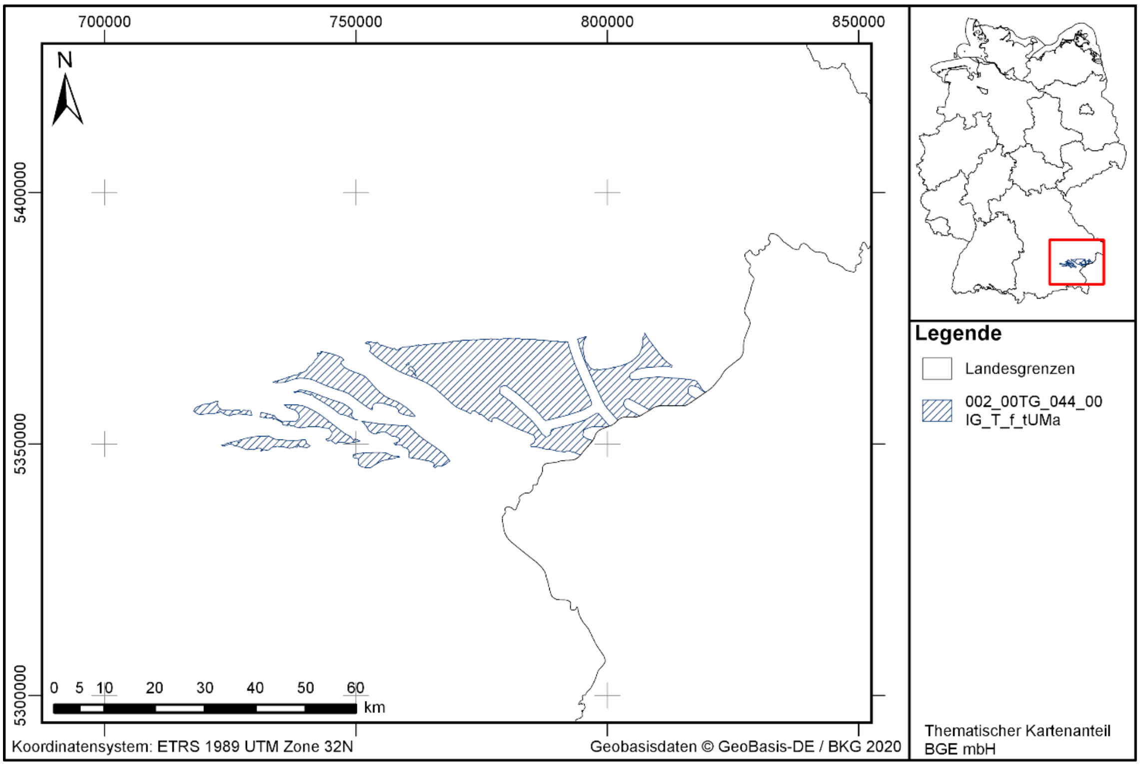


Figure 41: Overview map of the sub-area 002_00TG_044_00IG_T_f_tUMa. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

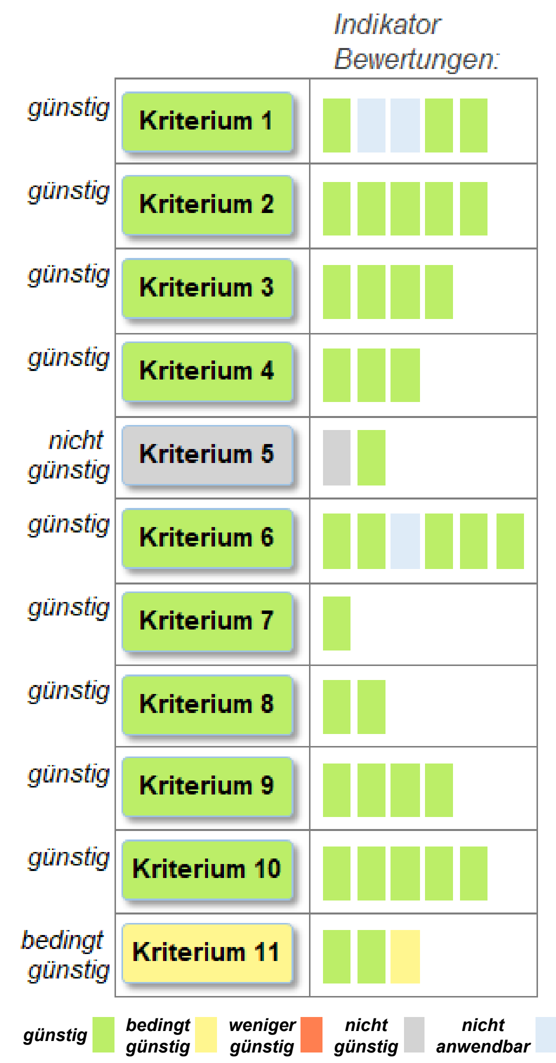
Table 9: Characteristics of the sub-area 002_00TG_044_00IG_T_f_tUMa

Characteristics of the sub-area 002_00TG_044_00IG_T_f_tUMa	
IA code	044_00IG_T_f_tUMa
Host rock type and configuration	Claystone
Geographic location	The sub-area is located in the east of the federal state of Bavaria.
Surface area	943 km²
Geological characteristics	The sub-area dates back to the Tertiary (older Lower Marine Molasse) stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 442 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 10: Result of the geoscientific weighing criteria for the sub-area 002_00TG_044_00IG_T_f_tUMa.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.3 Sub-area 003_00TG_046_00IG_T_f_tUMj

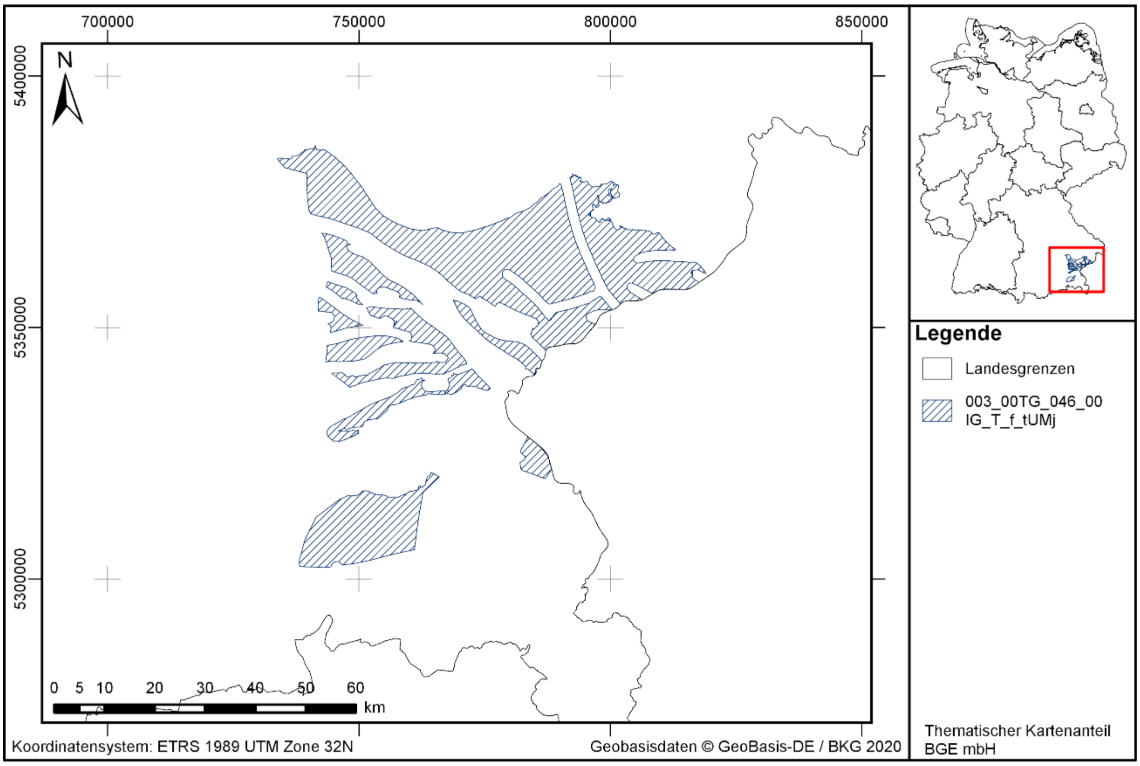


Figure 42: Overview map of the sub-area 003_00TG_046_00IG_T_f_tUMj. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

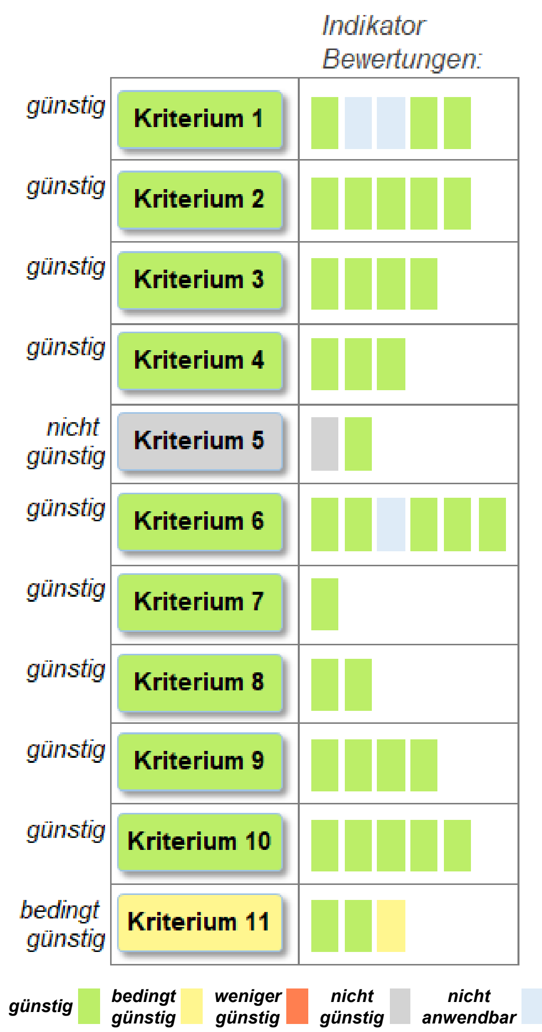
Table 11: Characteristics of the sub-area 003_00TG_046_00IG_T_f_tUMj

Characteristics of the sub-area 003_00TG_046_00IG_T_f_tUMj	
IA code	046_00IG_T_f_tUMj
Host rock type and configuration	Claystone
Geographic location	The sub-area is located in the southeast of the federal state of Bavaria.
Surface area	1,732 km²
Geological characteristics	The sub-area dates back to the Tertiary (recent Lower Marine Molasse) stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 12: Result of the geoscientific weighing criteria for the sub-area 003_00TG_046_00IG_T_f_tUMj.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystonein regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The "criterion for evaluation of the rock formation configuration", the "criterion for evaluation of the spatial characterisability" and the "criterion for evaluation of the long-term stability of favourable conditions" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.4 Sub-area 004_00TG_053_00IG_T_f_tpg

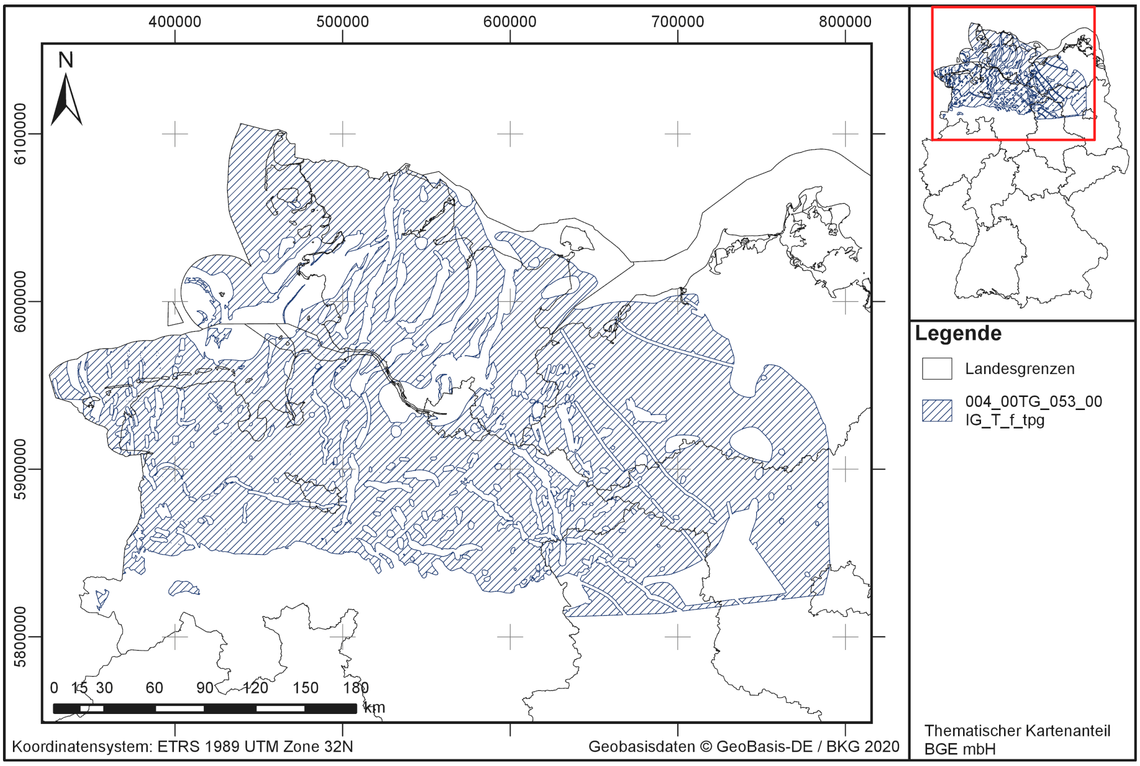


Figure 43: Overview map of the sub-area 004_00TG_053_00IG_T_f_tpg. Transltion of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

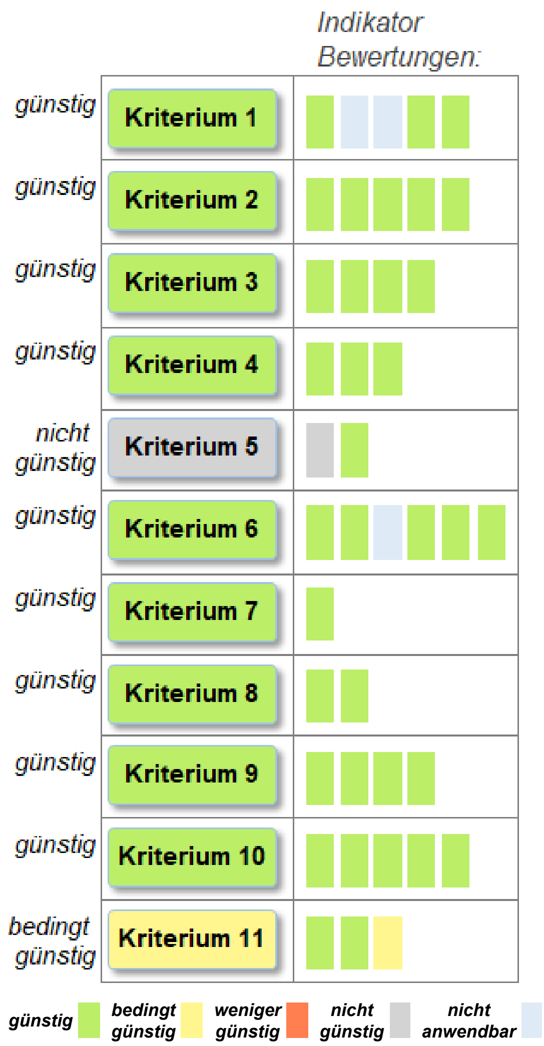
Table 13: Characteristics of the sub-area 004_00TG_053_00IG_T_f_tpg

Characteristics of the sub-area 004_00TG_053_00IG_T_f_tpg	
IA code	053_00IG_T_f_tpg
Host rock type and configuration	Claystone
Geographic location	The sub-area extends across sections of the federal states of Lower Saxony, Bremen, Hamburg, Schleswig-Holstein, Mecklenburg-Vorpommern, Brandenburg, Berlin and Saxony-Anhalt.
Surface area	62,885 km²
Geological characteristics	The sub-area dates back to the Tertiary (Palaeogene) stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,055 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 14: Result of the geoscientific weighing criteria for the sub-area 004_00TG_053_00IG_T_f_tpg.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.5 Sub-area 005_00TG_055_00IG_T_f_jm

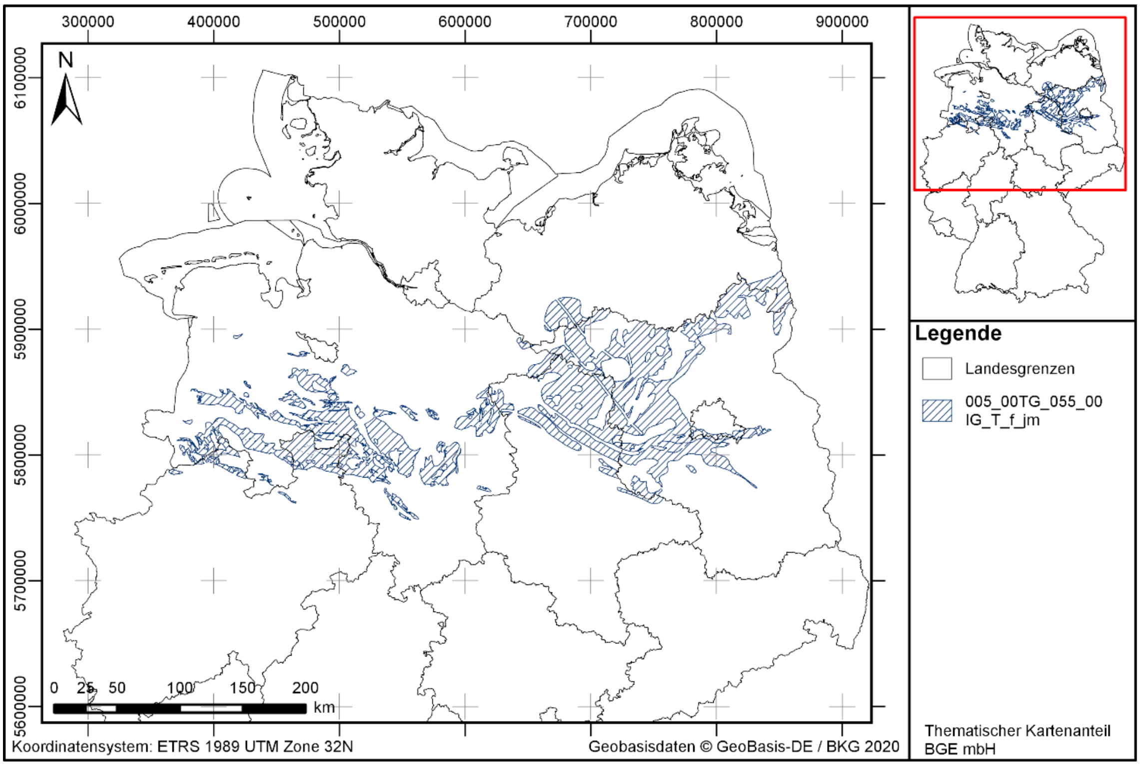


Figure 44: *Overview map of the sub-area 005_00TG_055_00IG_T_f_jm. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.*

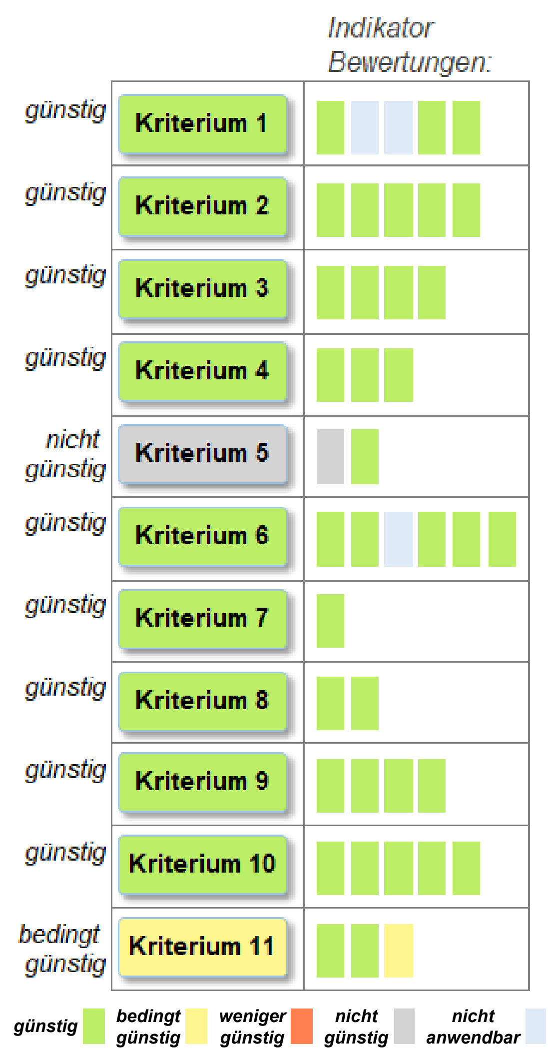
Table 15: *Characteristics of the sub-area 005_00TG_055_00IG_T_f_jm*

Characteristics of the sub-area 005_00TG_055_00IG_T_f_jm	
IA code	055_00IG_T_f_jm
Host rock type and configuration	Claystone
Geographic location	The sub-area extends across sections of the federal states of North Rhine-Westphalia, Lower Saxony, Mecklenburg-Vorpommern, Brandenburg, Berlin and Saxony-Anhalt.
Surface area	18,811 km²
Geological characteristics	The sub-area dates back to the Middle Jurassic stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 16: Result of the geoscientific weighing criteria for the sub-area 005_00TG_055_00IG_T_f_jm.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The "criterion for evaluation of the rock formation configuration", the "criterion for evaluation of the spatial characterisability" and the "criterion for evaluation of the long-term stability of favourable conditions" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.6 Sub-area 006_00TG_188_00IG_T_f_ju

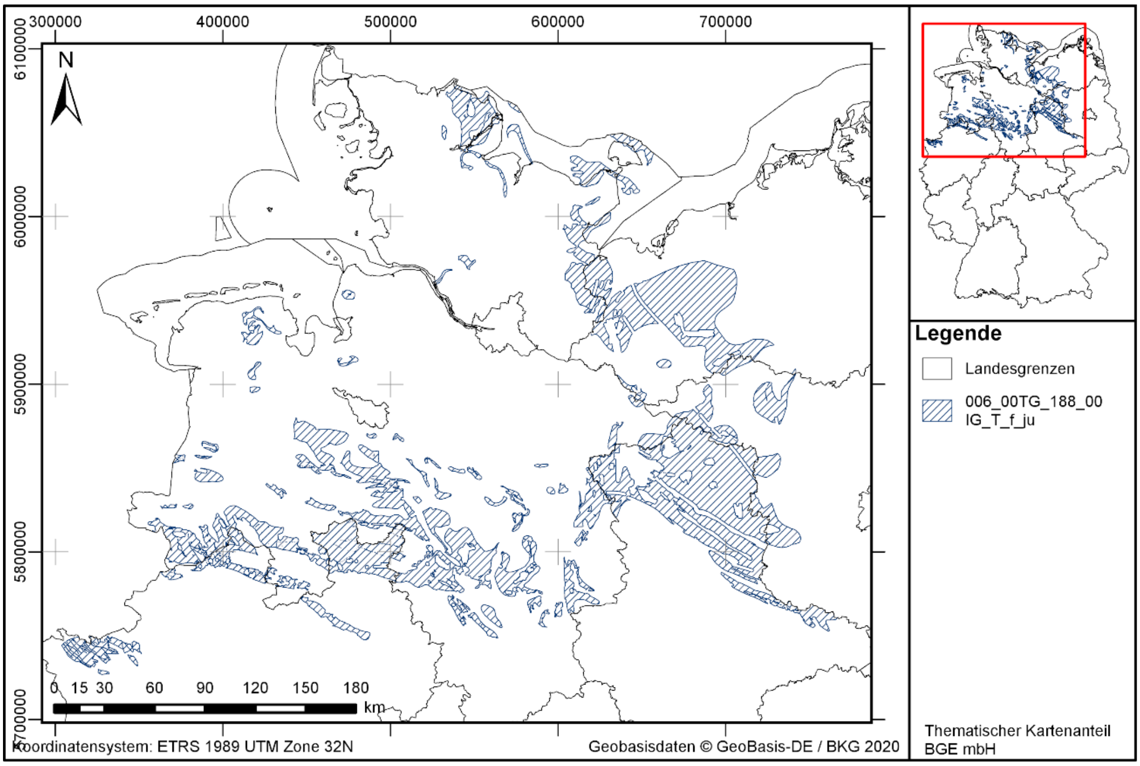


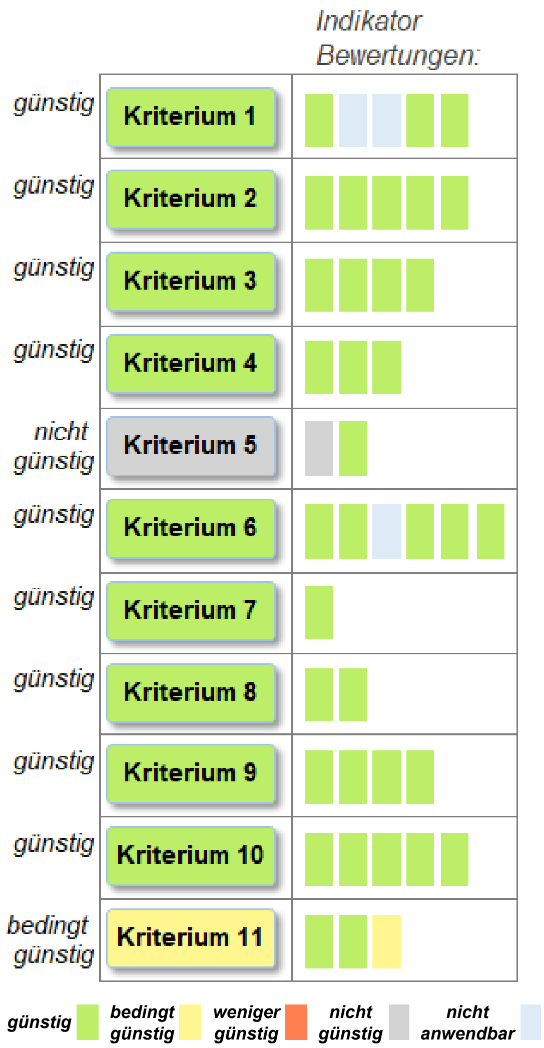
Figure 45: Overview map of the sub-area 006_00TG_188_00IG_T_f_ju. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.Table 17: Characteristics of the sub-area 006_00TG_188_00IG_T_f_ju

Characteristics of the sub-area 006_00TG_188_00IG_T_f_ju	
IA code	188_00IG_T_f_ju
Host rock type and configuration	Claystone
Geographic location	The sub-area extends across sections of the federal states of North Rhine-Westphalia, Lower Saxony, Mecklenburg-Vorpommern, Schleswig-Holstein, Brandenburg and Saxony-Anhalt.
Surface area	18,564 km²
Geological characteristics	The sub-area dates back to the Early Jurassic stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 18: Result of the geoscientific weighing criteria for the sub-area 006_00TG_188_00IG_T_f_ju. Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.7 Sub-area 007_00TG_202_02IG_T_f_kru

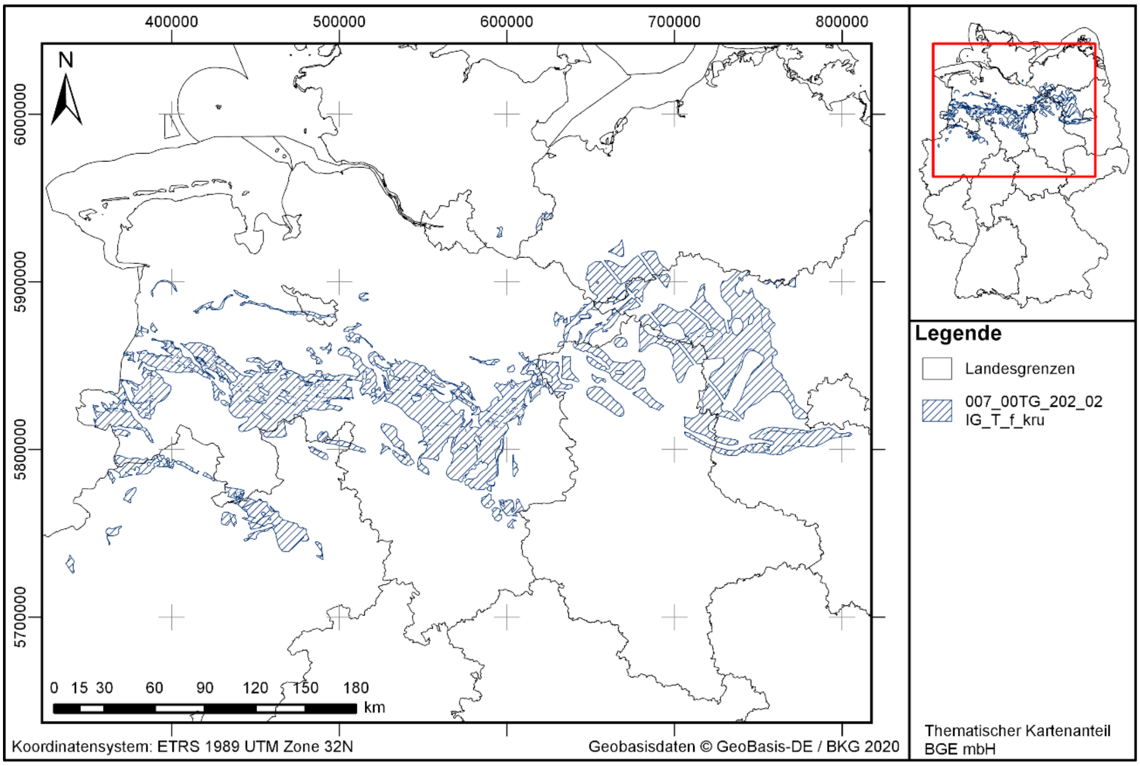


Figure 46: Overview map of the sub-area 007_00TG_202_02IG_T_f_kru. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

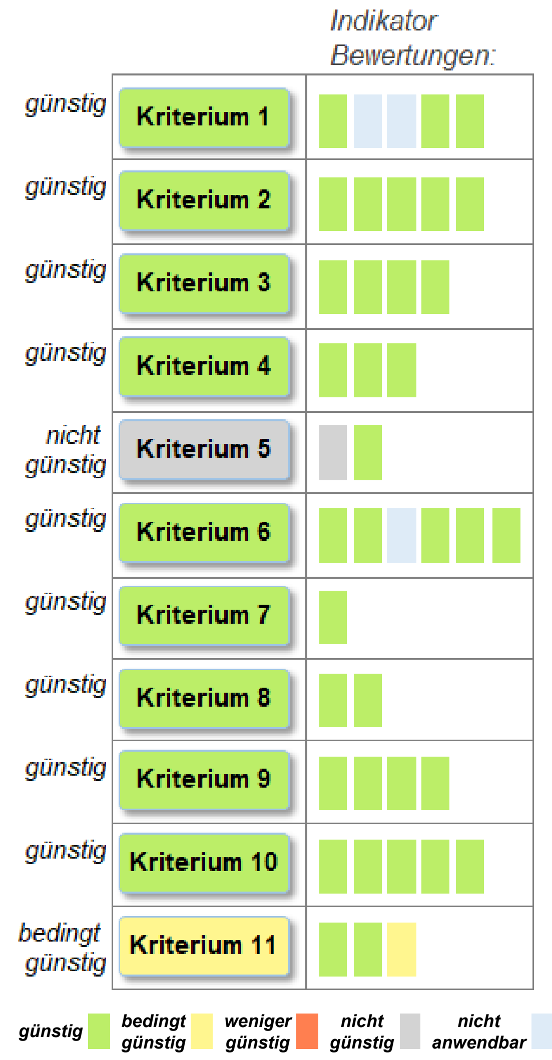
Table 19: Characteristics of the sub-area 007_00TG_202_02IG_T_f_kru

Characteristics of the sub-area 007_00TG_202_02IG_T_f_kru	
IA code	202_02IG_T_f_kru
Host rock type and configuration	Claystone
Geographic location	The sub-area extends across sections of the federal states of North Rhine-Westphalia, Lower Saxony, Bremen, Mecklenburg-Vorpommern, Brandenburg and Saxony-Anhalt.
Surface area	14,914 km²
Geological characteristics	The sub-area dates back to the Early Cretaceous stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 20: Result of the geoscientific weighing criteria for the sub-area 007_00TG_202_02IG_T_f_kru.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.8 Sub-area 008_01TG_204_01IG_T_f_kro

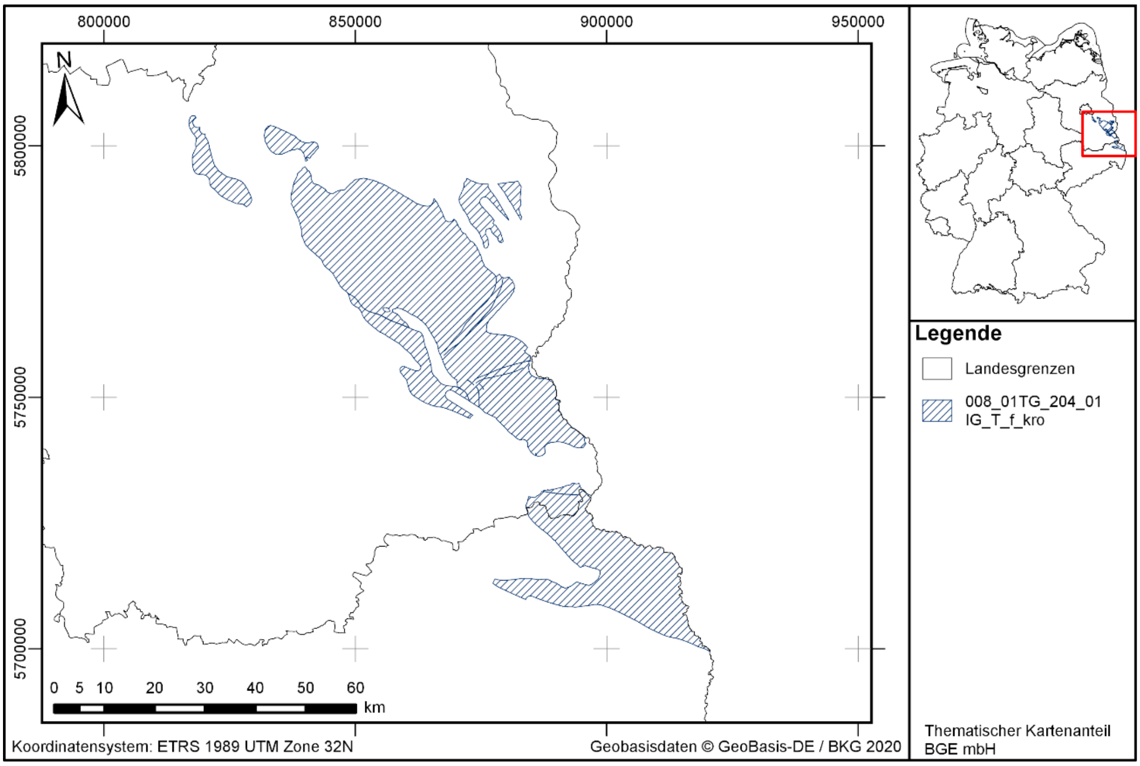


Figure 47: Overview map of the sub-area 008_01TG_204_01IG_T_f_kro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

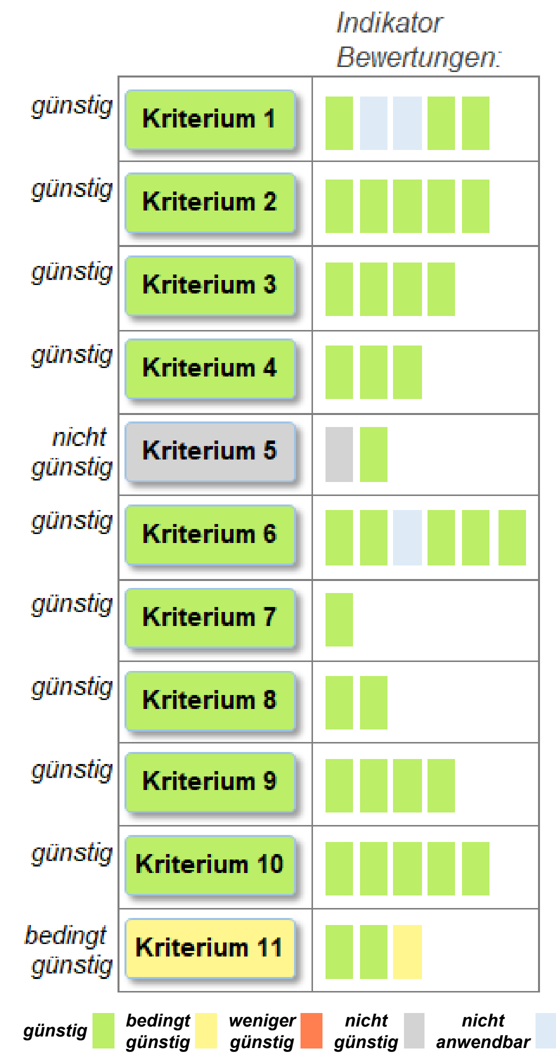
Table 21: Characteristics of the sub-area 008_01TG_204_01IG_T_f_kro

Characteristics of the sub-area 008_01TG_204_01IG_T_f_kro	
IA code	204_01IG_T_f_kro
Host rock type and configuration	Claystone
Geographic location	The sub-area is located in the east of the federal states of Brandenburg and Saxony.
Surface area	1,981 km²
Geological characteristics	The sub-area dates back to the Late Cretaceous stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 22: Result of the geoscientific weighing criteria for the sub-area 008_01TG_204_01IG_T_f_kro
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.1.9 Sub-area 008_02TG_204_02IG_T_f_kro

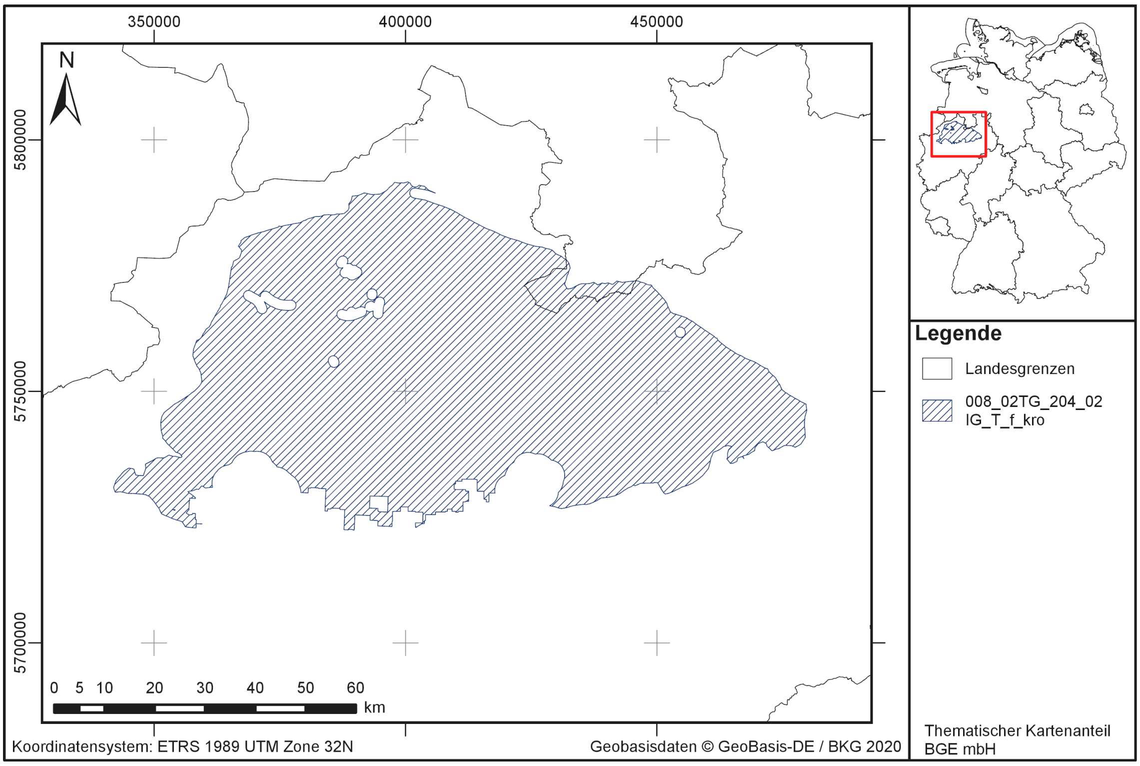


Figure 48: Overview map of the sub-area 008_02TG_204_02IG_T_f_kro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

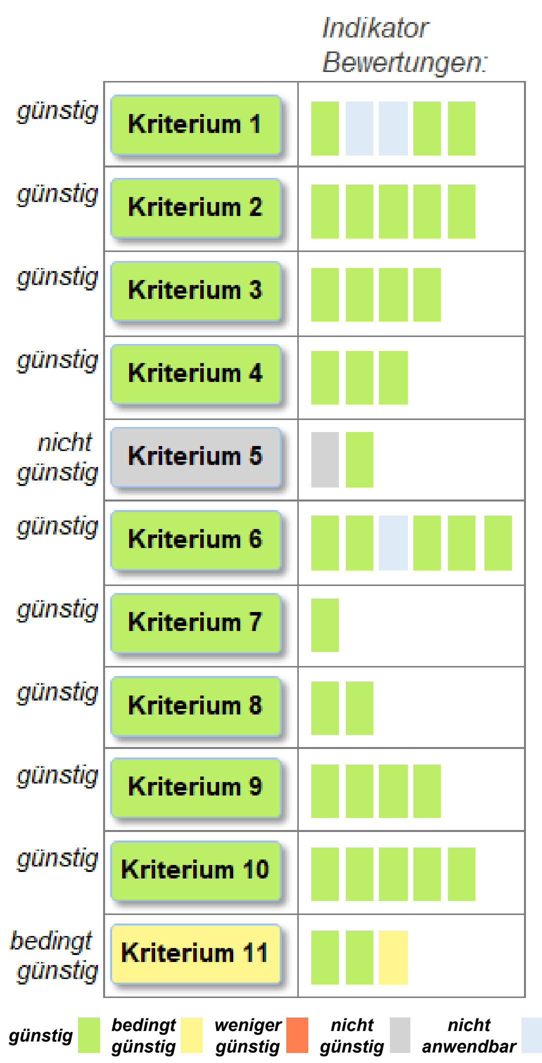
Table 23: Characteristics of the sub-area 008_02TG_204_02IG_T_f_kro

Characteristics of the sub-area 008_02TG_204_02IG_T_f_kro	
IA code	204_02IG_T_f_kro
Host rock type and configuration	Claystone
Geographic location	The sub-area is located in the north of the federal state of North Rhine-Westphalia and in the south of the federal state of Lower Saxony.
Surface area	5,322 km²
Geological characteristics	The sub-area dates back to the Late Cretaceous stratigraphic unit, which contains the claystone host rock. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 24: Result of the geoscientific weighing criteria for the sub-area 008_02TG_204_02IG_T_f_kro
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for claystone; six criteria were rated “favourable” and one criterion was rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Individual evaluation of each identified area was performed for claystone in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”.

However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone of 10 square kilometres (BT-Drs. 18/11398, p. 71) in a section without structural complications in the overburden that might cause impairments.

Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste.

For further information, refer to BGE (2020k) and BGE (2020b).

5.2 Sub-areas in crystalline host rock

5.2.1 Sub-area 009_00TG_194_00IG_K_g_SO

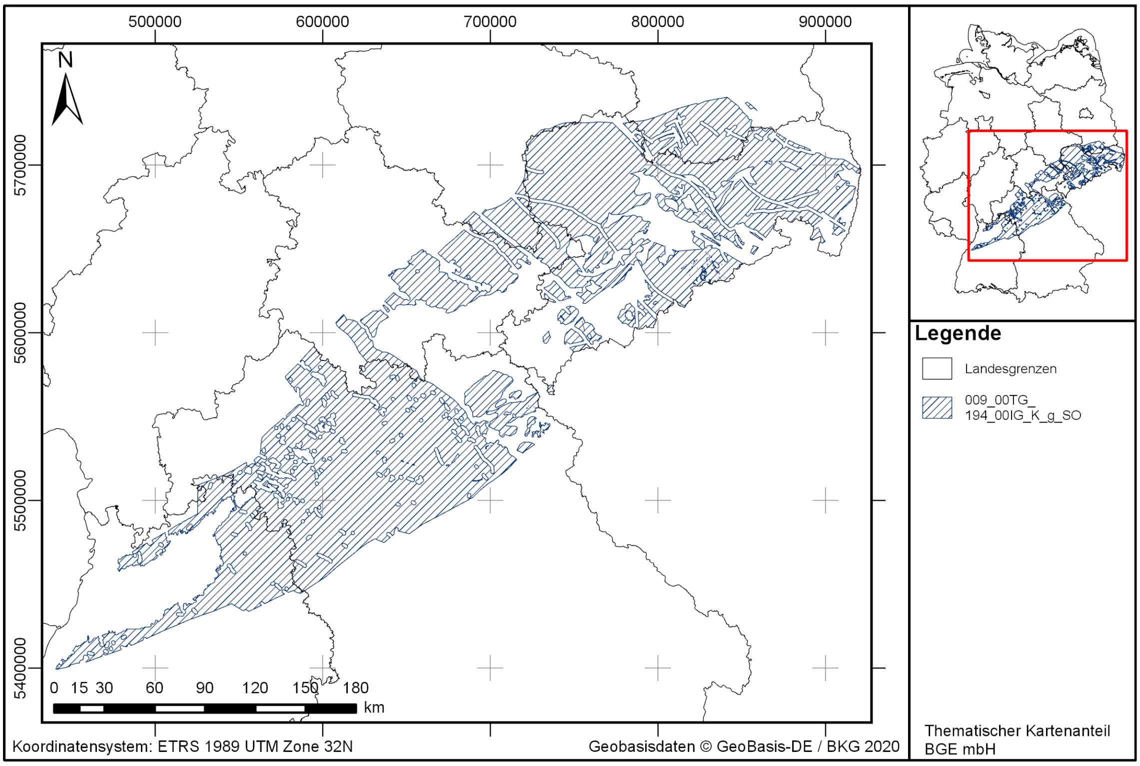


Figure 49: Overview map of the sub-area 009_00TG_194_00IG_K_g_SO. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

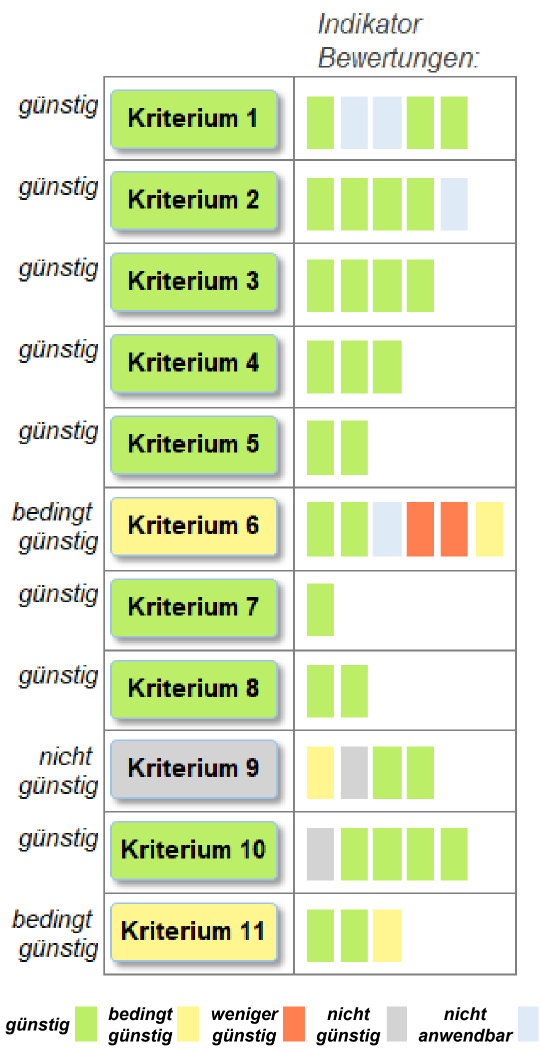
Table 25: Characteristics of the sub-area 009_00TG_194_00IG_K_g_SO

Characteristics of the sub-area 009_00TG_194_00IG_K_g_SO	
IA code	194_00IG_K_g_SO
Host rock type and configuration	Crystalline host rock in the basement
Geographic location	The sub-area extends from the southwest through Baden-Württemberg, Bavaria, Thuringia, Saxony-Anhalt, southern Brandenburg and Saxony in the northeast of Germany.
Surface area	32,655 km²
Geological characteristics	The sub-area is located in the basement of the Saxothuringian Zone and has a thickness of between 200 and 1,200 metres. The surface of the sub-area is located at a depth of 300 metres to 1,300 metres below ground surface.

Table 26: Result of the geoscientific weighing criteria for the sub-area 009_00TG_194_00IG_K_g_SO. Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated “favourable” and two criteria were rated “not favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “favourable” for this identified area. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.2.2 Sub-area 010_00TG_193_00IG_K_g_MKZ

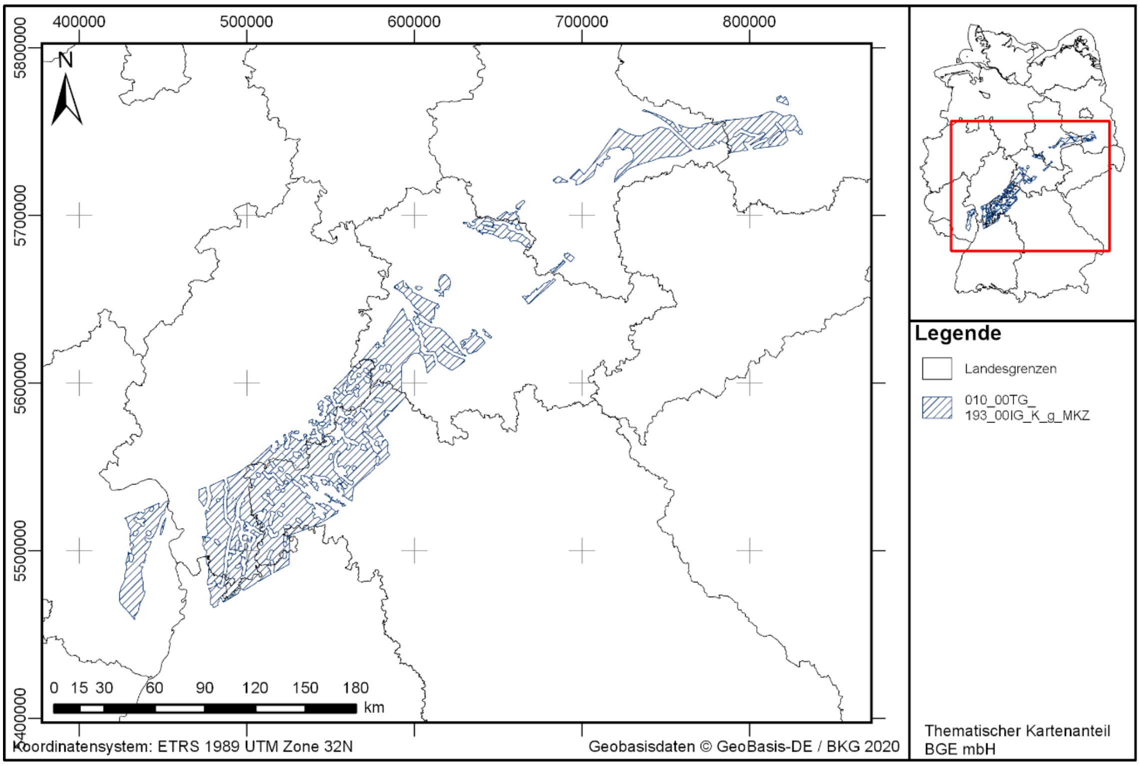
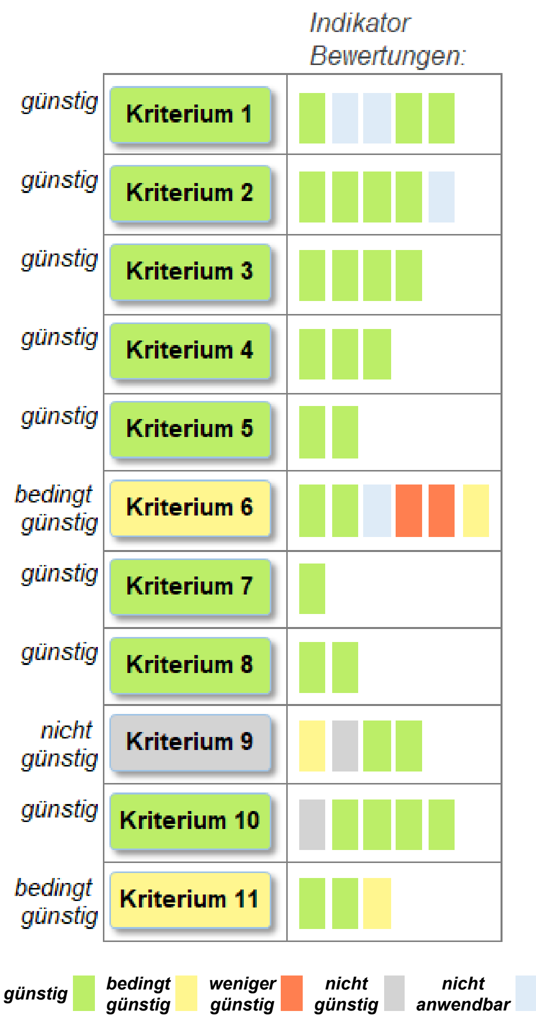


Figure 50: Overview map of the sub-area 010_00TG_193_00IG_K_g_MKZ. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.Table 27: Characteristics of the sub-area 010_00TG_193_00IG_K_g_MKZ

Characteristics of the sub-area 010_00TG_193_00IG_K_g_MKZ	
IA code	193_00IG_K_g_MKZ
Host rock type and configuration	Crystalline host rock in the basement
Geographic location	The sub-area extends from the southwest through Rhineland-Palatinate, Baden-Württemberg, Bavaria and Hesse to Thuringia, Saxony-Anhalt and Brandenburg in the northeast of Germany.
Surface area	10,066 km²
Geological characteristics	The sub-area is located in the basement of the Mid-German Crystalline Zone and has a thickness of between 200 and 1,200 metres. The surface of the sub-area is located at a depth of 300 metres to 1,300 metres below ground surface.

Table 28: Result of the geoscientific weighing criteria for the sub-area 010_00TG_193_00IG_K_g_MKZ.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated “favourable” and two criteria were rated “not favourable”.	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “favourable” for this identified area. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.2.3 Sub-area 011_00TG_200_00IG_K_g_SPZ

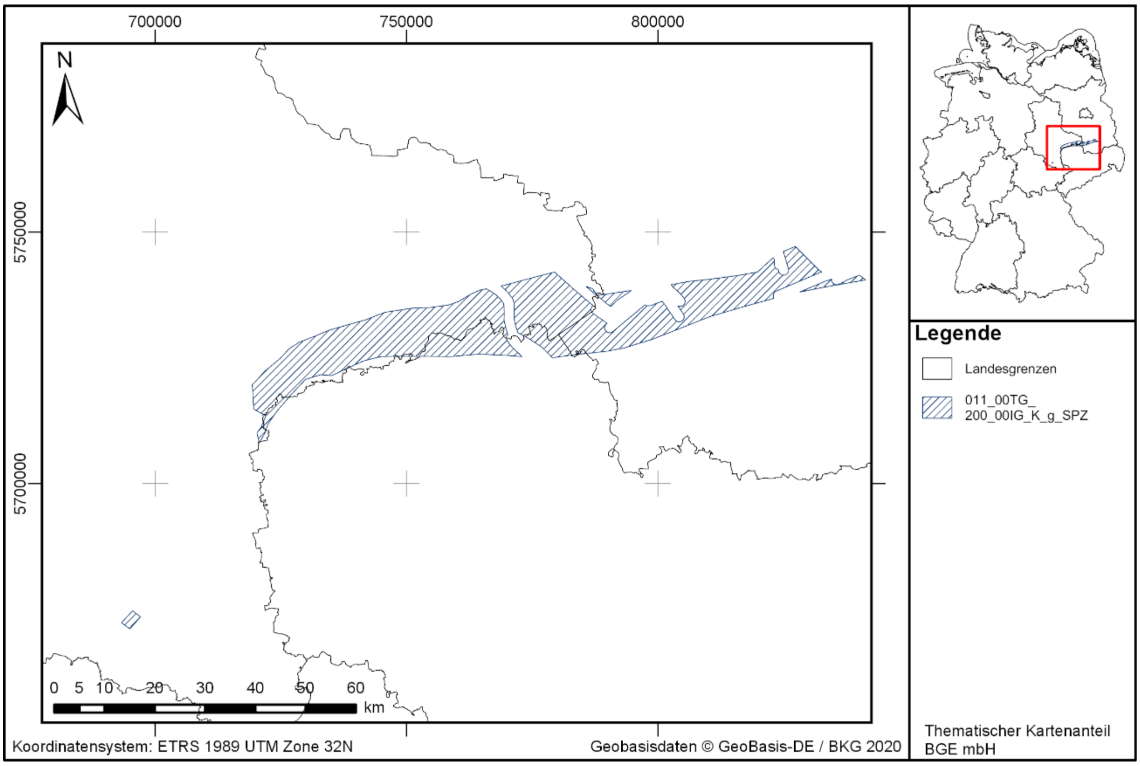


Figure 51: Overview map of the sub-area 011_00TG_200_00IG_K_g_SPZ. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

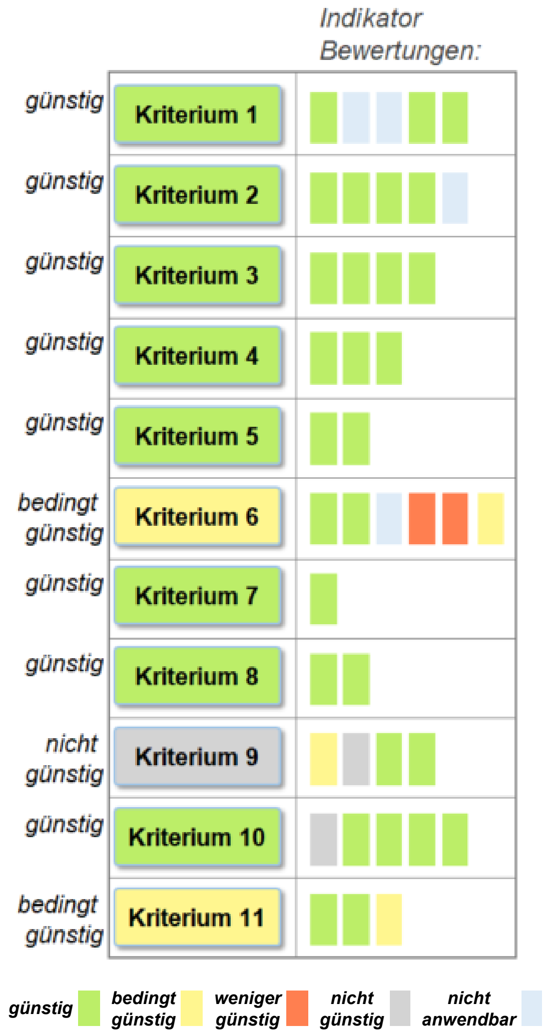
Table 29: Characteristics of the sub-area 011_00TG_200_00IG_K_g_SPZ

Characteristics of the sub-area 011_00TG_200_00IG_K_g_SPZ	
IA code	200_00IG_K_g_SPZ
Host rock type and configuration	Crystalline host rock in the basement
Geographic location	The sub-area extends along the border between Saxony-Anhalt and Saxony to the federal state of Brandenburg.
Surface area	991 km²
Geological characteristics	The sub-area is located in the basement of the Southern Phyllite Zone and has a thickness of between 210 and 1,200 metres. The surface of the sub-area is located at a depth of 300 metres to 1,290 metres below ground surface.

Table 30: Result of the geoscientific weighing criteria for the sub-area 011_00TG_200_00IG_K_g_SPZ.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated "favourable" and two criteria were rated "not favourable".

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “favourable” for this identified area. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.2.4 Sub-area 012_01TG_198_01IG_K_g_RHE

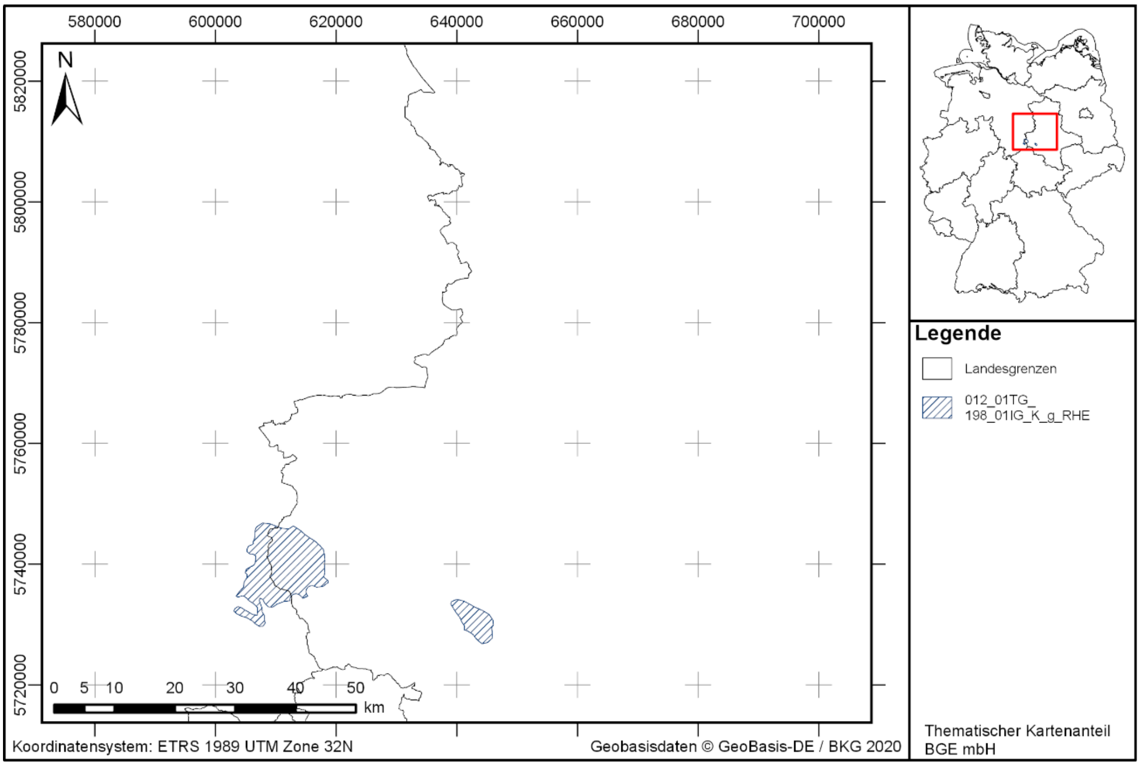


Figure 52: Overview map of the sub-area 012_01TG_198_01IG_K_g_RHE. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

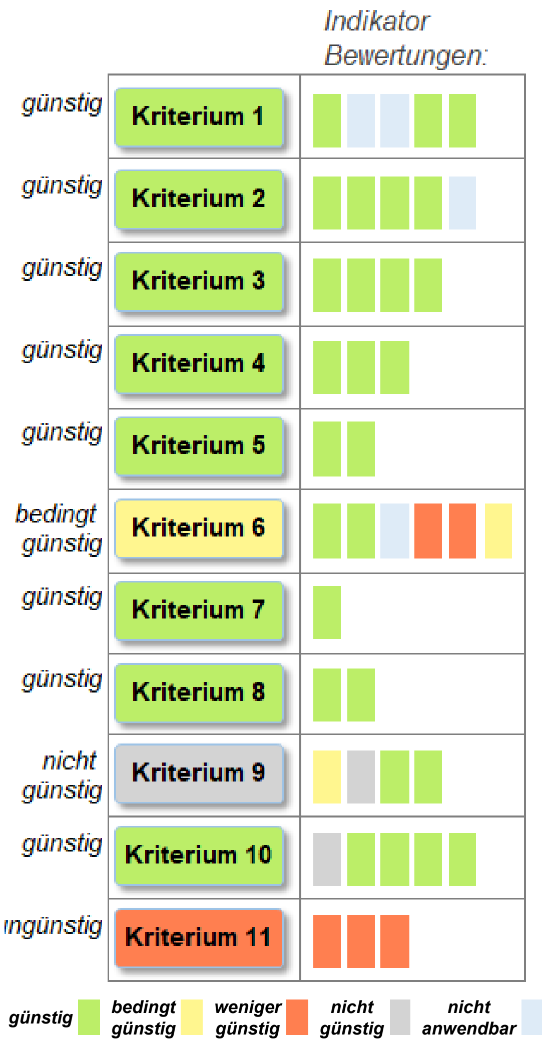
Table 31: Characteristics of the sub-area 012_01TG_198_01IG_K_g_RHE

Characteristics of the sub-area 012_01TG_198_01IG_K_g_RHE	
IA code	198_01IG_K_g_RHE
Host rock type and configuration	Crystalline host rock in the basement
Geographic location	The sub-area is traversed by exclusion criteria and is located on the one side along the southern border between Lower Saxony and Saxony-Anhalt and along the western edge of Saxony-Anhalt on the other.
Surface area	175 km²
Geological characteristics	The sub-area is located in the basement of the Rhenohercynian Zone and has a thickness of between 350 and 1,200 metres. The surface of the sub-area is located at a depth of 300 metres to 1,150 metres below ground surface.

Table 32: Result of the geoscientific weighing criteria for the sub-area 012_01TG_198_01IG_K_g_RHE.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated “favourable” and two criteria were rated “not favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “unfavourable”. The unfavourable evaluation for criterion 11 is due to the fact that the crystalline host rock in the identified area is located at ground surface and is therefore not covered by other rocks (“lack of coverage”). For this reason, the overburden consists of crystalline rock with a thickness of 300 m; it can nonetheless potentially guarantee groundwater- and erosion-inhibiting coverage of the effective containment zone without structural, hydraulically effective complications. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.2.5 Sub-area 012_02TG_198_02IG_K_i_RHE

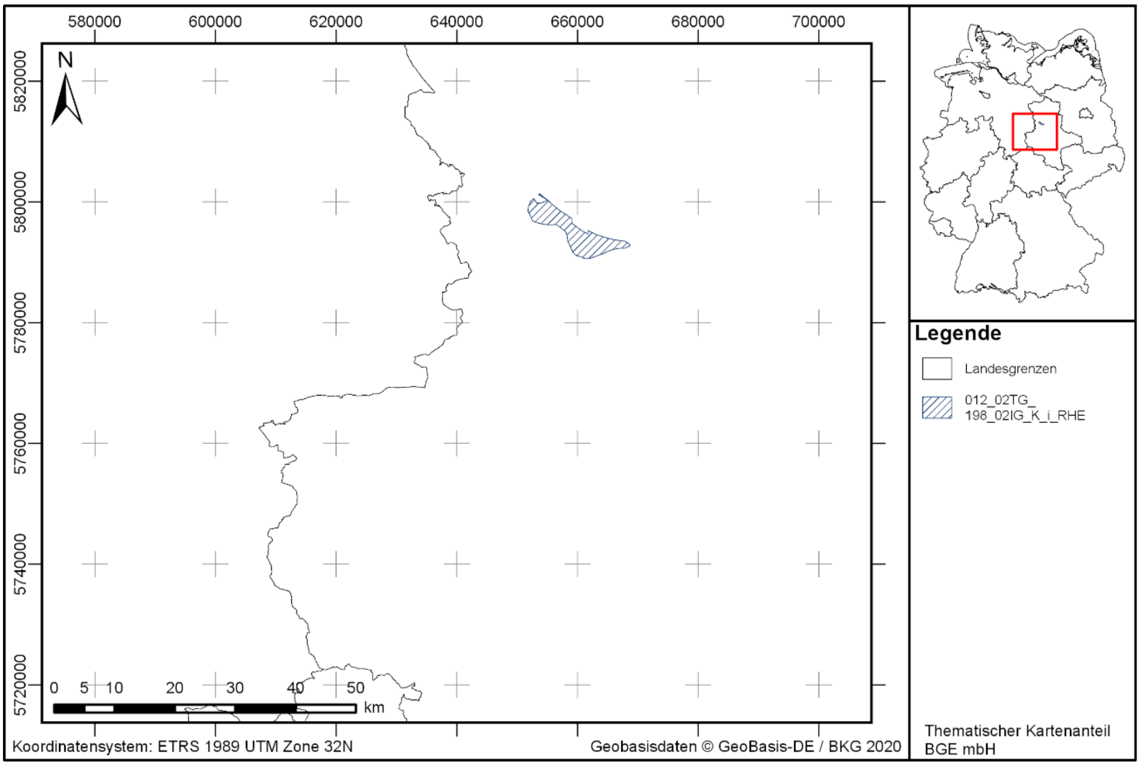


Figure 53: Overview map of the sub-area 012_02TG_198_02IG_K_i_RHE. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

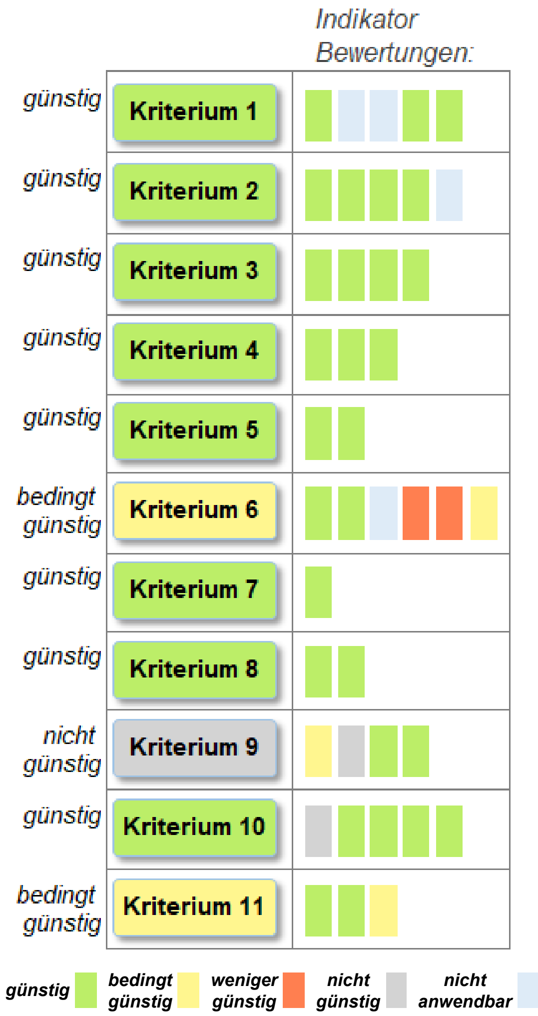
Table 33: Characteristics of the sub-area 012_02TG_198_02IG_K_i_RHE

Characteristics of the sub-area 012_0sTG_198_0sIG_K_i_RHE	
IA code	198_02IG_K_i_RHE
Host rock type and configuration	Intrusion body of crystalline host rock from the basement
Geographic location	The sub-area is located in the west of Saxony-Anhalt, near the border with Lower Saxony.
Surface area	52 km²
Geological characteristics	The sub-area is located in the basement of the Rhenohercynian Zone and has a thickness of between 210 and 920 metres. The surface of the sub-area is located at a depth of 580 metres to 1,290 metres below ground surface.

Table 34: Result of the geoscientific weighing criteria for the sub-area 012_02TG_198_02IG_K_i_RHE.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated “favourable” and two criteria were rated “not favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “favourable” for this identified area. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.2.6 Sub-area 013_00TG_195_00IG_K_g_MO

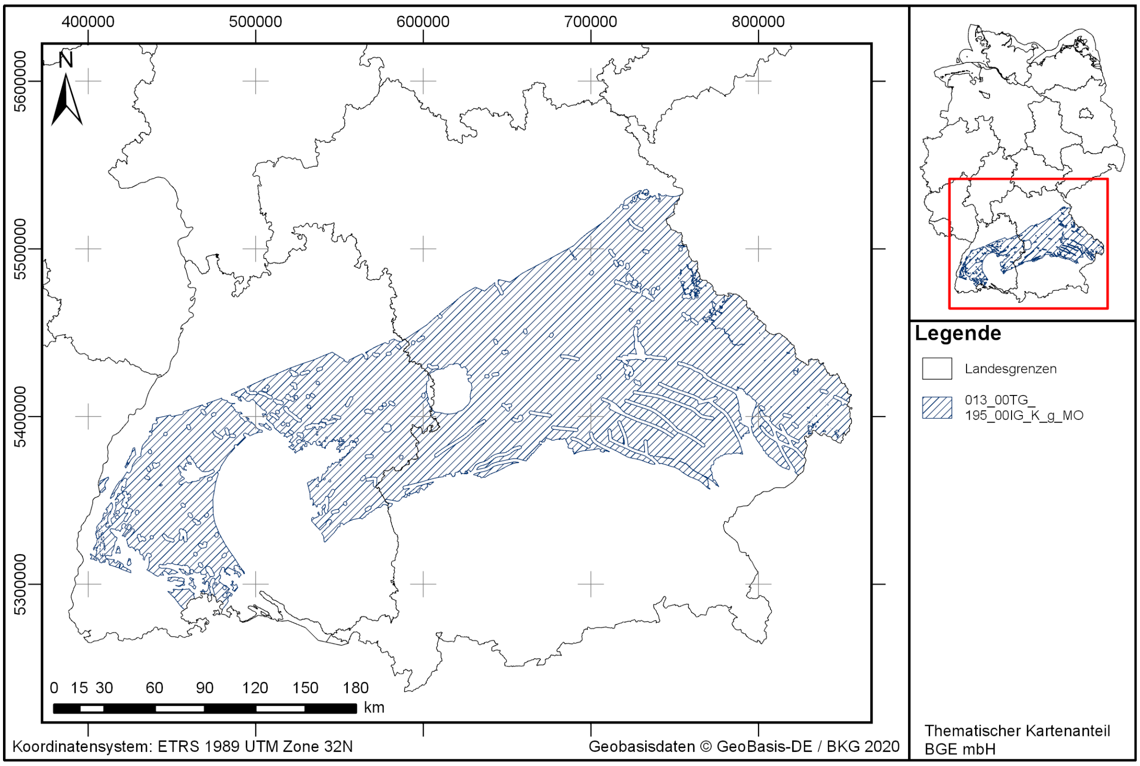


Figure 54: Overview map of the sub-area 013_00TG_195_00IG_K_g_MO. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 35: Characteristics of the sub-area 013_00TG_195_00IG_K_g_MO

Characteristics of the sub-area 013_00TG_195_00IG_K_g_MO	
IA code	195_00IG_K_g_MO
Host rock type and configuration	Crystalline host rock in the basement
Geographic location	The sub-area extends from the southwest through Baden-Württemberg and Bavaria in the south of Germany.
Surface area	36,836 km²
Geological characteristics	The sub-area is located in the basement of the Moldanubian Zone and has a thickness of between 200 and 1,200 metres. The surface of the sub-area is located at a depth of 300 metres to 1,300 metres below ground surface.

Table 36: Result of the geoscientific weighing criteria for the sub-area 013_00TG_195_00IG_K_g_MO.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:

Indikator Bewertungen:

günstig	**Kriterium 1**	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
günstig	**Kriterium 2**	Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
günstig	**Kriterium 3**	Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
günstig	**Kriterium 4**	Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
günstig	**Kriterium 5**	Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
bedingt günstig	**Kriterium 6**	Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
günstig	**Kriterium 7**	Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
günstig	**Kriterium 8**	Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
nicht günstig	**Kriterium 9**	Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
günstig	**Kriterium 10**	Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
bedingt günstig	**Kriterium 11**	Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

günstig ***bedingt günstig*** ***weniger günstig*** ***nicht günstig*** ***nicht anwendbar***

Reasoning for the summarised evaluation:

Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated “favourable” and two criteria were rated “not favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “favourable” for this identified area. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.2.7 Sub-area 014_00TG_199_00IG_K_g_NPZ

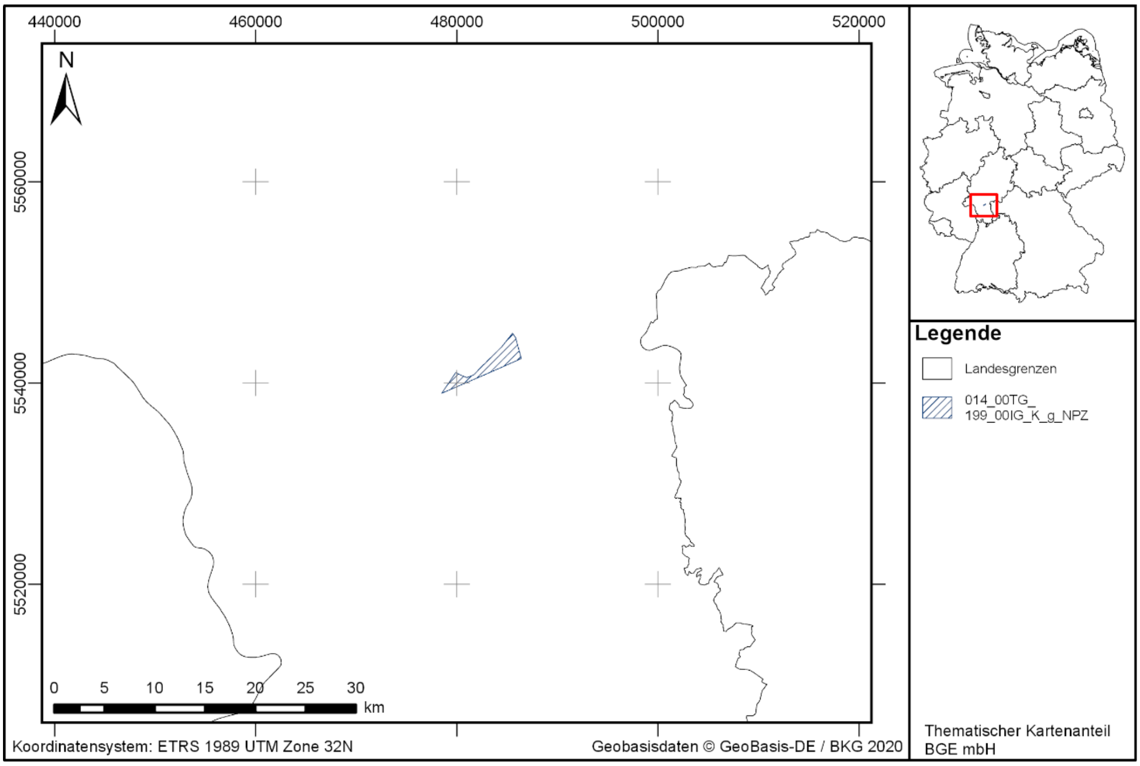


Figure 55: Overview map of the sub-area 014_00TG_199_00IG_K_g_NPZ. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

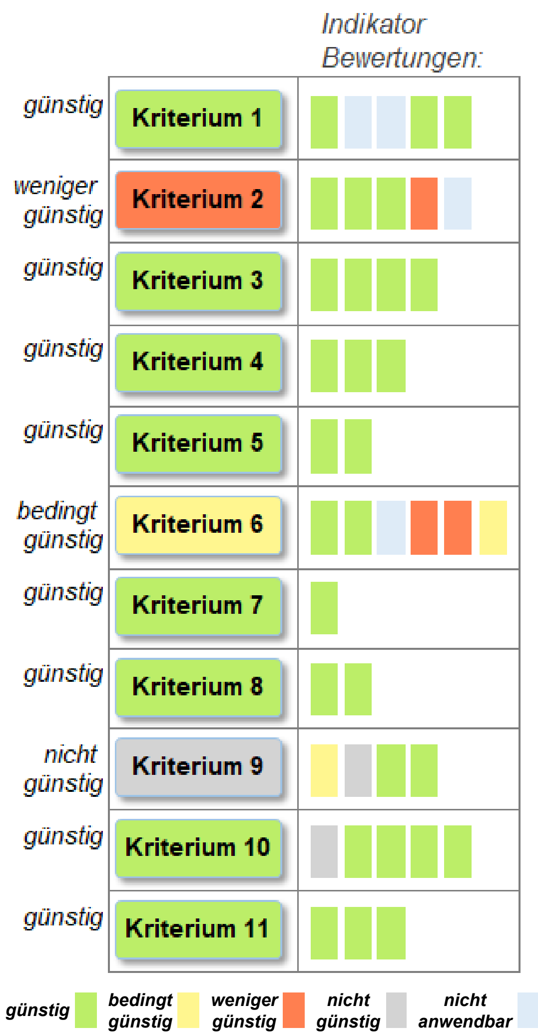
Table 37: Characteristics of the sub-area 014_00TG_199_00IG_K_g_NPZ

Characteristics of the sub-area 014_00TG_199_00IG_K_g_NPZ	
IA code	199_00IG_K_g_NPZ
Host rock type and configuration	Crystalline host rock in the basement
Geographic location	The sub-area is located in the south of the federal state of Hesse.
Surface area	10 km²
Geological characteristics	The sub-area is located in the basement of the Northern Phyllite Zone (NPZ) and has a thickness of between 1,180 and 1,200 metres. The surface of the sub-area is located at a depth of 300 metres to 320 metres below ground surface.

Table 38: Result of the geoscientific weighing criteria for the sub-area 014_00TG_199_00IG_K_g_NPZ.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Nine of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for crystalline rock; seven criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for crystalline host rock in regard to the criteria 2 (configuration) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “less favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “favourable”. The Northern Phyllite Zone is mainly composed of low-grade metamorphic units (phyllites), which are not potential crystalline host rocks for the final disposal of high-level radioactive waste. An exception is the identified area 199_00IG_K_g_NPZ, where two drill holes provide direct evidence of crystalline host rocks (cf. BGE 2020j). For this reason, the lithological formation is indicative of a **favourable overall geological situation**, even though the area is several times smaller than the required space. Furthermore, a repository system based primarily on technical and geotechnical barriers may potentially be feasible in the crystalline host rock (refer to Section 23 para. 4 StandAG). In the case of Section 23 para. 4 StandAG, the weighing criterion according to Annex 2 (to Section 24 para. 3) StandAG is replaced with a calculated retention capacity that the technical and geotechnical barriers are likely to achieve (refer to Section 24 para. 2 StandAG). This mathematical validation can be submitted at a later stage in the site selection procedure (refer to Section 23 para. 4). Given that a decision on which repository system will be implemented in the identified area at this time, all possibilities must be taken into consideration, and the result of the evaluation of the indicators for criterion 2 must be assessed accordingly. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3 Sub-areas in rock salt host rock

5.3.1 Sub-area 015_00TG_001_00IG_S_s_z

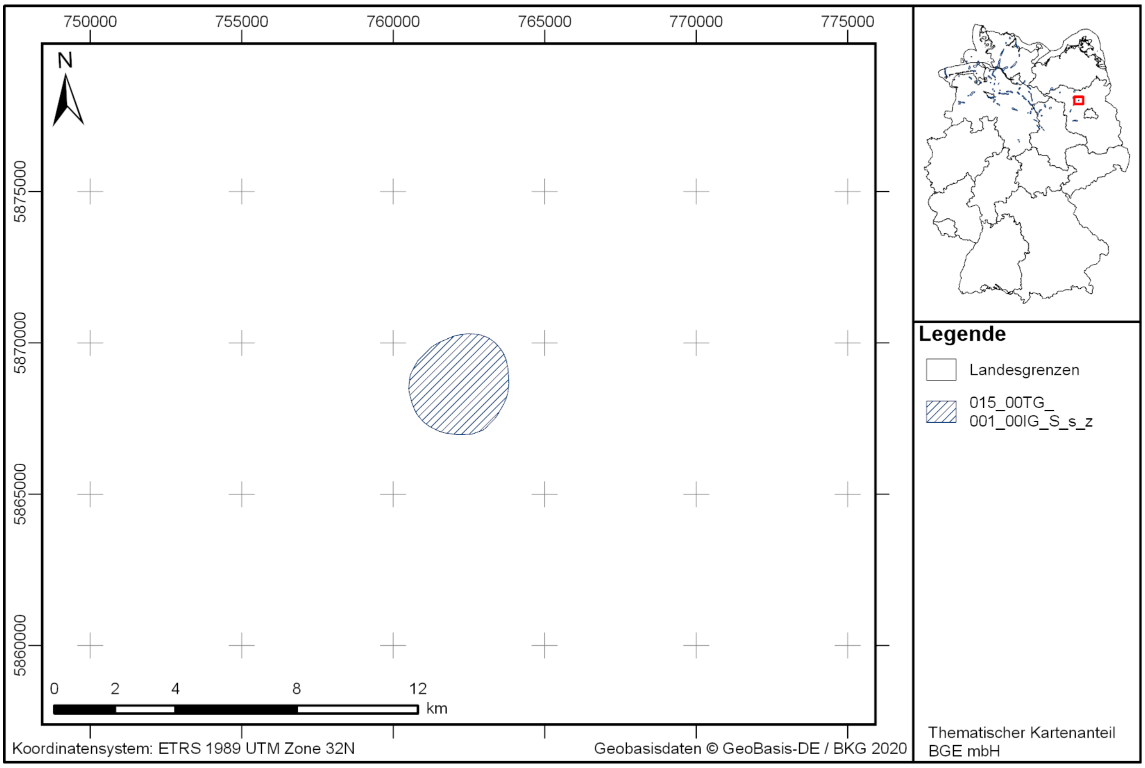


Figure 56: Overview map of the sub-area 015_00TG_001_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

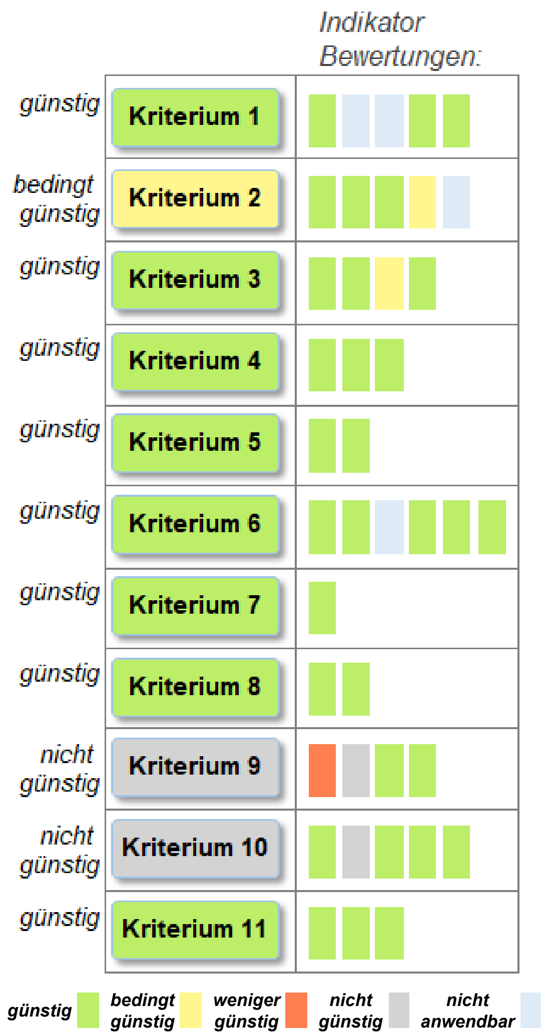
Table 39: Characteristics of the sub-area 015_00TG_001_00IG_S_s_z

Characteristics of the sub-area 015_00TG_001_00IG_S_s_z	
IA code	001_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of Brandenburg.
Surface area	9 km²
Geological characteristics	The sub-area is located in the zechstein of the Wulkow salt structure and has a thickness of 850 metres. The sub-area is located at a depth of 650 metres to 1,500 metres below ground surface.

Table 40: Result of the geoscientific weighing criteria for the sub-area 015_00TG_001_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for the evaluation of spatial characterisability” and the “criterion for evaluation of protection of the effective containment zone by the overburden” were rated “favourable”. The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be identified. Hence, application of the geoscientific weighing criteria permits anticipation of a favourable overall geological situation for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.2 Sub-area 016_00TG_002_00IG_S_s_z

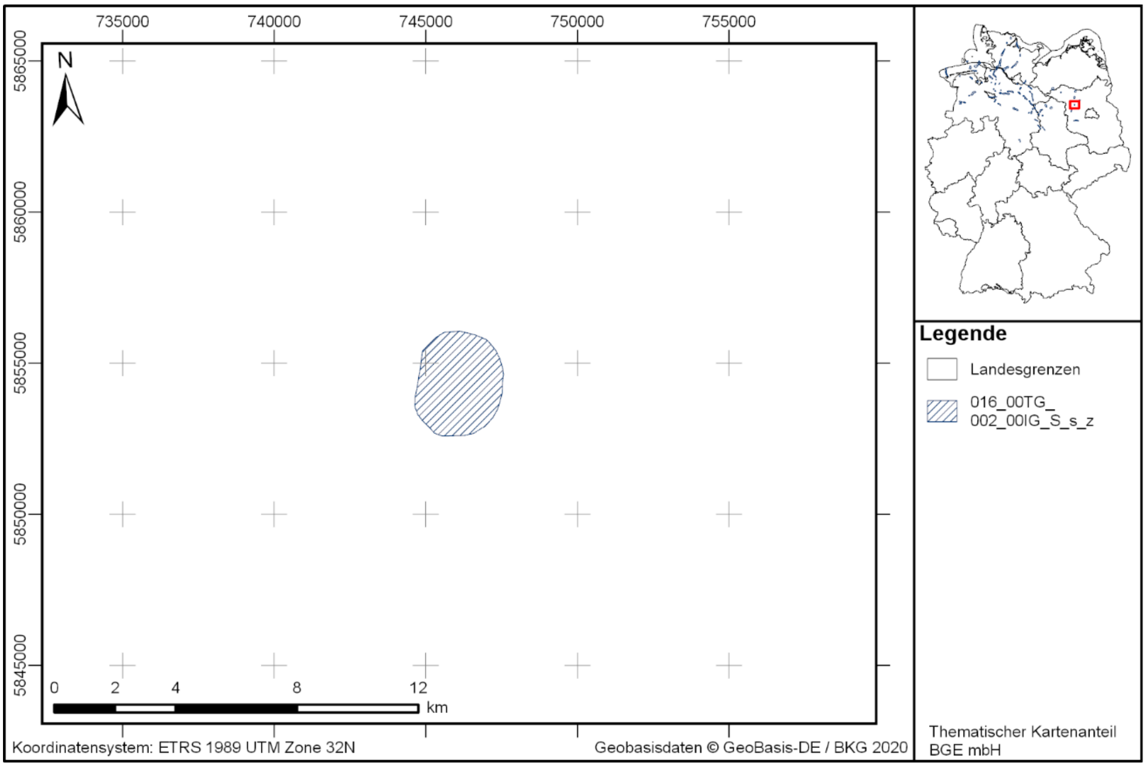


Figure 57: Overview map of the sub-area 016_00TG_002_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbH; Landesgrenzen = State borders.

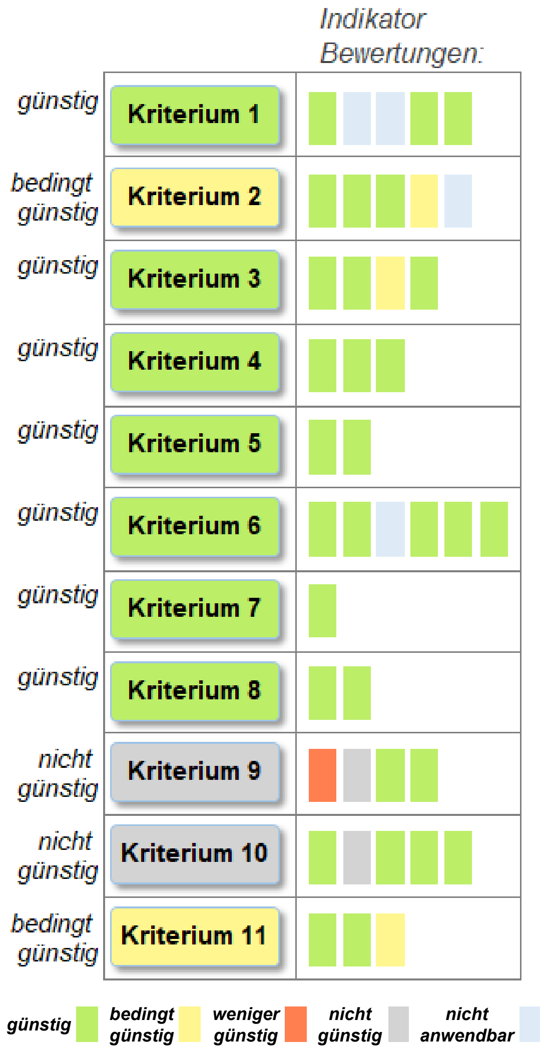
Table 41: Characteristics of the sub-area 016_00TG_002_00IG_S_s_z

Characteristics of the sub-area 016_00TG_002_00IG_S_s_z	
IA code	002_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of Brandenburg.
Surface area	8 km²
Geological characteristics	The sub-area is located in the zechstein of the Friesack salt structure and has a thickness of 990 metres. The sub-area is located at a depth of 510 metres to 1,500 metres below ground surface.

Table 42: Result of the geoscientific weighing criteria for the sub-area 016_00TG_002_00IG_S_s_z

<table>
<tr><th colspan="2">Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)</th></tr>
<tr><td>

<u>Results of the summarised evaluation</u>:



</td><td>

<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

</td></tr>
<tr><td colspan="2">

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

</td></tr>
</table>

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.3 Sub-area 017_00TG_003_00IG_S_s_z

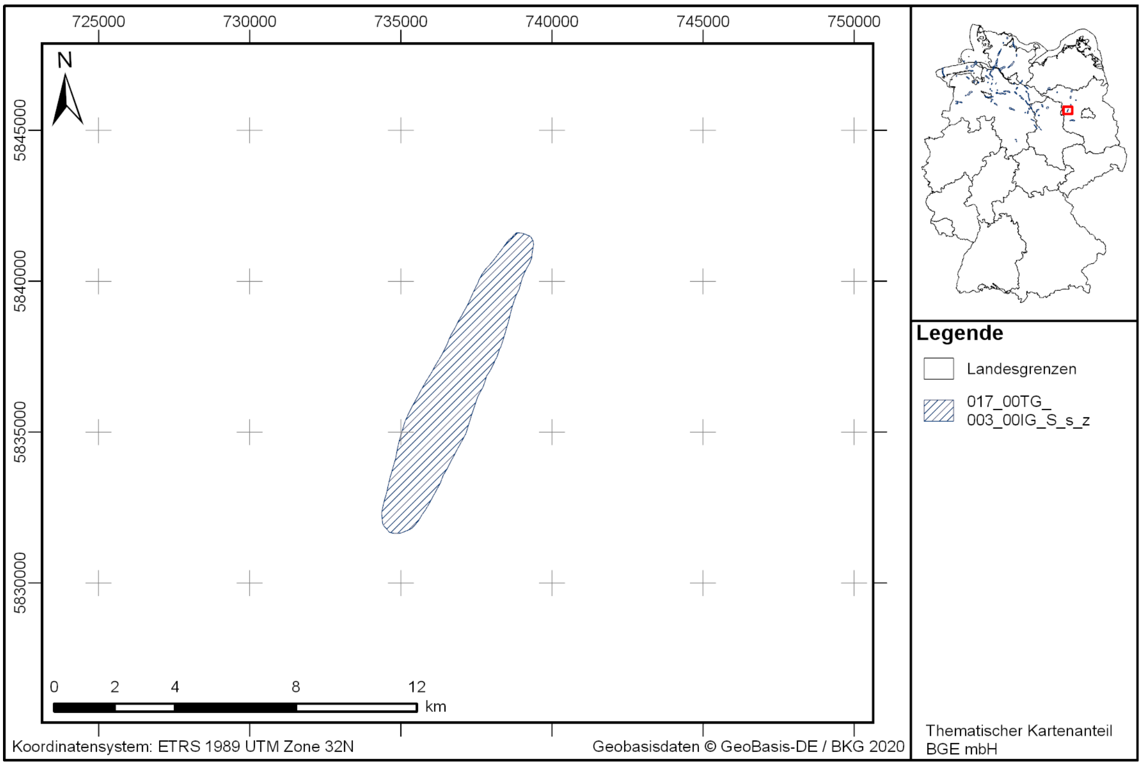


Figure 58: Overview map of the sub-area 017_00TG_003_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

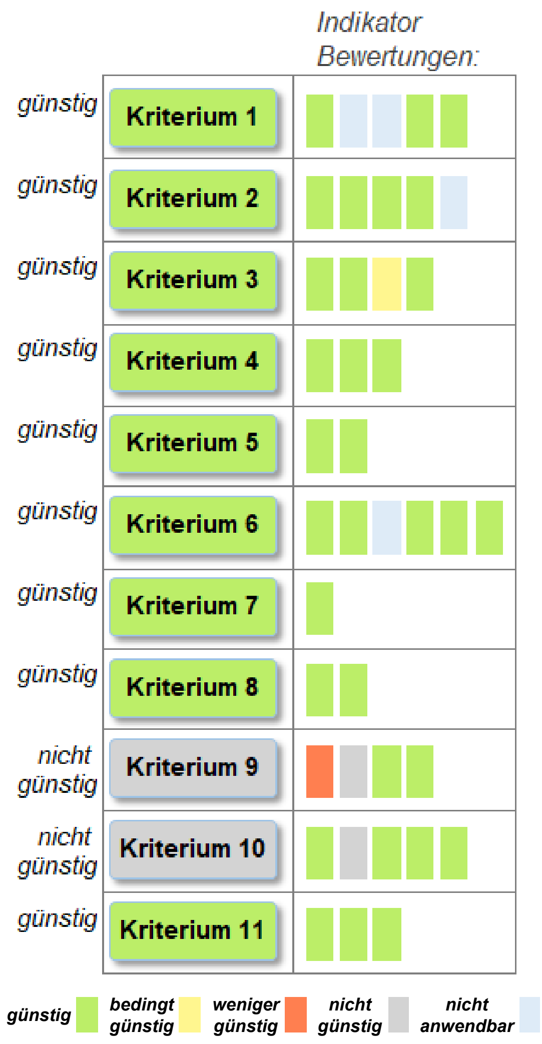
Table 43: Characteristics of the sub-area 017_00TG_003_00IG_S_s_z

Characteristics of the sub-area 017_00TG_003_00IG_S_s_z	
IA code	003_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the west of Brandenburg, on the north-eastern border with Saxony-Anhalt.
Surface area	16 km²
Geological characteristics	The sub-area is located in the zechstein of the Kotzen salt structure and has a thickness of 850 metres. The sub-area is located at a depth of 650 metres to 1,500 metres below ground surface.

Table 44: Result of the geoscientific weighing criteria for the sub-area 017_00TG_003_00IG_S_s_z
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

All evaluated criteria relating specifically to this area were rated “favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.4 Sub-area 018_00TG_006_00IG_S_s_z

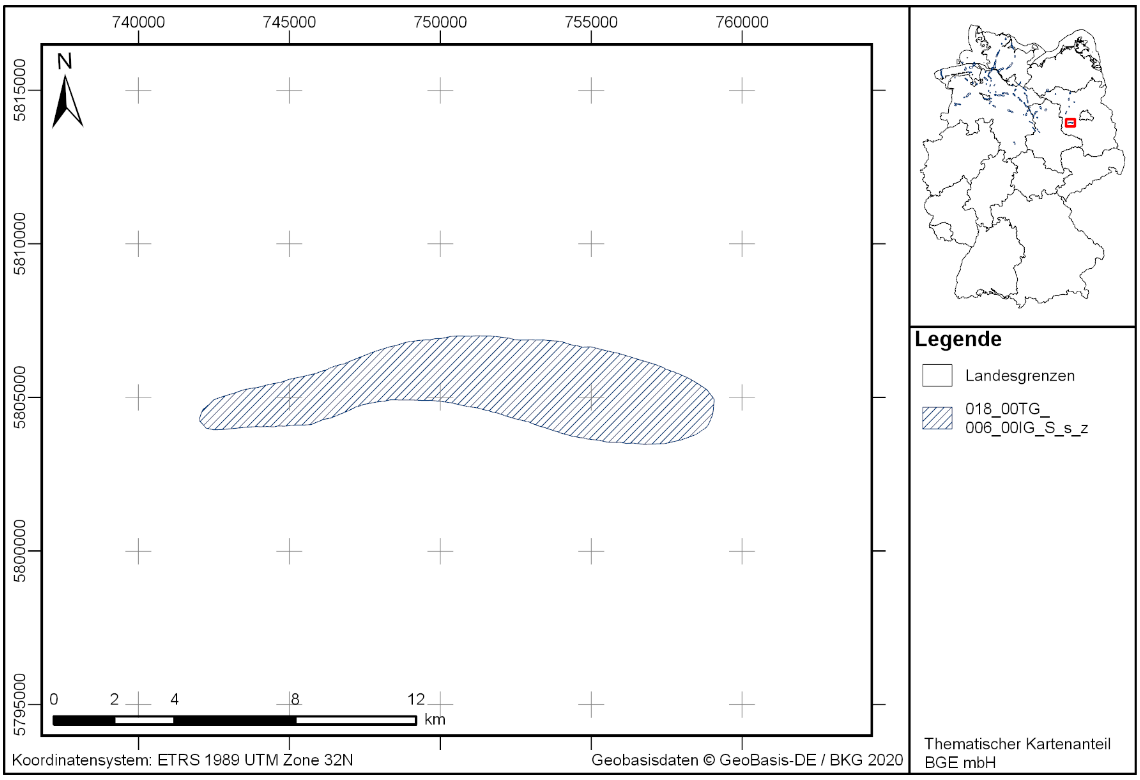


Figure 59: Overview map of the sub-area 018_00TG_006_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

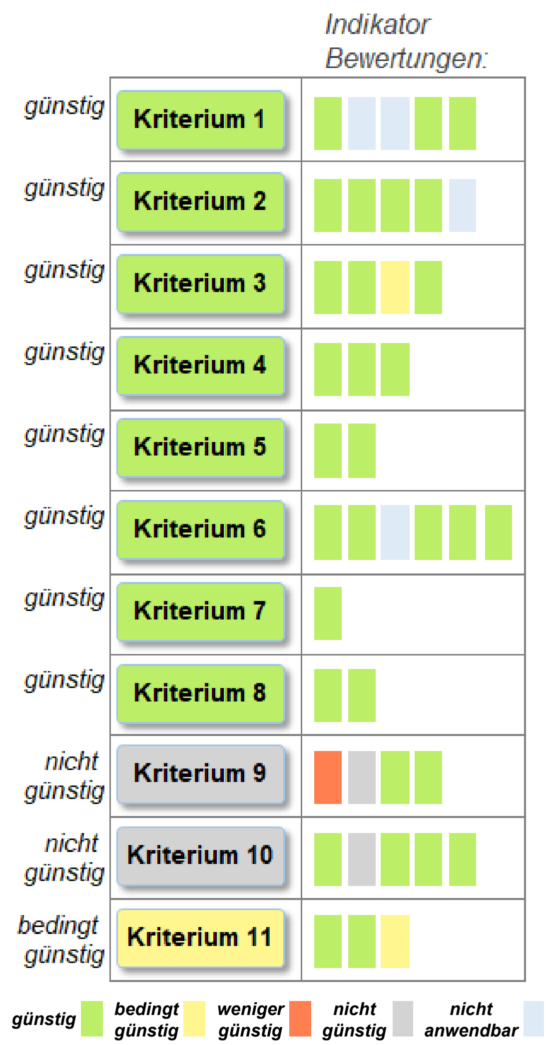
Table 45: Characteristics of the sub-area 018_00TG_006_00IG_S_s_z

Characteristics of the sub-area 018_00TG_006_00IG_S_s_z	
IA code	006_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the west of Brandenburg, on the east-north-eastern border with Saxony-Anhalt.
Surface area	35 km²
Geological characteristics	The sub-area is located in the zechstein of the Lehnin salt structure and has a thickness of 530 metres. The sub-area is located at a depth of 970 metres to 1,500 metres below ground surface.

Table 46: Result of the geoscientific weighing criteria for the sub-area 018_00TG_006_00IG_S_s_z
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.5 Sub-area 019_00TG_010_00IG_S_s_z

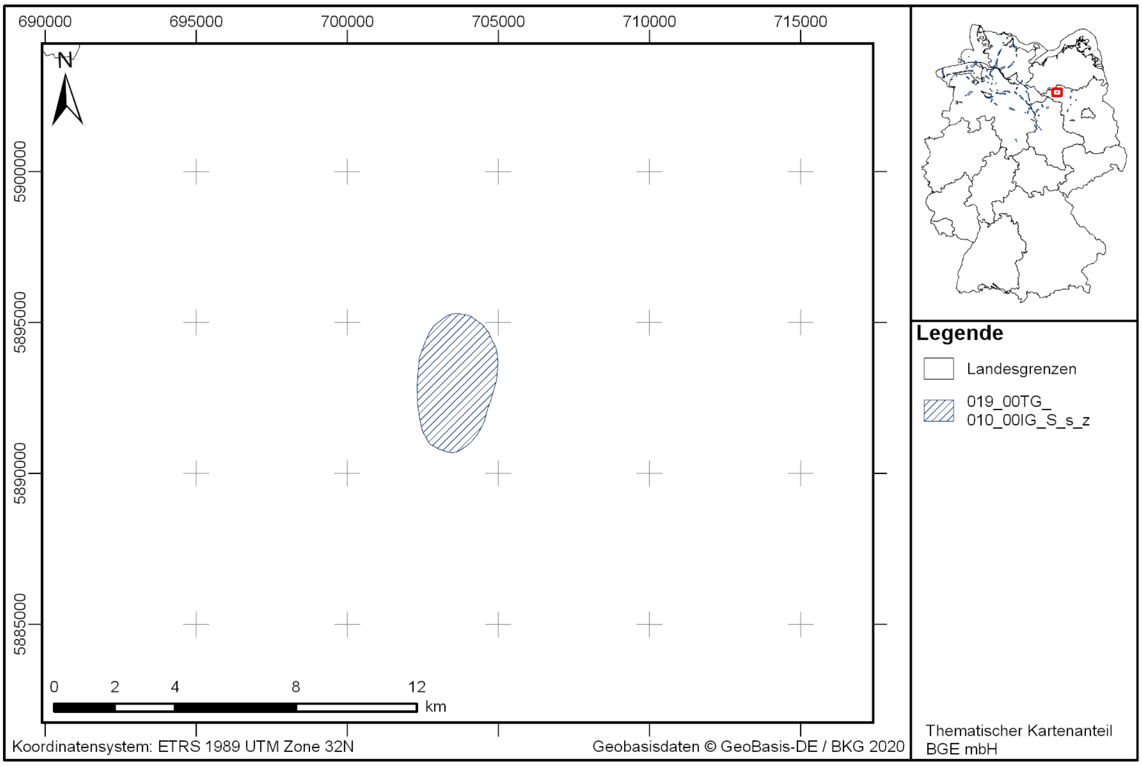


Figure 60: Overview map of the sub-area 019_00TG_010_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

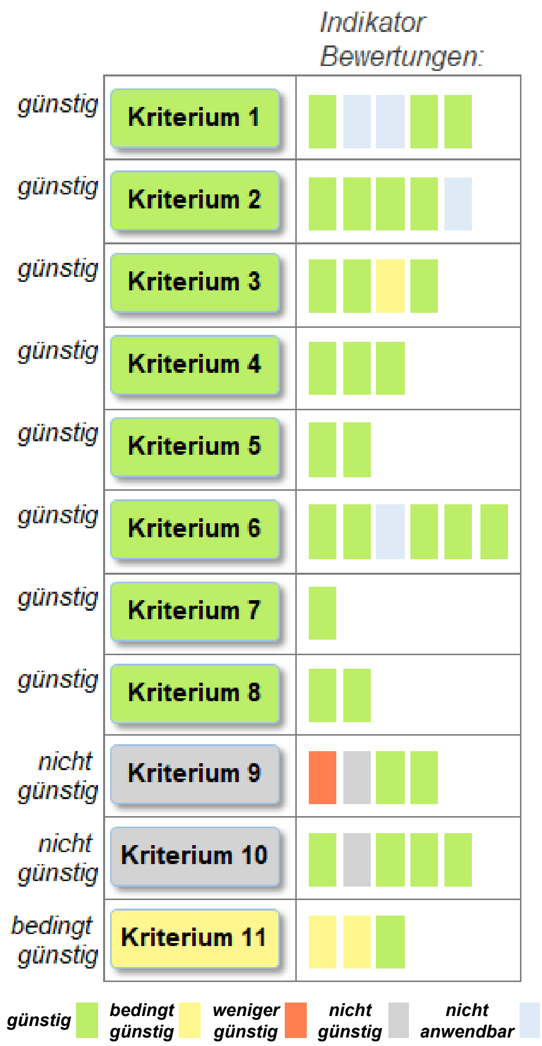
Table 47: Characteristics of the sub-area 019_00TG_010_00IG_S_s_z

Characteristics of the sub-area 019_00TG_010_00IG_S_s_z	
IA code	010_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of Brandenburg.
Surface area	10 km²
Geological characteristics	The sub-area is located in the zechstein of the Helle salt structure and has a thickness of 850 metres. The sub-area is located at a depth of 650 metres to 1,500 metres below ground surface.

Table 48: Result of the geoscientific weighing criteria for the sub-area 019_00TG_010_00IG_S_s_z
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". The indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone" was rated "conditionally favourable". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). However, the indicators "coverage with groundwater-inhibiting rock" and "coverage with erosion-inhibiting rock" of the "criterion for evaluation of protection of the effective containment zone by the overburden" were also rated "conditionally favourable". Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the total area, the overburden evaluation of "conditionally favourable" is weighed as less significant. It is therefore reasonable to assume that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.6 Sub-area 020_00TG_012_00IG_S_s_z

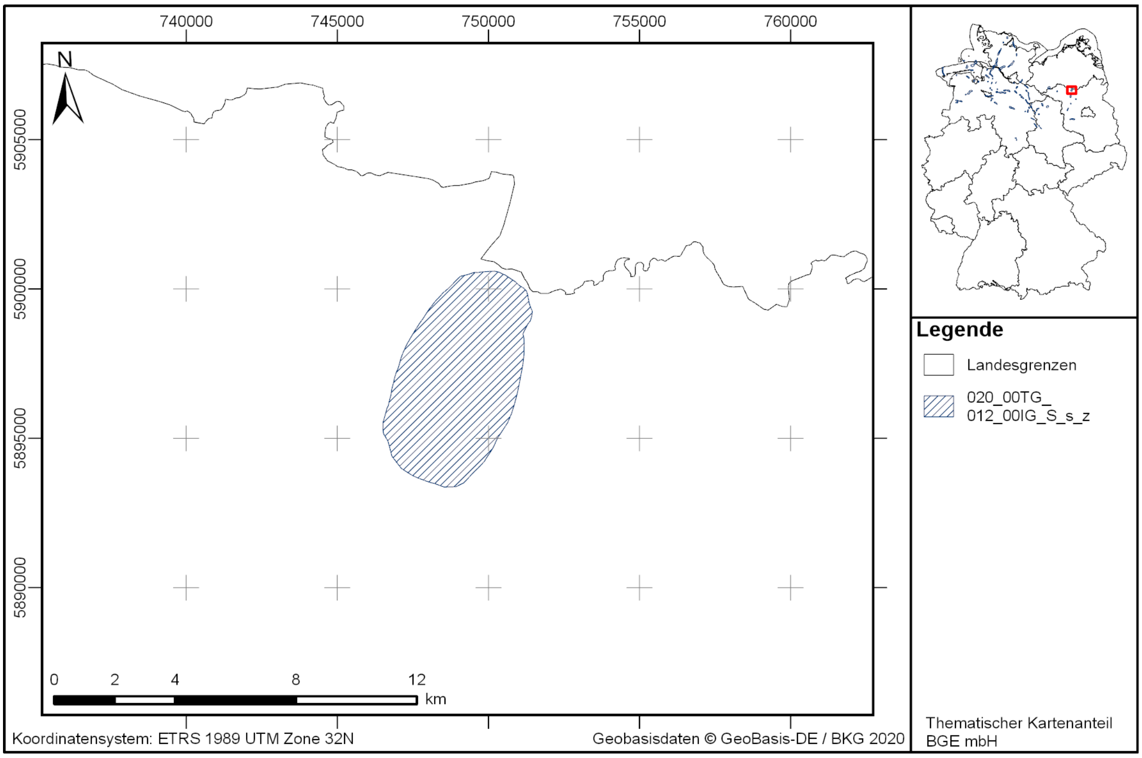


Figure 61: Overview map of the sub-area 020_00TG_012_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

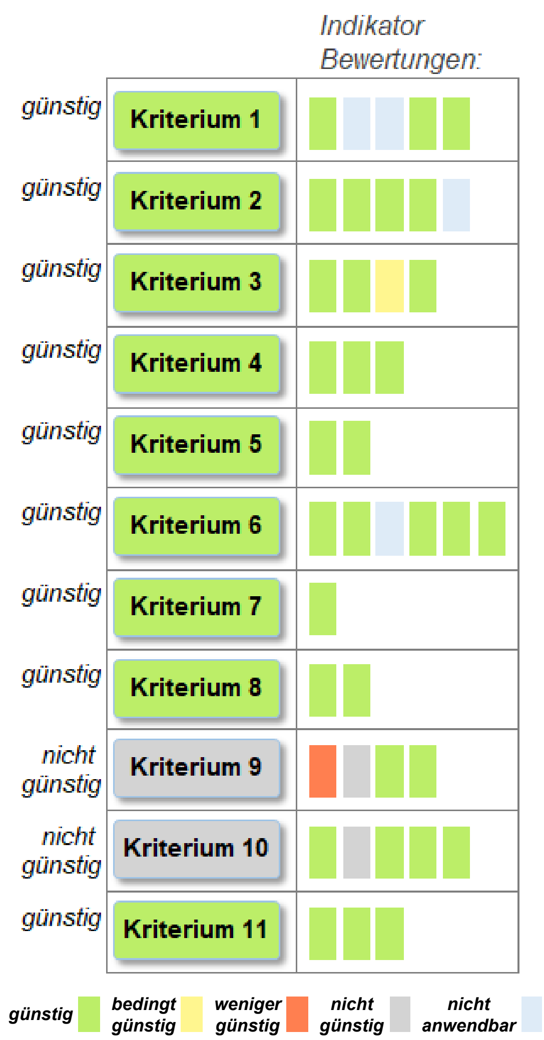
Table 49: Characteristics of the sub-area 020_00TG_012_00IG_S_s_z

Characteristics of the sub-area 020_00TG_012_00IG_S_s_z	
IA code	012_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of Brandenburg, directly on the south-eastern border to Mecklenburg-Vorpommern.
Surface area	24 km²
Geological characteristics	The sub-area is located in the zechstein of the Zechlin salt structure and has a thickness of 870 metres. The sub-area is located at a depth of 630 metres to 1,500 metres below ground surface.

Table 50: Result of the geoscientific weighing criteria for the sub-area 020_00TG_012_00IG_S_s_z
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

All evaluated criteria relating specifically to this area were rated “favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.7 Sub-area 021_00TG_017_00IG_S_s_z

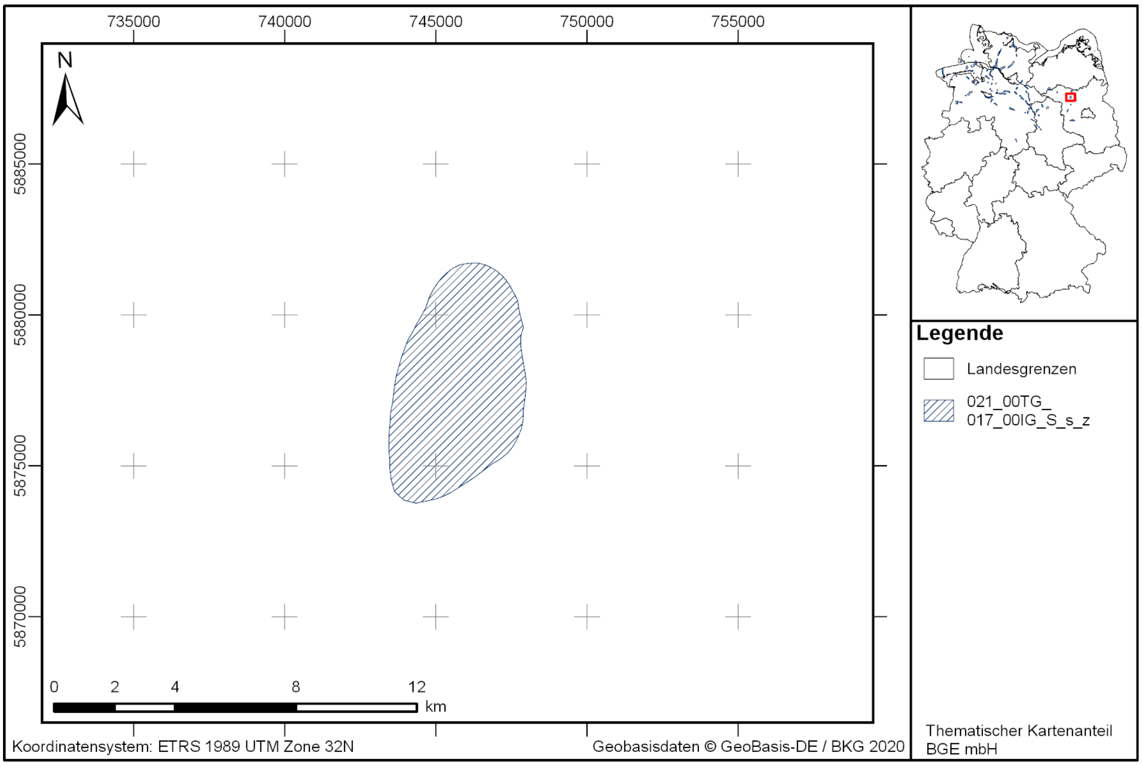
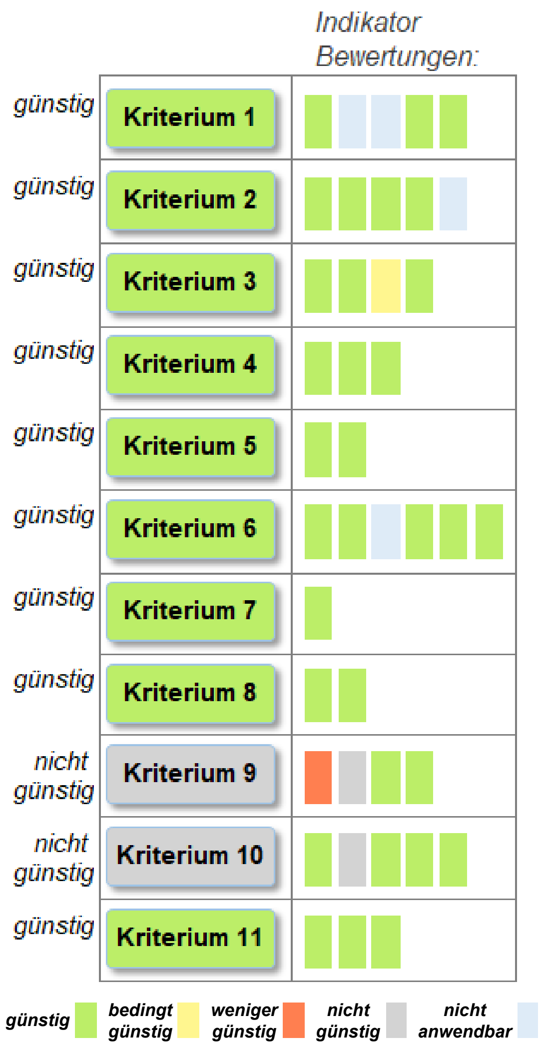


Figure 62: *Overview map of the sub-area 021_00TG_017_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.*

Table 51: *Characteristics of the sub-area 021_00TG_017_00IG_S_s_z*

Characteristics of the sub-area 021_00TG_017_00IG_S_s_z	
IA code	017_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of Brandenburg.
Surface area	27 km²
Geological characteristics	The sub-area is located in the zechstein of the Netzeband salt structure and has a thickness of 810 metres. The sub-area is located at a depth of 690 metres to 1,500 metres below ground surface.

Table 52: Result of the geoscientific weighing criteria for the sub-area 021_00TG_017_00IG_S_s_z
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
<u>Results of the summarised evaluation</u>: 	<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) <u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) <u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) <u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) <u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) <u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) <u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) <u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) <u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) <u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) <u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
<u>Reasoning for the summarised evaluation</u>: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden). All evaluated criteria relating specifically to this area were rated “favourable”.	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.8 Sub-area 022_00TG_019_00IG_S_s_z

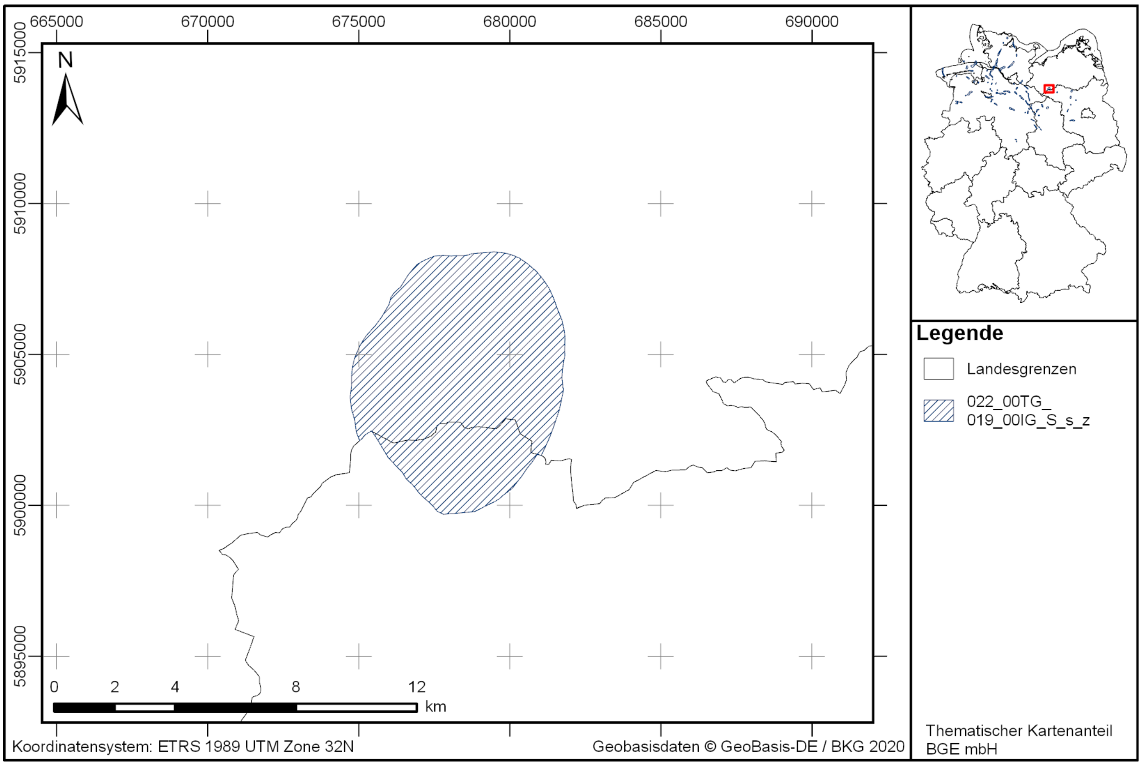


Figure 63: Overview map of the sub-area 022_00TG_019_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

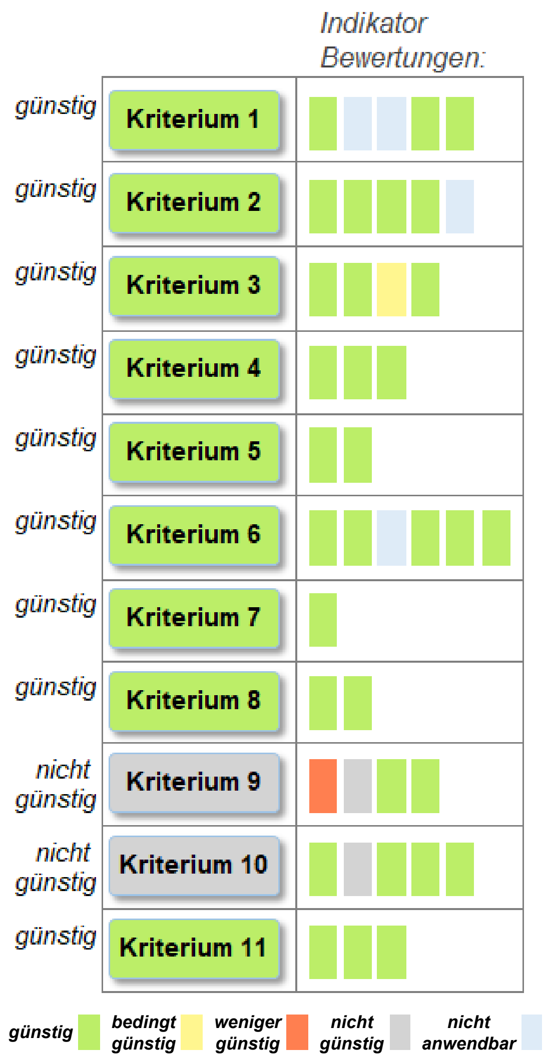
Table 53: Characteristics of the sub-area 022_00TG_019_00IG_S_s_z

Characteristics of the sub-area 022_00TG_019_00IG_S_s_z	
IA code	019_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the south of Mecklenburg-Vorpommern, directly on the north-western border to Brandenburg.
Surface area	46 km²
Geological characteristics	The sub-area is located in the zechstein of the Werle salt structure and has a thickness of 920 metres. The sub-area is located at a depth of 590 metres to 1,500 metres below ground surface.

Table 54: Result of the geoscientific weighing criteria for the sub-area 22_00TG_019_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

All evaluated criteria relating specifically to this area were rated “favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.9 Sub-area 023_00TG_028_00IG_S_s_z

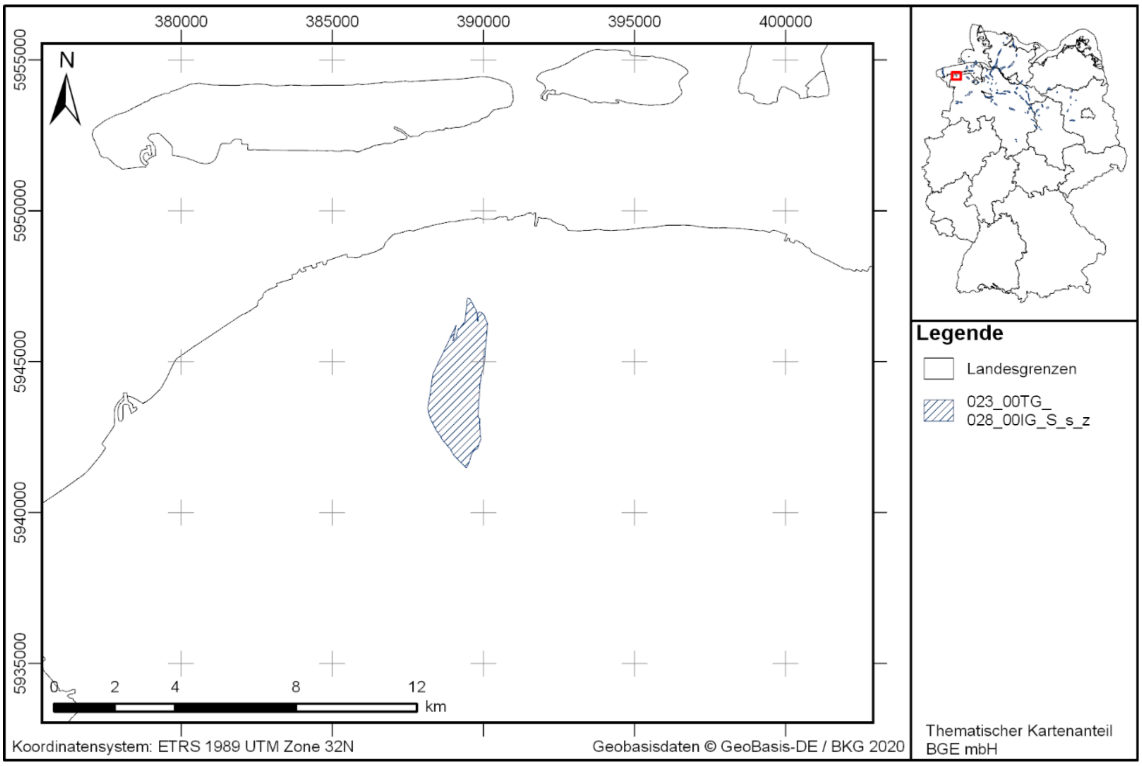


Figure 64: Overview map of the sub-area 023_00TG_028_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

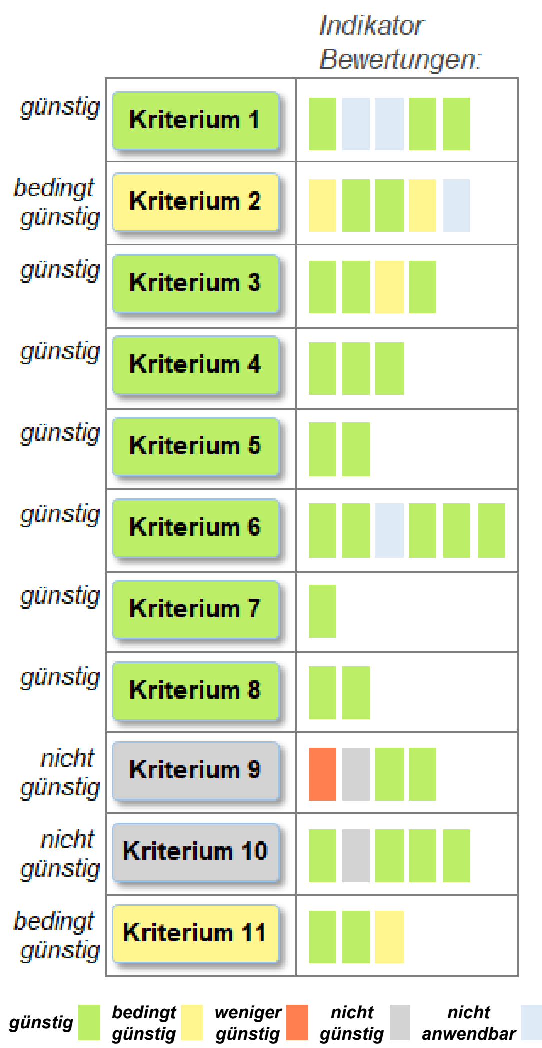
Table 55: Characteristics of the sub-area 023_00TG_028_00IG_S_s_z

Characteristics of the sub-area 023_00TG_028_00IG_S_s_z	
IA code	028_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of Brandenburg, level with the eastern tip of the North Sea island Nordeney.
Surface area	7 km²
Geological characteristics	The sub-area is located in the zechstein of the Westdorf salt structure and has a thickness of 450 metres. The sub-area is located at a depth of 1,040 metres to 1,500 metres below ground surface.

*Table 56: Result of the geoscientific weighing criteria for the sub-area 023_00TG_028_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be identified. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.10 Sub-area 024_00TG_029_00IG_S_s_z

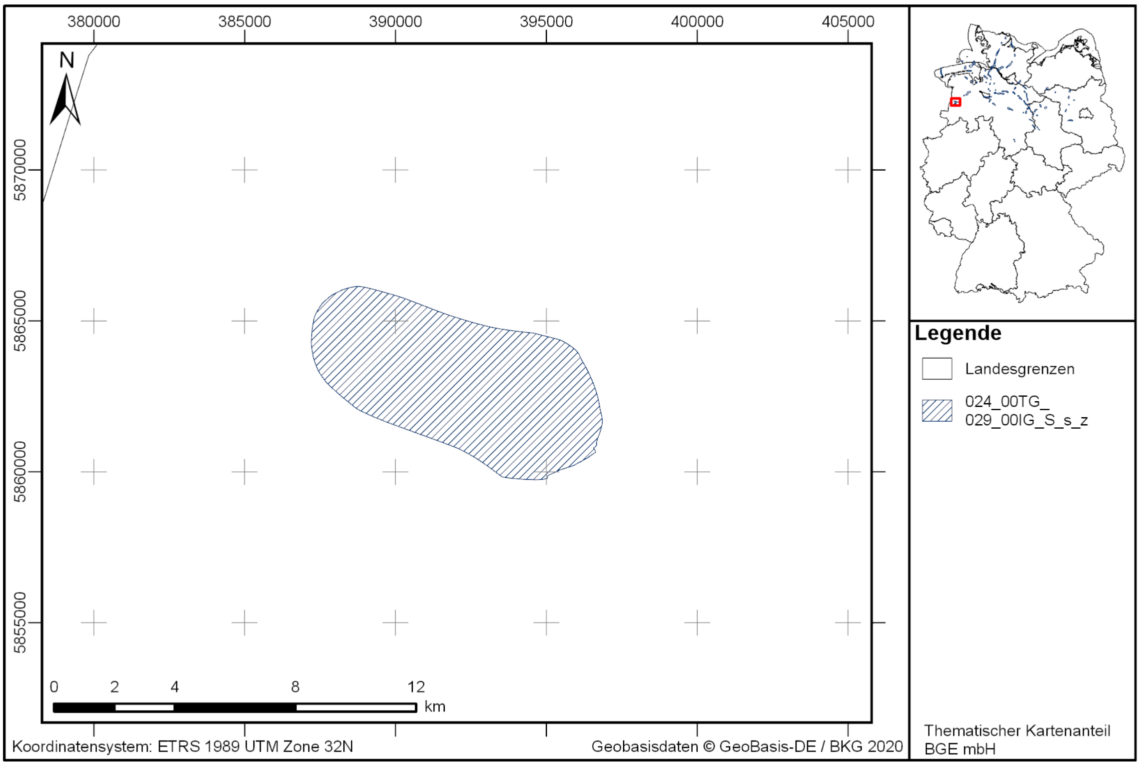


Figure 65: Overview map of the sub-area 024_00TG_029_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

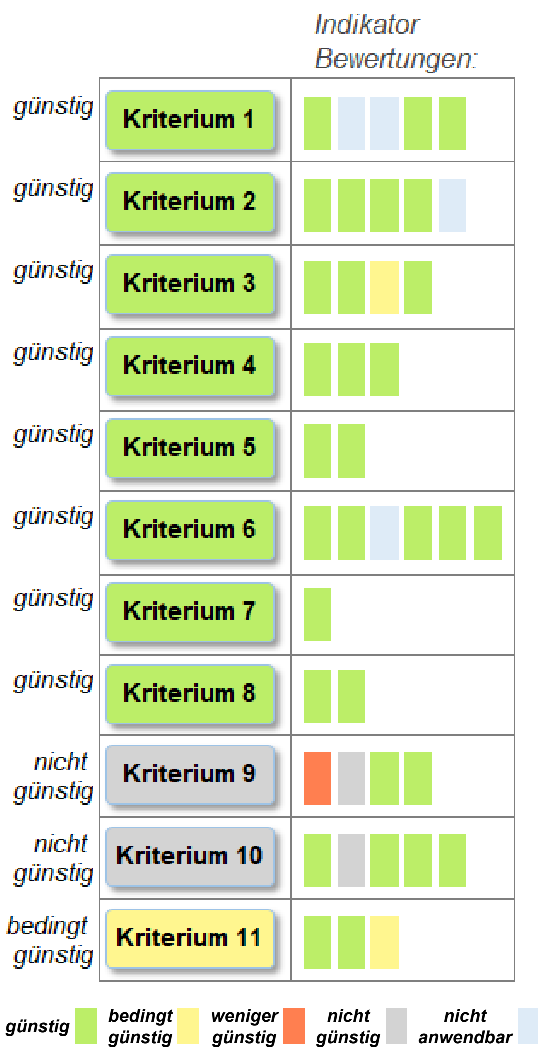
Table 57: Characteristics of the sub-area 024_00TG_029_00IG_S_s_z

Characteristics of the sub-area 024_00TG_029_00IG_S_s_z	
IA code	029_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the west of Lower Saxony, just before the border with the Netherlands.
Surface area	39 km²
Geological characteristics	The sub-area is located in the zechstein of the Wahn salt structure and has a thickness of 940 metres. The sub-area is located at a depth of 560 metres to 1,500 metres below ground surface.

Table 58: Result of the geoscientific weighing criteria for the sub-area 024_00TG_029_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.11 Sub-area 025_00TG_030_00IG_S_s_z

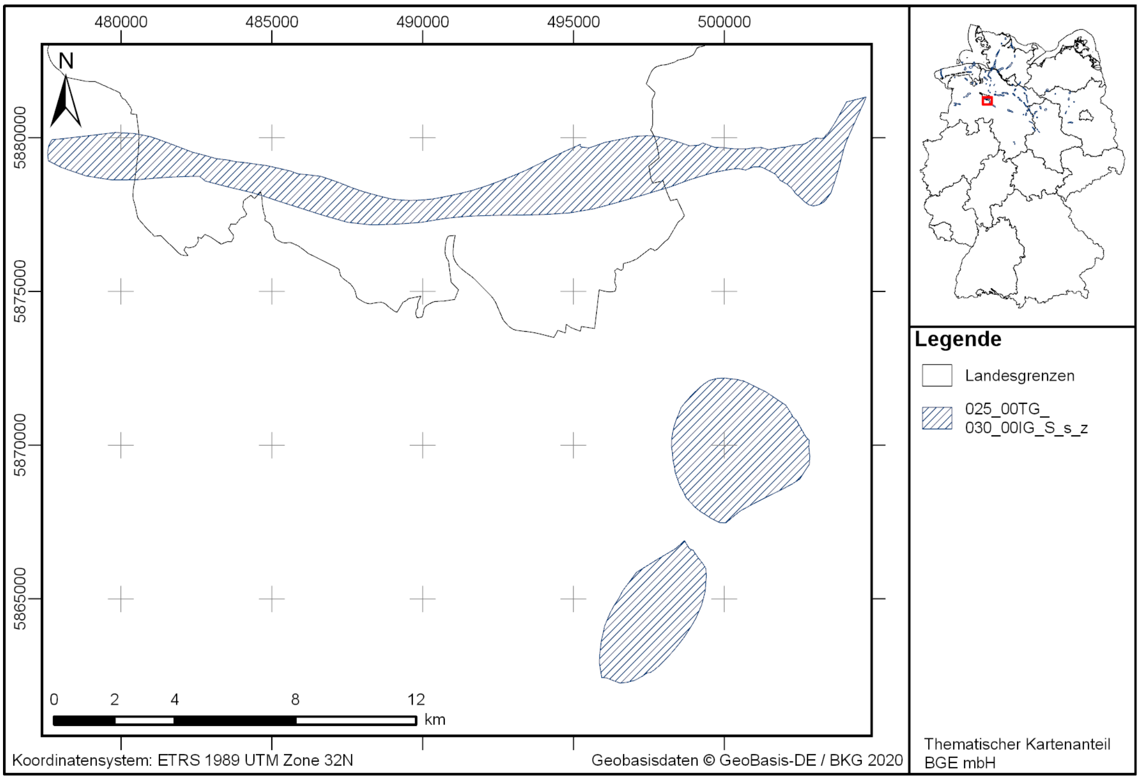


Figure 66: Overview map of the sub-area 025_00TG_030_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

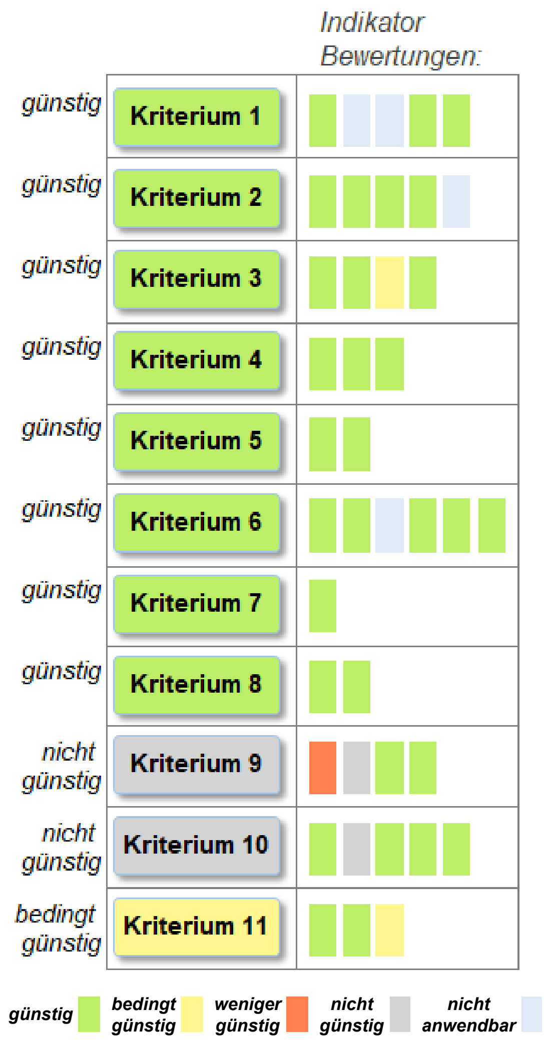
Table 59: Characteristics of the sub-area 025_00TG_030_00IG_S_s_z

Characteristics of the sub-area 025_00TG_030_00IG_S_s_z	
IA code	030_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area runs through the northern federal state of Bremen and extends over both the western and eastern borders of Bremen into the federal state of Lower Saxony.
Surface area	59 km²
Geological characteristics	The area is located in the zechstein of the Arsten/Osterholz/Schaphusen/Thedinghausen/Emtinghausen salt structure and has a thickness of 920 metres. The sub-area is located at a depth of 580 metres to 1,500 metres below ground surface.

Table 60: Result of the geoscientific weighing criteria for the sub-area 025_00TG_030_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.12 Sub-area 026_00TG_035_00IG_S_s_z

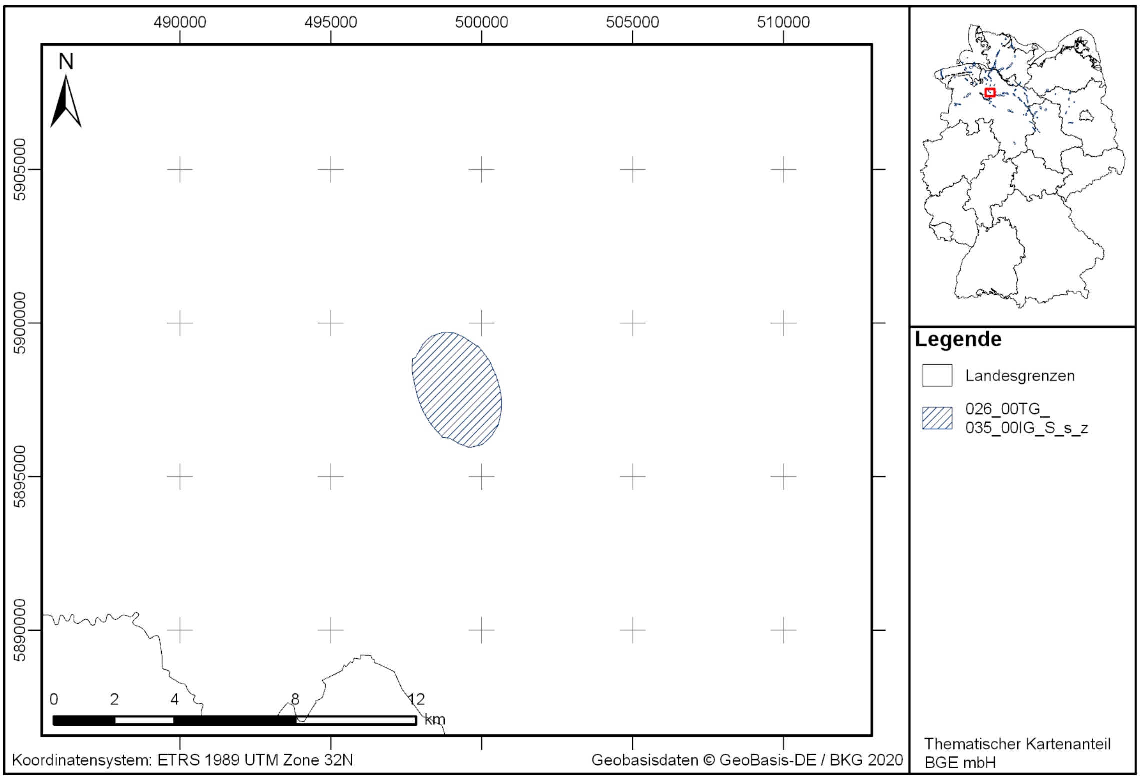


Figure 67: Overview map of the sub-area 026_00TG_035_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

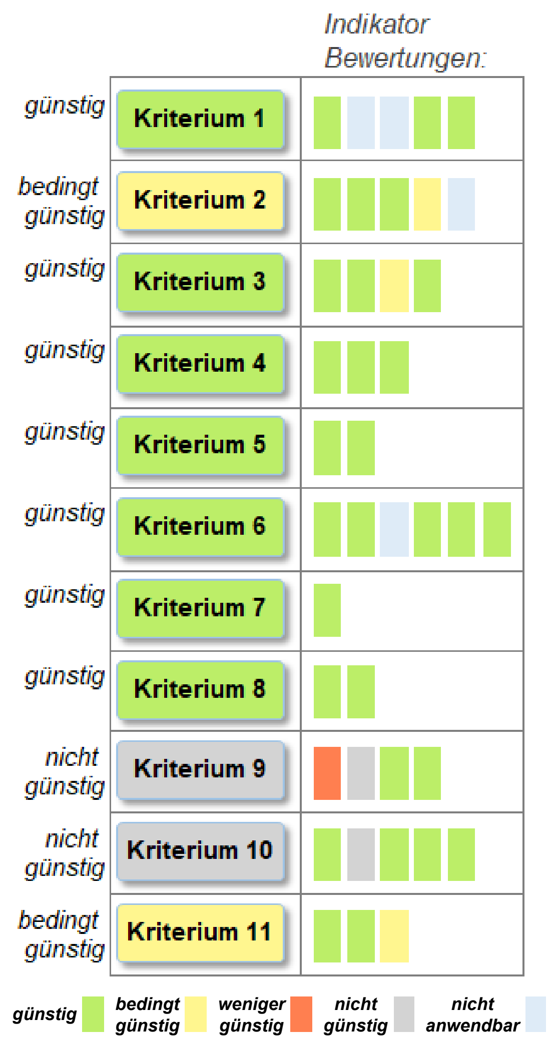
Table 61: Characteristics of the sub-area 026_00TG_035_00IG_S_s_z

Characteristics of the sub-area 026_00TG_035_00IG_S_s_z	
IA code	035_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in Lower Saxony, northeast of the federal state of Bremen.
Surface area	8 km²
Geological characteristics	The sub-area is located in the zechstein of the Adolphsdorf salt structure and has a thickness of 660 metres. The sub-area is located at a depth of 840 metres to 1,500 metres below ground surface.

Table 62: *Result of the geoscientific weighing criteria for the sub-area 026_00TG_035_00IG_S_s_z.*
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Due to the great depth of the structural culmination, the cap rock formation may be less significant or absent, and the Salzschwebe may therefore possess a greater extent than initially assumed. The conditionally favourable evaluation of the surface is therefore weighed as less significant. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.13 Sub-area 027_00TG_037_00IG_S_s_z

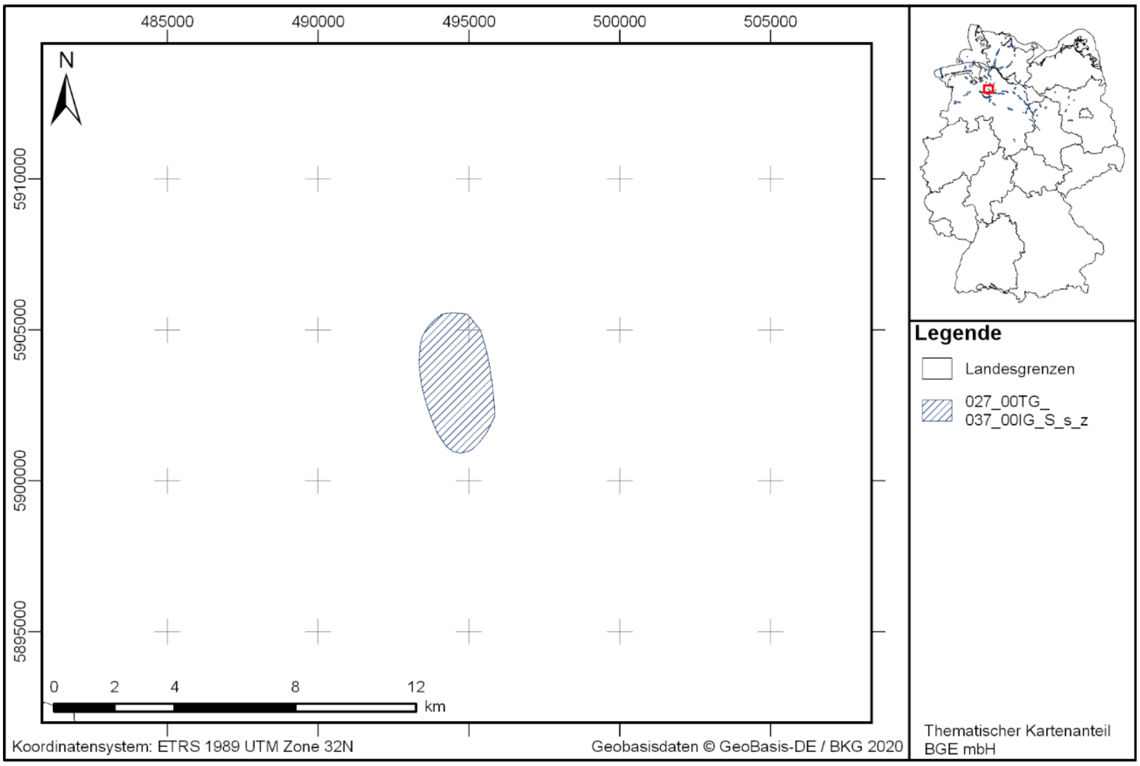


Figure 68: Overview map of the sub-area 027_00TG_037_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

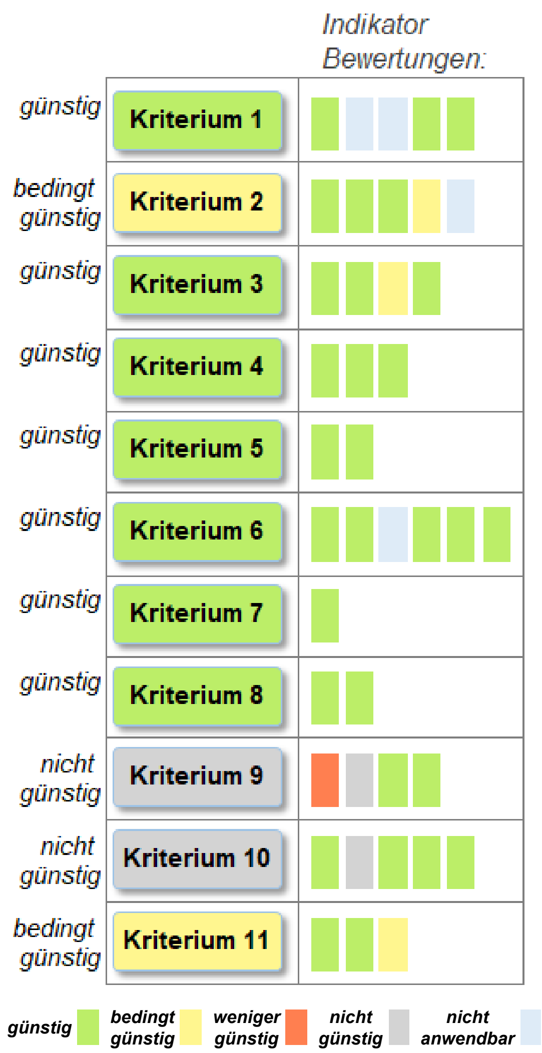
Table 63: Characteristics of the sub-area 027_00TG_037_00IG_S_s_z

Characteristics of the sub-area 027_00TG_037_00IG_S_s_z	
IA code	037_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in Lower Saxony, north of the federal state of Bremen.
Surface area	9 km²
Geological characteristics	The sub-area is located in the zechstein of the Teufelsmoor salt structure and has a thickness of 550 metres. The sub-area is located at a depth of 950 metres to 1,500 metres below ground surface.

Table 64: Result of the geoscientific weighing criteria for the sub-area 027_00TG_037_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for spatial characterisability" was rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". The indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone" was rated "conditionally favourable". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The "criterion for evaluation of the rock formation configuration" was rated "conditionally favourable" based on the "surface extent for the given thickness (multiple of the minimum surface requirement)". Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be identified. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.14 Sub-area 028_00TG_040_00IG_S_s_z

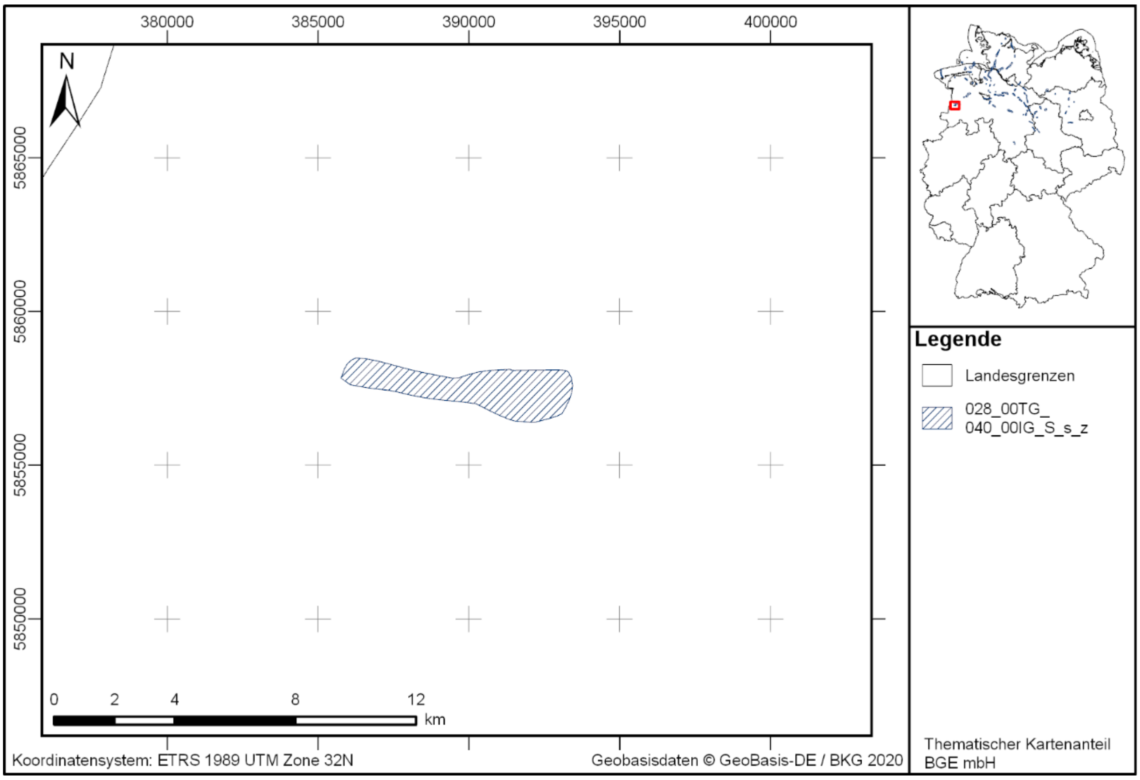


Figure 69: Overview map of the sub-area 028_00TG_040_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

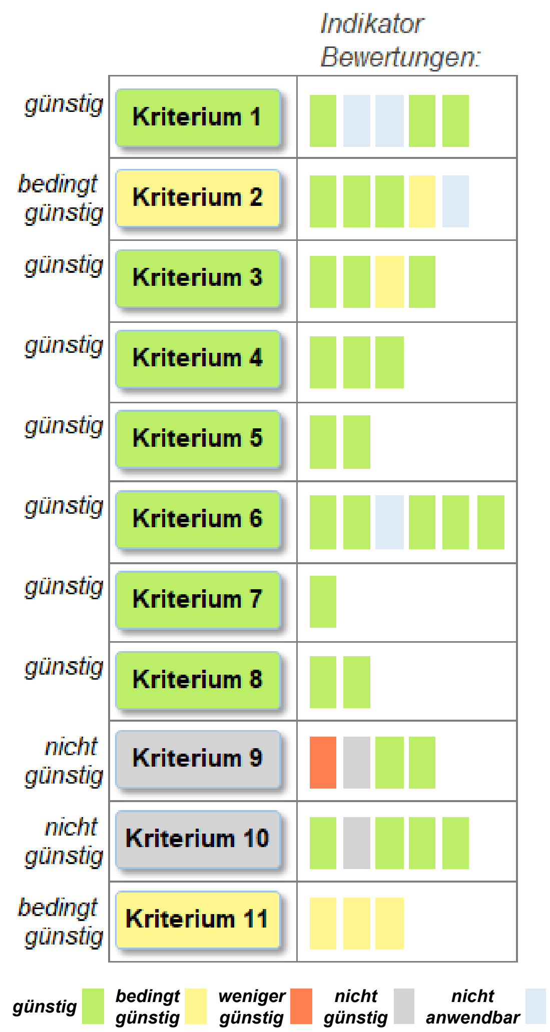
Table 65: Characteristics of the sub-area 028_00TG_040_00IG_S_s_z

Characteristics of the sub-area 028_00TG_040_00IG_S_s_z	
IA code	040_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of Lower Saxony, approx. 15 km east of the border with the Netherlands.
Surface area	8 km²
Geological characteristics	The sub-area is located in the zechstein of the Lathen salt structure and has a thickness of 1,000 metres. The sub-area is located at a depth of 500 metres to 1,500 metres below ground surface.

Table 66: Result of the geoscientific weighing criteria for the sub-area 028_00TG_040_00IG_S_s_z. Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.15 Sub-area 029_00TG_043_00IG_S_s_z

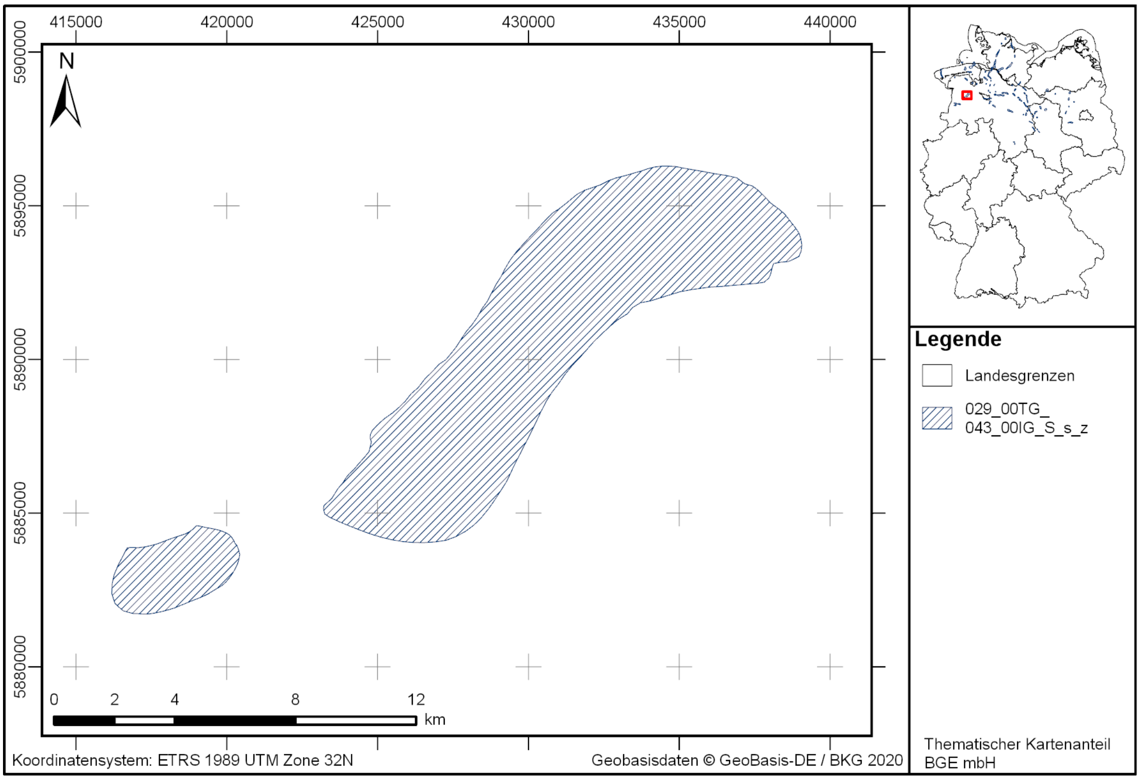


Figure 70: Overview map of the sub-area 029_00TG_043_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

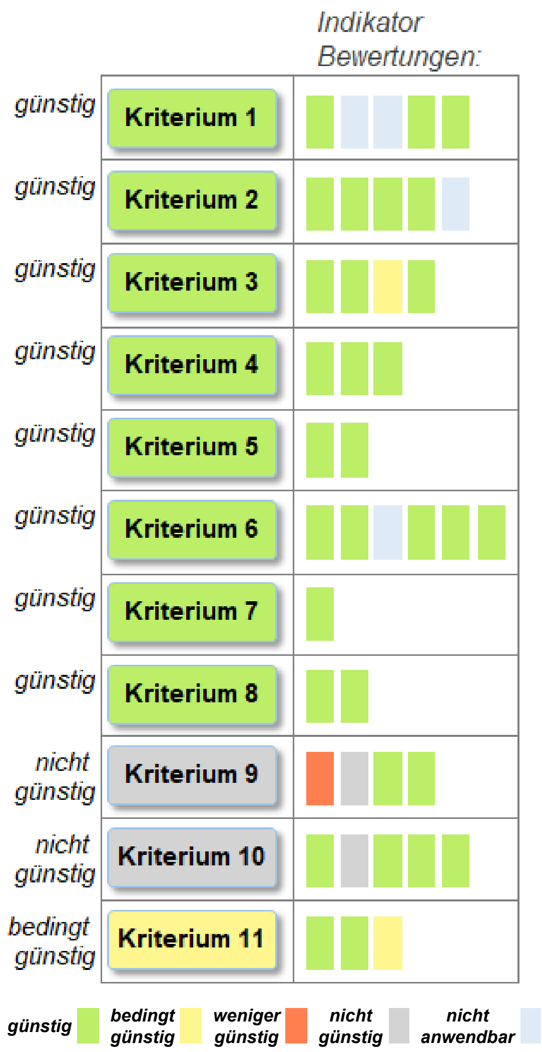
Table 67: Characteristics of the sub-area 029_00TG_043_00IG_S_s_z

Characteristics of the sub-area 029_00TG_043_00IG_S_s_z	
IA code	043_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 24 km south of Jade Bight.
Surface area	78 km²
Geological characteristics	The sub-area is located in the zechstein of the Kamperfehn/Zwischenahn salt structure and has a thickness of 910 metres. The sub-area is located at a depth of 590 metres to 1,500 metres below ground surface.

*Table 68: Result of the geoscientific weighing criteria for the sub-area 029_00TG_043_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

<table>
<tr><th colspan="2">Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)</th></tr>
<tr><td>

Results of the summarised evaluation:



</td><td>

Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

</td></tr>
<tr><td colspan="2">

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

</td></tr>
</table>

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.16 Sub-area 030_00TG_048_00IG_S_s_z

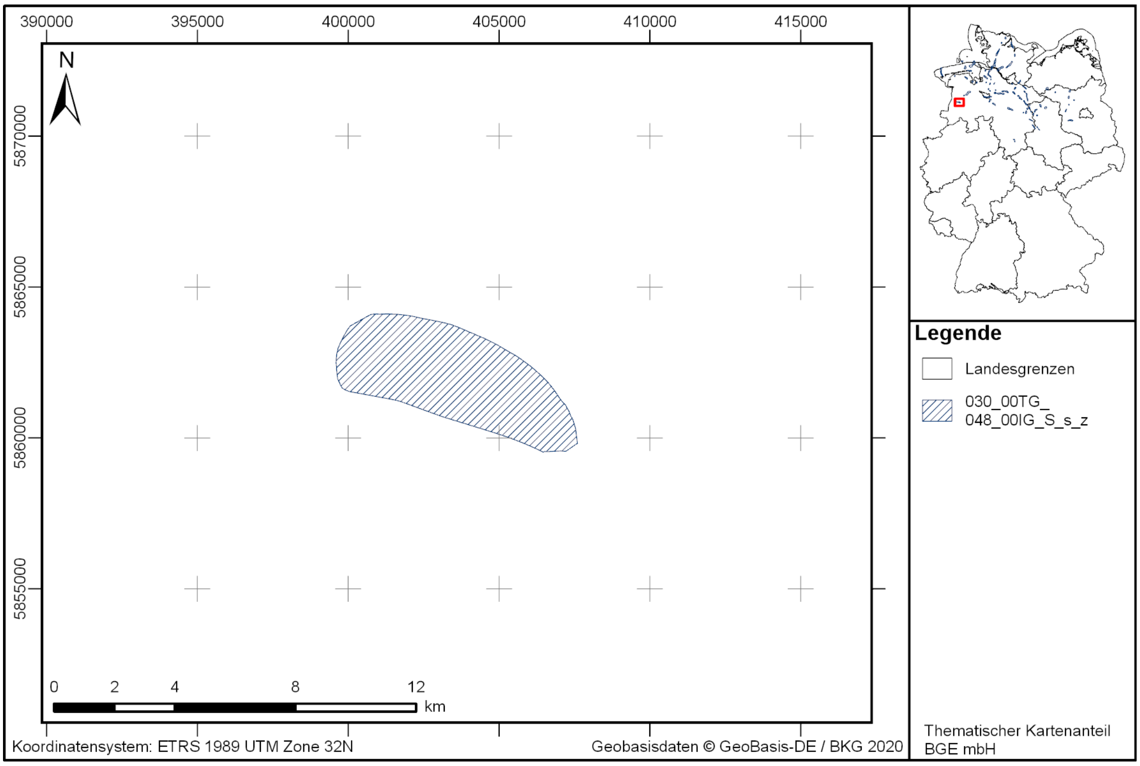


Figure 71: Overview map of the sub-area 030_00TG_048_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

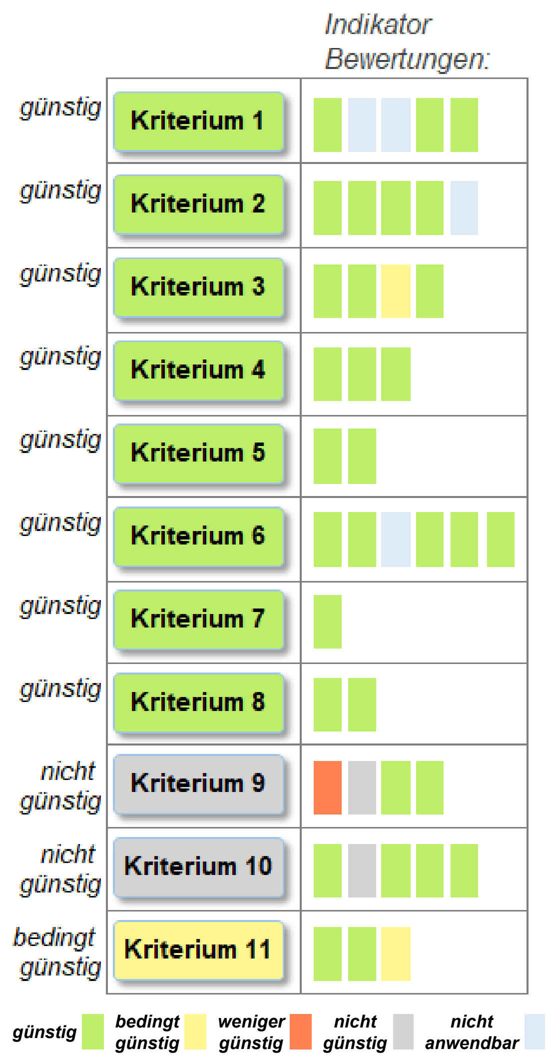
Table 69: Characteristics of the sub-area 030_00TG_048_00IG_S_s_z

Characteristics of the sub-area 030_00TG_048_00IG_S_s_z	
IA code	048_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of the federal state of Lower Saxony, approx. 24 km east of the border with the Netherlands.
Surface area	21 km²
Geological characteristics	The sub-area is located in the zechstein of the Börger salt structure and has a thickness of 670 metres. The sub-area is located at a depth of 830 metres to 1,500 metres below ground surface.

Table 70: Result of the geoscientific weighing criteria for the sub-area 030_00TG_048_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.17 Sub-area 031_00TG_050_00IG_S_s_z

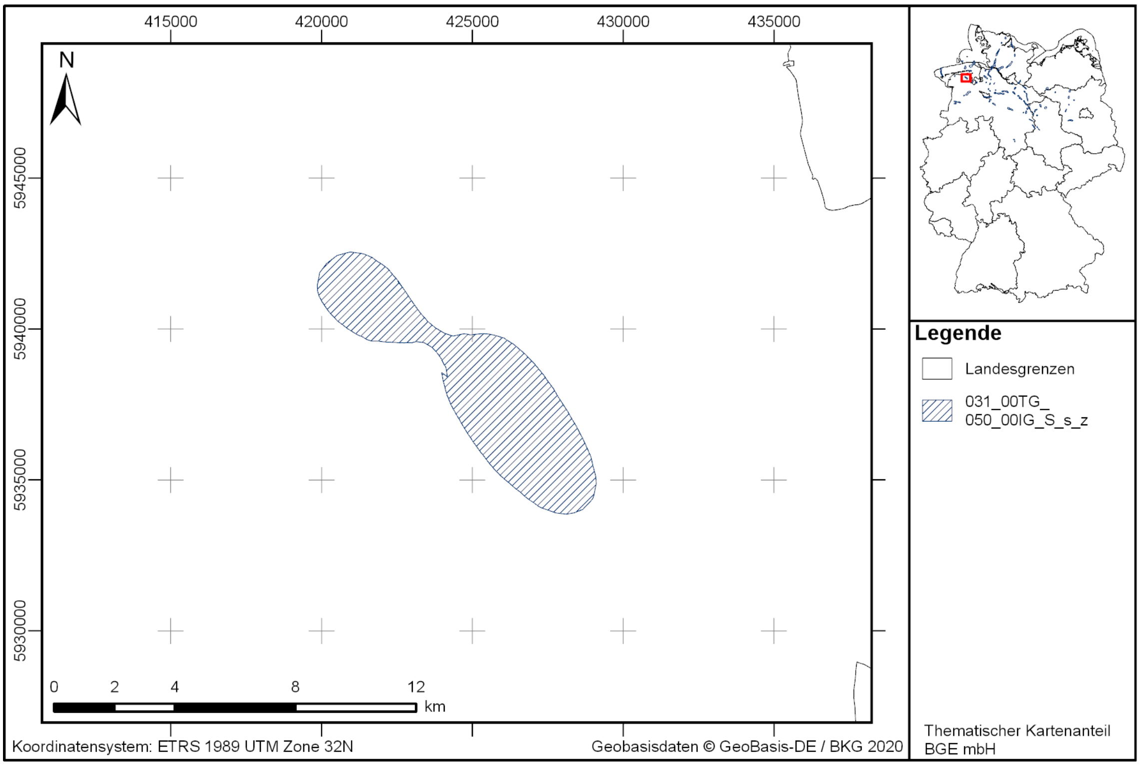
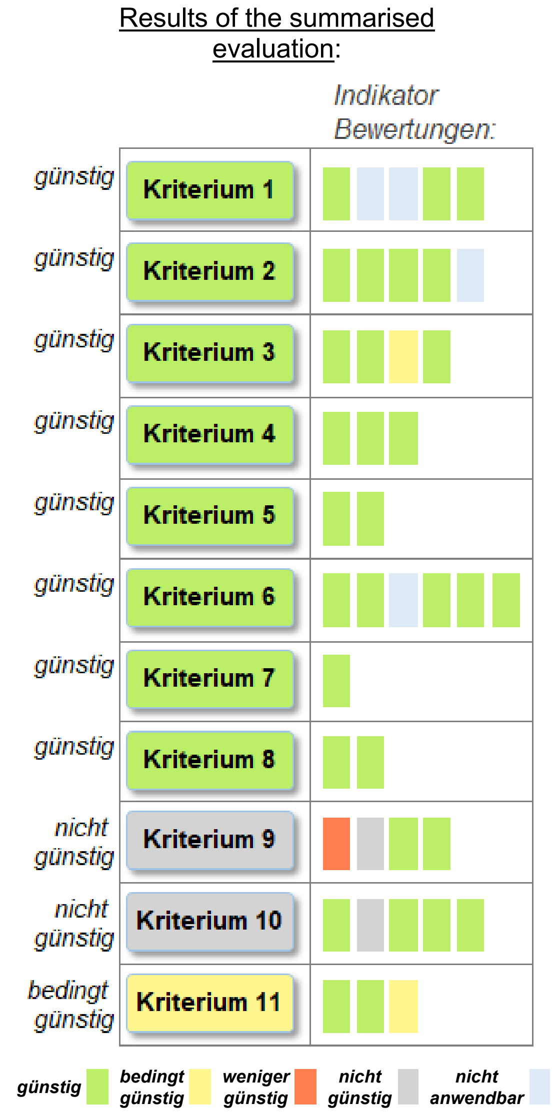


Figure 72: Overview map of the sub-area 031_00TG_050_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 71: Characteristics of the sub-area 031_00TG_050_00IG_S_s_z

Characteristics of the sub-area 031_00TG_050_00IG_S_s_z	
IA code	050_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of Lower Saxony, approx. 13 km northwest of Jade Bight.
Surface area	26 km²
Geological characteristics	The sub-area is located in the zechstein of the Berdum-Jever salt structure and has a thickness of 400 metres. The sub-area is located at a depth of 1,120 metres to 1,500 metres below ground surface.

Table 72: Result of the geoscientific weighing criteria for the sub-area 031_00TG_050_00IG_S_s_z. Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.18 Sub-area 032_00TG_051_00IG_S_s_z

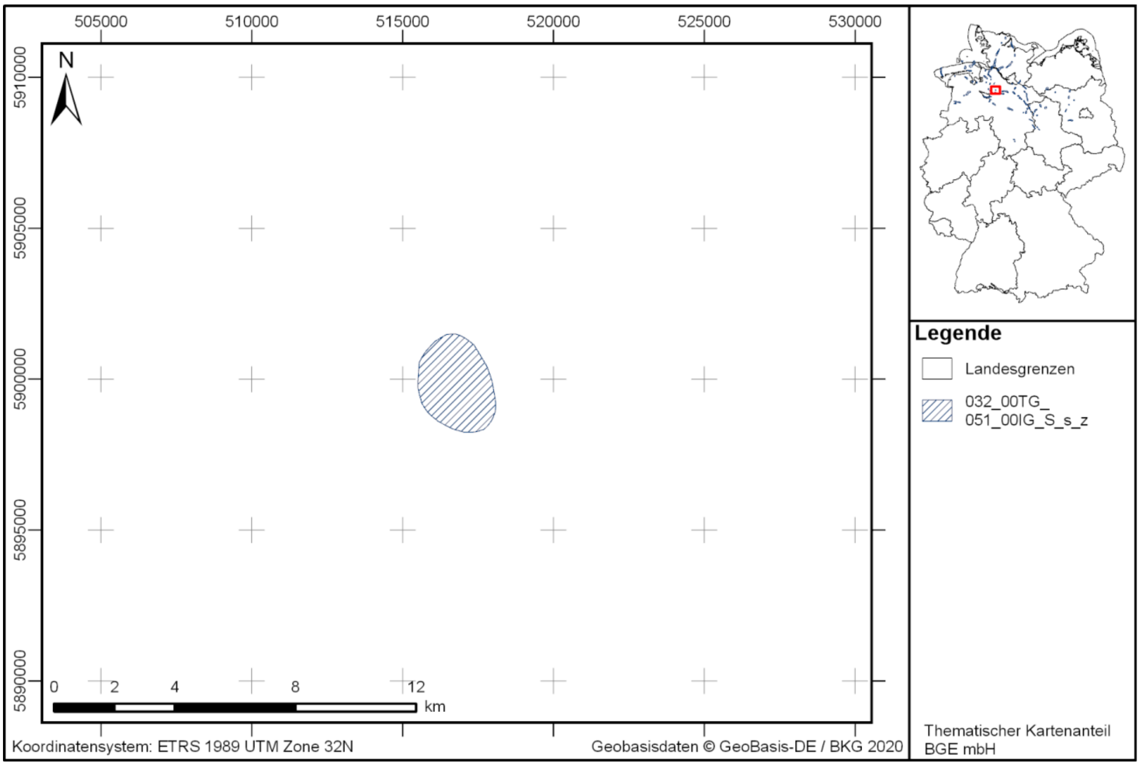


Figure 73: Overview map of the sub-area 032_00TG_051_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

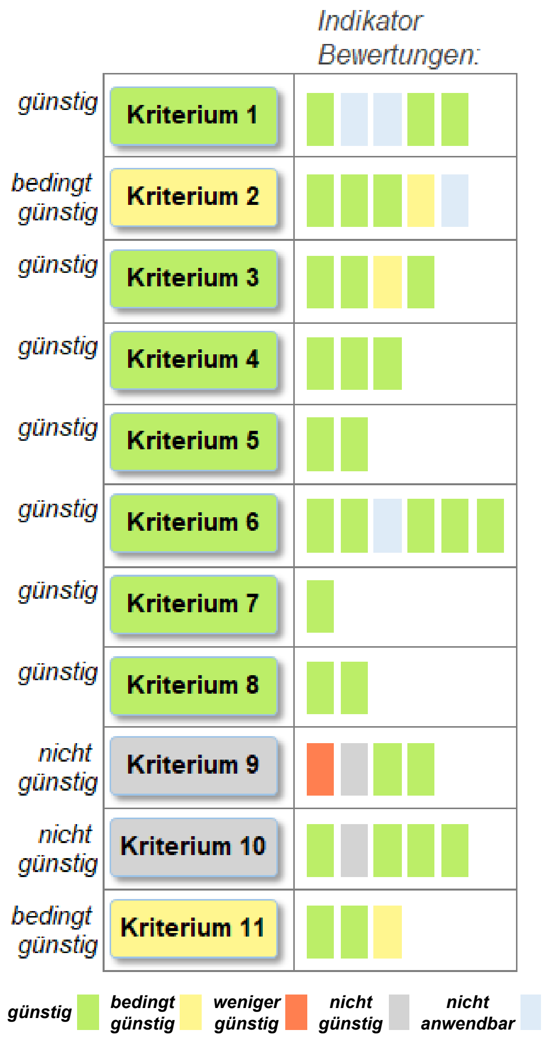
Table 73: Characteristics of the sub-area 032_00TG_051_00IG_S_s_z

Characteristics of the sub-area 032_00TG_051_00IG_S_s_z	
IA code	051_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 22 km northeast of the federal state of Bremen.
Surface area	6 km²
Geological characteristics	The sub-area is located in the zechstein of the Brümmerhof salt structure and has a thickness of 890 metres. The sub-area is located at a depth of 600 metres to 1,500 metres below ground surface.

Table 74: Result of the geoscientific weighing criteria for the sub-area 032_00TG_051_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.19 Sub-area 033_00TG_052_00IG_S_s_z

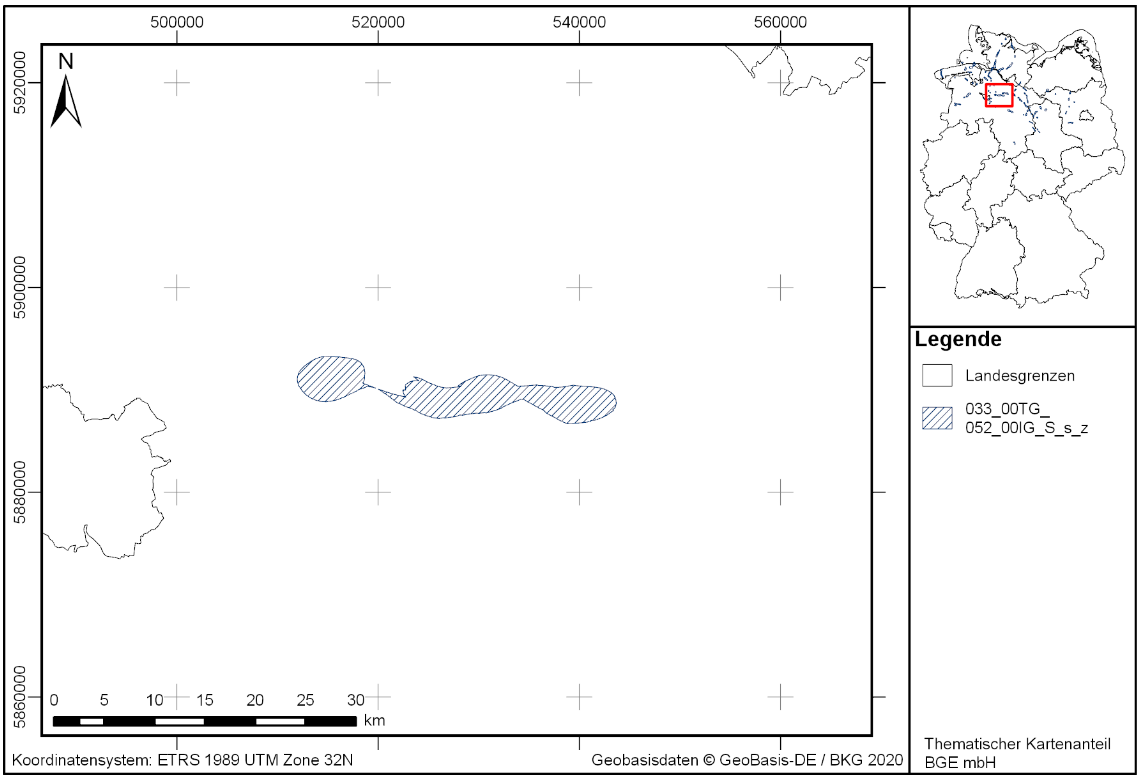


Figure 74: Overview map of the sub-area 033_00TG_052_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

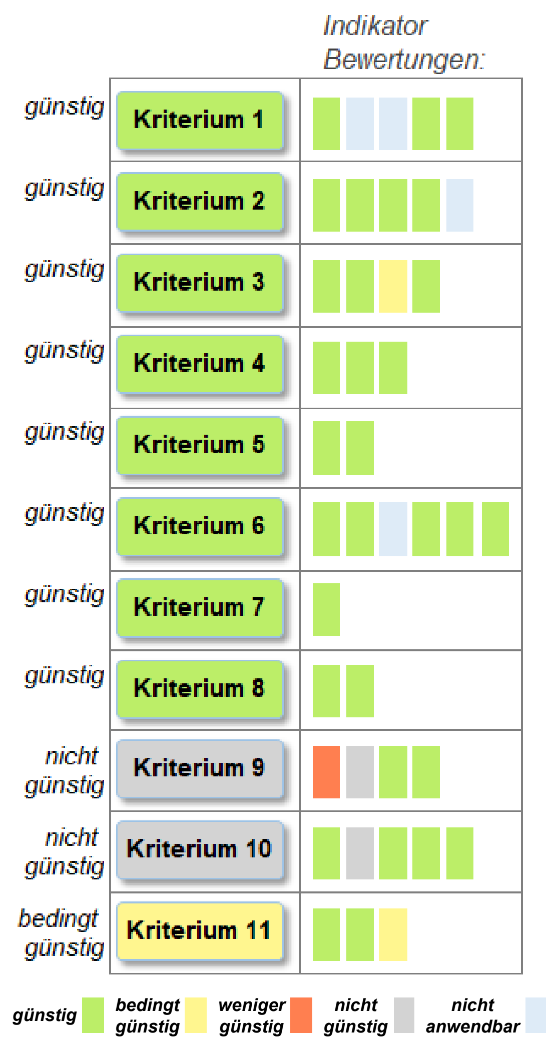
Table 75: Characteristics of the sub-area 033_00TG_052_00IG_S_s_z

Characteristics of the sub-area 033_00TG_052_00IG_S_s_z	
IA code	052_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 15 km east of the federal state of Bremen.
Surface area	85 km²
Geological characteristics	The sub-area is located in the zechstein of the Taaken/Scheessel/Ostervesede salt structure and has a thickness of 970 metres. The sub-area is located at a depth of 530 metres to 1,500 metres below ground surface.

Table 76: Result of the geoscientific weighing criteria for the sub-area 033_00TG_052_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.20 Sub-area 034_00TG_054_00IG_S_s_z

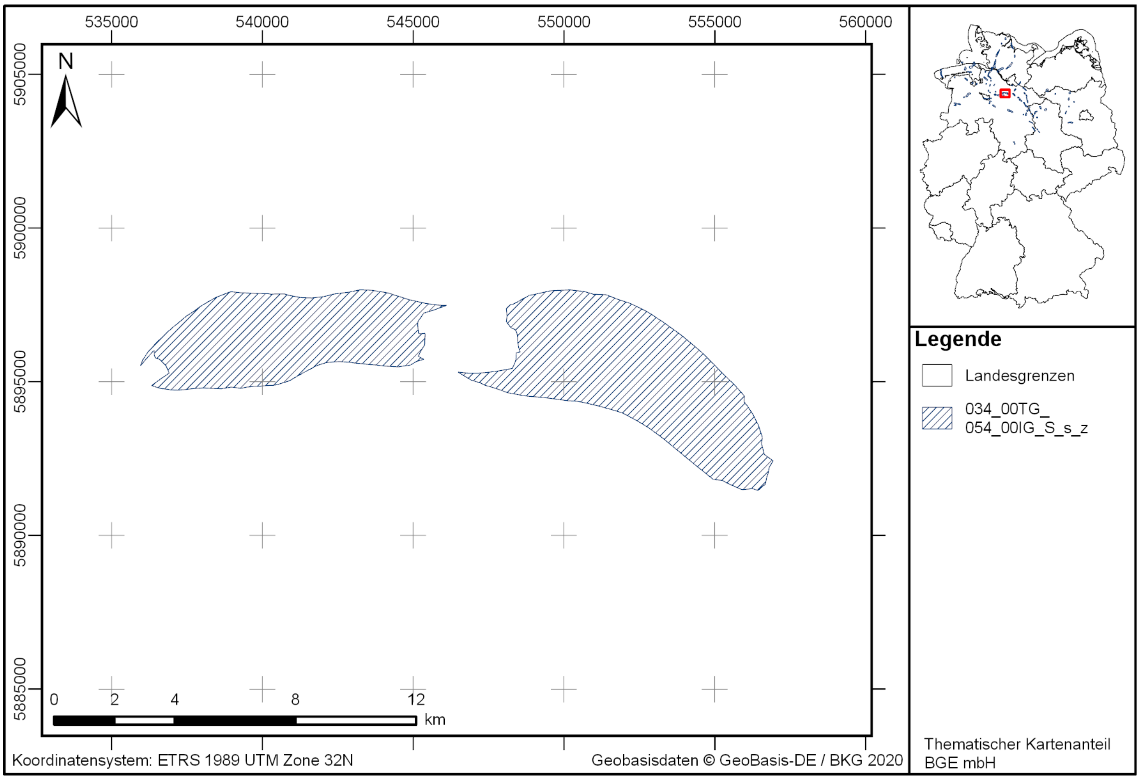


Figure 75: Overview map of the sub-area 034_00TG_054_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

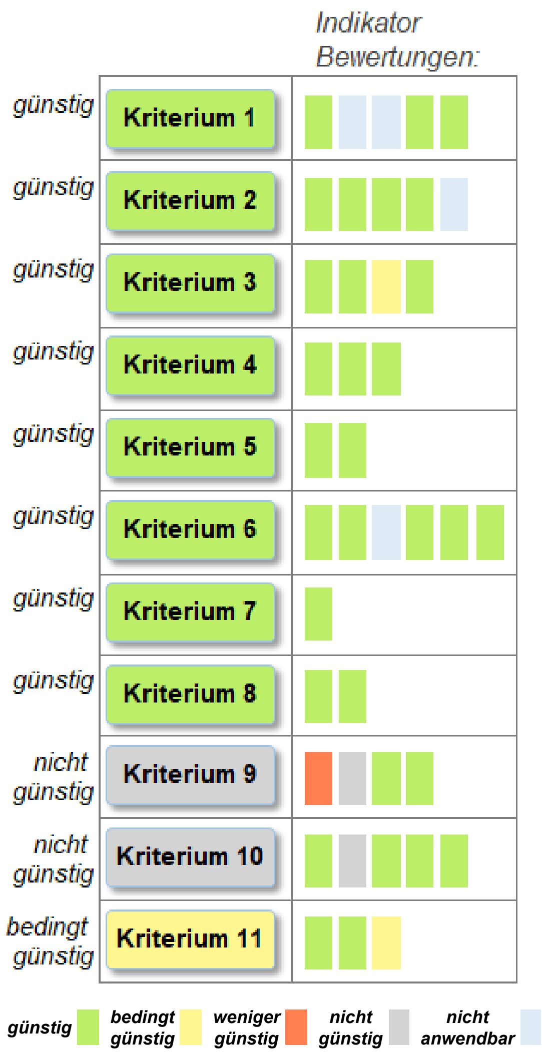
Table 77: Characteristics of the sub-area 034_00TG_054_00IG_S_s_z

Characteristics of the sub-area 034_00TG_054_00IG_S_s_z	
IA code	054_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, east of the federal state of Bremen.
Surface area	52 km²
Geological characteristics	The sub-area is located in the zechstein of the Stemmen/Otter-Todtshorn salt structure and has a thickness of 810 metres. The sub-area is located at a depth of 690 metres to 1,500 metres below ground surface.

Table 78: Result of the geoscientific weighing criteria for the sub-area 034_00TG_054_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.21 Sub-area 035_00TG_057_00IG_S_s_z

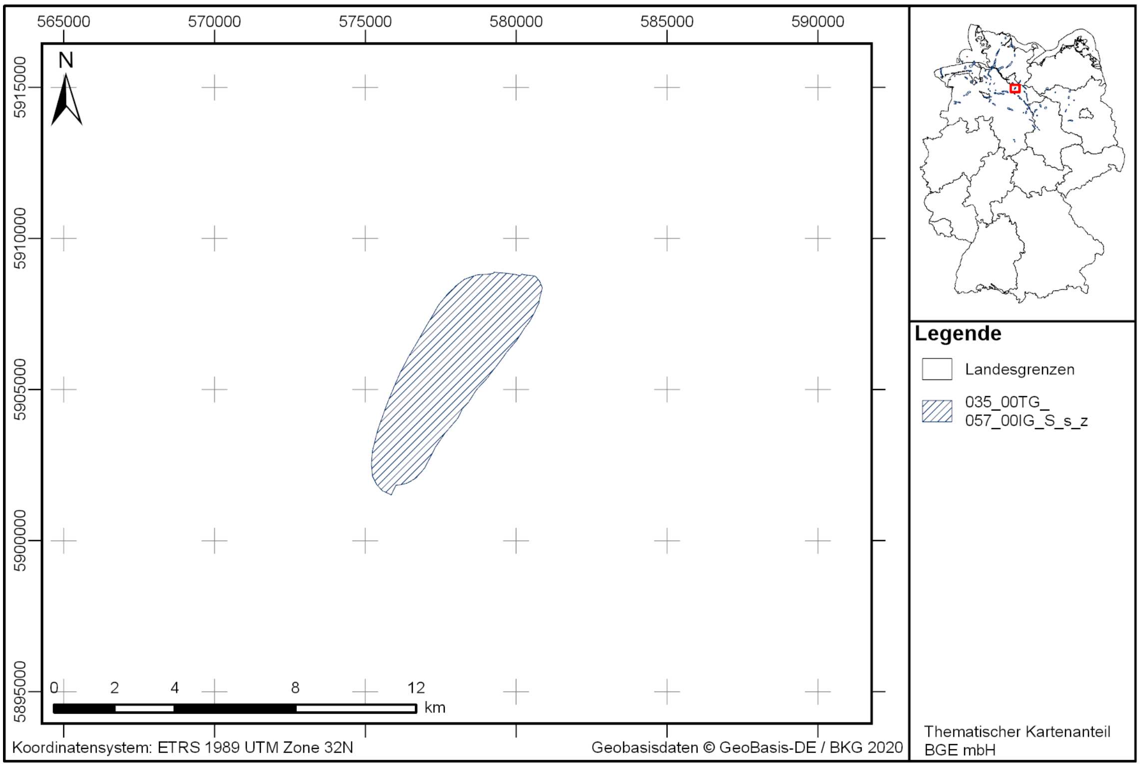


Figure 76: Overview map of the sub-area 035_00TG_057_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbH; Landesgrenzen = State borders.

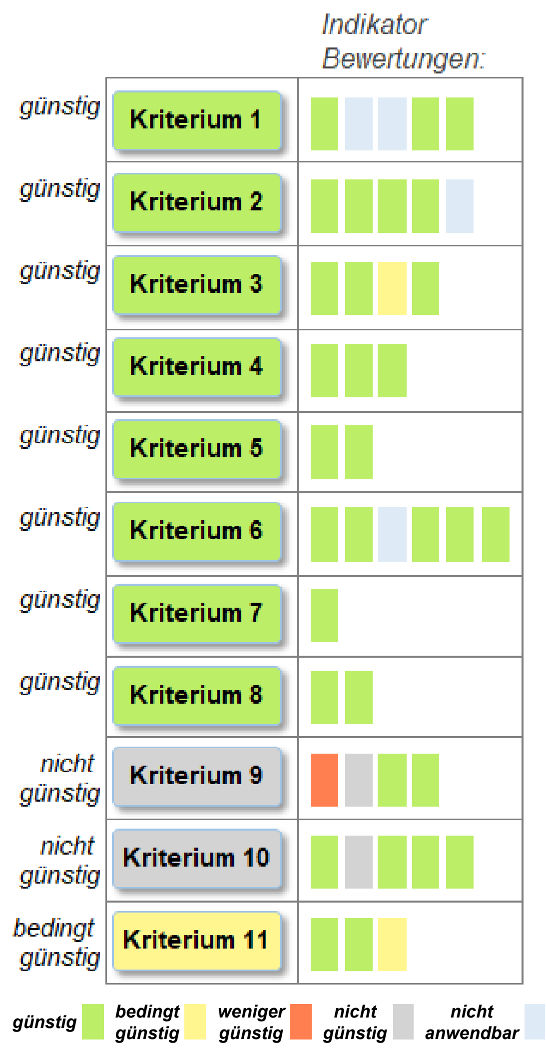
Table 79: Characteristics of the sub-area 017_00TG_003_00IG_S_s_z

Characteristics of the sub-area 035_00TG_057_00IG_S_s_z	
IA code	057_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 8 km south of the federal state of Hamburg.
Surface area	19 km²
Geological characteristics	The sub-area is located in the zechstein of the Bahlburg salt structure and has a thickness of 860 metres. The sub-area is located at a depth of 640 metres to 1,500 metres below ground surface.

Table 80: Result of the geoscientific weighing criteria for the sub-area 035_00TG_057_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.22 Sub-area 036_00TG_058_00IG_S_s_z

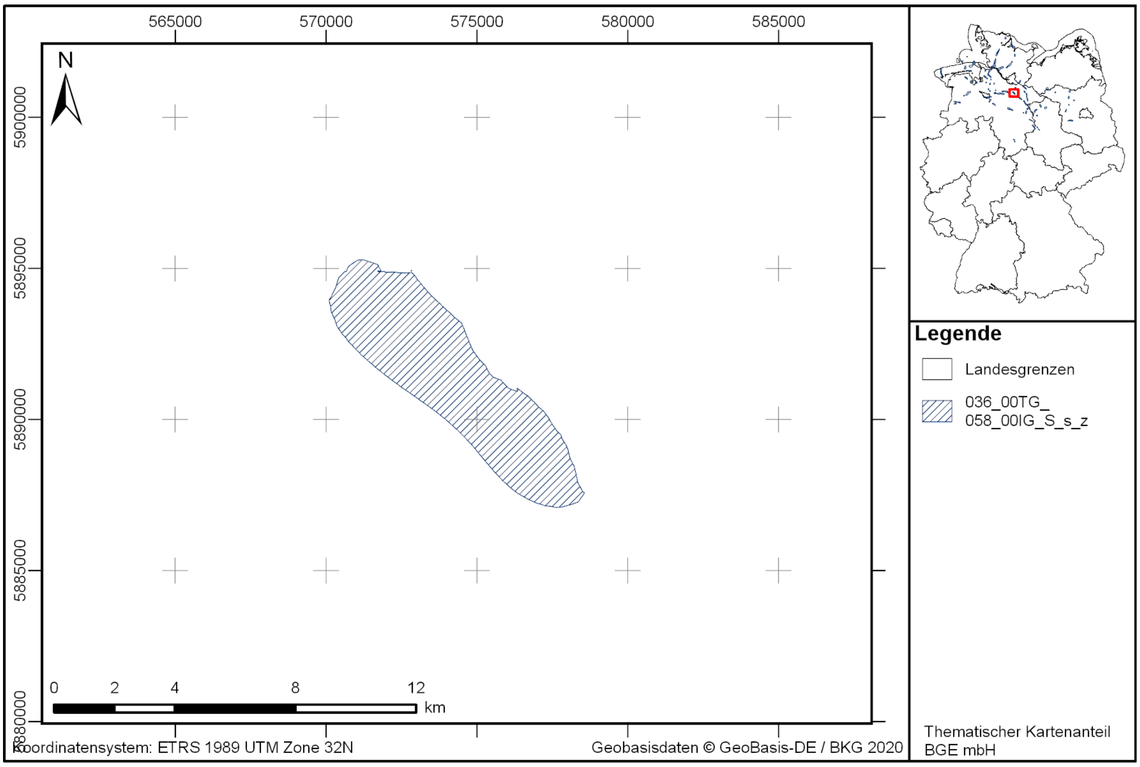
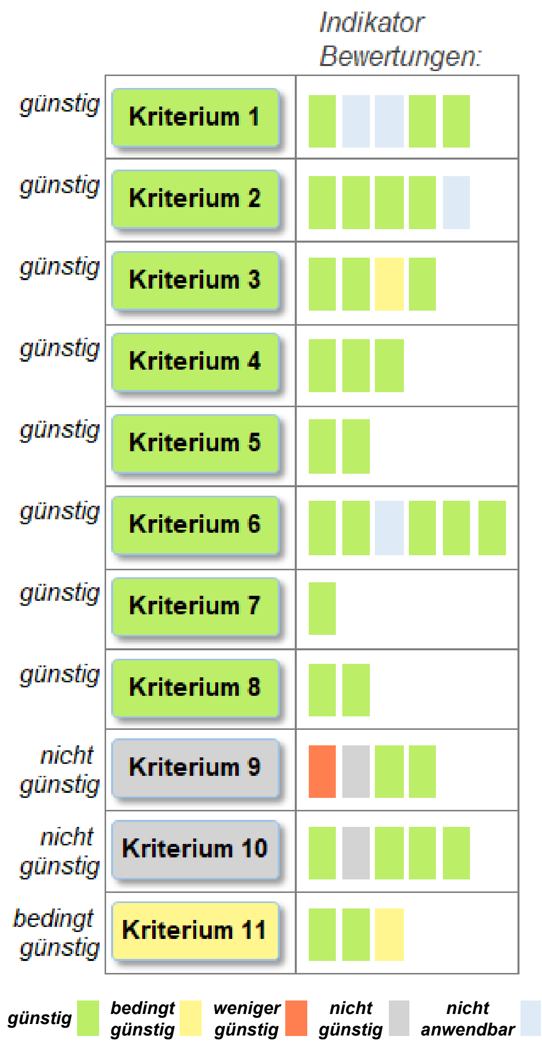


Figure 77: Overview map of the sub-area 036_00TG_058_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbH; Landesgrenzen = State borders.

Table 81: Characteristics of the sub-area 036_00TG_058_00IG_S_s_z

Characteristics of the sub-area 036_00TG_058_00IG_S_s_z	
IA code	058_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 27 km south of the federal state of Hamburg.
Surface area	26 km²
Geological characteristics	The sub-area is located in the zechstein of the Egestorf-Sodersorf salt structure and has a thickness of 710 metres. The sub-area is located at a depth of 790 metres to 1,500 metres below ground surface.

Table 82: Result of the geoscientific weighing criteria for the sub-area 036_00TG_058_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.23 Sub-area 037_00TG_061_00IG_S_s_z

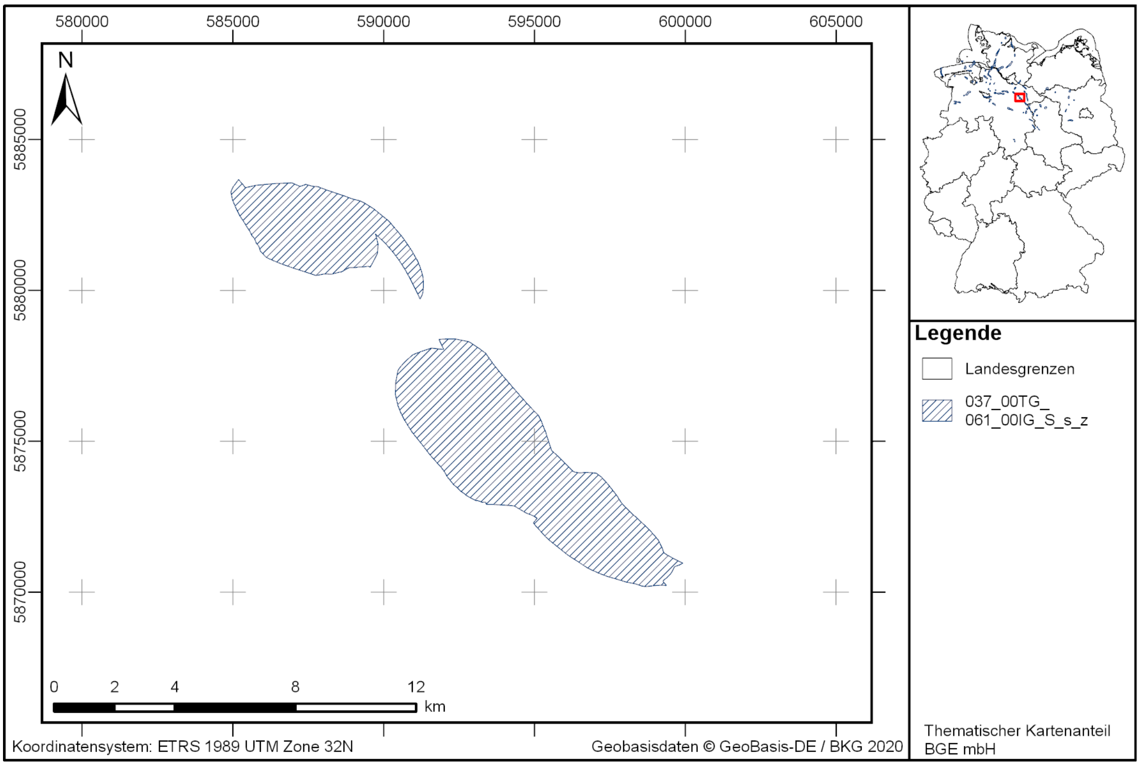


Figure 78: Overview map of the sub-area 037_00TG_061_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

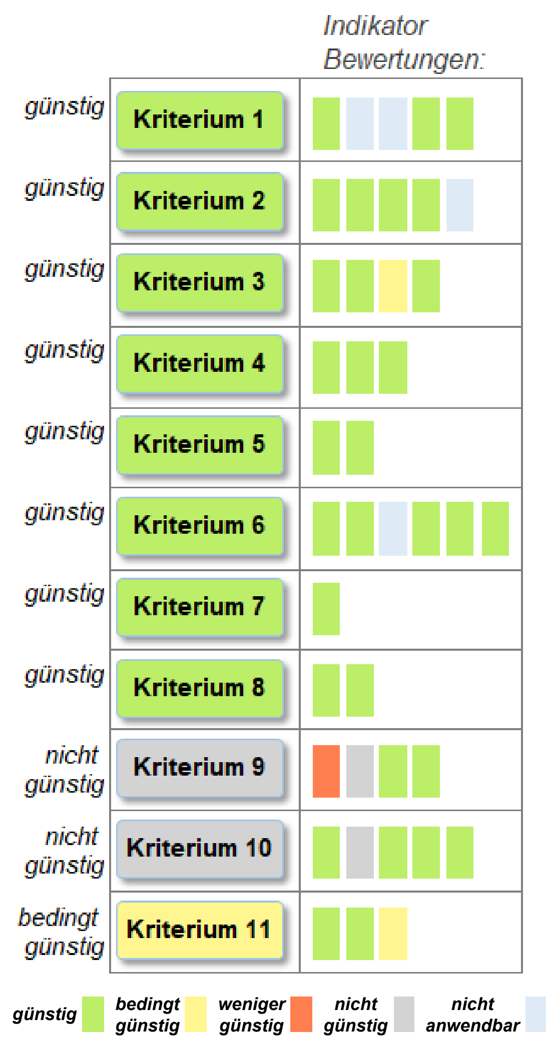
Table 83: Characteristics of the sub-area 037_00TG_061_00IG_S_s_z

Characteristics of the sub-area 037_00TG_061_00IG_S_s_z	
IA code	061_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northeast of the federal state of Lower Saxony, approx. 25 km northwest of the federal state of Saxony-Anhalt.
Surface area	43 km²
Geological characteristics	The sub-area is located in the zechstein of the Wettenbostel/Ebstorf salt structure and has a thickness of 780 metres. The sub-area is located at a depth of 720 metres to 1,500 metres below ground surface.

Table 84: Result of the geoscientific weighing criteria for the sub-area 037_00TG_061_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.24 Sub-area 038_00TG_063_00IG_S_s_z

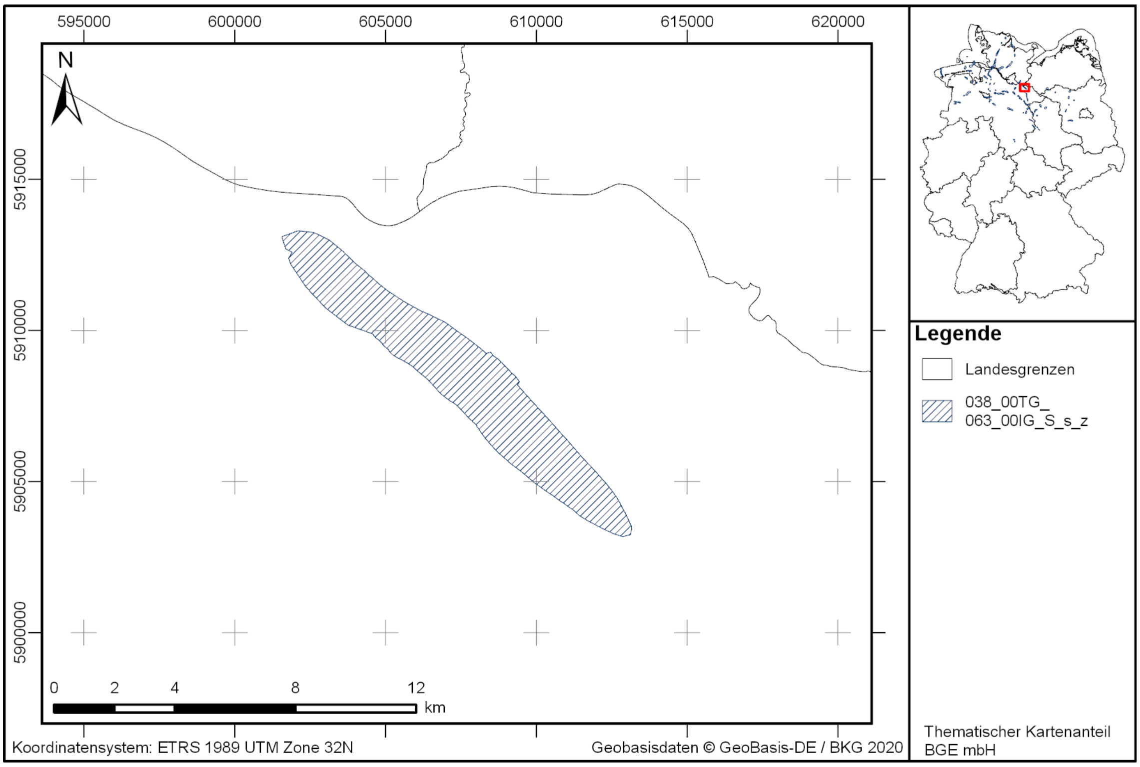


Figure 79: Overview map of the sub-area 038_00TG_063_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

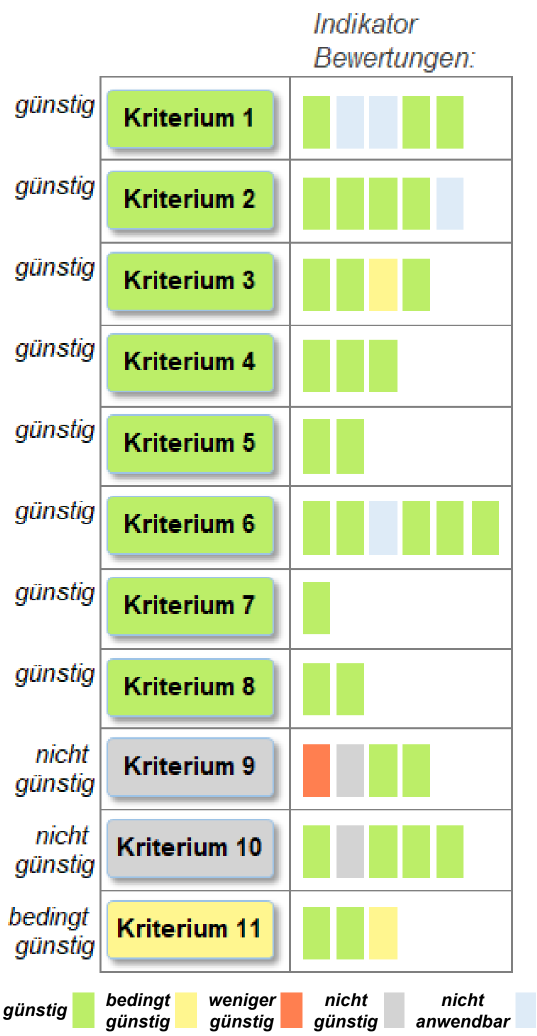
Table 85: Characteristics of the sub-area 038_00TG_063_00IG_S_s_z

Characteristics of the sub-area 038_00TG_063_00IG_S_s_z	
IA code	063_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 4 km south of the border triangle between the federal states of Lower Saxony/Schleswig-Holstein/Mecklenburg-Vorpommern.
Surface area	25 km²
Geological characteristics	The sub-area is located in the zechstein of the Rosenthal salt structure and has a thickness of 460 metres. The sub-area is located at a depth of 1,040 metres to 1,500 metres below ground surface.

Table 86: Result of the geoscientific weighing criteria for the sub-area 038_00TG_063_00IG_S_s_z. Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.25 Sub-area 039_00TG_064_00IG_S_s_z

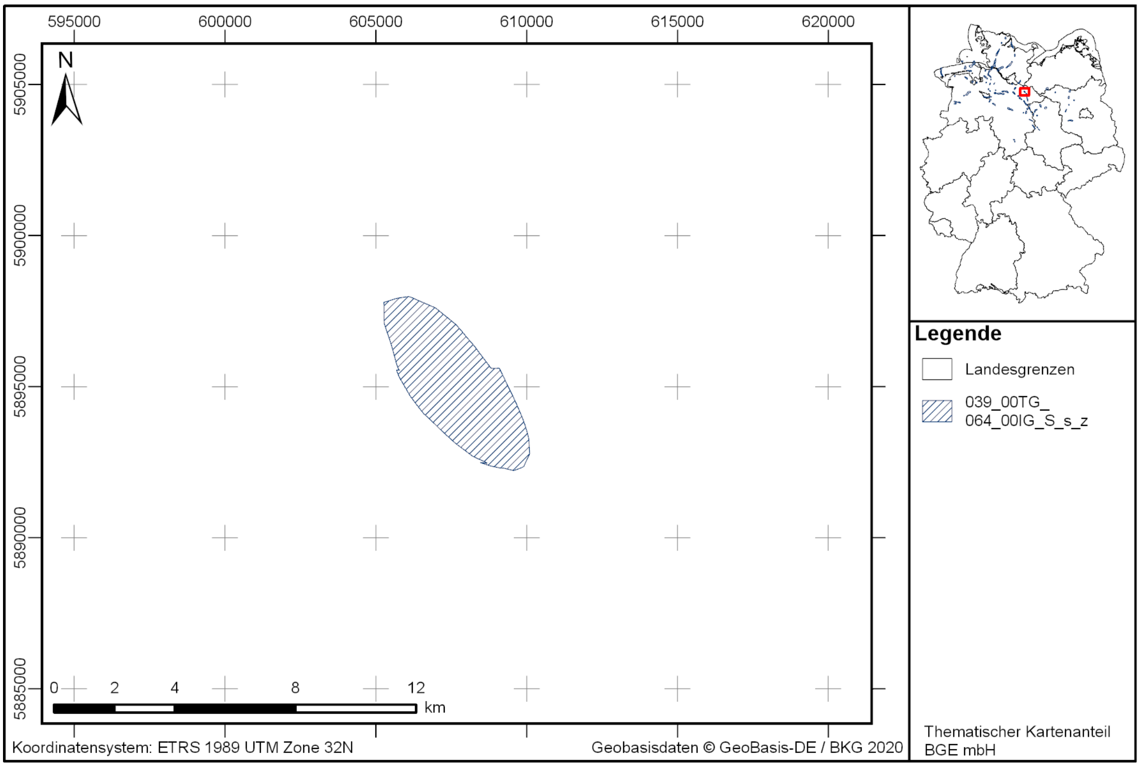


Figure 80: Overview map of the sub-area 039_00TG_064_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

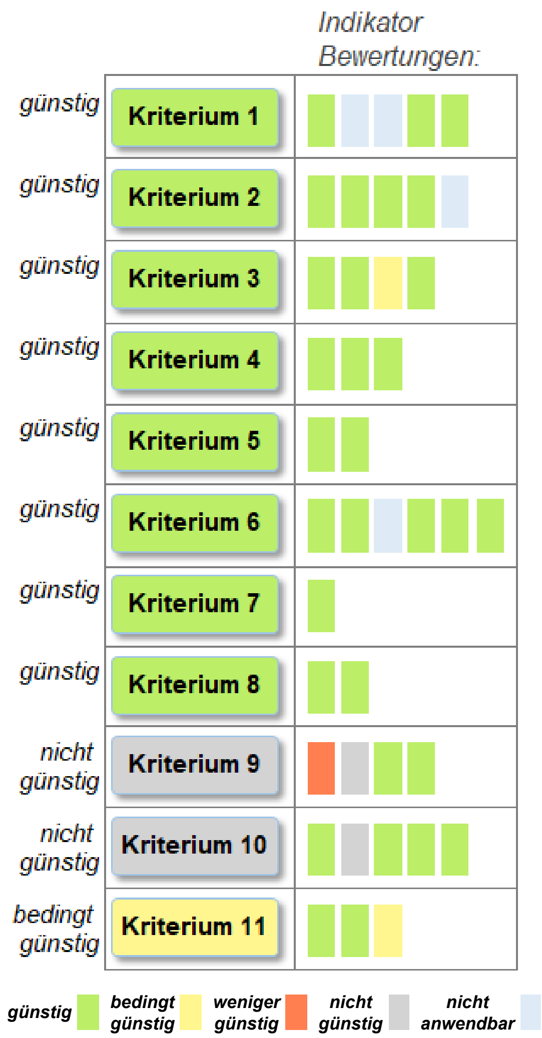
Table 87: Characteristics of the sub-area 039_00TG_064_00IG_S_s_z

Characteristics of the sub-area 039_00TG_064_00IG_S_s_z	
IA code	064_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 16 km south of the border triangle between the federal states of Lower Saxony/Schleswig-Holstein/Mecklenburg-Vorpommern.
Surface area	15 km²
Geological characteristics	The sub-area is located in the zechstein of the Horndorf salt structure and has a thickness of 750 metres. The sub-area is located at a depth of 750 metres to 1,500 metres below ground surface.

Table 88: Result of the geoscientific weighing criteria for the sub-area 039_00TG_064_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.26 Sub-area 040_00TG_067_00IG_S_s_z

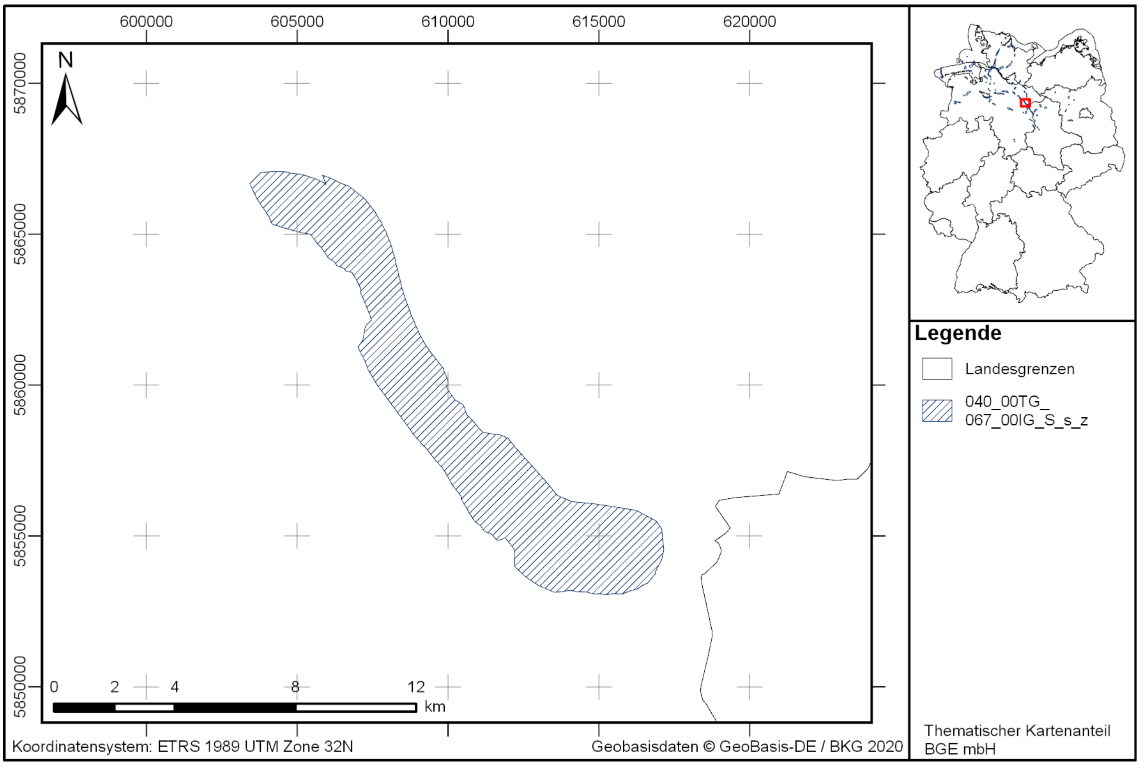
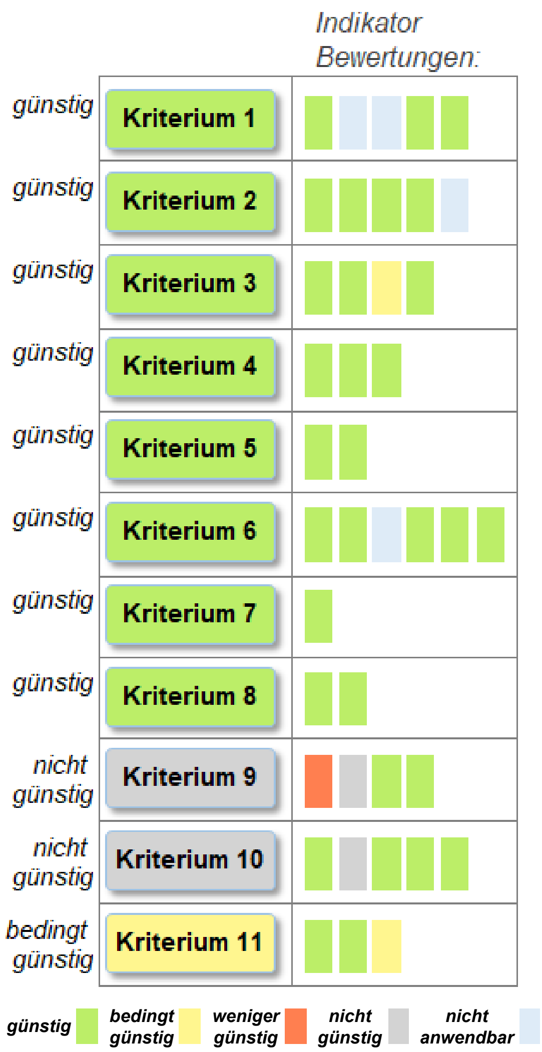


Figure 81: Overview map of the sub-area 040_00TG_067_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 89: Characteristics of the sub-area 040_00TG_067_00IG_S_s_z

Characteristics of the sub-area 040_00TG_067_00IG_S_s_z	
IA code	067_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 1.5 km northwest of the federal state of Saxony-Anhalt.
Surface area	42 km²
Geological characteristics	The sub-area is located in the zechstein of the Niendorf II/Wieren/Bodenteich salt structure and has a thickness of 920 metres. The sub-area is located at a depth of 580 metres to 1,500 metres below ground surface.

Table 90: Result of the geoscientific weighing criteria for the sub-area 040_00TG_067_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.27 Sub-area 041_00TG_068_00IG_S_s_z

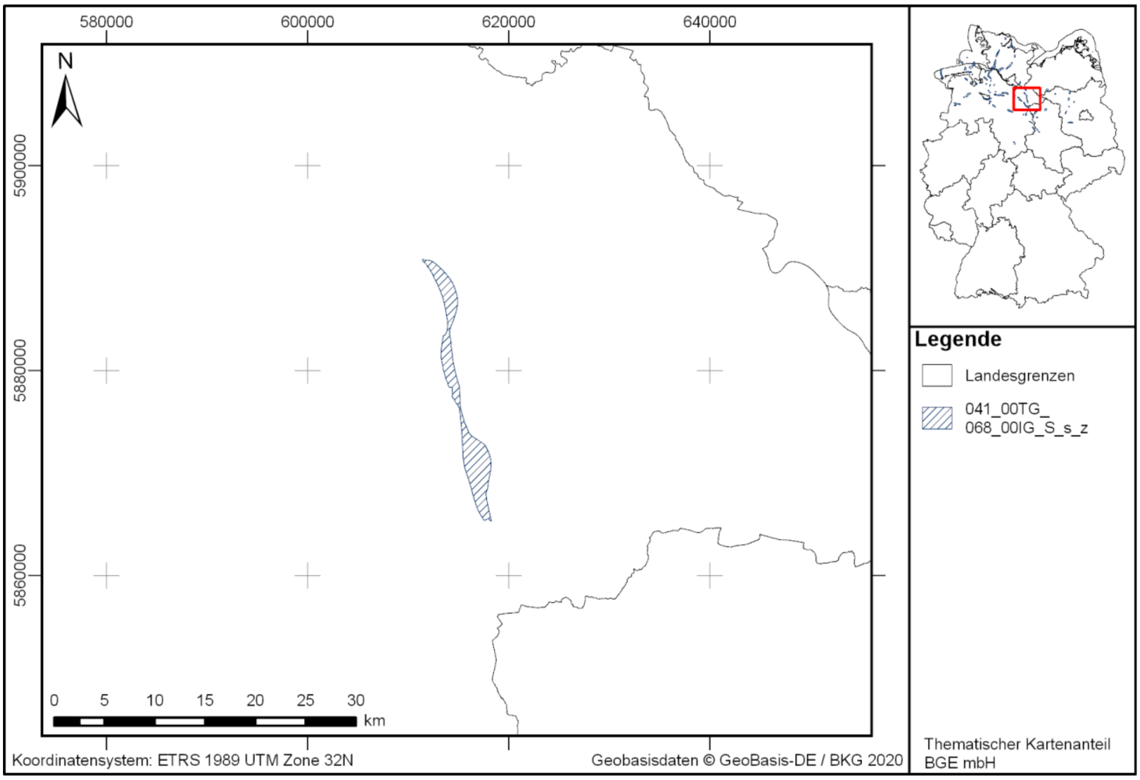


Figure 82: Overview map of the sub-area 041_00TG_068_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

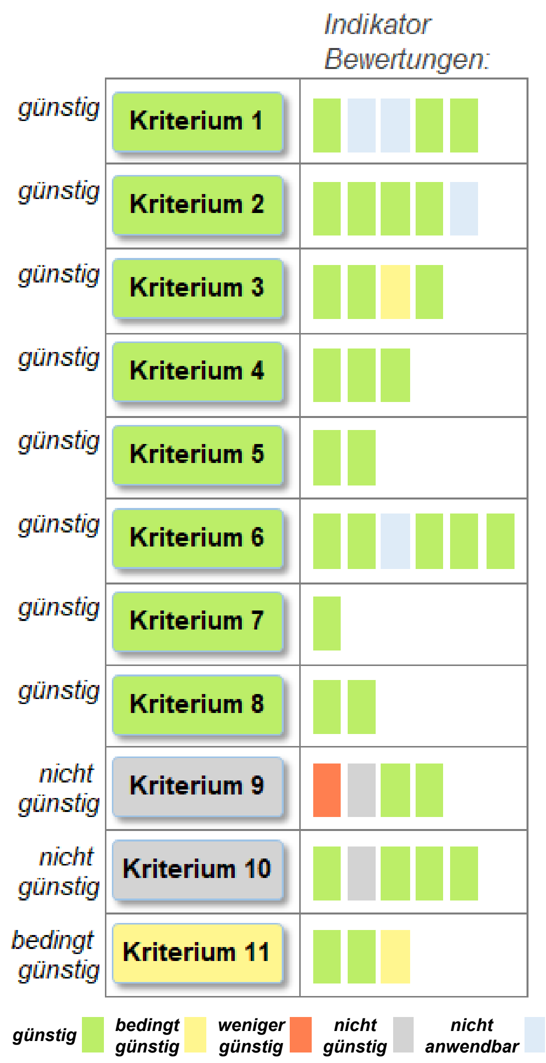
Table 91: Characteristics of the sub-area 041_00TG_068_00IG_S_s_z

Characteristics of the sub-area 041_00TG_068_00IG_S_s_z	
IA code	068_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 9 km northwest of the federal state of Saxony-Anhalt.
Surface area	30 km²
Geological characteristics	The sub-area is located in the zechstein of the Rosche-Thondorf salt structure and has a thickness of 890 metres. The sub-area is located at a depth of 600 metres to 1,500 metres below ground surface.

Table 92: Result of the geoscientific weighing criteria for the sub-area 041_00TG_068_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.28 Sub-area 042_00TG_071_00IG_S_s_z

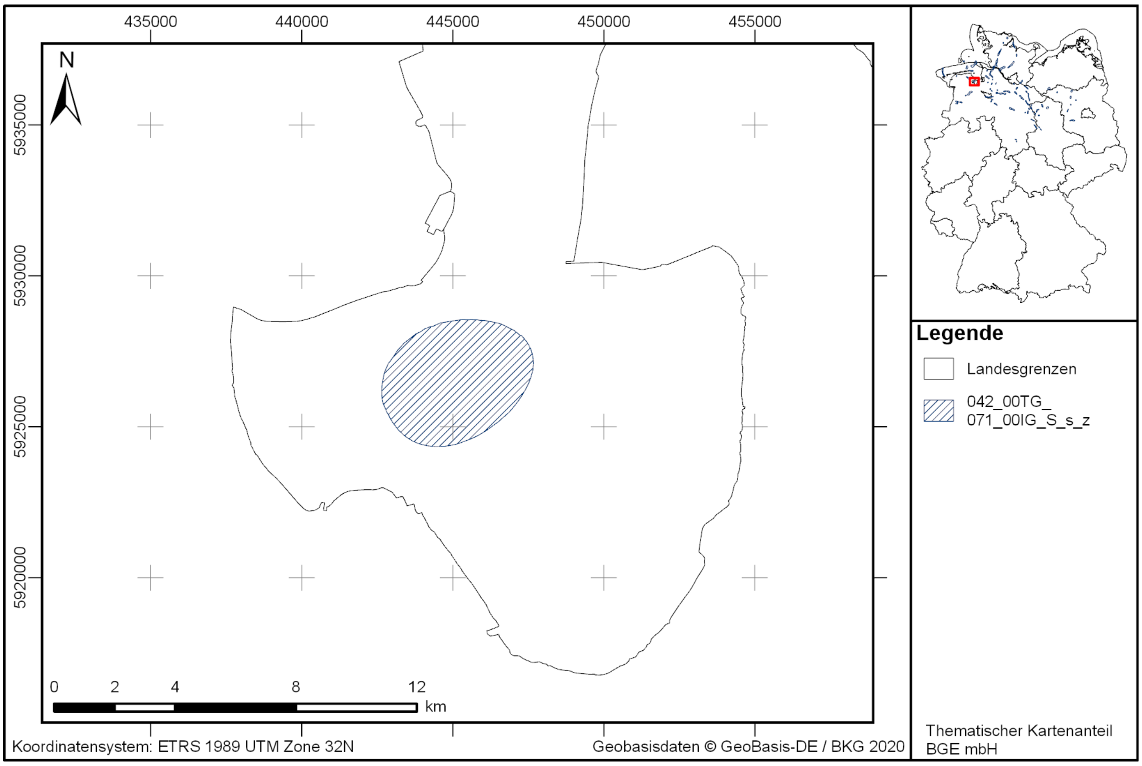


Figure 83: Overview map of the sub-area 042_00TG_071_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

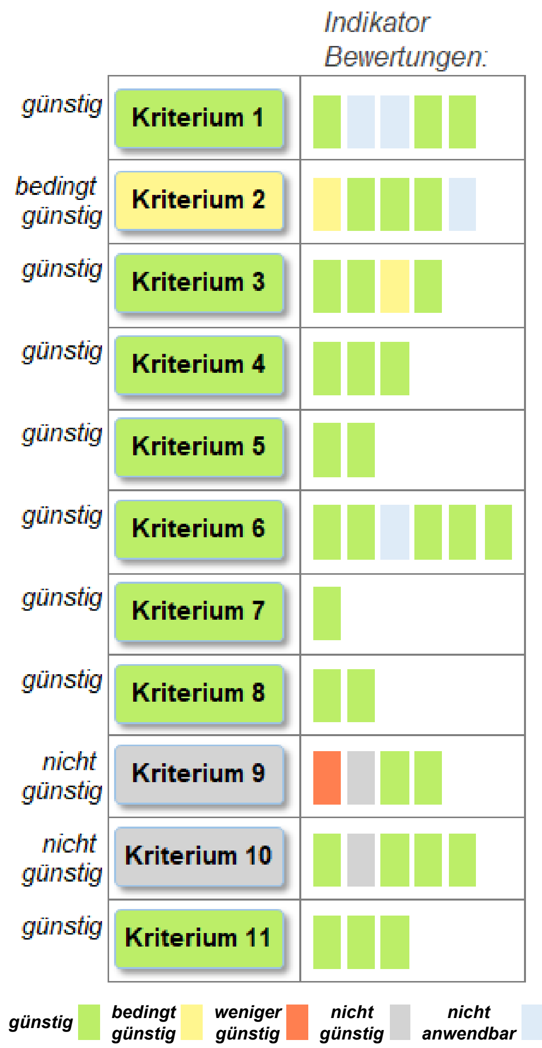
Table 93: Characteristics of the sub-area 042_00TG_071_00IG_S_s_z

Characteristics of the sub-area 042_00TG_071_00IG_S_s_z	
IA code	071_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, below Jade Bight.
Surface area	16 km²
Geological characteristics	The sub-area is located in the zechstein of the Arngast salt structure and has a thickness of 300 metres. The sub-area is located at a depth of 1,210 metres to 1,500 metres below ground surface.

*Table 94: Result of the geoscientific weighing criteria for the sub-area 042_00TG_071_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

**Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)**

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “favourable”. The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be identified. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.29 Sub-area 043_00TG_075_00IG_S_s_z

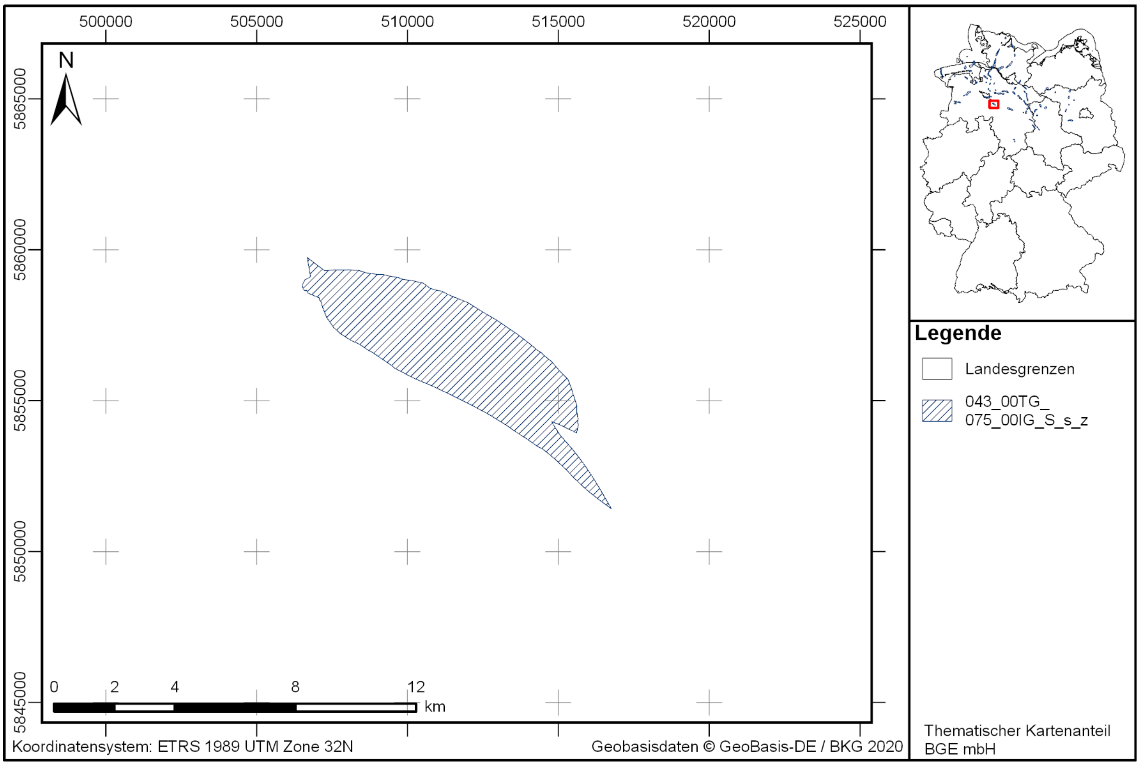
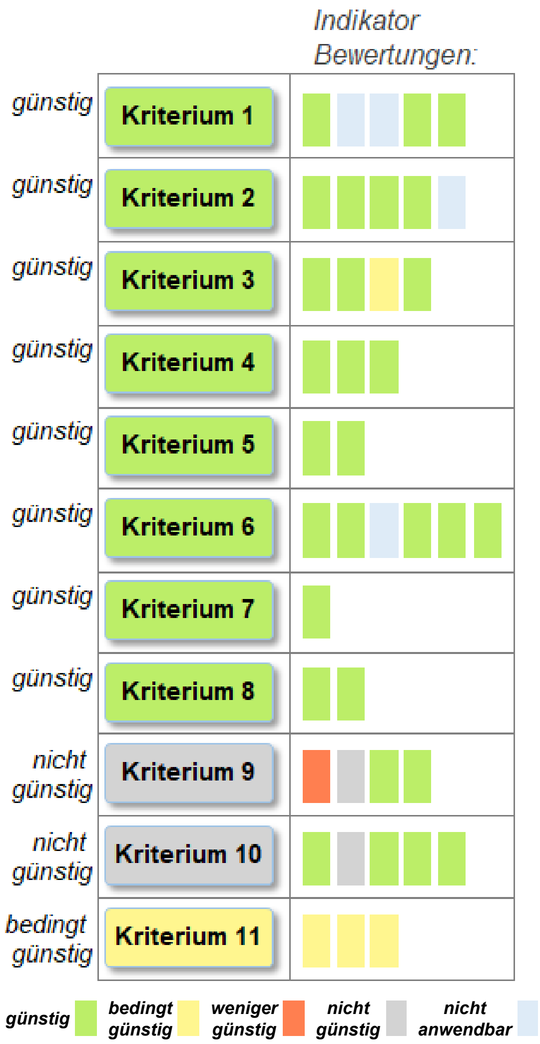


Figure 84: Overview map of the sub-area 043_00TG_075_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 95: Characteristics of the sub-area 043_00TG_075_00IG_S_s_z

Characteristics of the sub-area 043_00TG_075_00IG_S_s_z	
IA code	075_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 18 km southeast of the federal state of Bremen.
Surface area	26 km²
Geological characteristics	The sub-area is located in the zechstein of the Eitzendorf salt structure and has a thickness of 1,080 metres. The sub-area is located at a depth of 420 metres to 1,500 metres below ground surface.

Table 96: Result of the geoscientific weighing criteria for the sub-area 043_00TG_075_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated "favourable" and two criteria were rated "not favourable". The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". The indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone" was rated "conditionally favourable". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). However, the indicators "coverage with groundwater-inhibiting rock" and "coverage with erosion-inhibiting rock" of the "criterion for evaluation of protection of the effective containment zone by the overburden" were also rated "conditionally favourable". Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the overburden evaluation of "conditionally favourable" is weighed as less significant. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.30 Sub-area 044_00TG_082_00IG_S_s_z

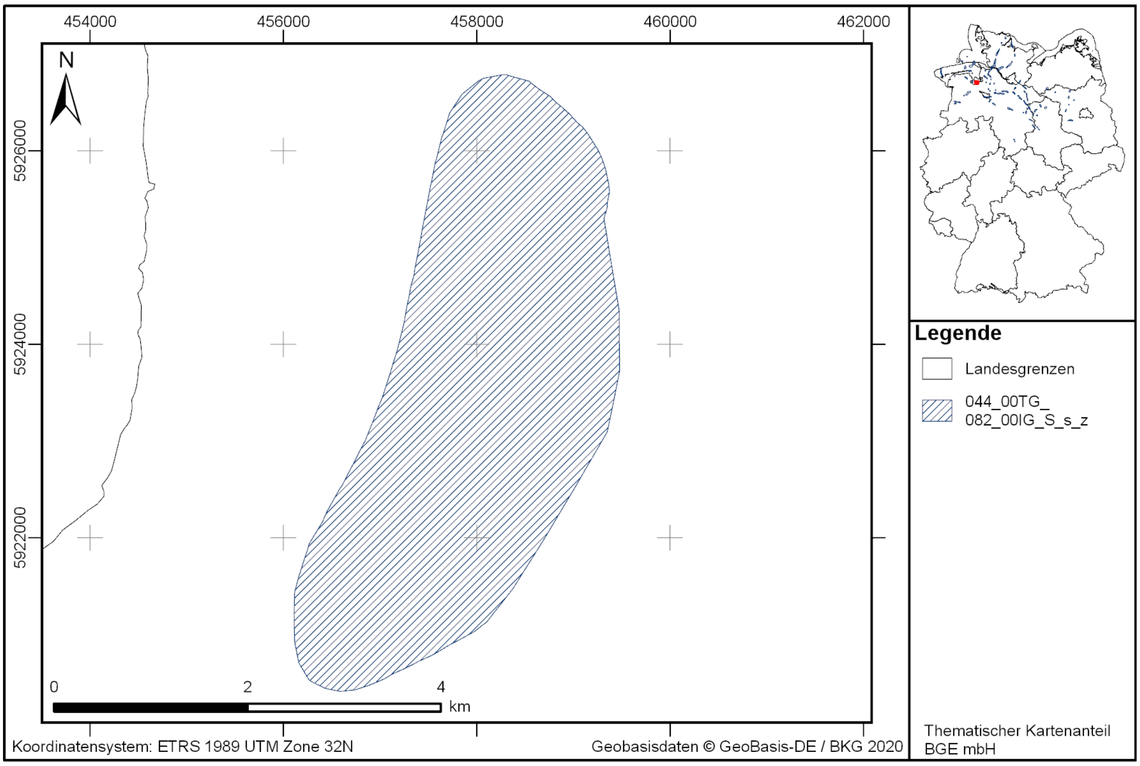


Figure 85: Overview map of the sub-area 044_00TG_082_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

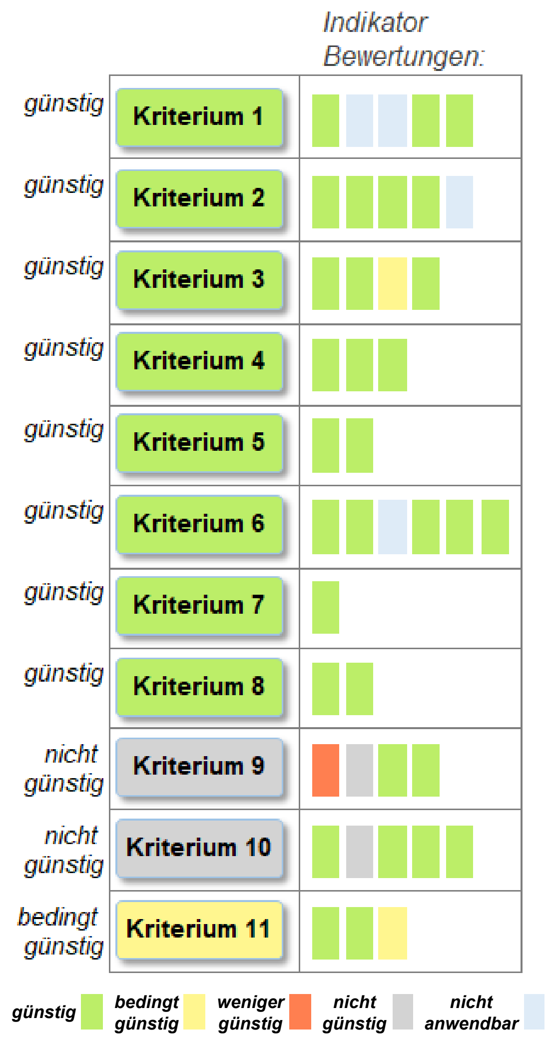
Table 97: Characteristics of the sub-area 044_00TG_082_00IG_S_s_z

Characteristics of the sub-area 044_00TG_082_00IG_S_s_z	
IA code	082_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the federal state of Lower Saxony, approx. 3 km east of Jade Bight.
Surface area	13 km²
Geological characteristics	The sub-area is located in the zechstein of the Seefeld salt structure and has a thickness of 450 metres. The sub-area is located at a depth of 1,060 metres to 1,500 metres below ground surface.

Table 98: Result of the geoscientific weighing criteria for the sub-area 044_00TG_082_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.31 Sub-area 045_00TG_086_00IG_S_s_z

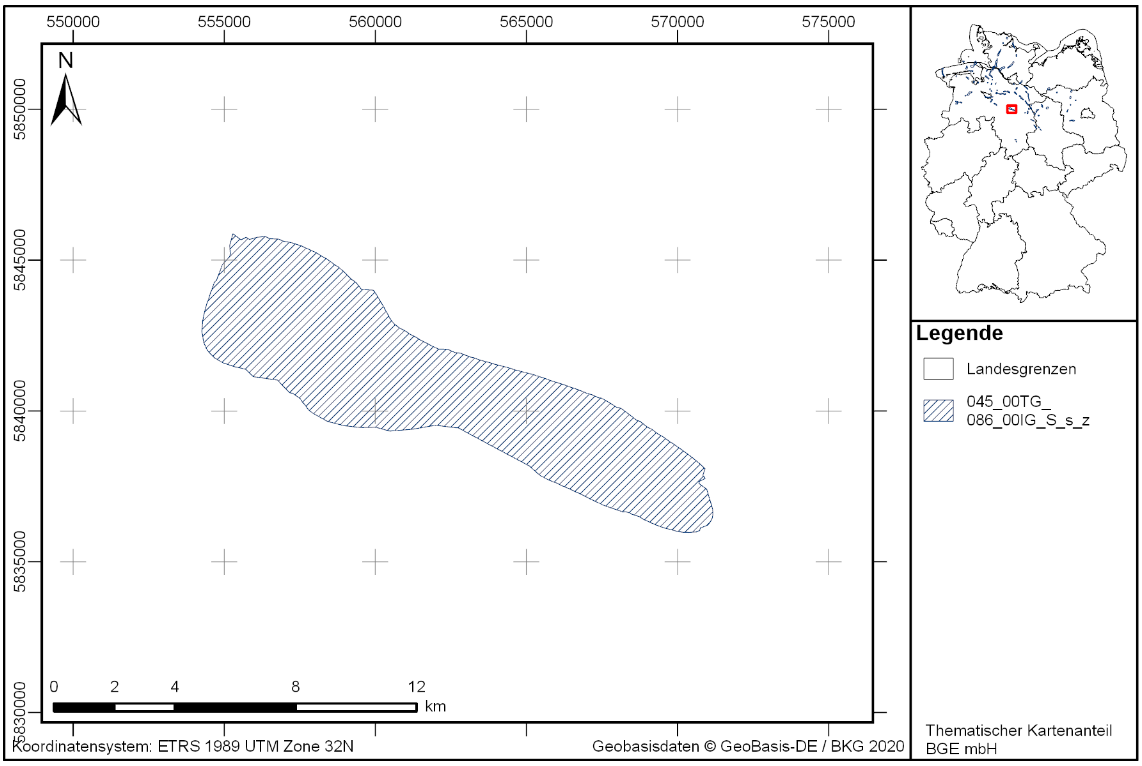
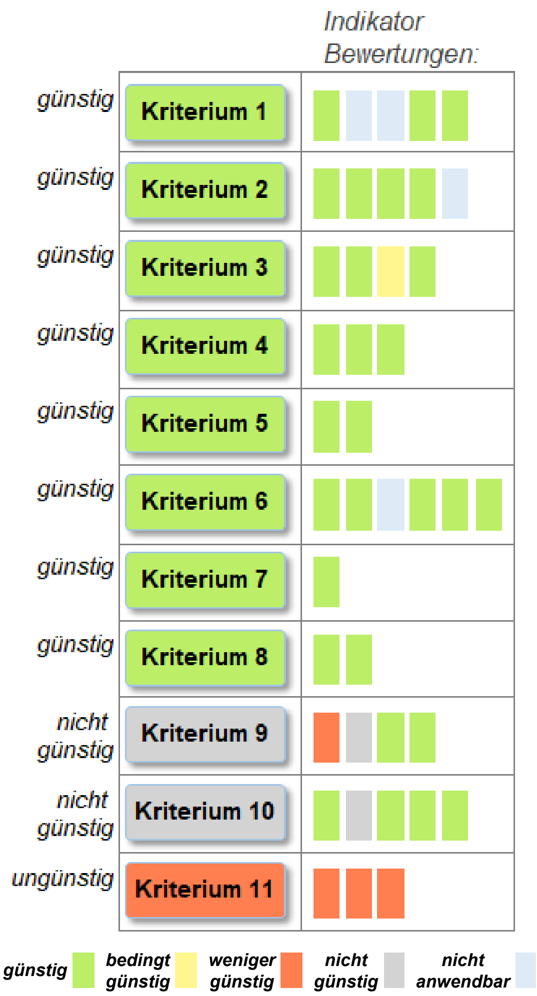


Figure 86: Overview map of the sub-area 045_00TG_086_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 99: Characteristics of the sub-area 045_00TG_086_00IG_S_s_z

Characteristics of the sub-area 045_00TG_086_00IG_S_s_z	
IA code	086_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is at a central location in the federal state of Lower Saxony.
Surface area	59 km²
Geological characteristics	The sub-area is located in the zechstein of the Meissendorf/Wolthausen salt structure and has a thickness of 480 metres. The sub-area is located at a depth of 410 metres to 1,500 metres below ground surface.

Table 100: Result of the geoscientific weighing criteria for the sub-area 045_00TG_086_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation:  	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. However, all indicators assigned to the “criterion for evaluation of protection of the effective containment zone by the overburden” were rated “unfavourable”. Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the evaluation of the distance to the Quaternary base and the distance to ground surface of “unfavourable” are weighed as less significant. It is therefore reasonable to assume that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.32 Sub-area 046_00TG_090_00IG_S_s_z

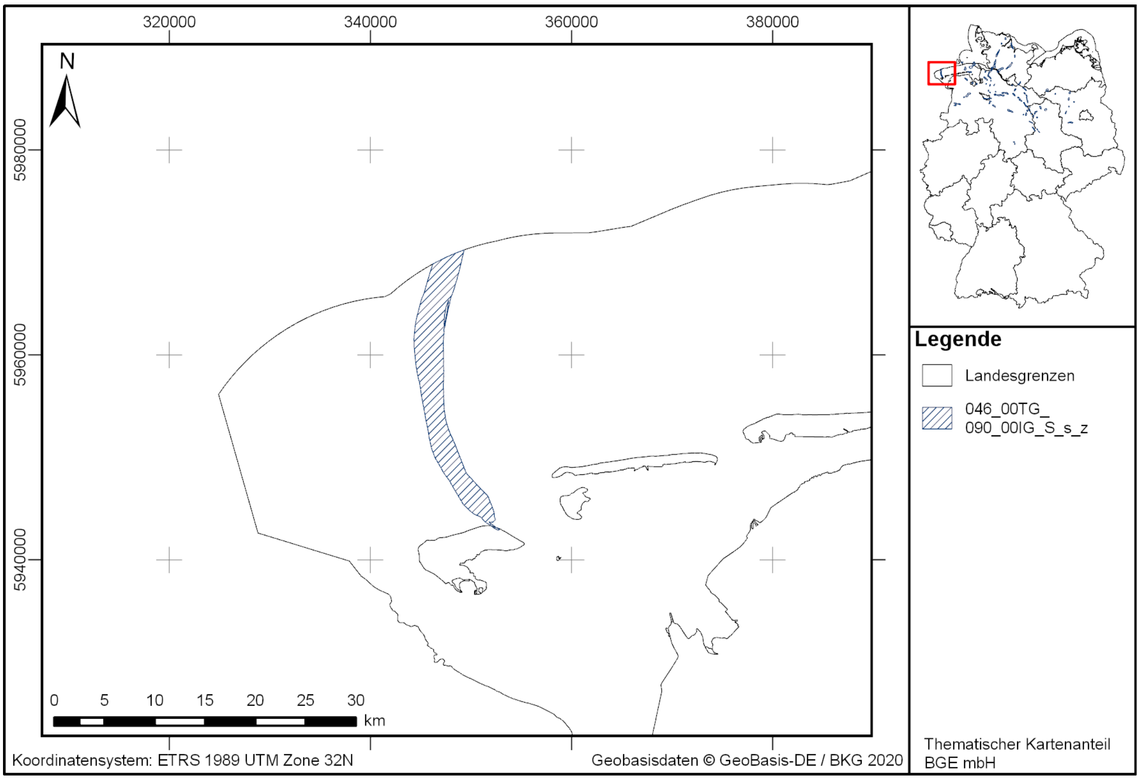


Figure 87: Overview map of the sub-area 046_00TG_090_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

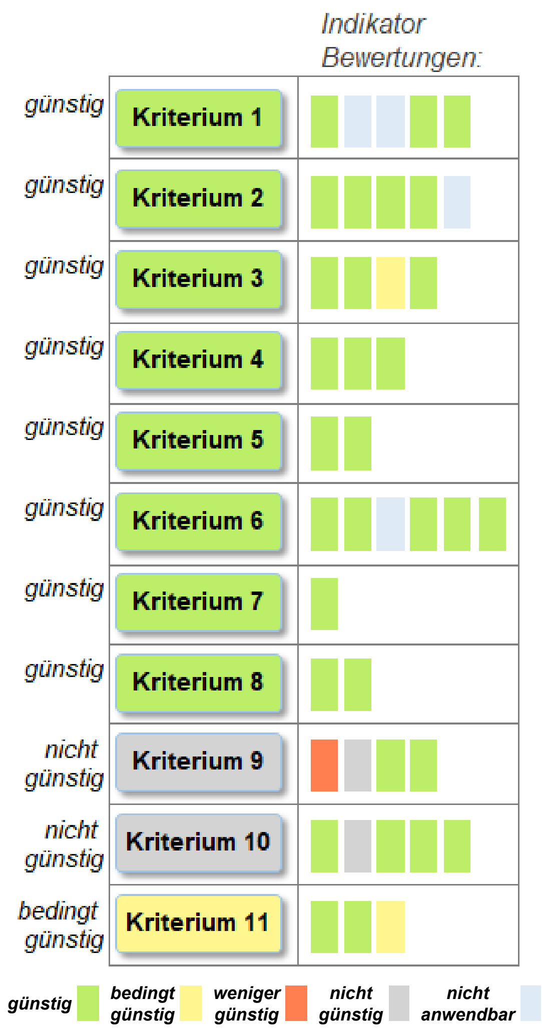
Table 101: Characteristics of the sub-area 046_00TG_090_00IG_S_s_z

Characteristics of the sub-area 046_00TG_090_00IG_S_s_z	
IA code	090_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located beneath the North Sea, directly north of the island of Borkum in the federal state of Lower Saxony.
Surface area	66 km²
Geological characteristics	The sub-area is located in the zechstein of the Lisa salt structure and has a thickness of 1,020 metres. The sub-area is located at a depth of 480 metres to 1,500 metres below ground surface.

*Table 102: Result of the geoscientific weighing criteria for the sub-area 046_00TG_090_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.33 Sub-area 047_00TG_096_00IG_S_s_z

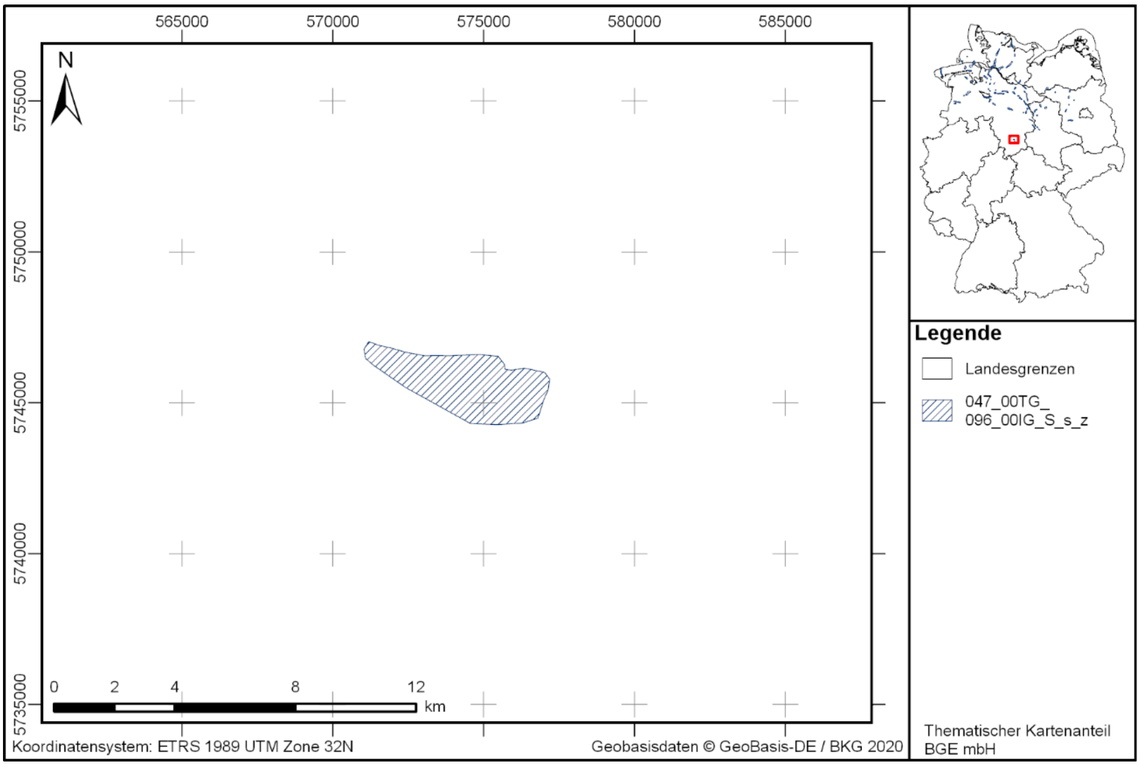
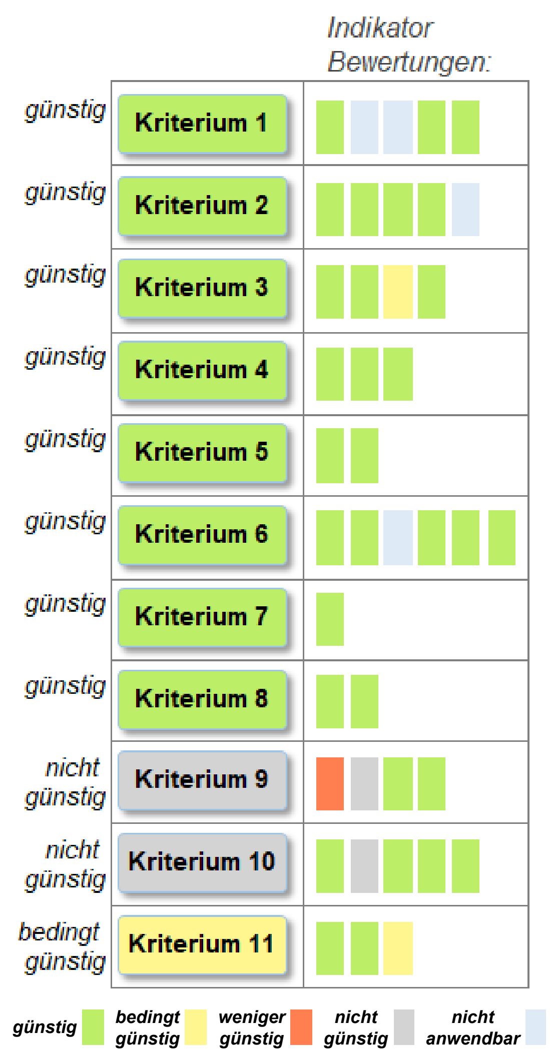


Figure 88: Overview map of the sub-area 047_00TG_096_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 103: Characteristics of the sub-area 047_00TG_096_00IG_S_s_z

Characteristics of the sub-area 047_00TG_096_00IG_S_s_z	
IA code	096_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the south of the federal state of Lower Saxony, approx. 35 km west of the federal state of Saxony-Anhalt.
Surface area	10 km²
Geological characteristics	The sub-area is located in the zechstein of the Harriehausen salt structure and has a thickness of 1,030 metres. The sub-area is located at a depth of 470 metres to 1,500 metres below ground surface.

Table 104: Result of the geoscientific weighing criteria for the sub-area 047_00TG_096_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.34 Sub-area 048_00TG_097_00IG_S_s_z

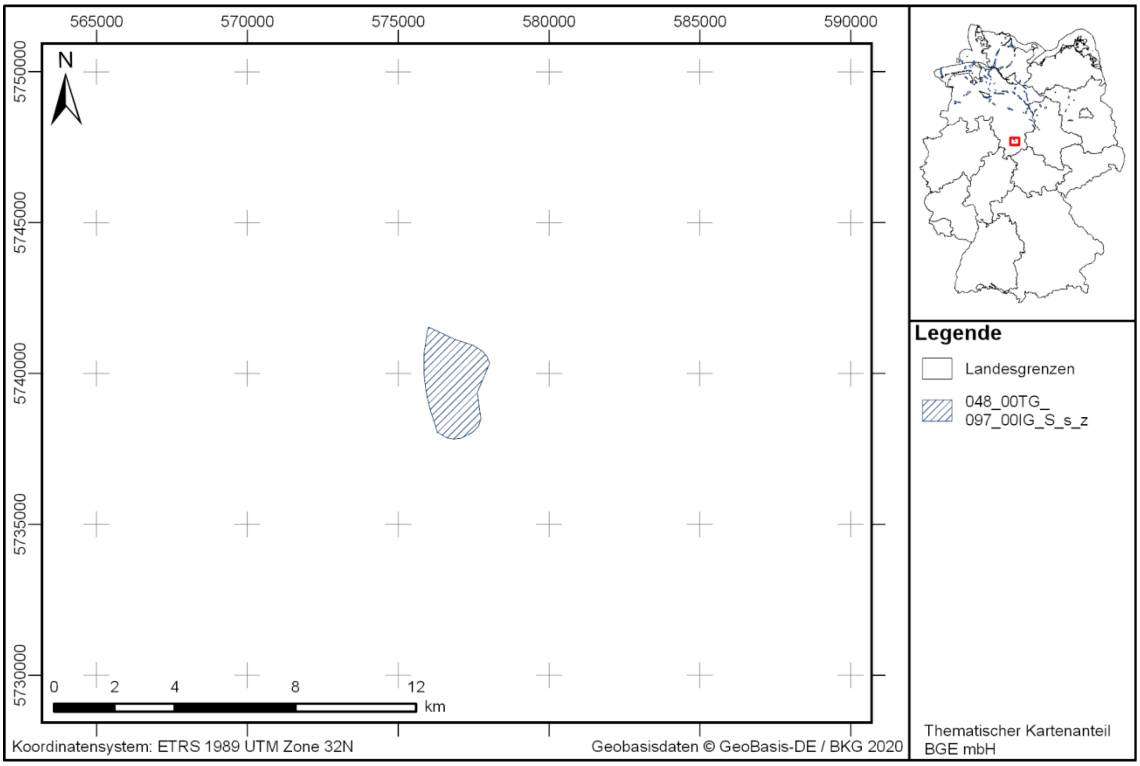


Figure 89: Overview map of the sub-area 048_00TG_097_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

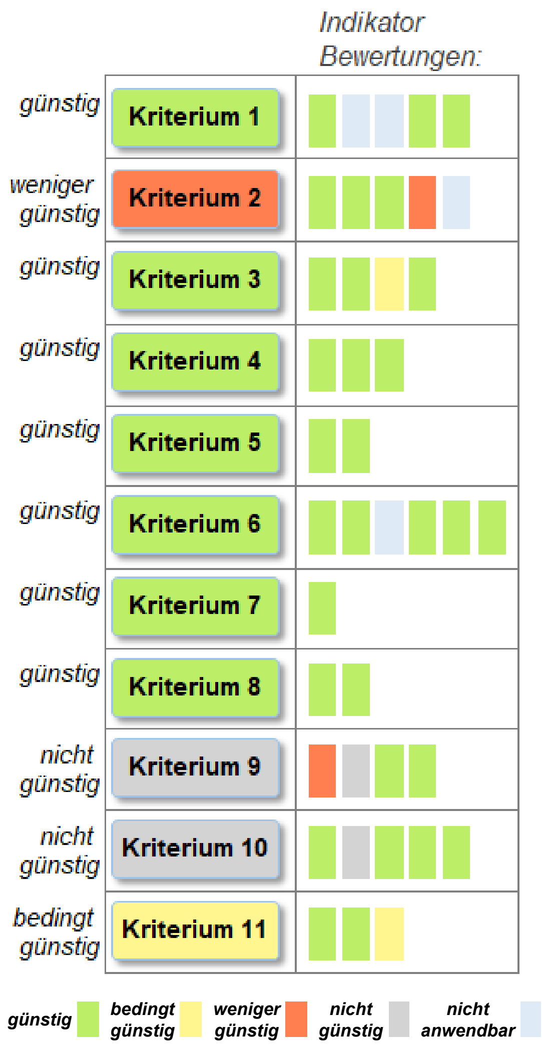
Table 105: Characteristics of the sub-area 048_00TG_097_00IG_S_s_z

Characteristics of the sub-area 048_00TG_097_00IG_S_s_z	
IA code	097_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the south of the federal state of Lower Saxony, approx. 35 km west of the federal state of Saxony-Anhalt.
Surface area	6 km²
Geological characteristics	The sub-area is located in the zechstein of the Düderode-Oldenrode salt structure and has a thickness of 940 metres. The sub-area is located at a depth of 560 metres to 1,500 metres below ground surface.

Table 106: Result of the geoscientific weighing criteria for the sub-area 048_00TG_097_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “less favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. With an area of 5.74 square kilometres, it can be assumed nevertheless that around twice the required area will be available, taking into account the model uncertainties. It is therefore reasonable to assume that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.35 Sub-area 049_00TG_106_00IG_S_s_z

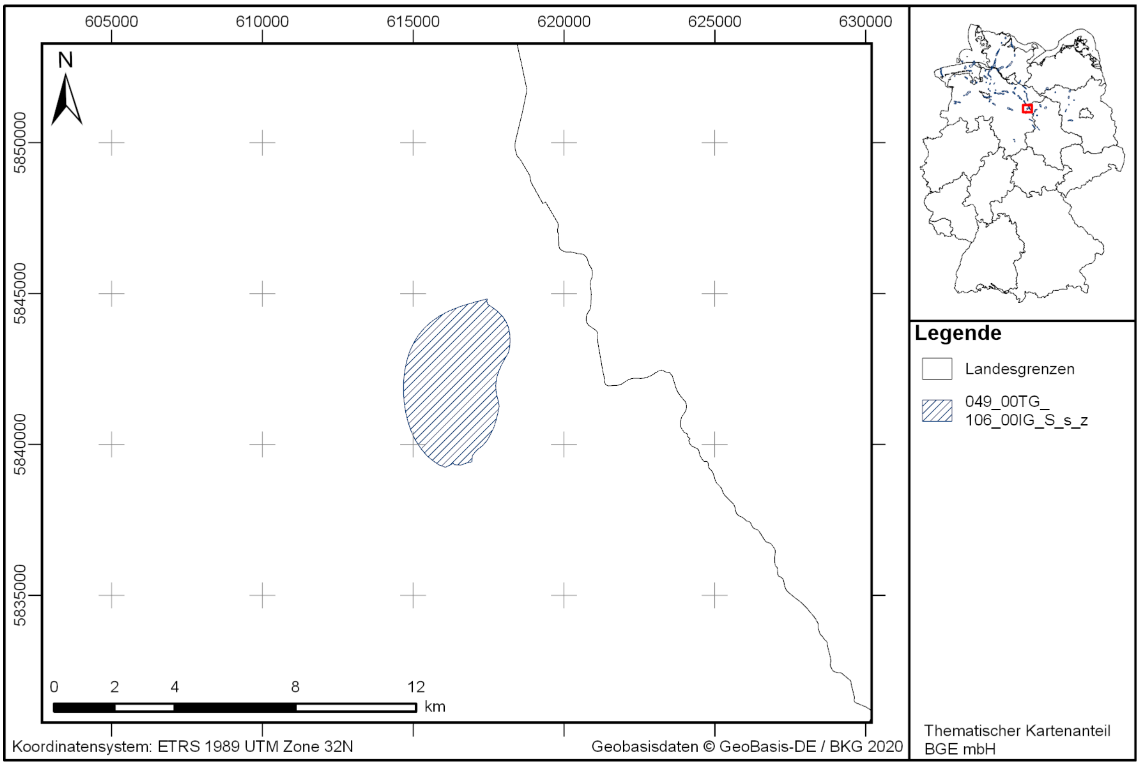
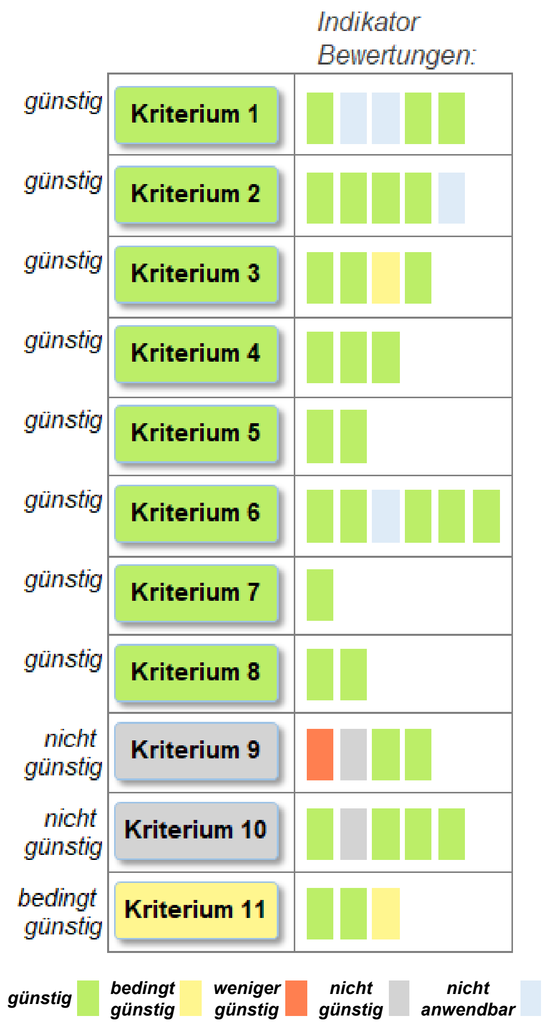


Figure 90: Overview map of the sub-area 049_00TG_106_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 107: Characteristics of the sub-area 049_00TG_106_00IG_S_s_z

Characteristics of the sub-area 049_00TG_106_00IG_S_s_z	
IA code	106_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony, approx. 4 km west of the border to the federal state of Saxony-Anhalt.
Surface area	14 km²
Geological characteristics	The sub-area is located in the zechstein of the Wittingen salt structure and has a thickness of 920 metres. The sub-area is located at a depth of 580 metres to 1,500 metres below ground surface.

Table 108: Result of the geoscientific weighing criteria for the sub-area 049_00TG_106_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.36 Sub-area 050_00TG_107_00IG_S_s_z

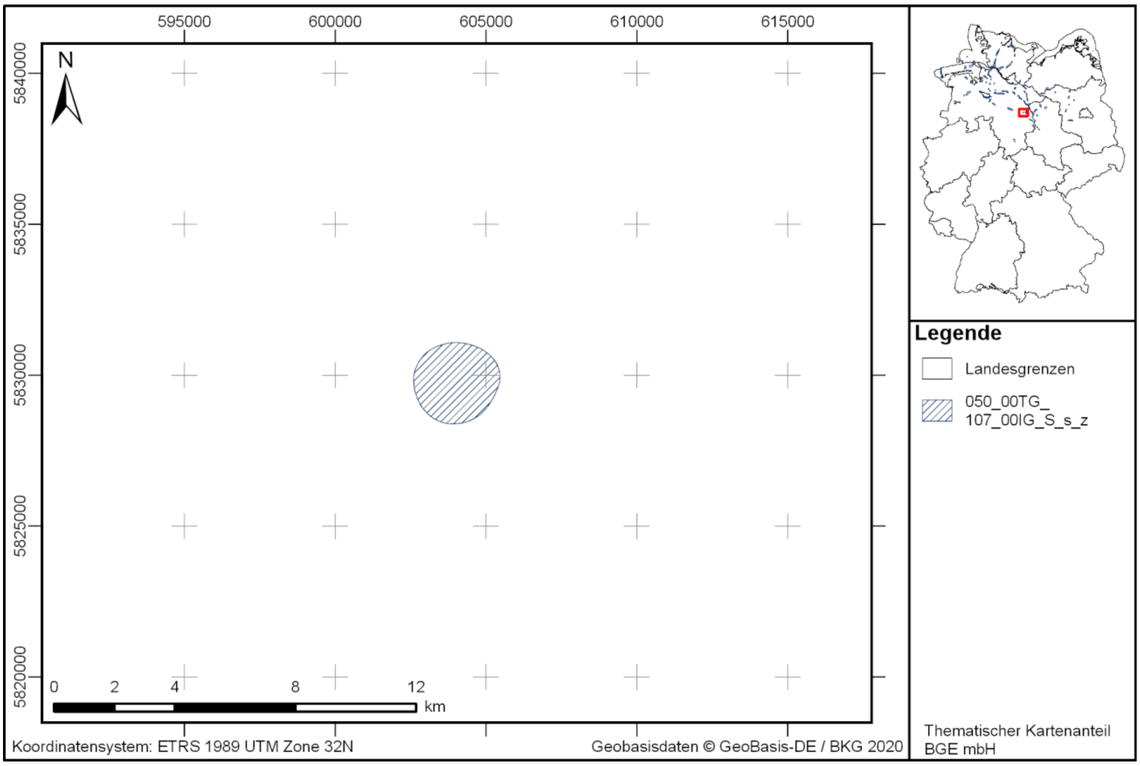


Figure 91: Overview map of the sub-area 050_00TG_107_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

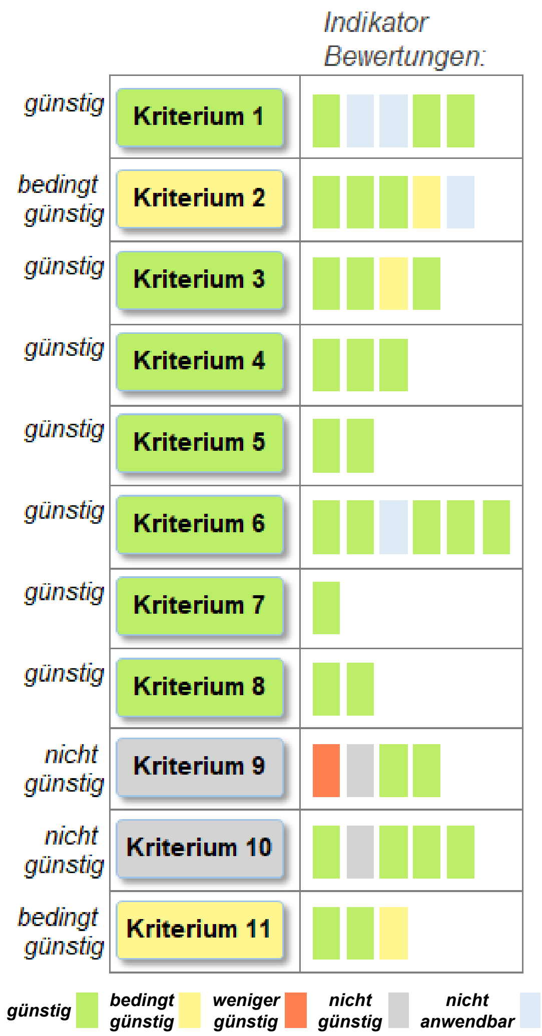
Table 109: Characteristics of the sub-area 050_00TG_107_00IG_S_s_z

Characteristics of the sub-area 050_00TG_107_00IG_S_s_z	
IA code	107_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony, approx. 25 km west of the border to the federal state of Saxony-Anhalt.
Surface area	6 km²
Geological characteristics	The sub-area is located in the zechstein of the Wesendorf salt structure and has a thickness of 820 metres. The sub-area is located at a depth of 680 metres to 1,500 metres below ground surface.

Table 110: Result of the geoscientific weighing criteria for the sub-area 050_00TG_107_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “less favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. With an area of 5.99 square kilometres, it can be assumed nevertheless that around twice the required area will be available, taking into account the model uncertainties. It is therefore reasonable to assume that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.37 Sub-area 051_00TG_109_00IG_S_s_z

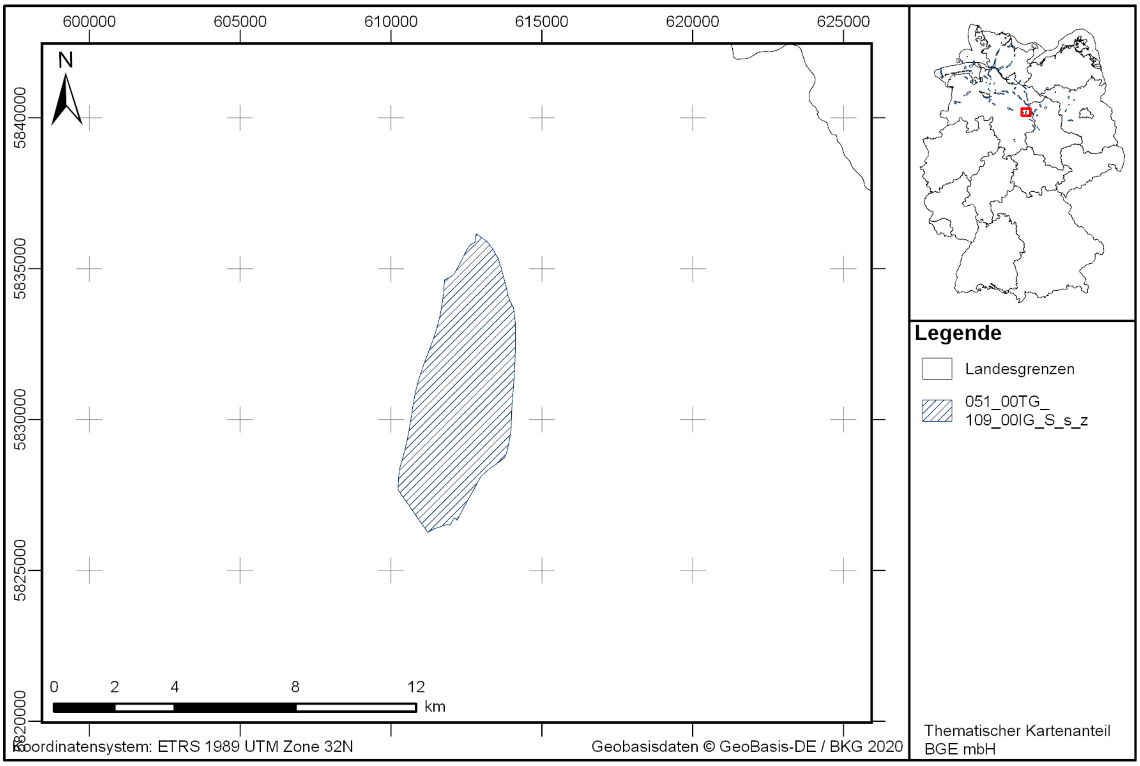


Figure 92: Overview map of the sub-area 051_00TG_109_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

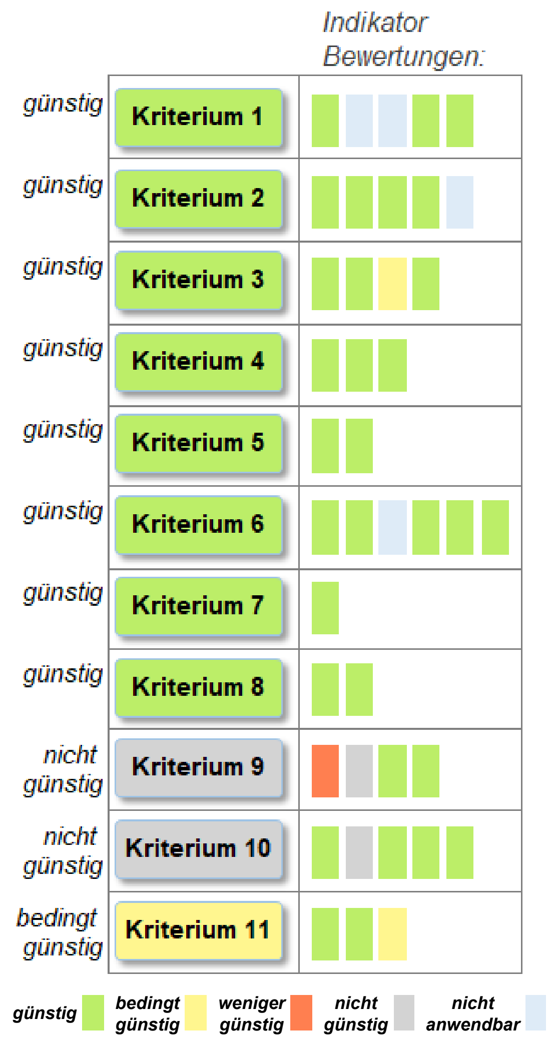
Table 111: Characteristics of the sub-area 051_00TG_109_00IG_S_s_z

Characteristics of the sub-area 051_00TG_109_00IG_S_s_z	
IA code	109_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony, approx. 15 km west of the border to the federal state of Saxony-Anhalt.
Surface area	24 km²
Geological characteristics	The sub-area is located in the zechstein of the Vorhop salt structure and has a thickness of 970 metres. The sub-area is located at a depth of 530 metres to 1,500 metres below ground surface.

Table 112: Result of the geoscientific weighing criteria for the sub-area 051_00TG_109_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<ins>Results of the summarised evaluation</ins>:



<ins>Criterion 1</ins>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<ins>Criterion 2</ins>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<ins>Criterion 3</ins>: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

<ins>Criterion 4</ins>: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

<ins>Criterion 5</ins>: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

<ins>Criterion 6</ins>: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

<ins>Criterion 7</ins>: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

<ins>Criterion 8</ins>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<ins>Criterion 9</ins>: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

<ins>Criterion 10</ins>: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

<ins>Criterion 11</ins>: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

<ins>Reasoning for the summarised evaluation</ins>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.38 Sub-area 052_00TG_119_00IG_S_s_z

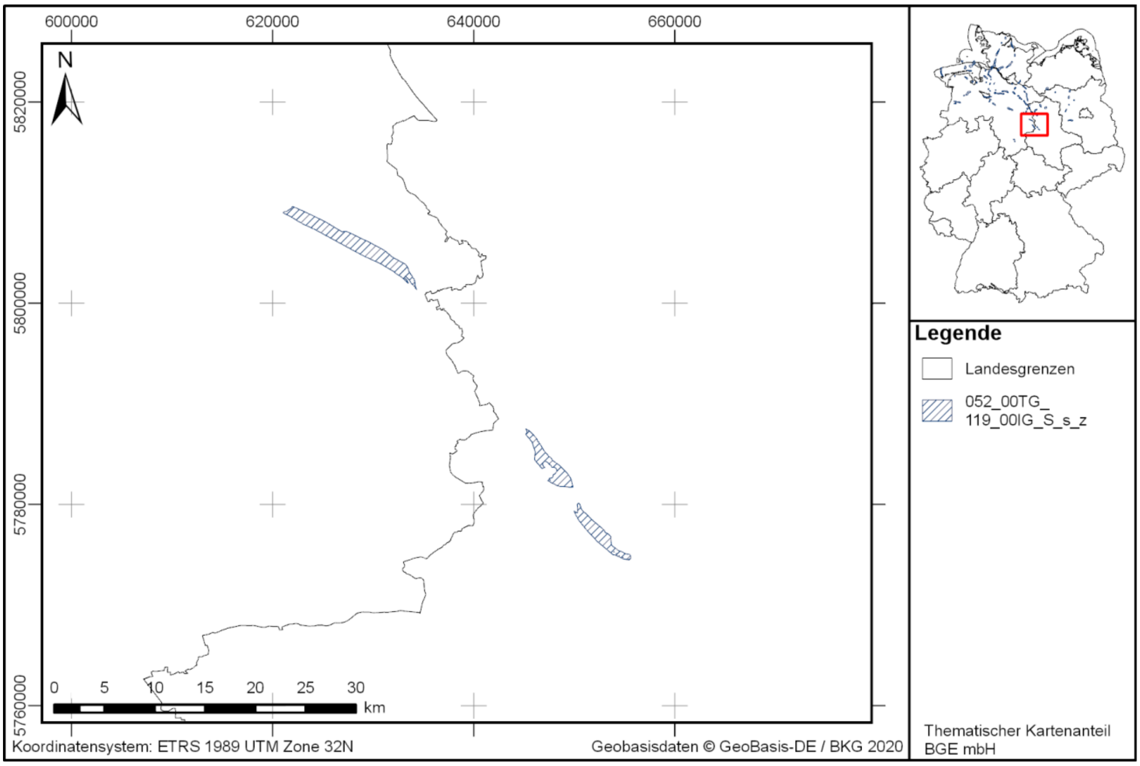


Figure 93: Overview map of the sub-area 052_00TG_119_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

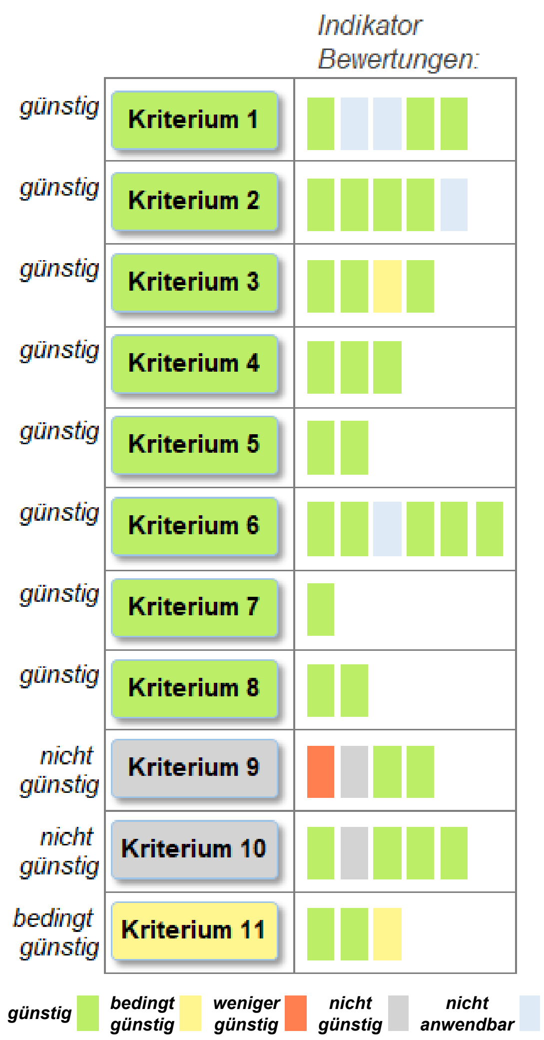
Table 113: Characteristics of the sub-area 052_00TG_119_00IG_S_s_z

Characteristics of the sub-area 052_00TG_119_00IG_S_s_z	
IA code	119_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony and in the west of the federal state of Saxony-Anhalt.
Surface area	31 km²
Geological characteristics	The sub-area is located in the zechstein of the Allertal salt structure and has a thickness of 480 metres. The sub-area is located at a depth of 440 metres to 1,180 metres below ground surface.

Table 114: Result of the geoscientific weighing criteria for the sub-area 052_00TG_119_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.39 Sub-area 053_00TG_122_00IG_S_s_z

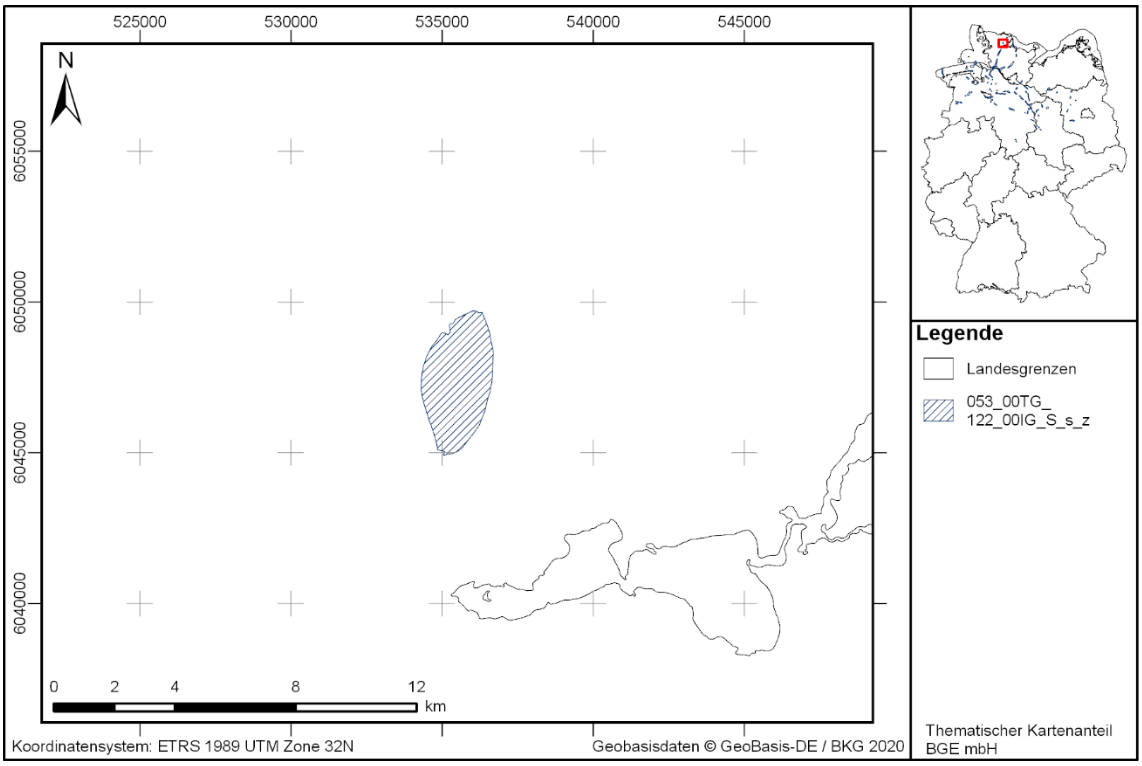


Figure 94: Overview map of the sub-area 053_00TG_122_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

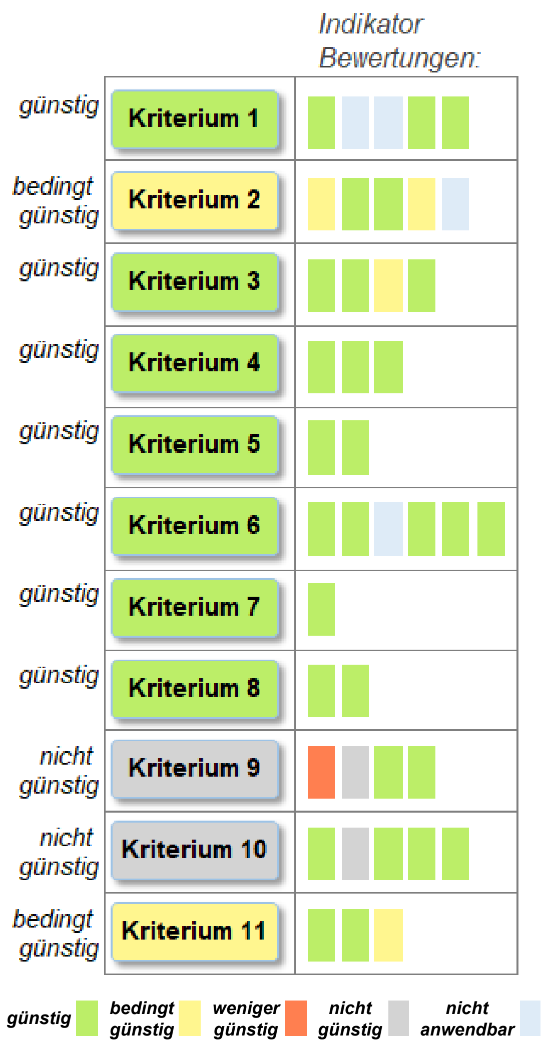
Table 115: Characteristics of the sub-area 053_00TG_122_00IG_S_s_z

Characteristics of the sub-area 053_00TG_122_00IG_S_s_z	
IA code	122_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Schleswig-Holstein, approx. 33 km south of the German border with Denmark.
Surface area	8 km²
Geological characteristics	The sub-area is located in the zechstein of the Langsee salt structure and has a thickness of 1,090 metres. The sub-area is located at a depth of 1,200 metres to 1,500 metres below ground surface.

*Table 116: Result of the geoscientific weighing criteria for the sub-area 053_00TG_122_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for spatial characterisability" was rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". The indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone" was rated "conditionally favourable". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The "criterion for evaluation of the rock formation configuration" was rated "conditionally favourable" based on the "barrier thickness" and "surface extent for the given thickness (multiple of the minimum surface requirement)" criteria. Due to the considerable depth of the structure, only the tip of the salt dome, showing a small area of low thickness, lies below ground surface at depth intervals of 300 metres to 1,500 metres. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.40 Sub-area 054_00TG_124_00IG_S_s_z

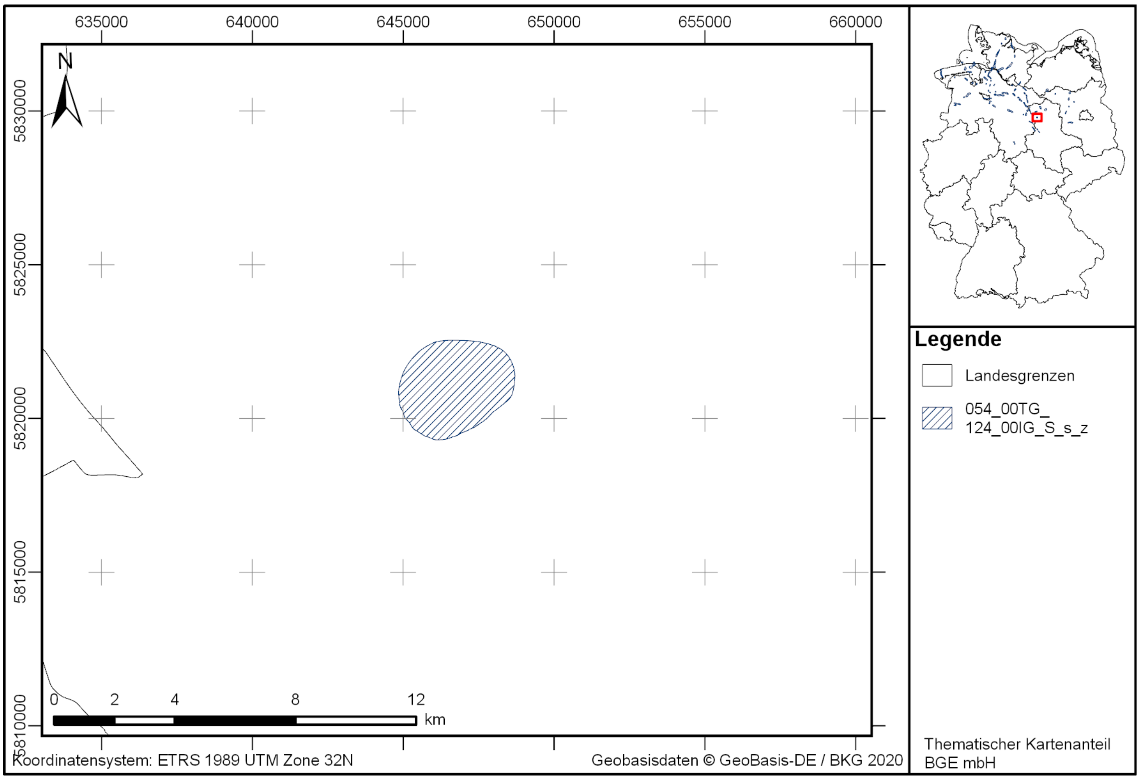
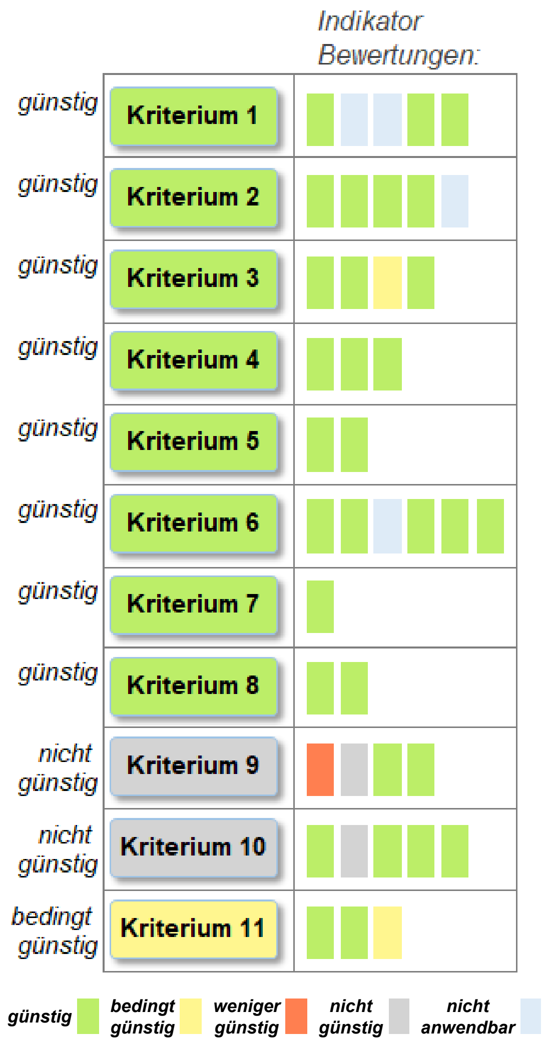


Figure 95: Overview map of the sub-area 054_00TG_124_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 117: Characteristics of the sub-area 054_00TG_124_00IG_S_s_z

Characteristics of the sub-area 054_00TG_124_00IG_S_s_z	
IA code	124_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of the federal state of Saxony-Anhalt, approx. 10 km east of the border to the federal state of Lower Saxony.
Surface area	10 km²
Geological characteristics	The sub-area is located in the zechstein of the Dannefeld salt structure and has a thickness of 530 metres. The sub-area is located at a depth of 530 metres to 1,060 metres below ground surface.

Table 118: Result of the geoscientific weighing criteria for the sub-area 054_00TG_124_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
<u>Results of the summarised evaluation</u>: 	<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) <u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) <u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) <u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) <u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) <u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) <u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) <u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) <u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) <u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) <u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
<u>Reasoning for the summarised evaluation</u>: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.41 Sub-area 055_00TG_130_00IG_S_s_z

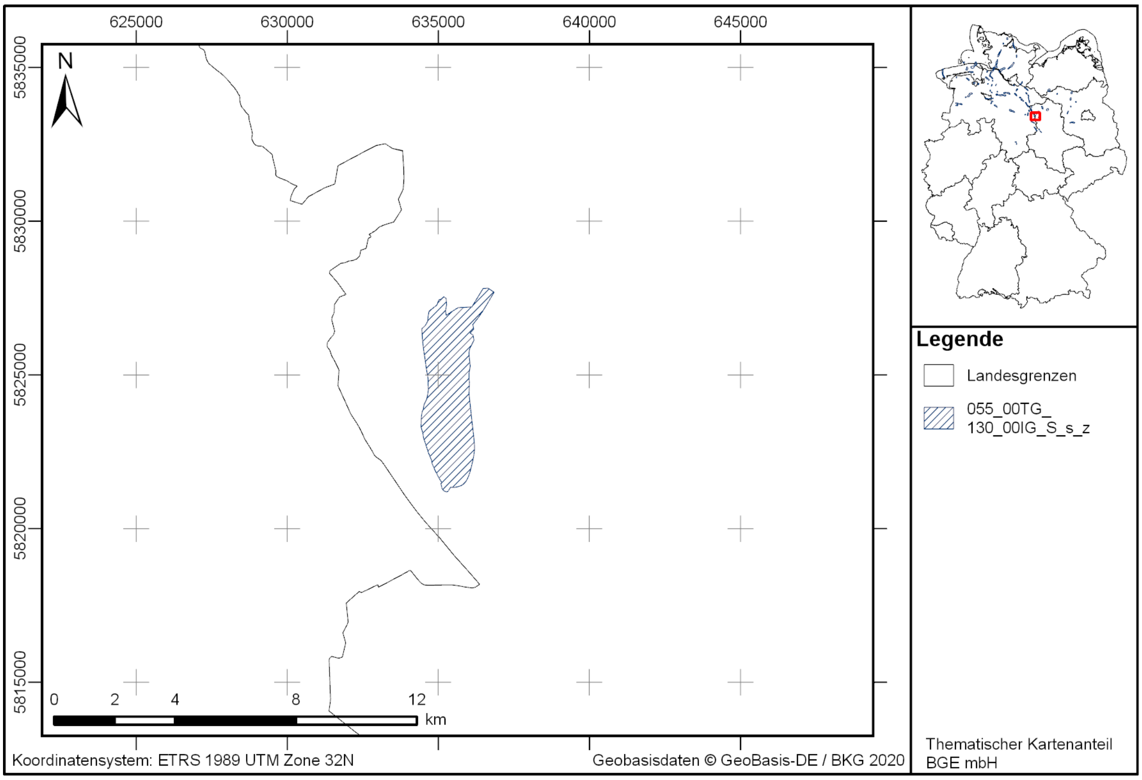


Figure 96: Overview map of the sub-area 055_00TG_130_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

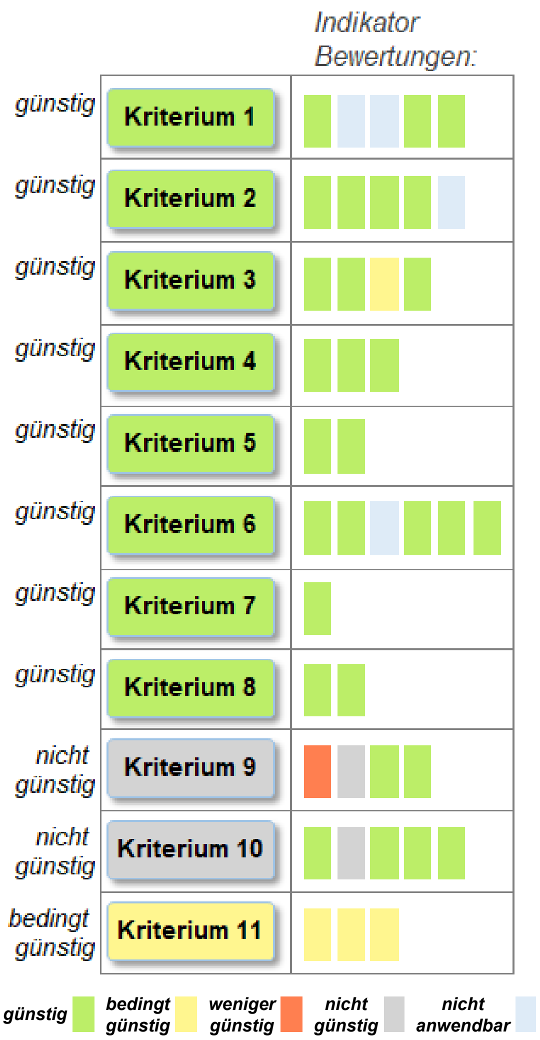
Table 119: Characteristics of the sub-area 055_00TG_130_00IG_S_s_z

Characteristics of the sub-area 055_00TG_130_00IG_S_s_z	
IA code	130_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northwest of the federal state of Saxony-Anhalt, approx. 2 km east of the border to the federal state of Lower Saxony.
Surface area	9 km²
Geological characteristics	The sub-area is located in the zechstein of the Jahrstedt salt structure and has a thickness of 990 metres. The sub-area is located at a depth of 510 metres to 1,500 metres below ground surface.

Table 120: Result of the geoscientific weighing criteria for the sub-area 055_00TG_130_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for spatial characterisability" was rated "favourable". The "criterion for evaluation of the rock formation configuration" was rated "conditionally favourable" based on the "surface extent for the given thickness (multiple of the minimum surface requirement)". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the overburden evaluation of "conditionally favourable" is weighed as less significant. If only almost three times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.42 Sub-area 056_00TG_132_00IG_S_s_z

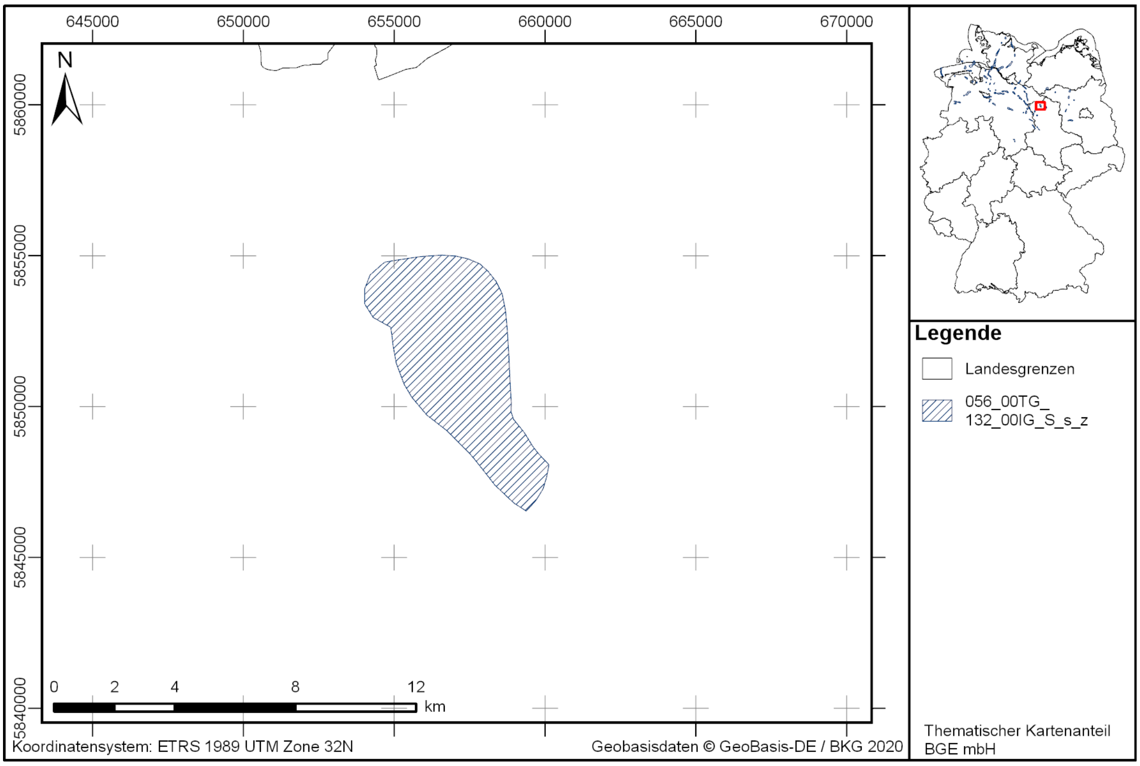


Figure 97: Overview map of the sub-area 056_00TG_132_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

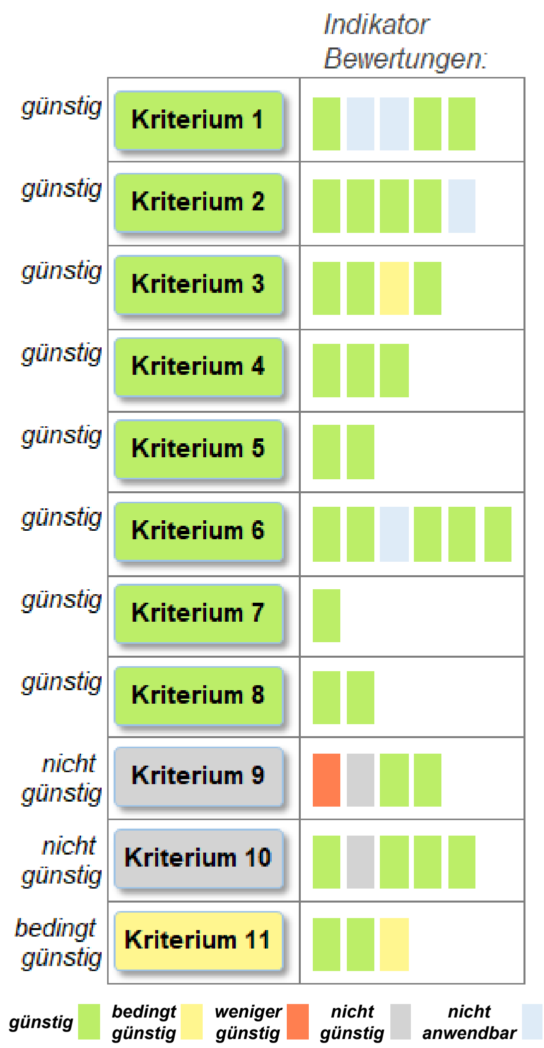
Table 121: Characteristics of the sub-area 056_00TG_132_00IG_S_s_z

Characteristics of the sub-area 056_00TG_132_00IG_S_s_z	
IA code	132_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Saxony-Anhalt, approx. 7.5 km south of the border to the federal state of Lower Saxony.
Surface area	26 km²
Geological characteristics	The sub-area is located in the zechstein of the Lüge-Liesten salt structure and has a thickness of 840 metres. The sub-area is located at a depth of 660 metres to 1,500 metres below ground surface.

Table 122: Result of the geoscientific weighing criteria for the sub-area 056_00TG_132_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.43 Sub-area 057_00TG_133_00IG_S_s_z

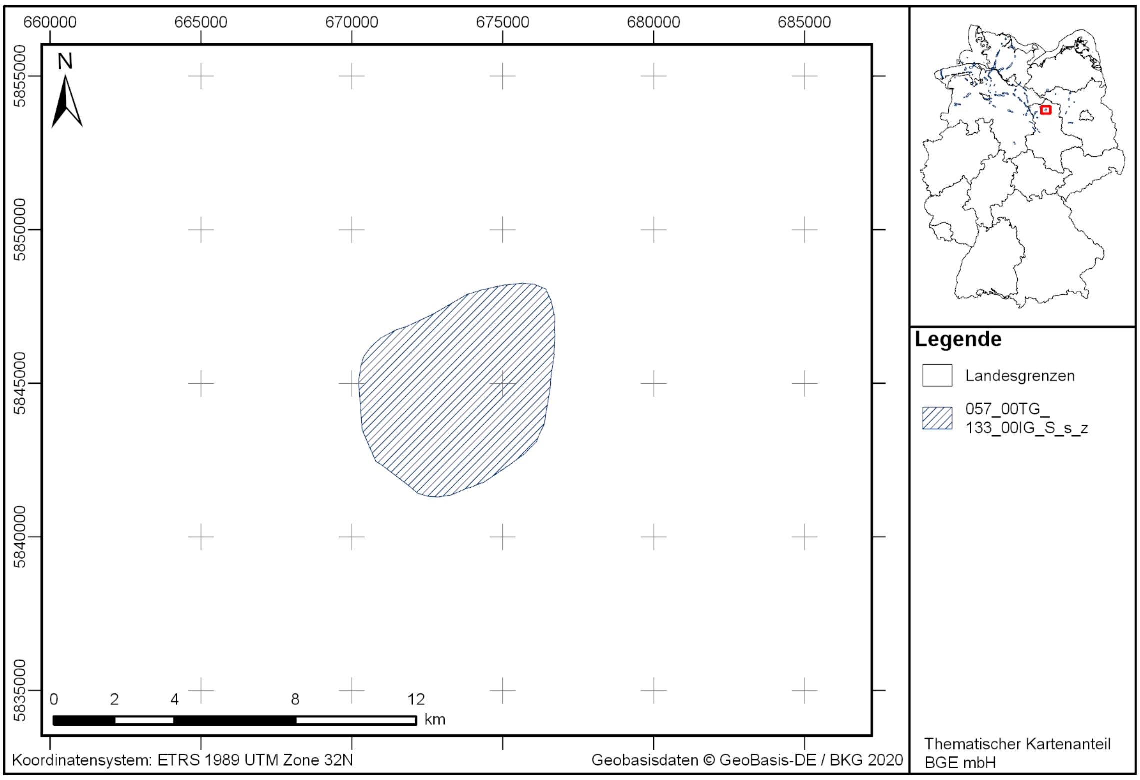


Figure 98: Overview map of the sub-area 057_00TG_133_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

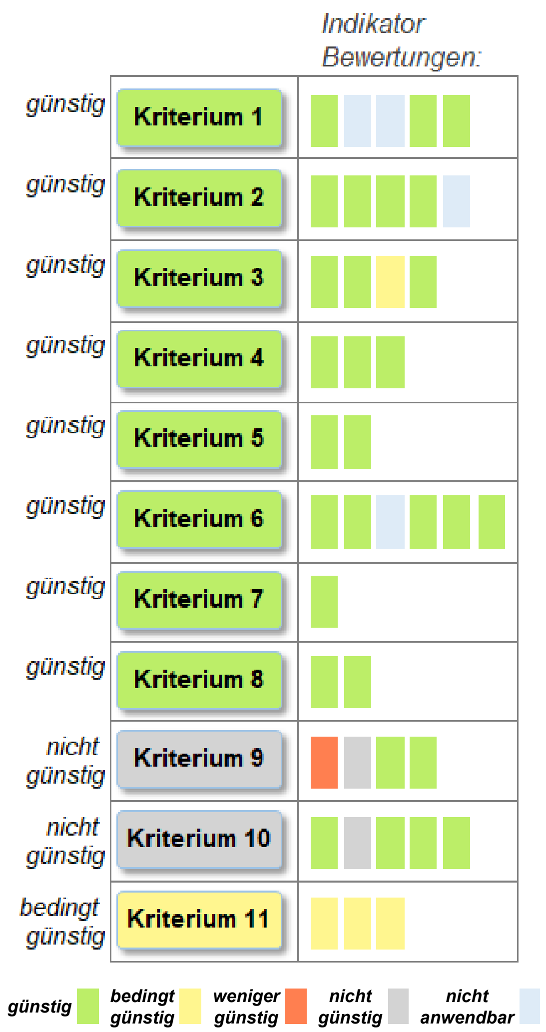
Table 123: Characteristics of the sub-area 057_00TG_133_00IG_S_s_z

Characteristics of the sub-area 057_00TG_133_00IG_S_s_z	
IA code	133_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Saxony-Anhalt, approx. 22 km south of the border to the federal state of Lower Saxony.
Surface area	34 km²
Geological characteristics	The sub-area is located in the zechstein of the Messdorf salt structure and has a thickness of 820 metres. The sub-area is located at a depth of 680 metres to 1,500 metres below ground surface.

Table 124: *Result of the geoscientific weighing criteria for the sub-area 057_00TG_133_00IG_S_s_z.*
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated "favourable" and two criteria were rated "not favourable".

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). However, the indicators “coverage with groundwater-inhibiting rock” and “coverage with erosion-inhibiting rock” of the “criterion for evaluation of protection of the effective containment zone by the overburden” were also rated “conditionally favourable”. Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the evaluation of the distance to the Quaternary base as “conditionally favourable” is weighed as less significant. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.44 Sub-area 058_00TG_136_00IG_S_s_z

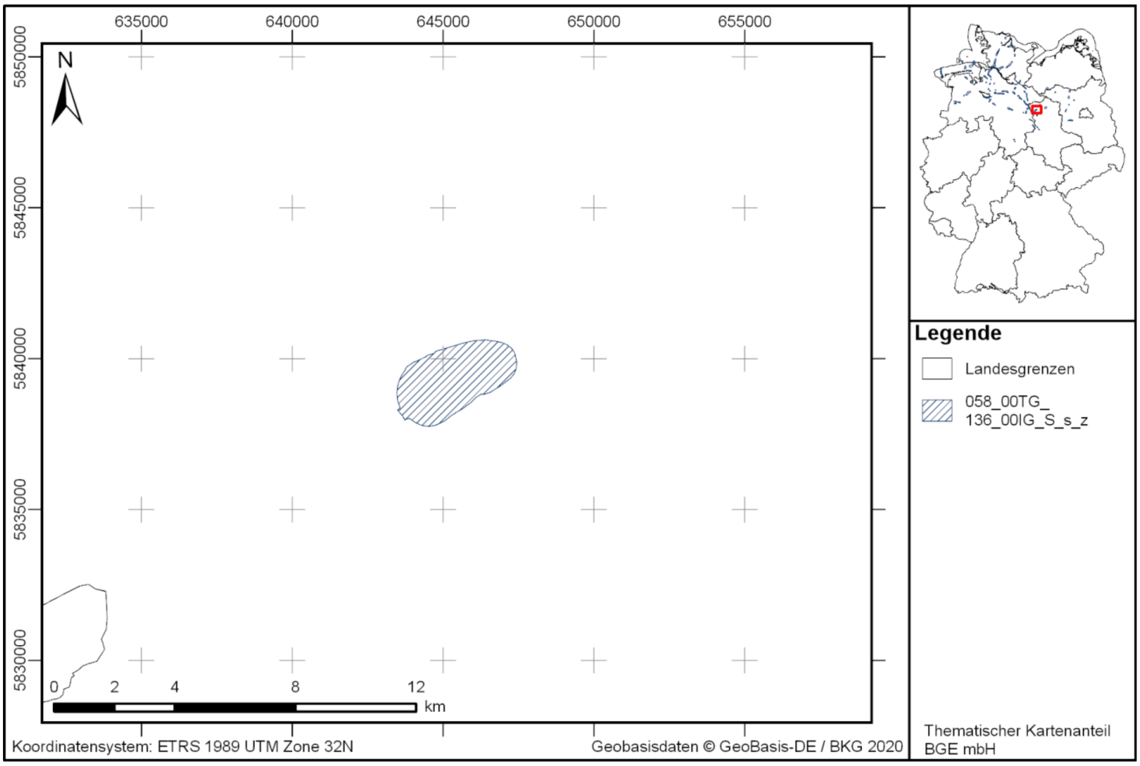


Figure 99: Overview map of the sub-area 058_00TG_136_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

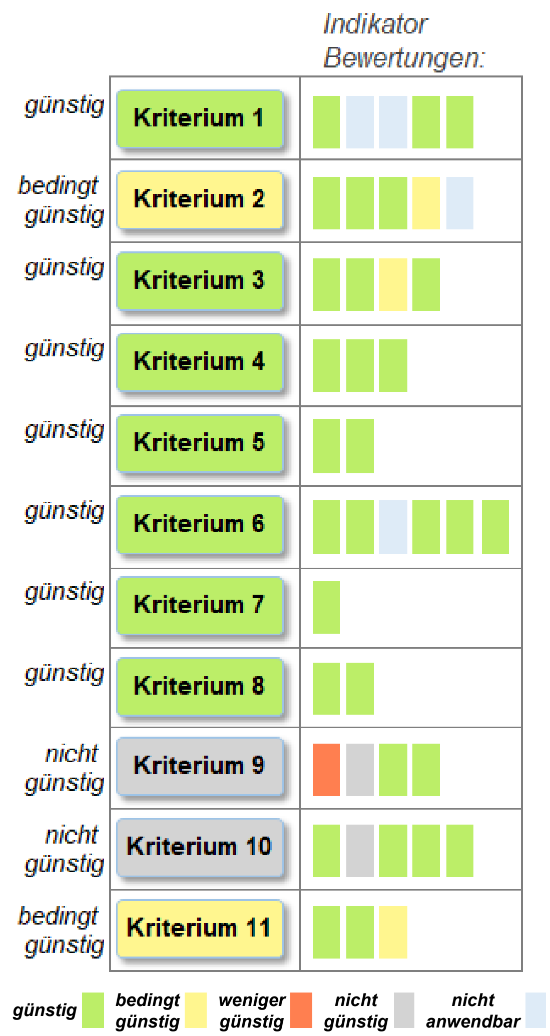
Table 125: Characteristics of the sub-area 058_00TG_136_00IG_S_s_z

Characteristics of the sub-area 058_00TG_136_00IG_S_s_z	
IA code	136_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northeast of the federal state of Saxony-Anhalt, approx. 27 km south and 18 km east of the border to the federal state of Lower Saxony.
Surface area	7 km²
Geological characteristics	The sub-area is located in the zechstein of the Poppau salt structure and has a thickness of 690 metres. The sub-area is located at a depth of 810 metres to 1,500 metres below ground surface.

Table 126: Result of the geoscientific weighing criteria for the sub-area 058_00TG_136_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated "favourable" and two criteria were rated "not favourable".

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.45 Sub-area 059_00TG_137_00IG_S_s_z

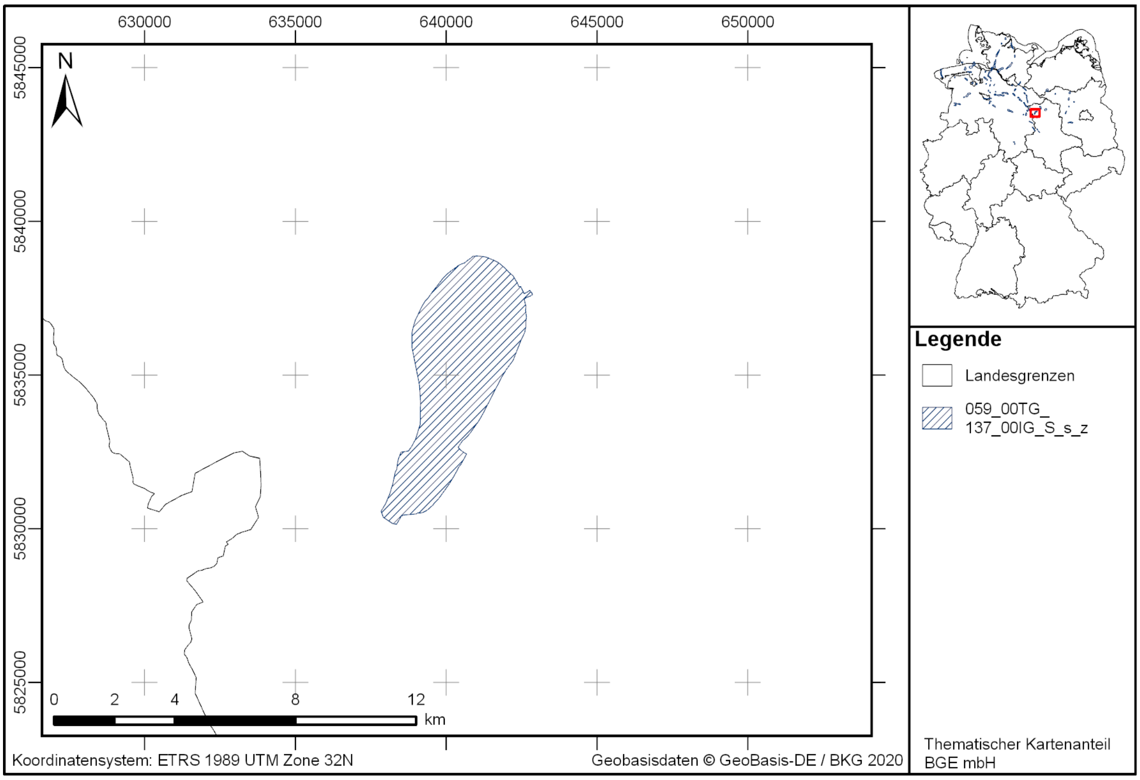


Figure 100: Overview map of the sub-area 059_00TG_137_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

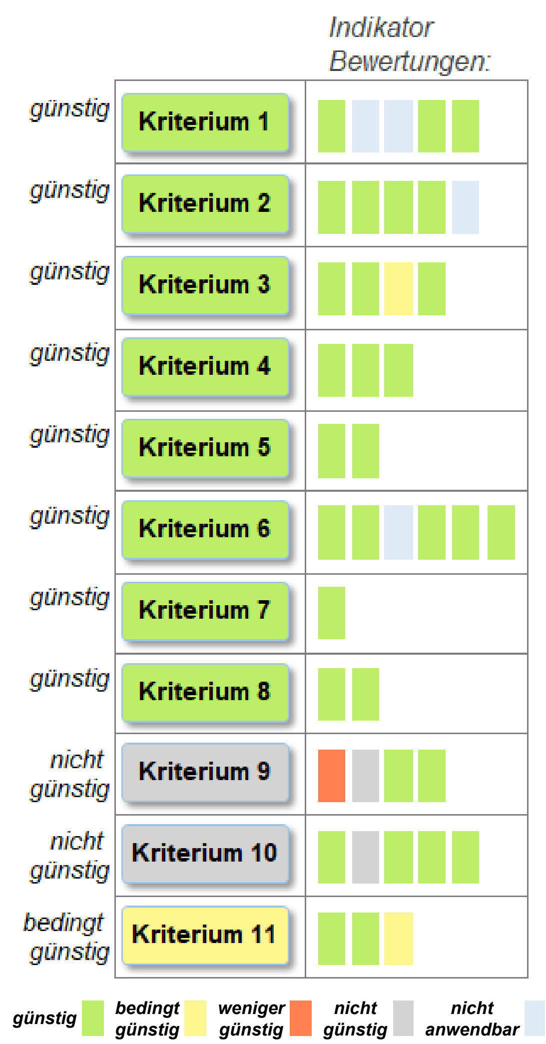
Table 127: Characteristics of the sub-area 059_00TG_137_00IG_S_s_z

Characteristics of the sub-area 059_00TG_137_00IG_S_s_z	
IA code	137_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northeast of the federal state of Saxony-Anhalt, approx. 24 km south and 5 km east of the border to the federal state of Lower Saxony.
Surface area	21 km²
Geological characteristics	The sub-area is located in the zechstein of Ristedt salt structure and has a thickness of 800 metres. The sub-area is located at a depth of 700 metres to 1,500 metres below ground surface.

Table 128: *Result of the geoscientific weighing criteria for the sub-area 059_00TG_137_00IG_S_s_z.*
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.46 Sub-area 060_00TG_144_00IG_S_s_z

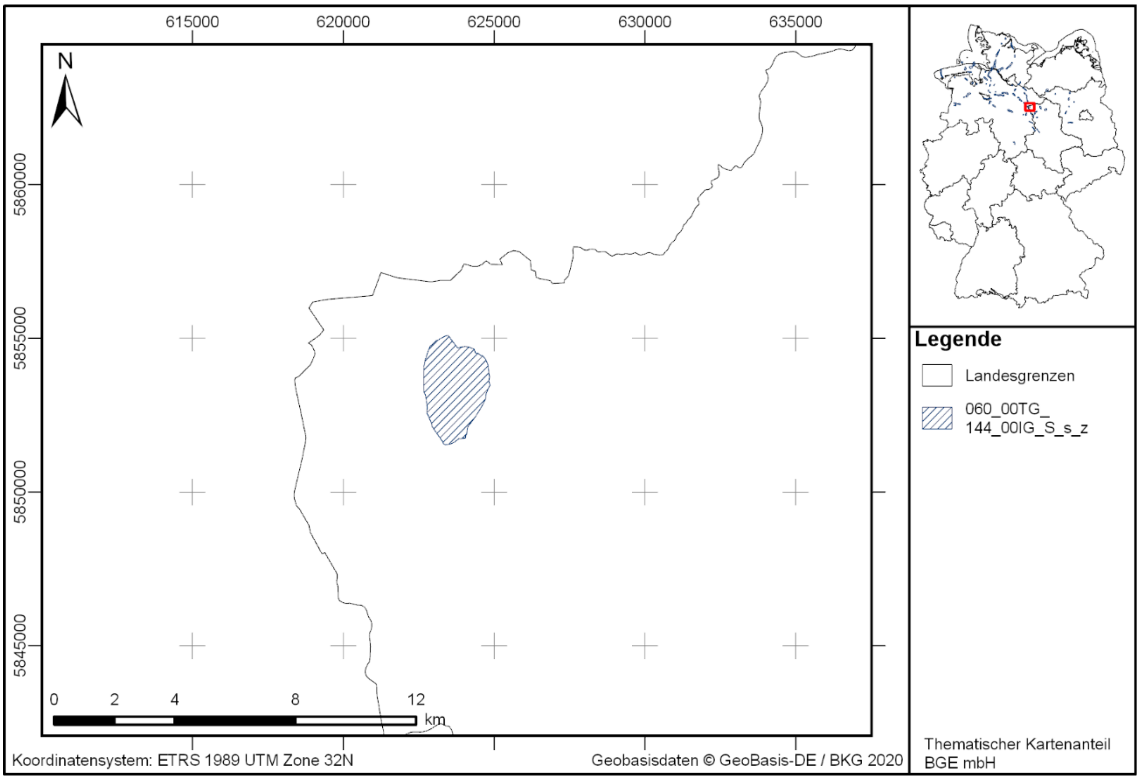
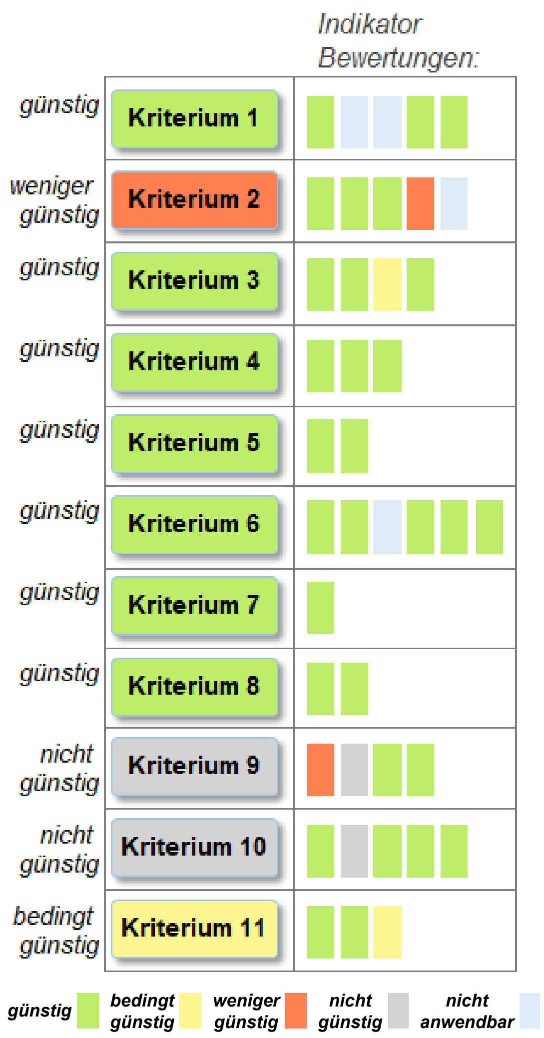


Figure 101: Overview map of the sub-area 060_00TG_144_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 129: Characteristics of the sub-area 060_00TG_144_00IG_S_s_z

Characteristics of the sub-area 060_00TG_144_00IG_S_s_z	
IA code	144_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northeast of the federal state of Saxony-Anhalt, approx. 2 km south and 4 km east of the border to the federal state of Lower Saxony.
Surface area	6 km²
Geological characteristics	The sub-area is located in the zechstein of the Bonese salt structure and has a thickness of 720 metres. The sub-area is located at a depth of 780 metres to 1,500 metres below ground surface.

Table 130: Result of the geoscientific weighing criteria for the sub-area 060_00TG_144_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation:  	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “less favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. With an area of 5.53 square kilometres, it can be assumed nevertheless that around twice the required area will be available, taking into account the model uncertainties. It is therefore reasonable to assume that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.47 Sub-area 061_00TG_145_00IG_S_s_z

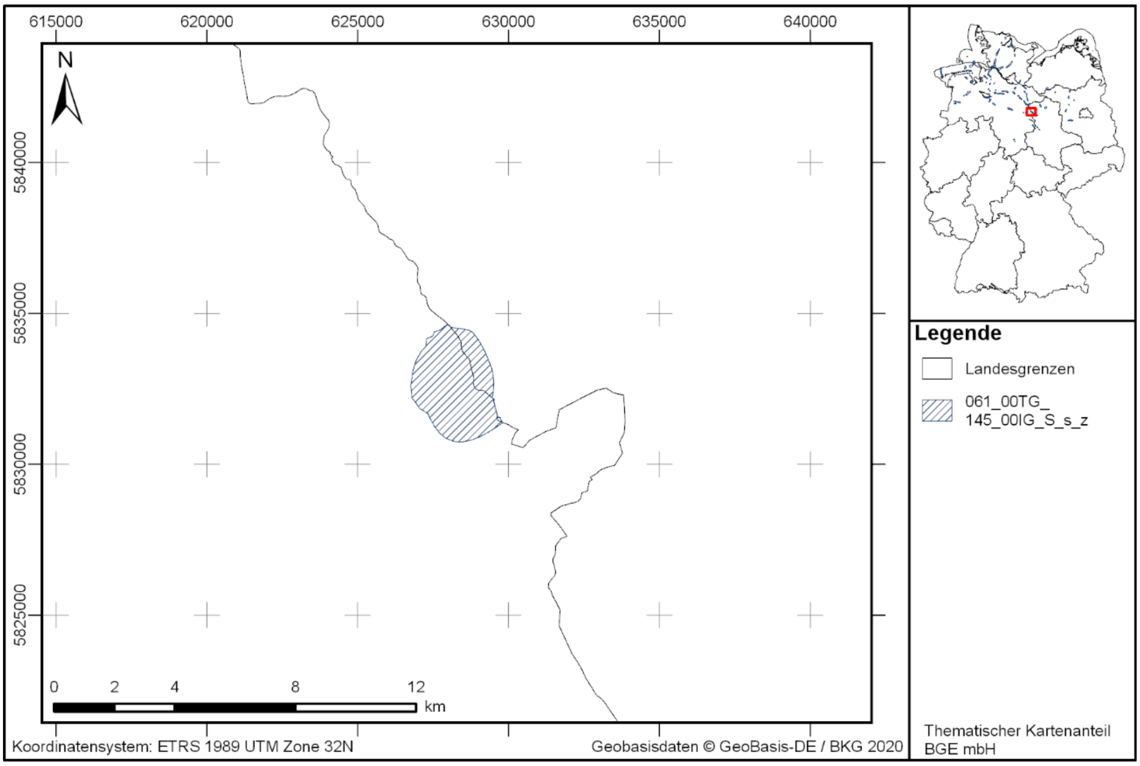
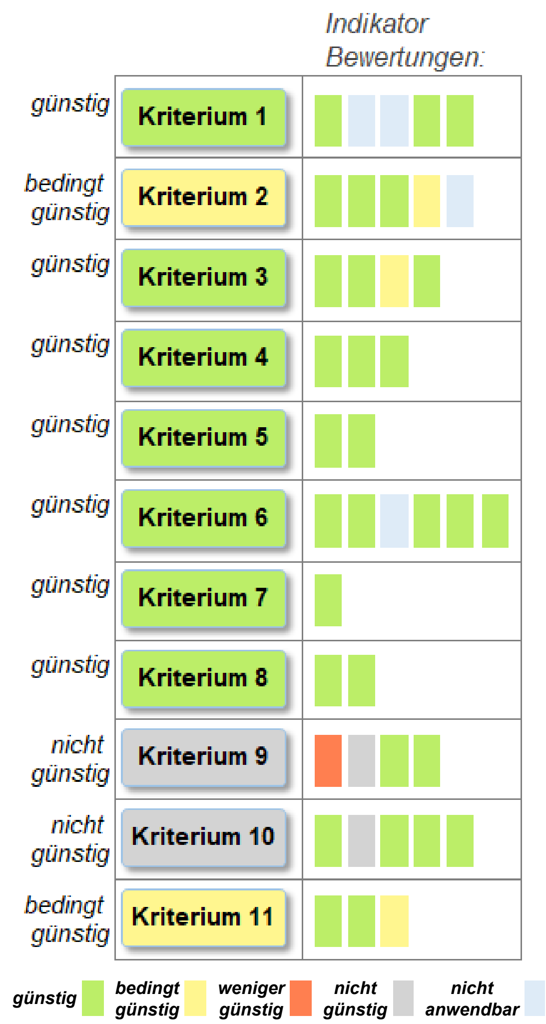


Figure 102: Overview map of the sub-area 061_00TG_145_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 131: Characteristics of the sub-area 061_00TG_145_00IG_S_s_z

Characteristics of the sub-area 061_00TG_145_00IG_S_s_z	
IA code	145_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony and in the northwest of the federal state of Saxony-Anhalt.
Surface area	8 km²
Geological characteristics	The sub-area is located in the zechstein of the Nettgau salt structure and has a thickness of 900 metres. The sub-area is located at a depth of 570 metres to 1,500 metres below ground surface.

Table 132: Result of the geoscientific weighing criteria for the sub-area 061_00TG_145_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
<u>Results of the summarised evaluation</u>: 	<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) <u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) <u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) <u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) <u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) <u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) <u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) <u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) <u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) <u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) <u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
<u>Reasoning for the summarised evaluation</u>: Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.48 Sub-area 062_00TG_146_00IG_S_s_z

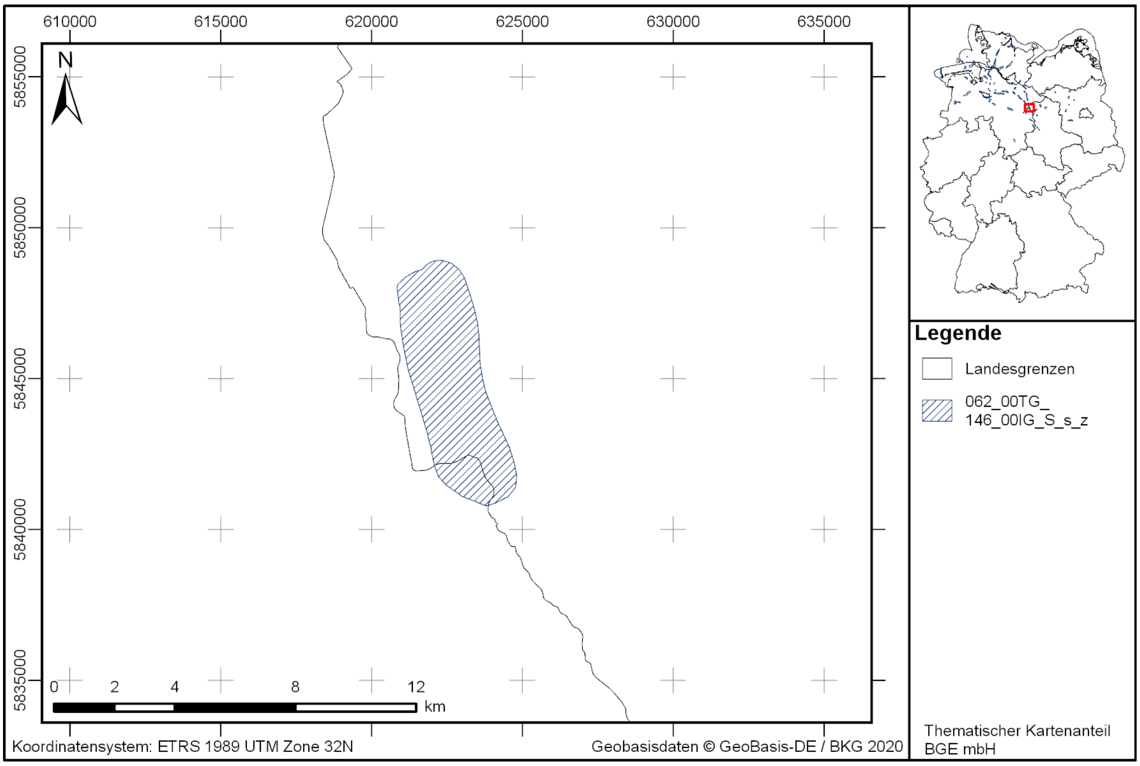


Figure 103: Overview map of the sub-area 062_00TG_146_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

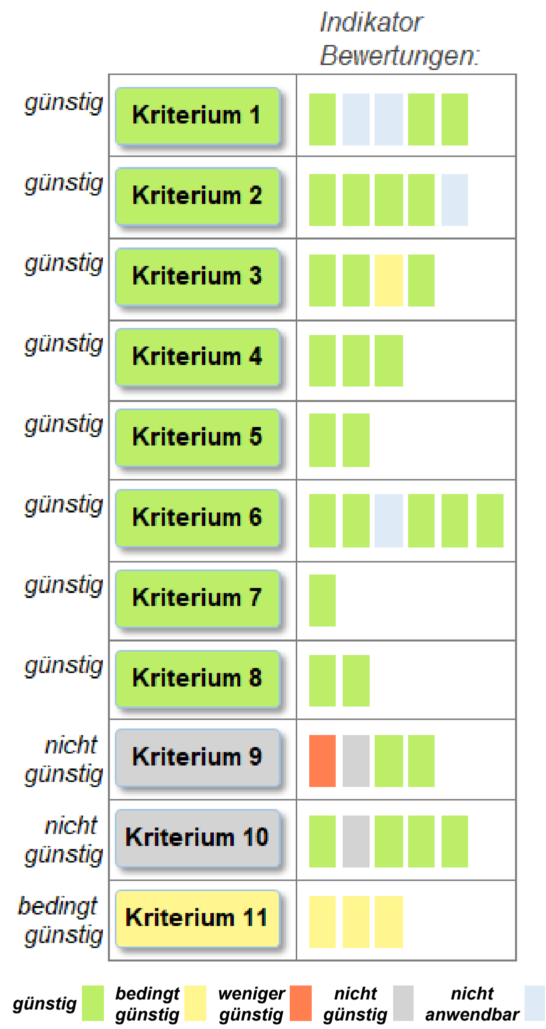
Table 133: Characteristics of the sub-area 062_00TG_146_00IG_S_s_z

Characteristics of the sub-area 062_00TG_146_00IG_S_s_z	
IA code	146_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony and in the northwest of the federal state of Saxony-Anhalt.
Surface area	19 km²
Geological characteristics	The sub-area is located in the zechstein of the Waddekath salt structure and has a thickness of 1,000 metres. The sub-area is located at a depth of 520 metres to 1,500 metres below ground surface.

Table 134: Result of the geoscientific weighing criteria for the sub-area 062_00TG_146_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". The indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone" was rated "conditionally favourable". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). However, the indicators "coverage with groundwater-inhibiting rock" and "coverage with erosion-inhibiting rock" of the "criterion for evaluation of protection of the effective containment zone by the overburden" were also rated "conditionally favourable". Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the evaluation of the distance to the Quaternary base as "conditionally favourable" is weighed as less significant. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.49 Sub-area 063_00TG_149_00IG_S_s_z-ro

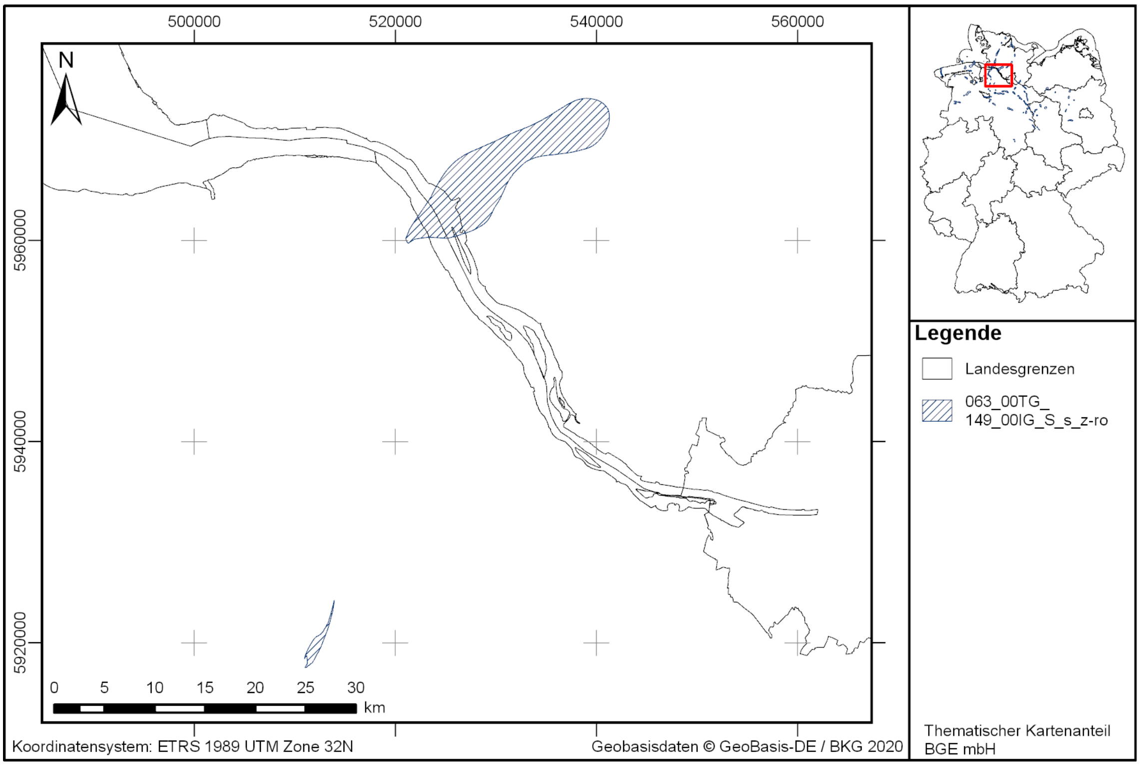


Figure 104: Overview map of the sub-area 063_00TG_149_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

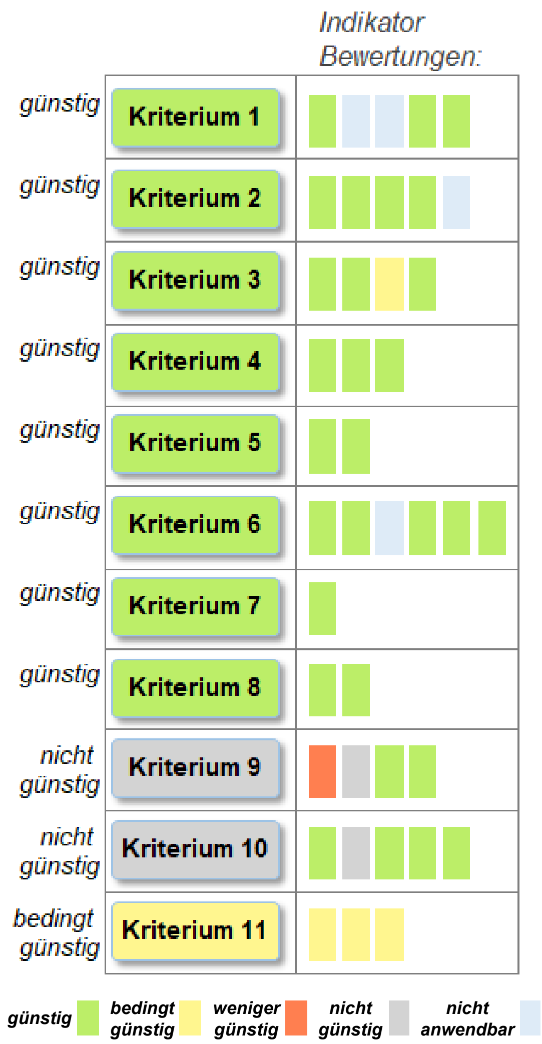
Table 135: Characteristics of the sub-area 063_00TG_149_00IG_S_s_z-ro

Characteristics of the sub-area 063_00TG_149_00IG_S_s_z-ro	
IA code	149_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony and in the northwest of the federal state of Schleswig-Holstein, some of it below the river Elbe.
Surface area	102 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Bevern/Hamelwörden/Krempe/Lägerdorf salt structure and has a thickness of 1,090 metres. The sub-area is located at a depth of 420 metres to 1,500 metres below ground surface.

Table 136: Result of the geoscientific weighing criteria for the sub-area 063_00TG_149_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". The indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone" was rated "conditionally favourable". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). However, the indicators "coverage with groundwater-inhibiting rock" and "coverage with erosion-inhibiting rock" of the "criterion for evaluation of protection of the effective containment zone by the overburden" were also rated "conditionally favourable". Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the overburden evaluation of "conditionally favourable" is weighed as less significant. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.50 Sub-area 064_00TG_151_00IG_S_s_z-ro

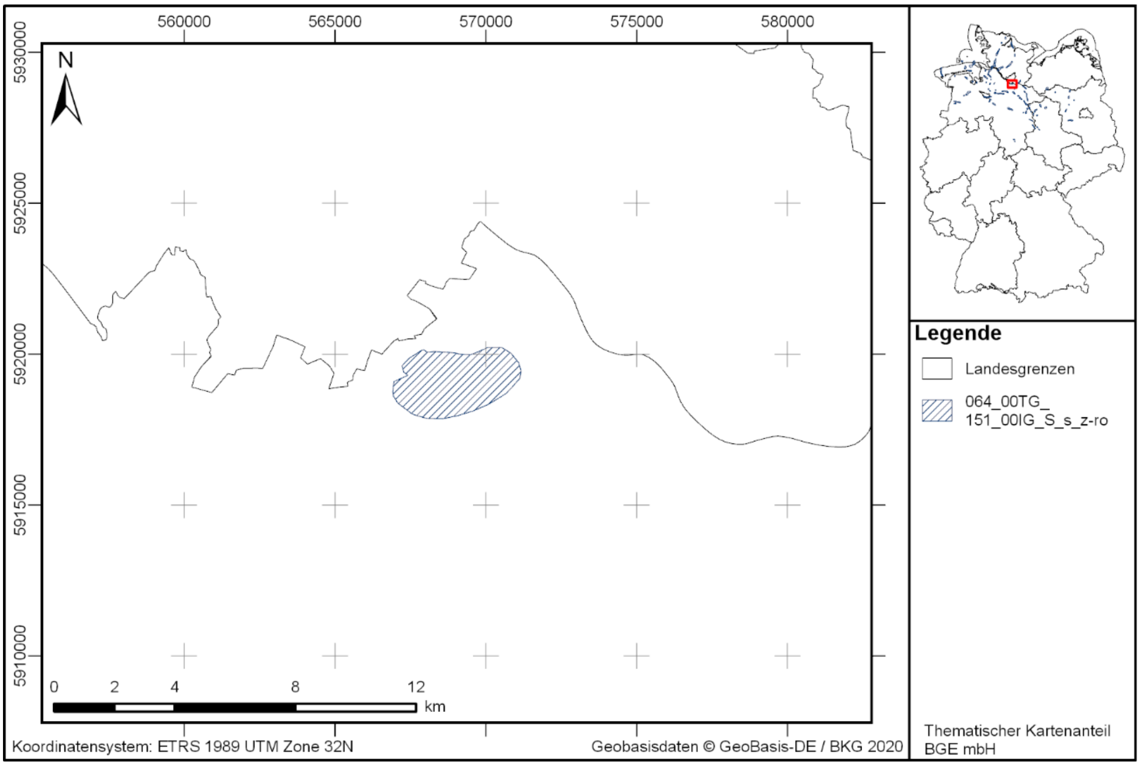


Figure 105: Overview map of the sub-area 064_00TG_151_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

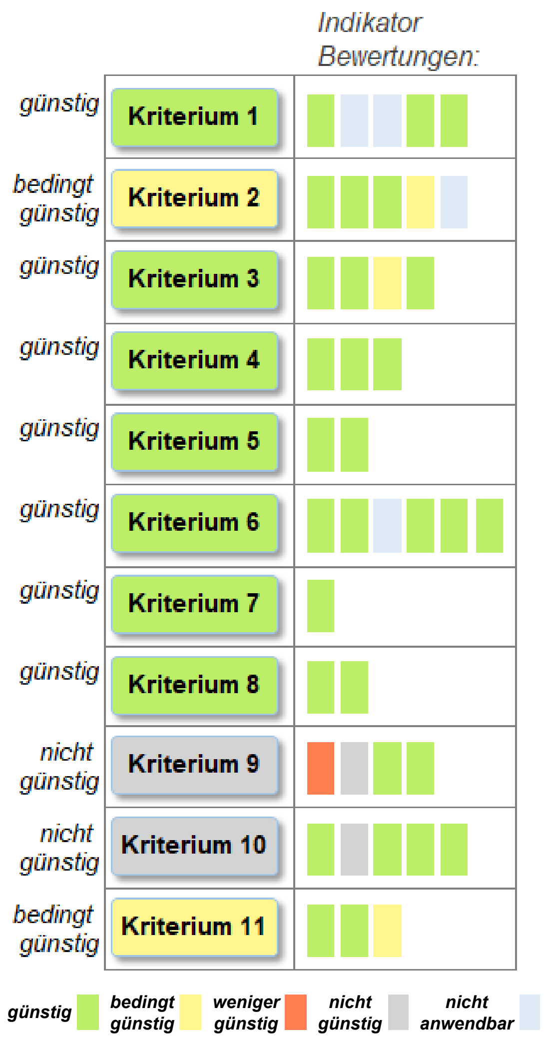
Table 137: Characteristics of the sub-area 064_00TG_151_00IG_S_s_z-ro

Characteristics of the sub-area 064_00TG_151_00IG_S_s_z-ro	
IA code	151_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony, approx. 1 km south of the federal state of Hamburg.
Surface area	7 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Meckelfeld salt structure and has a thickness of 1,090 metres. The sub-area is located at a depth of 420 metres to 1,500 metres below ground surface.

Table 138: Result of the geoscientific weighing criteria for the sub-area 064_00TG_151_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated "favourable" and two criteria were rated "not favourable".

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for spatial characterisability” was rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “surface extent for the given thickness (multiple of the minimum surface requirement)”. Even if only approximately two times the required space is available, it is to be expected that a suitable effective containment zone can be found. Application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.51 Sub-area 065_00TG_153_00IG_S_s_z-ro

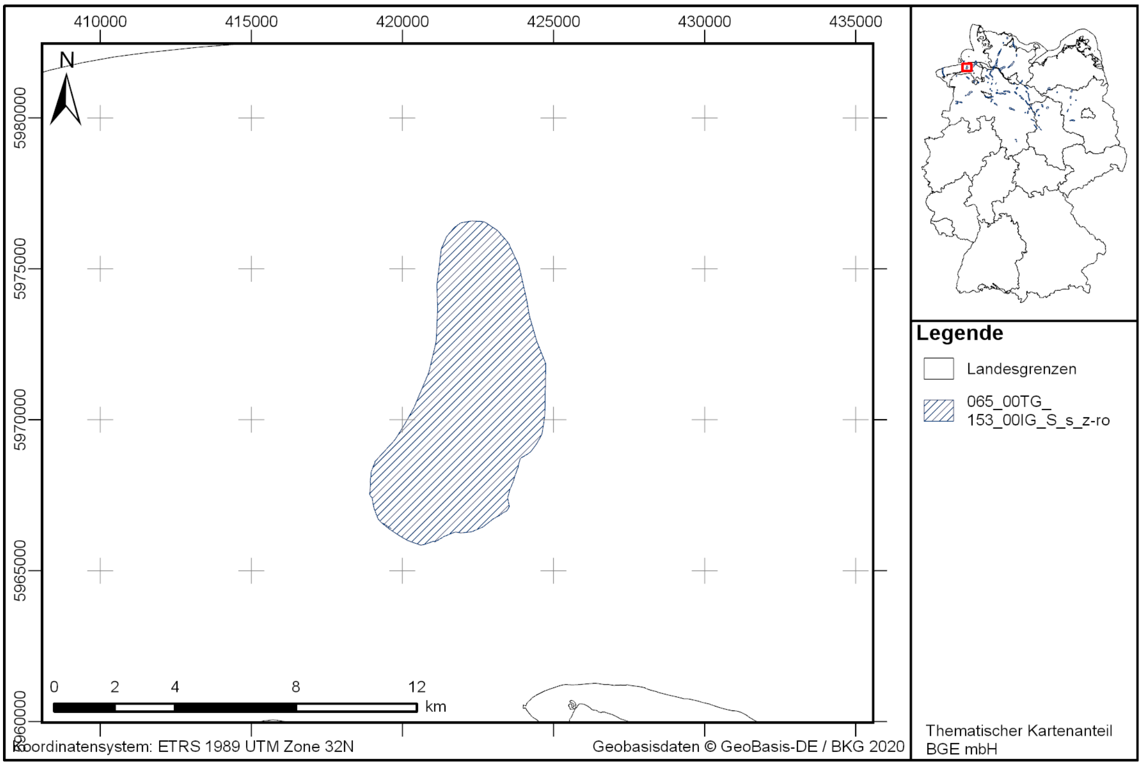


Figure 106: Overview map of the sub-area 065_00TG_153_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

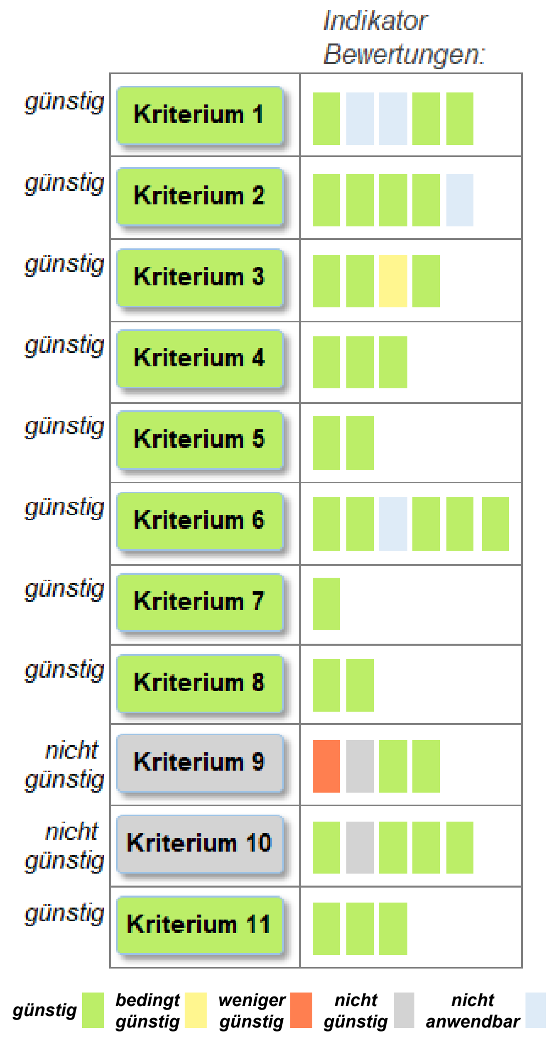
Table 139: Characteristics of the sub-area 065_00TG_153_00IG_S_s_z-ro

Characteristics of the sub-area 065_00TG_153_00IG_S_s_z-ro	
IA code	153_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located within the 12 nautical mile limit below the German territorial waters, above the North Sea islands of Wangerooge and Spiekeroog, in the federal state of Lower Saxony.
Surface area	38 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Harle Riff salt structure and has a thickness of 660 metres. The sub-area is located at a depth of 840 metres to 1,500 metres below ground surface.

Table 140: Result of the geoscientific weighing criteria for the sub-area 065_00TG_153_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

All evaluated criteria relating specifically to this area were rated “favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.52 Sub-area 066_00TG_154_00IG_S_s_z-ro

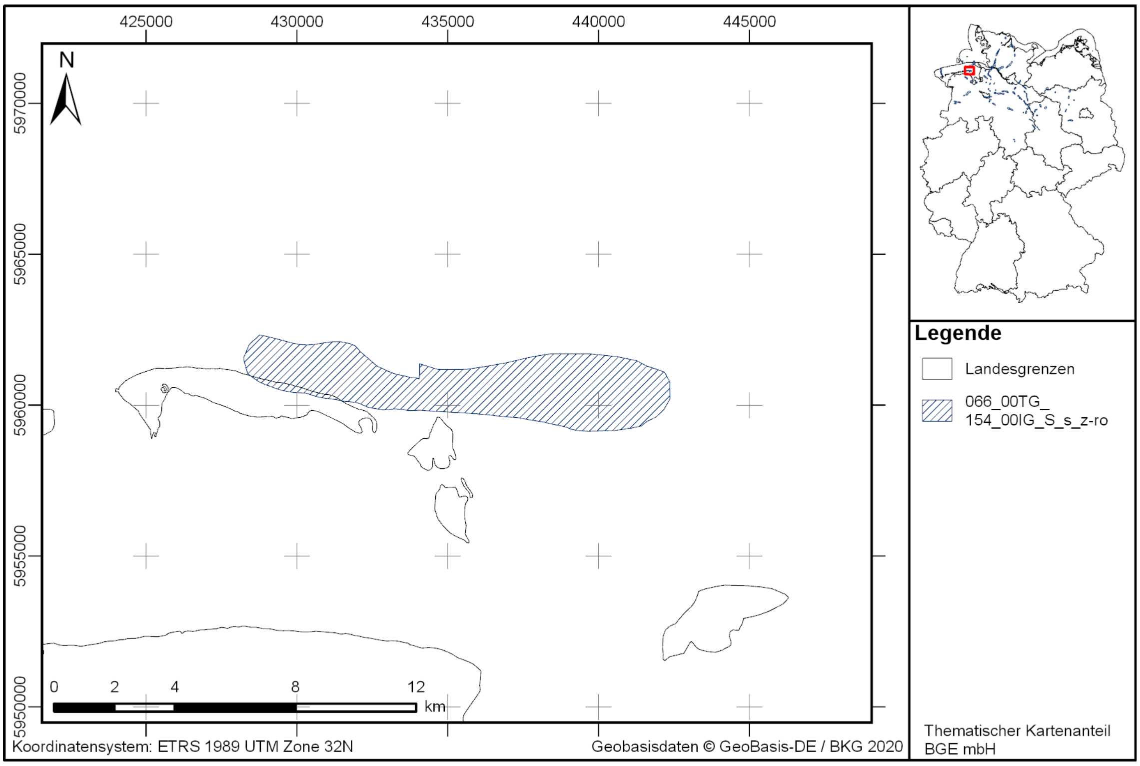


Figure 107: Overview map of the sub-area 066_00TG_154_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 141: Characteristics of the sub-area 066_00TG_154_00IG_S_s_z-ro

Characteristics of the sub-area 066_00TG_154_00IG_S_s_z-ro	
IA code	154_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony, bordering the island of Wangeroode to the north, below the North Sea.
Surface area	25 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Wangerooge salt structure and has a thickness of 490 metres. The sub-area is located at a depth of 1,010 metres to 1,500 metres below ground surface.

Table 142: Result of the geoscientific weighing criteria for the sub-area 066_00TG_154_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

<table>
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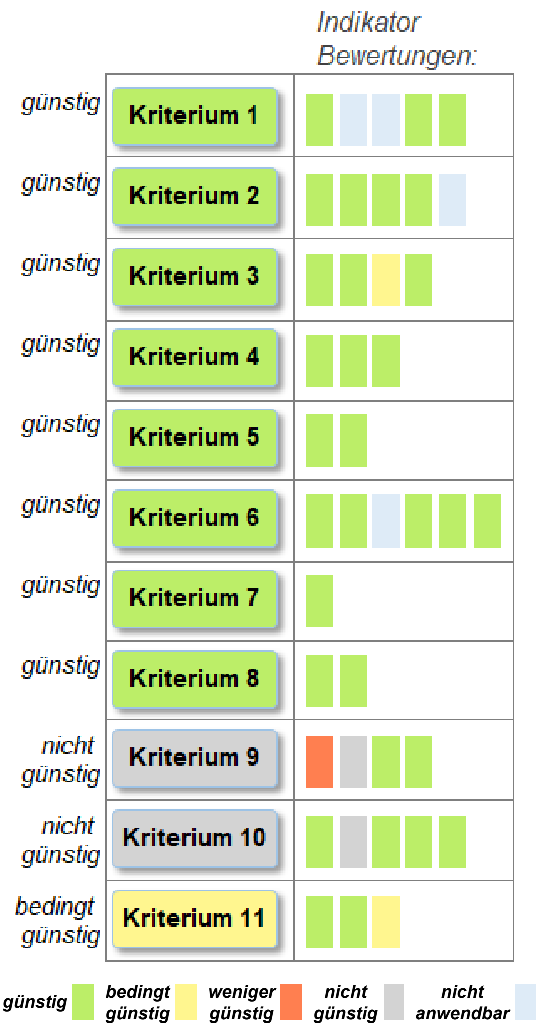
(Annexes 1 to 11 (to Section 24) StandAG)</th></tr>
<tr><td>

Results of the summarised evaluation:



</td><td>

Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

</td></tr>
<tr><td colspan="2">

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

</td></tr>
</table>

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.53 Sub-area 067_00TG_159_00IG_S_s_z-ro

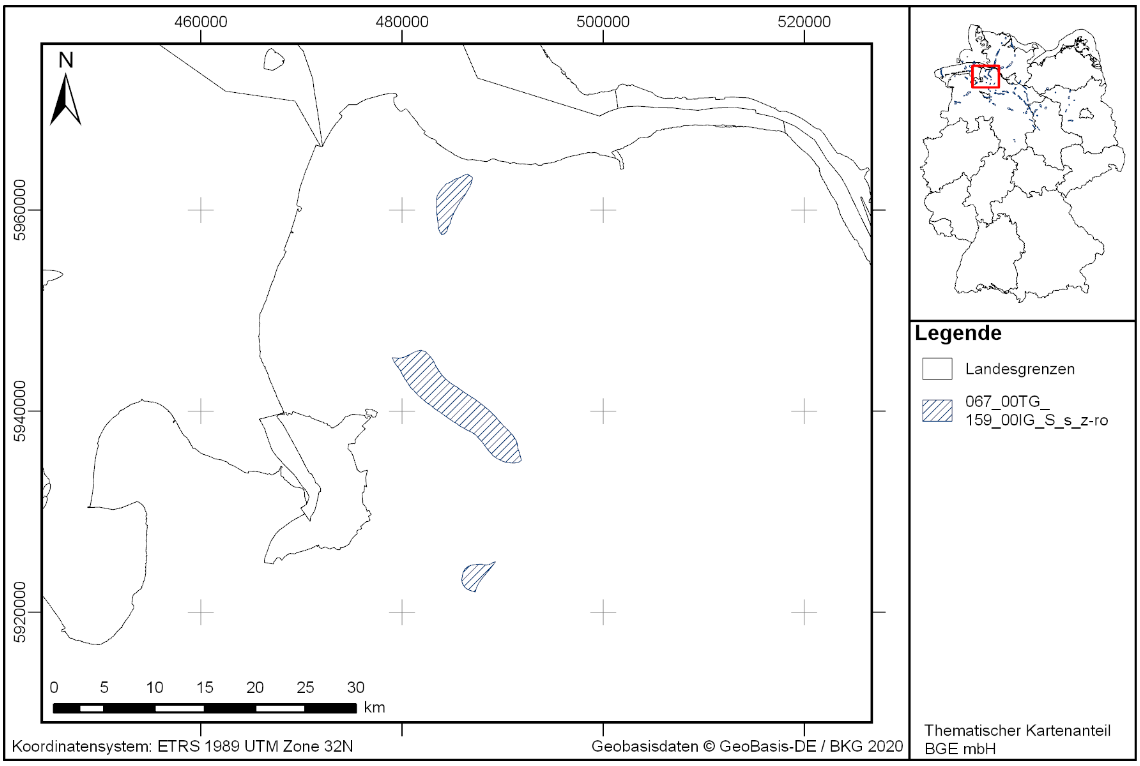


Figure 108: Overview map of the sub-area 067_00TG_159_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

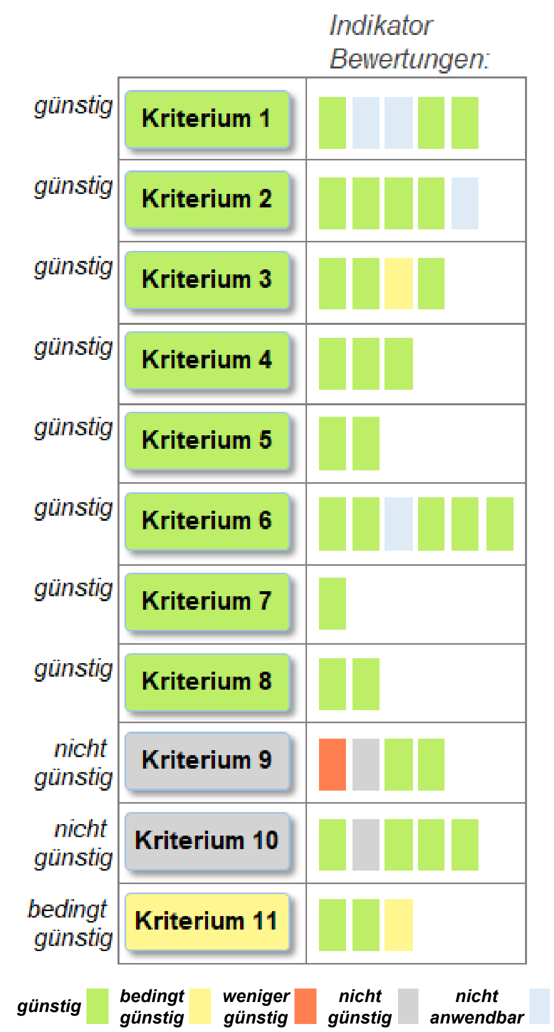
Table 143: Characteristics of the sub-area 067_00TG_159_00IG_S_s_z-ro

Characteristics of the sub-area 067_00TG_159_00IG_S_s_z-ro	
IA code	159_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony.
Surface area	59 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Altenbruch/ Westerwanna/Alfstedt/Beverstedt salt structure and has a thickness of 750 metres. The sub-area is located at a depth of 730 metres to 1,500 metres below ground surface.

Table 144: Result of the geoscientific weighing criteria for the sub-area 067_00TG_159_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.54 Sub-area 068_00TG_163_00IG_S_s_z-ro

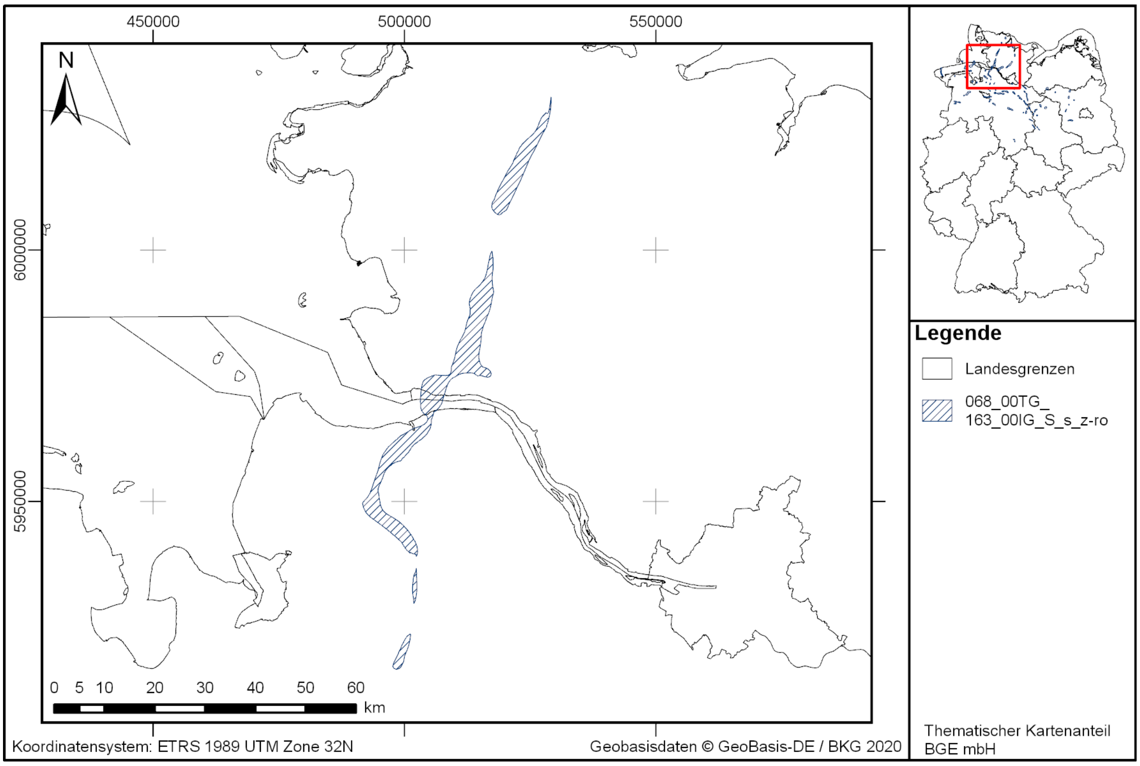


Figure 109: Overview map of the sub-area 068_00TG_163_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

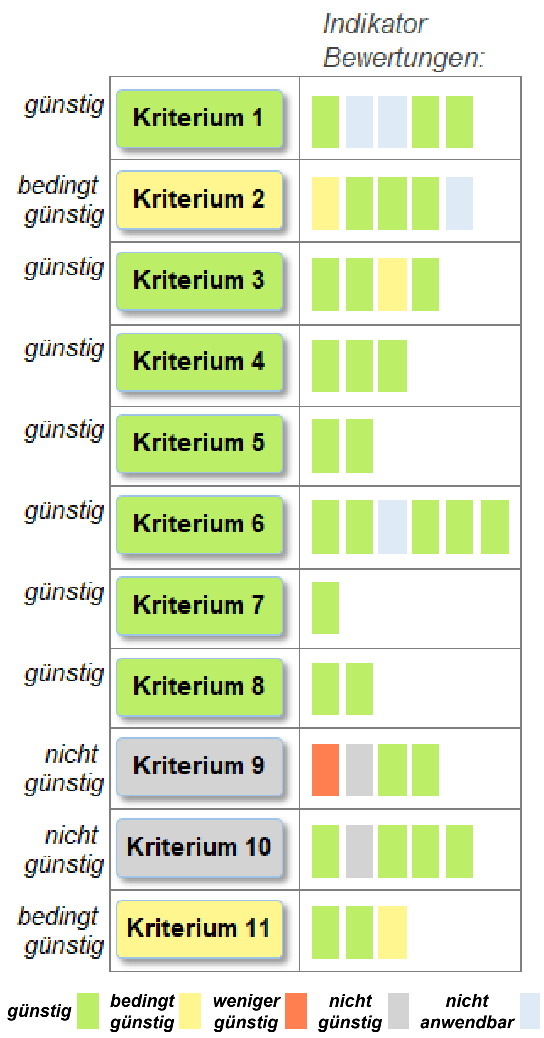
Table 145: Characteristics of the sub-area 068_00TG_163_00IG_S_s_z-ro

Characteristics of the sub-area 068_00TG_163_00IG_S_s_z-ro	
IA code	163_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony and in the southwest of the federal state of Schleswig-Holstein, some of it below the river Elbe.
Surface area	274 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Basdahl/Armstorf/Odisheim/Osterbruch/Belmhusen/Süderhastedt/Tellingstedt/Pahlhude/Grevenhorst salt structure and has a thickness of 700 metres. The sub-area is located at a depth of 800 metres to 1,500 metres below ground surface.

*Table 146: Result of the geoscientific weighing criteria for the sub-area 068_00TG_163_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

<u>Criterion 3</u>: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

<u>Criterion 7</u>: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.55 Sub-area 069_00TG_168_00IG_S_s_z-ro

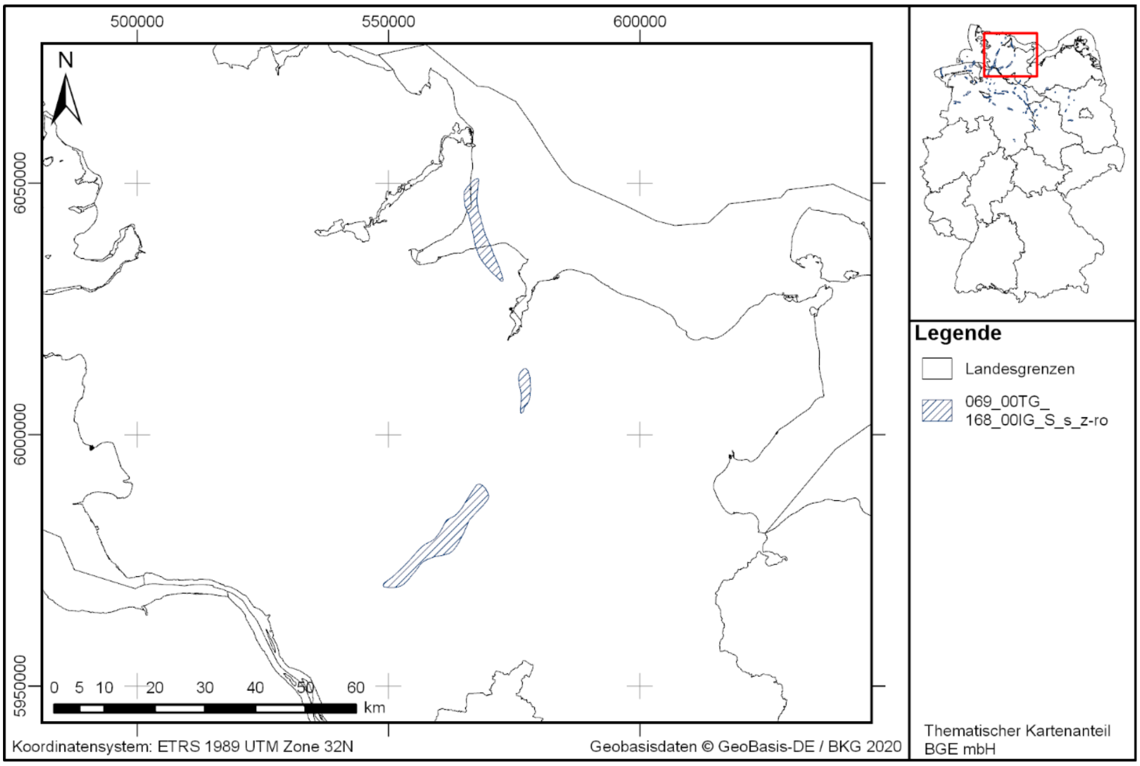


Figure 110: Overview map of the sub-area 069_00TG_168_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 147: Characteristics of the sub-area 069_00TG_168_00IG_S_s_z-ro

Characteristics of the sub-area 069_00TG_168_00IG_S_s_z-ro	
IA code	168_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the northeast of the federal state of Schleswig-Holstein, some of it below the Baltic Sea.
Surface area	147 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Mönkloh/Bramstedt/Boostedt/Warnau/Honigsee/Schwedeneck/Waabs/Waabs Nord salt structure and has a thickness of 1,090 metres. The sub-area is located at a depth of 410 metres to 1,500 metres below ground surface.

Table 148: Result of the geoscientific weighing criteria for the sub-area 069_00TG_168_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)		
Results of the summarised evaluation:	*Indikator Bewertungen:*	
günstig	**Kriterium 1**	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
günstig	**Kriterium 2**	Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
günstig	**Kriterium 3**	Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
günstig	**Kriterium 4**	Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
günstig	**Kriterium 5**	Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
günstig	**Kriterium 6**	Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
günstig	**Kriterium 7**	Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
günstig	**Kriterium 8**	Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
nicht günstig	**Kriterium 9**	Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
nicht günstig	**Kriterium 10**	Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
bedingt günstig	**Kriterium 11**	Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
günstig ***bedingt günstig*** ***weniger günstig*** ***nicht günstig*** ***nicht anwendbar***		

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone” was rated “conditionally favourable”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). However, the indicators “coverage with groundwater-inhibiting rock” and “coverage with erosion-inhibiting rock” of the “criterion for evaluation of protection of the effective containment zone by the overburden” were also rated “conditionally favourable”. Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the overburden evaluation of “conditionally favourable” is weighed as less significant. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.56 Sub-area 070_00TG_172_00IG_S_s_z-ro

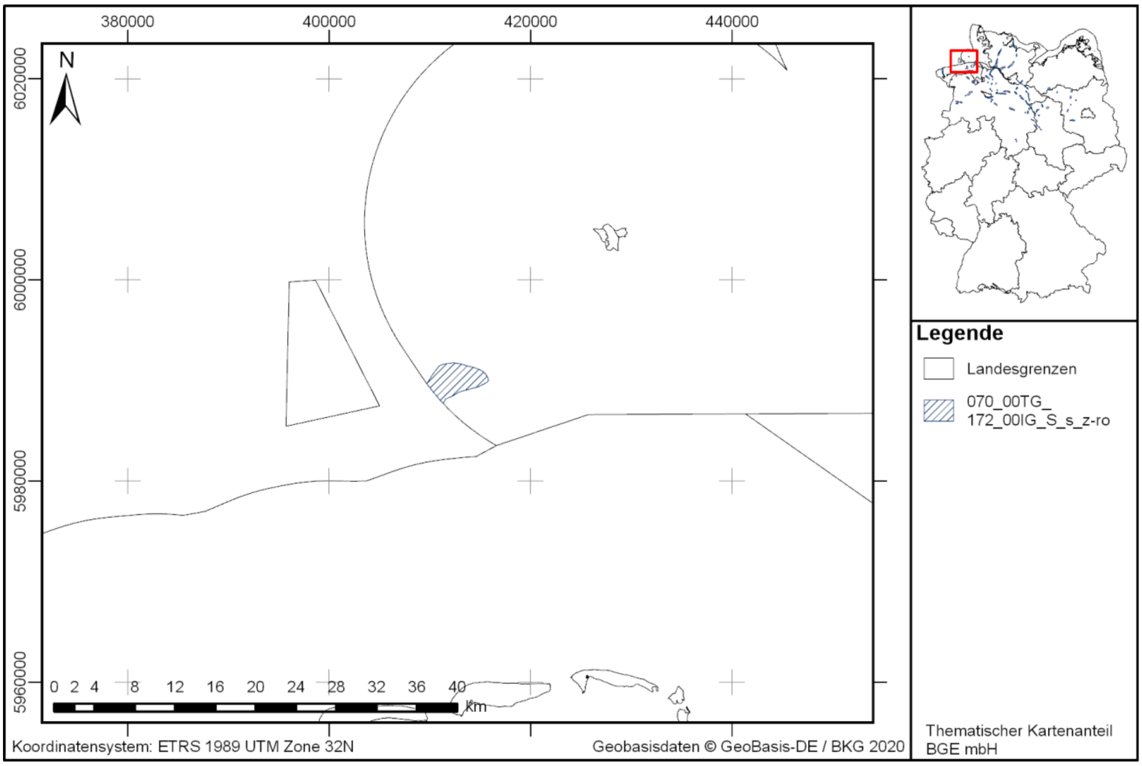


Figure 111: Overview map of the sub-area 070_00TG_172_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

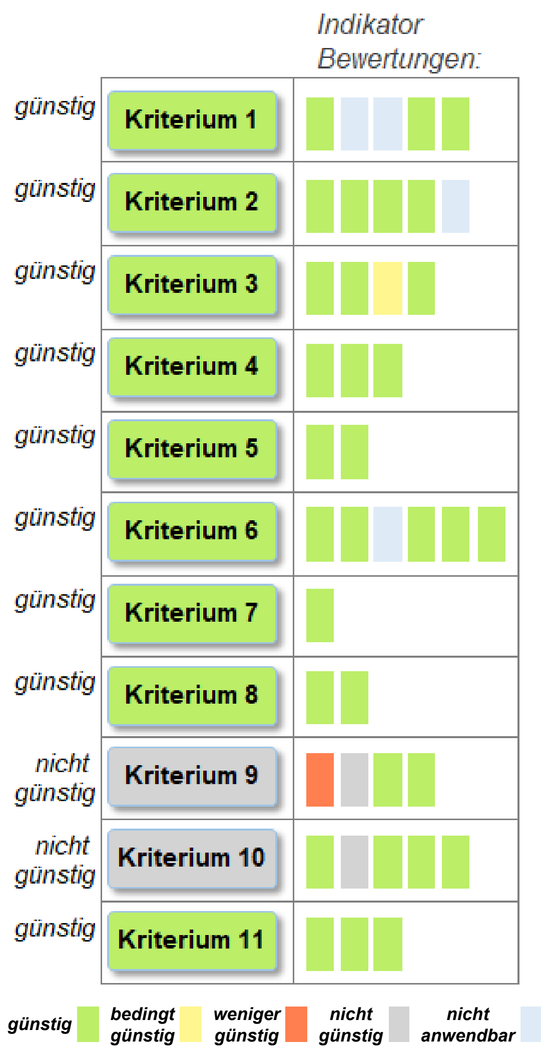
Table 149: Characteristics of the sub-area 070_00TG_172_00IG_S_s_z-ro

Characteristics of the sub-area 070_00TG_172_00IG_S_s_z-ro	
IA code	172_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located within the 12 nautical mile limit below the German territorial waters, southwest of Helgoland, in the federal state of Lower Saxony.
Surface area	14 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Justine salt structure and has a thickness of 1,120 metres. The sub-area is located at a depth of 510 metres to 1,500 metres below ground surface.

Table 150: Result of the geoscientific weighing criteria for the sub-area 070_00TG_172_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

All evaluated criteria relating specifically to this area were rated “favourable”.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.57 Sub-area 071_00TG_179_00IG_S_s_z-ro

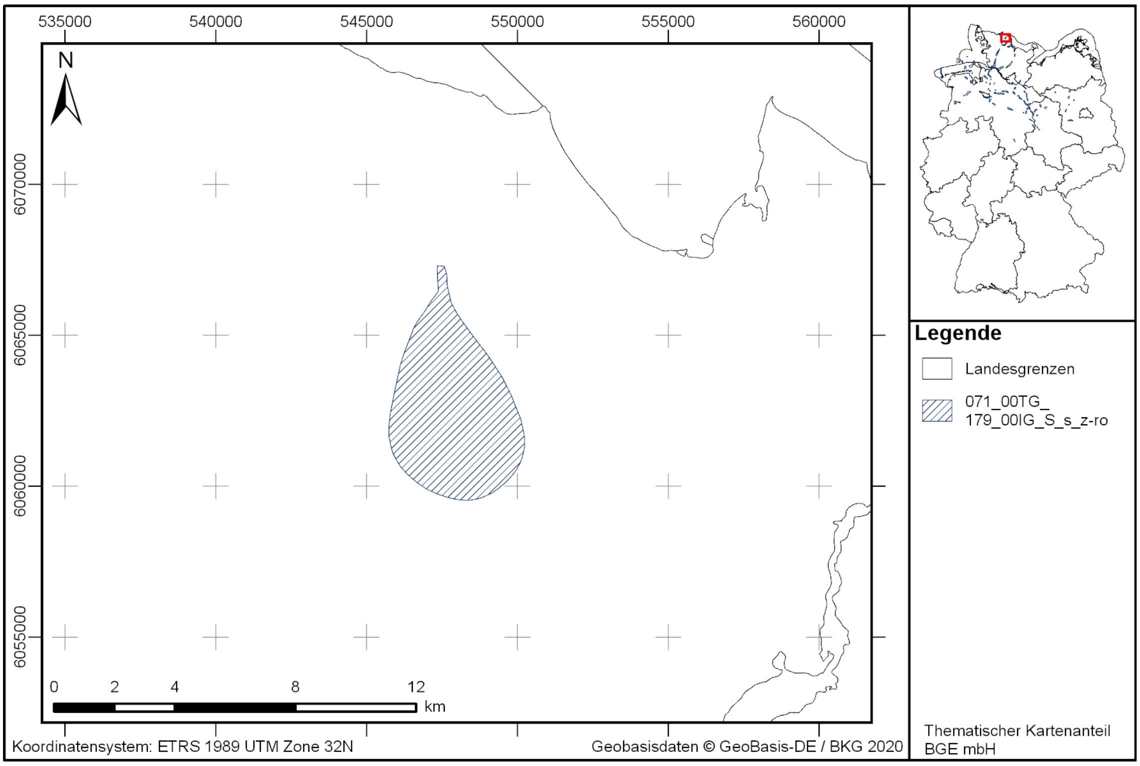


Figure 112: Overview map of the sub-area 071_00TG_179_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

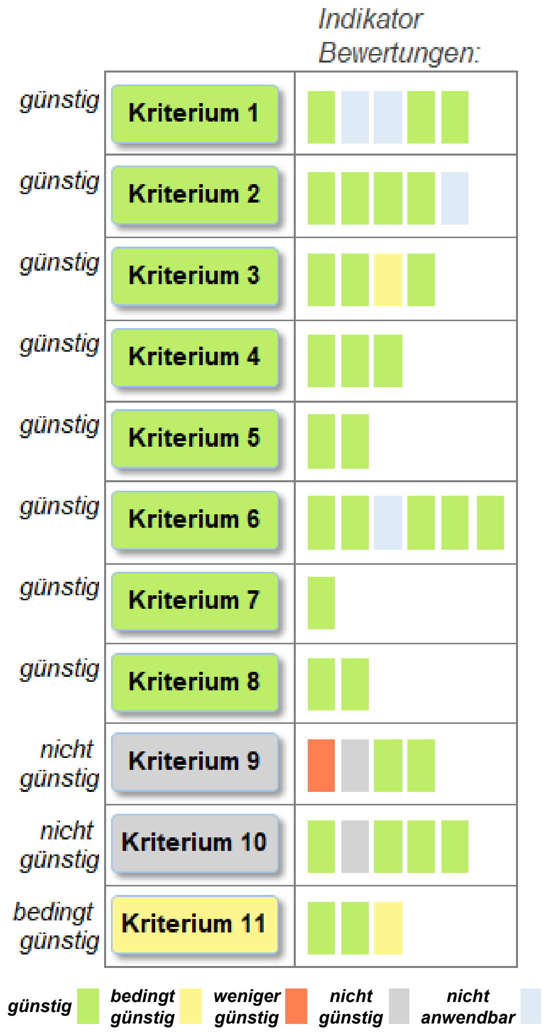
Table 151: Characteristics of the sub-area 071_00TG_179_00IG_S_s_z-ro

Characteristics of the sub-area 071_00TG_179_00IG_S_s_z-ro	
IA code	179_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Schleswig-Holstein, approx. 8 km south of the German border with Denmark.
Surface area	21 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Sterup salt structure and has a thickness of 870 metres. The sub-area is located at a depth of 630 metres to 1,500 metres below ground surface.

Table 152: Result of the geoscientific weighing criteria for the sub-area 071_00TG_179_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.58 Sub-area 072_00TG_181_00IG_S_s_z-ro

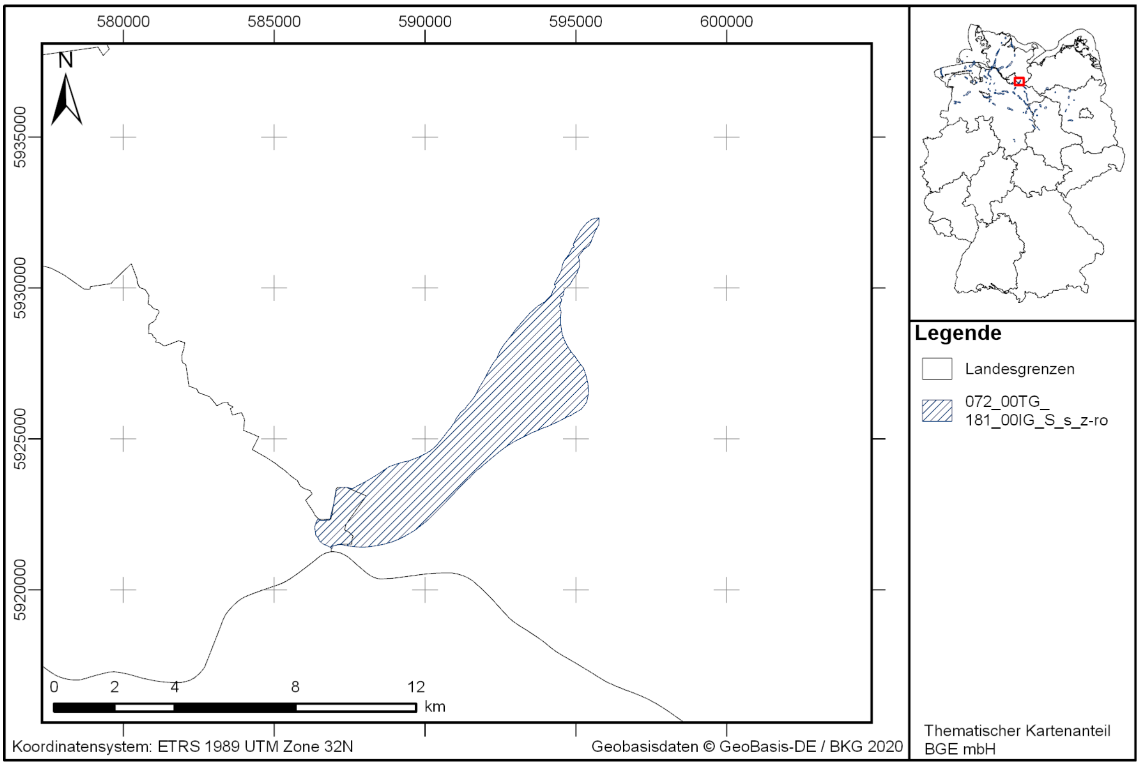


Figure 113: Overview map of the sub-area 072_00TG_181_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

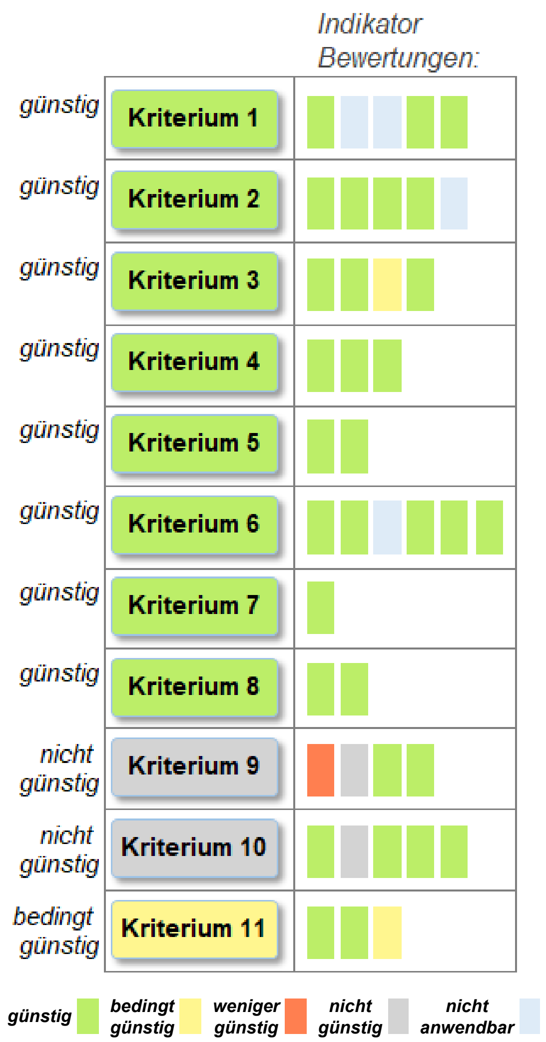
Table 153: Characteristics of the sub-area 072_00TG_181_00IG_S_s_z-ro

Characteristics of the sub-area 072_00TG_181_00IG_S_s_z-ro	
IA code	181_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the south of the federal state of Schleswig-Holstein and in the southeast of the federal state of Hamburg.
Surface area	24 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Geesthacht/Hohendorn salt structure and has a thickness of 1,170 metres. The sub-area is located at a depth of 800 metres to 1,500 metres below ground surface.

Table 154: Result of the geoscientific weighing criteria for the sub-area 072_00TG_181_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden" was rated "conditionally favourable". This evaluation is the result of the conditionally favourable rating according to the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.59 Sub-area 073_00TG_183_00IG_S_s_z

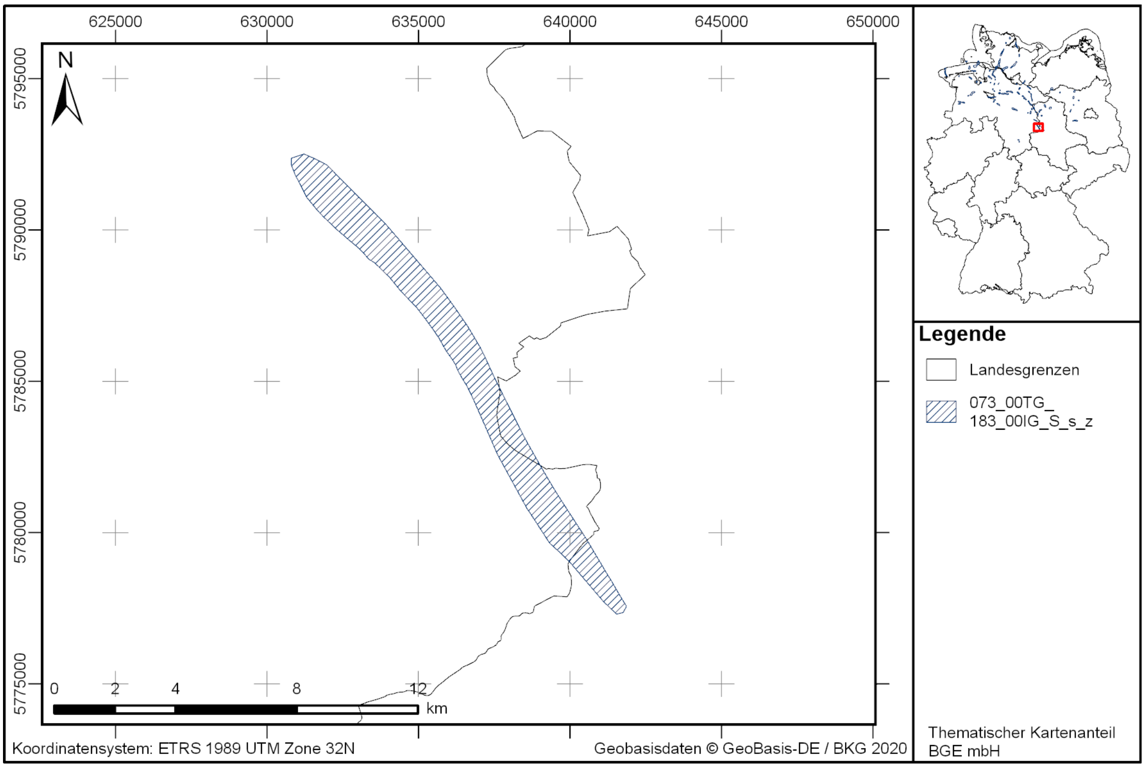


Figure 114: Overview map of the sub-area 073_00TG_183_00IG_S_s_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 155: Characteristics of the sub-area 073_00TG_183_00IG_S_s_z

Characteristics of the sub-area 073_00TG_183_00IG_S_s_z	
IA code	183_00IG_S_s_z
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony and in the west of the federal state of Saxony-Anhalt.
Surface area	19 km²
Geological characteristics	The sub-area is located in the zechstein of the Offlebender Sattel salt structure and has a thickness of 1,200 metres. The sub-area is located at a depth of 300 metres to 1,500 metres below ground surface.

Table 156: Result of the geoscientific weighing criteria for the sub-area 073_00TG_183_00IG_S_s_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

<table>
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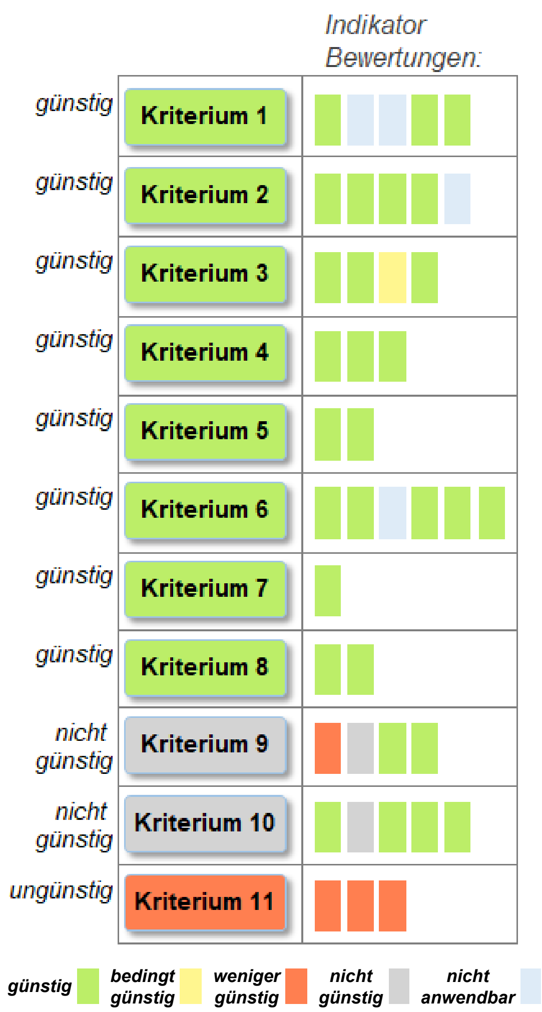
(Annexes 1 to 11 (to Section 24) StandAG)</th></tr>
<tr><td>Results of the summarised evaluation:

</td>
<td>Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)</td></tr>
<tr><td colspan="2">Reasoning for the summarised evaluation:
Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.
The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).</td></tr>
</table>

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Of the three evaluated criteria relating specifically to this area, the "criterion for evaluation of the rock formation configuration" and the "criterion for evaluation of the spatial characterisability" were rated "favourable". However, all indicators assigned to the "criterion for evaluation of protection of the effective containment zone by the overburden" were rated "unfavourable". Given the uncertainties in regard to the model horizon depths and due to the limited affected area relative to the surface of the identified area, the evaluation of the distance to the Quaternary base as "conditionally favourable" and the distance to ground surface as "unfavourable" are weighed as less significant. It is therefore reasonable to assume that a suitable effective containment zone can be found. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.60 Sub-area 074_00TG_185_00IG_S_s_z-ro

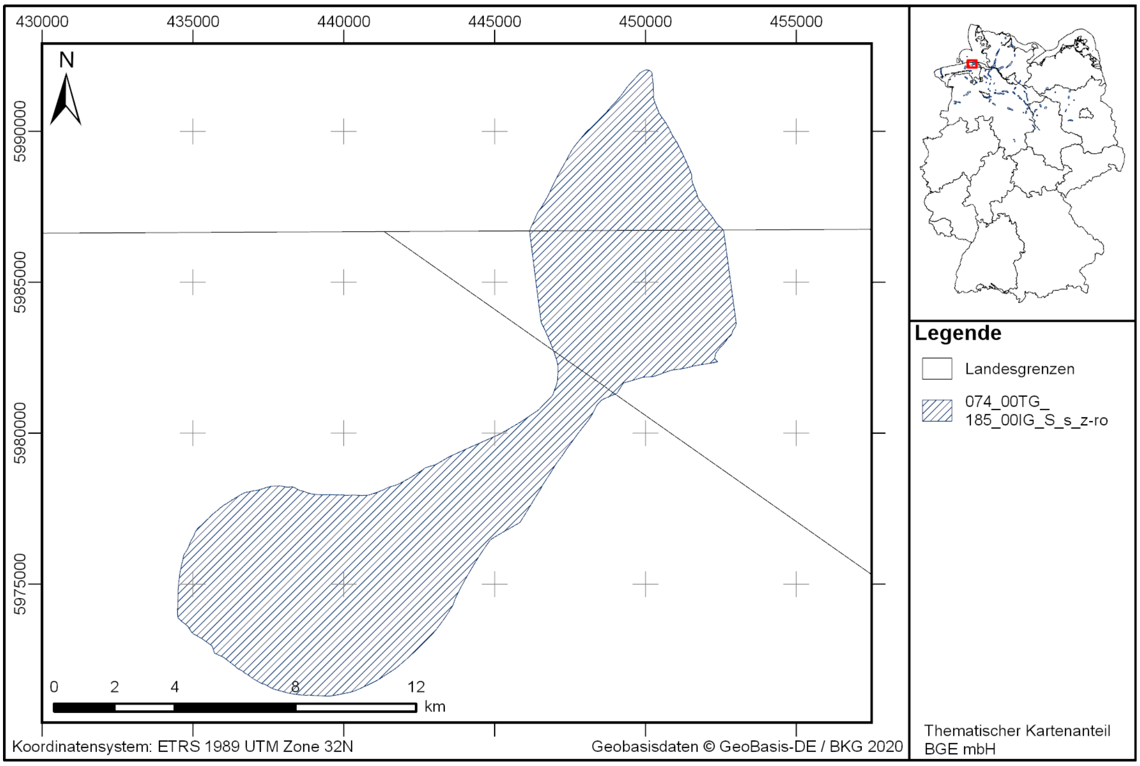


Figure 115: Overview map of the sub-area 074_00TG_185_00IG_S_s_z-ro. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

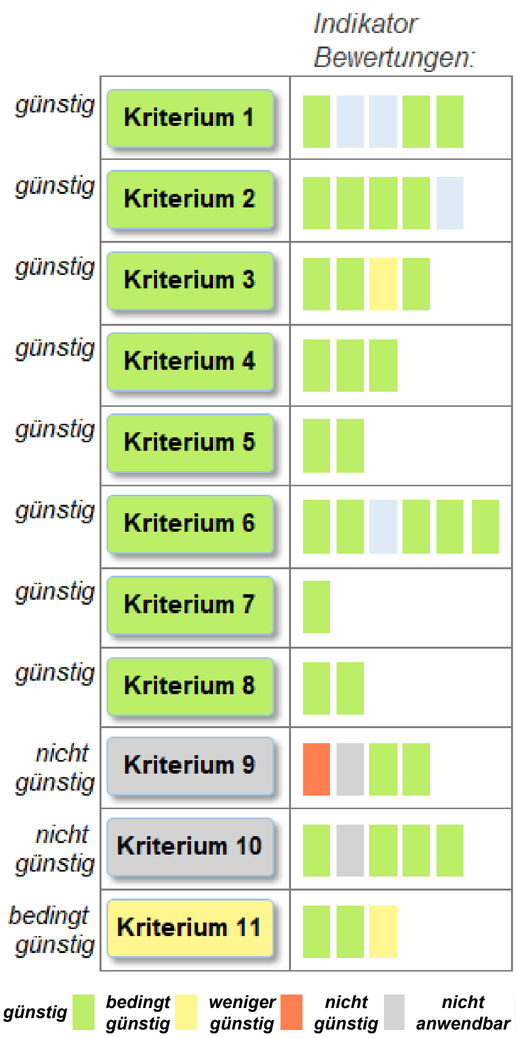
Table 157: Characteristics of the sub-area 074_00TG_185_00IG_S_s_z-ro

Characteristics of the sub-area 074_00TG_185_00IG_S_s_z-ro	
IA code	185_00IG_S_s_z-ro
Host rock type and configuration	Rock salt in a steep formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony and in the east of the federal state of Schleswig-Holstein, approx. 13 km north of the island of Wangerooge, below the North Sea.
Surface area	115 km²
Geological characteristics	The sub-area is located in the zechstein/rotliegend of the Roter Sand/Feuerschiff Elbe salt structure and has a thickness of 1,030 metres. The sub-area is located at a depth of 470 metres to 1,500 metres below ground surface.

Table 158: Result of the geoscientific weighing criteria for the sub-area 074_00TG_185_00IG_S_s_z-ro.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Eight of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; six criteria were rated “favourable” and two criteria were rated “not favourable”.

The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure. Individual evaluation of each identified area was performed for rock salt in a steep formation in regard to the criteria 2 (configuration), 3 (characterisability) and 11 (overburden).

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
The “criterion for evaluation of the rock formation configuration” and the “criterion for evaluation of the spatial characterisability” were rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. This evaluation is the result of the conditionally favourable rating according to the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. Comprehensive data on keystone faults is not available at present. When full data coverage is available, keystone faults should be expected for all salt structures due to the tectonic circumstances. As with the procedure in regard to the exclusion criteria, it is assumed in this case also that keystone faults end at the culmination of the salt dome structure (BGE 2020h). Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.61 Sub-area 075_01TG_189_01IG_S_f_km

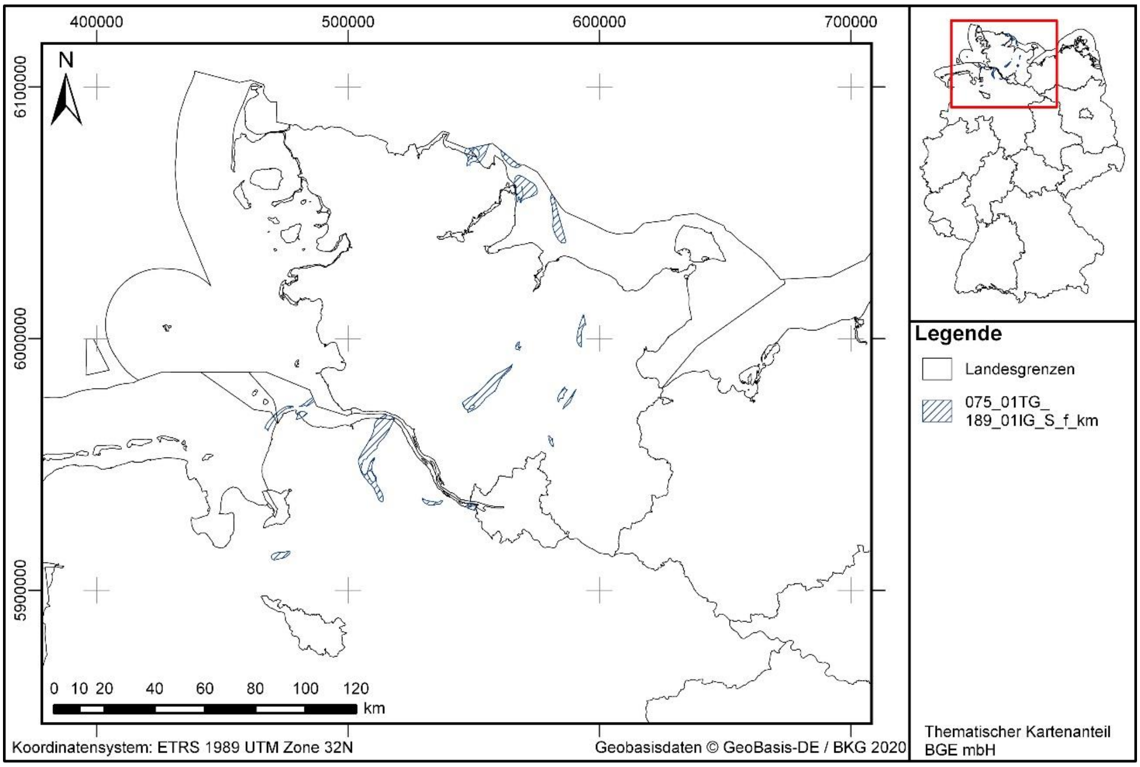
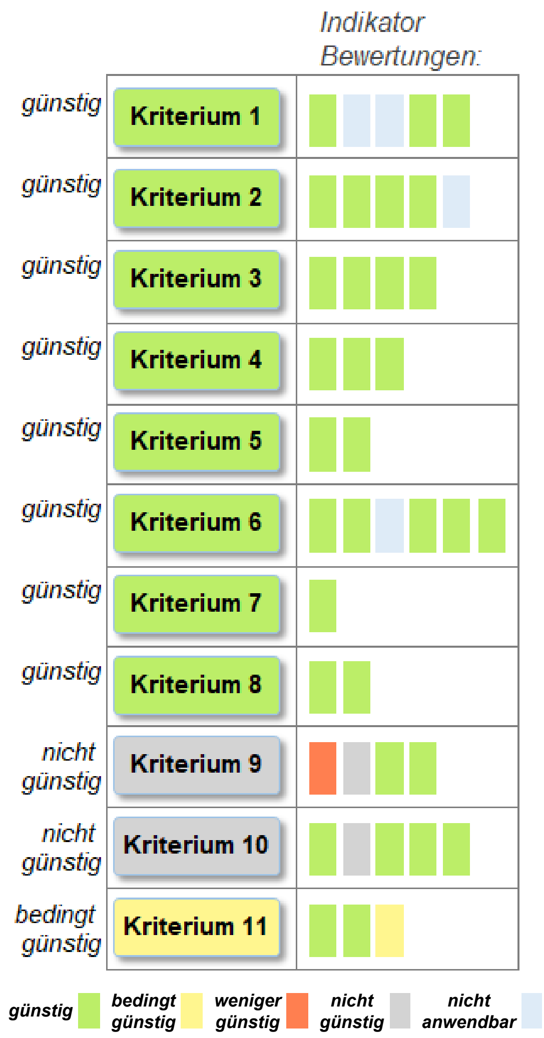


Figure 116: Overview map of the sub-area 075_01TG_189_01IG_S_f_km. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 159: Characteristics of the sub-area 075_01TG_189_01IG_S_f_km

Characteristics of the sub-area 075_01TG_189_01IG_S_f_km	
IA code	189_01IG_S_f_km
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the north of Germany and covers areas in the federal states of Hamburg, Lower Saxony and Schleswig-Holstein.
Surface area	475 km²
Geological characteristics	The sub-area is found in the Glückstadt Graben in the northern part of the North German Basin and dates back to the Keuper stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 880 metres. The base surface of the identified area is located at a depth of 640 metres to 1,500 metres below ground surface.

Table 160: Result of the geoscientific weighing criteria for the sub-area 075_01TG_189_01IG_S_f_km.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.62 Sub-area 075_02TG_189_03IG_S_f_km

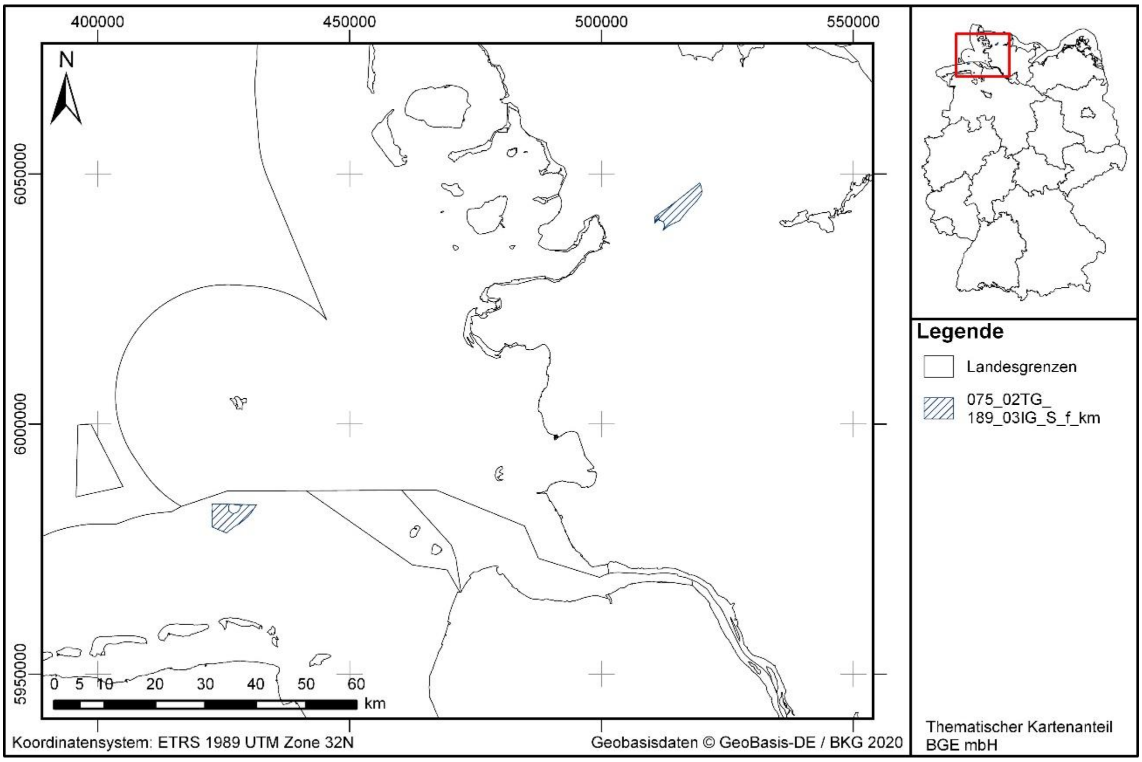


Figure 117: Overview map of the sub-area 075_02TG_189_03IG_S_f_km. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

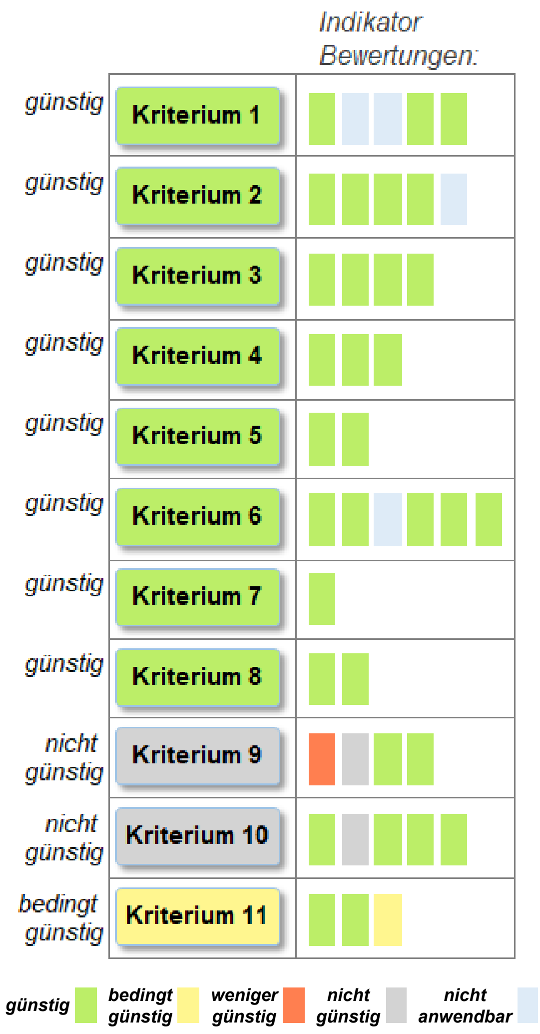
Table 161: Characteristics of the sub-area 075_02TG_189_03IG_S_f_km

Characteristics of the sub-area 075_02TG_189_03IG_S_f_km	
IA code	189_03IG_S_f_km
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the north of the federal state of Lower Saxony and in the northeast of the federal state of Schleswig-Holstein.
Surface area	61 km²
Geological characteristics	The sub-area is found in the Westschleswig-Block and dates back to the Keuper stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 330 metres. The base surface of the sub-area is located at a depth of 870 metres to 1,500 metres below ground surface.

*Table 162: Result of the geoscientific weighing criteria for the sub-area 075_02TG_189_03IG_S_f_km.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

**Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)**

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.63 Sub-area 076_01TG_191_01IG_S_f_so

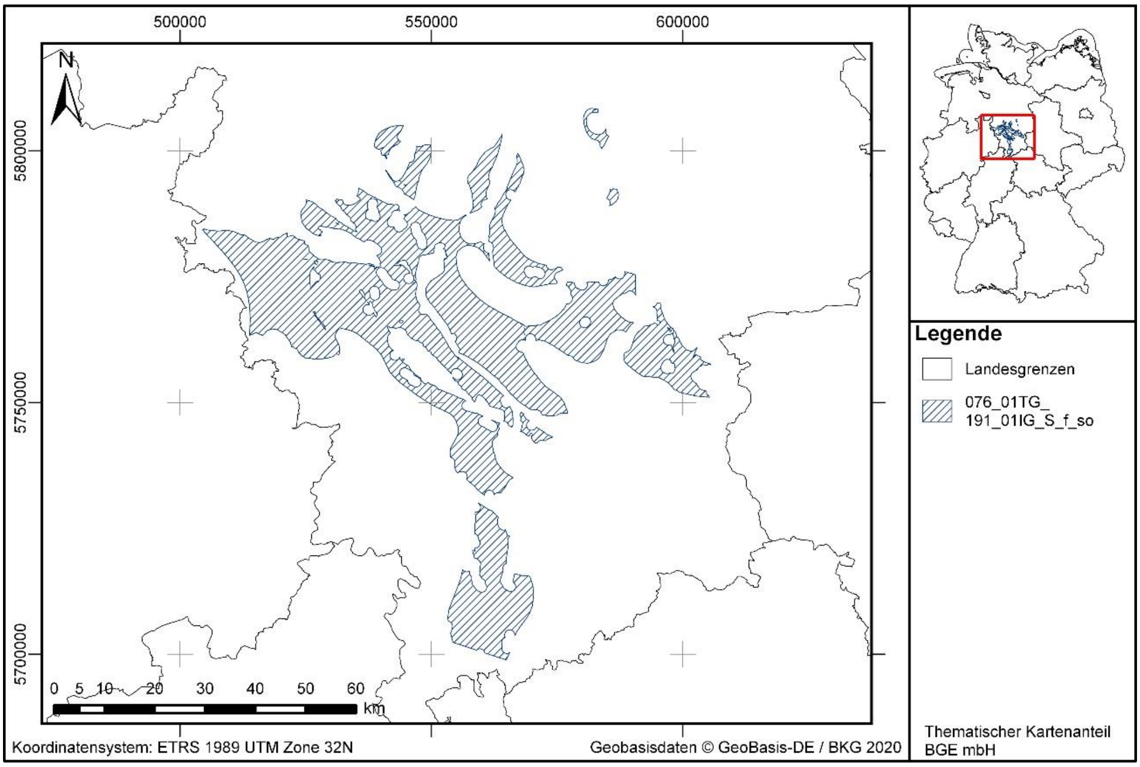


Figure 118: Overview map of the sub-area 076_01TG_191_01IG_S_f_so. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

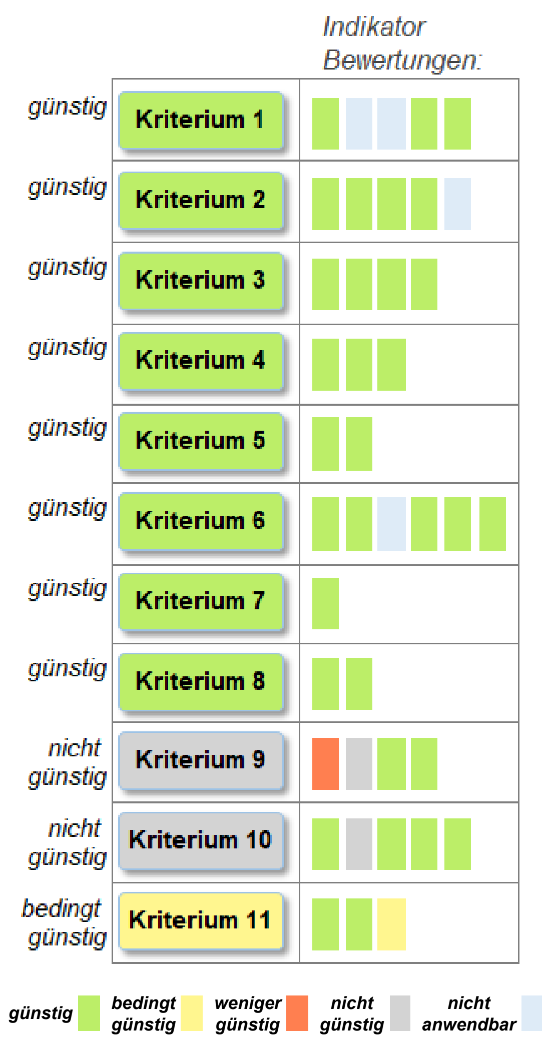
Table 163: Characteristics of the sub-area 076_01TG_191_01IG_S_f_so

Characteristics of the sub-area 076_01TG_191_01IG_S_f_so	
IA code	191_01IG_S_f_so
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the south of the federal state of Lower Saxony.
Surface area	2,133 km²
Geological characteristics	The sub-area is found in the southern part of the North German Basin and dates back to the Röt/Muschelkalk (shell-bearing limestone) stratigraphic model unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 164: Result of the geoscientific weighing criteria for the sub-area 076_01TG_191_01IG_S_f_so.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.64 Sub-area 076_02TG_191_02IG_S_f_so

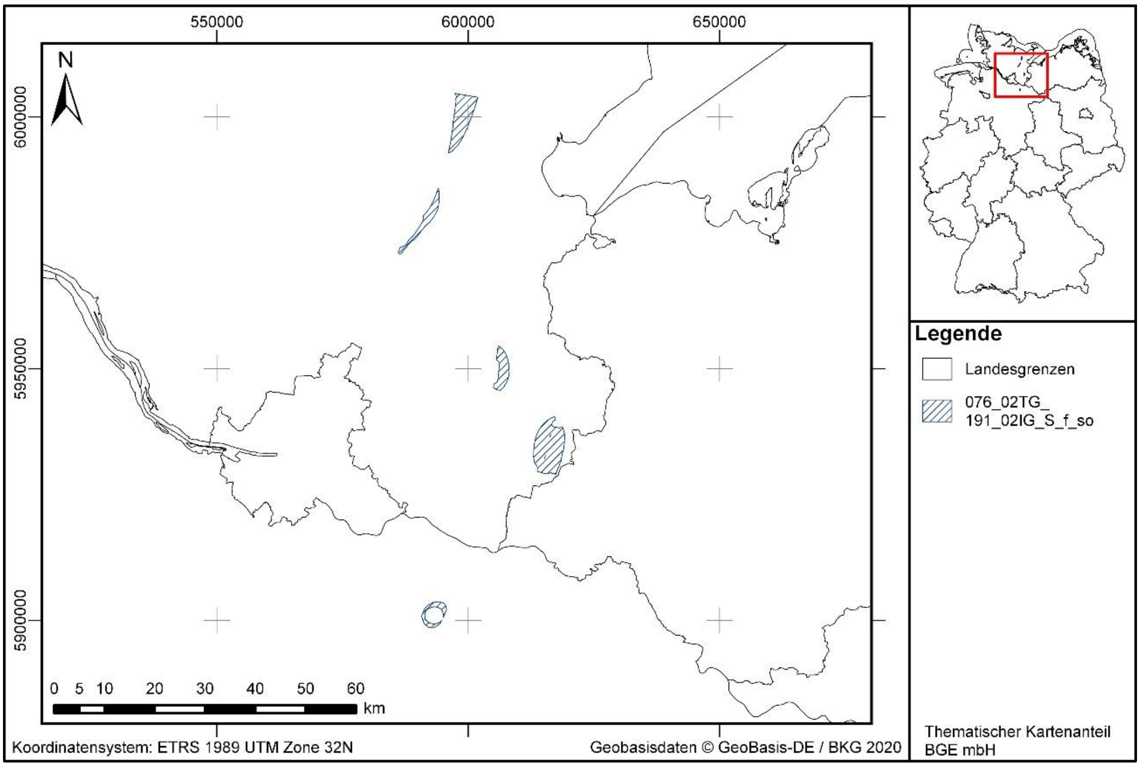


Figure 119: Overview map of the sub-area 076_02TG_191_02IG_S_f_so. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

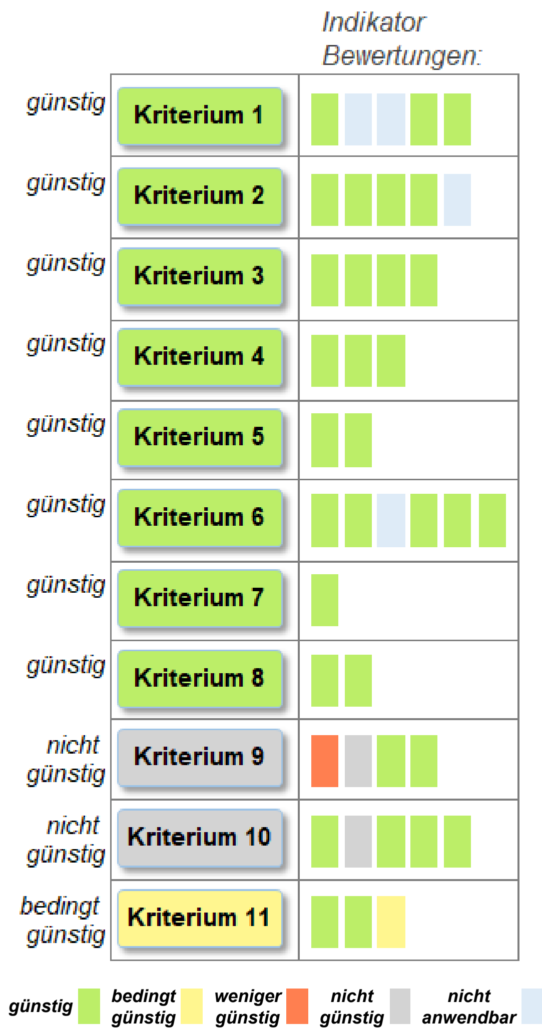
Table 165: Characteristics of the sub-area 076_02TG_191_02IG_S_f_so

Characteristics of the sub-area 076_02TG_191_02IG_S_f_so	
IA code	191_02IG_S_f_so
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the northeast of the federal state of Lower Saxony and in the south of the federal state of Schleswig-Holstein.
Surface area	123 km²
Geological characteristics	The sub-area is found in the North German Plain and dates back to the Röt/Muschelkalk (shell-bearing limestone) stratigraphic model unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 580 metres. The base surface of the sub-area is located at a depth of 1,150 metres to 1,500 metres below ground surface.

Table 166: Result of the geoscientific weighing criteria for the sub-area 076_02TG_191_02IG_S_f_so.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.65 Sub-area 076_03TG_191_05IG_S_f_so

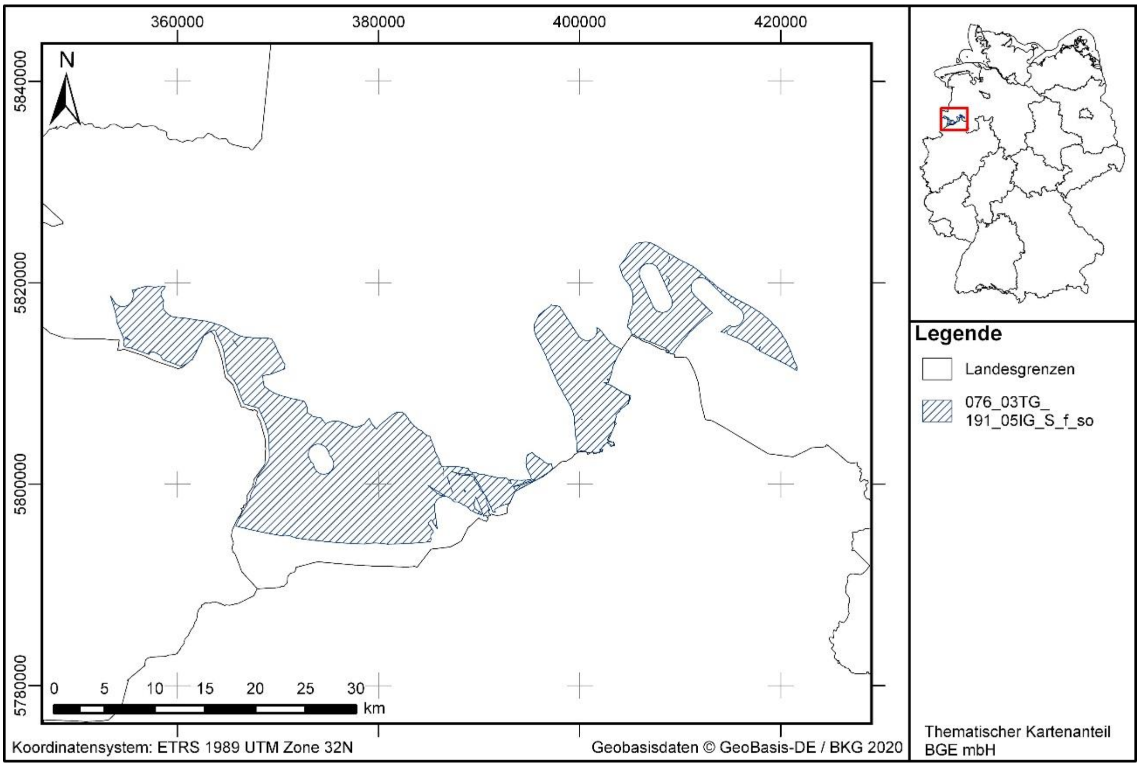


Figure 120: Overview map of the sub-area 076_03TG_191_05IG_S_f_so. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

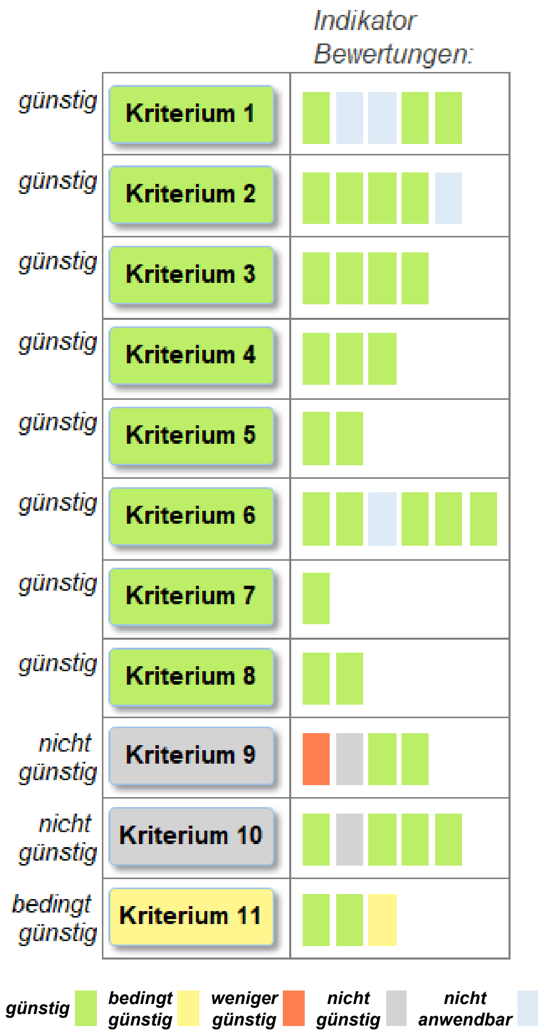
Table 167: Characteristics of the sub-area 076_03TG_191_05IG_S_f_so

Characteristics of the sub-area 076_03TG_191_05IG_S_f_so	
IA code	191_05IG_S_f_so
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the west of the federal state of Lower Saxony.
Surface area	459 km²
Geological characteristics	The sub-area is found in the Westphalian Lowland and dates back to the Röt/Muschelkalk (shell-bearing limestone) stratigraphic model unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 1,010 metres. The base surface of the sub-area is located at a depth of 500 metres to 1,500 metres below ground surface.

Table 168: Result of the geoscientific weighing criteria for the sub-area 076_03TG_191_05IG_S_f_so. Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.66 Sub-area 077_00TG_192_00IG_S_f_jo

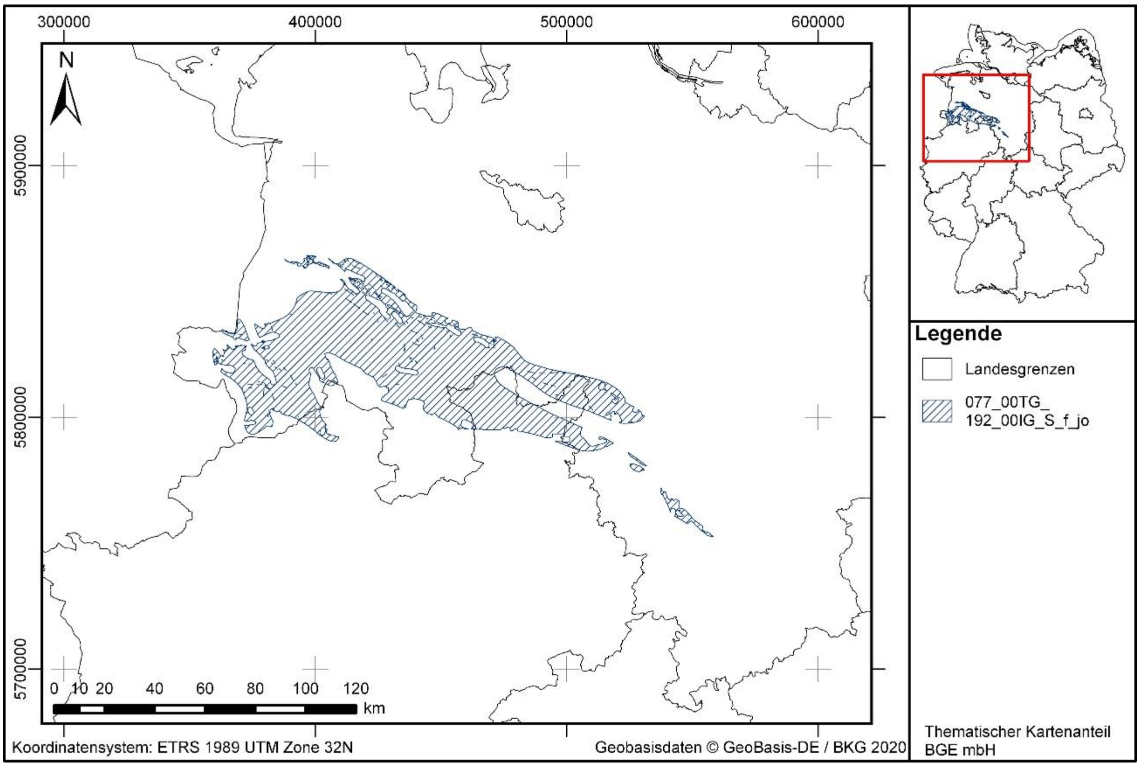
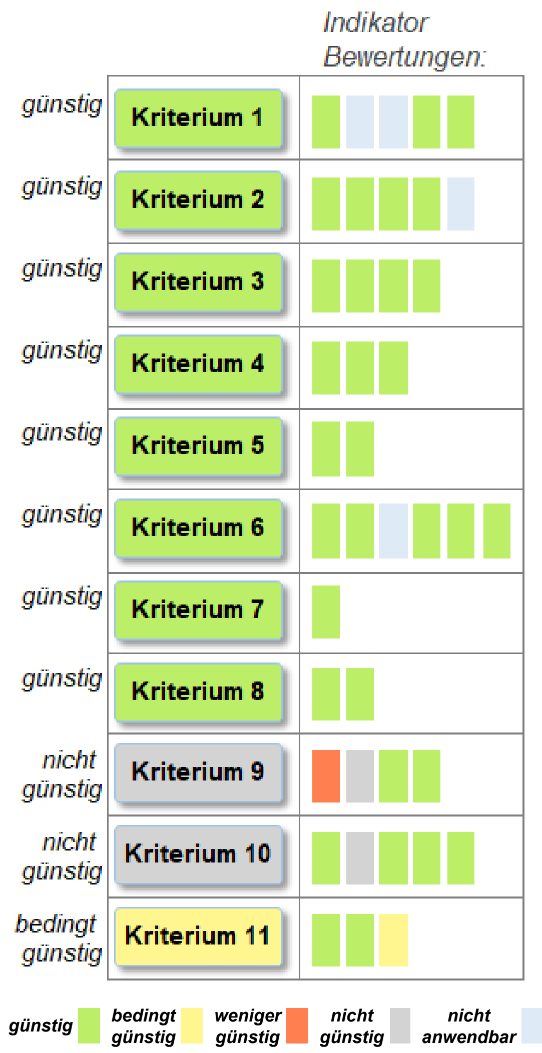


Figure 121: Overview map of the sub-area 077_00TG_192_00IG_S_f_jo. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 169: Characteristics of the sub-area 077_00TG_192_00IG_S_f_jo

Characteristics of the sub-area 077_00TG_192_00IG_S_f_jo	
IA code	192_00IG_S_f_jo
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the east of the federal state of Lower Saxony and in the north of the federal state of North Rhine-Westphalia.
Surface area	4,992 km²
Geological characteristics	The sub-area is found in the western part of the Lower Saxony Basin and dates back to the White Jura (Late Jurassic) stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 170: Result of the geoscientific weighing criteria for the sub-area 077_00TG_192_00IG_S_f_jo.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

<table>
<tr><th colspan="2">Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)</th></tr>
<tr><td>Results of the summarised evaluation:
</td>
<td>Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)</td></tr>
<tr><td colspan="2">Reasoning for the summarised evaluation:
Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.</td></tr>
</table>

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.67 Sub-area 078_01TG_197_01IG_S_f_z

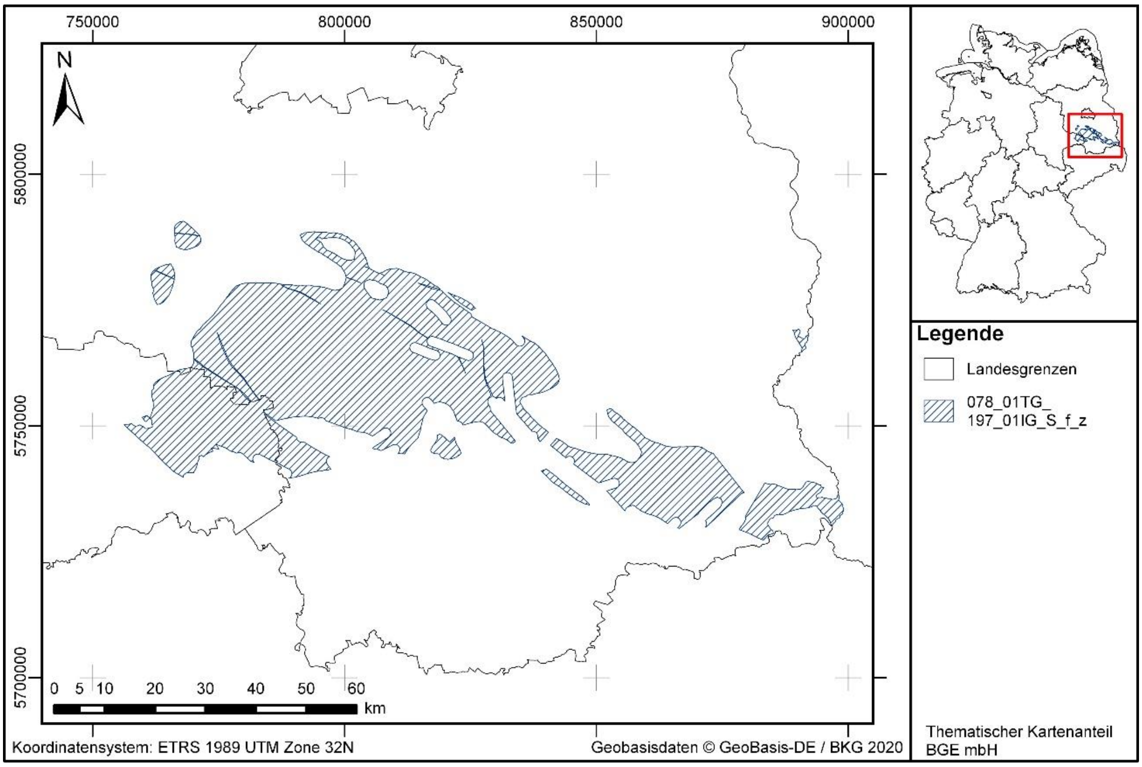
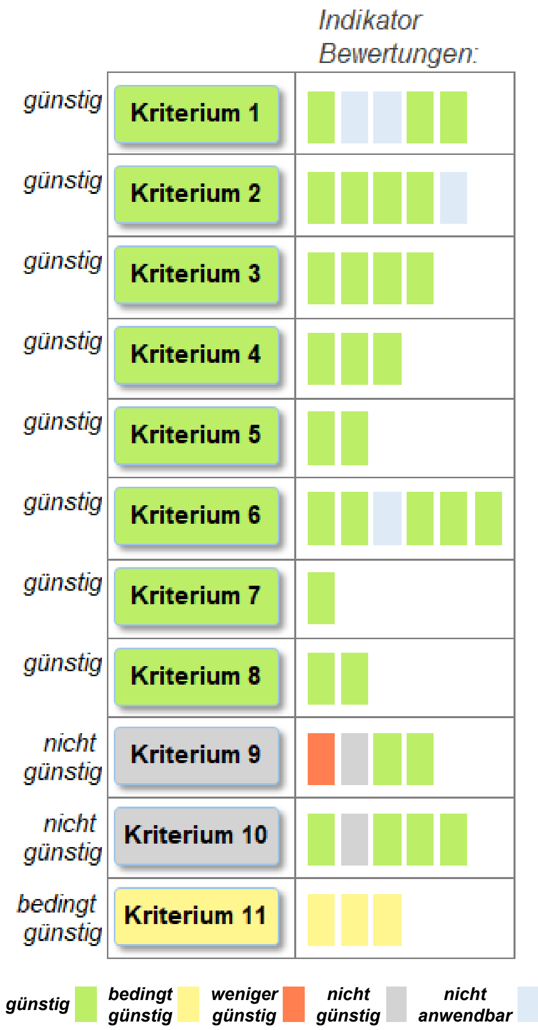


Figure 122: Overview map of the sub-area 078_01TG_197_01IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 171: Characteristics of the sub-area 078_01TG_197_01IG_S_f_z

Characteristics of the sub-area 078_01TG_197_01IG_S_f_z	
IA code	197_01IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area extends across sections of the federal states of Lower Saxony and Brandenburg.
Surface area	2,582 km²
Geological characteristics	The sub-area is found in the Lower Lusatian Basin and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 910 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 172: Result of the geoscientific weighing criteria for the sub-area 078_01TG_197_01IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation:  	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden” was rated “conditionally favourable”. The identified area consists of several sub-sections. The distance between the surface of the identified area and the Quaternary base is less than 150 metres in two small areas. Given the uncertainties in regard to the model horizon depths and due to the limited affected area – relative to the surface of the identified area – the overburden evaluation of “conditionally favourable” is weighed as less significant. In addition , the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.68 Sub-area 078_02TG_197_02IG_S_f_z

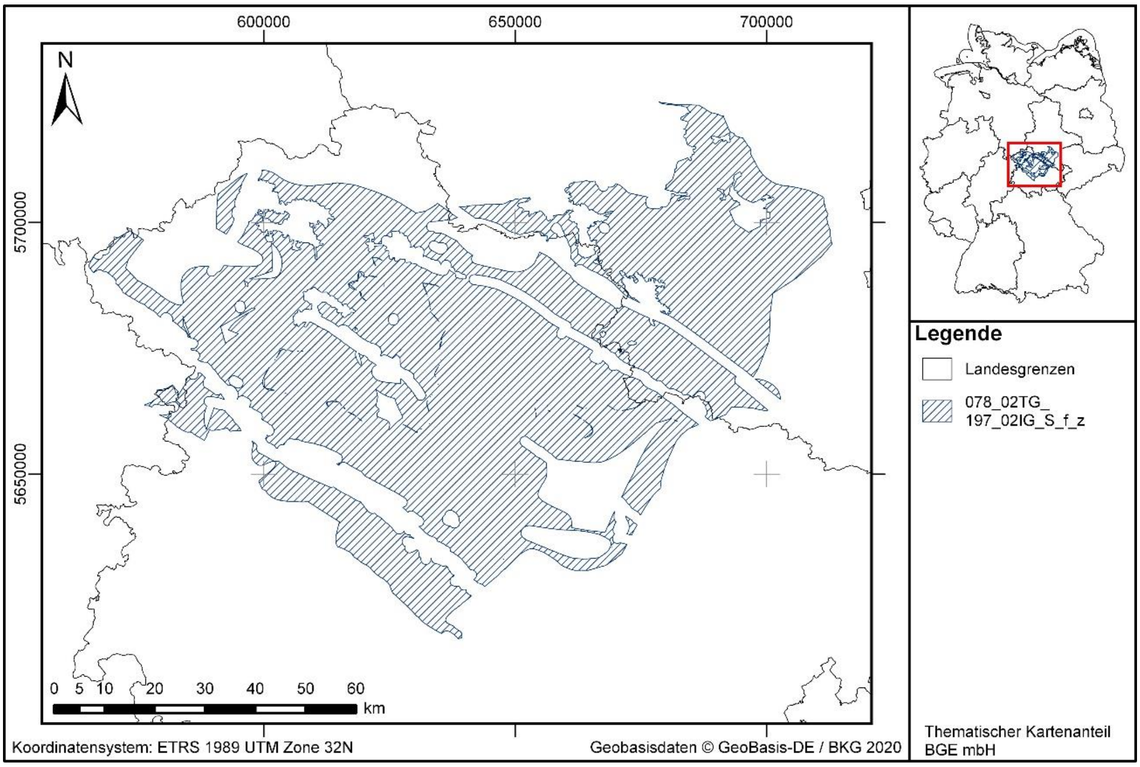


Figure 123: Overview map of the sub-area 078_02TG_197_02IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

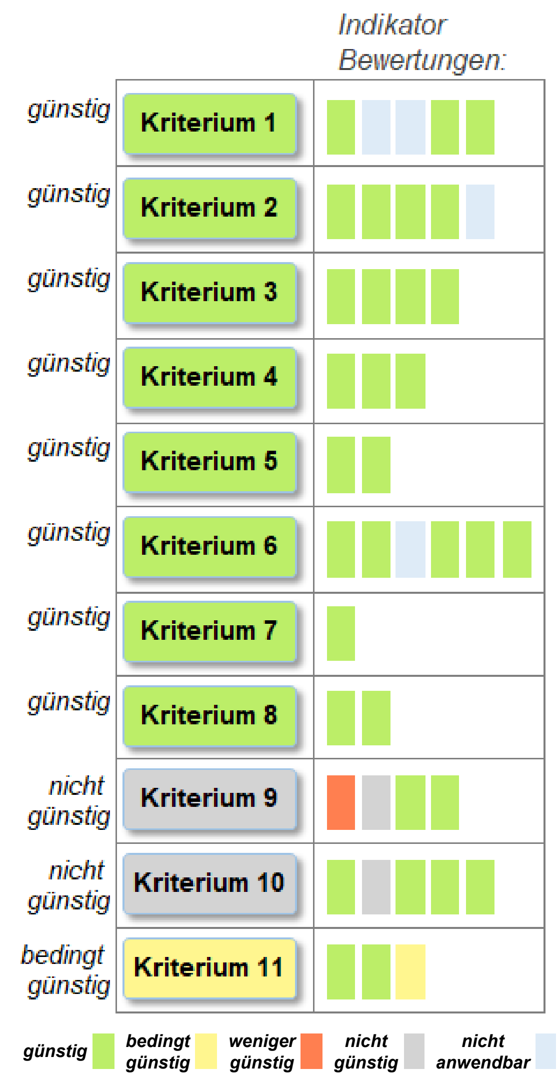
Table 173: Characteristics of the sub-area 078_02TG_197_02IG_S_f_z

Characteristics of the sub-area 078_02TG_197_02IG_S_f_z	
IA code	197_02IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area extends across sections of the federal states of Hesse, Lower Saxony, Saxony-Anhalt and Thuringia.
Surface area	6,151 km²
Geological characteristics	The sub-area is found in the Thuringian Basin and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 174: Result of the geoscientific weighing criteria for the sub-area 078_02TG_197_02IG_S_f_z
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.69 Sub-area 078_03TG_197_03IG_S_f_z

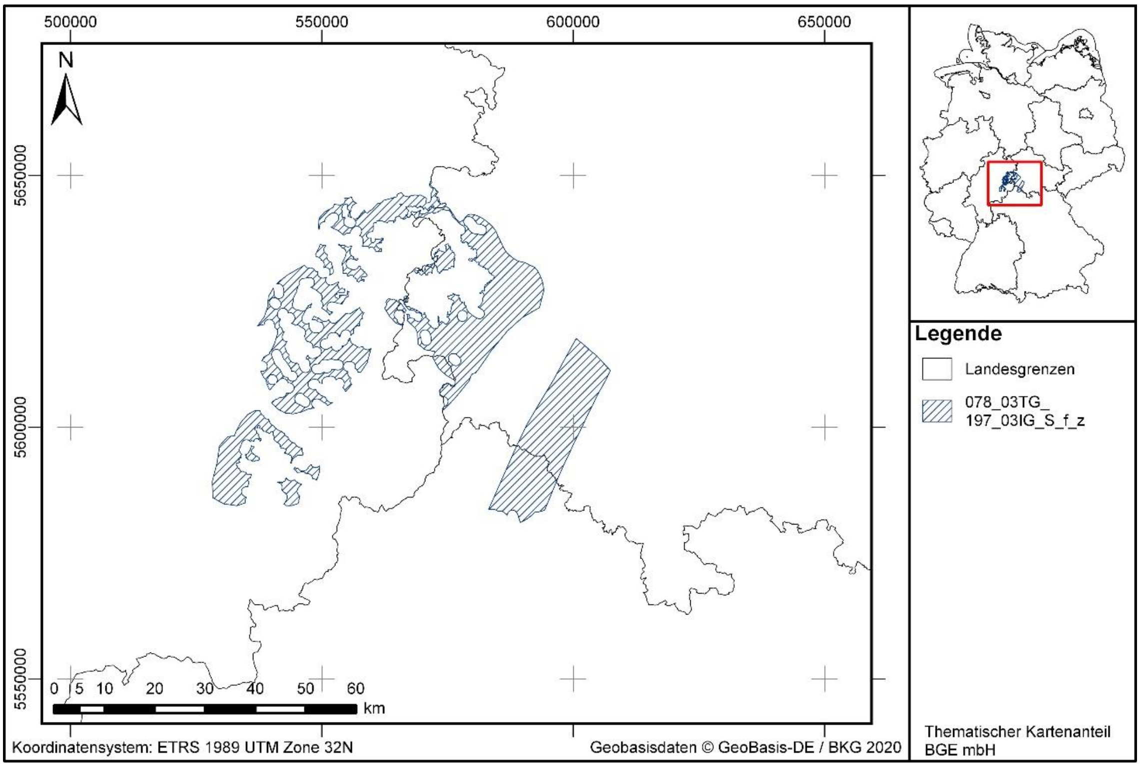


Figure 124: Overview map of the sub-area 078_03TG_197_03IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbH; Landesgrenzen = State borders.

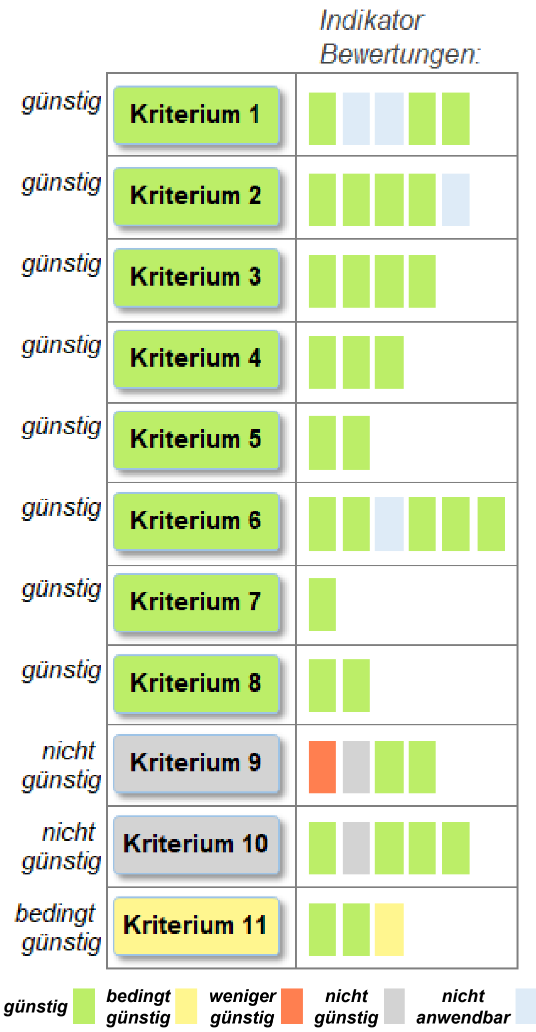
Table 175: Characteristics of the sub-area 078_03TG_197_03IG_S_f_z

Characteristics of the sub-area 078_03TG_197_03IG_S_f_z	
IA code	197_03IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area extends across sections of the federal states of Bavaria, Hesse and Thuringia.
Surface area	1,172 km²
Geological characteristics	The sub-area is found in the Werra-Fulda Basin and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 540 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,230 metres below ground surface.

Table 176: Result of the geoscientific weighing criteria for the sub-area 078_03TG_197_03IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

<u>Results of the summarised evaluation</u>:



<u>Criterion 1</u>: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
<u>Criterion 2</u>: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
<u>Criterion 3</u>: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)
<u>Criterion 4</u>: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)
<u>Criterion 5</u>: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)
<u>Criterion 6</u>: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)
<u>Criterion 7</u>: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)
<u>Criterion 8</u>: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
<u>Criterion 9</u>: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)
<u>Criterion 10</u>: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)
<u>Criterion 11</u>: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)

<u>Reasoning for the summarised evaluation</u>:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.70 Sub-area 078_04TG_197_04IG_S_f_z

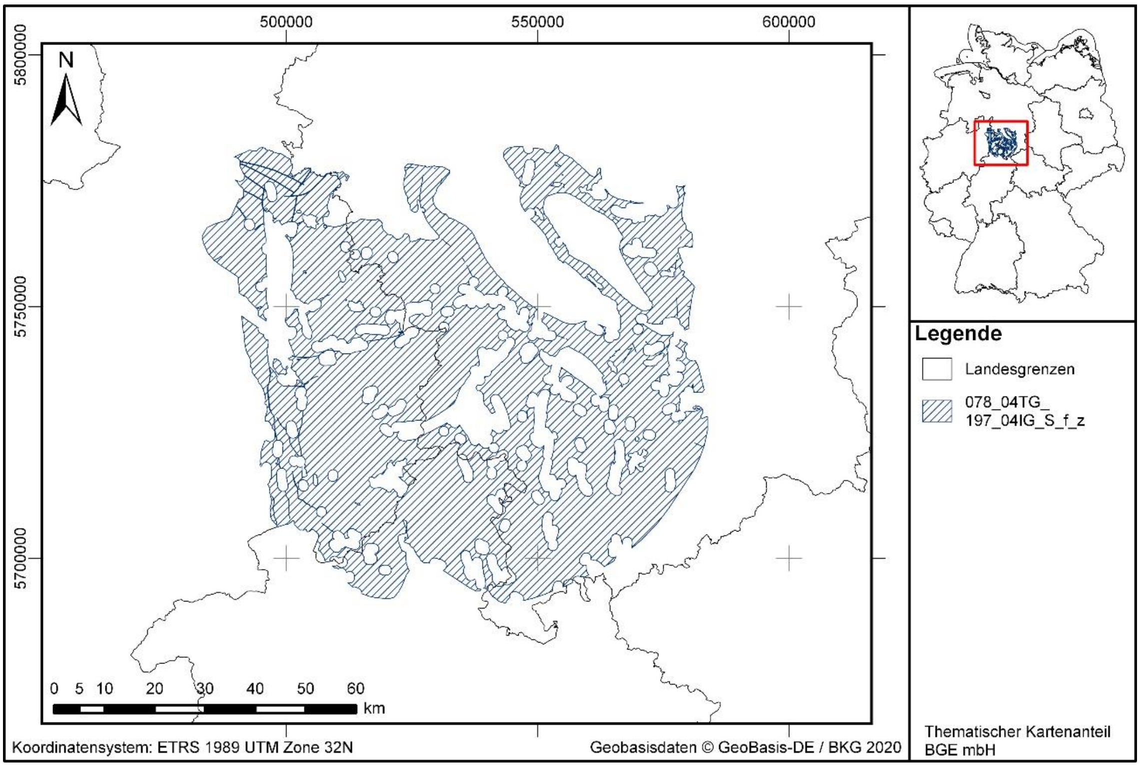


Figure 125: Overview map of the sub-area 078_04TG_197_04IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

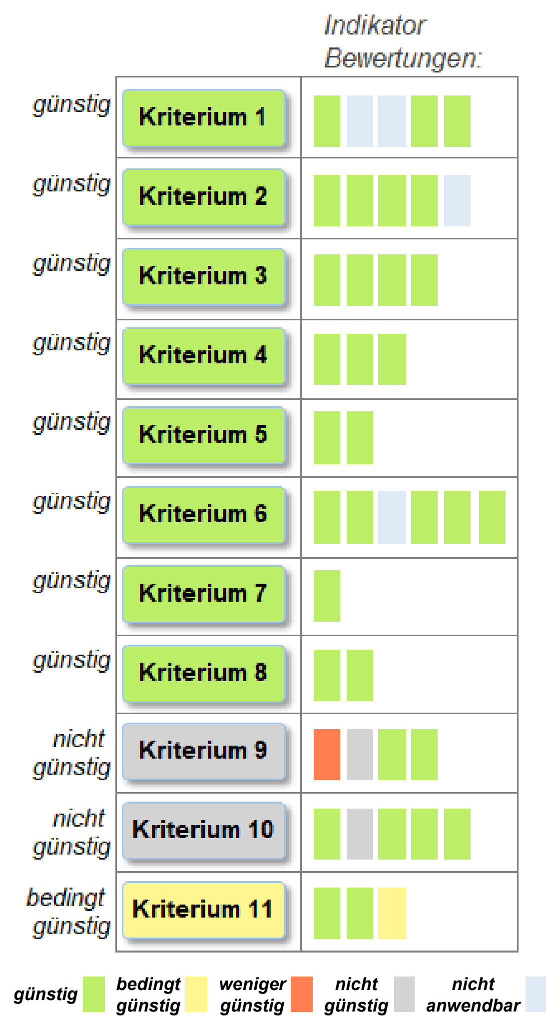
Table 177: Characteristics of the sub-area 078_04TG_197_04IG_S_f_z

Characteristics of the sub-area 078_04TG_197_04IG_S_f_z	
IA code	197_04IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area extends across sections of the federal states of Hesse, Lower Saxony and North Rhine-Westphalia.
Surface area	4,574 km²
Geological characteristics	The sub-area is found in the Solling Basin and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 1,200 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

*Table 178: Result of the geoscientific weighing criteria for the sub-area 078_04TG_197_04IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.*

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.71 Sub-area 078_05TG_197_05IG_S_f_z

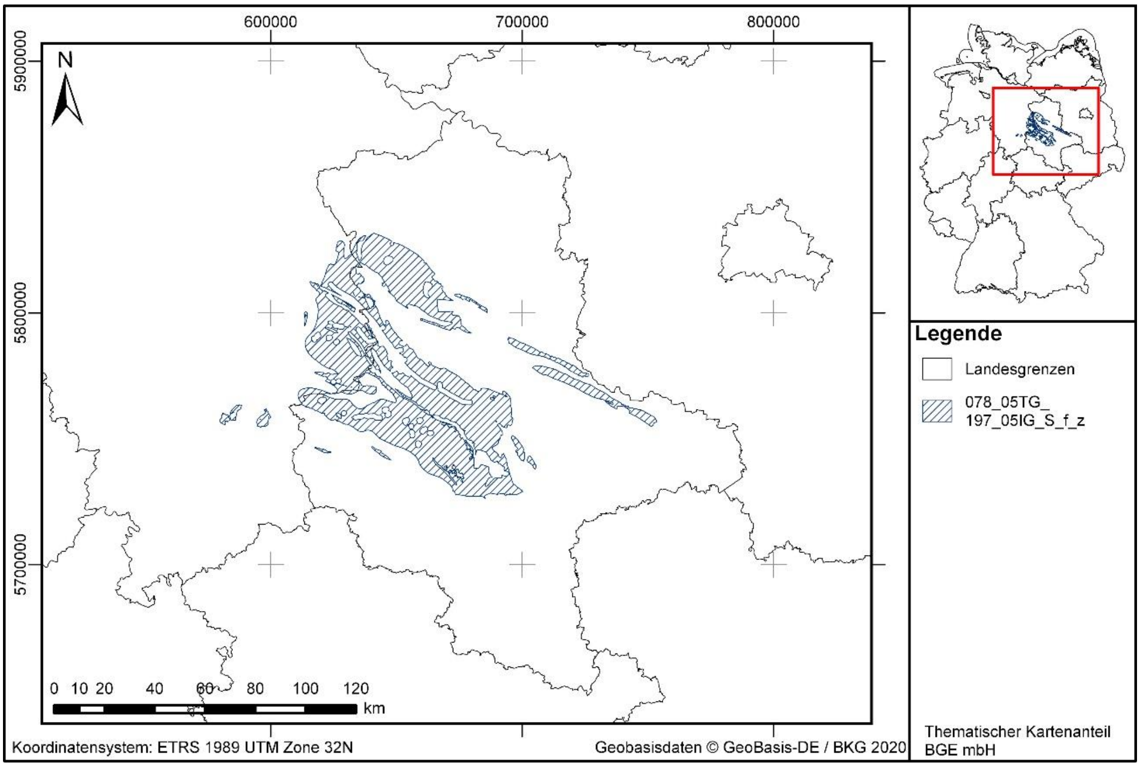
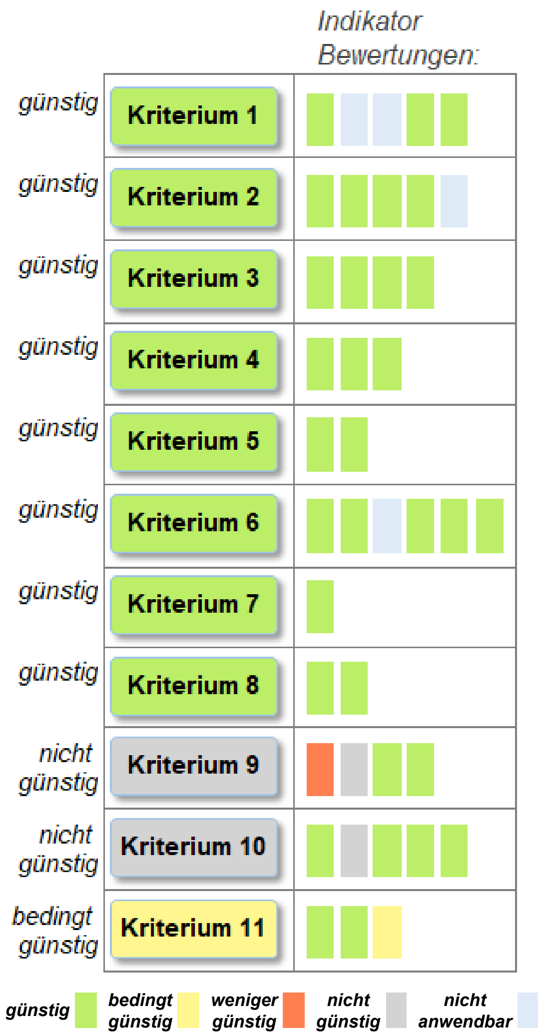


Figure 126: Overview map of the sub-area 078_05TG_197_05IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 179: Characteristics of the sub-area 078_05TG_197_05IG_S_f_z

Characteristics of the sub-area 078_05TG_197_05IG_S_f_z	
IA code	197_05IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area extends across sections of the federal states of Lower Saxony and Saxony-Anhalt.
Surface area	3,807 km²
Geological characteristics	The sub-area is found in the Subhercynian Basin and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 1,200 metres. The base surface of the identified area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 180: Result of the geoscientific weighing criteria for the sub-area 078_05TG_197_05IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

<table>
<tr><th colspan="2">Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)</th></tr>
<tr><td>Results of the summarised evaluation:

</td>
<td>Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)
Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)
Criterion 3: Evaluation of the spatial characterisability
(Annex 3 (to Sec. 24) StandAG)
Criterion 4: Evaluation of the long-term stability of favourable conditions
(Annex 4 (to Sec. 24) StandAG)
Criterion 5: Evaluation of the favourable geomechanical characteristics
(Annex 5 (to Sec. 24) StandAG)
Criterion 6: Evaluation of the tendency to form fluid pathways
(Annex 6 (to Sec. 24) StandAG)
Criterion 7: Evaluation of gas formation
(Annex 7 (to Sec. 24) StandAG)
Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)
Criterion 9: Evaluation of retention capacity in the effective containment zone
(Annex 9 (to Sec. 24) StandAG)
Criterion 10: Evaluation of the hydro-chemical circumstances
(Annex 10 (to Sec. 24) StandAG)
Criterion 11: Evaluation of protection of the effective containment zone by the overburden
(Annex 11 (to Sec. 24) StandAG)</td></tr>
<tr><td colspan="2">Reasoning for the summarised evaluation:
Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.</td></tr>
</table>

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The "criterion for evaluation of the rock formation configuration", the "criterion for evaluation of the spatial characterisability" and the "criterion for evaluation of the long-term stability of favourable conditions" were each rated "favourable". The "criterion for evaluation of protection of the effective containment zone by the overburden indicator" was rated as "conditionally favourable" based on the indicator "no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone". However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.72 Sub-area 078_06TG_197_06IG_S_f_z

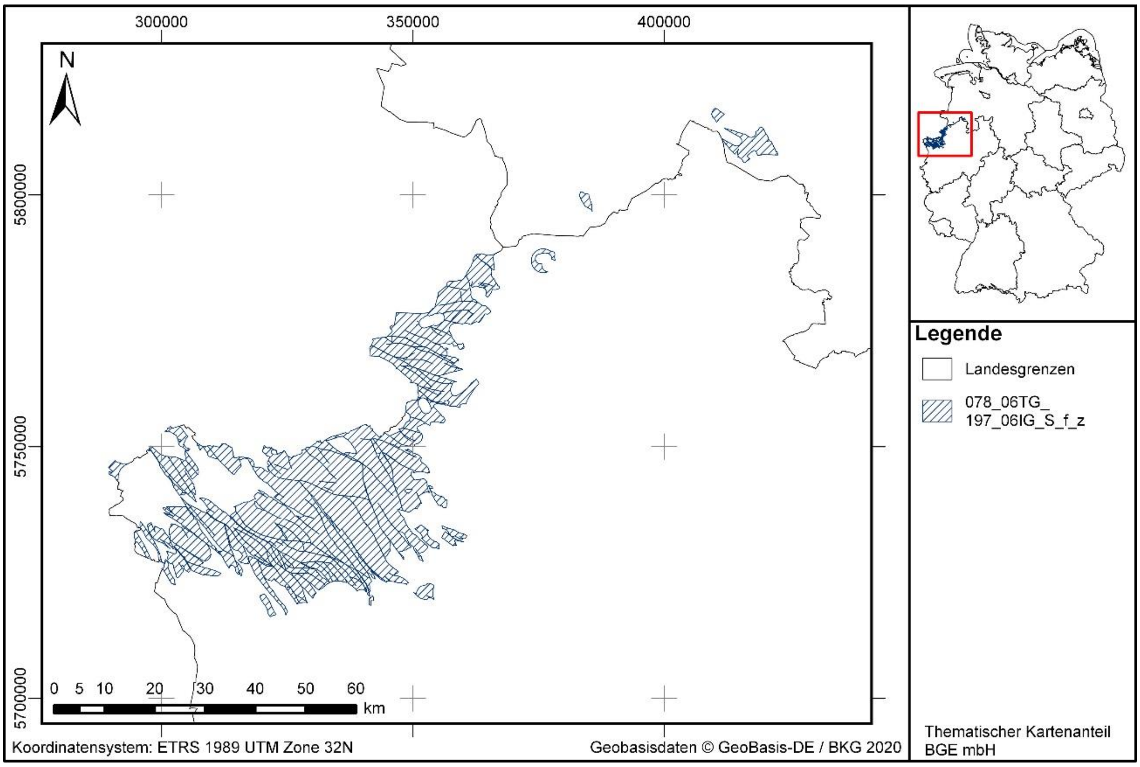
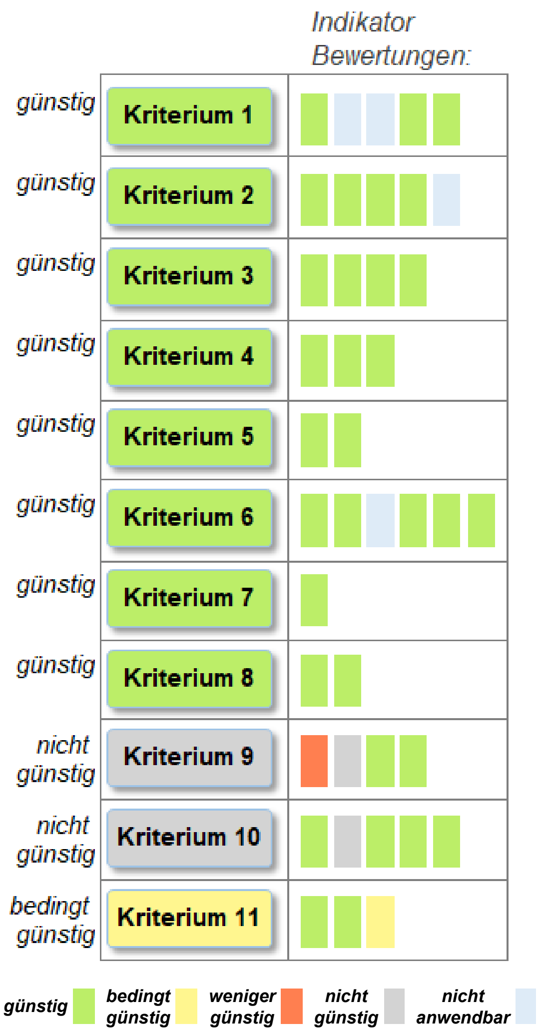


Figure 127: Overview map of the sub-area 078_06TG_197_06IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 181: Characteristics of the sub-area 078_06TG_197_06IG_S_f_z

Characteristics of the sub-area 078_06TG_197_06IG_S_f_z	
IA code	197_06IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area extends across sections of the federal states of North Rhine-Westphalia and Lower Saxony.
Surface area	1,541 km²
Geological characteristics	The sub-area is found in the Lower Rhine-Ems region and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 830 metres. The base surface of the sub-area is located at a depth of 400 metres to 1,500 metres below ground surface.

Table 182: Result of the geoscientific weighing criteria for the sub-area 078_06TG_197_06IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.73 Sub-area 078_07TG_197_07IG_S_f_z

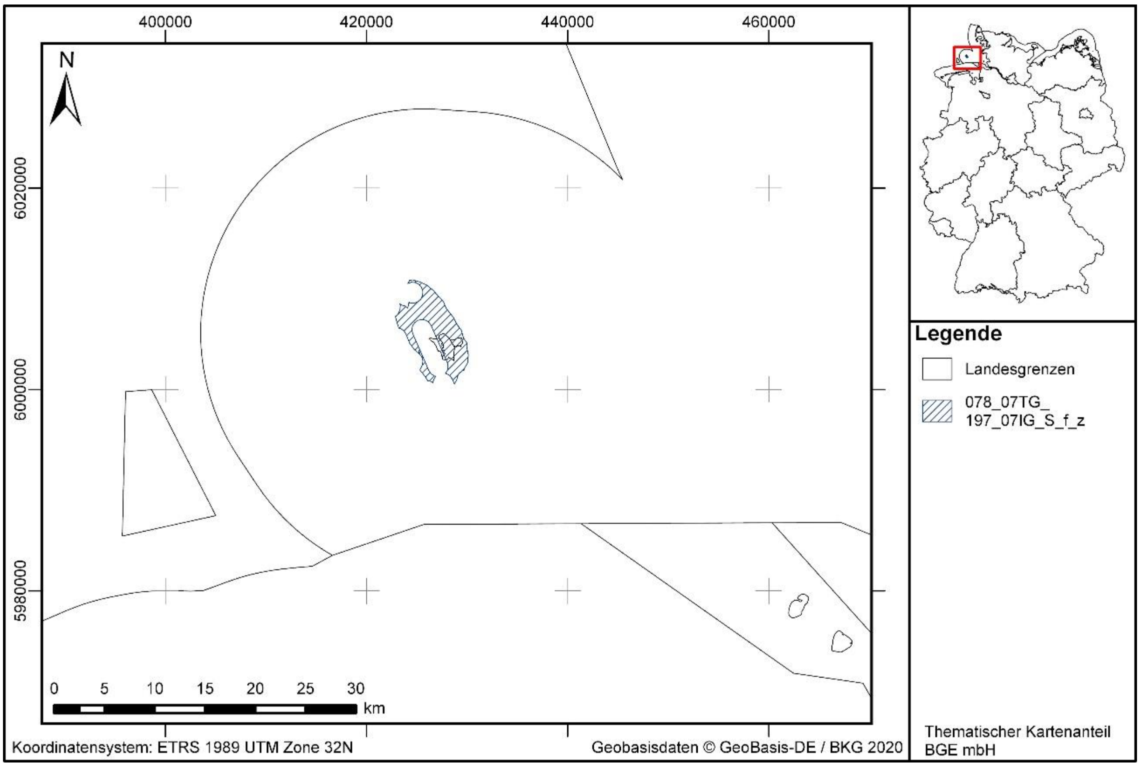


Figure 128: Overview map of the sub-area 078_07TG_197_07IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

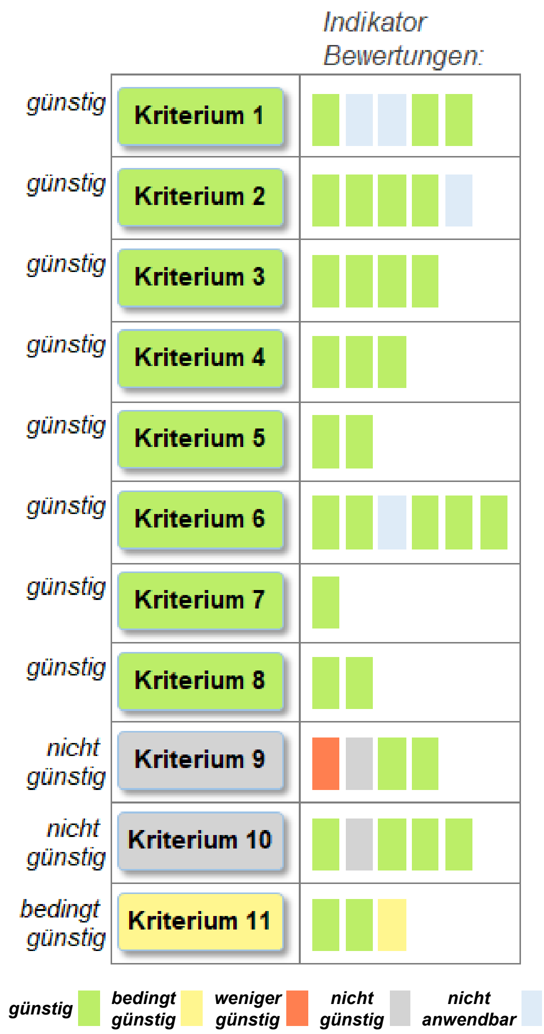
Table 183: Characteristics of the sub-area 078_07TG_197_07IG_S_f_z

Characteristics of the sub-area 078_07TG_197_07IG_S_f_z	
IA code	197_07IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the federal state of Schleswig-Holstein; it includes the island of Helgoland and is partly located in the North Sea.
Surface area	29 km²
Geological characteristics	The sub-area is found in the North Sea and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 740 metres. The base surface of the sub-area is located at a depth of 1,490 metres to 1,500 metres below ground surface.

Table 184: Result of the geoscientific weighing criteria for the sub-area 078_07TG_197_07IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria
(Annexes 1 to 11 (to Section 24) StandAG)

Results of the summarised evaluation:



Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG)

Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG)

Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG)

Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG)

Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG)

Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG)

Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG)

Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG)

Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG)

Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG)

Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)

Reasoning for the summarised evaluation:

Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration”, the “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. However, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

5.3.74 Sub-area 078_08TG_197_08IG_S_f_z

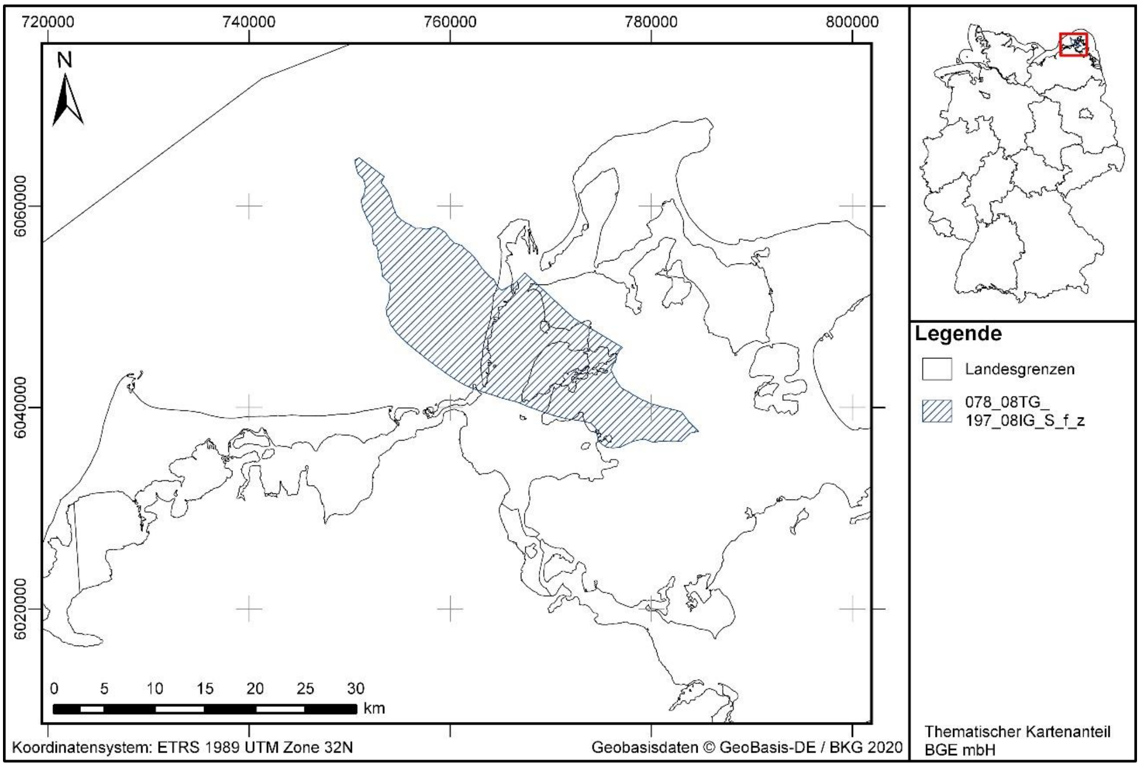
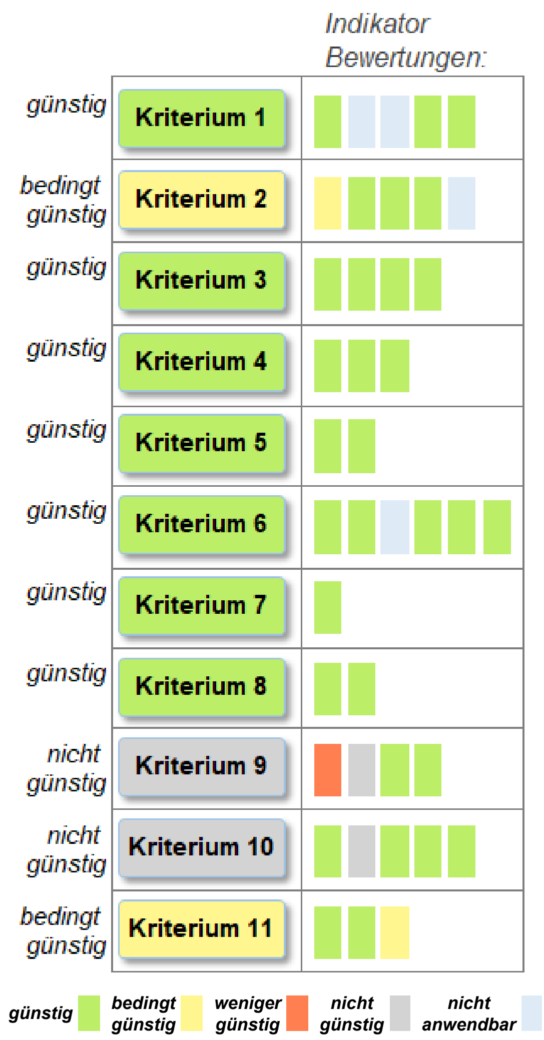


Figure 129: Overview map of the sub-area 078_08TG_197_08IG_S_f_z. Translation of terminology used in figure: Koordinatensystem = Coordinate system; Geobasisdaten = Geobasis data; Thematischer Kartenanteil BGE mbH = Map content BGE mbh; Landesgrenzen = State borders.

Table 185: Characteristics of the sub-area 078_08TG_197_08IG_S_f_z

Characteristics of the sub-area 078_08TG_197_08IG_S_f_z	
IA code	197_08IG_S_f_z
Host rock type and configuration	Rock salt in a stratiform formation
Geographic location	The sub-area is located in the north of the federal state of Mecklenburg-Vorpommern; it includes areas of the island of Rügen and is partly located below the Baltic Sea.
Surface area	318 km²
Geological characteristics	The sub-area is found in the north-eastern part of the North German Basin and dates back to the zechstein stratigraphic unit, which contains salt host rock in a stratiform formation. It has a maximum thickness of 340 metres. The base surface of the sub-area is located at a depth of 1,060 metres to 1,500 metres below ground surface.

Table 186: Result of the geoscientific weighing criteria for the sub-area 078_08TG_197_08IG_S_f_z.
Translation of terminology used in table: Indikator Bewertung = Evaluation of indicators; Kriterium = criterion; günstig = favourable; bedingt günstig = conditionally favourable; weniger günstig = less favourable; nicht günstig = unfavourable; nicht anwendbar = not applicable.

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)	
Results of the summarised evaluation: 	Criterion 1: Evaluation of the transport of radioactive substances by groundwater movements in the effective containment zone (Annex 1 (to Sec. 24) StandAG) Criterion 2: Evaluation of the rock formation configuration (Annex 2 (to Sec. 24) StandAG) Criterion 3: Evaluation of the spatial characterisability (Annex 3 (to Sec. 24) StandAG) Criterion 4: Evaluation of the long-term stability of favourable conditions (Annex 4 (to Sec. 24) StandAG) Criterion 5: Evaluation of the favourable geomechanical characteristics (Annex 5 (to Sec. 24) StandAG) Criterion 6: Evaluation of the tendency to form fluid pathways (Annex 6 (to Sec. 24) StandAG) Criterion 7: Evaluation of gas formation (Annex 7 (to Sec. 24) StandAG) Criterion 8: Evaluation of temperature compatibility (Annex 8 (to Sec. 24) StandAG) Criterion 9: Evaluation of retention capacity in the effective containment zone (Annex 9 (to Sec. 24) StandAG) Criterion 10: Evaluation of the hydro-chemical circumstances (Annex 10 (to Sec. 24) StandAG) Criterion 11: Evaluation of protection of the effective containment zone by the overburden (Annex 11 (to Sec. 24) StandAG)
Reasoning for the summarised evaluation: Seven of the eleven criteria were evaluated according to the reference dataset (BGE 2020b) for rock salt; five criteria were rated “favourable” and two criteria were rated “not favourable”. The criteria evaluated for the specific region relative to the reference datasets are assigned particular importance in the current phase of the site selection procedure.	

Geoscientific weighing criteria (Annexes 1 to 11 (to Section 24) StandAG)
Individual evaluation of each identified area was performed for stratiform rock salt in regard to the criteria 2 (configuration), 3 (characterisability), 4 (long-term stability) and 11 (overburden). The “criterion for evaluation of the rock formation configuration” was rated “conditionally favourable” based on the “barrier thickness [m]” indicator. The “criterion for evaluation of the spatial characterisability” and the “criterion for evaluation of the long-term stability of favourable conditions” were each rated “favourable”. The “criterion for evaluation of protection of the effective containment zone by the overburden indicator” was rated as “conditionally favourable” based on the indicator “no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone”. In principle, it is known the zechstein contains very thick rock salt horizons with homogeneous geological properties. For this reason, it is reasonable to assume that an effective containment zone is feasible, even if the thickness of the identified area is only conditionally favourable. In addition, the surface area of the identified area appears sufficiently large to accommodate an effective containment zone in a section without structural complications in the overburden that might cause impairments. Hence, application of the geoscientific weighing criteria permits anticipation of a **favourable overall geological situation** for the safe final disposal of radioactive waste. For further information, refer to BGE (2020k) and BGE (2020b).

Annex 1 Legal bases

Please note:

The translations of following materials into languages other than German are intended solely as a convenience to the non-German-reading public. Any discrepancies or differences that may arise in translations of the official German versions of these materials are not binding and have no legal effect for compliance or enforcement purposes.

The Site Selection Act (StandAG) of July 23rd, 2013 (BGBl. I p. 2553) was brought into force with last amendment of Art. 1 G of May 5th, 2017 (Federal Law Gazette (BGBl. I p. 1074) on May 16th 2017. The entry into force of the last amendment to Art. 3 G of December 12th, 2019 (BGBl. I p. 2510) took place on January 1st, 2020 (Art. 3 G of December 12th, 2019).

The following contains annex excerpts of sections 1, 12, 13, 22, 23, 24 and 36 StandAG, together with the corresponding passages from the explanatory memorandum on the draft of the act (BT-Drs. 18/11398).

In regard to the purpose of StandAG, Section 1 StandAG states:

Section 1 Purpose of the Act

(1) This act regulates the site selection procedure.

(2) The site selection procedure uses a participative, science-based, self-questioning and learning procedure to identify a site offering the best possible safety to accommodate a facility in Germany for the final disposal of high-level radioactive waste produced in the Federal Republic of Germany according to Section 9a para. 3 s. 1 Atomic Energy Act. The site with the best possible safety is defined as being the one – based on the total number of sites determined in each phase according to the authoritative requirements – that is identified in the course of the iterative and comparative procedure described in this act and which ensures the best possible safety for the permanent protection of humanity and the environment from ionising radiation and other harmful effects of this highly radioactive waste for a period of one million years. Included herein is the avoidance of unreasonable burdens and obligations for future generations. In order to achieve this objective, no agreement will be concluded between the Federal Republic of Germany and the other states with which the provisions of Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (ABl. L 199 of 2/8/2011, p. 48) permitted a transport of radioactive waste, including spent fuel elements, for the purpose of final disposal outside of Germany.

(3) In Germany, the host rocks of rock salt, claystone and crystalline rock can, in principle, be taken into consideration for the final disposal of highly radioactive waste.

(4) Final disposal at the site to be selected will take place in deep geological formations, namely in a repository mine that is constructed for this purpose with the aim of permanent containment. The option to enable retrievability for the duration of the operation phase of the repository and the possibility of recovery for 500 years after the planned closure of the repository must be included.

(5) The site selection procedure is reversible, pursuant to sections 12 et seq. StandAG. The StandAG earmarks 2031 as a date for defining a site.

(6) Final disposal of low- and intermediate-level radioactive waste at the selected site is permissible if the site fulfils the same “best possible safety standards” as it does for the disposal of high-level waste alone.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 47 f.) states:

Regarding Section 1 (Purpose of the Act)

Regarding paragraph 1

The act regulates the site selection procedure.

Regarding paragraph 2

The site selection procedure aims to locate a site to accommodate a facility for the final disposal of high-level radioactive waste. The selection procedure must take into account the possibility for the additional storage of low and medium-level radioactive waste. The stored waste, especially highly radioactive waste, includes irradiated fuel elements and waste from reprocessing that is melted into glass. Low- and intermediate-level radioactive waste that may be emplaced additionally refers to radioactive waste retrieved from the Asse II mine, radioactive waste that does not fulfil the acceptance criteria for the Konrad repository, and, as a precautionary measure, depleted uranium from uranium enrichment, if it is not designated for any further use. The consequences of the final disposal of this additional radioactive waste must be investigated within the framework of a preliminary safety assessment.

The site selection procedure must have a self-questioning and learning design. Crucial elements within a successful overall process that possesses a learning structure and that ultimately leads to final disposal with the best possible safety include the demands placed in all persons and institutions involved in the site selection process to question themselves and each other throughout the entire disposal process and to practice self-critical analysis of the achieved status both systematically and continuously.

In this regard, it is essential to assure self-critical structures that are used attentively and meticulously in every phase. The aim is to prevent negative trends, to recognise unexpected developments as early as possible, to engage in frank communication about these aspects, to initiate processes for dealing with them and to recognise and nip in the bud any signs of becoming stuck in a rut, either from an institutional or human resources perspective. The challenge can only be overcome by installing measures and precautions at different levels that allow for mutual corrections and criticism – and the overall process must therefore be designed as a self-questioning system.

The newly introduced definition of the site with the best possible safety implements a recommendation of the Repository Commission and contains the clarification that the site with the best possible safety is defined as being the one – based on the total number of sites determined in each phase according to the corresponding requirements – that is identified in the course of the iterative and comparative procedure and which ensures the best possible safety for the permanent protection of humans and the environment from ionising radiation and other harmful effects of this waste for a period of one million years. A site selection procedure that aims to determine the site with the best possible safety must have a comparative structure; the steps in the process and decision-making criteria must be designed in such a way that it arrives at the site with the best possible safety in a transparent and comprehensible way. In this regard, short-, medium- and long-term safety have priority over all other aspects. The overarching objective of the site selection procedure is to identify the best possible site from a safety perspective. In addition, the existing regulation for disposal within Germany will be maintained.

Regarding paragraph 3

Paragraph 3 names the host rocks that are eligible in principle for final disposal in Germany.

Regarding paragraph 4

After extensive deliberations on a large number of options for the management of high-level radioactive waste in particular, the Repository Commission has decided to recommend disposal in a repository mine in a deep geological formation. It will probably be possible to realise a mine of this kind at depths of between 300 and 1,500 metres, taking into account the local geological situation, the emplacement concept, the feasibility of mining engineering and, if necessary, additional precautions that are necessary to assure occupational health and safety and radiation protection. In accordance with this recommendation, final disposal in deep geological formations is defined as the, in principle, mandatory disposal option.

The demand to enable retrievability for the duration of the operation phase of the repository and the possibility of recovering the radioactive waste for 500 years is based on the recommendation of the Repository Commission to guarantee reversible final disposal in such a way as to accommodate any possible error corrections. As a precaution for recovery that may be required at a later stage, it is necessary in particular to plan for the availability of sufficient space for the excavation of a recovery mine and for the handling of waste containers based on a probable development of the repository until that time. Except where this would be detrimental to technical safety, the repository must be designed in such a way that downstream recovery is not made more difficult.

Regarding paragraph 5

The site selection procedure is reversible, pursuant to sections 12 et seq. StandAG. Reversibility, defined as the ability to switch directions during the ongoing procedure, is necessary to enable the correction of errors and hence to keep options open for future generations to take action, for example on the basis of fresh findings. This can contribute to building trust during the process.

The currently envisaged target schedule for the site selection procedure will be clarified. Sentence 2 states that a date for defining a site is earmarked for 2031.

Section 12 StandAG states in regard to exploration and the relationship with regional planning:

Section 12 Exploration; relationship to regional planning

(1) Sections 3 to 29, 39, 40, 48 and 50 to 104, 106 and 145 to 148 of the Federal Mining Act shall apply accordingly to exploration. The provisions of the Federal Mining Act shall otherwise remain unaffected. The principle that surface and subsurface exploration are carried out for overriding interests of the public good. Sections 9d to 9f and Section 9g (3 to 5) of the Atomic Energy Act apply to exploration pursuant to this Act and the respective site selection decisions.

(2) Decisions in the site selection procedure, including the approvals and authorisations under paragraph 1, shall take precedence over federal planning and urban land-use planning.

(3) The Waste Management Organisation shall, in the pursuit of its activities, cooperate with research and consulting institutions that operate within the portfolio of the Federal Ministry of Education and Research and the Federal Ministry for Economic Affairs and Energy, and may draw on scientific findings from other scientific institutions. Where it is necessary for the completion of exploration and the site comparison process to use necessary geo data, especially geoscientific and hydro-geological data, that is in the possession of the state authorities, this data shall be made available to the Waste Management Organisation by the state authorities without charge for the purposes of the site selection procedure; this also applies to data that is subject to third-party rights. The data that shall be made available also includes information on the projects approved under Section 21.

(4) This does not affect the functions of the federal states as official experts and public agencies.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398 p. 57 f.) states:

Regarding Section 12 (Exploration; relationship to regional planning)

The current provision in Section 12 para. 1 is deleted, as the content is redefined by the provisions in sections 13 et seq. StandAG. In addition, the current provision of Section 12 StandAG has been adopted and a clarifying provision has been included to the effect that the data provided by the federal state authorities shall also include information on the approval of projects under Section 21 para. 2. The provision in paragraph 3 does not create any obligation for the federal state authorities to collect or procure geo data required for exploration and site comparison by means of additional field work or other measures.

Paragraph 3 sentence 1 clarifies, as in the previous version of the StandAG, that in regard to the site selection procedure, the Waste Management Organisation is able to access all current data and scientific insight in the possession of federal authorities. In particular, the Waste Management Organisation can draw on all the expertise at the Federal Institute for Geosciences and Natural Resources.

The provision ensures that the data held by the federal state authorities is available to the Waste Management Organisation during the site selection procedure and is transmitted to the Waste Management Organisation for the purposes of the site selection procedure. Other provisions, in particular concerning publication of the data, shall remain the preserve of the amended Mineral Deposit Act.

Section 13 StandAG states in regard to the identification of sub-areas:

Section 13 Identification of sub-areas

(1) The Waste Management Organisation is tasked, through application of the geoscientific requirements and criteria specified in sections 22 to 24, with identifying sub-areas where favourable geological conditions for the safe final disposal of radioactive waste can be expected.

(2) To this end, the Waste Management Organisation shall proceed as follows: it shall first apply the geoscientific exclusion criteria in accordance with section 22 to the geological data that is made available by the competent federal and state authorities for the whole of Germany and shall then apply the minimum requirements in accordance with section 23 to the remaining area. The Waste Management Organisation applies to the identified areas the geoscientific weighing criteria pursuant to Section 24 in order to determine the sub-areas that prove favourable as a result of the weighing procedure. The Waste Management Organisation publishes the findings in an interim report and sends this report without delay to the Federal Office for the Safety of Nuclear Waste Management. The interim report shall present all facts and considerations that were relevant to the selection; where areas exist that cannot be classified due to insufficient geological data, these shall also be listed and a recommendation on how they should be dealt with shall be included. Section 23 para. 2 remains unaffected.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 58) states:

Regarding Section 13 (Identification of sub-areas)

Section 13 sets out how the Waste Management Organisation identifies the sub-areas, based on the recommendations put forward by the Repository Commission. Application of the statutory requirements and criteria, and in particular the performance of preliminary safety evaluations, are predicated upon the development of repository systems for different geological formations and configurations by the Waste Management Organisation. The development of the repository systems will be specified for the individual sites during the ongoing selection process as the level of knowledge increases. Generic repository concepts, based on the various host rock configurations, are adequate for the identification of the sub-areas.

Regarding paragraph 1

Paragraph 1 defines in general terms that in the first phase of the site selection procedure, the Waste Management Organisation is tasked, through application of the statutory geoscientific requirements and criteria, with identifying sub-areas where favourable geological conditions for the safe final disposal of radioactive waste can be expected.

Regarding paragraph 2

Paragraph 2 defines the procedure for identification of the sub-areas in more detail.

Firstly, the Waste Management Organisation must compile the geological data for the whole entire federal territory of Germany that may be relevant to the site selection procedure and that was obtained from the competent federal and state authorities and prepare this data in a suitable form. The statutory geoscientific exclusion criteria are applied to this data. The geoscientific exclusion criteria are used to identify all areas that are categorically unsuitable to accommodate a repository due to the circumstances defined in the criteria. The Waste Management Organisation shall apply the minimum geoscientific requirements defined by law to the remaining area and shall identify eligible areas. The statutory geoscientific weighing criteria are then applied in a further step. After that, the areas that are identified as particularly favourable based on the weighing process must be designated as sub-areas.

For this purpose, the Waste Management Organisation will prepare an interim report for submission to the Federal Office for the Safety of Nuclear Waste Management. The interim report shall identify not only the sub-areas with favourable geological conditions and the facts and considerations on which the decision is based, but also, where appropriate, areas which cannot be classified due to inadequate geological data. The Waste Management Organisation shall submit a recommendation on how to deal with these areas, and the National Advisory Committee shall adopt a position in regard to this recommendation.

Section 22 StandAG states in regard to the exclusion criteria:

Section 22 Exclusion criteria

(1) An area is not suitable as a repository site if at least one of the exclusion criteria in paragraph 2 is satisfied in that area.

(2) The exclusion criteria are:

1. large-scale vertical movements

   average large-scale geogenic uplift of more than 1 mm per year should be expected over the period of proof of one million years;
2. active fault zones

   geologically active fault zones that may affect the repository system and its barriers are present in the rock areas that are considered as repository zones, including an adequate buffer zone;
   The term "active fault zone" refers to fractures in the rock strata of the upper earth's crust, such as faults with significant rock displacement, as well as extensive disruption zones of tectonic origins where movements have demonstrably or in all probability occurred in the period from the Rupelian stage to the present day, so within the last 34 million years. Atectonic or aseismic processes, that is, processes that cannot be derived from tectonic processes or are not due to seismic activities and which may produce similar consequences for the safety of a repository as tectonic disturbances, must be treated as active fault zones.
3. influences from current or past mining activities

   the rock mass has been damaged by current or previous mining activities in such a way that negative impacts on the stress state and permeability of the rock mass in the area of a designated effective containment zone or designated repository zone should be expected; it must be demonstrable that existing historical boreholes do not impair the containment function of the barriers of a repository that ensure safe confinement;
4. seismic activity

   the local seismic hazard is greater than in seismic zone 1 according to DIN EN 1998-1/NA 2011-01;
5. volcanic activity

   Quaternary volcanism is present or volcanic activity is expected in the future;
6. groundwater age

   young groundwater has been identified in the rock mass that may be considered as an effective containment zone or storage area.

(3) The consequences of measures for the exploration of potential repository sites shall not be taken into account when applying the criterion under paragraph 2

number 3. The preliminary safety assessments must demonstrate that proof of safe containment can be assured despite these consequences. Exploration measures shall be planned and carried out in such a way that the effective containment zone is only excavated to the extent that is unavoidable to obtain the necessary information and that its integrity is not endangered.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 67 ff.) states:

Regarding Section 22 (Exclusion criteria)

Section 22 defines the exclusion criteria that shall be applied pursuant to Sections 13 to 20 during site selection. Site selection begins on a “white map” without any bias; this means that all areas in Germany must be evaluated in the same way to determine their suitability as repository sites when the exclusion criteria are applied for the first time.

Regarding paragraph 1

The exclusion criteria are used to exclude those areas from the procedure in which, irrespective of the proof concept, it is reasonable to assume that the containment of the repository may be damaged substantially during the period of proof of one million years. It cannot be expected that proof of safety as a repository site can be successfully completed for these areas.

Regarding paragraph 2

Section 22 para. 2 lists the exclusion criteria individually.

Regarding paragraph 2 number 1 (Large-scale vertical movements)

This criterion excludes areas where large-scale uplift is expected during the period of proof. The evaluation basis for this criterion is the expected rate of uplift, i.e. the expected uplift of the Earth’s surface each year according to current forecasts, which in turn shall be averaged for the period of proof. If this uplift rate is more than 1 mm per year on average, an uplift of more than 1,000 m would be expected over the period of proof. It is not possible to forecast the overall geological situation with the necessary certainty for areas that are exposed to such considerable uplift. It cannot be excluded that increased erosion will occur on the surface of the terrain, which may impair the necessary protective effect of the overlying layers above the repository or completely remove these layers.

Regarding paragraph 2 number 2 (Active fault zones)

The criterion excludes areas with geologically active fault zones that may impair the safety of a repository.

The necessary buffer zone around these fault zones must be estimated on a case-by-case basis. As a rule, it is at least one kilometre.

Regarding paragraph 2 number 3 (Influences from current or past mining activities)

This criterion is used to implement the recommendations put forward by the Repository Commission. The criterion excludes areas where mining activities are currently taking place or have taken place in the past, if there are reasons for concern that these activities may have a negative impact on the stress state or permeability of the rock in the effective containment zone or the planned repository zone. In compliance with the concept of precautionary protection, these areas shall also be disregarded, even if the relevant influences are well documented and a demonstration of safety, taking into account the negative influences, appears possible in principle.

The repository must not be excavated in a mine that was constructed for the extraction of mineral resources. It must instead, on all accounts, be excavated in a newly excavated mine. The exploration measures under mining law to be carried out within the framework of the site selection procedure would otherwise prevent the construction of a repository at any potential site.

Rock areas where drilling has already been carried out may only be included as part of a geological barrier for the repository if it can be demonstrated that the containment function has not been impaired. This applies in particular to the effective containment zone.

The consequences of exploration measures for the investigation of potential repository sites – which also includes the excavation, operation and keeping open of exploration mines – are exempted from the criterion, as they must be performed at each repository site to ensure its suitability. The impact of these exploration measures can be accounted for in documentation of their planning and implementation within the framework of repository design and the safety demonstration.

Regarding paragraph 2 number 4 (Seismic activity)

The criterion excludes areas where seismic activities are to be expected that may affect the safety of a repository. As proposed by the Commission on the Storage of High-level Radioactive Waste, the evaluation is based on the standard DIN EN 1998-1/NA:2011-01. This is formulated in more detail by the specifications contained in the corresponding National Annex.

Adherence to this criterion does not permit any conclusion to be drawn regarding the eligibility to obtain approval of a repository outside this area with a view to the aspect of seismic hazards. Site-specific calculations based on the nuclear rules and regulations are required for this purpose. The criterion serves only as a rough estimate of the areas where the seismic hazard is so considerable that the construction of a repository in these areas should be ruled out entirely.

Regarding paragraph 2 number 5 (Volcanic activity)

This criterion excludes areas with geological conditions that give grounds for concern in regard to the occurrence of volcanism and consequent impairments of the repository during the period of proof. A buffer zone of 10 km around these areas should be maintained in order to give adequate consideration to the hazard potential of volcanic activities.

Regarding paragraph 2 number 6 (Groundwater age)

The criterion excludes areas where it has been demonstrated that deep groundwater in the geological areas designated as the effective containment zone or storage areas are participating in the current hydrological cycle. The concentration of the isotopes tritium and carbon-14 in the groundwater of the effective containment zone can be used as an assessment basis. The groundwater age, which is calculated based on the concentration of tritium and carbon-14, must be validated and investigated if necessary by means of additional geochemical or isotope-hydrogeological indicators.

Section 23 StandAG states in regard to the minimum requirements:

Section 23 Minimum requirements

(1) The host rocks of rock salt, claystone and crystalline rock can be taken into consideration for the final disposal of highly radioactive waste. For crystalline host rock, an alternative concept to an effective containment zone that places significantly higher demands in the long-term integrity of the container is possible under the conditions of safe containment stipulated under para. 4.

(2) Areas that do not satisfy an exclusion criterion according to Section 22 are only suitable as a repository site if all minimum requirements in paragraph 5 are fulfilled.

(3) Insofar as the necessary data for applying the minimum requirements does not become available until a later phase of the site selection procedure, the respective minimum requirements shall be deemed fulfilled to the extent that this can be expected on the basis of the currently available data. The evidence that the specific site has satisfied all minimum requirements must be provided at the latest in the reasoning for the proposal according to Section 18 para. 3.

(4) Section 23 para. 4 StandAG states that where it is foreseeable that an effective containment zone cannot be designated in an area, but that is suitable for a repository system that is based essentially on technical and geotechnical barriers, evidence must be provided instead of the minimum requirement under paragraph 5 number 1 that the technical and geotechnical barriers can ensure the safe containment of radionuclides for one million years. The evidence must be provided at the latest in the reasoning for the proposal according to Section 18

para. 3. In this case, the minimum requirements set out in numbers 2 to 5 of paragraph 5 shall apply mutatis mutandis to the storage area." Paragraph 3 applies accordingly.

(5) The minimum requirements are:

1. Hydraulic conductivity of the rock

   the hydraulic conductivity of the rock k_f in an effective containment zone must be less than 10^{-10} m/s; insofar as direct evidence cannot yet be provided in the reasoning of the proposals in accordance with sections 14 and 16, it is necessary to demonstrate that the effective containment zone consists of rock types to which a hydraulic conductivity of less than 10^{-10} m/s can be assigned; satisfaction of the criteria can also be demonstrated based on the layers overlying the storage area;

2. Thickness of the effective containment zone

   the rock formation that will accommodate the effective containment zone must possess a thickness of at least 100 metres; in the case of host rock bodies containing crystalline material of lesser thickness, proof of safe containment for the affected rock section may also be provided by the interaction between the host rock and geotechnical and technical barriers in the presence of low hydraulic conductivity; a subdivision into several such rock sections within one repository system is permissible;

3. minimum depth of the effective containment zone

   the surface of an effective containment zone must be at least 300 metres below ground surface. In areas where exogenous processes, in particular intense glacial erosion, must be expected during the period of proof having direct or indirect effects that may impair the integrity of an effective containment area, the surface of an effective containment zone must be deeper than the greatest expected depth of such effects; if an effective containment zone is to be designated in rock salt in steep formations, the Salzschwebe above the effective containment zone must be at least 300 metres thick; to eliminate the possibility that the integrity of the effective containment zone may be compromised by decompaction if an effective containment zone is to be designated in clay rock, the overburden must be expected to be sufficiently thick even after the aforementioned exogenous processes have occurred.

4. Surface of the repository

   an effective containment zone must have a surface expansion that enables construction of the repository; included in the surface area required for the repository are areas that are necessary and must be kept available for the implementation of measures for the retrieval of waste containers or for the subsequent excavation of a salvage mine;

5. Preservation of the barrier effect

   there must be no available findings or data that cast doubt on the integrity of the effective containment zone, in particular on compliance with the geoscientific minimum requirements for hydraulic conductivity of the rock, thickness and expanse of the effective containment zone over a period of one million years.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 69 ff.) states:

Regarding Section 23 (Minimum requirements)

Section 23 defines the minimum requirements that, pursuant to sections 13 to 20, must be applied during site selection to those areas that do not meet any of the exclusion criteria under section 22.

Regarding paragraph 1

In repository concepts that are based on the designation of an effective containment zone – salt, clay rock, special crystalline configurations – the effective containment zone should completely fulfil the function of safe containment. The safety of the repository must not be based on the long-term functioning of the container, i.e. during the period of proof. In contrast, the interaction of technical and geotechnical barriers is required for safe containment and must be demonstrated for the period of proof in repository concepts that are based on crystalline rock without an effective containment zone. It follows, therefore, that significantly higher requirements are placed on the long-term integrity of the container in crystalline concepts. Proof of long-term safety must be provided in all cases.

Regarding paragraph 2

The minimum requirements are used to identify those areas with prevailing geological conditions that permit the assumption that safe containment is possible in principle for the duration of the period of proof.

Regarding paragraph 3

The provision under § 23(2) takes into account the gradual application of the minimum requirements as the data situation improves. It prevents the premature elimination from the procedure of areas for which geological data is only available to an extent that is inadequate for a final evaluation of compliance with the minimum requirements, in particular when the proposal is submitted pursuant to Section 14 para. 2. Insofar as the available data for an area indicates that a minimum requirement is likely to be met, the minimum requirement shall be deemed to be satisfied until sufficient data for a final evaluation is available. Data that is required to evaluate compliance with the minimum requirements will be collected in the course of the exploration pursuant to Sections 16 and 18, so that the final evaluation must be submitted at the latest with the proposal pursuant to Section 18 para. 3.

Regarding paragraph 4

The provision under Section 23 para. 3 ensures that suitable areas for the establishment of a repository system that is essentially based on technical and geotechnical barriers can be included in the selection process. In accordance with the recommendations of the Repository Commission, a repository system of this kind should be planned for sites at which a repository system based essentially on geological barriers, i.e. the effective containment zone, is feasible.

Direct application of the minimum requirements would not be expedient for sites at which it is not possible to construct a repository system with an effective containment zone, but where a repository system based essentially on technical and geotechnical barriers is possible, as these minimum requirements, assuming the narrowest possible implementation of the recommendations put forward by the Repository Commission, often contain requirements for the effective containment zone. In these cases, the minimum requirements must be applied accordingly to the storage area.

The minimum requirement concerning the hydraulic conductivity of the rock has a special status. This requirement assesses a property that is directly related to the containment capacity of an effective containment zone. Since the confinement of a repository system that is essentially based on technical and geotechnical barriers is assured by these same barriers, the minimum requirement for hydraulic conductivity of the rock must be replaced with proof of confinement by the geotechnical and technical barriers in these repository systems. The provisions set out in paragraph 3 also apply to this proof if the data situation is inadequate. However, proof must be presented no later than together with the proposal according to Section 18 para. 3.

When applying the minimum requirements under paragraph 5, points 2 to 5, to the storage area, the integrity of the effective containment zone shall be replaced by the integrity of the storage area. Its principal purpose that must be assessed in this context is the ability to guarantee functionality and preservation of the technical and geotechnical barriers. In this regard, the minimum requirement pursuant to paragraph 5 number 2 contains an independent, special arrangement for crystalline host rock.

Regarding paragraph 5

Section 23 para. 4 lists the minimum requirements individually.

Regarding paragraph 5 number 1 (Hydraulic conductivity of the rock)

This minimum requirement ensures that the geological formations that are taken into consideration for a final disposal site exhibit a low degree of hydraulic conductivity of the rock that would permit the construction of an effective containment zone. Paragraph 3 contains a provision that deviates from this minimum requirement and which applies to repository systems that rely essentially on technical and geotechnical barriers.

The hydraulic conductivity of the rock is the evaluation basis for satisfaction of this minimum requirement. Its purpose is to assure that advective material transport caused by flowing fluids that may impair the safety does not occur in the effective containment zone. This must be demonstrated no later than during subsurface exploration pursuant to Section 18. However, it is not reasonable to assume that sufficient deep geological exploration data will be available for all sites under consideration in order to demonstrate compliance with this minimum requirement at the time of submitting the proposals under sections 14 and 16. It is therefore sufficient in these procedural steps to prove that the effective containment zone consists of rock types, and that available data on these rock types permits the assumption that they exhibit an adequately low hydraulic conductivity.

Regarding paragraph 5 number 2 (Thickness of the effective containment zone)

This minimum requirement ensures that the geological formations that are taken into consideration exhibit sufficient thickness for a final disposal site. The evaluation basis in this regard is the vertical expansion of the relevant formations. This minimum requirement implements the corresponding recommendation of the Repository Commission, which contains a relevant special provision for crystalline host rock. Where it is necessary due to the geological situation in the planned repository zone, it is also possible to designate several effective containment zones or storage areas.

Regarding paragraph 5 number 3 (Minimum depth of the effective containment zone)

This minimum requirement defines the minimum depth of the designated effective containment zone. The evaluation basis is the depth of the surface of the effective containment zone measured from ground surface, whereby exogenous processes that should be expected in the region in future (intense glacial erosion in particular) must be given adequate consideration and in relation to the intended host rock. This is to prevent impairment of the effective containment zone’s integrity due to the direct and indirect consequences of these processes.

Regarding paragraph 5 number 4 (Area of the repository)

This minimum requirement ensures that the explored areas have sufficient space for the construction of a repository. The evaluation basis is the surface expanse of the corresponding geological formation. The space required to accommodate all waste to be emplaced depends on the site-specific properties of the host rock and cannot be estimated in detail before the exploration measures have begun. As a precautionary measure, a surface area of 3 km² should be assumed for salt host rock, 10 km² for the clay rock host rock and 6 km² for crystalline host rock.

Regarding paragraph 5 number 5 (Preservation of the barrier effect)

This minimum requirement ensures that there are no other findings concerning the areas designated for further investigation that would cast doubt on the ability of these areas to safely contain the radioactive waste throughout the period of proof. The evaluation basis is in particular the satisfaction of the minimum requirements throughout the entire period of proof. Furthermore, findings on other processes that may be essential for the safety of a repository can also be used.

Section 24 StandAG states in regard to the geoscientific weighing criteria:

Section 24 Geoscientific weighing criteria

(1) Each of the geoscientific weighing criteria is used to evaluate whether an area exhibits a favourable overall geological situation. The favourable overall geological situation is determined after a process of weighing up the results with reference to all weighing criteria. The criteria set out in paragraphs 3 to 5 are used as an evaluation basis.

(2) In the case of Section 23 para. 4, the weighing criterion according to Annex 2 is replaced with a calculated retention capacity that the technical and geotechnical barriers are likely to achieve. Insight into the manufacturing quality of the technical and geotechnical barriers, as well as on their ageing under repository conditions at the respective site, must be taken into account. Insofar as the weighing criteria according to Annexes 1 and 3 to 11 refer to the effective containment zone, they shall be applied accordingly to the storage area.

(3) The achievable quality of the containment and the expected robustness of the proof are evaluated based on the criteria for transport through groundwater, rock body configuration, spatial characterisation and predictability. These criteria are defined in Annexes 1 to 4.

(4) Assurance of insulation capacity is evaluated using the criteria of geomechanical conditions and low tendency to form fluid pathways. These criteria are defined in Annexes 5 and 6.

(5) Additional properties that are relevant to safety are evaluated on the basis of the criteria on gas formation, temperature compatibility, radionuclide retention capacity of the rocks in the effective containment zone, hydrochemical circumstances and the overburden. These criteria are defined in Annexes 7 to 11.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 71 f.) states:

Section 24 (Geoscientific weighing criteria)

Section 24 defines the geoscientific weighing criteria that, pursuant to Sections 13 to 20, must be applied during site selection to those areas that do not meet any of the exclusion criteria under Section 22 and satisfy all minimum requirements according to Section 23.

Regarding paragraph 1

The purpose of defining geoscientific weighing criteria is to enable a comparative evaluation of the remaining areas following application of the exclusion criteria and minimum requirements with regard to their suitability as repository sites. In this regard, no single weighing criterion is sufficient to prove or exclude a favourable overall geological situation. As recommended by the Repository Commission, this should involve weighing up through a process of verbal argumentation to identify the areas that exhibit a favourable overall geological situation for the safety of the repository site. In each step of the process, all requirements and their associated weighing criteria must be assessed and checked for the areas under consideration, based on the level of information in each case. Combined effects may also be relevant to the process of weighing up. It is deliberate that there are no plans to carry out an arithmetical evaluation concerning overall fulfilment of the weighing criteria. When weighing up the evaluation of the overall geological situation, the significance of the respective weighing criteria for a specific site and the repository system that is planned at that location must be assessed.

Regarding paragraph 2

In the case of Section 23 para. 3, a special provision is required with regard to the weighing criterion for the containment capacity of the rock in the storage area, as this criterion aims exclusively at containment by means of geological barriers and hence cannot be meaningfully applied to a repository system in which safe containment must be ensured by technical and geotechnical barriers. A calculation must be made in this case to derive the achievable containment capacity of the technical and geotechnical barriers, whereby the expected ageing of the components at the specific site must be taken into account, as they depend on the geochemical circumstances at the site and other factors. When applying the weighing criteria under paragraph 1, points 3 to 11, to the storage area, the integrity of the effective containment zone shall be replaced in each case by the integrity of the storage area. Its principal purpose that must be assessed in this context is the ability to guarantee functionality and preservation of the technical and geotechnical barriers.

Regarding paragraph 3

The first group of criteria, namely quality of containment and reliability of proof, includes the weighing criteria with which the quality of containment for radioactive materials at the site of their final disposal and the robustness of records of discharged hazardous waste for the demonstration of long-term safety are evaluated in comparison with other areas. Both of them are key aspects in regard to final disposal, as they indicate the likelihood that long-term, safe containment of radioactive materials is possible at the potential storage site and that this can foreseeably be demonstrated with sufficient certainty for the period of proof within the framework of a validation procedure. Here, robustness means the reliability and quality and hence resilience of the repository system and its barriers in regard to internal and external influences and disturbances, as well as the resilience of the results from the safety assessments in regard to deviations from the underlying assumptions.

Regarding paragraph 4

A second group of criteria, namely securing the containment capacity, contains weighing criteria to evaluate how well the rock preserves its containment capacity when exposed to stresses that arise during construction and operation of the repository’s underground cavities.

Regarding paragraph 5

A third group of criteria, namely additional safety-relevant characteristics, contains weighing criteria to evaluate the robustness of the repository system. Favourable characteristics in this criteria group strengthen and increase the safety of the overall system beyond the containment capacity evaluated in criteria groups 1 and 2.

Annex 1 (to Section 24 para. 3) StandAG states:

Annex 1 (to Sec. 24 para. 3)

Criterion for evaluating the transport of radioactive substances by groundwater movements in the effective containment zone

(Retrieved: BGBI I 2017, 1088)

The transport of radioactive substances by groundwater movements and diffusion in the effective containment zone should be kept as low as possible. The properties that are relevant to evaluation under this criterion are the groundwater flow in the effective containment zone, the groundwater supply and the diffusion rate according to the table below. The respective host rock can be used as the indicator until the corresponding, actual indicators are collected at the specific sites.

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	less favourable
Groundwater flow	Distance velocity of the ground water [mm/a]	< 0.1	0.1 – 1	> 1
Groundwater supply	Characteristic hydraulic conductivity of the rock type [m/s]	$< 10^{-12}$	$10^{-12} – 10^{-10}$	$> 10^{-10*}$
Diffusion rate	Characteristic effective diffusion coefficient of the rock type for tritiated water (HTO) at 25°C [m^2/s]	$< 10^{-11}$	$10^{-11} – 10^{-10}$	$> 10^{-10}$
Diffusion rate for clay rock	Absolute porosity	< 20%	20 % – 40 %	< 40 %
	Degree of consolidation	Clay rock	Solid clay	Semi-solid clay

* In regard to repository systems that are essentially based on geological barriers, sites with a hydraulic conductivity of the rock greater than 10^{-10} m/s shall be excluded from the procedure and rated not suitable in accordance with Section 23 para. 4 no. 1.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 69 ff.) states:

Regarding Annex 1

The weighing criterion according to Annex 1 covers hydrogeological conditions that are favourable to the safe final disposal of radioactive waste. These conditions are described as favourable if both the groundwater supply in the area of the repository, the groundwater movement in the effective containment zone and the diffusion rate are low. The corresponding table defines the evaluation framework for the characteristics of “groundwater flow”, “groundwater supply” and “diffusion rate”.

Annex 2 (to Section 24 para. 3) StandAG states:

Annex 2 (to Sec. 24 para. 3)

Criterion for evaluation of the rock formation configuration

(Retrieved: BGBl I 2017, 1089)

The rocks in an effective containment zone that possess a barrier effect must have a minimum thickness that ensures the safe confinement of radionuclides over a period of one million years. The expected containment capacity should be as high and reliably predictable as possible. It shall be derived by means of model calculations, taking into account the barrier effect of the intact barrier, as soon as the geoscientific data required for this is available, at the latest in the site proposal pursuant to Section 18 para 3. As long as the data required for the arithmetical derivation is not yet available, the location, extent and thickness of the barrier-effective rock formation, the degree to which it is enclosed by an effective containment zone and, for the clay host rock, its insulation from water-conducting layers and sources of hydraulic head can be used as indicators according to the table below.

Evaluation-relevant characteristic of the criterion	**Evaluation factor i.e. criterion indicator**	**Rating group**		
		favourable	**conditionally favourable**	**less favourable**
Barrier effectiveness	Barrier thickness [m]	> 150	100 – 150	50 – 100
	Degree of enclosure of the storage area by an effective containment zone	complete	incomplete, smaller gaps in uncritical position	incomplete, larger gaps in critical position
Robustness and safety reserves	Depth of the upper boundary of the required effective containment zone [m below ground surface]	> 500	300 – 500	

Evaluation-relevant characteristic of the criterion	**Evaluation factor i.e. criterion indicator**	**Rating group**		
		favourable	**conditionally favourable**	**less favourable**
Volume of the effective containment zone	surface extent for the given thickness (multiple of the minimum surface requirement)	>> 2-times	around 2-times	<< 2-times
Indicator "head source" for clay rock connection between water conducting layers in the immediate proximity to the effective containment zone/ host rock body and an area causing substantial hydraulic head	Presence of rock strata layers with hydraulic properties and hydraulic head that can induce or amplify groundwater movement in the effective containment zone.	No aquifers as possible head sources available in the immediate vicinity of the host rock/effective containment zone		Aquifer present in the vicinity of the host rock/effective containment zone

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 74) states:

Regarding Annex 2

With regard to the geological barrier effect, the weighing criterion according to Appendix 2 primarily records the extent and function of the rock body determining a favourable overall geological situation or – if there are several rock bodies – the geometric arrangement of the rock bodies involved characterised in terms of extent and function. If possible, they should fully enclose the emplaced radioactive waste. Additional factors include the depth of the effective containment zone within the geosphere, as well as the possible impairment of its barrier effect due to proximity to rock bodies showing elevated hydraulic head. Model calculations for the specific site are used to evaluate the geological formation's containment capacity based on these circumstances. It must be ensured in this context that the product of these model calculations permit proper comparison of the different areas under consideration, i.e. that the methodology used is identical to the greatest possible extent. Given that the extent, arrangement and depth position of rock bodies are generally easier to determine than certain rock characteristics or the hydraulic and hydrochemical circumstances of the site, the configuration of rock bodies in the geological barrier that are relevant to safety is of particular significance as an early identifiable feature of a favourable overall geological situation, especially at the beginning of the selection procedure. This weighing criterion is replaced accordingly where Section 23 para. 3 applies. The corresponding table defines the evaluation framework for the characteristics of “barrier effectiveness”, “robustness and safety reserves”, “volume of the effective containment zone” and “head sources for clay rock”.

Annex 3 (to Section 24 para. 3) StandAG states:

Annex 3 (to Sec. 24 para. 3)

Criterion for evaluation of the spatial characterisability

(Retrieved: BGBl I 2017, 1090)

Spatial characterisation of the main geological barriers which directly or indirectly ensure safe confinement of the radioactive waste, in particular the planned effective containment zone or the storage area, should be as reliable as possible. Properties that are relevant to the evaluation in this regard are the determinability of the relevant rock types and their characteristics, as well as the transferability of these characteristics according to the table below.

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	unfavourable
Determinability of the rock types and their characteristic properties in the planned repository zone, especially in the intended effective containment zone	Variability range of the rock type characteristics in the repository zone	low	significant but known or reliably determinable	considerable and/or not reliably determinable
	Spatial distribution of the rock types in the repository zone and their characteristics	even	continuous, known spatial changes	discontinuous, insufficiently predictable spatial changes
	Extent of the tectonic overprint of the geological unit	largely undisturbed (disturbances at a distance of > 3 km from	little disturbance (widely spaced disturbances at a distance of 100 m to 3 km from	disturbed (narrow blocks at a distance of < 100 m), folded

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	unfavourable
		the boundary of the effective containment zone), flat deposit	the boundary of the effective containment zone), flexures	
Transferability of the characteristics in the planned effective containment zone	Rock formation (rock facies)	Uniform regional facies	Facies alternate according to a known pattern	Facies alternate according to an unknown pattern

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 74) states:

Regarding Annex 3

The weighing criterion according to Annex 3 records the reliable spatial characterisability of the essential geological barriers which directly or indirectly ensure safe confinement of the radioactive waste, in particular the planned effective containment zone. A good spatial characterisation is a basic condition for sound decisions in the selection procedure and for reliable downstream safety assessments. The evaluation basis is the geological structure of the rocks in the planned repository zone. Overprinting should be as low as possible in tectonically overprinted geological units. The extent of overprinting is derived from the deposit conditions with consideration of fracture and fold tectonics. Salt structures should, as far as possible, only show large-scale folding of layers that have different mechanical and hydraulic properties. The associated table defines the evaluation framework for the properties “determinability of the rock types and their characteristic properties” and “transferability of the properties in the intended repository zone”.

Annex 4 (to Section 24 para. 3) StandAG states:

Annex 4 (to Sec. 24 para. 3)

Criterion for evaluation of the long-term stability of the favourable conditions

(Retrieved: BGBl I 2017, 1091)

The safety-related geological features that are important for the long-term stability of the favourable conditions should not have changed significantly for as long a period as possible. Indicators for this include, in particular, the time periods over which the observation characteristics “thickness”, areal or spatial “extent” and “hydraulic conductivity of the rock" in the effective containment zone have not changed significantly. They must be evaluated as follows:

1. as favourable if there has been no material change in the relevant property for more than ten million years,
2. as conditionally favourable if no such change has occurred over the last one million, but fewer than ten million years, and
3. as unfavourable if a change of this kind has occurred over the last one million years.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 75) states:

Regarding Annex 4

The weighing criterion according to Annex 4 records the reliable predictability of geological circumstances over time. The reliable identification and evaluation of safety-relevant long-term changes is an essential requirement for demonstrating the long-term stability of the favourable geological conditions. It refers in particular to the repository zone. The evaluation basis is the stability of geological circumstances over the longest possible time in the past.

Annex 5 (to Section 24 para. 4) StandAG states:

Annex 5 (to Sec. 24 para. 4)

Criterion for evaluation of the long-term stability of the favourable geomechanical characteristics

(Retrieved: BGBl I 2017, 1092)

The tendency to form mechanically induced secondary permeabilities in the effective containment zone should be as low as possible outside a near-contour, consolidated evacuated damaged zone (EDZ) around the repository cavities. The indicators in this regard are:

1. as the main geomechanical load-bearing element, the rock is able to absorb the stresses from drivage and operation without planned load-bearing support, apart from contour support and with tolerable deformations;
2. no mechanically induced secondary permeabilities are expected outside an unavoidable near-contour consolidated EDZ around repository cavities.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 75) states:

Regarding Annex 5

The weighing criterion according to Annex 5 records favourable geomechanical circumstances for the construction of a repository mine. Their purpose is to ensure that stable mine workings can be constructed in the existing rock without lasting damage to the surrounding rock and with the lowest possible expenditure on technical safety equipment for the intended period of operation. In addition, no mechanical, thermal or hydraulic processes that are detrimental to maintaining the barrier integrity should be induced by anthropogenic impacts during operation and post-operational periods. In particular, functioning geotechnical barriers are to be constructed at a later date in accordance with the respective decommissioning concept so that long-term safety can be ensured. The evaluation basis is the anticipated impact of cavity construction on the structure and stability of the host rock.

Annex 6 (to Section 24 para. 4) StandAG states:

Annex 6 (to Sec. 24 para. 4)

Criterion for evaluation of the tendency to form fluid pathways

(Retrieved: BGBl I 2017, 109 – 1094)

The tendency of the effective containment zone to form fluid pathways should be as low as possible. Characteristics that are relevant to the assessment in this regard include changeability of the hydraulic conductivity of the rock, experience concerning the barrier effectiveness of rock formations, the recoverability of cracks and – to enable comparisons between areas – the ductility of the rock according to the table below.

Evaluation-relevant characteristic of the criterion	**Evaluation factor i.e. criterion indicator**	**Rating group**		
		favourable	**conditionally favourable**	**less favourable**
Changeability of the prevailing hydraulic conductivity of the rock	Ratio of representative hydraulic conductivity of the rock/representative hydraulic conductivity of the stone	< 10	10 – 100	> 100
	– Experience on the barrier effectiveness of rock formations in the following areas – recent existence as water-soluble stone – fossil fluid inclusion – underlying water-soluble stones – underlying deposits of liquid or gaseous hydrocarbons – involvement as a hydrogeological protective	Using one or more areas of experience, the rock formation/rock type is classified directly or indirectly as low-level permeable to geologically sealed, also when exposed to geogenic or	Due to a lack of experience, the rock formation/rock type cannot be characterised directly or indirectly as low-level permeable to geologically sealed.	Using one area of experience, the rock formation/rock type is classified directly or indirectly as inadequately low-level permeable.

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	less favourable
	layer for extraction mines – preservation of the sealing function, even when exposed to dynamic load – use of cavities for storage of gaseous and liquid media without containers	technogenic stress.		
	Ductility of the rock (since there are no defined limits of fracture deformation beyond which a rock is ductile or brittle, this criterion should only be used for a comparison between sites)	Ductile/plastic-viscous, pronounced	Brittle-ductile to elastovisco-plastic, less pronounced	Brittle, linear-elastic
Recoverability of cracks	Reduction of secondary permeability through crack closure	In principle, crack closure takes place completely due to ductile material behaviour with compensation of surface roughness.	Crack closure is achieved by mechanical crack width reduction in connection with secondary mechanisms, e.g. swelling deformations.	Crack closure takes place to a limited extent only (e.g. in case of brittle material behaviour, surface roughness, bridge formation).
	Recovery of mechanical properties through crack healing	Crack healing by geochemical processes with renewed activation		Crack healing only through geogenic influx and crystallisation of secondary

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	less favourable
		of atomic bonding forces in the crack surface		minerals (mineralised pore and fissure water, secondary mineralisation)
Summarised evaluation of the tendency to form fluid pathways based on an evaluation of the individual indicators		Evaluation is largely “favourable”: No to marginal tendency to form fluid pathways	Evaluation is largely “conditionally favourable”: Low tendency to form permanent fluid pathways	Evaluation largely “less favourable”: Formation of permanent, secondary fluid pathways must be expected

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 75) states:

Regarding Annex 6

The evaluation criterion according to Annex 6 records fluid pathways that may occur in the host rock and upon whose occurrence the migration of fluid phases from the deep geological subsurface into the biosphere cannot be ruled out. To avoid endangering the safe containment of radioactive waste, it is necessary to exclude as far as possible that these pathways already exist in the effective containment zone or that they will be created on a permanent basis due to construction of a repository. The evaluation basis is the tendency of the host rock to form fluid pathways. The corresponding table defines the evaluation framework for the properties “changeability of the prevailing hydraulic conductivity of the rock” and "experience regarding the barrier effectiveness of the rock formations”.

Annex 7 (to Section 24 para. 5) StandAG states:

Annex 7 (to Sec. 24 para. 5)

Criterion for evaluation of gas formation

(Retrieved: BGBl I 2017, 1095)

As little gas as possible should form in the storage area. The indicator in this regard is the supply of water in the storage area based on the table below.

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	less favourable
Gas formation	Water supply in the storage area	dry	damp and sealed (hydraulic conductivity of the rock < 10^{-11} m/s)	damp

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 75) states:

Regarding Annex 7

The weighing criterion according to Annex 7 records the possible formation of gas in the planned storage area. Gases may form in the repository due to chemical or microbiological processes, especially in the presence of water. This can increase the pressure on the rock and therefore endanger the integrity of the effective containment zone. The formation of gas caused by contact between water and waste containers should be as low as possible so as to avoid placing safe containment of the radioactive waste at risk. The evaluation basis is the supply of water in the planned storage area. The corresponding table defines the evaluation framework for the characteristic of "gas formation".

Annex 8 (to Section 24 para. 5) StandAG states:

Annex 8 (to Sec. 24 para. 5)

Criterion for evaluation of the temperature compatibility

(Retrieved: BGBl I 2017, 1096)

The rock formations affected by temperature changes resulting from the emplacement of radioactive waste should be such that the resulting changes in rock properties and thermomechanical rock stresses do not lead to a loss of strength and the formation of secondary permeabilities in the repository zone. Indicators in this regard are the tendency to form heat-induced secondary permeabilities and their expansion, as well as the temperature stability of the host rock in response to mineral transformations.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 76) states:

Regarding Annex 8

The weighing criterion according to Annex 8 records the behaviour of rock in the repository zone in response to temperature changes. Given that temperature changes in geotechnical barriers and the surrounding rock formations can trigger, accelerate or intensify processes with a variety of negative or positive consequences for repository safety, the definition and enforcement of temperature limits for specific host rocks or even universally is only conditionally suitable for reliable avoidance of adverse consequences for repository safety. In practice, therefore, it will be necessary to perform model-based considerations or (coupled) model calculations on the intensity and range of the thermal, mechanical and hydraulic effects of the heat input within the framework of preliminary safety assessments, which must be updated for the specific site as the procedure progresses. This way, concrete results can be used to control heat input caused by the waste and to deal with its effects. The evaluation basis is the functional integrity of the repository system barriers in the event of temperature changes caused by the emplacement of high-level radioactive waste, as far as they can be reliably predicted. The provisions of Section 26 para. 3 apply in regard to the specification of limit temperatures for the design of the repository.

Annex 9 (to Section 24 para. 5) StandAG states:

Annex 9 (to Sec. 24 para. 5)

Criterion for evaluating the retention capacity in the effective containment zone

(Retrieved: BGBl I 2017, 1097)

The barrier-effective rocks in an effective containment zone should possess the highest possible retention capacity to confine the radionuclides with long-term relevance. Indicators for this are the adsorption capacity of the rocks or the adsorption coefficients for the relevant radionuclides according to the table below, the highest possible content of mineral phases with a large reactive surface such as clay minerals as well as iron and manganese hydroxides and oxyhydrates, the highest possible ionic strength of the groundwater in the geological barrier and opening widths of the rock pores in the nanometer range.

Evaluation-relevant characteristic of the criterion	**Evaluation factor i.e. criterion indicator**	**Rating group**		
		favourable	**conditionally favourable**	**less favourable**
Adsorption capacity of the rocks in the effective containment zone	K_d-value for the following radionuclides with	Uranium, protactinium, thorium,	Uranium, plutonium, neptunium, zirconium,	–

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	condition-ally favour-able	less fa-voura-ble
	long-term relevance ≥ 0.001 m^3/kg	plutonium, neptu-nium, zirconium, tech-netium, palla-dium, iodine, caesium, chlorine	technetium, caesium	

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 76) states:

Regarding Annex 9

The weighing criterion according to Annex 9 covers the retention of radionuclides in the effective containment zone. Transport of radionuclides should be slowed down and, if possible, stopped completely. The evaluation basis is the adsorption capacity of the host rock in regard to the relevant radionuclides. However, the extent to which this criterion is relevant for the safe containment of radioactive waste is highly dependent on the type of host rock and the repository system. The significance of the retention capacity must therefore be assessed within the framework of the weighed overall consideration of repository systems. The corresponding table defines the evaluation framework for the characteristic of “gas formation”.

Annex 10 (to Section 24 para. 5) StandAG states:

Annex 10 (to Sec. 24 para. 5)

Criterion for evaluation of the hydrochemical circumstances

(Retrieved: BGBl I 2017, 1098)

The chemical composition of the deep waters and the solid mineral phases in the effective containment zone should positively effect the retention of radionuclides, even after the emplacement of containers and support materials, and should not chemically attack the material of technical and geotechnical barriers. The indicators in this regard are:

1. chemical equilibrium between the host rock in the effective containment zone and the deep groundwater it contains,
2. neutral to slightly alkaline conditions (pH value 7 to 8) in the area of the deep water,
3. an anoxic-reducing environment in the area of the deep water,

4. the lowest possible content of colloids and complexing agents in the deep water, and
5. a low carbonate concentration in the deep water.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 76) states:

Regarding Annex 10

The evaluation criterion according to Annex 10 records the chemical properties of groundwater, in combination with the rock in the effective containment zone. Their effects on the safe containment and retention of radioactive waste in the effective containment zone should be as positive as possible. The chemical circumstances in the planned effective containment zone are used as the evaluation basis. However, it is already foreseeable that, in the early stages of the selection procedure in particular, it will not be possible to make reliable statements on the comprehensive characterisation and assessment of siting regions and sites on the basis of hydrochemical criteria. There is insufficient knowledge of the hydrochemical circumstances, particularly in the case of groundwater at a depth range that has been earmarked for the construction of a repository. Hence, it is only possible to make reliable statements after closer consideration of regions or specific sites based on corresponding data in connection with the planned repository system.

Annex 11 (to Section 24 para. 5) StandAG states:

Annex 11 (to Sec. 24 para. 5)

Criterion for evaluation of protection of the effective containment zone by the overburden

(Retrieved: BGBl I 2017, 1099)

The overburden should contribute to protecting the effective containment zone from direct or indirect effects of exogenous processes for as long as possible by virtue of its thickness, structure and composition. Indicators in this regard include coverage of the effective containment zone with rocks to control groundwater and erosion, their distribution and thickness in the overburden, as well as the absence of structural complications in the overburden that might cause impairments of the effective containment zone as shown in the table below.

Evaluation-relevant characteristic of the criterion	**Evaluation factor i.e. criterion indicator**	**Rating group**		
		favourable	**conditionally favourable**	**unfavourable**
Favourable structure of the overburden to protect	Covering of the effective containment zone with rocks that inhibit	thick, complete cover, closed distribution of	expansive but interrupted or incomplete cover,	lack of cover, lack of rocks in the

Evaluation-relevant characteristic of the criterion	Evaluation factor i.e. criterion indicator	Rating group		
		favourable	conditionally favourable	unfavourable
the effective containment zone from erosion, subrosion and their consequences (especially decompaction)	the groundwater, distribution and thickness of rocks in the overburden that inhibit the groundwater	rocks in the overburden that inhibit groundwater	expansive but interrupted or incomplete distribution of rocks in the overburden that inhibit groundwater	overburden that inhibit groundwater
	Distribution and thickness of rocks in the overburden of the effective containment zone that inhibit erosion	thick, complete cover, expansive, closed distribution of rocks in the overburden with a particular capacity to inhibit erosion	expansive but interrupted or incomplete cover, expansive but interrupted or incomplete distribution of rocks in the overburden that inhibit erosion	lack of cover, lack of rocks in the overburden that inhibit erosion
	no expression of structural complications (e.g. faults, keystone faults, karst structures) in the overburden which might lead to subrosive, hydraulic or mechanical impairments for the effective containment zone.	Overburden with undisturbed structure	structural complications, but without noticeable hydraulic impact (e.g. healed fissures/faults)	structural complications with a potential hydraulic impact

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 76) states:

Regarding Annex 11

The evaluation criterion according to Annex 11 records the overburden above the effective containment zone of a repository up to the Earth's surface. If possible, this should provide an additional safety reserve for the effective containment zone to protect its integrity against direct or indirect effects of exogenous processes. The evaluation is based on the geological condition of the overburden. In this regard, the properties of the overburden that are decisive for the protection potential depend strongly on the intended host rock and the repository system. On the one hand, there are differences that result from regional variance in the expected and considered exogenous processes that, in regard to their type, mode of action, intensity and probability of occurrence within the period of proof, may influence the safety of the repository; on the other hand, there are also differences in connection with how sensitively the effective containment zone, host rock and overburden respond to these processes. The corresponding table defines the evaluation framework for the characteristic of "favourable structure of the overburden to protect the effective containment zone against erosion, subrosion and their consequences".

Section 36 StandAG states the following in regard to the handling of the Gorleben exploratory mine:

Section 36 Gorleben salt dome

(1) Like any other site under consideration, the Gorleben salt dome is included in the site selection procedure in accordance with the criteria and requirements laid down in sections 22 to 26. It can only be compared with one or more other sites at the relevant stage of the procedure in accordance with sections 13 to 20 of the Site Selection Act, as long as it has not been excluded under sentence 5. It does not function as a reference site for the exploration of other sites. The fact that findings from the previous exploration are available for the Gorleben site may not be included in the comparative assessment, nor may the fact that infrastructure for exploration has already been created for the Gorleben site. The Gorleben salt stock will be excluded according to the Site Selection Act if it

1. does not become one of the sub-areas identified under Section 13 para. 2,
2. does not become one of the siting regions for surface exploration identified under Section 15 para. 3,
3. does not become one of the sites for subsurface exploration identified under Section 17 para. 2, or
4. is not selected as the site under Section 20 para. 2.

(2) Exploration of the Gorleben salt stock for mining purposes is complete. Measures included in the site selection procedure must only be carried out in accordance with this act and at the current stage of the site selection procedure. The mine will be kept open until a site decision has been made in accordance with the Site Selection Act; all legal requirements and the necessary maintenance work are guaranteed, provided that the Gorleben salt dome has not been excluded from the procedure under paragraph 1. The federal government is responsible for the Gorleben mine. An independent salt laboratory for research into the medium of salt as a host rock is not in operation at the Gorleben salt dome.

The explanatory memorandum to the draft law of 07/03/2017 (BT-Drs. 18/11398, p. 73) states:

Regarding Section 36 (Gorleben salt dome)

The wording of the provision has been revised in line with the new provisions and terminology of the Continued Development Act. The change in terminology from “exploration mine” to “mine” in paragraph 2 reflects the fact that the mine will be transferred into an operation for keeping the mine open and that exploration has come to an end. The provisions of the former paragraph 3 concerning termination of the preliminary safety assessment at the Gorleben site are now obsolete.

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