

**Realisation of a vertical research borehole to a
depth of 250 meters with a triple core barrel**

Descriptive document

V30-04-2021

Inhoud

1	INTRODUCTION.....	3
2	GENERAL INFORMATION.....	8
2.1	LOCATION AND RESTRICTIONS.....	8
2.2	SAFETY AND CERTIFICATION.....	9
2.3	WORKING CONDITIONS	10
2.4	TIME FRAME.....	10
2.5	INFRASTRUCTURAL/ENVIRONMENTAL ASPECTS AND WATER PROTECTION.....	10
2.6	DRILLING METHODS AND TECHNICAL SPECIFICATIONS	13
3	TENDER CONDITIONS	17
3.1	PRICING.....	18
3.2	DESCRIPTION OF WORK	20
3.3	REFERENCE PROJECTS.....	21
3.4	SUBMISSION	21
4	PLANNING	22
5	EVALUATION CRITERIA	22
6	APPENDIX: ALTERNATIVE PRICING	24

1 Introduction

The Einstein telescope is an advanced gravitational wave observatory that is currently in the planning phase. The Einstein telescope can be used to detect signals emitted immediately after the Big Bang and to study the nature of black holes. The Einstein telescope makes high demands on its location. Stable underground conditions with minimal environmental disturbances is essential for its operation. To observe gravitational waves, the Einstein Telescope will measure tiny changes in the length of the detector tunnels at a depth of 200-300 meters and a length of about 30 kilometers. The border region between the Netherlands, Belgium and Germany is considered a potential location and will be further investigated in a feasibility study funded by the European Union, the Dutch Ministry of Economic Affairs, the Land of North Rhine-Westphalia, the Province of Flemish Brabant, the Province of Belgian Limburg, the Province of Dutch Limburg, Flanders and Wallonia.

The main objective of the E-Test project is to develop an advanced underground geological model down to a depth of 300 m within the potential perimeter of the Einstein telescope. This model aims to validate the location of the Einstein telescope and optimize its design.

This call for offers concerns an approximately 250 m deep borehole for geophysical, geomechanical and hydrogeological borehole investigations as well as undisturbed, high quality sampling of relevant geological units for laboratory investigations. To this end, the borehole must 1) be cored in relevant sections, 2) be accessible for borehole investigations requiring direct access via an unlined borehole section and the assistance of the drilling contractor, and 3) be converted into a dry borehole well cemented into the rock after completion of the investigations. Due to the complexity and geological unpredictability of the project, the required performance may be reduced in agreement with the Contractor.

The borehole will be drilled vertically from the surface (Figure 1) and through a series of weak and hard rock formations (Figure 2 and Table 1). The drilling site is located on a parking space near the campsite in Cottessen in the state of Limburg (Cottessen 6, 6294 NE Vijlen, The Netherlands). The relative height of the drilling site is about 146 m above sea level (146m +NAP).

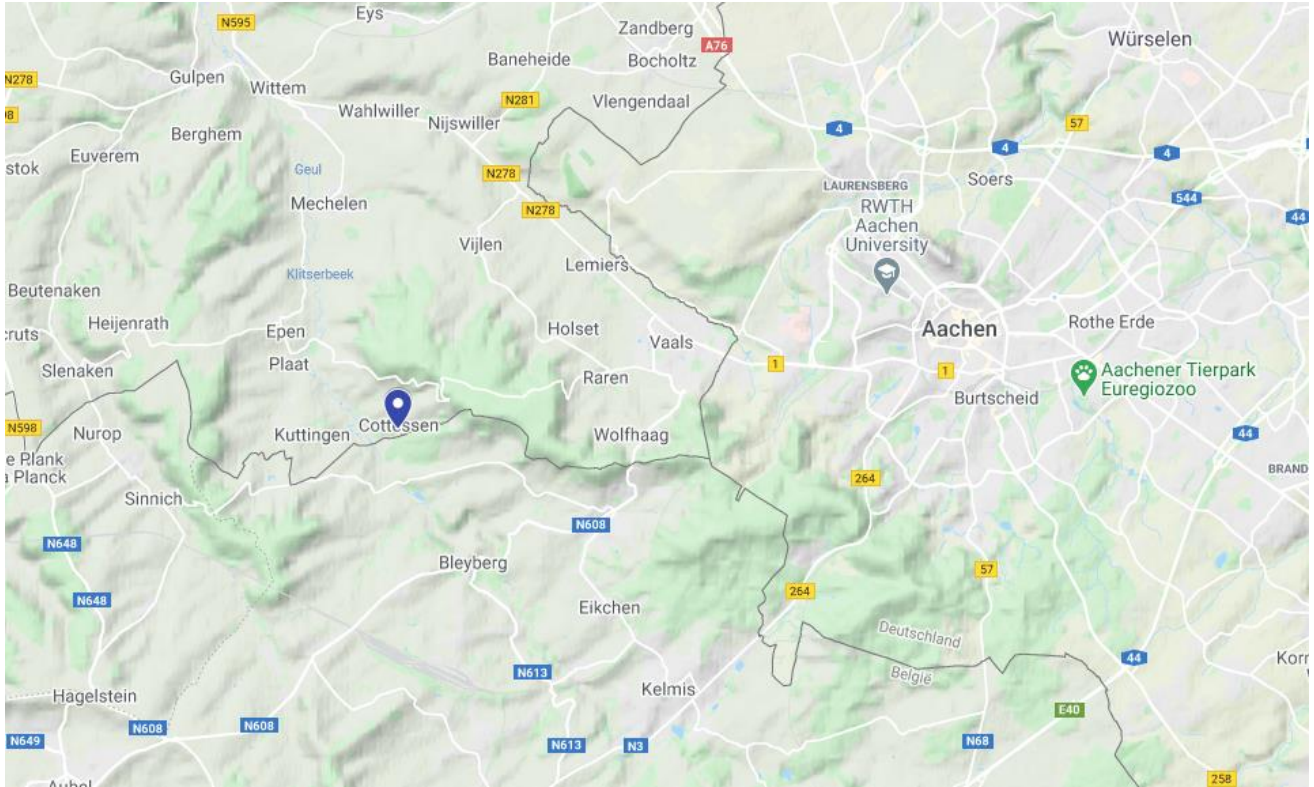


Figure 1: Location of the drilling site (Cottessen 6, 6294 NE Vijlen, Netherlands) [UTM 50.759149, 5.940543](#)

The geological sequence at the Cottessen site is an estimation based on some outcrops at former quarries, a 80m deep drilling at Vieux Moulin 500m south of this location. And a 260m deep drilling near Terziet 3 km West of this site and two ERT-surveys nearby. The first few meters consist of soft, poorly consolidated fine-grained chalk sand (Fm. Vaals). Within the first 3 to 11 meters, layers of clayey sand and silt, wood fragments and plant remains can be expected. Towards the base of the uppermost layer, the lithology is expected to become richer in clay. Maybe during the pre-excitation of 1,5m rock can be present.

Table 1: Geological forecast of the borehole profile.

Depth [m] Estimation!	Formation	Description
0 – 7 [+/-4m]	„Vaals-Aachen Sands“	clay to fine grained sand
7 – 70	„Namurian“ Mostly Alportian age	At the top soft clay and siltstone; further down sandstone Possible occurrence of a fault zone and some quarzitic layers
70 – 75	Dinantian Limestone or Dolomite	karstified limestone, dolomite, shales but uncertain whether it occurs or how thick the layer is. probably higher water inflow
75 – 250	„Famennian sandstone“	Quarzitic sandstone, with mica shales, Formations: Evieux, Monfort and maybe Esneux or Hodimont.

Below this uppermost unit, an unconformity to consolidated rock occurs: Namurian, of Alportian and Chokerian age. The Namurian section consists of claystones, siltstones and sandstones. It might be possible that quarzitic sandstones appear as well. These can be highly abrasive. It is expected that this section will be fissured and tilted. The water table is unknown. There will be stagnant groundwater at the top of the Namurian but the water table in the Namurian could be 32 m as well based on the level of the Cottesserbeek running 200m south of this location.

Below the Namurian strata a thin layer (thickness unclear) of karstified limestone or dolomite can be found from the Dinantian. Due to the karstification it is assumed that this limestone is crumbly, but this is an assumption the layer might be absent as well.

The Famennian formations of Evieux, Monfort contain alternating layers of mica schist, sandstone and quarzitic sandstones. It is possible that these layers extend to 250m depth or that they gradually change in mineralogical composition to carbonate shales with some quarzitic sandstone layers. Expected formations Evieux, Monfort and maybe Esneux and or Hodimont. In theory the Frasnian shales, and karstified limestones might be in reach as well, but this is highly uncertain. These layers will be tilted and can be fissured as well.

The present quarzitic sandstone layers could lead to an increased rock strength and abrasivity. The strength of the material could reach up to a description from “very high” to “extraordinary high” (DIN EN ISO 14689).

The abrasivity in this part could then reach up to a classification of “medium” to “high” (Classification of abrasivity by the CERCHAR test).”

A summary of the expected lithology is shown in Figure 2.

Distortions can occur in two directions: (a) striking (N)NW-(S)SE and (b) striking (E)NE-(W)SW. Faults oriented towards (N)NW-(S)SE typically occur at an angle between 60-80° and can be water-bearing. Based on the geological map of the area, one of these structures could be hit at a depth of about +60 m above sea level (± 30 m). Faults striking (E)NE-(W) SW are predicted to be incident at an angle of $< 40^\circ$ and are typically narrow to partially open. Along these structures a small water flow is expected. This prediction is based on a nearby outcrop and previous drilling and exploration drilling within 500 m of this site and some ERT-profiles.

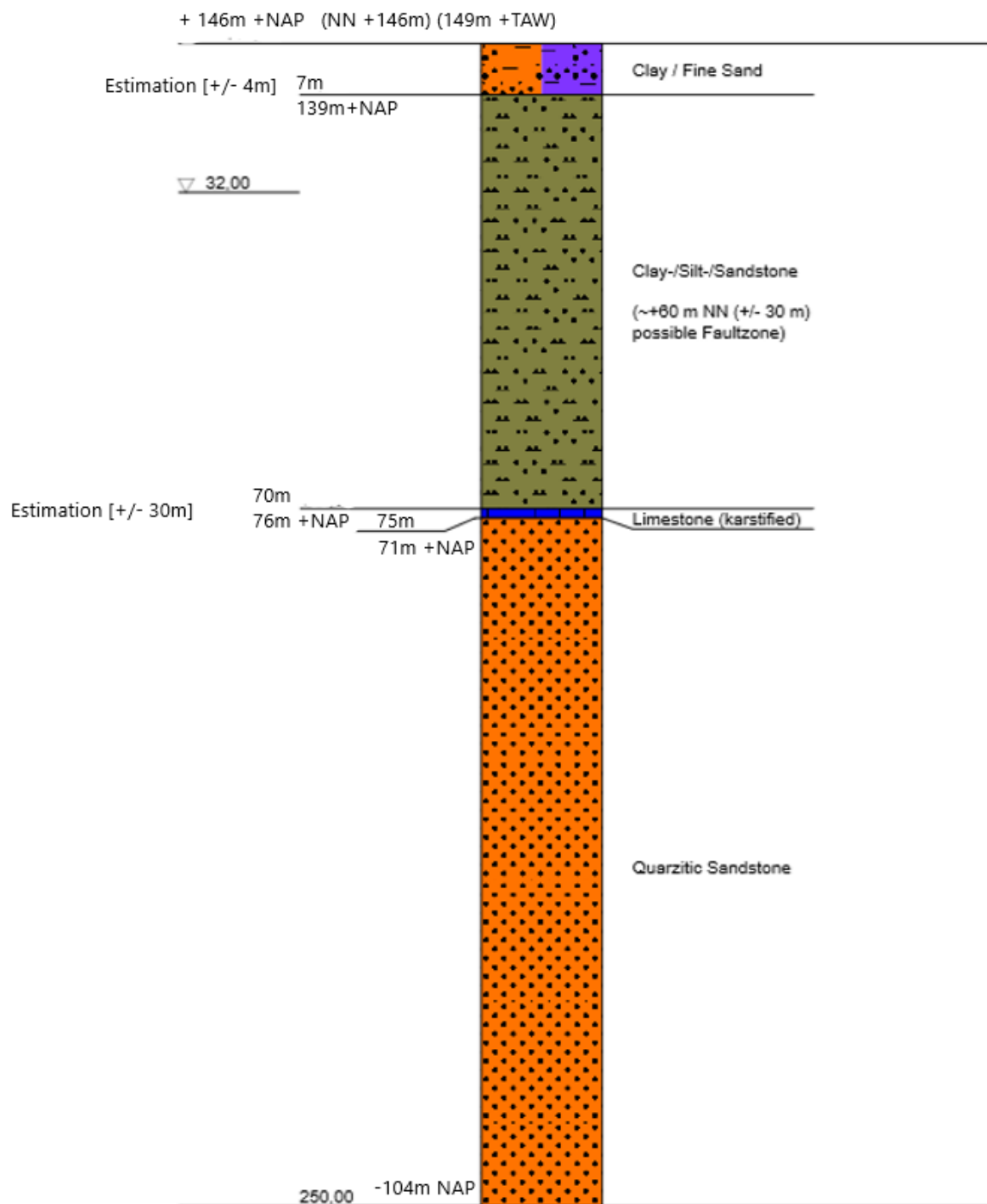


Figure 2: Geological forecast of the planned borehole

2 General Information

2.1 Location and restrictions

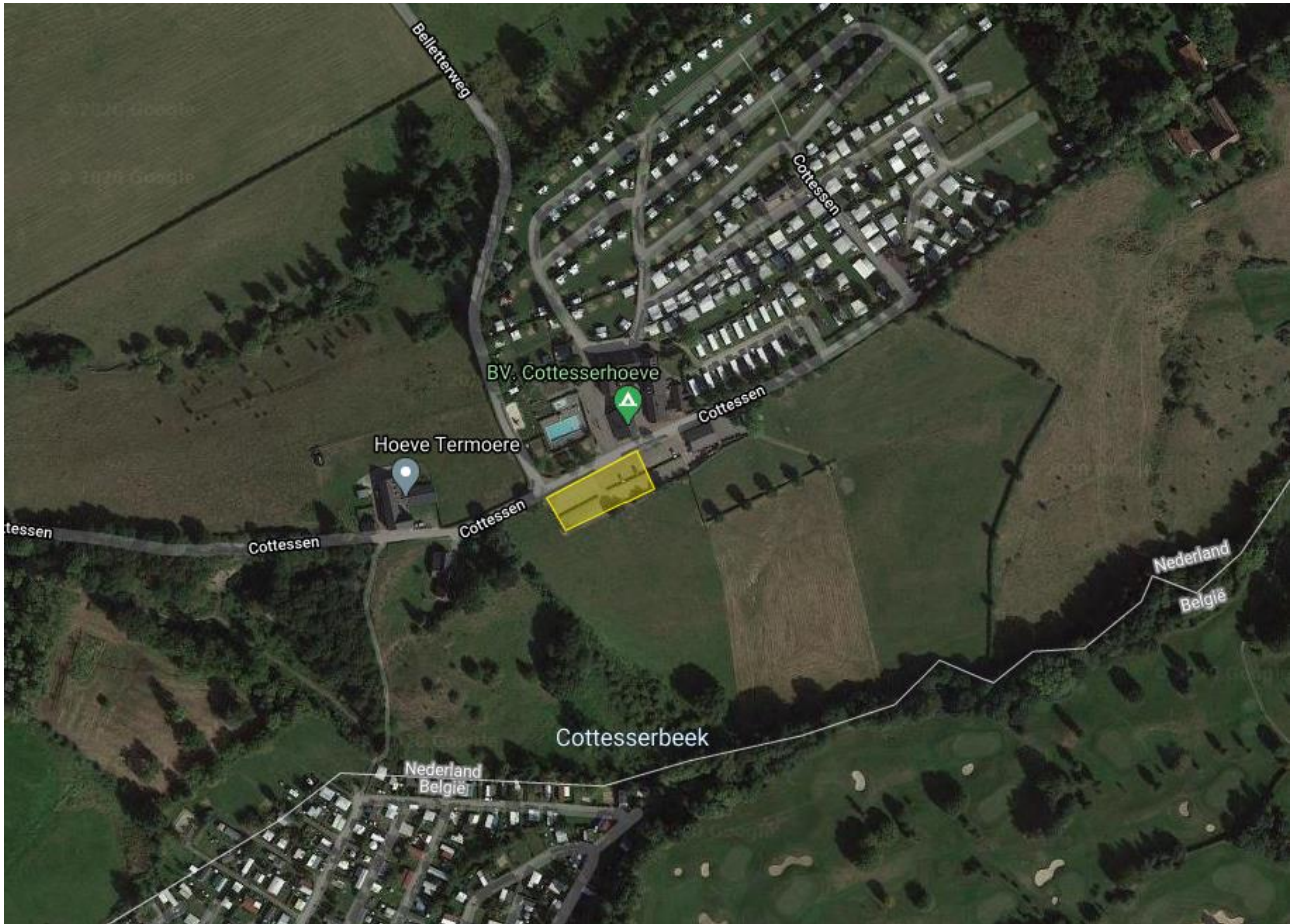


Figure 3: Location of the drilling site on the southern parking lot of the campsite "BV. Cottesserhoeve"

The available space is about 25 [m] x 70 [m] and is flat. As part of the site, which is used as a visitor parking area, it is not used for agricultural purposes and is surrounded to the south by a 1-meter high pasture fence.

Due to the close distance to the campsite and the protected areas, it is mandatory to keep noise and pollution of the roads as low as possible. The area is located at [UTM coordinate 50.759149, 5.940543](#) Cottessen (NL). The planned drill hole is located in the lower left section of the yellow marked part of the map.

The campsite is closed from the first of October to the end of March. The machines and drilling rig can be installed from the 1st of October 2021. **All noisy drilling activities should take place during the start of October and the end of December 2021.**

An inspection of the site with the contractor, the landowners and those responsible must be scheduled before work begins. The terrain is always accessible. The terrain is a horizontal parking lot that has gravel on top.

The WML (local drinking water company) has a well within 60m distance of the drilling location which provides access to high quality drinking water (~ 4 m³/h). The drilling company should arrange supply its own hydrant; this is the connection to the well with a well calibrated volume meter.

Important Measurements Natura 2000 Nitrogen NOx-deposition

This location is directly surrounded by the Natura 2000 area ‘Geuldal’; therefore NOx deposition should be minimized to nearly zero. NOx concerns the different Nitrogen-Oxygen molecule combinations that occurs in exhaust gasses after burning fuel. The strict regulations in the Netherlands lead to some practical measurements that the contractor should apply:

1. Use the high-power electricity available on location (340V). Due to emission of NOx a generator can't be utilized over here. There is an agreement made with landowner: a power connection within 100m distance is available that should power up other instruments that normally would be connected to the generator. The contractor should provide the connection cables and measure the consumption (KWh).
2. The exhaust gasses of the drilling rig and other diesel driven machines should be led to a DENOX installation containing Ad-Blue (Ureum). Normally such installation has the size of a mid-sized container. Information can be found about renting an installation can be found here <https://www.volkerwessels.com/en/news/nonox> or here https://www.bredenoord.com/nl/huren/clearconcept/denox/?gclid=Cj0KCQjw1PSDBhDbARIsAPeTgrdLtzPfganetxU3LQ-NMAY7X-pkPHkMXZ5ZILSLv8mr0tqn9hZCwQaAnCEEALw_wcB
3. Provide us the Stage-class age of the drilling rig and truck and revision data, age of the diesel-engine. Also provide the testing papers of the motors concerning the measurements of the exhaust gasses. These papers should be available on location.

2.2 Safety and certification

The contractor is responsible for the safety and health of his employees and subcontractors. Because of the health and safety regulations in the Netherlands, a VCA certificate is required for every person on the construction site.

The employer must take the necessary measures in accordance with the European Agency for Safety and Health at Work and the local safety and health regulations. By means of a self-declaration, the employer

undertakes to comply with the health and safety regulations and the regulations on working and salary conditions. Non-compliance with these regulations can lead to immediate termination of the contract.

At drilling sites in the Netherlands, the contractor must have BRL (SIKB) 2100 certification.

All materials and equipment used should be tested and inspected regularly and kept in good condition in accordance with safety regulations.

The drilling site must be inaccessible to the public, who do not have permission to visit the site. A closed construction fence with privacy protection must be provided to secure the site. The site should be closed during non-working hours. It is strongly recommended that a 'Bouwwatch/BauWatch' camera system is installed/leased, which is directly connected to the police and prevents burglars from stealing equipment during the absence of the crew. The camera system should be infrared sensitive to prevent the use of light sources during the night, as these can disturb wild animals such as bats.

Important contact addresses in the region: Police: 112, Rescue service: 112, Fire brigade: 112.

2.3 Working conditions

During drilling, the drilling site is accessible 24 hours a day, 5 days a week (from Monday to Friday). The location Cottessen is situated in a so-called 'silent area', working hours are limited from 7h to 19h. In case of special occasions during the drilling project this restriction can be changed in close consultation with the client and the landowners. The applications for special permits to carry out the work will be submitted by the client.

2.4 Time frame

The borehole is scheduled to be drilled between 1 October and 31 December 2021. The planned duration of the drilling (excluding mobilisation, demobilisation, installation and rehabilitation) is estimated to be about 1,5 to 2 months (including the time for support of the borehole testing and the contractor responsible for completion).

2.5 Infrastructural/environmental aspects and water protection

In order to protect surface and ground water, the contractor respects local regulations, guidelines and environmental legislation in the Netherlands.

Only tap water may be used to prepare the necessary liquid to cool the drill head and support the stability of the borehole. It is strictly prohibited to add water to the surface water of ponds and streams or to use water from them. The use of barium is strictly prohibited. Tap water is easily accessible on site, hydrant is available.

The contractor is obliged to obtain information about the location of obstacles (cables, pipes, drains, sewers, etc.) from the respective suppliers before starting the drilling work and to attach this information to his documentation. Utilize <https://www.kadaster.nl/zakelijk/registraties/landelijke-voorzieningen/klic> to inform the authorities and obtain data of cables. This should be done at least two weeks before starting the drilling please contact the client as well.

No drilling sludge or wastewater may be spilled at the drilling site. Protective measures must be taken to avoid any contamination of the soil, surface or ground water (e.g. laying out a protective film or sheets). If necessary, the bottom of the drilling site must be filled or covered. Tanks for sedimentation of the drilling sludge are required for the drillings. A closed circulation system with 100% recycling is preferred. All wastewater from the installation site, which is generated during construction/drilling work, must be treated in accordance with water protection regulations. The removal of the remaining drilling mud should be agreed with local companies that have a permit for recycling (e.g. Attero).

The leakage of fluids into the environment must be avoided. The site equipment must be maintained in a condition that prevents fuel or lubricant losses. Lubricants should be biodegradable. The hydraulic lines and equipment must be inspected regularly by the machine operator to prevent leakage. Cans, canisters etc. containing lubricants, fuels and other liquids hazardous to groundwater are under lock and key. Adequate quantities of oil binding agents must be available on the site and, if necessary, retention basins must be installed under motors and hydraulic motors. The oil binding agents must be stored in an easily accessible place and the staff must be informed about the storage location and instructed in their use.

Repair and cleaning work on machines and vehicles can be carried out in suitable places where leaking liquids cannot affect the environment. Washing and maintenance areas must be maintained in accordance with municipal guidelines for the treatment and disposal of wastewater containing mineral oil.

Special tanks equipped with the prescribed safety devices must be used for refueling machines and vehicles.

An environmental impact assessment is required for additives to the drilling fluid. This concerns the production of drilling mud with additives, facilities for collecting the liquids and the corresponding neutralization should be available. If necessary, sufficient tanks or containers must be installed to transport contaminated wastewater from the construction site.

For noise protection, the following regulations, guidelines, standards and provisions must be observed: BRL SIKB 2100, measures laid down in the permission for work in vulnerable silent areas.

If the drilling process of the borehole fails, the borehole should be finished as prescribed in SIKB-protocol 2101 'Mechanical Boren' in case the borehole can't be redrilled at that exact location. This means that the possibility of the exchange of groundwater between different aquifer-levels should be totally excluded.

The specifications must be taken into account during the construction phase. The following measures must be taken, particularly in noise-sensitive areas: All construction machinery must be maintained, operated and used in such a way as to avoid avoidable noise. Machines and equipment must maintain a permissible noise level in accordance with the recognized state of the art. Noise-intensive construction phases must be carried out outside the rest periods if possible. Noise-intensive preparatory work must be carried out at noise-insensitive locations. Stationary machinery and equipment must be kept as far away as possible from noise-sensitive neighborhoods. The use of acoustic warning signals emitted outside the area concerned (factory, construction site, etc.) is only permitted if it does not impair work safety. The contractor must use silent compressors and pumps.

All persons employed on the construction site are bound by personal instructions and draw attention to these regulations. In the event of damage, the police and the contractor must be informed immediately. If necessary, the police will call in the fire brigade or environmental protection authorities. The person causing the damage is obliged to take immediate action to prevent further damage.

The contractor is liable for all environmental damage (e.g. due to leaked oil) which occurs in the course of the drilling work as well as for damage caused by improper filling of the borehole or insufficient securing and clearing of the drilling site.

2.6 Drilling methods and technical specifications

The final diameter of the borehole is at the contractor's discretion, but there must be a continuous inside diameter of at least 130 mm to allow passage with hydraulic testing equipment, especially in the unsupported part of the borehole. A borehole logger (e.g. Lutz s.a.) should be used to automatically record drilling parameters such as pressure, rotational speed and drilling speed.

After reaching the Paleozoic rocks, at a depth of 3 to 11 m, the sampling of intact cores is necessary. A triple core barrel with an outer diameter between 150 and 140 mm must be used for drilling in the rock. In order to keep the cores in the best possible condition, they must remain in the inner core barrel without unnecessary interference. The cores must have a diameter of over 90 mm. And transparent Perspex liners should be utilized and should be capped to maintain the moist in the rock. And the borehole should be finished in such a way that it can host a deep sensor and a surface sensor as explained below under '6) '.

Summarised:

1) Drillings from 0 m - 11 m; clay/fine sand

- a) As this part of the borehole will be stabilized after reaching the more solid rock layers (after 8 to 15 m), the inner diameter of the borehole and the support system must be selected in such a way that a continuity into the deeper layers with the triple core barrel diameter selected by the contractor is guaranteed.
- b) The flushing additive shall be determined by the contractor with agreement of the client before the beginning of the work.

2) Installation of a stable steel casing up to 11 m depth or up to stable rock conditions (11 to 15 m)

- a) The inner diameter of the steel casing must ensure the continuity of the selected core drill diameter (see 1) a)).
- b) It is essential that the supported borehole section is completely sealed and 100% watertight during the remaining drilling work.

3) Core drillings from 11 m - 250 m; clay/ silt/ sandstone, limestone, quartzite sandstone

- a) The drilling diameter of the triple core barrel can be chosen by the contractor, but must be between 140 and 150 mm. The contractor should utilize transparent Perspex liners that should be shut off in a watertight way to prevent rock samples from drying.
- b) The flushing additive must be agreed between contractor and client before the start of the work.

4) Preparation (/support) of a geophysical survey by an external contractor

- a) Within the open borehole.
- b) Exchange of drilling mud with clear water.
- c) Support for borehole logging by drilling personnel (standby with team on site).

5) Installation and implementation of the borehole system by external contractor (hydrogeological test equipment)

- a) Support in the installation and implementation of well equipment by drilling personnel (on-call service with team and drilling equipment on site).
- b) Estimated time for installation: 7 working days.
- c) De-installation, de mobilisation.

6) Finishing the top of borehole to house a seismic sensor station

- a) A prefab concrete cylinder of 1000 mm diameter with a concrete bottom of at least inside diameter 800mm depth should be fitted on top of the casings. A similar sized solution with a square concrete element is also possible. The remaining gap between the hole and the casing should be filled up in such a way that water can't enter in large quantities. The casing should be fitted eccentric to maintain 300mm. Practical finetuning will take place in direct contact with the contractor during the installation.
- b) The top of this pit should be a solid cover that can withstand the forces of heavy machinery, trucks et cetera. The lid should be sealed by an O-ring to prevent rainwater ingress.
- c) There are prefab solutions for sewer inspection pits that suit this job well. Based on similar experience; estimated time for installation directly after removing the drilling rig: 8 manhours.

Further remarks:

- The contractor must organize the necessary inspections for explosives, cables, and pipes at the drilling site.
- The drilling site must be returned to its original condition after completion of the work. In case of unavoidable damage, restoration work must be considered in consultation with the landowner.
- When conditions in Paleozoic rock change, the rock strength changes with contact between formations. In such a case, the core liner should be lifted and inspected to minimize loss or damaging of samples.
- In the event of a borehole collapse, the contractor is obliged to ensure the usability of the borehole by re-drilling. If this is not possible to drill at the exact same location, the collapsed borehole should be finished conform BRL 2101 like stated in 1.4.
- After completion of the drilling work and hydrogeological tests, a final installation of a support system of the borehole may be necessary.

The contractor must be able to convert the borehole to a dry borehole (inner diameter > 100 mm) well cemented with the rock for further test campaigns. Due to the tight time frame of the work or unforeseen geological findings, this item from the bill of quantities may be reduced in consultation with the Contractor.

- The contractor must provide all necessary materials:
 - power cables.
 - quiet compressors. A generator is not needed, there is a 340V power connection available.
 - tubes/rods/drill heads and spare heads, as waiting for them can be time-consuming.
 - tools for electrical power distribution.
 - scaffolding, if necessary.
 - water and hydrocarbon filters for compressor (if required).

- Access to electricity, water connections, hoses, or water containers.
 - Copies of certification papers should be present on site since authorities can check.
 - Normally authorities like: the RUD ('Regionale Uitvoerings Dienst = Regional Control Authority), Waterschap, Council Vaals might visit the site and check.
- Drilling with triple-tube core tubes from 0 m - 250 m or 11 m - 250 m. The drilling method in Paleozoic rock can be selected by the Contractor as long as it meets the above requirements.
 - The deviation from the vertical must be documented and must not exceed an inclination of 3-4 degrees. However, this requirement may be adapted in agreement between client and contractor.
 - A drill report describing the daily work (according to DIN EN ISO 22475-1), the people on site, the working hours, incidents, accidents, technical problems etc. shall be provided together with the automatically generated borehole logging.
 - All costs must be included in the prices offered.

Mobile toilet facilities are required by arrangement.

3 Tender conditions

This tender is issued on behalf of Nikhef (National Institute for Subatomic Physics), an institute of the NWO-I Foundation ('Stichting Nederlandse Wetenschappelijke Onderzoek Instituten).

The content of the Tender Response must comply with the following conditions:

- a. The Tender response and all further communications must be in the English language.
- b. The General Government Purchase Conditions 2018 are applicable i.e. ARIV_2018 conditions as published here: https://www.nwo-i.nl/wp-content/uploads/2019/11/ARIV_2018-mei2018_0-2.pdf;
- c. The Tender response must be irrevocable for at least 60 days after the closing date of this procurement procedure.
- d. All amounts must be stated in euros excluding VAT.
- e. Nikhef reserves the right to check the accuracy of all data and to contact the persons designated with regard to competence requirements. If that information is found to be missing, Nikhef may decide to request it, provided that competition is not thereby damaged. Nikhef is in no way obliged to do this.
- f. The submission of a Tender response signifies that the Tenderer agrees to the proposed procedure and the provisions of this Descriptive Document (including Appendices).

Other conditions:

- a. Nikhef reserves the right at all times not to award the contract (in full or in part) and to discontinue the procurement procedure.
- b. The Dutch Public Procurement Act (Dutch Official Journal 2012, 542), is *not* applicable to this tender.

The following documents need to be submitted:

- Price, including a breakdown
- Description of work
- Reference projects

3.1 Pricing

The template for pricing is given below:

Works	Unit	Unit price excl. VAT	Quantity	Sum
Mobilisation and demobilisation of equipment, including auxiliary equipment (e.g. compressor, pumps, sedimentation tanks, dust removal equipment, etc.)	[pc.]		1	
Mobilisation and demobilisation of the crew	[pc.]		1	
Installation and de-installation of drilling equipment including preparation and rehabilitation work (e.g. site investigations, earthworks, preparation of the drilling site, installation of sedimentation tanks, pumps)	[pc.]		1	
Drilling 0 – 11 m	[m]		11	
Coring 11 – 250 m	[m]		239	
Installation of a permanent steel casing (inner diameter depending on the selected core drill diameter) in the Paleozoic rock (0 m to ~11 m) before continuing the drilling work	[m]		11	

Installation of a permanent steel housing (inner diameter > 100 mm) after completion of the drilling and testing campaigns (~11 m to 250 m)	[m]		250	
Finishing borehole, e.g. prefab standard sewer inspection pit with watertight lid diameter ~ 1000mm,	[pc.]		1	
Additional drilling meters (core drillings) beyond the planned depth	[m]		50	
Extra re-drilling for cleaning the borehole (e.g. due to breakouts)	[pc.]		1	
Exchange of drilling mud with clear water (drinking water quality) in the borehole	[pc.]		1	
Standby during borehole tests, during the day (crew on site; no drilling) *)	[day]		1	
Standby during well tests, during the day (crew not on site, but in waiting position; no drilling) *)	[h]		1	
Additional auxiliary work (except drilling) for a crew member during the working day *)	[h]		8	
The rent of a DENOX-installation, mobilization, calculate 12 weeks.	[d]		1	

Sum (excl. VAT)	
-----------------	--

*) "Stand-by" or "auxiliary work" as expressly ordered by the PI in connection with work other than drilling-related work. Note: Working day = Monday - Friday (07:00 - 19:00).

The contractor must state the working hours per day on which this offer is based for regular drilling work (excluding "stand-by" and "auxiliary" work).

Standby time due to equipment maintenance or waiting for equipment is not compensated. Waiting times due to weather conditions or access restrictions to the installations must be submitted to the site management for examination and approval. Downtimes must be reported immediately and signed off by the client or the site management.

As part of the offer, the contractor is asked to provide an alternative pricing if the borehole needs to be telescoped after a depth of 100 m. The conditions mentioned above stay the same, including the collection of cores, the demanded coring technique, and the installation/properties of the permanent casing. The drilling diameter can be chosen by the contractor. Please see the Appendix for this alternative pricing.

3.2 Description of work

The description should include the following elements:

- Contract analysis including problem identification, recognition of the relevant boundary conditions and identification of opportunities and risks with the proposed measures.
- Technical description including process proposal, methodology and work steps, statements on quality assurance and safety, installation concept, construction logistics, supply and disposal concept. This also includes the installation of the borehole incl. standpipe/anchor pipe (if necessary), a construction site installation plan and comprehensive information on the operating materials used with safety data sheets.
- Personnel organization, regulation of the deputy, project and construction site organization, interface to the organization of the client, personnel deployment plan and personnel strength; please note that A change of machine operator is permitted.

- Timetable including drilling program, milestones, performance and staffing, indication of regular drilling hours.

The description should contain a self-declaration of compliance with safety and work regulations.

The description should be as concise as possible, providing all necessary information to evaluate the plan of work and feasibility of the approach. Drawings or diagrams are allowed.

3.3 Reference projects

Provide a list of successful reference projects, carried out by the company, that comply with the following characteristics: long directional drilling with high quality (triple-tube core barrel) core extraction for scientific purposes and including installation of well-cemented dry casing to a depth of more than 250 m.

The list should contain per project at least: location, depth, purpose, client.

3.4 Submission

Price and alternative price should be submitted as a separate document (PDF). A Word-template is available via Tendered.

The description of work and the list of reference projects may be combined in a single document (PDF).

Offers should be submitted via Tendered, ultimately Friday 28 May, 17:00 CEST.

All offers are treated confidentially. Incomplete offers will not be accepted. After evaluation of the bids, the bidders will be informed about the score for their bid. Participation in the tendering procedure does not entail any obligations.

4 Planning

Until 17 May 2021, 17:00	A site visit can be planned: please contact Bjorn Vink (00316 53338848, bjorn.vink@anteagroup.nl & bjorn2vink@gmail.com).
Until 17 May 2021, 17:00	Questions on the tender should be submitted via Tendered.
22 May 2021, 17:00	Answers on questions will be provided.
28 May 2021, 17:00 CEST	Offers should be received.
8 June 2021	Provisional awarding
15 June 2021	Final awarding

5 Evaluation criteria

The following evaluation scheme will be used to score the tenders submitted:

- a. Price max. 40 points
- b. Description of work max. 30 points
- c. References showing experience with scientific drilling max. 30 points

Part a: scores will be calculated using the following formula: $40 * [\text{lowest price} / \text{submitted price}]$. The lowest price offer will therefore score 40 points.

Part b: will be evaluated by an expert panel on behalf of the client using the following checklist of attention items:

1.	Identification geological conditions risk and chance analysis related to the proposed measurements concerning the execution of the drilling.
2.	Recognition of the relevant boundary conditions.
3.	The working process to gain high quality samples of the rock, maintaining the original rock strength.
4.	The working process to obtain a near vertical, dry subsurface housing for a seismic station.
5.	Quality assurance staff : Curriculum Vita , experience, strength.
6.	Quality assurance of the used equipment and materials.
7.	The construction logistics on site, supply and disposal of materials.
8.	A comprehensive working plan and installation concepts with safety data sheets.
9	Organisation, project organization on the drilling site and interface to the client.

Part c: the list will be evaluated by an expert panel on behalf of the client. Less than 20 valid reference projects will score no points. Starting from 20 valid projects the score will be calculated using the formula: [number of valid projects] * 0,5. Therefore, the maximum score (30) requires at least 80 valid reference projects.

6 Appendix: Alternative Pricing

Table 1: Alternative pricing for telescopic drilling

Works	Unit	Unit price excl. VAT	Quantity	Sum
Mobilisation and demobilisation of equipment, including auxiliary equipment (e.g. compressor, pumps, sedimentation tanks, dust removal equipment, etc.)	[pc.]		1	
Mobilisation and demobilisation of the crew	[pc.]		1	
Installation and de-installation of drilling equipment including preparation and rehabilitation work (e.g. site investigations, earthworks, preparation of the drilling site, installation of sedimentation tanks, pumps)	[pc.]		1	
Drilling 0 – 11 m	[m]		11	
<i>Coring 11 – 100 m (+ widening the borehole diameter if necessary)</i>	[m]		89	
Coring 101 – 250 m	[m]		150	

Installation of a permanent steel casing (inner diameter depending on the selected core drill diameter) in the Paleozoic rock (0 m to ~11 m) before continuing the drilling work	[m]		11	
<i>Installation of a permanent steel casing (inner diameter depending on the selected core drill diameter) in the Paleozoic rock (11 m to 100 m) before continuing the drilling work</i>	[m]		89	
Installation of a permanent steel housing (inner diameter > 100 mm) after completion of the drilling and testing campaigns (0 m to 250 m)	[m]		250	
Finishing borehole, e.g. prefab standard sewer inspection pit with watertight lid diameter ~ 1000mm,	[pc.]		1	
Additional drilling meters (core drillings) beyond the planned depth	[m]		50	
Extra re-drilling for cleaning the borehole (e.g. due to breakouts)	[pc.]		1	
Exchange of drilling mud with clear water (drinking water quality) in the borehole	[pc.]		1	
Standby during borehole tests, during the	[day]		1	

day (crew on site; no drilling) *)				
Standby during well tests, during the day (crew not on site, but in waiting position; no drilling) *)	[h]		1	
Additional auxiliary work (except drilling) for a crew member during the working day *)	[h]		8	
The rent of a DENOX-installation, mobilization, calculate 12 weeks.	[d]		1	
Sum (excl. VAT)				