

# KAROO GEOPHYSICAL RESEARCH PROJECT

SEISMIC SURVEYS WITHIN THE SARAH BAARTMAN, CHRIS HANI & JOE GQABI DISTRICTS, EASTERN CAPE PROVINCE AS WELL AS PIXLEY KA SEME DISTRICT, NORTHERN CAPE PROVINCE

July 2025

## BACKGROUND INFORMATION DOCUMENT

### PROJECT ANNOUNCEMENT

**NOTE:**

Due to the size of the study area, the following separate Basic Assessments are being undertaken for the Geophysical Research Project:

- Phase 1 covers the Western Cape Province (Central Karoo District); and
- Phase 2 covers the Eastern Cape Province (Sarah Baartman, Chris Hani and Joe Gqabi Districts) as well as a small portion of the Northern Cape Province (Pixley ka Seme District) (**focus of this document**).

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### 1. PURPOSE OF THIS DOCUMENT

The purpose of this **Background Information Document** (BID) is as follows:

1. It serves to provide an overview of the proposed seismic survey to scan the subsurface geology of parts of the Sarah Baartman, Chris Hani and Joe Gqabi Districts in the Eastern Cape as well as a small part of the Pixley Ka Seme District in the Northern Cape (the "Research Project");
2. It outlines the Basic Assessment that will be undertaken to assess the potential environmental impacts associated with the Research Project; and
3. It allows stakeholders to provide upfront comments regarding the proposed Research Project.

## 2. PROJECT PARTNERS

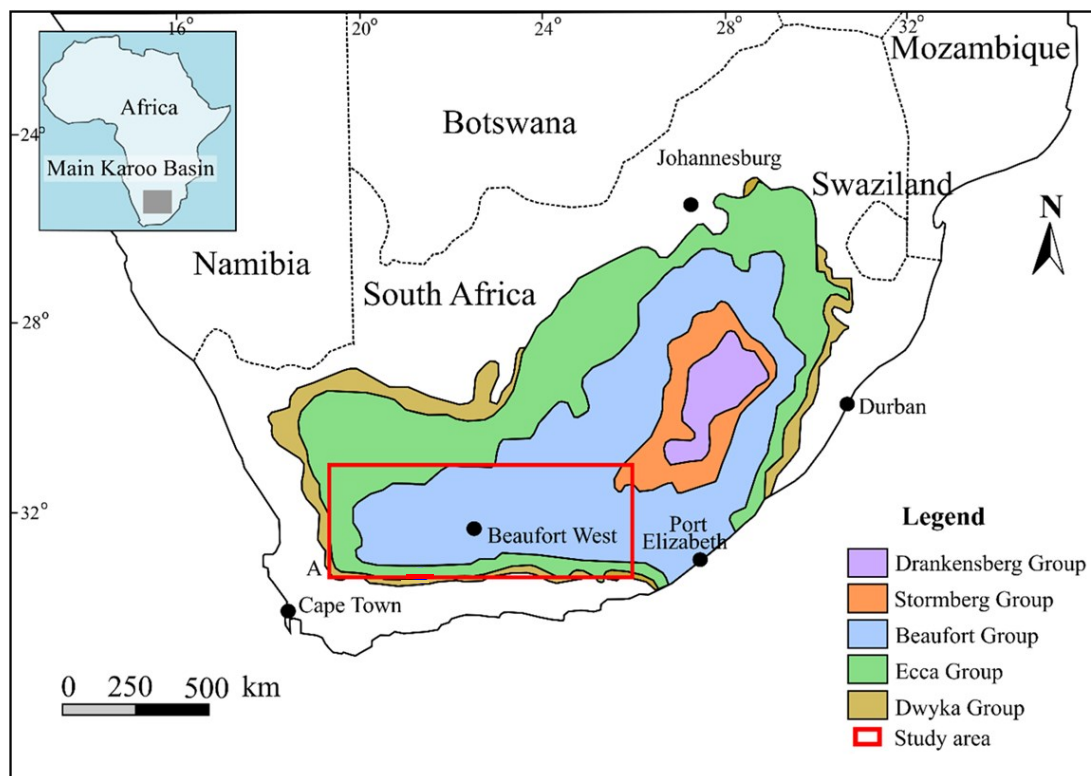
The Research Project is owned by the Department of Mineral and Petroleum Resources (DMPR). The Petroleum Agency of South Africa (PASA) is the designated entity leading the processes on behalf of the state. Wits Enterprise (in its capacity as an agent of Wits University) is the service provider appointed to acquire, process and interpret geophysical data for the Research Project.

## 3. AIMS & OBJECTIVES OF THE RESEARCH PROJECT

The aim of the Research Project is to use geophysical methods to study and improve the understanding of the subsurface geology, regional structures and basin geometry of the south-central Karoo Basin (shown in **Figure 1**).

The broader objectives of the Research Project include the following:

- To gain a better understanding of the subsurface geology;
- To understand the major geological structures controlling groundwater and to determine the structural linkage between shallow and deep groundwater aquifers;
- To monitor the groundwater movement and determine potential contamination;
- To develop deeper knowledge of geohazards, specifically seismicity (earthquakes);
- To understand the key geological attributes needed for broader environmental mapping;
- To develop an understanding of the major geological structures that could control natural resources;
- To allow for integrated planning for best use of land; and
- To develop skills for new and emerging industries.



**Figure 1:** Regional Geological Map of the Main Karoo Basin

### Basic research questions:

- How **deep** and **thick** is the stratigraphy of the Karoo Supergroup?
- Where are **groundwater aquifers** and how **deep** are they? Are they compartmentalized by **sills** and **dykes**? Are there any signs of contamination?
- Is there a **structural linkage** between shallow and deep groundwater aquifers?
- Are there any structures associated with **natural resources** in the Karoo Supergroup?
- Are there any potential **geohazards** and **geo-environmental risks**?

## 4. OVERVIEW OF SEISMIC SURVEY

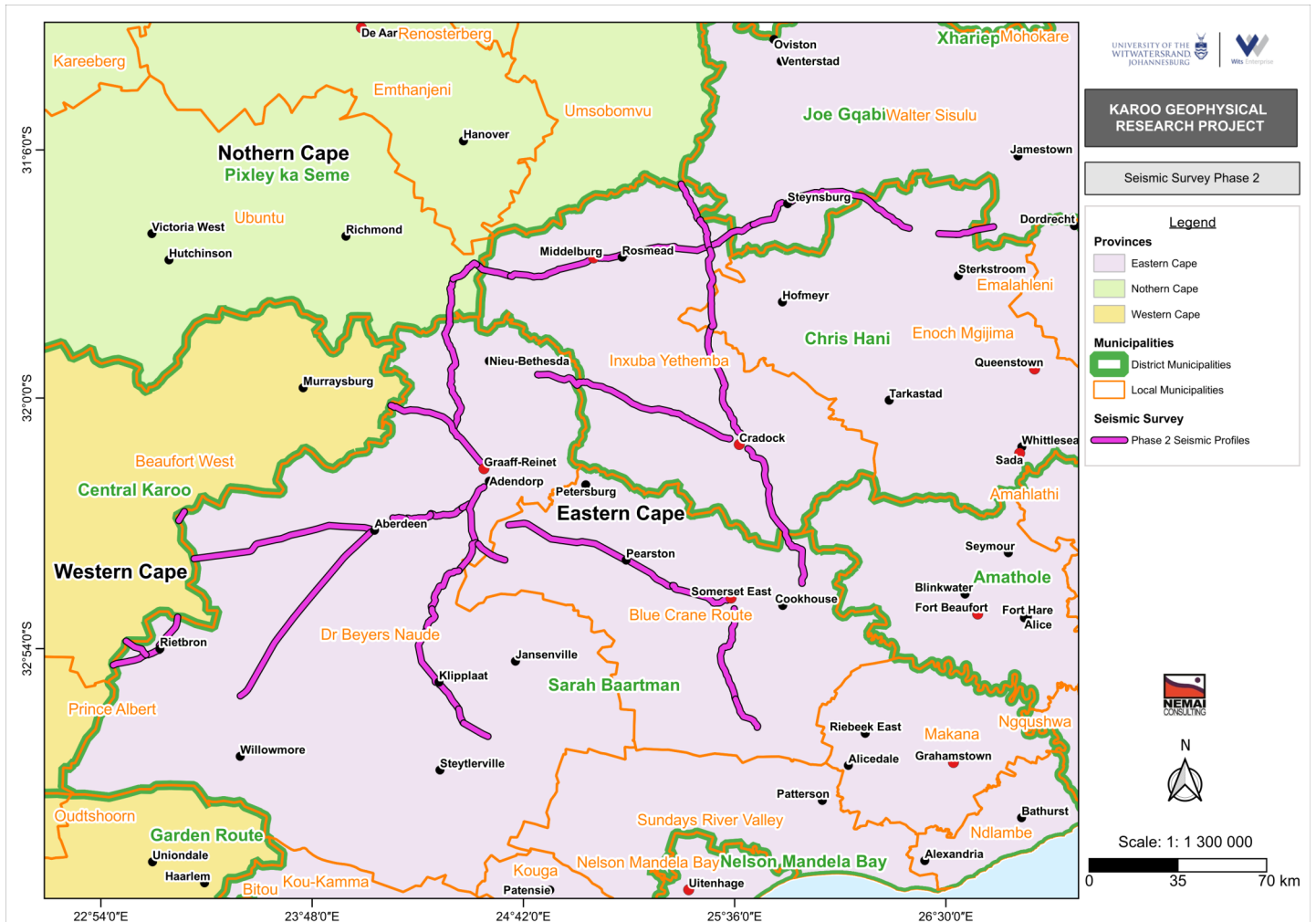
### 4.1 Location

Phase 2 of the seismic survey will occur in the following areas (see **Figure 2**):

- Eastern Cape Province:
  - Sarah Baartman District Municipality (DM) - Blue Crane Route Local Municipality (LM) and Dr Beyers Naude LM;
  - Chris Hani DM - Enoch Mgijima LM and Inxuba Yethemba LM; and
  - Joe Gqabi DM - Walter Sisulu LM.
- Northern Cape Province:
  - Pixley ka Seme DM - Ubuntu LM.

#### Nearest towns:

- |                 |                 |
|-----------------|-----------------|
| • Graaff-Reinet | • Adendorp      |
| • Middelburg    | • Rosemead      |
| • Cradock       | • Steynsburg    |
| • Aberdeen      | • Pearston      |
| • Somerset East | • Klipplaat     |
| • Rietbron      | • Nieu-Bethesda |



**Figure 2:** Footprint of Seismic Survey Phase 2 in relation to provinces and municipalities

### 4.2 Survey Technique

#### 4.2.1 Introduction

Geophysical surveys are conducted to infer the structure and properties of the Earth's interior. Typically, measurements are made of variations in the Earth's gravitational and magnetic fields.

The geophysical surveys proposed as part of the overall Research Project include airborne magnetic, Magnetotelluric (MT), and land reflection seismic surveys (active and passive). These techniques were chosen to meet the objectives of the survey, and also because they are cost-effective, novel and environmentally friendly.

Note that the subject of this document is the seismic survey only and this survey technique is explained further overleaf.



#### 4.2.2 Seismic Survey

Seismic surveys can either be active (i.e., use controlled man-made energy sources), or passive (i.e., use natural sources such as vibrations produced by ocean waves, or uncontrolled man-made sources such as traffic noise). The man-made or natural source-generated signals (i.e., data acquisition) are measured in the field by the specialized sensitive detectors, processed in the field/office (i.e., to remove 'unwanted information' or 'noise'). The output is displayed and interpreted geologically using advanced computer techniques for further analysis and evaluation. This project will utilise both active and passive methods.

For an active seismic survey, a truck called a 'vibrator' and seismic sensors called 'geophones' will be used along the roadside. A truck transmits sound waves deep into the earth. The waves bouncing back (reflections) are captured by sensors. The signals from the sensors are analysed to create a picture of the subsurface geology. In contrast to other seismic sources such as explosives (known as 'blasting'), the vibroseis vehicle is environmentally friendly because it generates artificial seismic waves through mechanical vibration. The survey will also utilise novel and non-invasive wireless (cable-free) sensors. This technology was chosen to reduce risk and minimise any environmental impact.

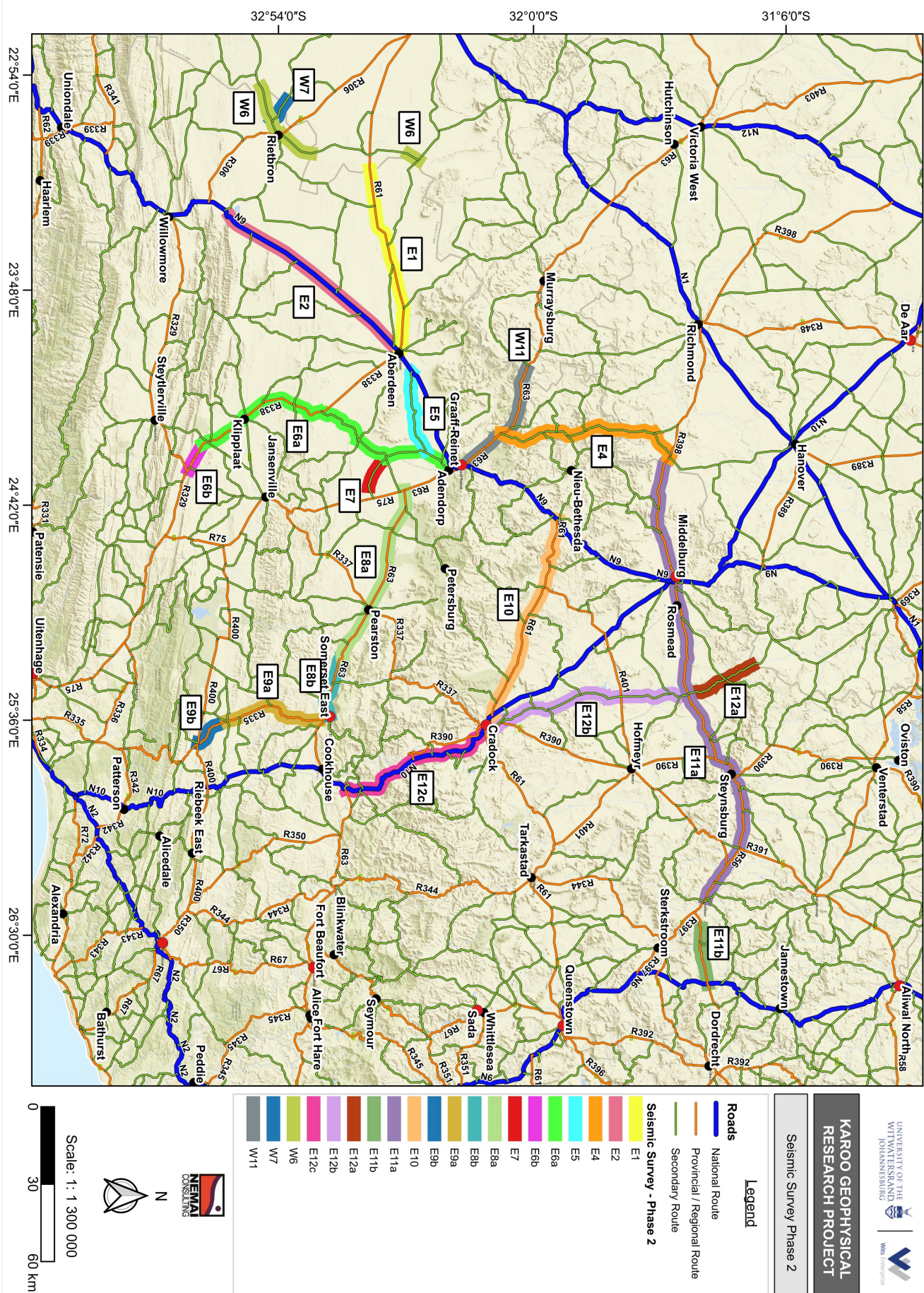
Only public roads (including national, provincial, and municipal roads) will be used for the seismic survey. The proposed seismic profiles and main roads are shown in **Figure 4** below.

Photographs of an example of a previous seismic survey, using a similar set-up to the Karoo survey, is provided in **Figure 3** below.



**Figure 3:** Example of a previous survey using a similar set-up to the Karoo survey







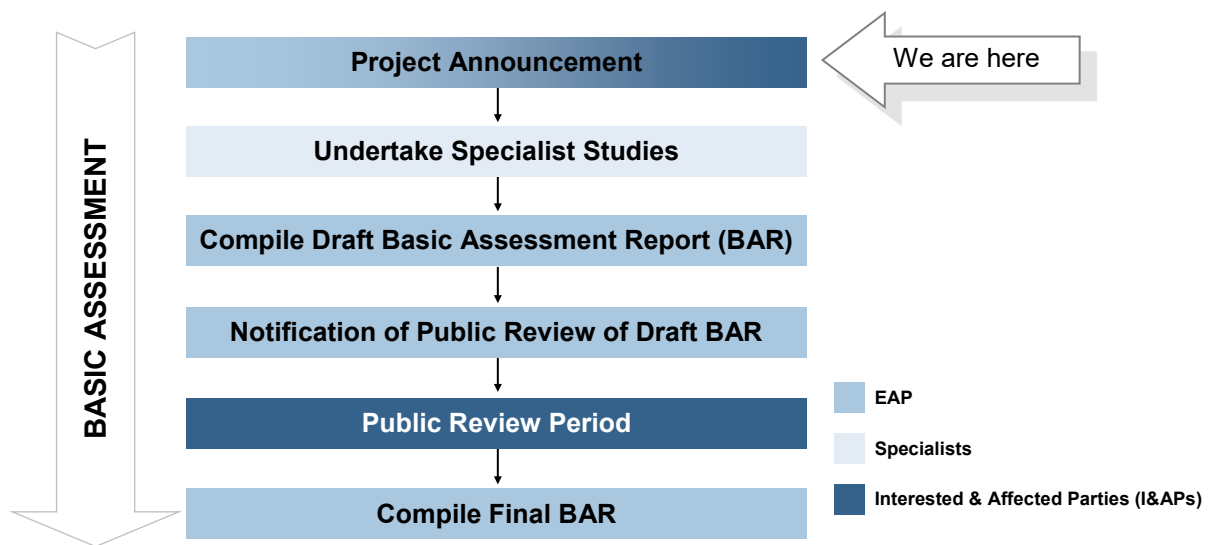
## 5. ENVIRONMENTAL ASSESSMENT

### 5.1 Environmental Governance Framework

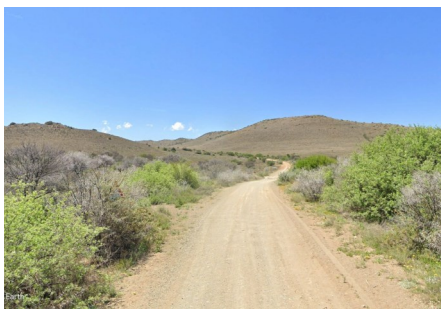
This is a Geoscientific research project conducted in terms of section 50(1) of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA), published in the Government Gazette by the Minister on 22 November 2024 to 09 January 2025. The published notice invited written comments on the proposed investigation; specifying an address to which and the date before which comments must be submitted; and calling on the owner, occupier or person in control of such land to furnish the Minister with his/her particulars. While an Environmental Impact Assessment (EIA) and Public Consultation are only mandated for Listed Activities under the National Environmental Management Act (Act No. 107 of 1998) (NEMA), they will be conducted in this instance.

### 5.2 Basic Assessment

Nemai Consulting was appointed by Wits Enterprise as the independent Environmental Assessment Practitioner (EAP) to conduct the Basic Assessment for the Research Project. An outline of the Basic Assessment is provided in Figure 5.



**Figure 5:** Outline of the Basic Assessment for the Research Project



### 5.3 Stakeholder Engagement

#### 5.3.1 Purpose of Stakeholder Engagement

Public Participation will be undertaken as part of the Basic Assessment, which will include the following key tasks (amongst others):

- Compile and maintain a database of stakeholders;
- Announce Phase 2 of the seismic survey and allow for the registration of Interested and Affected Parties (I&APs) (*note: this is where we currently are in the process*); and
- Grant authorities and registered I&APs a period of 30 days to review and submit comments on the draft Basic Assessment Report.

### 5.3.2 Public Meetings

The following public meetings will be held to provide a platform for project-related discussions and to obtain input from stakeholders:

**Table 1: Details of Public Meetings - Seismic Survey Phase 2**

	Town	Date	Time	Venue
Physical Meeting 1	Graaff-Reinet	22 July 2025	15:30 to 17:30	Alex Laing Community Hall
Physical Meeting 2	Somerset East	23 July 2025	15:30 to 17:30	Somerset East Town Hall
Physical Meeting 3	Middelburg	24 July 2025	15:30 to 17:30	Middelburg Town Hall
Physical Meeting 4	Nxuba (Cradock)	25 July 2025	15:30 to 17:30	Cradock Town Hall
Virtual Meeting	N/A	30 July 2025	10:00 to 12:00	Virtual Platform



Note the following:

- The same information will be presented at all the public meetings. Hence, you only need to attend one of these meetings.
- If you want to attend the virtual Public Meeting, **please RSVP with the person below by 23 July 2025**. The meeting link will only be shared with the pre-registered parties.

### 5.3.3 Providing Comments

Please submit your contact information and any comments that you may have regarding Phase 2 of the seismic survey, which forms part of the Research Project, to the contact person below by **21 August 2025**. The attached Reply Form can be used for commenting purposes.

## 6. CONTACT DETAILS

For any queries or comments related to Phase 2 of the seismic survey, please contact the EAP below:



**Contact Person:** *Donavan Henning*  
**Tel:** *(011) 781 1730*  
**Mobile:** *082 891 0604*  
**Email:** *donavanh@nemai.co.za*  
**Postal Address:** *PO Box 1673, Sunninghill, 2157*