PRELIMINARY GEOTECHNICAL REPORT

PROPOSED RESIDENTIAL DEVELOPMENT ON REM ERF 2833, GROOTBRAK, MOSSEL BAY

22 April 2024 (Rev 0)

Prepared by:

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Applicant:
NEW CARE INNOVATIONS (PTY) LTD

EAP:
CAPE EA PRAC
17 PROGRESS STREET
GEORGE

Ref No: 2024\Cape EA Prac\Rem Erf 2833Grootbrak\PrelimReport\PrelimGeotech Report 22.4.2024 Rev0

Report review history:

Revision No	Date	Prepared by:	Reviewed and approved by:
0	22.4.2024	I Paton	I Paton Pr Sci Nat Pr Tech Eng
			

Authors qualifications and affiliations:

Iain Paton has post graduate degrees in Geology and Geotechnical Engineering and has over 25 years' experience in the mining, energy and construction industries. Iain Paton is a registered geotechnical professional with the Engineering Council of South Africa (ECSA) and the South African Council for Natural and Scientific Professions (SACNSP). Iain Paton is a member of the Geotechnical Division of the South African Institute of Civil Engineering (SAICE), South African Institute of Engineering and Environmental Geologists (SAIEG), the and the Institute of Municipal Engineering of South Africa (IMESA).

Declaration of independence:

The authors of this report are independent professional consultant with no vested interest in the project, other than remuneration for work associated with the compilation of this report.

General limitations:

1. The investigation has been conducted in accordance with generally accepted engineering practice, and the opinions and conclusions expressed in the report are made in good faith based on the information at hand at the time of the investigation.
2. The contents of this report are valid as of the date of preparation. However, changes in the condition of the site can occur over time as a result or either natural processes or human activity. In addition, advancements in the practice of geotechnical engineering and changes in applicable practice codes may affect the validity of this report. Consequently, this report should not be relied upon after an eclipsed period of one year without a review by this firm for verification of validity. This warranty is in lieu of all other warranties, either expressed or implied.
3. Unless otherwise stated, the investigation did not include any specialist studies, including but not limited to the evaluation or assessment of any potential environmental hazards or groundwater contamination that may be present.
4. The investigation is conducted within the constraints of the budget and time and therefore limited information was available. Although the confidence in the information is reasonably high, some variation in the geotechnical conditions should be expected during and after construction. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent this could affect the proposed project, and it may be necessary to re-evaluate recommendations in this report. Therefore, it is recommended that Outeniqua Geotechnical Services is retained to provide specialist geotechnical engineering services during construction in order to observe compliance with the design concepts, specifications and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction. Any significant deviation from the expected geotechnical conditions should be brought to the author's attention for further investigation.
5. The assessment and interpretation of the geotechnical information and the design of structures and services and the management of risk is the responsibility of the appointed engineer.

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1. Introduction

1.1 Background information

The proposed development of Remainder of Erf 2833, Great Brak, includes 12 single residential erven and 31 group residential erven, to be located in two separate areas of the site (see Figure 1 and 2).

1.2 Site description

The site is located along Sandhoogte Road, approximately 1km west of the town centre of Great Brak. The topography is described as moderately to steeply sloping terrain with a natural watercourse which roughly bisects the site, draining in a southwesterly direction towards the street below. Access to the site was gained from an existing servitude driveway along the western boundary which leads off Sandhoogte Road. The site was vacant and covered in fairly dense coastal fynbos bush with some clearings covered on long grass (see Figure 3).

1.3 Scope of work

The Environmental Assessment Practitioner (EAP) appointed Outeniqua Geotechnical Services on behalf of the Applicant to conduct a preliminary investigation, including a desktop study and brief site walk-over survey, to assess the geology and general geotechnical conditions on the site, with special focus on probability of slope stability problems which may affect the proposed development, and any recommendations for mitigating measures to be adopted.

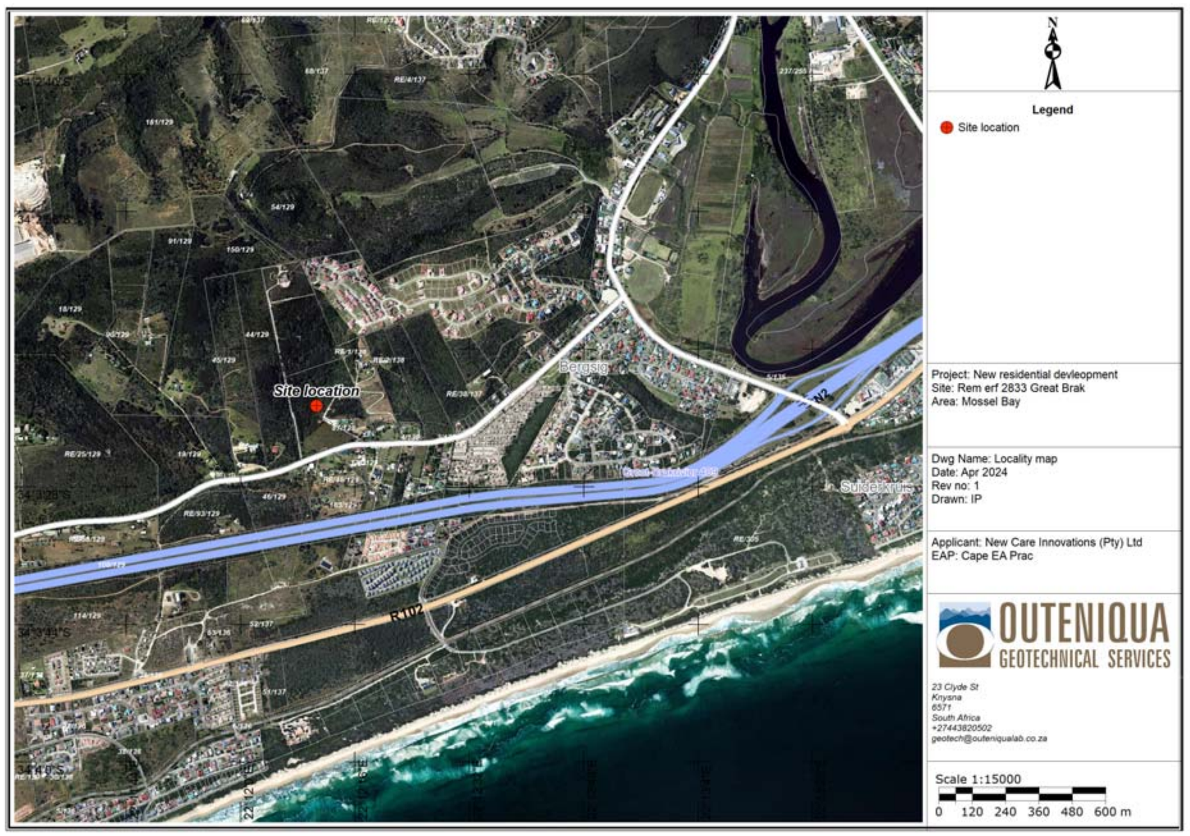

Figure 1: Site locality map

Figure 2: Site development plan (source: JV Town Planner)


Figure 3: Aerial photo of site

1.4 Available information

The following information was available for consultation:

- 1:50 000 geological map of the area, obtained from the Council for Geoscience.
- Topo-cadastral data for the area, obtained from the National Geospatial Institute (NGI).
- Aerial photos of the area, obtained from the ESRI and Google Earth.
- Site development plan provided by the EAP (produced by Jan Vrolik Town Planners).
- In-house geotechnical databases.

1.5 Limitations

This preliminary investigation was conducted in accordance with the SAICE Code of Practice for Site Investigations. The study did not include any subsurface investigations or testing, and the conclusions were drawn purely from a visual assessment of the site and experience of the geology and geotechnical conditions in the local area.

2. Site geology

The 1:50 000 geological map indicated that the site was underlain by fine grained sedimentary rocks of the Kirkwood Formation of the Uitenhage Group (See Figure 4). Sediments of the Uitenhage Group were deposited in the Mossel Bay basin during the breakup of Gondwana during the Jurassic-Createceous period circa 60-160 million years ago. The Kirkwood Formation is composed of sedimentary rocks deposited under fluvial conditions at or near sea level, such as variegated mudstone, siltstone and fine-grained sandstone. In the Mossel Bay area, the Kirkwood Formation is underlain and overlain by conglomerates of the Enon and Buffelskloof Formations, respectively.

3. Seismicity

The Southern Cape has historically been an area of low seismic activity with a maximum intensity of V, according to the Modified Mercalli scale (see Figure 5) – described as a rather strong tremor, felt generally, sleepers awakened, no significant damage. Approximate equivalent to 4.8 on the Richter scale.

4. Geotechnical conditions

Geotechnical conditions associated with the Kirkwood Formation typically include a clay-rich soil profile, which is prone to expansion and contraction (active soil) with fluctuations in ground moisture content, and particularly influenced by seasonal changes in rainfall. An exposure of such typical clayey soil profile was observed in the road cutting along the southern boundary of the site (see Figure 6). The fine-grained soils are also typically prone to a reduction in shear strength, and this can cause settlement of foundations and instability on very steep slopes and excavations. Exposed soils are also prone to erosion and dispersion under the influence of concentrated stormwater. Shallow groundwater seepage (a perched water table) is also expected on slopes in wet conditions. In summary, special consideration will be required in the engineering design to mitigate any negative impacts these factors may have on structures and civil services.

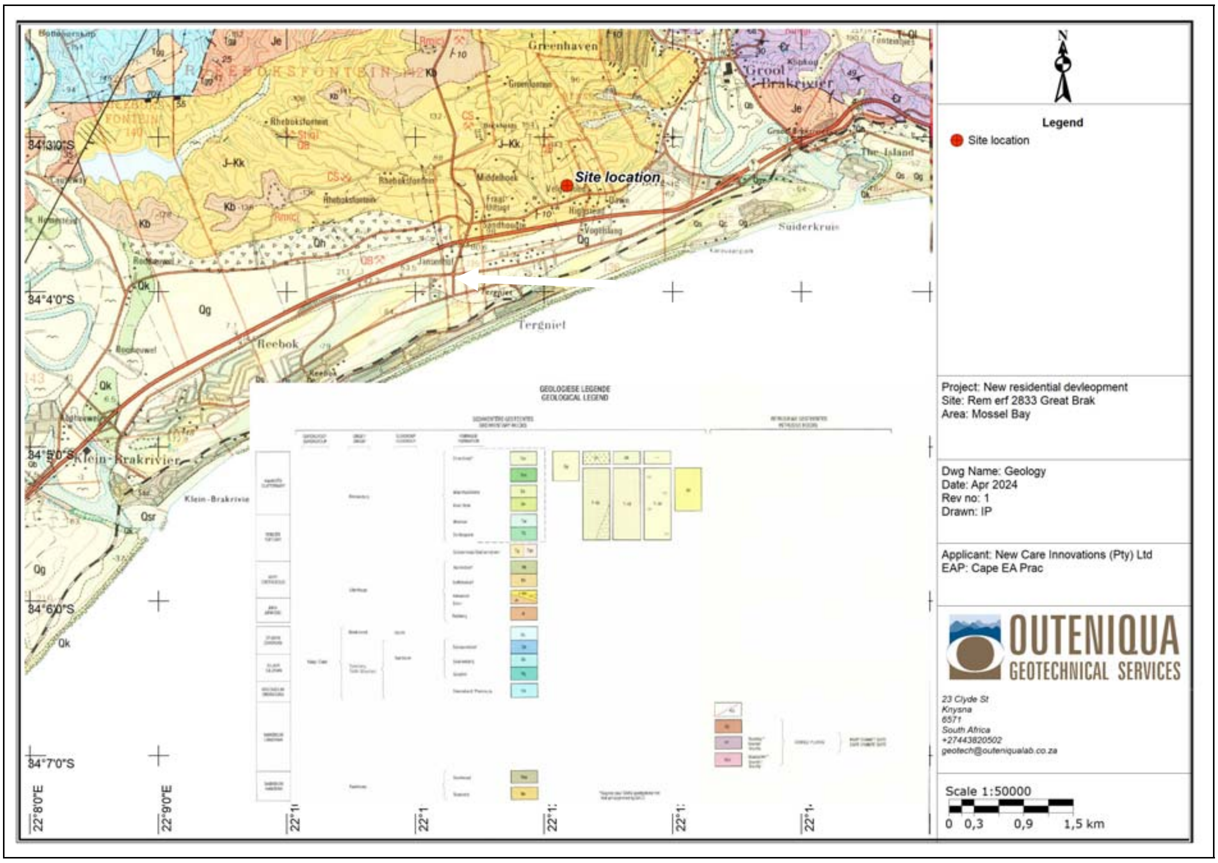

Figure 4: Geological map of the area

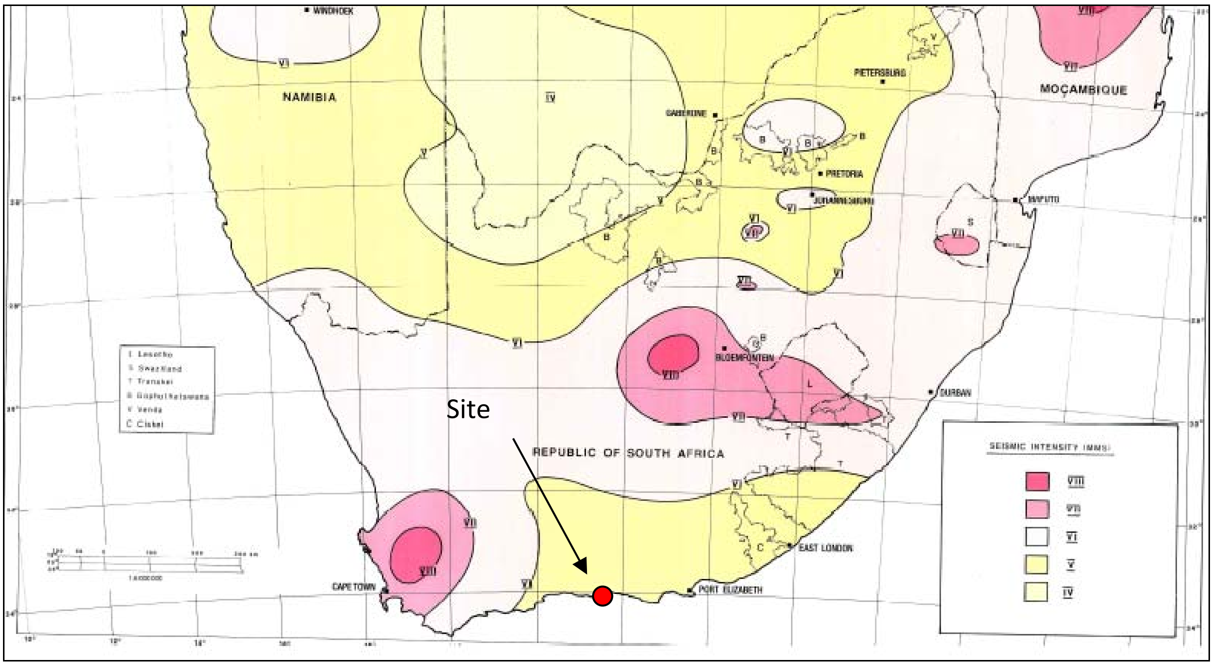

Figure 5: Peak ground acceleration with a 10% probability of being exceeded once in a 50 year period (Brandt, 2011)

Figure 6: Reddish orange clayey soil profile exposed in road cutting along southern boundary of the site (inset: shattered clay structure)

5. Slope stability

The natural slope gradients on the site were estimated ranging between 1v:8h/~7° (low) on the southwest (lower) side to 1v:3h/~18° (steep) on the northeast (higher) side of the site. No signs of any significant slope stability issues were noted in the general site area, although a detailed survey could not be undertaken due to the dense vegetation cover, particularly along the natural drainage line that bisects the site. A small-scale soil slip was, however noted along the very steep road cutting embankment along the southern boundary (see Figure 7). The gradient of this embankment was estimated at 1v:1.5h/34° (very steep). In general and under normal conditions, natural slopes with a gradient of 1v:4h (14°) or less with no superimposed loading are considered to be generally stable, and natural slopes steeper than this are considered marginal or unstable and may require special consideration.

Figure 7: Small soil slip on the road cutting along the southern boundary

6. Assessment

The site is underlain by potentially problematic soils; the topography is charactersied by some moderate to steep slopes and the site is bisected by a natural drainage line, all of which tends to complicate the development of the site. However, there are areas which have been identified on the site which appear to be more suitable for development and there are solutions which can be employed in the engineering design to mitigate the geotechnical risks further.

7. Recommendations

7.1 Site development layout

The proposed site development plan generally appears to take into account the site topography and slope constraints, as the development areas are confined to areas where slope gradients are less than or equal to 1v:4h, which is considered stable. Special attention is, however, drawn to the steep embankment along the southern boundary which falls within the proposed erven in this area. Special mitigating measures are recommended here, e.g. a development set-back line of 3m from the crest of the slope or, alternatively provision should be made to support/retain this embankment with suitable methods.

7.2 Earthworks and excavations

Modification of natural slopes can lead to instability and bulk earthworks and excavations should take into account safe slope angles, as this will have an impact on slope batters and/or shoring requirements for temporary excavations exceeding 1m for retaining walls, etc. and this should be designed and supervised by an engineer. Similarly, filled embankments (e.g. on cut-to-fill platforms) will require suitable retaining systems to prevent subsidence and/or sliding.

7.3 Structural foundations

Foundations on potentially expansive and/or compressible soils may require special reinforcement and stiffening to resist movement. Bearing pressures may also be restricted, particularly for foundations on or near slopes or retaining walls. Detailed investigations including laboratory testing of soil is recommended in order to provide more information for design purposes.

7.4 Stormwater Drainage

Careful consideration should be paid to the expected increased run-off from hard surfaces on individual properties and roads and the handling and discharging of stormwater into natural drainage lines or formalised stormwater systems. Consideration should also be given to the capacity of the natural drainage line and possible flooding which may affect properties in the lower reaches.

8. Conclusions

This preliminary investigation has established the general topography, geology and geotechnical conditions on the site. Some constraints have been identified and preliminary recommendations have been provided for consideration by the planners and engineers, but further investigations are recommended to inform the detailed design process.

References

Brandt, M. 2011. Seismic Hazard in South Africa. Report for the Council for Geoscience, Pretoria.

1:50 000 Geological Series Sheet 3422AA Mosselbaai, 1993. Council for Geoscience, Government Printer, Pretoria.

Appendix 1

Maps

N

Legend

Site location

Project: New residential devleopment
Site: Rem erf 2833 Great Brak
Area: Mossel Bay

Dwg Name: Locality map
Date: Apr 2024
Rev no: 1
Drawn: IP

Applicant: New Care Innovations (Pty) Ltd
EAP: Cape EA Prac

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Scale 1:15000

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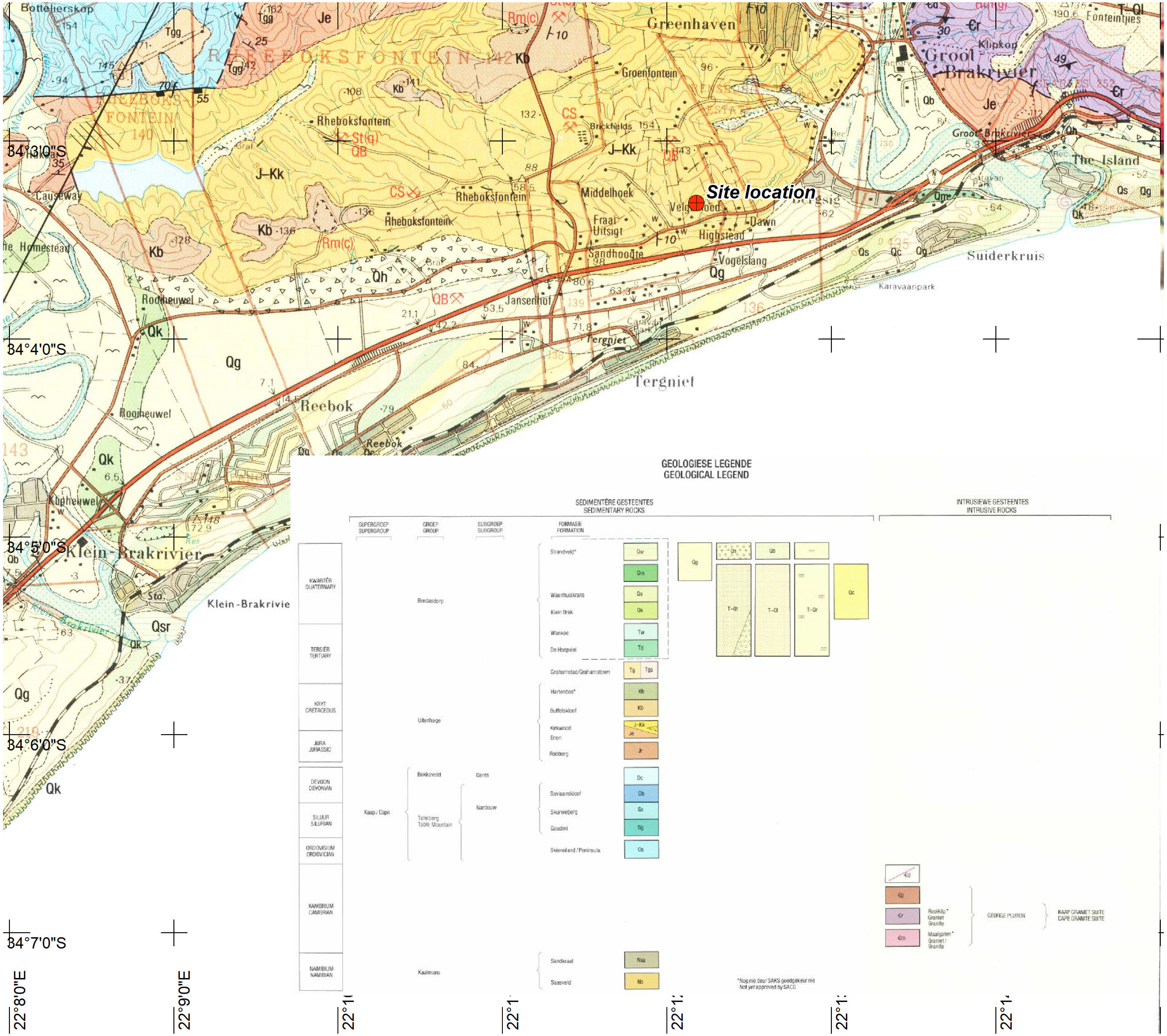

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Legend

Site location

Project: New residential devleopment
Site: Rem erf 2833 Great Brak
Area: Mossel Bay

Dwg Name: Geology
Date: Apr 2024
Rev no: 1
Drawn: IP

Applicant: New Care Innovations (Pty) Ltd
EAP: Cape EA Prac

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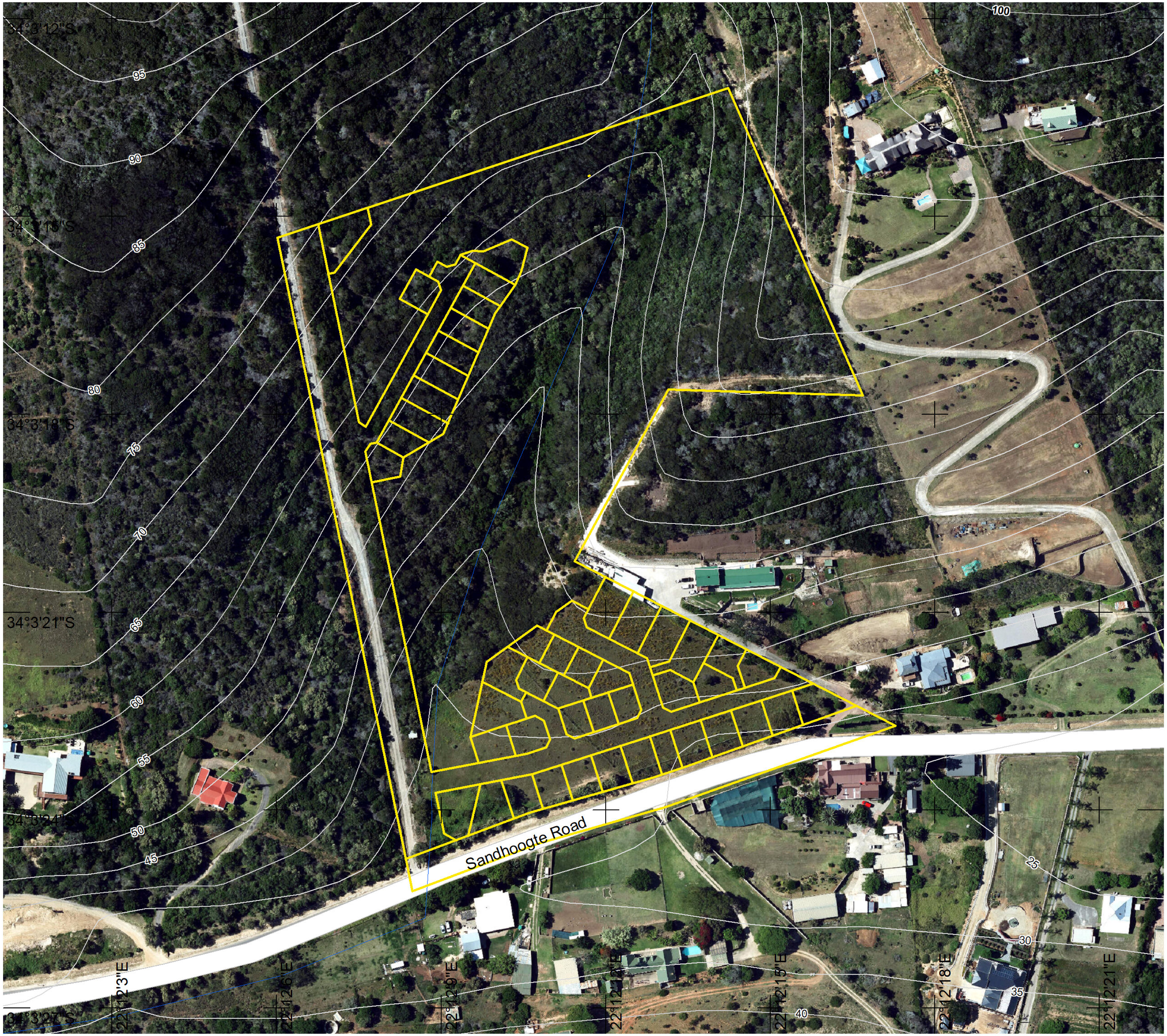
Scale 1:50000

0 0,3 0,9 1,5 km



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JVLayout_6Feb24

Project: New residential devleopment
Site: Rem erf 2833 Great Brak
Area: Mossel Bay

Dwg Name: Site development plan
Date: Apr 2024
Rev no: 1
Drawn: IP

Applicant: New Care Innovations (Pty) Ltd
EAP: Cape EA Prac

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Scale 1:2500

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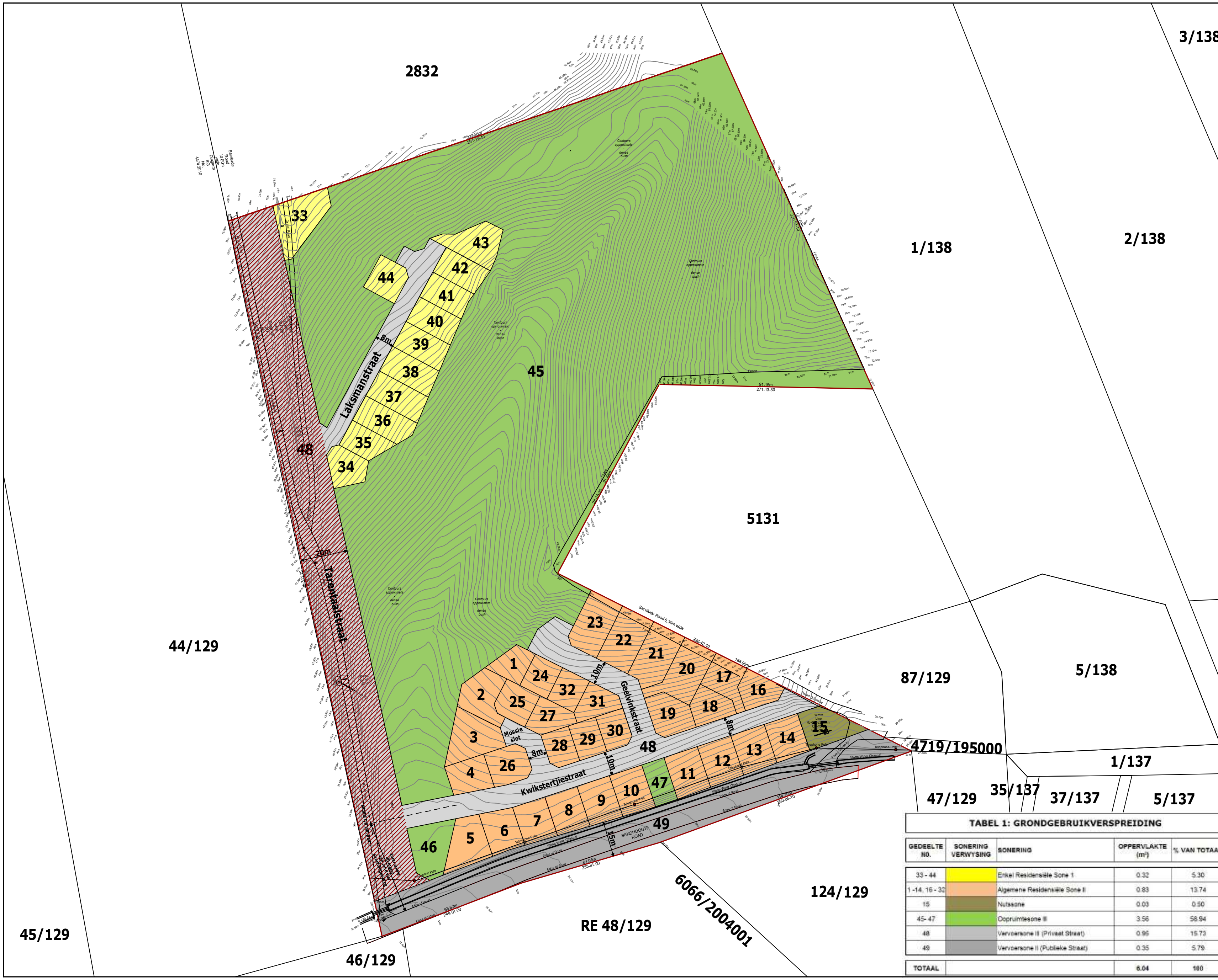

TABEL 1: GRONDGEBRUIKVERSPREIDING

GEDEELTE NO.	SONERING VERWYSING	SONERING	OPPERVLAKTE (m^2)	% VAN TOTAAL
33 - 44		Enkel Residensiële Sone 1	0.32	5.30
1 -14, 16 - 32		Algemene Residensiële Sone II	0.83	13.74
15		Nutssone	0.03	0.50
45- 47		Oopruimtesone II	3.56	58.94
48		Vervoersone II (Privaat Straat)	0.95	15.73
49		Vervoersone II (Publieke Straat)	0.35	5.79
TOTAAL			6.04	100

AANSOEK:

- Aansoek word in terme van Artikel 15(2)(a) van die Verordening op Grondgebruikbeplanning vir Mosselbaai Munisipaliteit, 2021 gedoen vir die hersonering van die Restant van Erf 2833 Groot Brakrivier vanaf Landbousone I na 'n Onderverdelingsgebied bestaande uit Enkel Residensiële Sone I erwe (± 0,32 hektaar), Algemene Residensiële Sone I erwe (± 0, 83 hektaar), 1 Nutssone erf (± 0, 03 hektaar), 3 Oopruimtesone II erwe (± 3, 56 hektaar), 'n Vervoersone III erf (Privaat straat) (± 0, 95 hektaar) en 'n Vervoersone II erf (Publieke straat) (± 0, 35 hektaar).

- Aansoek word in terme van Artikel 15(2)(d) van die Verordening op Grondgebruikbeplanning vir Mosselbaai Munisipaliteit, 2021 gedoen vir die onderverdeling van die Onderverdelingsgebied in die volgende erwe:

  i. 12 Enkel Residensiële Sone I erwe (Gedeeltes 33 tot 44);
  ii. 31 Algemene Residensiële Sone I erwe (Gedeeltes 1 tot 14 en 16 tot 32);
  iii. 3 Oopruimtesone II erf (Gedeelte 45 - 47);
  iv. 1 Vervoersone III (Privaat Straat) erf (Gedeelte 48), en
  v. 1 Vervoersone II (Publieke Straat) erf (Gedeelte 49).

NOTA

Serwituut: Reg van Weg (Landmeter Generaal Diagram Nommer 5859/2003), 20 meter wyd. Serwituut word gehandhaaf om vrye toegang tot Erf 2832 Groot Brakrivier te verseker.

0 5 10 15 20 30 40 50 60 70
SKAAL IN METER

cell: 082 464 7871 | email: janvrolijk@vodmail.co.za

PROJECT
VOORGESTELDE HERSONERING EN ONDER-VERDELING: RESTANT VAN ERF 2833 GROOT BRAKRIVIER

DRAWING TITLE
HERSONERING EN ONDERVERDELINGSPLAN

PROJECT No.	DWG No.	REVISION No.	DATE OF PRINT
ERF 2833 G BRAK	P.2	3	06.02.2024
SCALE	**PROJECT DATE**	**DRAWN BY**	**CHECKED BY**
NTS	SEPT 2023	AA	JV

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PLAN 3: HELLINGSANALIESE

ERF 2833, GROOT BRAKRIVIER

124/129

LEGENDE

- 1:4 HELLINGSANALIESE
- 32 METER GEEN ONTWIKKELINGSSONE

N

0 5 10 15 20 30 40 50 60 70
SKAAL IN METER

JAN VROLIJK JV TOWN PLANNER • STADSBEPLANNER