

## MAKUUTU RARE EARTH EXPLORATION TARGET

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### HIGHLIGHTS

- ❖ Globally significant Exploration Target defined at the Makuutu Ionic clay Rare Earth Project
  - ❖ Mineralisation starts at approximately 1 metre below surface, is flat lying with an average thickness of circa of 13.5 metres and may extend over an area of 15km x 1.5km
  - ❖ Defined ionic clay hosted rare earth deposits are rare outside of China, making them strategically important potential sources of non-Chinese rare earth supply
  - ❖ Exploration Target indicates Makuutu could be one of the largest Ionic clay rare earth deposits outside of China with grades typical of these types of deposits
  - ❖ Initial diamond drilling program is planned commence in September 2019 with an aim to collect samples for metallurgical test-work and increase geological data.
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Oro Verde Limited (ASX: OVL) (“Oro Verde” or “the Company”) is pleased to report that it has defined an Exploration Target at the Makuutu Rare Earths project (Makuutu) located in Uganda of:

**270 – 530 million tonnes grading 0.04 – 0.1 % TREO\***

\*This Exploration Target is conceptual in nature but is based on reasonable grounds and assumptions. There has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

Due diligence and examination of historic exploration results (ASX: 28 August 2019) indicated that the project had the potential to be large with drilling successfully encountering mineralisation over an area of 15 km x 1.5 km. A review of those drilling results, conformational assays undertaken by Oro Verde and technical reports generated by the current owner has enabled the Company to derive an initial exploration target (refer Table 4 for full breakdown). Mineralisation generally commences at about 1m from surface and has an average thickness of 13.5 metres.

Makuutu is significant in size and is understood to be potentially one of the largest ionic clay deposits outside of China with grades consistent with these types of deposits. Ionic clay-hosted Rare Earth deposits are a substantive source of existing critical and heavy rare earth production in China. The mining and processing of these deposits is generally simpler than hard rock deposits, which provides significant operating cost advantages. A general overview of these differences was provided in the market announcement on 5 July 2019.

## Geology

The Makuutu Project is located in the Paleoproterozoic (1600 – 2500 Ma) Lake Victoria Terrane with the Kayango granite and the Iganga Suite granites interpreted as basement rocks and potentially the primary source of the REE (Figure 1). Overlying the basement granites in the Project area is a basin filled with sediments including diamictite/glacial tills, mudstones, siltstones and shales. The upper units of these sediments are potentially derived from degradation of the surrounding granites and represent the protolith for the mineralisation at Makuutu.

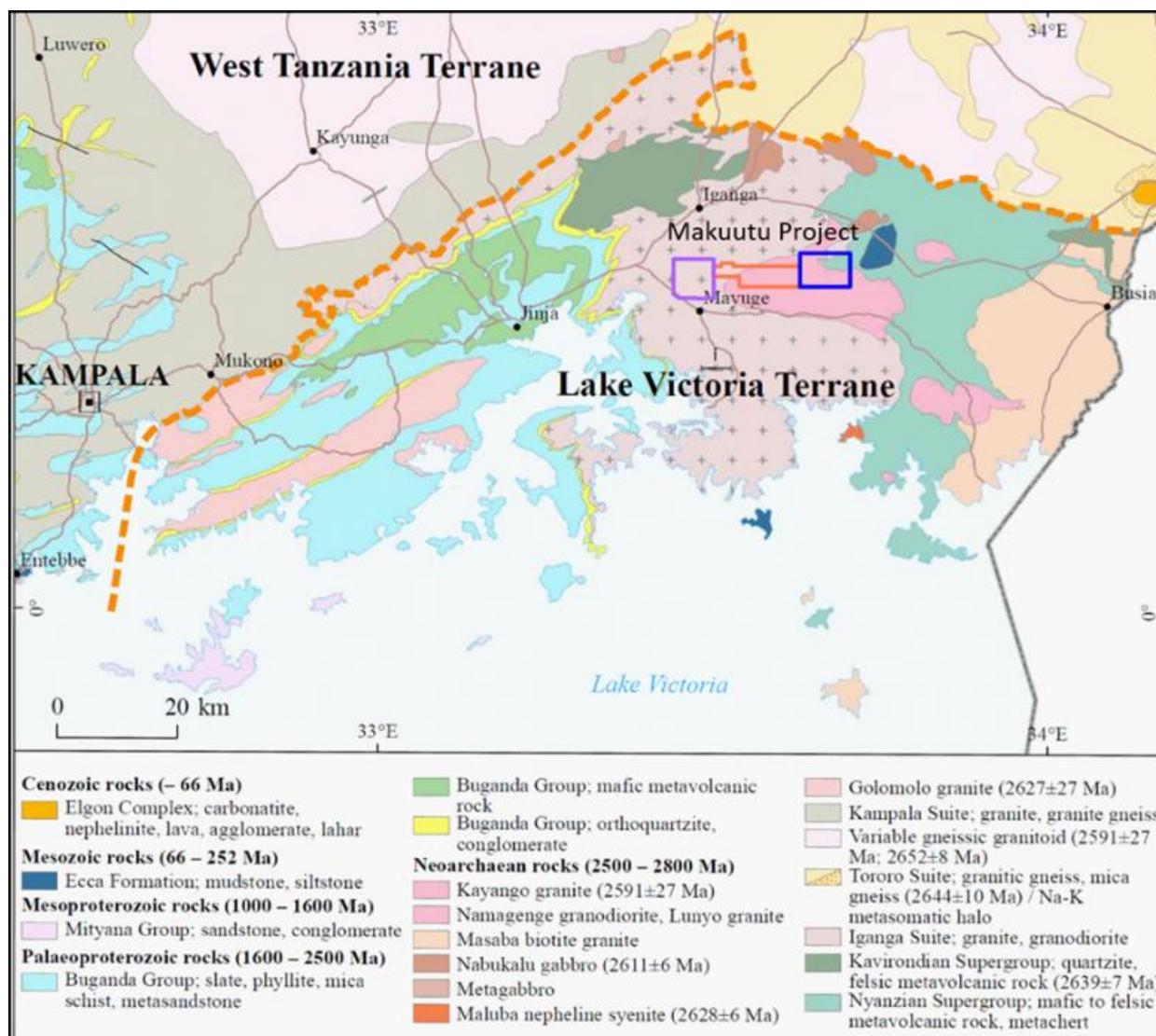


Figure 1. Project Geological Setting<sup>1</sup>.

## Previous Exploration

The previous exploration activities undertaken on the Makuutu Rare Earth project are summarised in Table 1. The drill hole details and REO analytical results from the 2016-2017 drilling program undertaken by Rwenzori Rare Metals is tabulated in Appendix 1 and Appendix 2 of the ASX announcement made by the Company on 28 August 2019” Confirmation of Makuutu Mineralisation Bearing Rare Earths”.

<sup>1</sup> Geological Survey of Finland, Special Paper 55, 2014; Geology and Geodynamic Development of Uganda with Explanation of the 1:1,000,000 -Scale Geological Map.

**Table 1. Previous Exploration activities undertaken on the Makuutu Project.**

<b>Period</b>	<b>Activities Undertaken</b>
1990s	French BRGM and Ugandan DGSM agencies undertook geochemical and geological surveys over South-Eastern Uganda including the Project area. Anomalous Au, Zn, Cu, Sn, Nb and V areas were identified.
2006-2009	Country wide high resolution airborne magnetic and radiometric survey identified U anomalism in the Project area.
2009	Finland GTK reprocessed radiometric data and refined the Project anomalies.
2010	Kweri Ltd undertook field verification of radiometric anomalies including scout sampling of existing community pits. Samples showed an enrichment of REE and Sc.
2011	Kweri Ltd conducted ground radiometric survey and evaluated historic groundwater borehole logs.
2012	Kweri Ltd and partner Berkley Reef Ltd conducted prospect wide pit excavation and sampling of 48 pits and a ground gravity traverse. Pit samples showed enrichment of REE weathered profile. Five (5) samples sent to University of Toronto - Aqueous Research Laboratory for cursory metallurgical evaluation.
2016-2019	Rwenzori Rare Metals conducted excavation of 11 pits, ground gravity survey, RAB drilling (109 drill holes) and one (1) diamond drill hole. Metallurgical testing of was undertaken on select RAB drill samples by SGS and a bulk sample processed by Mintek.

### Mineralisation Style and Occurrence

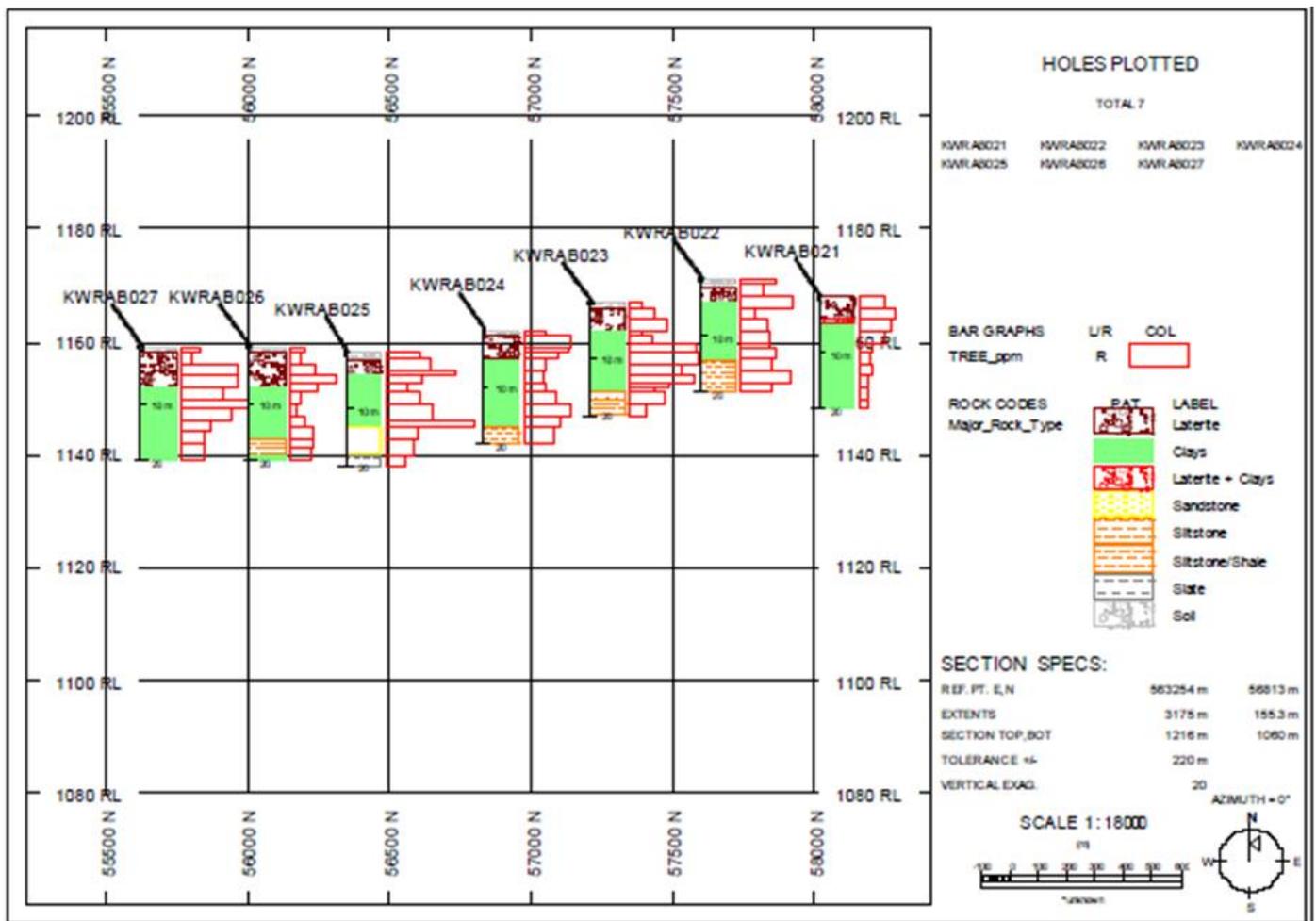
The REE mineralisation at Makuutu is considered to be ionic clay style similar to the type of deposits found in China, Madagascar and Brazil, with the mineralisation hosted in the near surface tropical lateritic weathered sediments. The weathered profile is typically comprised of a surface hard-cap, followed by mottled clays grading to saprock and fresh sediments at the base. The hard-cap is variably overlain by recent alluvial soils, up to 1m thick. The average thickness of the mineralised zones >500ppm TREO is shown in Table 2.

**Table 2. Average thickness of mineralisation by host rock type (>500 ppm TREO cut-off).**

<b>Type</b>	<b>Minimum Thickness (m)</b>	<b>Maximum Thickness (m)</b>	<b>Average Thickness (m)</b>
<b>Laterite</b>	1.0	7.0	3.8
<b>Clay</b>	1.0	16.0	6.4
<b>Sediments</b>	1.0	10.0	3.3

A typical cross-section through the project area is shown in Figure 2. The clay band (illustrated in green) demonstrates the generally consistent nature of the profile over the section distance of 2.4 km. The REE mineralisation is dominantly hosted in the clay and laterite, although some rare earths are contained in the shales, albeit at lower concentrations than in the overlying clays.

The existing drilling on the Project shows a clear vertical zonation of REE through the weathered profile, which is typical of a laterite style of mineralisation. The zonation is notable as the light rare earths (LREE), particularly cerium, are concentrated in upper portions of the profile. The hard-cap and the mottled clays beneath the hard cap are more cerium rich relative to the rest of the mineralisation. The higher value rare earths such as neodymium, praseodymium, dysprosium and terbium are generally concentrated toward the mid to lower levels of the weathered sequence.



**Figure 2. Cross Section (A- A') showing consistency of clay and laterite (vertical exaggeration x20). (The location of the section line is shown in Figure 3)**

The average grades of TREO (Total Rare Earth Oxide), TREO-Ce<sub>2</sub>O<sub>3</sub> (Total Rare Earth Oxide minus Cerium Oxide), HREO (Heavy Rare Earth Oxides<sup>2</sup>) and CREO<sup>3</sup> (Critical Rare Earth Oxides<sup>4</sup>) from existing RAB drilling intersections >500 ppm TREO are summarised in Table 3.

These average grades demonstrate the higher concentrations of TREO-Ce<sub>2</sub>O<sub>3</sub>, HREO and CREO in the clay and sediments. Full details of these intersections are shown in Appendix 2 of the ASX announcement made by the Company on 28 August 2019" Confirmation of Makuutu Mineralisation Bearing Rare Earths".

**Table 3. Average grades by material type >500 ppm TREO intersections.**

Type	TREO (ppm)	TREO-Ce <sub>2</sub> O <sub>3</sub> (ppm)	HREO (ppm)	HREO (% of TREO)	CREO (ppm)
Laterite	904	303	89	10%	129
Clay	846	555	197	23%	274
Sediments	720	503	219	30%	253

<sup>2</sup> HREO = Sm<sub>2</sub>O<sub>3</sub> + Eu<sub>2</sub>O<sub>3</sub> + Gd<sub>2</sub>O<sub>3</sub> + Tb<sub>2</sub>O<sub>3</sub> + Dy<sub>2</sub>O<sub>3</sub> + Ho<sub>2</sub>O<sub>3</sub> + Er<sub>2</sub>O<sub>3</sub> + Tm<sub>2</sub>O<sub>3</sub> + Yb<sub>2</sub>O<sub>3</sub>, + Y<sub>2</sub>O<sub>3</sub> + Lu<sub>2</sub>O<sub>3</sub>

<sup>3</sup> U.S. Department of Energy Critical Materials Report 2011

<sup>4</sup> CREO = Nd<sub>2</sub>O<sub>3</sub> + Eu<sub>2</sub>O<sub>3</sub> + Tb<sub>2</sub>O<sub>3</sub> + Dy<sub>2</sub>O<sub>3</sub> + Y<sub>2</sub>O<sub>3</sub>

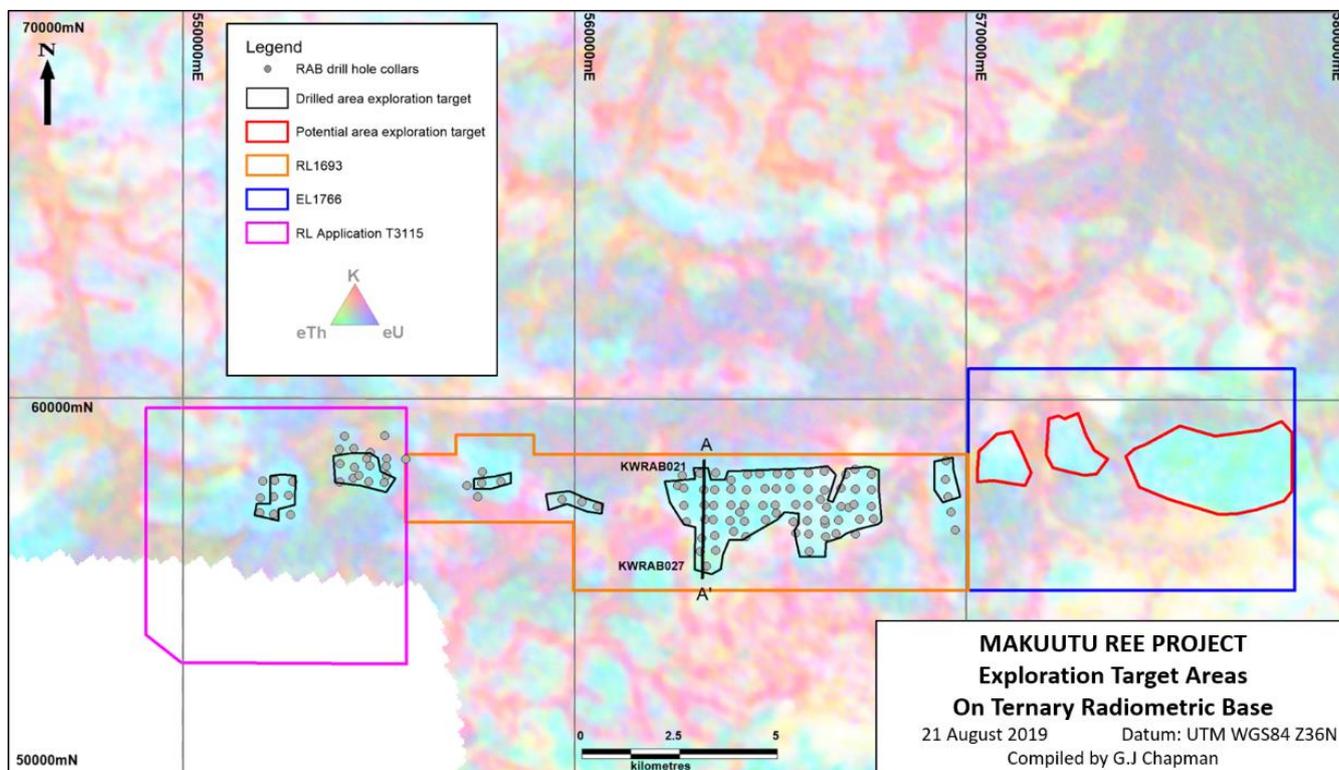
## Makuutu Project Exploration Target

An exploration target for the Makuutu project has been estimated using a combination of existing exploration results for areas where drilling has been undertaken, and projection of criteria such as grade and thickness of mineralisation to the untested but prospective areas. The exploration target is detailed in Table 4. The potential quantity and grade of the Exploration Target is conceptual in nature and there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

**Table 4. Exploration Target Ranges for the Makuutu Project.**

Exploration Target Ranges	Material Type			Totals (Mt)
	Laterite	Clay	Sediments	
Minimum Tonnes (Million Tonnes)	90	110	70	<b>270</b>
Maximum Tonnes (Million Tonnes)	170	220	140	<b>530</b>
Minimum Average TREO (ppm)	800	680	490	
Maximum Average TREO (ppm)	1000	930	790	
Minimum Average TREO – Ce <sub>2</sub> O <sub>3</sub> (ppm)	290	440	320	
Maximum Average TREO – Ce <sub>2</sub> O <sub>3</sub> (ppm)	330	610	550	

The areas comprising the Exploration Target are shown in Figure 3. The exploration target for the Project has been estimated using existing RAB drilling data (refer Appendix 1 and 2 of the ASX announcement made by the Company on 28 August 2019 "Confirmation of Makuutu Mineralisation Bearing Rare Earths".), as well as projection of geological criteria into prospective areas. The RAB drilling data covered 83 holes (2,040 metres), with drill hole spacing generally greater than 300 metres, and downhole sample spacing predominantly 2.0 metres, with ranges from 1.0 metres to 6.0 metres. For the "Maximum Tonnes" target where projection of geological criteria into untested areas was applied, the target is based on airborne radiometric anomalies considered similar to those tested by existing drilling.



**Figure 3. Makuutu REE Project Exploration Target Areas on Ternary Radiometric Base, Drilled areas and target areas correlate with elevated uranium anomalism at surface.**

The exploration target was estimated using the following methodology:

- The existing drilled areas were digitised in plan view and the mineralised area (i.e. m<sup>2</sup>) measured. These areas are limited to only mineralised drill holes and boundaries of radiometric anomalies.
- The average intercept thicknesses of different material types, determined from RAB drilling, were calculated at >500 ppm TREO grade for each logged material type (“laterite”, “clay” and “sediments”). This average thickness was then applied to the measured area to estimate a volume for each material type.
- The estimated quantity of dry tonnes for each material type was then calculated from these volumes using an assumed density of 2.0 t/m<sup>3</sup> for laterite, 1.6 t/m<sup>3</sup> for clay and 1.9 t/m<sup>3</sup> for sediments. These densities are considered representative based on review of information available in the public domain<sup>5</sup> and experience-based estimates by the Competent Person.
- The exploration target “Minimum Tonnes” is 100% of the estimate for the existing drilled area.
- Potential target (i.e. outside the areas with existing drilling) were identified by radiometric anomalies similar to those in the known mineralised areas. The potential areas were digitised in plan view and the potential mineralised area (m<sup>2</sup>) measured.
- The factors for thickness and dry bulk density were then applied as per the existing drilled areas.
- The “Maximum Tonnes” target was calculated by adding the Minimum Tonnes target and the potential target together.

The factors required to generate an economic cut-off grade are not known at this stage of the Project. Subsequently the Exploration Target minimum grade is the weighted average of all drill results by material type from the existing drilling. There is no selection cut-off or top cut applied to this data. The maximum grade is estimated by using length weighted average grade of intersections >500 ppm TREO from the existing drilling, then applying a factor of 1.1 to this average grade.

## Exploration Program

The exploration program to confirm the Exploration Target and upgrade it to a Resource will be undertaken in a phased and systematic manner. The program is planned commence in September 2019 and to be completed in early 2020 and consist of the following activities:

- 750 metres of diamond core drilling in the Makuutu main zone (RL 1693) and minor exploratory drilling (EL 1766). Drilling to provide infill geological data and processing test-work samples.
- Metallurgical process development and preliminary testing work
- Additional resource drilling to develop JORC (2012) compliant mineral resource
- Estimate of a JORC (2012) compliant Mineral Resource
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<sup>5</sup> AusIMM Field Geologists Manual 3rd Edition, 1995, p324.

## **Competent Person Statement**

*The information in this Report that relates to the Exploration Target Ranges for the Makuutu Project is based on information compiled by Mr. Geoff Chapman, who is a Fellow of the Australian Institute of Mining and Metallurgy (AusIMM). Mr. Chapman is a Director of geological consultancy GJ Exploration Pty Ltd that is engaged by Oro Verde Limited. Mr. Chapman has sufficient experience relevant to the style of mineralisation and type of deposit under consideration, and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves' (JORC Code). Mr. Chapman consents to the inclusion in this report of the matters based on the information in the form and context in which it appears.*

*Information in this report that relates to previously reported Exploration Results has been cross-referenced in this report to the date that it was originally reported to ASX. Oro Verde Limited confirms that it is not aware of any new information or data that materially affects information included in the relevant market announcements.*