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Date: 20 July 2020

Atlantic Renewable Energy Partners (Pty) Ltd
Attention: Michael Johnson

By Email: michael@atlanticep.com

Dear Michael Johnson

RE: GEOSCIENTIFIC REPORT TO ADVISE ON THE WIND PIPE CLUSTERS DEVELOPMENT FARM PROJECT, SECTION 53 OF THE MPRDA 2002 APPLICATION

Atlantic Renewable Energy Partners (Pty) Ltd requested the Council for Geoscience (CGS) to advice on the potential mineral resources in the area where the Wind Pipe Cluster (WPC) development farm project is located. The area includes the farm Pofadder Cluster (De Neus 149, Ganna-Poort 202, Lovedale 202, and Sand-Gat 15) in the Kenhardt District, Northern Cape Province.

The proposed area for the Wind Pipe Cluster (WPC) development farm project is located approximately 20km south-east of Pofadder on Pofadder Cluster (Figure 1). The farm is indicated on Figure 1 predominantly consist of the Quaternary System, Brulkolk Formation, Koeipoort Granite, Volmoed Formation, Kraandraai Formation, Swartmodder Gneiss, Pella Subgroup, Longsiekvlei Formation, Klipvlei Formation, Mbizane Formation, Lekkerdrink Gneiss, Wortel Formation, Bossiekom Formation, and Nouzees Suite

Geologically, this farm is dominated by the Quaternary System comprises sand, red and grey aeolian dune sand. The Koeipoort Granite is part of the highly-metamorphosed Late Precambrian rocks of the Aggeneys Subgroup (Bushmanland Group). Dolerite is post-tectonic, most likely of Karoo age and occurs as sills and remnant hillocks. Non-diamondiferous kirnberlite pipes occur in the west and their emplacement appears to have been structurally controlled, being situated along the Nouzees shear zone. The basal Wortel Formation (650–

920 m thick) consists of interlayers of biotite-sillimanite schist and subordinate quartzite, which is magnetite-bearing in places.

The central parts of the Bushmanland Subprovince are characterized by voluminous concordant to semi-concordant bodies of red-weathered quartzofeldspathic gneisses, often referred to as the “Pink Gneiss” or “Hoogoor Suite” (Joubert, 1971; Albat, 1984). However, in the southern Garies Terrane Macey et al. (2011) refers to these “pink gneisses” as the Lekkerdrink Gneiss. Biotite gneiss of Klipvlei Formation. Wortel Formation shale, quartzite and muscovite schist, white quartzite. Brulkolk Formation medium-grained biotite gneiss, calc-silicate rocks with lenses and layers of muscovite schist, limestone, conglomerate and amphibolite.

Noubestaan gneiss dark-grey-weathering, medium-grained, well-foliated biotite gneiss with well developed, elongated k-feldspar megacrysts and numerous fine-grained biotite-rich xenoliths. Swartmodder Gneiss medium-grained augen gneiss. Pella Subgroup quartzite, quartz-muscovite and mica-sillimanite schists, iron-formation, nodular gneisses, minor conglomerate. Longsiekvlei Formation calc-silicate rocks, quartzite, amphibolite, conglomerate. Koeipoort Granite pink-weathering, medium-grained granite/gneiss. Mbizane Formation diamictite, sandstone, siltstone, mudrock (Maclaren, 1984) and Volmoed Formation white to grey, glassy (recrystallized), medium-grained, monomineralic quartzite and interbedded feldspathic quartzite, schist and iron-formation.

The farm is located in geological fields that show potential for copper, graphite, zinc, uranium, tungsten, and beryllium. Adjacent west of the farm boundary there are abandoned beryllium and sillimanite mines, occurrences of zinc, beryllium, copper, tungsten, and uranium.

- A radioactive, silvery metal. Uranium is a very important element because it provides us with nuclear fuel used to generate electricity in nuclear power stations. It is also the major material from which other synthetic trans-uranium elements are made.

- Most copper is used in electrical equipment such as wiring and motors. This is because it conducts both heat and electricity very well, and can be drawn into wires. It also has uses in construction (for example roofing and plumbing), and industrial machinery (such as heat exchangers).

- Beryllium is a silvery-white metal. It is relatively soft and has a low density. Beryllium is used in alloys with copper or nickel to make gyroscopes, springs, electrical contacts, spot-welding electrodes and non-sparking tools. Mixing beryllium with these metals increases their electrical and thermal conductivity.

- Current uses are as electrodes, heating elements and field emitters, and as filaments in light bulbs and cathode ray tubes. Tungsten is commonly used in heavy metal alloys such as high speed steel, from which cutting tools are manufactured. It is also used in the so-called 'super-alloys' to form wear-resistant coatings.

- Graphite is used in pencils and lubricants. It is a good conductor of heat and electricity. Its high conductivity makes it useful in electronic products such as electrodes, batteries, and solar panels.

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- Sillimanite minerals are mainly utilised in the production of mullite or high-alumina refractories. 95% of the world's consumption of these minerals is used for this purpose in the manufacture of metals, glass, ceramics and cement.

- Zinc is also used in alloys such as brass, nickel silver and aluminium solder. Zinc oxide is widely used in the manufacture of very many products such as paints, rubber, cosmetics, pharmaceuticals, plastics, inks, soaps, batteries, textiles and electrical equipment.

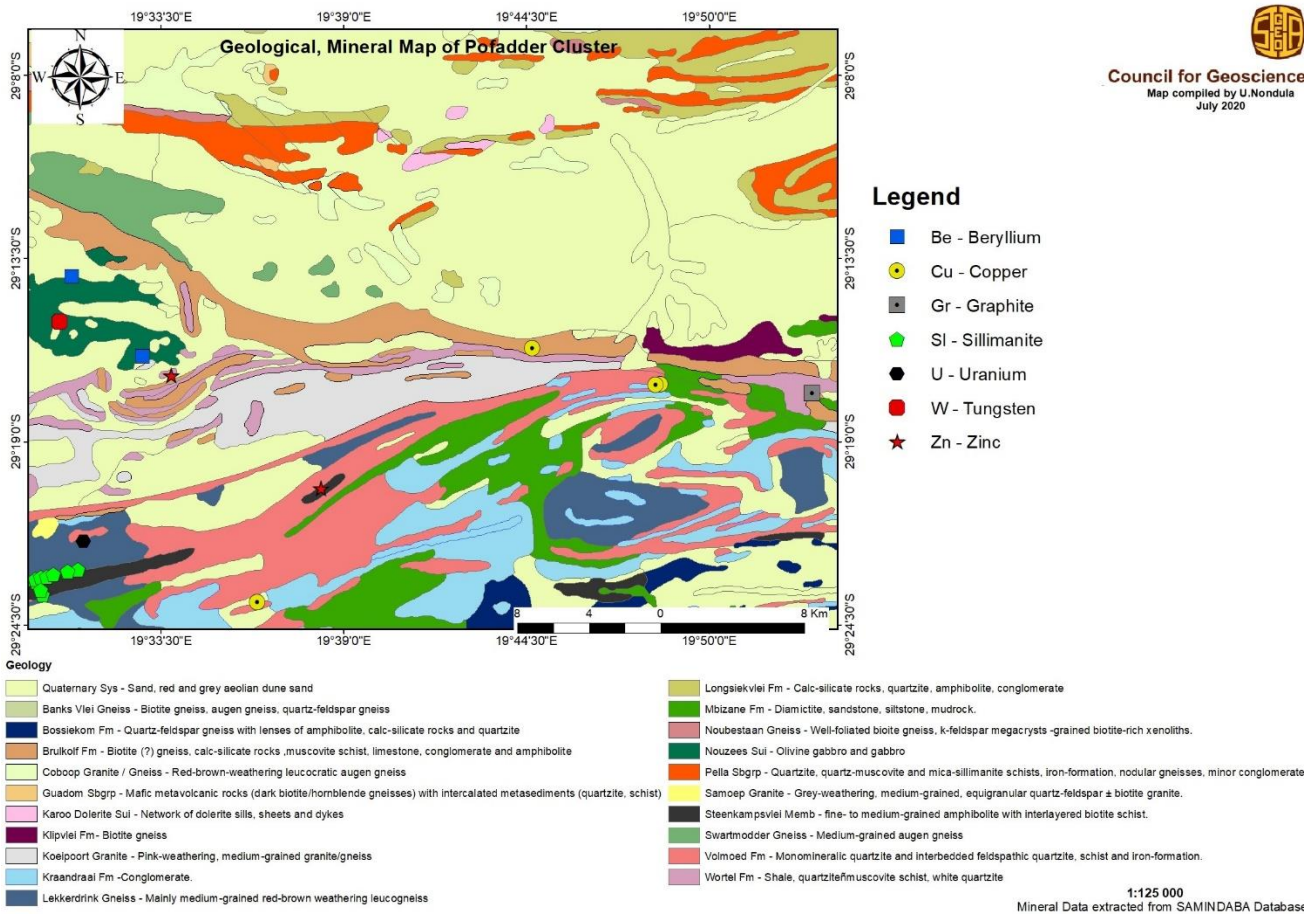

Figure 1: A local geological map proposed for the WPC development farm project section 53 application

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