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Council for Geoscience

Our Reference: F1189.2
Stand 1211, Pierre van Ryneveld Ext 2
Your Reference: LM286D/17
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23 May 2017

Tshwane Metropolitan Municipality
Department Roads and Stormwater: Geology Section
Centurion Offices
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Attention: Deputy Director: Geological and Geotechnical Engineering Management
Mrs. Ashika Sudu

By Email: ashikas@tshwane.gov.za

The Deputy Manager: Regional Spatial Planning
Mrs. Pat de Vos

By Email: patdv@tshwane.gov.za

Dear Madame,

STAND 1211, PIERRE VAN RYNEVELD EXTENTION 2.

The firm, Holland-Muter and Associates (HMA) submitted their letter, "Footprint Drilling Dolomite Investigation for the proposed single storey residential development on Stand 1211, Pierre van Ryneveld Extension 2: Centurion City of Tshwane", dated May 2017, on behalf of their client to this office on 17 May 2017. This office acts as an agent to state authorities in reviewing dolomite stability investigations on their behalf.

The initial investigations were conducted by HMA between 2001 and 2002. A series of comments were provided during 2001 to 2004 period as indicated in CGS Ref. GO 16/1/5/3 dated 16 March 2004, a B4 Certificate dated 19 March 2004 was issued and the layout plan was also co-signed by this office on the same date.

Subsequent to that, the site layout was changed and the new plans/ maps with proposed footprint investigation (FPI) borehole positions have since been submitted to this office for co-signing. However, this office could not sign these plans subject to FPI been conducted.

During the latest meeting held on 10 February 2017, HMA requested that this office provide a formal letter with provisional support to the proposed site layout and development, provided FPI results are favourable, hence a letter, CGS Ref. F1189.1 dated 14 February 2017 was issued. The current report is for the recently conducted FPI on site.

The site encompasses an area of approximately 3.4 ha, and is bordered in the north by Dan Pienaar Avenue, in the west by Klopper Avenue and in the east by Van Ryneveld Avenue.

The following is noted from the HMA's report:

1. According to the available regional geology map, it appears that the eastern portion of the terrain is underlain by chert of the Rooihogte and shales of the Timeball Hill Formation, Pretoria Group, while the rest of the site is underlain by the Eccles Formation of the Malmuni Subgroup, Chuniespoort Group and Transvaal Supergroup consisting of chert and dolomite.
2. According to the Information from the Department of Water Affairs (DWA), the groundwater level of the area is in excess of 75 m below surface. This is the original water level which has not been lowered by any groundwater extraction.

HMA further indicates that, since no water was encountered in any of the boreholes drilled the groundwater level is deeper than the bedrock head and therefore any lowering of the water level should not have a negative impact on the stability of the terrain. No groundwater was encountered in any of the footprint investigation boreholes.
3. A total of 30 boreholes were drilled across the site between 2001 and 2002. Ten additional footprint investigation boreholes were drilled during the current study. These boreholes were drilled to a depth ranging between 16 m and 54 m below surface, and they generally intersected.
 - Transported materials from surface to 3 m depth.
 - Residuum materials to weathered rock (dolomite, chert, shale & quartzite) between 3 m and 22 m depth.
 - Dolomite bedrock between 9 m and 41 m depth.
4. HMA has divided the site into five inherent hazard class (IHC) zones, namely:
 - Zone A: IHC 2, with a D2 dolomite area designation.
 - Zone B: IHC 3, with a D3 dolomite area designation.
 - Zone C: IHC 4, with a D3 dolomite area designation.
 - Zone D: IHC 4, with a D3 dolomite area designation.
 - Zone D1: IHC 6, with a D3 dolomite area designation.
5. HMA discussed the development proposal in section 8 of the report and the following is noted:
 - From a stability point of view, HMA indicates the site is considered suitable for the proposed residential development.
 - It is recommended that that a Low-rise (3 storey's or less) residential development should be considered for the site.
 - Any development on dolomite can never be deemed entirely risk free.

This office would like to comment as follows:

- a) This office is broadly in agreement with the previous hazard assessment and zonation of the site. HMA had divided the site into five zones, namely:
- Zone A: IHC 2, with a D2 dolomite area designation and this is not supported.
 - Zone B: IHC 3, with a D3 dolomite area designation and this is supported.
 - Zone C: IHC 4, with a D3 dolomite area designation and this is supported.
 - Zone D: IHC 4, with a D3 dolomite area designation and this is supported.
 - Zone D1: IHC 6, with a D3 dolomite area designation and this is supported.

However, Zone D1 should be IHC 6/7 with a D4 dolomite area designation for residential type development, this is because BH1 and BH9 represent IHC 7 conditions in our opinion. A D2 designation assigned in **Zone A (IHC 2)** should be changed to D3 as per Table 10 of NHBRC Manual 2015.

- b) HMA has stated in Section 5 of the report that the proposed development is single storey residential dwellings, however, further recommended that low-rise residential developments can be considered for the site. According to Table 2 of SANS 1936-1:2012 and Table 10 of NHBRC Home Building Manual 2015, **AHH3, AHL2 & DH2 to DH3** residential type developments are permissible up to **IHC or 5** land, and **AHL1** and **DH1** are only permissible up to **IHC 2** land, subject to **D3** precautionary measures and footprint investigations (FPI's) where applicable.
- This office confirms that the initial drilling of 30 boreholes on this meets the minimum drilling requirements as stipulated in SANS 1936:2012.
 - This office also confirms that drilling of additional 10 footprint boreholes meets the FPI requirement.
 - Decisions on the development type and founding options will need to take into consideration the site classification and the SANS 1936 requirements.
 - This office confirms that the geological conditions are considered suitable for the proposed development.
- c) HMA will have to ensure that the proposed development densities are in line with the SANS 1936:2012 and the NHBRC 2015 Manual requirements.

Therefore this office confirms support for the proposed residential development on Stand 1211, Pierre van Ryneveld Extension 2 in Centurion, subject to the points above and the following:

- d) No residential development is allowed in Zone D1 and if commercial developments are planned on this zone, FPI must be conducted as per the SANS 1936:2012 requirements.
- e) A certified site development plan (SDP) should be submitted to this office for co-signing.
- f) The development as such should be enrolled with the NHBRC and must be designed and constructed in accordance with their requirements for residential buildings on dolomite as prescribed in the NHBRC Home Building Manual of 2015.
- g) All foundations should be suitably designed to span at least 5 m loss of support due to sinkhole or subsidence formation and these must be according to SANS 10400-H requirements.

- h) A site specific Dolomite Risk Management Plan in accordance with SANS 1936-4:2012 must be compiled and implemented for the site. The owners/responsible persons must be made aware of the risks involved in building on dolomite, and be informed about how to be vigilant and act pro-actively by applying sound water management principles.
- i) General precautionary measures as set out in SANS 1936 Part 3: Design and construction of buildings, structures and infrastructure, must be studied and implemented for a D3 portion of the site. Some precautions are listed below:
- * All stormwater from downpipes and gutters from buildings and structures shall discharge onto concrete-lined channels which, in turn, shall discharge the water at least 1,5 m away from structures onto areas permitting surface drainage away from buildings and structures. Joints between any open channel drains and buildings shall be suitably sealed.
 - * Where guttering is not provided, impervious paved areas or apron slabs shall be provided within 3 m (or greater if deemed appropriate by the competent person (engineer)) of buildings or structures, runoff from which shall drain into lined channels feeding into a designed stormwater system or shall be spread as sheet flow. The paved areas or apron slabs shall include areas located below the drip line or the periphery of the building or structure that is subject to draining rainwater.
 - * Wet engineering services should, wherever possible, not be placed parallel to buildings unless they are at least 5 m away (if stand size allows) from the structure. Should this be unavoidable, a rational design shall be performed by the competent person (engineer).
 - * The preferred pipe type for all wet engineering services, and the sleeve systems for such services, on dolomite area designation D3 sites are polyethylene (PE) pipes and fittings that comply with the material manufacturing requirements of the relevant parts 1, 2, 3 and 5 of SANS 4427.
 - * Liquid-retaining structures shall be watertight (zero leakage), constructed without any joints, and shall not be placed closer than 5 m from a building.
 - * The water supply to a building shall be via a single water supply connection unless otherwise approved by the competent person (engineer). This also applies to other pressurized liquid bearing services.
 - * Wet engineering services, excluding stormwater systems, shall be capable of spanning the projected notional sinkhole diameter (5 m), which has a high likelihood of formation in accordance with the requirements of SANS 1936-2, without the service rupturing or any joint leaking or separating from the pipeline.
 - * Gardens within 15 m of buildings and structures shall not include (a) water features, such as fish ponds, except where an impermeable lining is provided in accordance with a design prepared by a competent person (engineer); or (b) water features with automatic replenishment systems. No automated irrigation systems shall be installed within a distance of 5 m from any structure or building on sites designated as D3 dolomite land.
- j) The Builder must inform the professional team when the service/foundation trenches are open for inspection takes place. The results of these inspections and quality control must be recorded in a construction report (copy to the Local Authority, NHBRC and this Office).

- k) The professional team involved, including HMA, shall carefully consider the appropriate water precautionary measures and then ensure and finally certify that these have been implemented.
- l) Wet services should be laid exactly where indicated on the drawings presented to the Local Authority, and to this Office. Wet service may not be laid below structures. The Builder or his appointed professional team should certify that they have been placed as indicated. The Home Owner must also have a copy of the exact plan presented to this Office.
- m) The Local Authority must implement a risk management system. Commenting on the suitability of sites within its jurisdiction is based on the premise that this system will be implemented.

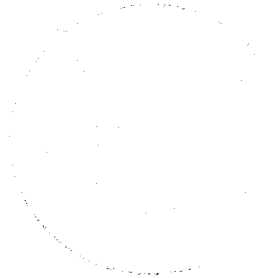
This letter reflects the Council for Geoscience's view and approach to development on dolomite at this time, as reflected by the above date. These comments may not be viewed as open-ended. If a property changes ownership or land-use changes are made, the comment may in part or wholly no longer apply. This Office should be informed of such changes and the Competent Person responsible for the dolomite stability investigation should be given the opportunity to indicate the influence such changes could have on the overall stability.

If you have any further queries, please do not hesitate to contact this office.

Yours faithfully,



S NGUBELANGA
Engineering Geologist
For Dr. S Foya



Stand 1211, Pierre van Ryneveld Ext 2 (F1189.2)

CC: HOLLAND-MUTER & ASSOCIATES

Attention: Mr. L Holland-Muter

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