

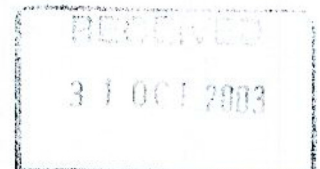
NATIONAL HOME BUILDERS

NHBRC®

REGISTRATION COUNCIL

30 October 2003

Intraconsult
P.O. Box 2022
Rivonia
2128



Fax no. : (011) 465-0772

Attention : Dr. D. Buttrick

Dear Sir

Re: Irene Extensions 33 and 34 *(covers Irene x 70)*

Following a careful review of the documents provided on the abovementioned stands the NHBRC would like to comment as follows:-

1. The following documentation has been received and studied.
 - 1.1 Intraconsult 2003 Geotechnical investigations for proclamation: Area approximately 417 ha east of Irene.
Report No.: IR523F
Report dated: July 2003.
 - 1.2 Council for Geoscience letter dated 29 July 2003
Subject: Comment on the dolomite stability assessment for 417 ha east of Irene.
Letter to Intraconsult CC
Ref: G016/1/5/3 2528CC15 Irene Estate
Typing Ref. a20ic/centu/Irene/Irene vd bylland

2. Following a review of the above listed documentation in the context of the requirements of Section 2.8 of the House Builders Manual, the following comments are provided.
- 2.1 The stability zonation of this large area was done using air-photo studies, soil mapping, a gravity survey on a 30 m grid followed by the drilling of a large number of boreholes. Some boreholes were drilled during previous investigations i.e Jan Cronje on the southeastern area east of the railway line and Johann van der Merwe on the area north and east of Cornwall Hill. The reports on these investigations were not available. Only the Intraconsult interpretations of the information were therefore studied.

The area was divided into five stability zones:

Stability zone 1

Apart from zone 2 the stability zones could not be easily delineated using gravity and drilling results. Drilling results and surface features therefore played an important part in the characterization and delineation of zone 1. Zone 1 is generally underlain by very thick chert horizons. Silty sand is often a constituent of the horizons. Clayey silt (wad) type materials are not prominent. Most of the boreholes were drilled to 60 m depth into reasonably homogeneous chert-rich materials. Dolomite bedrock was only encountered in a small number of holes eg. BH 4214 from 51-57 m, BH 3524 from 30-36 m, BH 315 from 21-27 m and BH 2412 from 17-22 m. Most of these boreholes are situated just east of the Lyttelton Formation and some dolomite may represent Lyttelton Formation rocks dipping below the chert rich strata. Mudrocks and intrusive rock were also found in some of the holes but their lateral extent seem to be limited although some have extensive vertical dimensions i.e. Karoo rocks in BH4353 from 2-42 m and intrusive rock in BH4241 from 3-60 m. The driller's sheet of the boreholes show good conditions. Very few instances of air loss or sample loss were recorded. The zone is assigned a stability risk class 4 and this is supported by the results from the investigation.

An NHBRC class D3 is assigned to the area.

Stability zone 2

Stability zone 2 is present on a large area in the west of the site and two small areas to the east. The larger part of stability zone 2 is underlain by the Lyttelton Formation and is well defined by the gravity field and the borehole results. This large zone is situated parallel to the railway line. Dolomite bedrock was encountered at shallow depth except near Nellmapius Avenue where deeper dolomite is present in a gravity low. If this southeastern area, the waste filled areas and BHI9 are excluded, the depth to dolomite bedrock averages

about 2.5m. The inherent risk in most areas is therefore probably class 5. This is borne out by existing township developments towards the north in Lyttelton where a number of small sinkholes was triggered over the years by leaking pipes, ponding etc. Proper water and risk management should, however, be able to avoid most of the occurrences. As mentioned before two similar areas of shallow dolomite were also identified on the site i.e. an area in the northern part of the site south of the N1 and west of the quartz vein and an area also in the central part of the site east of the quartz vein and north of Nellmapius Road.

It is agreed that these areas may be suitable for Townhouse complexes (i.e Res 2, 3 and 4 type development). In the CGS comments, mention is made of high rise buildings. It is thought that the Buttrick report also includes Res 2 and 3 type of developments.

Stability zone 3

As mentioned above the stability zones are not easily delineated by using gravity and drilling results. The western zone 3 area is an area where poor results were encountered within the larger zone 1 area. Some good conditions, similar to zone 1, were therefore also encountered in this area. Boreholes with "poor" results are eg. 5116, 120, 7938 and 8031. The poor results in some of these boreholes were only encountered at great depth. Some also showed other mitigating factors eg. BH5116 with intrusive material from 2-31 m. The northern part of this western stability zone 3 area therefore shows limited poor conditions. Poor conditions are more prominent in the southern part of the zone eg. in boreholes 120, 8031 and 7938.

The eastern stability zone 3 area skirts around Cornwall Hill Estate. Backfilled areas (old waste dumps) were zoned out as 4(a) areas. The results from the boreholes show reasonable but variable conditions. The conditions indicated by the northern holes between Nellmapius Road and Cornwall Hill Estate are poorer eg. BH1, BH4, and BH22. The conditions in the holes in the northeast and the east (adjacent to the R21) are better, but variable.

To summarise, the western zone 3 area the zone is flanked by good conditions or by conditions on surface which allows the delineation of the zone. In the eastern zone 3 conditions north of Cornwall Hill are poor (including the old dump sites). The conditions towards the Pretoria Group contact are, however, better but variable.

The classification of the zone 3 area as a higher risk class is therefore supported but the statement that parts of it may classify as risk class 4 must be emphasized. Commercial/office type development can therefore be considered for parts of zone 3 following more specific site investigations.

Stability zone 4

The boundaries of stability zone 4 were mainly determined from geological and man-made instability features i.e the prominent quartz vein which is known to have a negative stability effect on surrounding conditions, the prominent chert ridge as well as the man-made area of poor drainage which caused sinkholes and possibly dolines. The 4(a) areas are backfilled dump sites on the sites of old quarries. The excavations which were backfilled are therefore likely to be very irregular and ponding and infiltration will occur in these excavations if water is allowed into the waste material. This can cause pollution, but more importantly in this case, instability.

The backfilled areas including the backfilled areas west of the railway line, must therefore be handled carefully. It is highly unlikely that it will be cost-effective to shift or remove any of the waste. The waste must therefore be capped and handled in a way which conforms to the "Minimum requirements" documents of the DWAF. Landfill degradation processes leads to the formation of landfill gases, including methane, which will have an impact on development eg. parking areas on the landfill and also on any type of development surrounding the landfill. The zonation of this risk class 4 and 4(a) areas are therefore supported and steps to mitigate further degradation of subsurface conditions must be taken during the design of and the development of the area.

Stability zone 5

Stability zone 5 includes a small number of areas where extensive thicknesses of Karoo mudrock or intrusive rock (eg. syenite) was encountered in the boreholes. Further investigations of these areas are required to investigate the conditions and to delineate the area. A comment from the Peer reviewer would be that these investigations are required for the risk zone 5 areas surrounded by risk zone 3 and risk zone 4 areas and also the area adjoining the quartz vein. It should, however, not be necessary for the risk zone 5 area (BH3738) surrounded by risk zone 1.

In conclusion it is stated that the stability zonation has been done in accordance with prevailing practise. Further work, as mentioned in report and in the CGS comments, is necessary on some areas if it is decided to use those areas for other types of development.

- 2.2 Precautionary measures for the design and construction of the township are given in the report.

- 2.3 No township layouts have been done (or submitted) up to now. These layouts must be submitted when they become available. Any developments, other than Residential 1, will be subject to further investigations and full reports and layouts must be submitted to the CGS and NHBRC.
- 2.4 The report has been submitted to the CGS and although they have some requests which must be attended to, they are in agreement with the findings of the report.
- 2.5 Borehole installations are addressed in the report. It is stated that the permission of the local authority must be obtained and that approval must be subject to an evaluation by an engineering geologist.
- 2.6 The construction of swimming pools are also addressed. Swimming pools are not to be allowed on certain stability zones. Further requirements are given on p34 (Swimming Pools) in the report. The Peer Reviewer recommends that swimming pools must be designed as water retaining structures by an experienced engineer and that piping must be installed in such a way that leaks can be detected immediately.
- 2.7 A risk management plan which have been signed by the CEO has been completed for Centurion in 1998 and is therefore now a Tshwane document. Further work on procedures has been done towards the end of June 2003 and Tshwane officials intend further updating and implementation of the plan early in the 2003/2004 financial year.
- 2.8 Following the layout of the township(s) and the design of the services, a specific risk management plan must be compiled for the development and implemented by the relevant authority. This is of the utmost importance and is also a requirement of the CGS.
- 2.9 The Competent Person-geotech fully understands his further duties and must be involved in all discussions and decisions regarding township layout, development phases, further investigations etc.

Conclusion

Based on the information provided by the Consultants (Intraconsult), and following the Peer Review report, NHBRC confirms that enrolment "in principal" in line with item 2.1 is supported.

As the above process only covers "township Establishment Phase" (see Part 1, Section 2, Page 22 of the NHBRC home Building Manual), all information as at "Township Development Phase", and "Development of Individual Sites" must be submitted to consider enrolments.

Yours faithfully

A handwritten signature in cursive script, reading "Fred Wagenaar".

FRED WAGENAAR
MANAGER: TECHNICAL SERVICES