APPENDIX E16 – Geotechnical Assessment

ENGEOLAB (PTY) LTD

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Our Ref: LL3891

Your Ref: 10784 - 750MW Gas to Power Project RB - Geotechnical Assessment

04 July 2024

Nemai Consulting
147 Bram Fischer Drive
Ferndale, 2194, South Africa
PO Box 1673,
Sunninghill, 2157

Attention: Mr. Donovan Henning *donavanh@nemai.co.za*

RE: Geotechnical Assessment ERF 16673, Alton, Richards bay

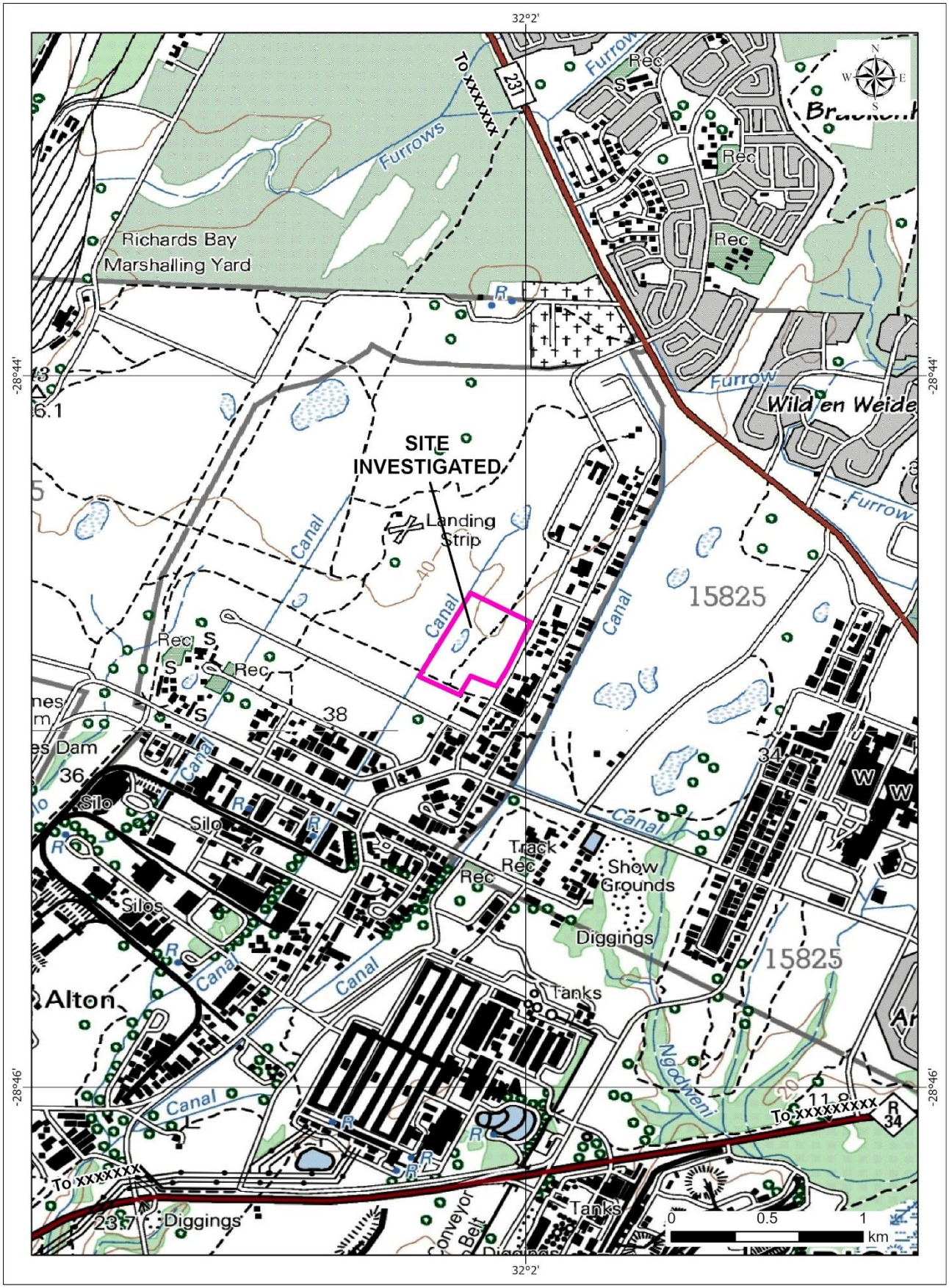
Sir,

Attached hereto is an assessment of the geotechnical constraints one may encounter on the site. Included also are comments on the site geology, the geohydrological aspects, foundation conditions as well as on the availability of pavement construction materials, fine - and coarse aggregate.

Yours Faithfully,

Paul Hansmeyer *Pr. Sci. Nat.*

FIGURE 1: LOCALITY PLAN



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GEOTECHNICAL ASSESSMENT OF ERF 16673, ALTON, RICHARDS BAY

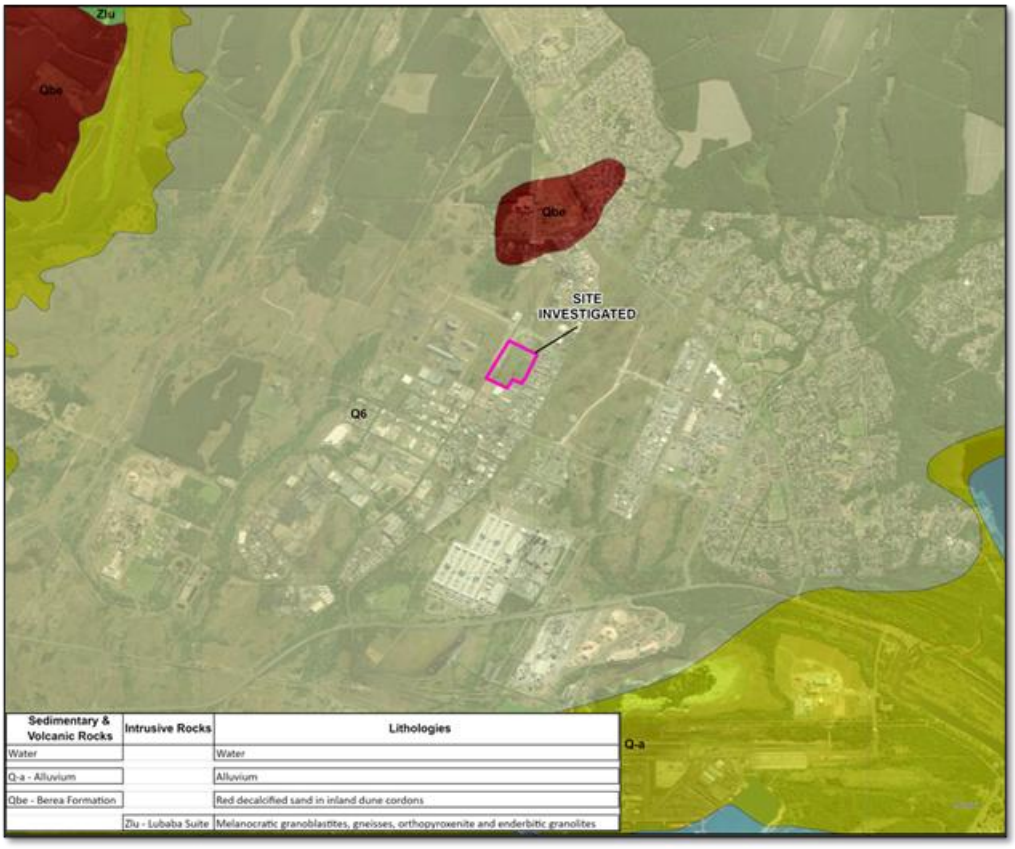
A 750MW Combined Cycle Gas Turbine Power Plant is to be developed on Erf 16673 located in Alton, Richards Bay – refer to the Locality Plan, Figure 1 in the beginning of the report.

The geotechnical assessment is required for the Scoping and Environmental Impact Assessment Process for the project which falls under the auspices of the Richards Bay Independent Development Zone.

In short, the geotechnical information includes comments on the site geology, the groundwater aspects, foundation conditions and the availability of on-site construction materials for pavement layers as well as fine and coarse aggregate for concrete mixes.

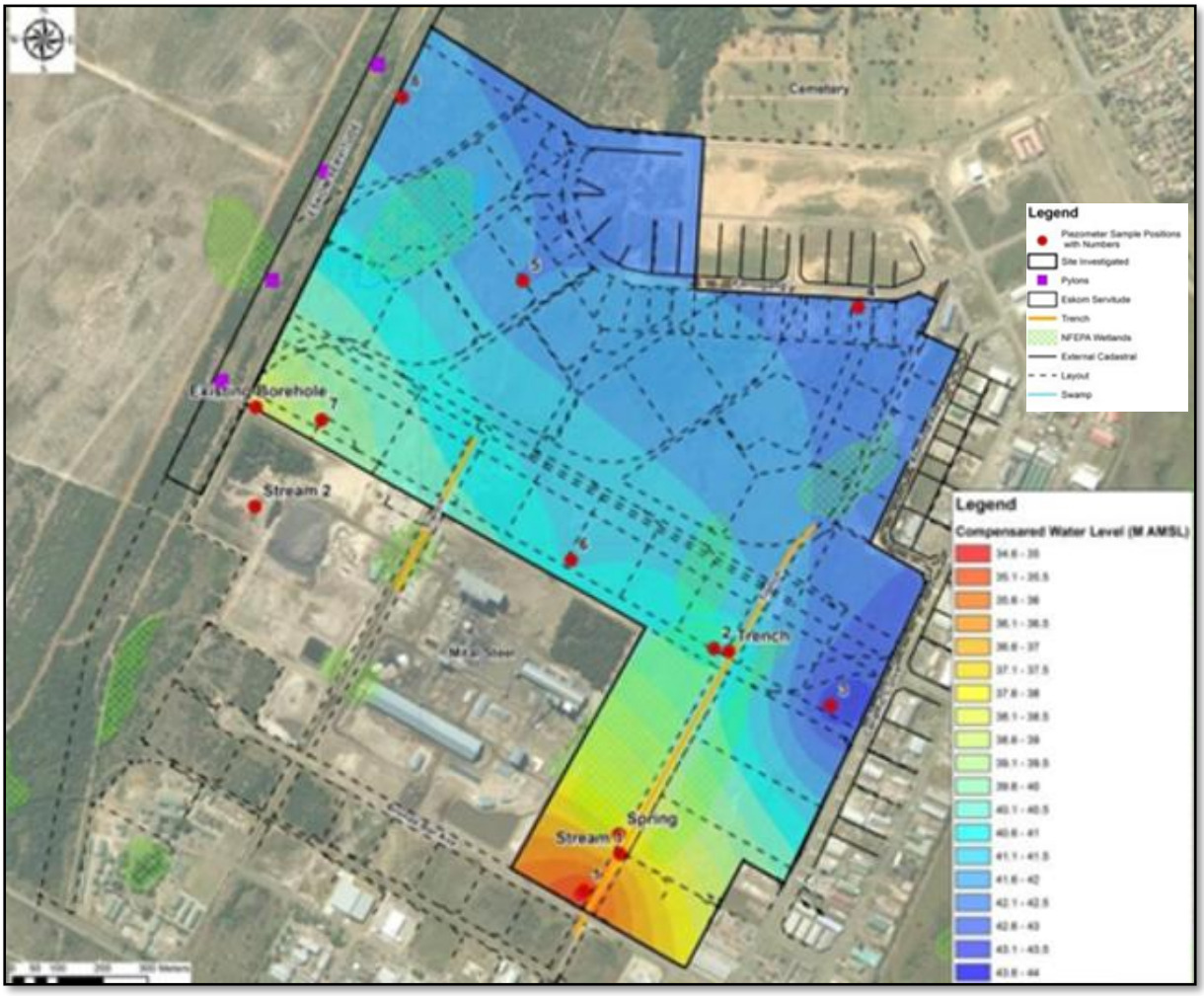
The site is located on unconsolidated sediments of the Maputuland Formation and is blanketed by grey, loose cover soils underlain by clay-silt-sand mixes up to 30m – refer to the Geology Map, Figure 2 below. The soil profile is dominated by fine to medium grained sand with subordinate clay and silt fractions.

FIGURE 2: GEOLOGY MAP



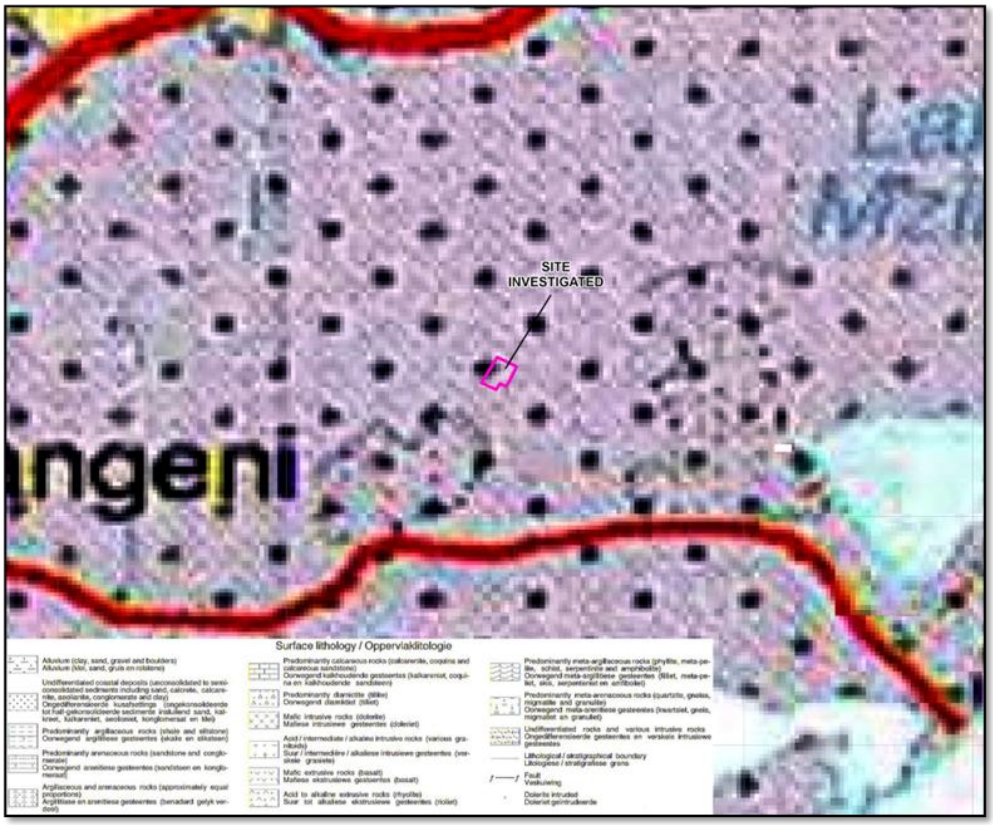
The site is located within the W12F quaternary catchment and surface run-off drains southwards towards the Mhlathuze River basin. A fluctuating perched water table which varies between 1.5m and 3.3m below natural ground level characterises the area. During high rain fall periods, a rebound of the perched water table usually occurs with shallow excavations and topographical depressions becoming water logged for extended periods. As indicated by Figure 3 below, the regional hydraulic trend is seemingly in a north-easterly direction with an inferred groundwater divide trending south-east, most probably following the site's northern perimeter.

FIGURE 3: REGIONAL HYDRAULIC TREND



The site is located on the Zululand coastal aquifer associated with unconsolidated sediments of the Maputuland Group, characterised by an intergranular aquifer with a potential yield ranging from 0.5 to 2l/s – refer to Figure 4 on the following page. The shallow groundwater sources on site can be classified as typical marine waters with similar deeper sources inclusive of Ca-HCO_3 type waters associated with fresh, deeper seated aquifers.

FIGURE 4: COASTAL AQUIFER



The top soil cover is suitable for backfill only and good quality pavement construction material is not available on site and has to be imported. Fine and coarse aggregates need to be sourced from local suppliers. These soils are highly compressible with low bearing capacities and unless some form of ground improvement is carried out, settlement of structures may occur.

Cognisance should be taken of the following geotechnical constraints: -

- a densely rooted profile is present in the top 1m of cover soils;
- the area is subject to a shallow perched water table;
- the sandy cover soils tend to be highly permeable;
- deep compaction of foundation materials is inhibited by a shallow perched water table;
- a competent shallow founding horizon for movement-sensitive structures is not present on site;
- immediate collapse of excavations occur within very moist to wet material >1.5m;
- site soils are highly compressible and hence susceptible to settlements;
- founding material characterised by a low bearing capacity;
- good quality pavement construction materials have to be imported;
- light structures should preferably found on raft foundations with light reinforcing in masonry;
- heavy, vibrating structures need to found on piles.