
CHAPTER 7

GEOLOGY AND SOILS

7.1 General Geology of the Area

Based on the Geological map compiled by Cornec (2002) the area consists of Miocene/Pleistocene deposits as seen in figure 7.1. These are geologically recent (<24 million years) deposits.

The underlying geology is the limestone while the overlying clay layer is bentonite. This Bentonite clay layer is apparently derived from volcanic ash (from a volcano in Guatemala) which has chemically weathered in an acidic environment to form the bentonite clay.

The geological area of San Marcos is typical of the bentonite clay layer. Inclusive, both wells are not far away from each other. The bentonite clay is considered as vertisol type, which cracks heavily in the dry season and becomes soft during the rainy season. This soft clay was experience during the field assessment. This is also similar to the Spanish Lookout wells

7.2 Soils

A large feature of the area is the Bentonite Clay deposits which are very thick. These clay deposits tend to be basic and appear to have a limestone influence. A few small lower-lying areas, particularly in the center experience acidic leaching affects on the soils. Limestone is surfacing in the extreme west of the Yalbac hills.

The bentonite clay is very dense and sticky and as it forms a nearly waterproof layer it acts as a barrier for vertical exchange of water and chemicals. It should also be noted that no shallow groundwater was found during drilling operations. The agricultural value of these soils is listed as 2-3, which is moderate. This moderate agricultural value has led the area to be developed primarily for pasture. These soils are very prone to erosion and most often occurs in road sides

The soils of Spanish Lookout are sensitive to erosion. Proper measures are to be taken to prevent any such erosion. Also the soils are very plastic, capable of potentially affecting the alignment of any pipes. This is particularly the case near stream crossings were landslides and slumps are not unheard of. There are 3 main stream crossings along the proposed pipeline route. The agricultural value of the soils in the area of interest is a mosaic ranging from patches with low suitability (class 4) to areas with medium suitability (classes 2-3). Most of the better soils have already been developed for agriculture of are in the process of being converted.

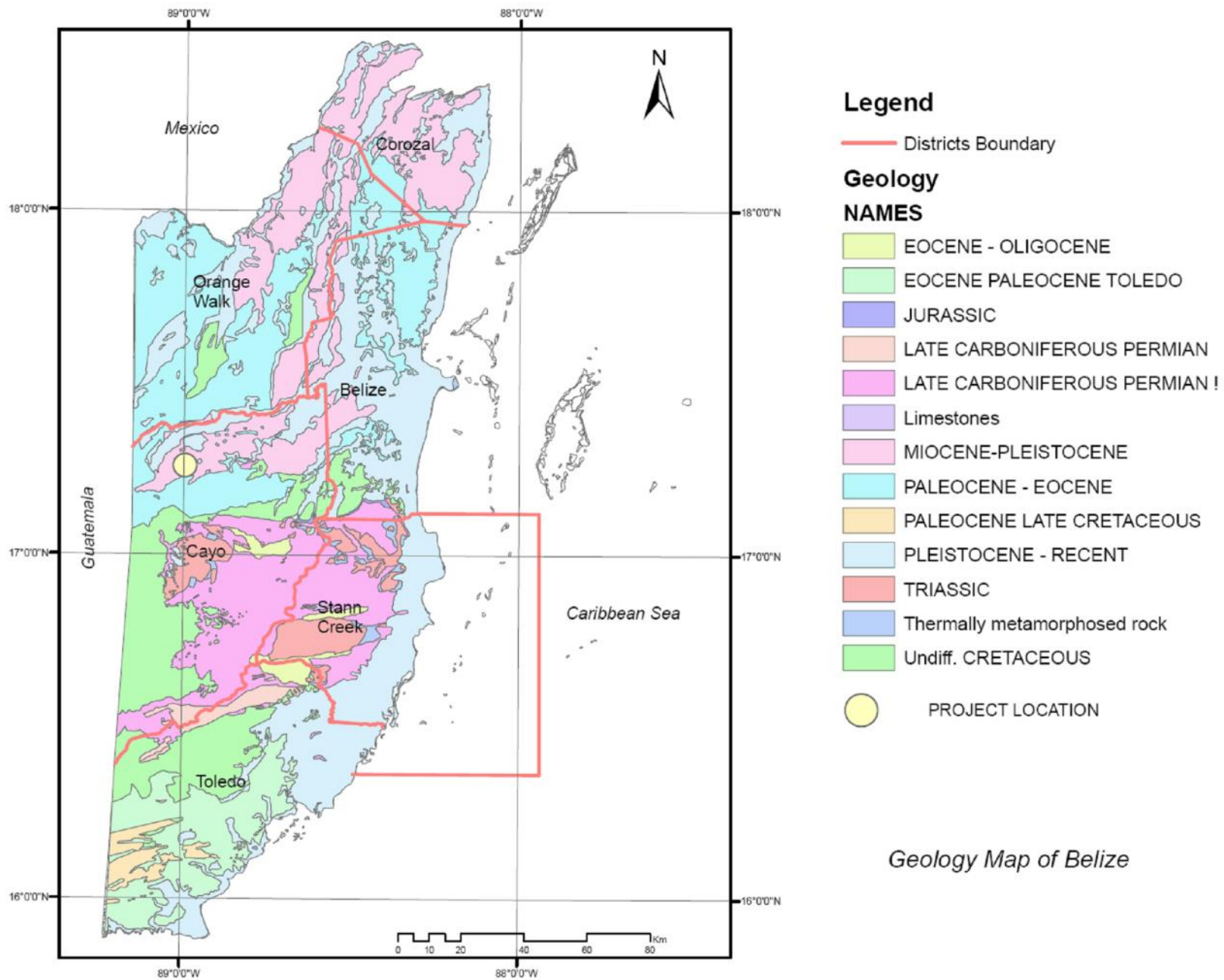


Fig. 7.1 Geology Map of Belize

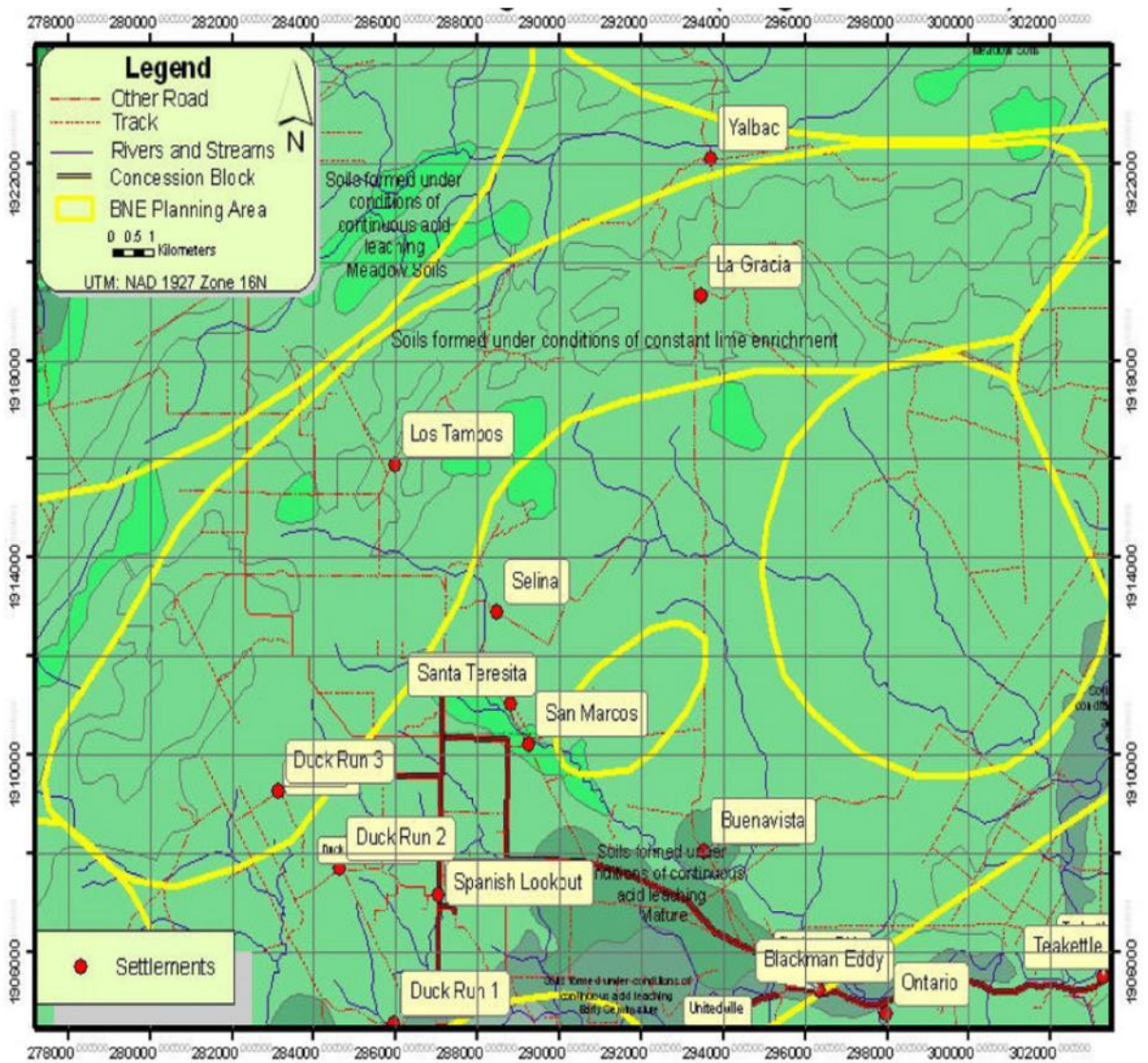


Fig.7.2 Soil Types according to Wright et al 1959

7.3 Land use

The Western part of the project area is largely cleared and part of the Spanish Lookout agricultural layout. Most of the area is developed for pasture, although corn and beans are being cultivated to a smaller extent. Part of the area of interest is still under its natural vegetation cover, particularly the steeper areas towards the east, but heavily impacted by small scale agricultural activities.

Much of western part of the area of interest is owned by members of the Mennonite community of Spanish Lookout. The eastern section lies under the influence of villages such as Duck Run 3, Yalbac (including La Gracia), Selena, Los Tambos and even Valley of Peace.

Originally, the area was divided up into large (logging) blocks, and one of these blocks is still recognizable as the Spanish Lookout territory. The other large blocks are piecemeal being subdivided in small agricultural layouts.

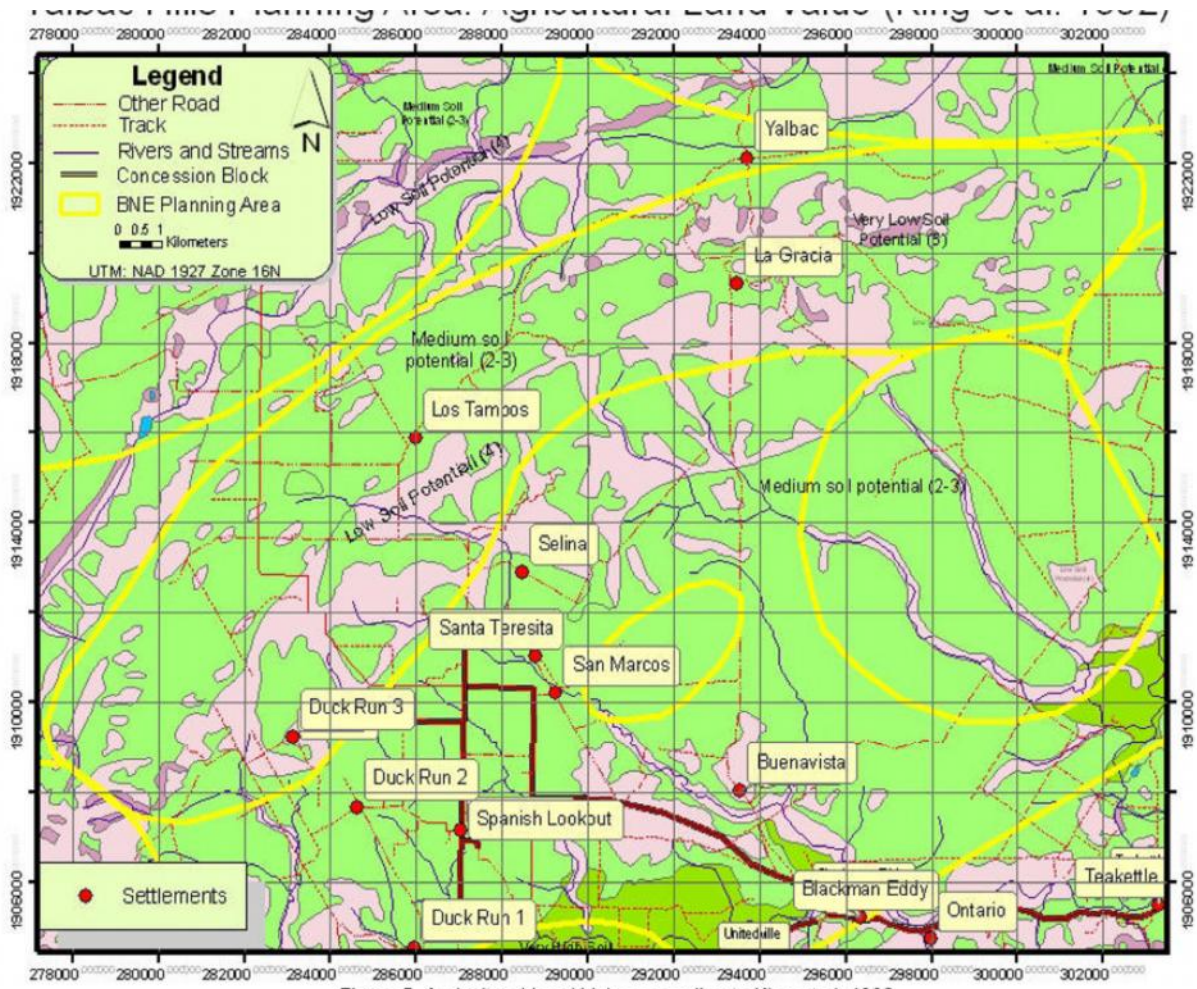


Fig. 7.3 Agricultural Land Use Value according to King et al 1992

7.4 Hydrocarbon Baseline Data

The consultancy was unable to conduct hydrocarbon testing due to the short notice of the project proponent. However, BNE was cognizant of the issue and has been collecting data over their entire production field. This baseline data is available from BNE for review.

7.5 Soil Related Impacts

The proposed activities at the well sites do have the potential to impact the area. Belize Natural Energy is cognizant of the fact and has made preparations in order to mitigate this occurrence. The following section summarizes the soil impacts and further information can be cited throughout the document.

Access Roads

Each new well will require an adequate access road to accommodate the large, heavy equipment needed to drill the well. Adequate access can be provided by:

- Using existing roads, some of which may need upgrading
- Constructing a new road
- A combination of both.

Experience has shown that in areas where wells only produce marginally economic quantities, operators tend to seek surface locations that minimize the amount of access road that needs to be constructed. For analysis purposes, it will be assumed that an average of 1000 feet of new access road will be constructed for each new well drilled. Road construction will require clearing a width of 24 feet to provide a “running” surface of 16 feet. If the involved well is completed for production, disturbance beyond the “running” surface will be re-vegetated leaving 0.38 acres of net surface disturbance for the average road. The access road remains in place to provide all weather access to the well and its facilities for the life of the well.

Well Pads/ Production Facilities

Typically a new well drilled will require, on average, a 0.83-acre well-pad area (150 by 240 ft.) to be cleared and leveled. Wells drilled to formations over 5,000 feet deep use a larger drill rig and would need a 1.1 acre (250 by 200 ft.) well pad area cleared.

If commercial quantities of oil and/or gas are discovered, roughly a 50-by-50 foot portion of the disturbed well pad is used to set up the piping, tanks, and production equipment necessary to produce the well. Additional area of the pad will also be used as a turnaround area used for inspection and maintenance vehicles/equipment. This report assumes that about 25 percent of the disturbed pad area (0.17 acres) will remain in use for the producing life of the well. The balance of the pad area not needed for production is then re-vegetated.

Trench Excavation

The proposed new wells are going to be connected to the Iguana Creek Storage Facility via the installation of a pipeline network (see Chapter 10). Survey lines will demarcate the pipeline routes. An estimated 3.1 acres of land will be cleared for the San Marcos pipeline (1.4 km).

Spills and Leaks

Possible soil contamination can result from spills and leaks. BNE is cognizant of this fact and therefore has implemented measures to minimize and in some instances prevent the spill and leaks of hydrocarbons. Spills can arise from the vehicular and equipment

operation, during the well fracturing process and pipeline installation. BNE will install adequate contingency kits and employ rapid response measures as well as frequent site and ancillary inspections.