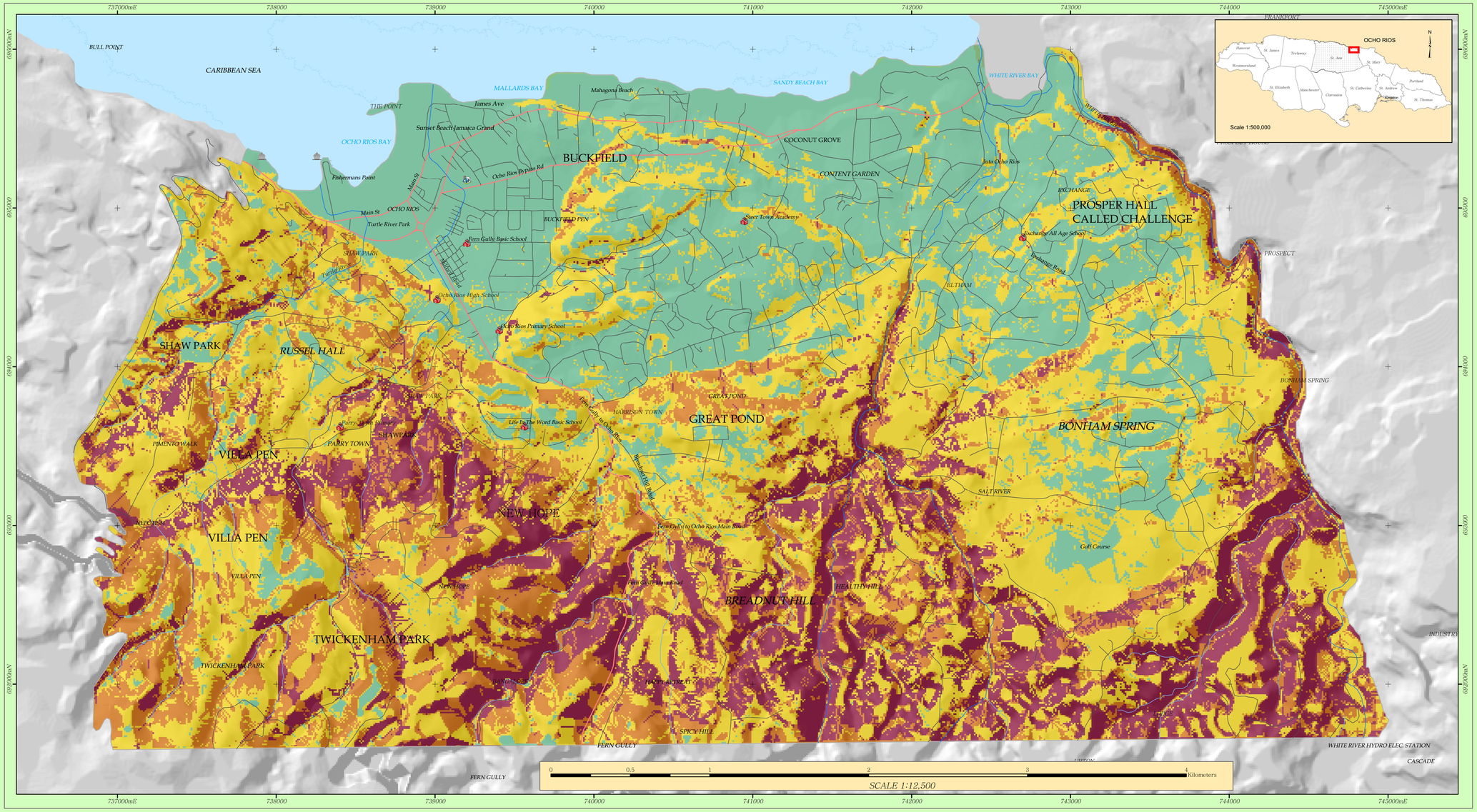
ENGINEERING GEOLOGY MAP OF OCHO RIOS, ST. ANN (DRAFT)



LEGEND

Critical Facilities

- Schools
- Ports
- Fire Station
- Police Station

Topological Symbols

- Main Roads
- Minor Roads
- Rivers
- Coral Reefs

Engineering Suitability Zones

- Suitable
- Moderate Suitability
- Poor Suitability
- Very Poor Suitability

The slight variation between the tone of colours shown in the legend and that exhibited on the map is due to the impact of the underlying hillshade which renders a three dimensional effect.

RESEARCH

The Ocho Rios Engineering Geology Mapping Project was funded by the Government of Jamaica, while base data was prepared by Mines & Geology Division.

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GEODETICAL DATA

Grid:	Jamaica Metre Grid
Projection:	Lambert Conformal Conic With One Standard Parallel
Ellipsoid:	WGS84
Unit of Measurement:	Metre
Meridian of Origin:	77 degrees West of Greenwich
Latitude of Origin	18 degrees North
Scale Factor of Origin:	1.000
False Co-oids of Ogin:	750,000m Easting, 650,000m Northing
Plan Datum:	Fort Charles Flagstaff
Height Datum:	Mean Sea Level

REFERENCES

Bieniawski, Z.T. 1973. "Engineering Classification of Jointed Rock Masses", Transactions of the South African Institution of Civil Engineering, Vol. 12, No. 12, pp. 335-344.

Mines and Geology Division, 1974, Kingston Geological Sheet 25, Ministry of Mining and Energy, scale 1:50,000

Mines & Geology Division, 2013, Engineering Geology Map of Jacks Hill, St Andrew,Ministry of Science, Technology, Energy and Mining, scale 1:10,000

Wischmeier, W.H., and D.D. Smith. 1978. Predicting rainfall erosion losses, a guide to conservation planning. USDA Agric. Handbook. No. 537. 58 p.

RECOMMENDED CITATION

Mines & Geology Division, 2014, Engineering Geology Map of Ocho Rios, St Ann, Ministry of Science, Technology, Energy and Mining, scale 1:12,500.

Engineering Suitability Zones & Guidelines.

SUITABLE

This zone is characterised by flat to gentle slopes, low landslide susceptibility and low erosion potential. Rock type within this zone displays good to fair rock mass quality for engineering purposes. The soil within this zone is primarily composed of the alluvium (well-graded, medium dense, silty sand) overlying limestone, for the exception of a narrow strip of fill material located seawards of the Turtle River Park in the town of Ocho Rios.This area is located predominantly along the coastal portion of the region, where it accounts for approximately 26% of the total area, spanning much of the Ocho Rios, Bonham Spring, Eltham and Content Garden.

This zone is suitable for engineering construction and development of all types. However, geotechnical site investigation may be required for large scale development or if development is sited in engineering fill or weak rocks and soils. Excavatability of material varies within this zone. Engineered fill and alluvial soils are easily ripped using conventional grading equipment. In contrast, where material is slightly weathered and well cemented blasting will be required in the well-cemented coralline limestone. In instances where there I localised weathering, the rock may require hard ripping with the use of impact rippers and hydraulic rock breakers.

MODERATE SUITABILITY

This zone is defined by moderate slopes, low to moderate erodability and low to moderate landslide susceptibility. Rock mass quality for engineering is generally fair as a large proportion of this zone consists of a medium strong, moderately weathered, limestone of the Coastal Formation.

Large scale construction projects can be facilitated within this zone. Construction however, may be exposed to some engineering challenges, particularly where the Coastal limestone Formation displays outcrops of highly weathered marls, or where highly weathered outcrops of travertine is encountered. In areas of rubbly and chalky limestone, rippability may vary from rippable to marginally rippable. Large scale engineering works in such material may require the necessary slope stability and erosion control works.

POOR SUITABILITY

This zone is characterised by moderately steep to very steep slopes, moderate to high landslide susceptibility, moderate to high erodability and poor to very poor rock mass rating.

This zone is not recommended for large scale, high density urban/suburban occupation, however low density, single family developments are permitted within this zone. Such areas are underlain predominantly by interbedded chalks of the Montpellier limestone and rubbly limestone of the Coastal Formation, on steep slopes with very poor rock mass quality and high erodability. Excavatability of this material is variable. As such, highly weathered material such as those observed in Parry Town and Shaw Park can be excavated by digging or it may be easily ripped. On the contrary areas which display hard, compact limestone (eg Harrison Town area) are non-rippable and may only be removed by blasting.

A comprehensive Geotechnical and geohazard investigations must be presented for construction projects and engineering works in this zone.

VERY POOR SUITABILITY

This area is dominated by very steep slopes (>30 degrees/58%), high to very high landslide susceptibility, moderate to high erosion potential and very poor rock mass quality. The geology of this zone consists mainly of creamish coloured marls with intraclast of reworked limestone from the Coastal Formation and micritic limestone and chalks of the Montpellier Formation. Chalks and marly material of this nature can be excavated by digging while ripping is the most suitable method to remove moderately fractured micritic limestones of the Montpellier Formation.

The erosion potential of this zone is very high and as such contributes to the existing slope stability and siltation issues following long periods of rainfall. Additionally, the engineering characteristics (intact rock strength, weathering index and fracture conditions) of the rocks within this area is very poor. Marginal areas may be favourable only for leisure activities, green spaces, limited infrastructure works and public utilities where alteration of the natural environment will be minimal. Hence, this zone should not be considered for any type of large scale engineering construction.

GENERAL NOTES

Purpose of the Engineering Geology Map

The purpose of the engineering map is to provide general information on the engineering and geo-hazard characteristics of the area for planning and land management engineering purposes.This map provides the framework for the collection of site-specific information utilized by urban/city planners, land managers and developers, as well as engineering and construction companies.

Production of the Engineering Geology Map

The Engineering Geology Map is constructed from the overlay of four thematic maps using Geographical Information Systems (GIS) software. These thematic layers consists of the Slope Map, Landslide Susceptibility Map, Erosion Map and Geotechnical Unit Map. The Slope Map is created using the DEM generated from 25ft interval contour data procured from the National Land Agency (NLA). The Slope Map is then reclassified into five slope gradient classes based on the Mines and Geology Division, Hillside Development Manual (2014).

The Geotechnical Unit Map exhibits geo-engineering data based on the Bieniawski (1973), rock mass classification scheme. This scheme uses intact rock strength, weathering index and other fracture indices (fracture opening, fracture spacing, fracture infilling, and fracture continuity) to determine the general rock quality for engineering purposes.

The landslide Susceptibility Map was produced by the use of the GIS based Bivariate Statistical Method. Where a comparison of the spatial coverage of landslide source area is made with geology, elevation, slope gradient, distance from faults and slope aspect. Five defined zones were recognized; Negligible to Low, Moderate, Moderately high, High and Very High Susceptibility

The Erosion Map was generated using the Universal Soil Loss Equation: (A= R x K x C x LS), an erosion model that computes average annual soil loss caused by rainfall and associated overland flow whereby; A= Annual Soil Loss, R= Rainfall Erosivity, K=Soil Erodibility, C= Cover/Vegetation Factor,LS=Length/Slope Factor
Map Algebra Tool in GIS was used to produce this map using the Formula; A= R x K x C x LS. Once completed, the Landslide Susceptibility Map, Erosion Map, Geotechnical Unit Map and the Slope GradientMap were then combined to produce the final Engineering Geology Map.

OVERLAY OF THEMATIC MAPS

Engineering Geology Map