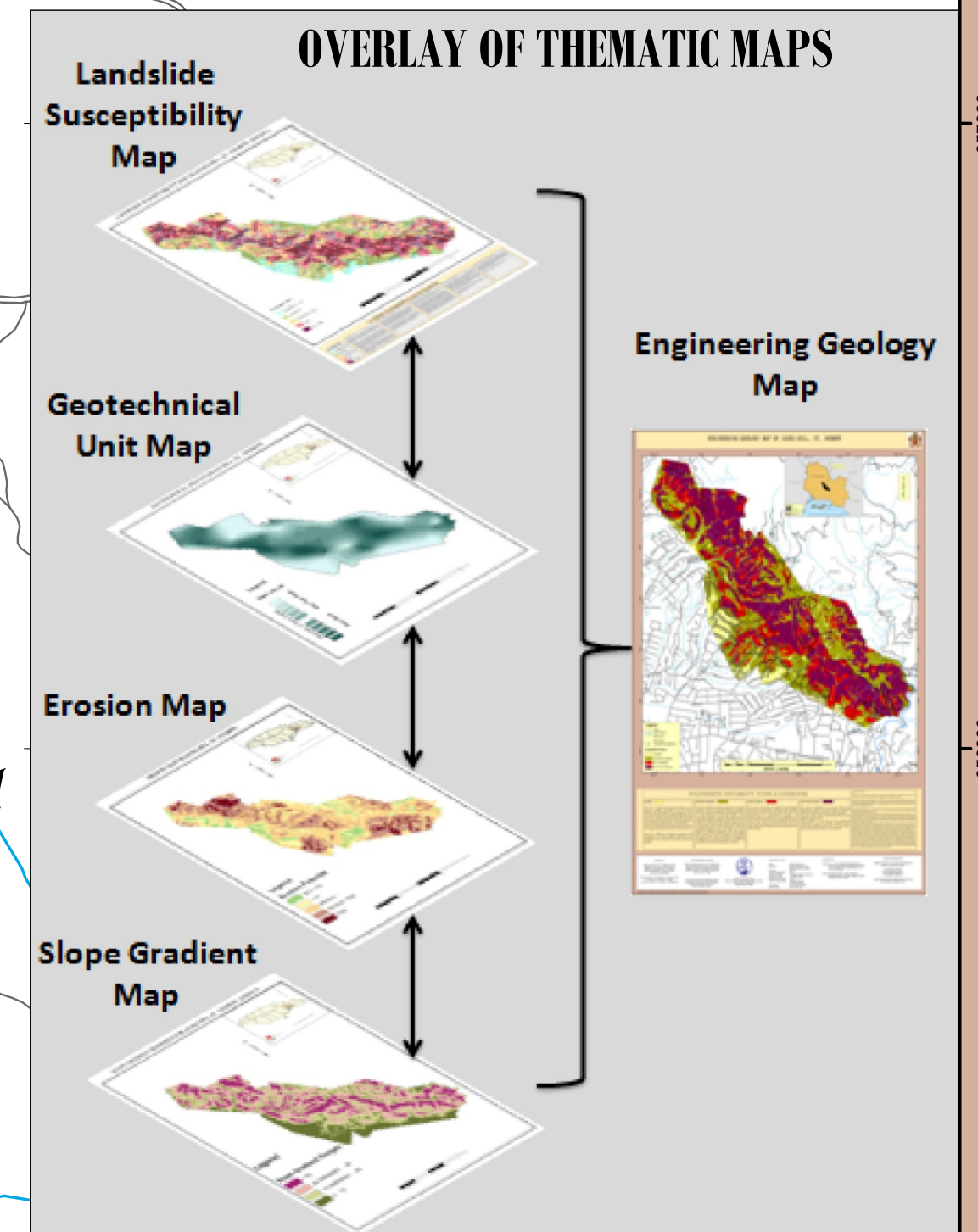
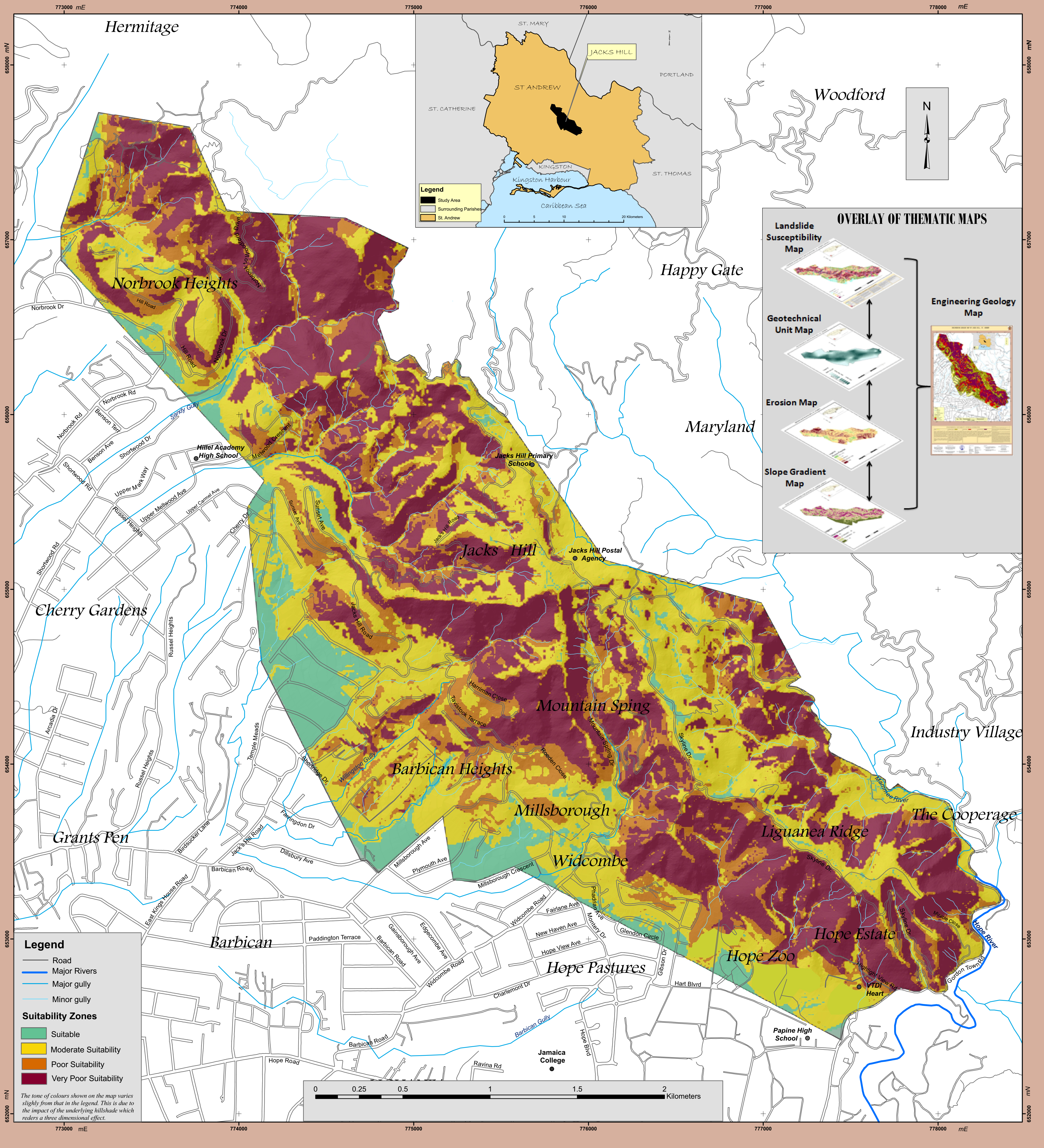


# ENGINEERING GEOLOGY OF JACKS HILL, ST. ANDREW



## ENGINEERING SUITABILITY ZONES & GUIDELINES.

### SUITABLE

This zone is characterised by gentle slopes, low to moderate landslide susceptibility and low erosion potential. Rock type within this zone displays fair rock mass quality. Soils vary from well-graded, medium dense, silty sand to compact clayey sand. Soils within this zone are composed of mainly alluvium, which essentially are those well graded sediments (fines, sand and gravel).

This zone is predominantly along the southern boundary of the region, where it accounts for 7% of the total area.

This zone is suitable for engineering construction and development of all types. However, geotechnical site investigation may be required for specific construction purposes.

### MODERATE SUITABILITY

This zone is defined by moderate slopes, low to moderate landslide susceptibility and low to moderate erosion potential. Rock mass quality for engineering is generally fair to poor as a large proportion of this zone consists of the Swanswick Limestone, a medium strong, highly fractured, moderately weathered limestone, while other areas are covered by colluvial soils (old landslide deposits) which are problematic soils for engineering purposes.

Large scale construction projects, may be considered, but will be exposed to engineering challenges. These may require safety measures such as deep foundations, slope stability and erosion control works. Geotechnical and geohazard investigations for construction projects and engineering works will be necessary for development in this zone.

### POOR SUITABILITY

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

This zone is not recommended for urban/suburban occupation and therefore engineering construction is not desirable in this area. There are areas that may be favourable for leisure activities, green spaces, limited infrastructure works and public utilities where alteration of the natural environment will be minimal.

### VERY POOR SUITABILITY

This area is dominated by very steep slopes (>30 degrees/58%), high to very high landslide susceptibility, high erosion potential and very poor rock mass quality.

This zone consists mainly of Granodiorite (KG) and the Wagwater Formation (Ew) and is the main source area for many of the major landslides in the Jacks Hill area.

Slope instability is very high and the engineering characteristics (fracture rock strength, weathering index and fracture characteristics) of the rocks are very poor, hence, engineering construction in this zone should be strongly discouraged.

**GENERAL NOTES**

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 utilised by urban/city planners, land managers and developers, as well as engineering and construction companies. Such entities will find the engineering geology map useful for making important decisions about planning and development in Jacks Hill and surrounding areas.

The engineering geology map is constructed from the overlay of four thematic maps using Geographical Information Systems (GIS). These include slope map, landslide susceptibility map, erosion map and geotechnical unit map. The creation of this map involves three phases, an in-house/desktop study phase, a fieldwork component and a geohazard/geotechnical analysis using GIS. The desktop study phase involves extensive literature reviews, interpretation of landslide and erosion features from aerial photos. Information gathered was used to assist in the preparation of the landslide susceptibility map and erosion map. This was followed by the fieldwork.

The fieldwork phase of creating the geotechnical unit map, was aimed at collecting geo-engineering data based on the Bieniawski (1973) rock mass classification scheme. During the collection of data for the erosion map, fieldwork was focused on mapping erosion features, gully areas, land use and vegetation cover. Likewise, the collection of data for the landslide susceptibility map was based on the reconnaissance of landslide source and deposit areas, and adjustments to the location of geological contacts, fault lines etc. The project then entered the analysis phase. The production of the landslide susceptibility map was achieved 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. The geotechnical unit map was created by converting geotechnical field data, to a raster file. A raster file was created for each geotechnical parameter which was reclassified and overlaid to produce the geotechnical unit map. A slope map was also created and utilised in the production of the engineering geology map. The landslide susceptibility map, erosion map, geotechnical unit map and the slope gradient map were then combined to produce the final Engineering Geology Map of Jacks Hill.

### RESEARCH

Map produced by C.D. Ricketts under the supervision of N. Harris, (Director of the Research & Mapping Unit), S.S. Bhalai (Senior Geologist) & E. James-Holness (Former Project Manager).

Research Team: C.D. Ricketts, E. James-Holness, N. Harris, M. Downswell, H. Hedge, Z. Gayle, A. Jones, M. Smith, J. Thompson, S. Wedderburn.

### RECOMMENDED CITATION

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

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

### GEOLOGICAL DATA

Grid: Jamaica Metre Grid  
 Projection: Lambert Conformal Conic With One Standard Parallel WGS84  
 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-ords of Origin: 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

### FURTHER INFORMATION

Detailed information on the Jacks Hill Engineering Geology Map may be obtained through:

Commissioner of Mines  
 Mines and Geology Division  
 Hope Gardens, Kingston 6.  
 Tel. (876) 927-1936 (40)

Copies of this map may be obtained from the Library of the Mines and Geology Division.