

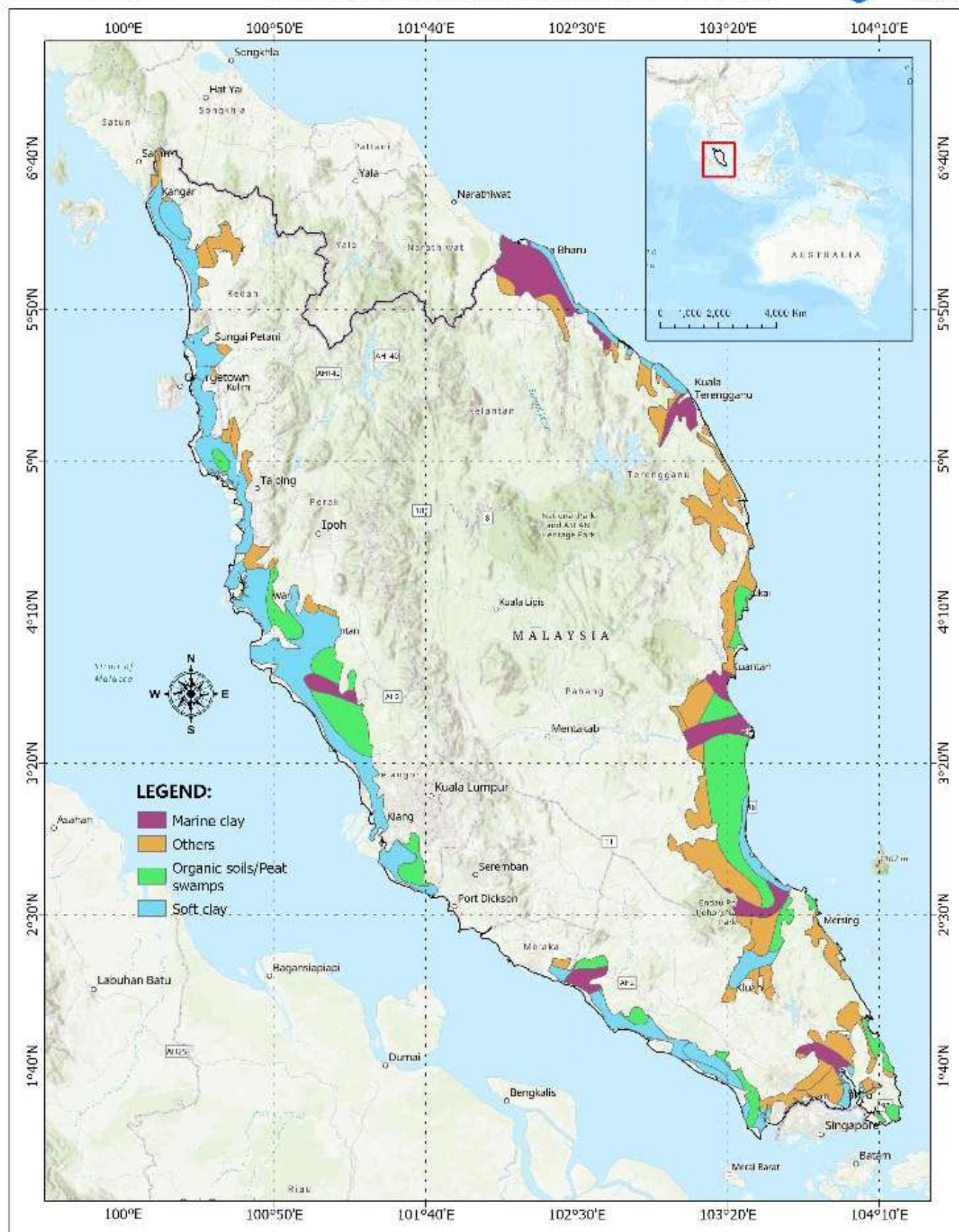


Scale: 1:2,100,000

# PENINSULA MALAYSIA: QUATERNARY DEPOSITS

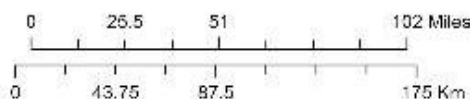


Made in ArcGIS Pro 3.0.0



## SPATIAL REFERENCE

Name: GCS WGS 1984  
GCS: GCS WGS 1984  
Datum: WGS 1984  
Map Units: Degree  
1 inch = 33 miles  
1 cm = 21 kilometers



Soils Data Source: FAO/UNESCO  
Designed by Mr. Youventharan Duraisamy

Geological Data Source: United States Geological Survey, 1999, Generalized Geology of Southeast Asia (geo3bl); U.S. Geological Survey data release, <https://doi.org/10.5066/952M11CV>.

Basemaps: Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, TomTom, FAO, NOAA, USGS, Esri, USGS

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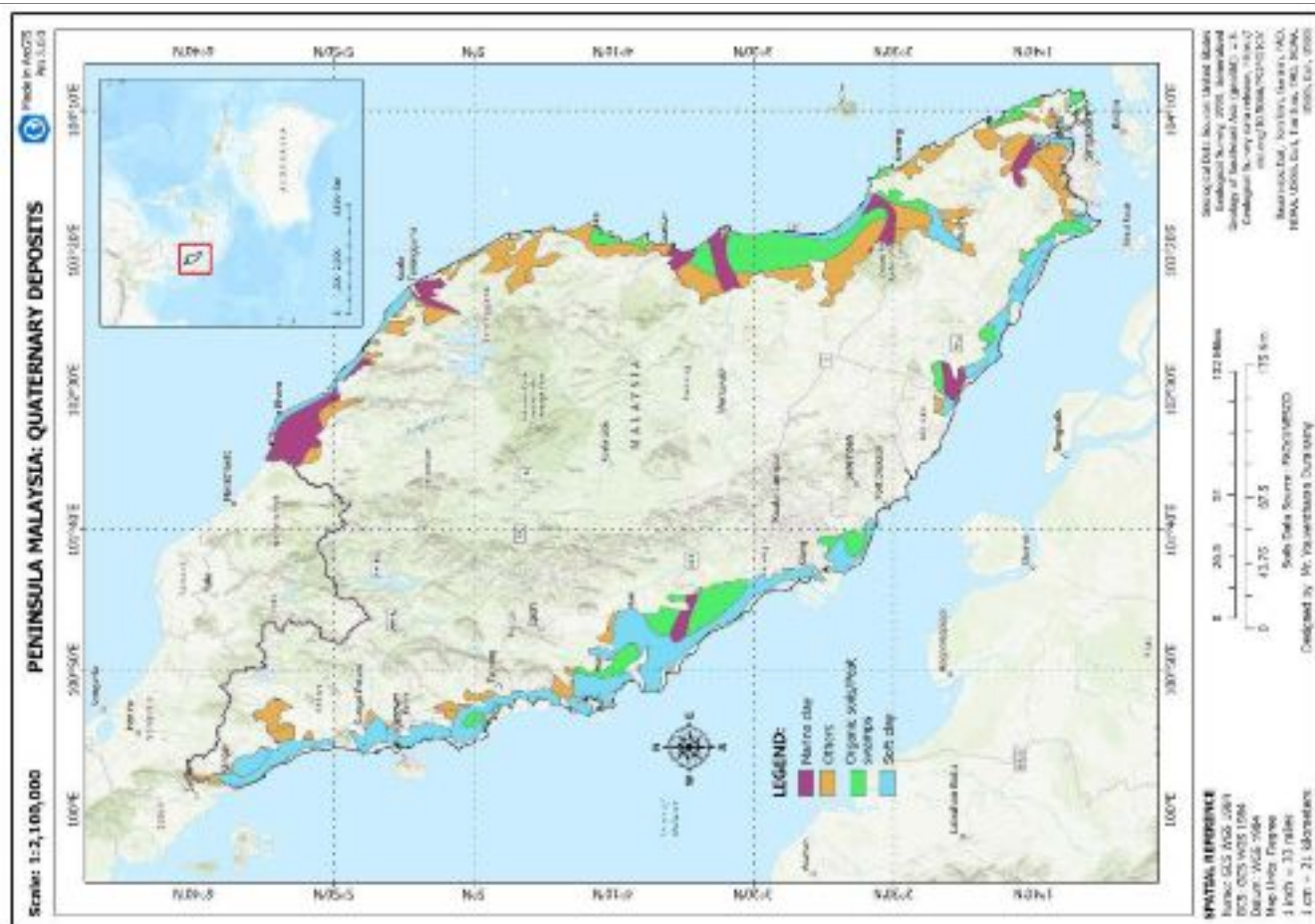
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## Malaysia's ECRL Project: A Marvel in Motion or a Disaster in Waiting?

15 December 2025

As Malaysia advances its transportation infrastructure to align with its economic ambitions, the East Coast Rail Link (ECRL) stands as a symbol of progress, a high-speed connection meant to bridge the east and west coasts of Peninsular Malaysia. Set to commence full operations in 2027, the ECRL promises faster logistics, economic integration, and regional upliftment. However, beneath this steel-and-concrete marvel lies a far less glamorous truth: the environmental and geotechnical implications that could spell long-term consequences for the very soil it stands on.

While the economic benefits are widely touted, the engineering and environmental communities are voicing growing concerns about the ECRL's path through highly sensitive terrain, particularly the collapsible soil zones and residual tropical formations that define much of the East Coast region. Left unmitigated, these geotechnical challenges could trigger not only excessive settlement but also widespread slope failures and infrastructure vulnerability.





The issue is not purely geotechnical. Large-scale transportation projects bring with them an ecological cost, one that includes:

- Clearing of forest reserves, disrupting biodiversity corridors,
- Sediment runoff into rivers, harming aquatic ecosystems and increasing siltation,
- Altered hydrology, increasing flood risks downstream.

In particular, some portions of the ECRL alignment cut through water catchment zones and protected forests, potentially displacing endemic species and threatening Malaysia’s already vulnerable natural heritage. Construction near highlands or karst areas may even open sinkholes or create irreversible changes to groundwater flow.

Table 1: Key Locations and Characteristics of Collapsible Soils in Peninsular Malaysia\*

State	Geological setting	Soil type	Characteristics	Engineering concerns
Pahang	Alluvial plains, residual granite soils	Silty sand, lateritic soils	High void ratio; collapses when saturated	Settlement risk for ECRL embankments
Terengganu	Coastal alluvium	Loose sand, silts	Rapid loss of strength after rain	Embankment instability
Kelantan	Floodplain alluvium	Silty sand	Moisture-sensitive; monsoon impact	Differential settlement

\*based on available data and the personal experience of the author.

Are We Engineering with Nature — Or Against It?

Malaysia has the talent and tools to build sustainably. What we lack is often the policy enforcement and early-stage geotechnical integration into mega-project planning. In the case of ECRL, the pressing question is: Have enough soil investigations, slope hazard mapping, and hydrological studies been conducted and, more importantly, acted upon?

Time and again, we have seen the cost of hindsight. The Highland Towers tragedy, the Bukit Kukus landslide, and the recent sinkholes in urban areas, such as the Masjid India incident, remind us that engineering oversight on unstable ground is not merely a design error, but it is a life-threatening gamble.

Engineering Recommendations That Must Not Be Ignored

To avoid the ECRL becoming an environmental time bomb, it is critical that:

1. Detailed Geotechnical Risk Assessment be mandatory along the entire alignment, especially in

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known collapsible soil areas.

2. Slope Stability Monitoring Systems be installed with real-time alerts during and post-construction.
3. Advanced Ground Improvement Techniques, such as dynamic compaction, soil replacement, or deep soil mixing, be deployed where required.
4. Environmental Impact Assessments (EIA) be continuously updated — not just pre-construction but during operations.
5. Transparent public reporting on environmental mitigation strategies to restore public trust and allow academic scrutiny.
6. Collapsible Soil Map must be produced by the relevant authorities as guidance to local government and town planners to propose any mitigation actions.

## **Balancing Progress and Responsibility**

No one is disputing the potential economic merits of the ECRL. However, responsible engineering must account for not just the structure, but the substrate, the ecosystem, and the communities it affects. Short-term progress cannot come at the cost of long-term environmental degradation and structural failure.

If the government and contractors act now proactively, transparently, and with scientific diligence, the ECRL can still be a beacon of sustainable development. Without serious reconsideration of the geotechnical and ecological concerns, we risk building not a railway of the future, but a costly reminder of what happens when we move too fast and think too little about the ground beneath our feet.



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