CREATING A MARINE CLAY MATRIX WITH INCINERATION BOTTOM ASH (IBA) FOR LAND RECLAMATION

Project Scope

Objectives
To develop a novel integrated engineered system using IBA-marine clay formulations for land reclamation

Value Proposition
a. Use of IBA and marine clay to significantly substitute imported sand as the primary fill in land reclamation
b. Practical solutions with time-, energy- and cost-savings
c. Provide a platform for further R&D works on the transforming Incineration Fly Ash (IFA) for reuse

Description

Module 1
- Develop chemical additives to stabilise the IBA

Module 2
- Study the use of marine clay to encapsulate the stabilised IBA
- Study the pozzelanic and other properties in the IBA-marine clay mixture

Module 3
- Develop a 3D non-linear finite strain (NFS) consolidation model of the mixture
- Predict leaching potential and consolidation process of the mixture

Module 4
- Investigate the use of marine clay and liner thickness as additional liner to prevent potential leaching

Module 5
- Study the long-term stability of the mixture

Completion
- Integration of above into a complete engineering system for land reclamation using IBA and marine clay

Contributions to Singapore’s Environmental Sustainability

a. To transform IBA into “Singapore New Sand” which will reduce its dependence for importing raw materials for land reclamation.

b. Assist NEA to achieve its vision of “Towards Zero Landfill & Zero Waste".

c. To develop an engineering technology to transform two waste materials—IBA and marine clay into valuable civil construction resources for land reclamations in both Singapore and exportable to other coastal countries.

Key Deliverables

- Leachate compliance
- Enhancing the self weight consolidation of the IBA-marine clay
- Appropriate chemical and physical properties
- Higher accuracy of mechanical and chemical modeling
- Minimising leaching
- Complete engineering system for land reclamation using IBA and marine clay

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