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# Understanding Soil Characteristics and Hydrology to Optimise FloodWall®: Another Step Towards Effective Green Infrastructure

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With rising urbanisation and environmental concerns, green infrastructure has become increasingly used to address a range of environmental issues, including flood hazards. By incorporating green infrastructure into their innovation strategies, cities may achieve a better balance between development and environmental conservation. In accordance with these global initiatives, Andel Ltd.'s FloodWall® stands out as an affordable, green substitute for perimeter flood defence made primarily of non-porous, post-industrial plastic waste, reinforced at the posts with steel pipes for added durability. This flood defence system, made from recycled materials and powered by renewable energy, can be installed in new constructions, existing buildings, and commercial settings. With the goal to maximise the potential of FloodWall® as a sustainable flood defence system, a collaborative effort has been made to develop specific site investigation methods to better understand the local soil hydrology and other characteristics that will control excess water flow beneath the wall and hence determine its effectiveness. Integrated methods are used including analysing geographic information system (GIS) data alongside *in-situ* and controlled laboratory findings to improve the efficiency of FloodWall® while cutting down its cost. For such green infrastructure solutions to be effectively and successfully implemented, a thorough understanding of site-specific soil properties such as permeability, soil water holding capacity, and the precise location of underground water pipelines and electrical equipment is vital. Accurate temporal and geographical soil hydraulic data are also critically needed for strategic management and accurate flood predictions. Precise soil moisture change measurements across larger areas can be difficult due to the dynamic nature of soil moisture levels. Although AI tools have a lot of potential in tackling this issue, the effectiveness of this approach is restricted by data availability. As a result, it is critical to prioritise localised research and modelling to maximise flood defence design, reliability, and cost. The main objective of this study is to determine an efficient evidence-based workflow that enables key decisions on how to implement installation of sustainable and cost-effective flood walls around properties in locations where public or private funding for community defences are not viable. Our study uses (i) analysis of satellite imagery, (ii) controlled laboratory experiments, (iii) in-situ analysis using cutting-edge sensors, and (iv) appropriate machine learning (ML) and artificial intelligence (AI) techniques to investigate site-specific soil hydraulic properties. Data feeds a suitable numerical model to estimate soil water flow and water

seepage beneath flood defence structures. With this integrated approach, environmental stakeholders and flood researchers are provided with extensive site-specific data as well as comprehensive reports that will allow well-informed decisions regarding the implementation of sustainable flood defence technologies in cities, with a particular focus on the FloodWall®.