

Rational Approach to the Design of a Sustainable Drainage System for Permanent Site of Federal Polytechnic Oko: A Case Study for Flood Mitigation and Environmental Management

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Abstract : The design of a drainage system at the permanent site of Federal Polytechnic Oko in Anambra State is critical for mitigating flooding, managing surface runoff, and ensuring environmental sustainability. The design process employed a comprehensive analysis involving topographical surveys, hydraulic modeling, and the assessment of local soil types to ensure stability and efficient water conveyance. Proper slope gradients were considered to maintain adequate flow velocities and avoid sediment deposition, which could hinder long-term performance. From the result, the channel size estimated was 0.199m by 0.0199m and 0.0199m². This study proposed a channel size of 1.4m depth by 0.5m width and 0.7m², optimized to accommodate the anticipated peak flow resulting from heavy rainfall and storm-water events. This sizing is based on hydrological data, which takes into account rainfall intensity, runoff coefficients, and catchment area characteristics. The objective is to effectively convey storm-water while preventing overflow, erosion, and subsequent damage to infrastructure and properties. This sustainable approach incorporates provisions for maintenance and aligns with urban drainage standards to enhance durability and reliability. Implementing this drainage system will mitigate flood risks, safeguard campus facilities, improve overall water management, and contribute to the development of resilient infrastructure at Federal Polytechnic Oko.

Keywords : flood mitigation, drainage system, sustainable design, environmental management

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