

Formula 1

Content placeholder

Formula 2

Content placeholder

Formula 3

Content placeholder

Detailed Explanation

The BRE/SCS-2 Hybrid Decision Tree was developed to address the lack of standardized, risk-proportionate scour assessment protocols across the MRE sector, where inconsistent methodologies previously led to over-design, unnecessary monitoring, or underestimation of scour hazards. It operates as a tiered decision framework: starting with project-scale boundary conditions (e.g., device type, water depth, current velocity), it progressively evaluates key drivers—including bed shear stress, sediment mobility (using Shields parameter), foundation geometry, and sediment cohesion—to determine the appropriate level of scour analysis (Tier 1: desk-based screening; Tier 2: semi-empirical equations; Tier 3: physical or numerical modelling). A core principle is proportionality—requiring higher-fidelity analysis only when lower-tier methods indicate significant scour potential ($>0.5D$, where D is foundation diameter) or when site conditions exceed empirical validity limits (e.g., cohesive sediments, complex flow fields, or multi-device arrays). The tree explicitly incorporates SCS-2's sediment classification system (e.g., SCS-2 Sediment Mobility Classes A–E) and BRE's foundation-specific scour coefficients, while also embedding mitigation logic—for example, recommending scour protection design only after confirming scour depth exceeds 1.0 m or threatens structural stability. Practitioners use this tool during early-stage design, consenting submissions, and post-installation monitoring planning, ensuring compliance with Marine Scotland Licensing Operations Workbooks and the UK's Engineering Guidelines for Offshore Wind and Tidal Energy Foundations.

Key Components

#	Component
1	Tiered Assessment Framework (Tiers 1–3)
2	SCS-2 Sediment Mobility Classification
3	BRE Foundation-Specific Scour Coefficients

Applications

#	Application
1	Pre-consent environmental and geotechnical risk assessment for tidal stream arrays
2	Design basis selection for scour protection (e.g., rock armour, geotextile mattresses)
3	Justification of monitoring strategy scope and frequency in O&M plans

Related Concepts

#	Concept
1	Sediment Transport Modelling
2	Foundation Stability Analysis
3	Marine Consent Requirements (Scotland/UK)

Tags

marine renewables, scour prediction, foundation design, BRE, SCS-2, hydrodynamics, sediment transport

ToolFusion Engineering