



SUSTAINABILITY OF ACSW TESTING

Guidance Note SSGN024

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Introduction

SoilSafe Limited specialises in the use of Advanced Continuous Surface Wave (ACSW) testing as a routine civil engineering test. The SoilSafe has developed its ACSW testing system integrates advanced software with robust hardware to enable fast and accurate shear wave velocity profiling to be undertaken in the construction environment, including the challenging conditions of the UK weather. SoilSafe has an ongoing research programme to continuously refine and improved its technology, and to expand the range of use of ACSW data, drawing on or funding on academic research as necessary.

As designer and manufacturer of the ACSW system, SoilSafe actively promotes the adoption of this sustainable technology with a range of publications and guides, as well as controlling the manufacturing process in the UK to ensure its environmental impacts are minimised

This document outlines the environmental and sustainability benefits SoilSafe ACSW testing system, a finalist for the Sustainability Award category of the 2025 Ground Engineering Awards.



Sustainability Through Design Optimisation

Sustainable ground engineering is all about optimised design. The accuracy of estimation of ground movements for design is traditionally extremely poor due to the low quality or limited amounts of ground stiffness data available. Low-cost techniques such as empirical relationships or plate load tests often result in poor Serviceability Limit State design, potentially meaning unduly resource heavy, waste generating designs (for example piled foundations where ground improvement could be undertaken). Accurate measurement of stiffness at known strain (such as pressuremeter testing or large-scale load tests) is not routinely undertaken due to time and cost considerations, and even here the typically small quantity of data may limit the design benefits. Additionally, obtaining high quality stiffness data typically involves significant waste generation or energy use (for example in the advancement of boreholes).

ACSW is a rapid, low cost, non-intrusive investigation technique capable of routinely generating accurate ground stiffness profiles in a construction environment therefore has significant benefits in terms of sustainable design. Use of accurate stiffness parameters in analysis can lead to a significantly lower design displacement reducing the need for or scale of foundation solutions.



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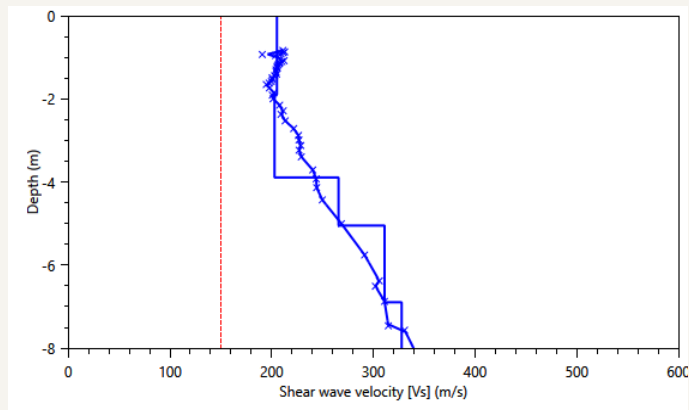
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SoilSafe Validated Independent Base (VIB) system

ACSW provides accurate, representative soil properties which can be strain-softened to design values. Foundation designs can then be optimised to allow construction on materials where replacement, deep foundation or ground improvement is traditionally required. The size of foundations can also be reduced. Value engineering using ACSW can therefore result in significant reductions in risk, cost, programme, landfill volumes and embodied carbon.

SoilSafe have developed a design approach for spread footing using ACSW. The SoilSafe Validated Independent Base (VIB) system is an Observational Method approach which uses ACSW's rapid testing benefits to confirm the soil properties at each foundation location. Using VIB, foundations can be optimised for the actual rather than worst credible ground conditions.



Testing twice at each foundation location against a target shear wave velocity provides assurance that any locally poorer ground conditions are identified and addressed by the design as part of planned mitigations.

Using VIB, carbon savings 30 to 90% have been achieved over traditional foundation design approaches.

