

Guidance: Submission / Appraisal / Adoption of Geocellular SuDS Structures

PURPOSE AND BACKGROUND

To provide initial guidance when considering geocellular crates offered for future adoption. This includes appraisal, structural and hydraulic design, authorisation, supervision, inspection, testing, adoption etc. **Please note that the consideration of the use of Geocellular SuDS Structures will only be considered if the use of hard engineered solutions are not feasible.**

On 22 May 2016 the NI Assembly introduced The Water and Sewerage Services Act (Northern Ireland) 2016, providing the powers for the adoption of sustainable drainage structures (SuDS). Developers recognise the benefits of SuDS and offer hard engineered solutions and geocellular crates as a cost effective option. There are many and varied types of geocellular systems on the market.

LEGISLATION

The adoption at a future date of drainage systems including sewers, drains or works falls under Article 161 of The Water and Sewerage Services (Northern Ireland) Order 2006. Article 163 relates to the 'Right of private drains and private sewers to communicate with public sewers'. Under The Water Act 2016: - Section 4: specified SuDS structures can be adopted; Section 5: where alternatives means of disposal are available, surface water discharge to a public sewer can be refused; and Section 6 - makes it a condition of the approval to connect to a public sewer that a sewer adoption agreement with associated bond security is mandatory.

REQUIREMENTS FOR SUBMISSION OF DETAILED DRAINAGE DESIGN FOR GEOCELLULAR STRUCTURES

Installations to comply with CIRIA 737 'Structural and Geotechnical Design of Modular Geocellular Drainage Systems', and CIRIA 753 'Sustainable Drainage Systems Manual'. Site classification and Zones of Influence must comply with CIRIA 737, Chapter 3. All modular drainage systems to have third party accreditation from BBA, to meet as appropriate current standards for BSI, EN, EUROCODES ECO, EC1, EC7, and CEN Testing Standards (currently under development). Materials used must comply with ISO 9001:2008 tests. Structures with WRc approval will be given consideration for future adoption, over those that do not.

DESIGN

Submissions to include detailed drainage design layout for the development area, including all future upstream development served by the downstream sewers; longitudinal sewer sections; relevant statutory agency approvals, eg. Rivers Agency consent for communication with a watercourse, Transport NI TASS approval, etc.; site investigation report; geotechnical interpretive report, etc. Hydraulic and structural design of Geocellular structures, including supporting evidence of (i) a reputable manufacturer (ii) a strong technical back up team, (iii) construction method statement indicating quality assurance procedures in accordance with the manufacturer's instructions, (iv) design parameters indicating construction, operational and accidental loadings, surface materials, unit depths, concentrated loads from containers, wheels, etc; and lateral loads from earth pressure, compaction, water, flotation forces, traffic, distributed loads from fill and surcharge, adjacent buildings and structures, and bending moments in the panels and joints; (v) product information for Geotextile fleece, Geomembrane, and (vi) design should factor in potential for creep, and ground settlement, loosening of dense sand and clay during construction. (vii) methodology for dealing contaminated land where appropriate. Hydraulic design calculations for submitted sewers and associated structures to be in WinDes InfoDrainage format. All installations to (i) be designed for no out of sewer flooding in a 1 in 30 year storm, no localised flooding of property in a 1 in 100 year rainfall event, (ii) have a minimum design life 50 years minimum, (iii) installation of Registered Geocellular Structures by specialist contractor, and (iv) Compliance with NI Water's Standard Specification for Geocellular Structures (currently under development).

CRITERIA

Geocellular structures offered for adoption to be located in **non-trafficked areas**; structures must not be within the designated Private Streets area. The attenuated structure to be symmetrically designed with no odd shapes or irregular features, in off-line format (in parallel) as per CIRIA 753 The SuDS Manual page 531 Diagram 24.6, and should (i) not exceed a depth of 3.0m, (ii) be brick-bonded for additional stability, (iii) have adequate air ventilation, (vi) adequate inspection chambers, to accommodate sewer cleansing and CCTV equipment, permitting camera surveys at a maximum of 15 m intervals (vi) should be encased in a hot-jointed sealed impermeable heavy duty geomembrane minimum 1mm thickness, encapsulated in a protective geotextile (fleece) layer, minimum weight of 300g/mm², and (vii) have adequate silt traps in the inlet sewer to reduce volume of sediments entering the structure. All inlet and outlet pipework to be a minimum of 150 mm diameter; connections to the geocellular structure to be pre-formed adaptors which are completely sealed to prevent ingress / egress. Only air ventilation units with approved flanged adaptors will be accepted. Maintenance schedules and manuals are required.

ASSESSMENT

All assessments of submitted designs undertaken by NIW or their appointed agents, will take into account type of structure proposed, soil type, depth of cover, finished surface type, ground water levels, and type of traffic loading, other buried structures in proximity, sloping ground and embankments. NOTE : Geocellular structures installed in the water table, and structures operating as an infiltration structures will not be considered for adoption.

INSTALLATION AND TESTING

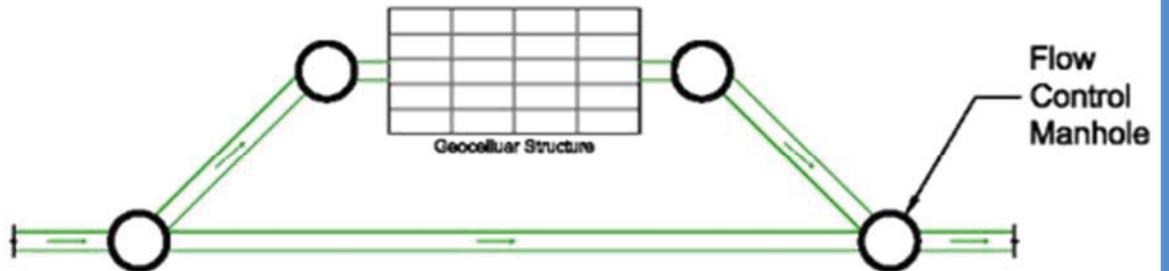
Method of installation to be approved prior to going on site and installation witnessed by NI Water nominated inspector. Ground to be excavated, levelled and compacted. First layer to be a 100 mm minimum of coarse sand or non-angular granular material. Each unit (crate) to be inspected before installation, damaged or broken crates must be rejected. Crates installed in brick-bonded format aligned securely using approved interconnector systems. Placement of stone free backfill materials to be lightly compacted. When units installed, they must not be subjected to additional loading at any time, eg. Trafficking by construction traffic, including mechanical equipment or site compounds. The completed sealed attenuation structure to be tested to 1 bar pressure for five minutes. On completion of the installation and at application for Preliminary Certificate stage, a 25 Year Certificate of Warranty for Installation of the Structures is required from the manufacturer's accredited / approved / registered installer.

GENERAL

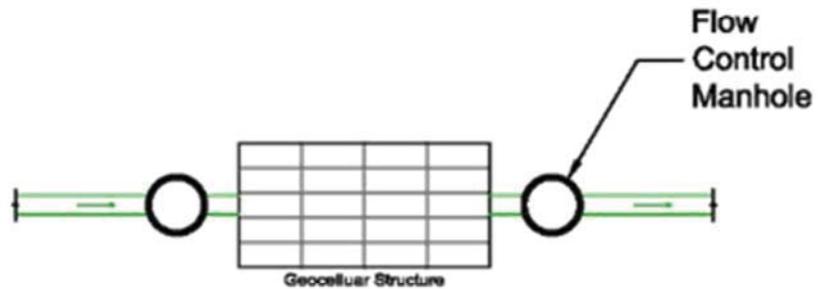
(1) Sewer design and construction **must** comply with current edition of the Sewers for Adoption Northern Ireland (2) Fees and charges from the Company's current Scheme of Charges will apply. (3) The 'developer' is encouraged to contact NI Water early in the process to discuss the on-site infrastructure and agree parameters. (4) Where applicable a hybrid of soft and hard SuDS may be considered, and requisitioned off-site sewers may be required.

Typical layouts for Geocellular orientation on site with regards to NI Water approval under Article 161

1. Preferred Orientation



2. Possible Orientation
(silt trap will be required)



3. Orientation NOT PERMITTED

