

Aggregate from Inert Waste: Resource Framework

Unbound Recycled Aggregate Granular Fill

Guidance & Testing Requirements

Specification for Highway Works (SHW) 2025

Clause CC 201 (Sections 6 & 7)

(formerly SHW Series 600)

Applications

- Heavy-duty pavement foundations
- Roads, trafficked pavements

Focus

- Performance





Unbound Recycled Aggregate Granular Fill

Disclaimer

This document is provided for general guidance and information only. It is intended to support understanding of the use, testing and compliance considerations relating to recycled aggregates, the Specification for Highway Works and associated standards. It does not constitute legal, contractual, engineering, environmental, regulatory or professional advice and should not be relied upon as a substitute for project-specific assessment, competent professional judgement or formal approval by the relevant client, designer, regulator, certifying body or highway authority. No duty of care is owed by the author or any associated parties in relation to the preparation or provision of this document.

All users of this document remain responsible for verifying the current requirements of the applicable specifications, standards, permits, end-of-waste criteria, quality protocols, testing regimes, contract documents and site-specific conditions before specifying, producing, supplying, placing or accepting any material. Standards, specifications and regulatory requirements may change, and the content should be checked against the latest published documents and any project amendments or departures. Full responsibility for compliance with all applicable requirements rests with the user of this guidance.

No warranty, representation or guarantee is given as to the accuracy, completeness or suitability of the information in relation to any particular project, location, design, specification, material source or intended use. To the fullest extent permitted by law, the author and any associated parties shall not be liable for any loss, damage, cost, delay, claim or other consequence (whether direct or indirect) arising from reliance on, or use of, the information contained in this document.

Project teams should obtain appropriate professional, technical, legal and regulatory advice where required and should ensure that all materials are independently tested, certified, documented and approved in accordance with the relevant contract, specification and Resource Framework requirements. This includes compliance with the requirements of the relevant client, contracting authority and any applicable framework or procurement arrangements.



Unbound Recycled Aggregate Granular Fill

CC 201 Explained

CC 201 is part of the 2025 Specification for Highway Works (SHW) that covers how to construct pavement foundations i.e. the layers between the subgrade (earthworks) and the road base.

CC 201 replaces older prescriptive rules (from Series 600/800) with a performance-based specification aligned with DMRB design standards (CD 225 / CD 226).

CC 201 is responsible for turning prepared ground into a tested, reliable, load-bearing foundation ready for construction.

What CC 201 is responsible for

CC 201 is responsible for ensuring the pavement foundation is properly constructed and proven to perform. This includes:

- Building the foundation layers
- Checking the ground (subgrade)
- Controlling construction
- Delivering performance
- Setting levels and tolerances
- Testing and proving compliance

Where CC 201 fits in the SHW

Within the 2025 SHW structure, CC 201 builds the foundation layers (capping and subbase). It sits directly above earthworks and below the specifications for pavement layers.

How CC 201 differs from SHW Series 600

Series 600 approach

- Shapes the ground (earthworks, cut/fill, ground improvement)
- Create a stable formation level for works
- Specifies what to use and where

CC 201 approach (2025)

- Building the structural base
- Provides a load-bearing foundation
- **Specifies what performance level to achieve**



Unbound Recycled Aggregate Granular Fill

Summary:

Series 600 governs earthworks and formation preparation, while CC 201 governs the construction and performance verification of the pavement foundation layers built above that formation.

Aspects of CC 201 (high-level)

1. Purpose

CC 201 defines:

- How to construct and verify pavement foundations
- Ensure a stable, load-bearing platform

2. Scope

CC 201 gives clear requirements for foundation layers above formation level.

- Capping, both bound and unbound
- Sub-base
- Foundation surface

3. Construction Controls

- Layer thickness
- Compaction
- Moisture control
- Surface levels and tolerances

4. Performance Requirements

Foundation requirements must achieve:

- Strength
- Stiffness
- Load distribution capability

*Focus is on what it **does**, not what it is.*



Unbound Recycled Aggregate Granular Fill

5. Testing and Verification

Mandatory proof of performance is required via:

- Compaction tests
- Thickness checks
- Stiffness testing

No proof means non-compliance and rejection.

CC 201 and Recycled Aggregates

CC 201 explicitly allows recycled aggregates, especially in unbound capping and subbase layers. They are treated the same as natural materials, provided they meet specification and performance requirements.

Where recycled aggregates are used under CC 201

Under CC 201, recycled aggregates are **typically used in the pavement foundation layers**.

Common acceptable uses:

1. Unbound capping (Section 6; PRIMARY USE)

- General granular capping material
- Substitute for natural aggregate
- Recycled concrete aggregate (RCA)
- Mixed recycled aggregate
- Site-won or imported aggregate materials

2. Sub-base layers

- Unbound sub-base e.g. Type 1 equivalent
- Must meet grading and strength requirements
- Deliver required performance

Recycled aggregate use is very common in applications where Type 1 is specified.



Unbound Recycled Aggregate Granular Fill

3. Bound capping (Section 7; CONDITIONAL USE)

Recycled aggregates can be used within **stabilised materials**:

- Cement-treated
- Lime-treated
- Subject to laboratory design mix and compliance with strength and stiffness requirements

Recycled aggregates can be used where performance design allows it.

Where recycled aggregates are NOT normally used under CC201

Under CC 201, recycled aggregates are **not normally acceptable** for:

- Use under earthworks formation layers
- Pavement layers

What CC 201 expects from recycled aggregates

Under CC 201, recycled aggregates are fully acceptable if they perform to the same strict requirements as natural aggregates.

1. Material quality & composition

- Properly processed (crushed, screened, clean)
- Free from contamination (wood, plastic, metal)
- Controlled limits on asphalt, masonry, glass etc. Class 6F3 for example needs to exceed 50% asphalt plantings.

It can't be just "crushed waste"; it must be a controlled, processed and tested material.

2. Performance (CRITICAL)

- Must achieve required strength
- Must achieve required stiffness
- Good load distribution qualities

CC 201 is performance based. Origin doesn't matter; performance does.



Unbound Recycled Aggregate Granular Fill

3. Frost resistance

- Must resist frost heave
- Maintain integrity in freezing conditions

4. Durability

- Resistant to breakdown under traffic
- Stable over time with no excessive degradation
- Source variability must be controlled

5. Compliance with Standards

Recycled aggregates must comply with:

- SHW 2025 aggregates requirements
- Relevant BS/EN testing requirements
- Meet End of Waste status under Aggregates from Inert Waste: Resource Framework

6. Certification and Traceability

- Must have product certification
- Must have test data
- Traceable sources, production processes and testing regimes
- Independent UKAS accredited, third-party certification

7. Construction suitability

- Must be placeable and compactable
- Suitable for specified layer thickness
- Consistent in grading and moisture behaviour



Unbound Recycled Aggregate Granular Fill

8. Testing & Verification

Performance must be proven through:

- Compaction testing
- Thickness checks
- Stiffness testing

Same quality as natural aggregates must be proven; no relaxation.

Recycled Aggregates: What CC 201 DOES NOT allow

- Uncontrolled demolition waste
- Mixed or contaminated materials
- Materials that cannot meet grading, frost resistance or required performance standards

Summary:

CC 201 requires recycled aggregates to meet strict quality, durability, and performance criteria, ensuring they deliver the same strength, stiffness, and reliability as natural aggregates. Use must be supported by full testing and certification.

Mandatory Tests for Recycled Aggregates (CC 201)

For SHW 2025 CC 201 (Pavement Foundation Construction), recycled aggregates used in capping, sub-base, and foundation layers must meet a combination of:

- Classification tests (what the material is made of)
- Physical/mechanical performance tests (how it behaves)
- Chemical/environmental compliance tests
- In-situ performance verification (installed performance)



Unbound Recycled Aggregate Granular Fill

Below is a **practical, audit-ready list of mandatory, critical tests** aligned to SHW / BS EN standards and how they are typically applied under CC 201.

Material Classification

1. Constituent Content (Recycled Aggregate Quality)

Required to confirm acceptable recycled material composition.

Test	Standard
Constituents of coarse recycled aggregate (concrete, masonry, asphalt, etc.)	BS EN 933-11

Purpose:

- Quantifies % concrete, masonry, asphalt, glass, wood, plastics

2. Grading and Physical Properties

These confirm the materials meet engineering suitability.

Test	Standard
Particle Size Distribution	BS EN 933-1
Moisture Content	BS EN 1097-5
Plasticity (Class 6S Only)	BS 1377-2

Purpose:

- Used to confirm compliance with grading requirements.



Unbound Recycled Aggregate Granular Fill

3. Mechanical Performance Tests

These tests are critical for verifying load-bearing performance in pavement foundations.

Test

Los Angeles Abrasion

Standard

BS EN 1097-2

Purpose:

- Measures strength and resistance to fragmentation (crushing, impact etc.)

California Bearing Ratio (CBR)

BS 1377 plus in-situ tests

Purpose:

- This is one of the most critical CC 201 tests and confirms the foundation class and load-bearing capacity.

4. Durability and Weathering

Soundness testing is not a requirement, however if the unbound capping was to be within 450mm of the final surface or 350 mm if the Mean Annual Frost Index (MAFI) of the site is less than 50 then a frost heave test will be required.

5. Chemical Testing (Critical for Recycled Aggregates)

Always required for recycled aggregates under CC 201.

Test

Water soluble sulphate (mg/l)

Total sulphur

Standard

BS EN 1744-1

BS EN 1744-1

Purpose:

- Proves that recycled aggregates are clear from sulphates, which may have impacts on foundation performance or structure.



Green Compass Scheme Limited

L1 Rowan Suite,
Mamhilad House,
Mamhilad Park Estate,
Pontypool,
NP4 0HZ

Call: 03300 026 398

Email: info@greencompass.org

Visit: www.greencompass.org

