	<b>Recycling</b> <b>Part 1 – Use of Hydraulically Bound Materials (HBM)</b>	<b>Version 1.0</b> <b>April 2007</b>
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## 1. Objective

- 1.1 This document is designed to provide a formal process for both the Highways Authorities (HAs), Statutory Undertakers (SUs), and other interested parties to follow when using Hydraulically Bound Materials (HBM) within the Anlian HAUC area.

## 2. Scope

- 2.1. This process aims to provide consistent criteria that will ensure that any HBM meets the specification laid down within the Code of Practice for Reinstatement of Openings in Highways (SROH) for the use of recycled excavated materials. It also provides the producers of HBM with a controlled method of producing materials that comply with Appendix 9 of the SROH (Alternative Reinstatement Materials (ARMs)), thus ensuring compliance with the strength requirements in the HAUC specification. The process aims to ensure the following criteria is achieved:

- Efficient mixing of materials
- Batching accuracy
- Quality control testing (during and after production)
- Record keeping
- Method Statements
- Health and Safety

## 3. References and Definitions

- 3.1 The following references have been used in the production of this document:
- New Roads and Street Works Act 1991
  - Specification for the Reinstatement of Openings in Highways (2002) second edition
  - Highways Act 1980
  - Volume 1 Specification for Highway Works (SHW) Amendment – November 2004 and December 1991.

#### 4. Use of Alternative Reinstatement Materials

- 4.1 Stabilised Material for Fill (SMF) may be used as a backfill material and as an alternative to type one sub-base in class 0, 1, 2, 3 and 4 roads, footpaths and cycleways, as appendix A3.3.of the SROH.
- 4.2 Non-Flowable Structural Material for Reinstatement (NFSMR) may be used for the whole backfill layer, sub-base and roadbase in all classes of roads, footpaths and cycleways as described in the SROH.

#### 5. Batching Accuracy.

- 5.1 Batch tickets should provide the following minimum information as described within clause 814 and 815 of the SHW (as amended 2005 )
- Date of mixing
  - Weight of powders added (individually)
  - Weight of water added if required
  - Weight of admixture added
  - Weight of spoil added
  - Total weight of batch.

#### 6. Quality Control Testing

- 6.1 One appropriate recognized way to test SMF is to use a Clegg hammer. Clegg tests can be carried out during post production by compacting into a standard CBR mould. Using a pre-weighted hammer the mould will be compacted to give an indication only of strength that will be achieved in the long term.
- 6.2 A CBR test will be carried out at 90 days (soaked) as table A9.2 of the SROH, to the overall requirements in the HAUC specification. Samples should be taken on a regular basis unless agreed otherwise. Samples should be compacted into a CBR mould and tested after soaking at 90 days.
- 6.3 A frost heave test to BS 812: Part 124 (NG5.3 Additional Requirements) will also be carried out on a regular basis, or as agreed with the HA.

6.4 All records and results should be forwarded on a monthly basis to each HA concerned in accordance with s5.3.1 of the SROH.

## **7. Non-Flowable Structural Material for Reinstatement (NFSMR)**

7.1 NFSMR should be tested by Clegg hammer as it is produced and a correlation built up to show relationships between the as-produced Clegg results and 90 day strength tests.

7.2 NFSMR should be sampled on each day of production and two 150mm cube samples taken, for testing at 90 days. All tests must be carried out to table A9.1 strength requirements by a UKAS laboratory, or by a company agreed by both the HA and SU. All test results should be forwarded to the HA involved and/or posted on the AHAUC website.


7.3 All Clegg testing should comply with the manufacturer's recommendations.

7.4 Clegg testing should be carried out on SMR and NFSMR on a random basis during routine backfilling operations, and the results logged by the SU. All results should be forwarded to the relevant HA and/or posted on the AHAUC Web site.

7.5 Clegg testing is a good guide to compaction achieved and should be utilised for each layer as the excavation is filled. Clegg results will only apply to a layer of up to 150mm in depth as the weight of the hammer will only be effective up to this thickness.

Note: Clegg hammers of early design CST/881 should not be used unless they have been upgraded to CST/882 by the manufacturers due to inherent manufacturing faults. All Clegg hammers must be calibrated every year by the manufacturer, with dated results imprinted onto the body of the Clegg hammer. Clegg hammers should also be regularly checked as described by the manufacturer's instructions by utilising the calibration ring supplied. Results should be recorded and kept with the hammer box for inspection.

7.6 DCP load against penetration testing can be carried out to check layer depths in situ. This will monitor and ensure excavations are backfilled correctly. The DCP or similar device is a good guide to compaction and long term strengths, but the results should only be used as a monitoring tool as no specification of

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use has been written within any Code of Practice. Certain types of DCP equipment now automatically convert the test results from MegaPascals / Newtons to CBR values at the time of test for better understanding. The recommendation is that the manufacturer should train the relevant person or persons to operate the equipment and certificate the individuals accordingly.

- 7.7 Copies of certificates will be presented to the HA for their records.
- 7.8 In situ CBR Plate load bearing tests can also be carried out to check Clegg results and insitu bearing strengths. All tests will be carried out by a UKAS registered company employed by the SU, or a company agreed by both the HA and SU.
- 7.9 Coring will not be effective as HBM is designed for re-excavation (in a similar manner to foamed concrete).

**8. Record Keeping.**

- 8.1 After 1 year, with the agreement of the HA, a number of excavations will be visually checked by the SU for defects, logged, and sent to the relevant HA.
- 8.2 At the end of the guarantee period (2 or 3 years as appropriate), with agreement of the HA, a number of excavations will be checked visually for defects, logged, and results sent to the relevant HA.
- 8.3 As agreed with the HA a number of 100mm cores of bound layers will be taken to allow for DCP tests. All tests will be carried out by a UKAS registered company employed by the SU, or a company agreed by both the HA and SU. All results will be logged and sent to the relevant HA.
- 8.4 The opportunity will be afforded to the relevant HA to attend the investigation and witness the checks. All test data will be kept for a minimum of 2 years by the SU.

**9. Method statement requirement.**

- 9.1 The following method statements must be supplied with the application for approval for each material proposed

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- Mechanical mixing process statement required.
- Shelf life of product explained and how it is monitored
- Separation of Materials i.e. (Plastics, Litter, Wood and Metal) method statement
- Laying and compaction method statement
- Re-Excavation Method statement
- Storage and Transportation method statement

## **10. Supporting information requirement**

10.1 The following information must be supplied with each application for approval for each material proposed:

- Operative Training certificates
- Chemical Data sheet that includes Ecological and Toxicological information
- Waste Management Registration of Exempt Activity from the EA for production.

## **11. Notice requirements**

11.1 All works that use HBM for reinstatement purposes must register their use on each relevant opening notice sent to the HA, within the job description field.

11.2 The abbreviation to be used is HBM with full agreement from each HA

## **12. Approval Process**

12.1 All approval applications must be made in writing to the relevant HA.

12.2 The application must be made by the SU stating the start of use date, the company supplying the HBM, what specification it will be used for, and what cover is applied for, i.e. a particular area/scheme or all excavations within the HA area.

12.3 HA approval will not be unreasonably withheld if all of the above criteria is met.



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12.4 If the above criteria is not adhered too the HA may withdraw the approval.