



Protocols for alternative materials in construction

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A set of protocols has been developed to illustrate how recycled and secondary aggregates can be used in a range of applications in construction. The protocols cover both engineering and environmental aspects and draw on existing specifications, regulations, legislation and guidance documents.

1. INTRODUCTION

The use of recycled and secondary aggregates in construction contributes to government sustainability objectives of prudent use of natural resources and protection of the environment. However, they are subject to a number of requirements, which can often act as barriers to their use. These requirements can take various forms

- inclusion on a list of permitted materials in a specification
- compliance with the engineering properties specified for the particular application
- changes to standard design procedures or methods of working
- assessment of risks of pollution of controlled waters or harm to human health
- compliance with Waste Management Licensing Regulations.¹

These requirements can be more onerous for recycled and secondary aggregates than for primary aggregates, which, for example, do not fall under the remit of the Waste Management Licensing Regulations.¹ Equally important is the perception that there are more barriers to the use of these materials than for primary aggregates. Confusion about what the requirements are, and fear of additional paperwork, delays, expense and potential liabilities, can lead to the loss of opportunities to use these materials.

The requirements fall into two broad categories: engineering and environmental. Engineering requirements are generally expressed in the form of specifications, which list the permitted materials for given applications and the properties they must possess to give satisfactory performance. Environmental requirements include the Waste Management Licensing Regulations¹ and concerns about pollution and risk to human health. The two categories have very different objectives and have largely developed independently of each other. A material might therefore satisfy all engineering specifications for a given application but if used could cause pollution of surface water or groundwater. Equally, a material might be inert chemically but

not have the required engineering properties for the application. There is thus a need for a system that takes into account all these aspects and guides the user through the questions that have to be answered before a recycled or secondary aggregate can be used in a given situation.

2. THE PROTOCOLS

An attempt to meet this need has been made by Viridis. A set of protocols has been developed in a project funded by the RMC Environment Fund under the Landfill Tax Credit Scheme with third-party contribution from Tarmac Limited.²

The protocols are in the form of a series of linked flow charts, which can be accessed from the initial slide, titled 'All Applications' (Fig. 1).

To use the protocols, the user clicks on an application which will open to reveal a flow chart which goes through the relevant questions for the use of a material in that application. The questions fall into three broad categories.

- (a) Selection: which materials are permitted for the application?
- (b) Environmental: what considerations have to be addressed?
- (c) Engineering properties: can the material perform the required function?

At every question, there is a link to slides that provide the detail to answer the questions. At the selection stage there are a series of matrices showing the permitted constituents for the relevant applications under existing specifications. At the environmental stage, questions such as waste management permitting, harm to human health and pollution of controlled waters are addressed and references given for appropriate publications and legislation. For engineering properties, the relevant test methods, limiting values and references to specification clauses are given. Where more detail is required, a further layer of slides is provided. The aim has been to keep the overall process clear, with the detail available in further slides as required.

The protocols can also be accessed via the 'All Materials' button on the Applications slide (Fig. 1). This leads to a list of the materials covered by the protocols. Clicking on the material the user is interested in, takes them to a list of applications for which it is a permitted constituent. Clicking on the application

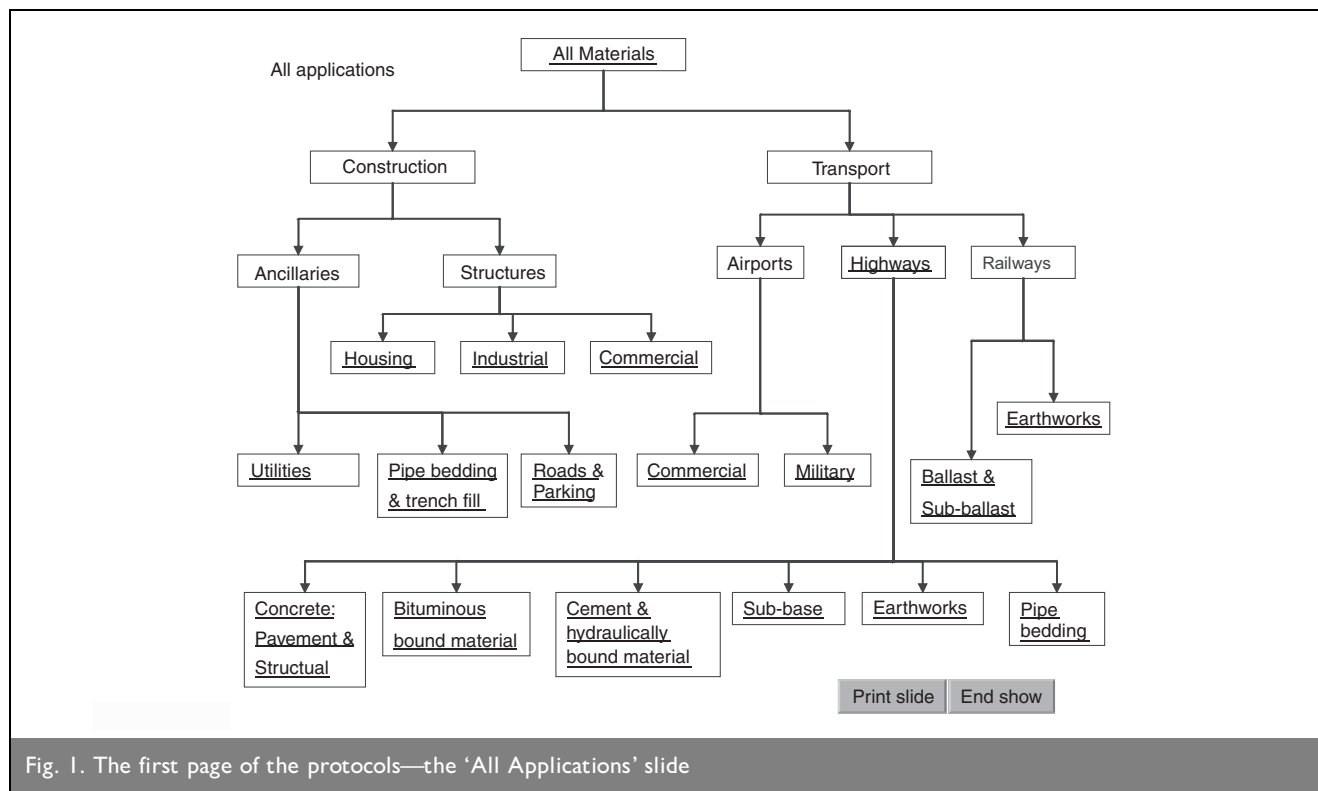


Fig. 1. The first page of the protocols—the 'All Applications' slide

then takes the user to the relevant flow chart in the lower half of the applications slide, where the selection-environmental-properties route is rejoined. This facility allows users to rapidly determine the applications for which a particular material may be suitable.

The protocols are based on existing specifications and legislation. The documents on which the protocols are based include

- Specification for Highway Works
- Civil Engineering Specification for the Water Industry
- Highway Authorities and Utilities Committee Specification for the reinstatement of openings in highways (2nd edition)
- National House Building Standards
- Railtrack and MoD specifications
- BRE Digest 433: Recycled Aggregates
- BR 392: Quality Control—the production of recycled aggregates
- BS 8500: 2002 Parts 1 and 2, Concrete
- Waste Management Licensing Regulations¹
- DEFRA/Environment Agency Soil Guideline Values and CLEA model.

The intention is not to supersede existing specifications, regulations and legislation, but to provide a guide for users to navigate the system with respect to alternative materials. The information is based on the latest available versions, which are indicated in the text. The information is necessarily somewhat simplified, and users should refer to the original documents for full details and the most up-to-date information.

In some sectors, such as road building, specifications have developed substantially in recent years and allow considerable

use of recycled and secondary aggregates. This has been accompanied by a requirement for quality control procedures to ensure that the materials are consistent and fit for purpose. Examples include the Quality Control procedure for recycled aggregates that is included in the Specification for Highway Works, and the development of new tests for the expansion of steel slag, contained in BS EN 1744-1. These measures give the client confidence that use of recycled and secondary aggregates will not lead to unsatisfactory performance.

The protocols are based on current versions of specifications and interpretations of legislation, but this is an area where there is rapid change. The protocols will thus need updating at regular intervals to maintain their usefulness; the next challenge will be the introduction of harmonised European Standards for aggregates and the withdrawal of the existing British Standards in 2004. Among other changes, the European Standards will require the use of factory production control systems for all aggregates, not just recycled and secondary ones, and will probably lead to the widespread use of CE marking. These developments will generally favour the use of recycled and secondary aggregates.

There are of course a number of other factors that affect the use of recycled and secondary aggregates, not least the economics compared to the use of primary aggregates. Many clients are now including the proportion of recycled materials as a factor in tender assessment. These and other factors will determine which materials are used on a case-by-case basis, as every project has its own unique circumstances. However, it is hoped that the provision of clear guidance on existing specifications and environmental issues will help to reduce the confusion surrounding the use of recycled and secondary aggregates, and so encourage their greater use in construction.

REFERENCES

1. WASTE MANAGEMENT LICENSING REGULATIONS 1994. No. 1056.
See <http://www.hmso.gov.uk> for more details.
2. See <http://www.viridis.co.uk> for more details.

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