



Recycled Glass for Pipe Embedment

Tests and trials on the use of glass fines as sand substitute in pipe embedment

FACT SHEET

IN 2006 the Sustainability Programs Division of the Department of Environment and Climate Change NSW collaborated with Sydney Water and Benedict Sand and Gravel to conduct laboratory tests and field trials on crushed, recycled, glass fines as pipe bedding material. DECC undertook to facilitate the assessment of four sample grades of separated, crushed and washed glass fines.

Approximately 195,000 tonnes of glass containers are currently recovered for recycling from the municipal and commercial waste streams in NSW. However approximately 40% of this material is small glass pieces, or 'fines', which are unsuitable in the manufacture of new glass containers. These secondary resources, if demonstrated to be fit-for-purpose and environmentally appropriate, are potentially suitable for a range of alternative uses including pipe bedding material, replacing natural sand. The use of recycled glass as a substitute for quarried material not only conserves natural resources but also reduces landfill.



CHEMICAL TESTING

Samples tested had the following four size ranges; under 4mm particle size, graded particles between 4mm and 2mm, graded particles between 2mm and 1mm and graded particles between 1mm and 0.4mm.

The samples were subjected to chemical tests having regard to the parameters listed in the following published guidelines:

- *Environmental Guidelines: Assessment, Classification and Management Of Liquid & Non-Liquid Wastes* (DEC, 1999) ('the Waste Assessment Guidelines');
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)*, Volume 1 — The Guidelines ('ANZECC 2000'); and
- *National Environment Protection (Assessment of Site Contamination) Measure 1999*, Table 5-A — Soil Investigation Levels.

The glass samples were tested for numerous chemical and physical contaminants including a range of metals and other inorganics, pesticides, PAHs, PCBs, VOCs, TPHs, other general organics, nutrients, BOD, total suspended solids, and COD. The samples were also examined for asbestos, and the pH and electrical resistivity of the glass samples were determined.

The chemical testing showed that the samples examined were inert and asbestos free. For each of the four samples, all of the identified chemical and physical contaminants were either not detected or were present at background or trace levels. The main pollutants present were most likely due to residual food and paper matter mixed with the crushed glass rather than the glass itself.



FIELD TRIALS

Two locations were identified by Sydney Water as suitable to trial the crushed glass in their operations as a replacement for sand and trials were conducted in November 2006. The aim of the trials was to assess the performance of the material during placement in terms of its suitability for the purpose of pipe-embedment, ease of handling, OH&S and compaction. In both locations, three different glass+sand mixtures were used; 25% glass and 75% sand, 50% of each, and 100% glass.

The first trial location was a 1 metre deep trench, approximately 20 metres in length, of a water mains renewal at Kingsgrove in southern Sydney. The second trial was conducted with sewerage mains pipes on a new residential development at Greystaynes, in western Sydney and was with 60 metres of PVC pipe with trench depths between 1 and 3 metres.

Placement, compaction and testing of the embedment material was undertaken in accordance with the Water Supply Code of Australia, WSA-03 (Sydney Water Edition). Compaction testing per AS1289.5.6.1 (as specified by WSA-03) returned results in the range 73–76% which exceeded the minimum requirement of 70%.

Both trials demonstrated that all three material blends of crushed glass and sand were suitable replacements for natural sand as pipe embedment.

The construction workers using the material commented that it handled as easily as natural sand and that they experienced no greater problems with odour, skin contact or dust.

SAFETY ISSUES

From an OH&S perspective there are a number of perceived risks that arise from using crushed recycled glass onsite. These perceived risks are associated with breathing the dust from the glass and handling the glass particles.

Previous research has shown that glass dust is an inert nuisance dust and has no significant biological effect although it may interfere with personal comfort. Contractors on the trial site commented that it generated less dust than other materials normally used; nevertheless, dust suppression is recommended by specifying it is supplied moist and hosing down stockpiles. Handling crushed glass fines also represents no greater hazard of skin cuts than conventional crushed construction aggregates. However, because of its abrasive qualities, crushed glass can be a greater irritant to skin and eyes.

The OH&S risks associated with airborne glass dust and handling crushed glass can be avoided by the same protective measures that apply to natural crushed aggregates and which would normally be specified in the Material Safety Data Sheets for all supplied materials.



LINKS

- Report of the Trial of Recycled Glass as Pipe Embedment Material: www.environment.nsw.gov.au and go to the Environmental Issues - Waste and Resource Recovery section.
- Sydney Water Crushed Glass Specification: www.sydneywater.com.au/BuildingDevelopingandPlumbing/SupplierInformation/PurchaseSpecification.cfm
- Sample Material Safety Data Sheet: www.benedict.com.au/pdfs/BSG_MSDS_GlassSand.pdf