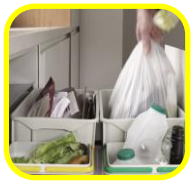



The use of Bottom ash as Aggregate

David M York Dip HCM MCIHT

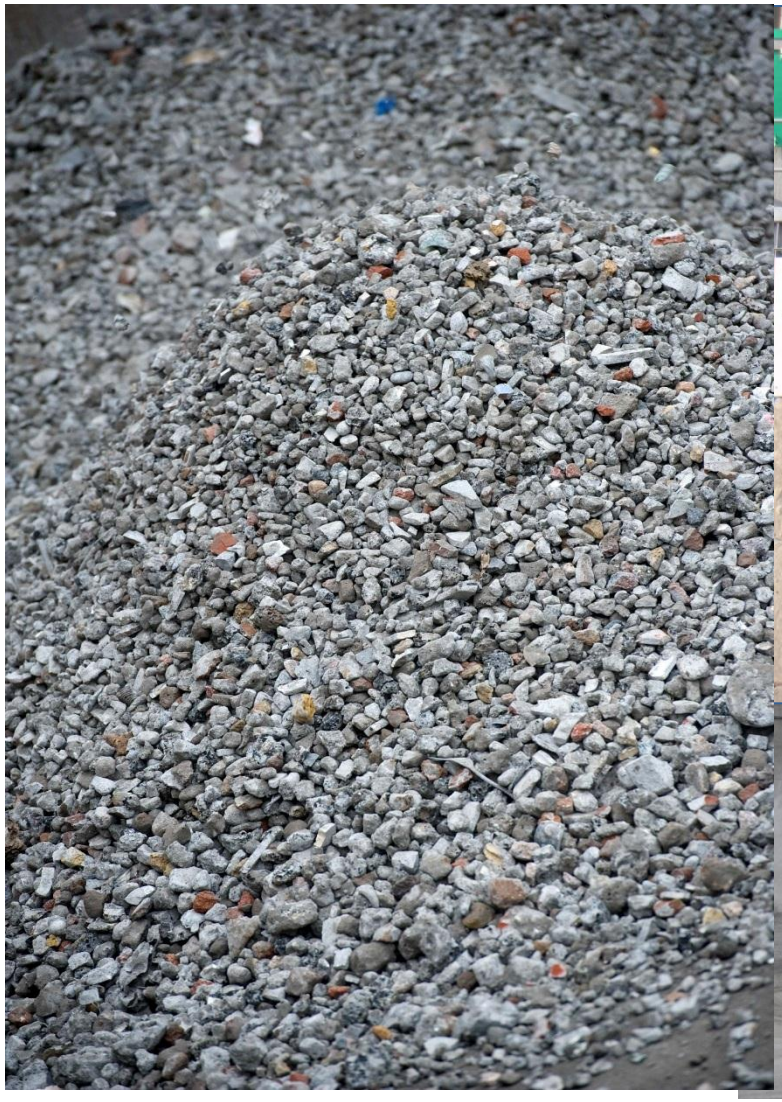
Chairman of Ballast Phoenix Ltd

Does it do the job as aggregate?

Bottom ash has been used for many years in a variety of applications:

- as capping layer or sub base for road or other heavily trafficked area (port) foundations
- as a selected fill for use around structures
- backfill for trenches in highways
- as a component of Hydraulically Bound Mixtures HBMs
- other bound applications

It looks like aggregate!



Key Aggregate Parameters

- Particle Size Distribution
- Strength
- Durability

Incinerator Bottom Ash Aggregate (IBAA) is not the best aggregate in the world, but it has adequate strength and durability for groundwork and general paving applications.

Particle size distribution

Laboratory Report	ETS/106968A	Contract Sample No	C2246/22
Report Date	27 June 2014	Client Ref	

Construction Testing Solutions Ltd
Rotherham Lane Industrial Estate
Dunscroft | Doncaster | DN7 4JU
T | (01302) 352652
E | enquiries@constructiontesting.co.uk
W | www.constructiontesting.co.uk

Ballast Phoenix Ltd Victoria Stables South Road Bourne Lincolnshire PE10 9JZ	Material Description	T.1.S.B IBAA
	Source	Cleveland
	Supplier	Ballast Phoenix
	Date Sampled	22/04/2014
	Date Received	22/04/2014
Cleveland	Date Completed	24/06/2014
	Sample Location	Stockpile

Determination of water content by drying in a ventilated oven, BS EN 1097-5:1999

		Specification
Water content of test portion (w)	11.0 %	

Determination of particle size distribution (wet sieving method) - BS EN 933-1: 1997

BS Sieve Size	Passing BS Sieve	Specification MCHW. SHW Vol 1, Table 8/5
63 mm	100 %	100
31.5 mm	97 %	75-99
16 mm	68 %	43-81*
8 mm	41 %	23-66*
4 mm	27 %	12-63*
2 mm	19 %	6-42*
1 mm	13 %	3-32*
63 µm	2.7 %	0-9

* Suppliers Declared Limites Not Stated

Authorised Signatory

J A Hardcastle - Managing Director

Los Angeles Abrasion Value

Laboratory Report	ETS/100720C	Contract Sample No	C2246/17
Report Date	01 April 2014	Client Ref	

Construction Testing Solutions Ltd
Bootham Lane Industrial Estate
Dunscroft | Doncaster | DN7 4JU
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Ballast Phoenix Ltd
Victoria Stables
South Road
Bourne
Lincolnshire
PE10 9JZ

Cleveland

Material Description	40mm
Source	Cleveland
Supplier	Ballast Phoenix
Date Sampled	15/01/2014
Date Received	15/01/2014
Date Completed	13/02/2014
Sample Location	Stockpile

Determination of Los Angeles Coefficient - BS EN 1097-2:2010

Specification

Size fraction tested	14-10 mm
Proportion Passing 11.2mm sieve	38 %
Proportion retained 11.2mm sieve	62 %
Los Angeles Coefficient (LA)	**35 %**

Authorised Signatory

J A Hardcastle - Managing Director

Durability – Frost Heave Test

celtest

Construction Testing Solutions Ltd.
Units 8 & 9
Bootham Lane Industrial Estate
Bootham Lane, Dunscroft
Doncaster
DN7 4JU

Date: 11 June 2014
Test Report Ref: STR 369259

Order No: CST/3094
Page 1 of 2

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Frost Heave of Unbound Aggregate In accordance with BS 812: **Part 124: 2009 - Annex B (Use of Comparator Specimens)**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S47386**
Client Ref. No:	**C2246/22**
Date and Time of Sampling:	**22/04/20144**
Date of Receipt at Lab:	**14/05/2014**
Date of Start of Test:	**21/05/2014**
Sampling Location:	**Ballast Phoenix**
Name of Source:	**Cleveland**
Method of Sampling:	**BS 812 Part 102**
Sampled By:	**Client**
Material Description:	**T.I.S.B IBAA**
Target Specification	**SHW Series 800: clause 801.8**

RESULTS:
Were any unrepresentative lumps present? No

Frost Heave Test Result:

Maximum Heave Observed in 96 hours (mm)		
Comparator Specimen 1	12.0	(nearest 0.5mm)
Comparator Specimen 2	13.5	(nearest 0.5mm)
Comparator Specimen 3	11.5	(nearest 0.5mm)
Mean	**12.3**	(nearest 0.1mm)
Test Specimen 1	5.0	(nearest 0.5mm)
Test Specimen 2	5.0	(nearest 0.5mm)
Test Specimen 3	6.5	(nearest 0.5mm)
Mean Frost Heave	**5.5**	**(nearest 0.1mm)**

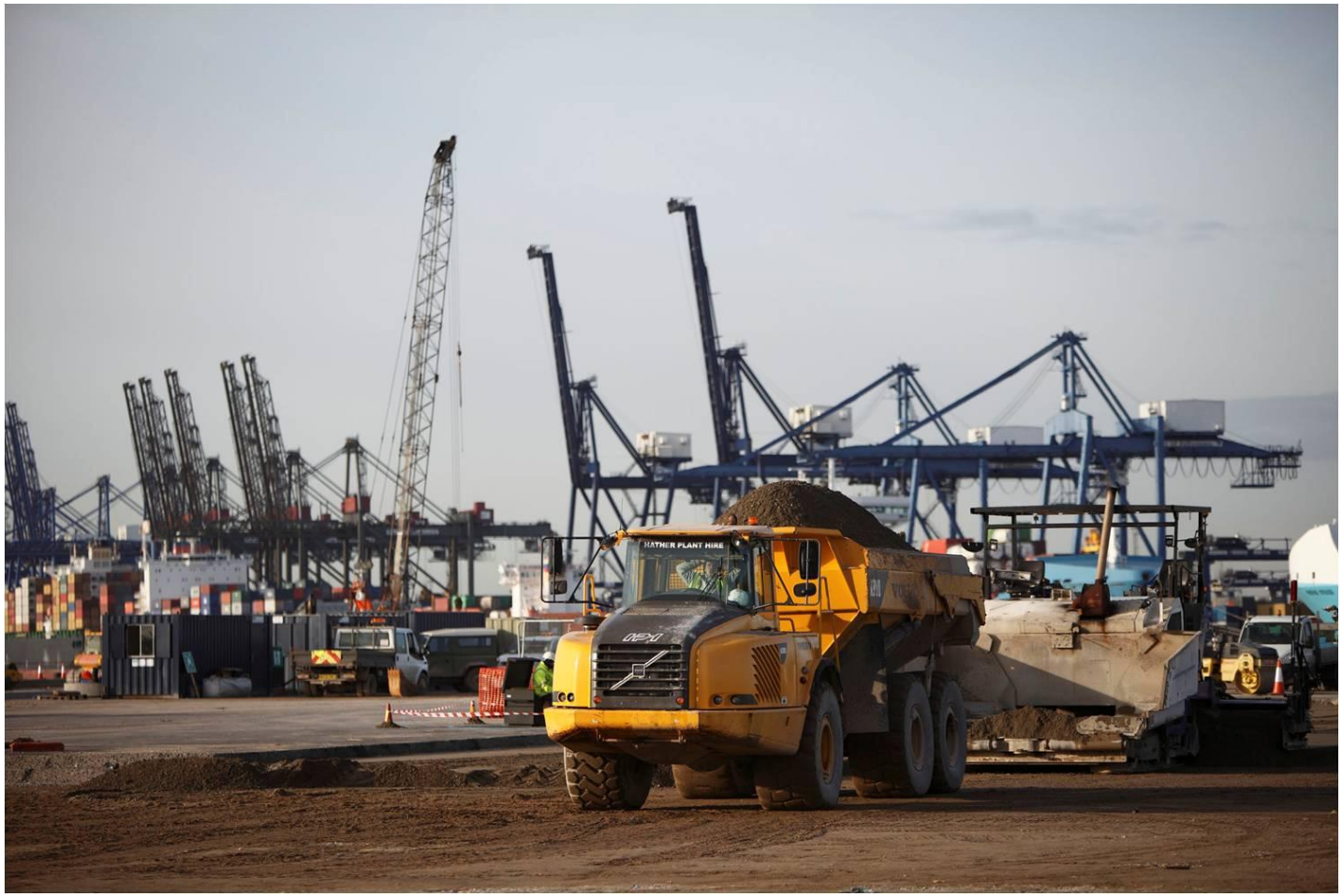
In accordance with SHW Series 800: clause 801.8 the sample is classified as being
Non Frost Susceptible (mean frost heave ≤ 15mm)

Capping Layer/sub-base

Selected fill around structures

Trench backfill

A component of HBM



Is it safe to use?

- Two formal risk assessments in the UK have concluded that risk to human health is negligible when routine dust control measures are in place
- The Groundwater and surface water impact is for Member States to decide based on local circumstances.
- In the UK the hydrology and geology is appropriate for use in large areas of the country

What are the advantages?

- IBA aggregate has a relatively low bulk density when compared to limestone or granite – less vehicle movements, congestion and pollution
- Use of IBA aggregate helps to preserve good quality natural aggregates
- IBA has self-setting properties, providing strong foundations
- Using IBA aggregate diverts the material from landfill and converts local ‘waste’ into a local ‘resource’ – part of a circular sustainable system
- IBA aggregate helps ‘sustainable development’ agenda

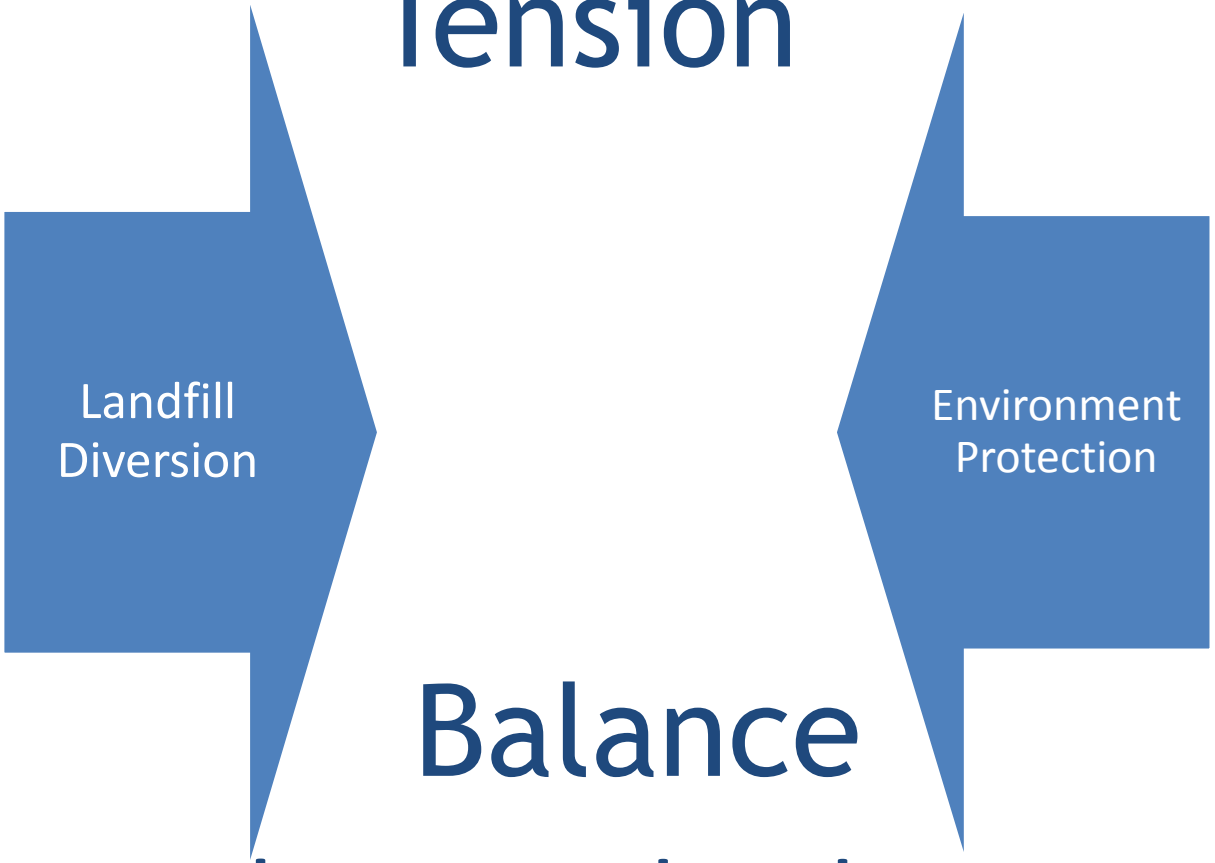
Use on high profile UK schemes

- London Olympics sites
- M25 London Orbital motorway widening schemes
- M6 Birmingham Northern Relief Road
- M1/M6 Interchange Improvements
- London Gateway Port development
- Heathrow Airport Terminal 5 paving
- Port of Felixstowe Landguard Container Terminal

In each case, it was necessary to supply adequate supporting evidence of performance

The European Commission Factor

Tension



Balance

MS Regulator and Industry Factor

The Future

- There are many new EfW plants built and to be built in the UK
- The beneficial use of IBA aggregate is an added benefit to the EfW option in a waste strategy
- Industry and investors like stability and the dynamics of the previous page make life difficult for the IBA recycling industry (and others)– too many European interactive directives, too many changes
- If society is to make best use of resources, simple easy to understand legislation/regulation is needed.

Any questions?

There are no silly questions. I have yet to meet a person who knows everything!