REPORT

Boston Alternative Energy Facility – Preliminary Environmental Information Report

Appendix 16.1 Supplementary Information to Estuarine Processes

Client: Alternative Use Boston Projects Ltd

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baef
Boston Alternative Energy Facility

Royal HaskoningDHV
Enhancing Society Together

HASKONINGDHV UK LTD.

Rightwell House
Rightwell East
Bretton
Peterborough
PE3 8DW
Industry & Buildings
VAT registration number: 792428892

+44 1733 334455 **T**
+44 1733 262243 **F**
email **E**
royalhaskoningdhv.com **W**

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Author(s):	David Brew

Drafted by:	David Brew
Checked by:	Gary Bower
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Disclaimer

A16 Appendix 16.1: Supplementary Information

A16.1 Details of relative sea-level rise projection

A16.1.1 Future changes in relative sea level at the Facility will be due to the interaction of several mechanisms, broadly divided into two types:

- global (eustatic) changes: these are changes in the absolute water elevation; for example, ice melt causing an increase in the total worldwide volume of seawater; and
- local changes: these mechanisms are due to local changes in the elevation of the land surface. These can take the form of isostatic effects (changes in land elevations due to the redistribution of weight on the land surface, e.g. due to post-Pleistocene loss of glacier ice), tectonic effects (changes in land elevations due to tectonic adjustments), and/or sediment supply (the balance between sediment availability and the rate that sea level changes).

A16.1.2 According to the IPCC's Fifth Assessment of Climate Change (Church et al. 2013), it is likely (IPCC terminology meaning greater than 66 % probability) that the rate of global sea-level rise has increased since the early 20th century. It is very likely (IPCC terminology meaning greater than 90 % probability) that the global mean rate was 3.2 mm/year (2.8 mm/year to 3.6 mm/year) between 1993 and 2010, and this is the historic rate used in this assessment.

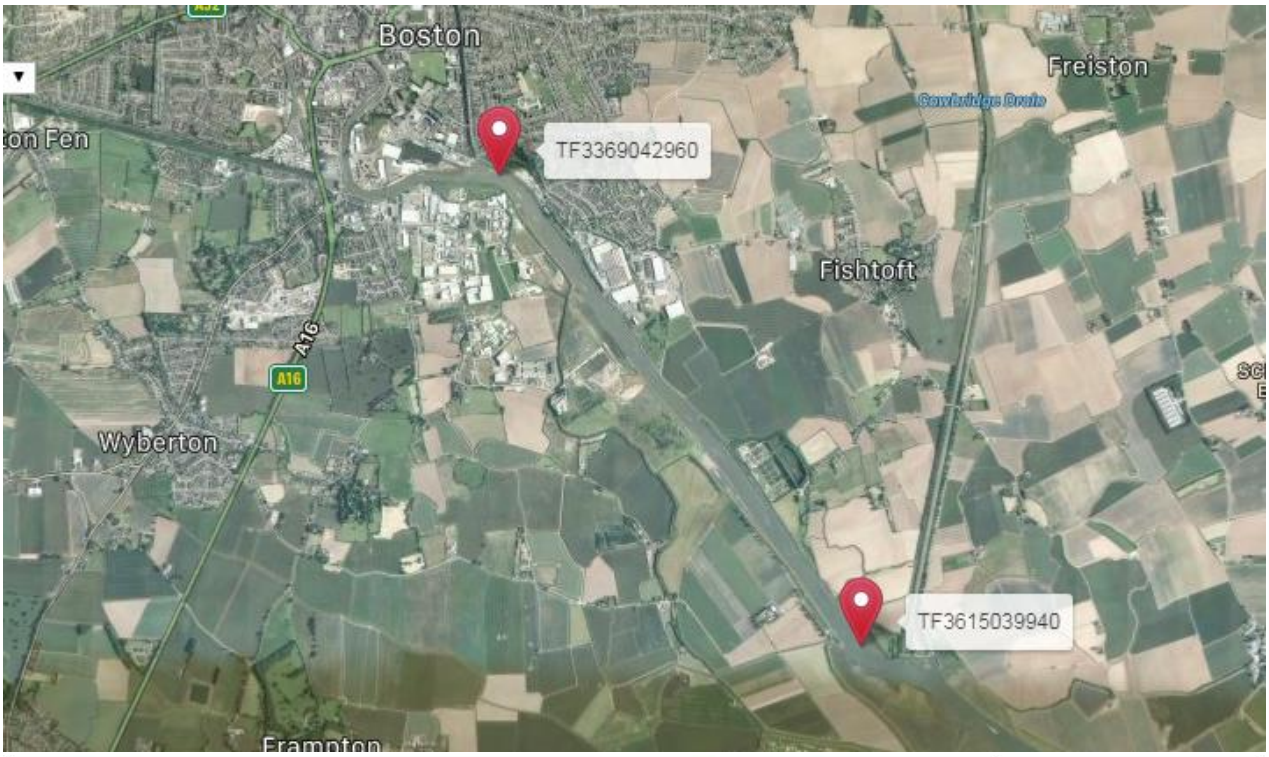
A16.1.3 The rate of global mean sea-level rise during the 21st century is likely to exceed the rate observed between 1993 and 2010. Church et al. (2013) developed projections of global sea-level rise for four emissions scenarios of future climate change, called the Representative Concentration Pathways (RCP). In this assessment, the median projection of the worst case emissions scenario (RCP8.5) is used. For RCP8.5, the rise by 2100 is 0.74 m (range 0.52 m to 0.98 m) with a predicted sea-level rise rate during 2081–2100 of 8 mm/year to 16 mm/year. Using the RCP8.5 scenario, and a baseline at 2018, sea-level rise in 2038 (20 years' time) and 2068 (50 years' time), would be about 0.1 m and 0.32 m, respectively.

A16.1.4 Shennan et al. (2012) presented the most up to date estimates of vertical land motion for the United Kingdom. They showed that near Boston the land is vertically lowering by approximately 0.8 mm/year. If this land motion estimate is

applied to the estimate of future sea-level rise, then the future estimated relative sea-level change at Boston can be calculated.

Particle size analysis of estuary bed samples collected in 2000, 2005 and 2010

A16.1.5 Two sediment samples were collected on 22nd/23rd August 2000 and 16th August 2005 at two locations in the Haven (one immediately upstream of the Facility and one further downstream, **Plate A16.1**).



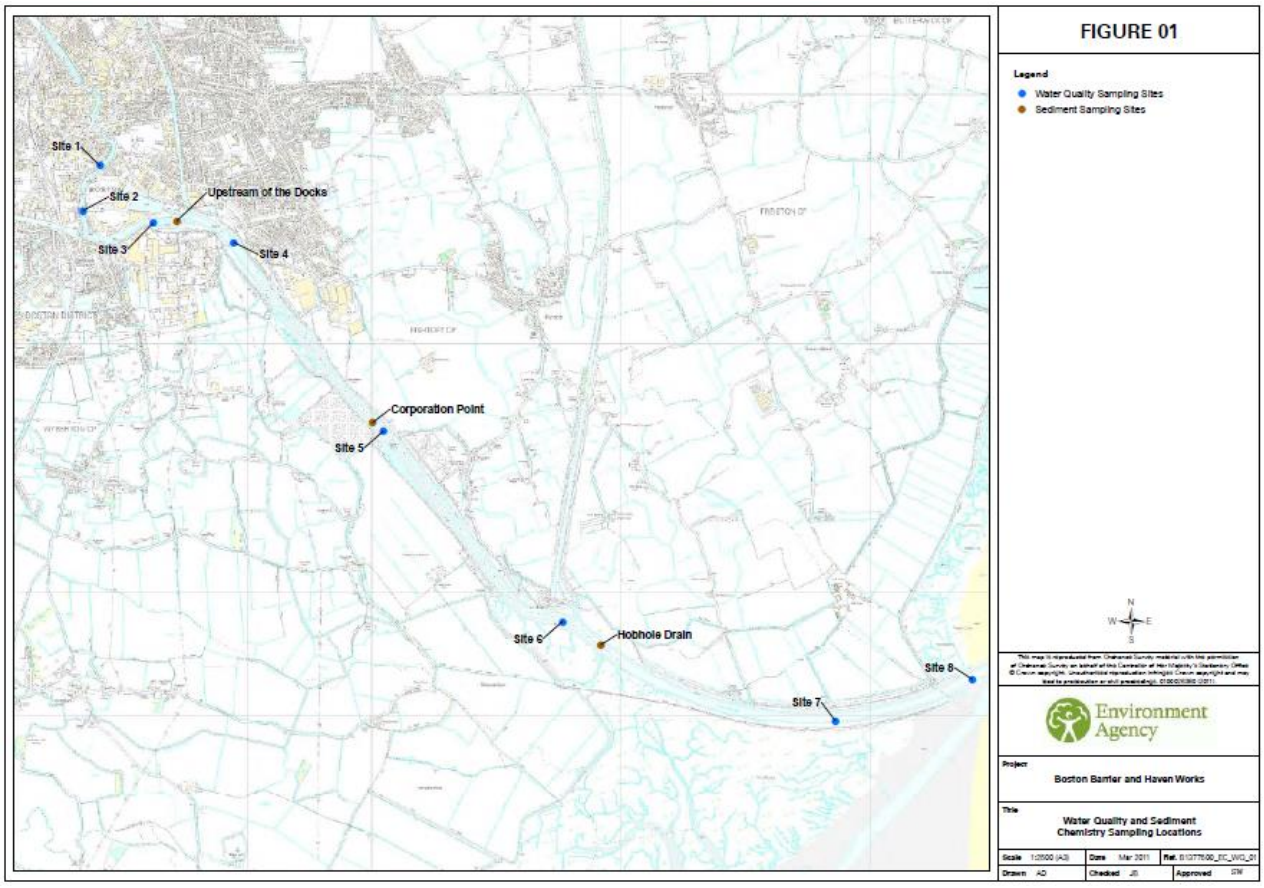


Plate A16.1 Location of Surface Sediment Samples Collected in 2000, 2005, and 2010 (Halcrow Jacobs Alliance 2011; Environment Agency 2016b).

A16.1.6 The samples close to the Facility (WITHSC13) recorded median particle sizes of about 0.12 mm (2000) and 0.09 mm (2005) (both very fine sand) and containing about 19% and 32% mud, respectively (**Plate A16.2**).

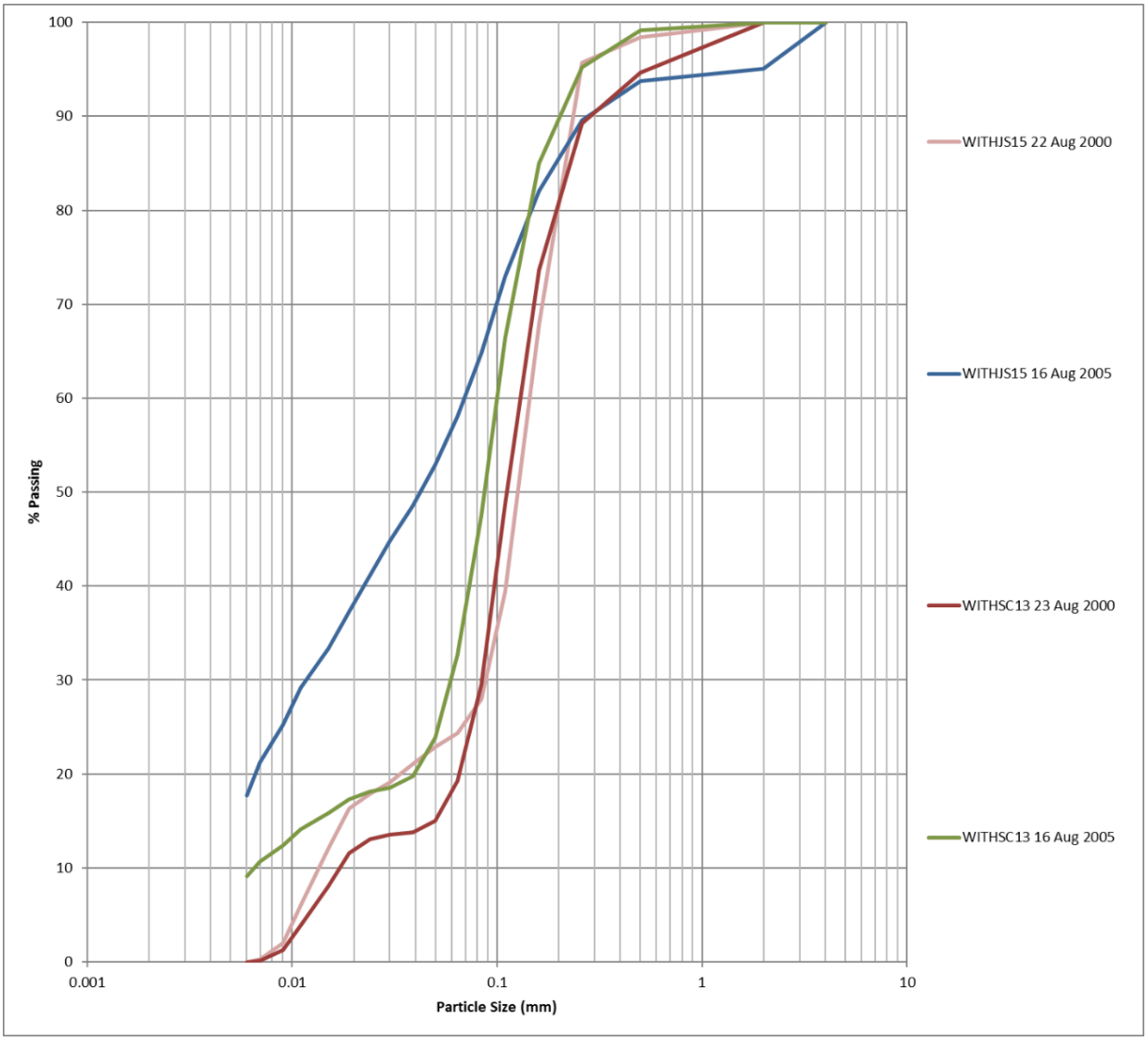


Plate A16.2 Cumulative Particle Size Distributions of Surface Sediment Samples Collected in 2000 and 2005. Locations are Shown on Plate A16.1.

A16.1.7 Three intertidal and three subtidal sediment samples were collected in the Haven on 29th April 2010 (Halcrow Jacobs Alliance 2011) (one of each at Upstream of the Docks, Corporation Point and Hobhole Drain, **Plate A16.2**).

A16.1.8 Particle size analysis was completed on all the samples. The nearest sample site to the Facility is Upstream of the Docks, where the median particle size was

0.063 mm (silt/very fine sand) for the subtidal sample and 0.006 mm (very fine silt) for the intertidal sample (**Plate A16.3**).

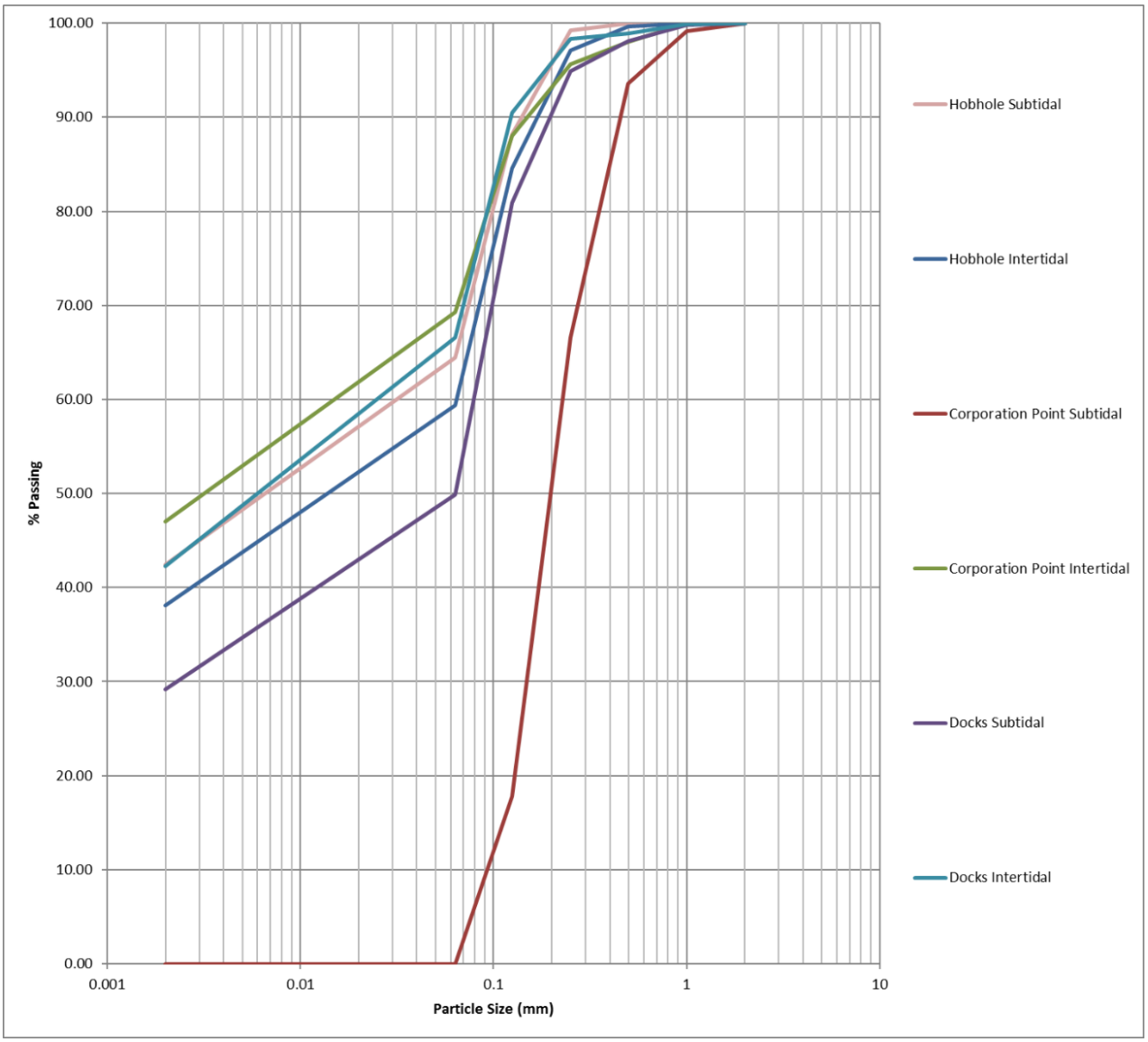


Plate A16.3 Cumulative Particle Size Distributions of Surface Sediment Samples Collected in 2010 (Halcrow Jacobs Alliance 2011; Environment Agency 2016b). Locations are Shown on Plate A16.1.