London Gateway: Marine Archaeology

Monitoring of Exclusion Zones
Commentary on Pre-dredge Monitoring

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Wessex Archaeology (WA) has been commissioned by London Gateway Port to provide archaeological services in respect of marine works in the course of developing London Gateway Port and its associated dredged channel.

As part of this work, WA has been asked to review data relating to the monitoring of three exclusion zones intended to protect sites of archaeological interest.

Provision for each Archaeological Exclusion Zones (AEZ) and their monitoring is made in the document *Archaeological Exclusion Zones and Monitoring Regimes: Method Statement* (13/11/08: LG-WSA-ENV-CEP-C7013-RPT-ARC-3012), agreed with the Port of London Authority (PLA) and English Heritage, which is appended to the Dredge Plan. The AEZ document, as part of the Dredge Plan, is a requirement of the Tidal Works Agreement regulated by the PLA.

The three AEZs protect sites 5020, 5019 and 5029, which were identified as being potentially important in the course of EIA and pre-clearance investigations. The background to each site is presented in their respective Clearance Mitigation Statements (CMSs).

Site 5020 is known as the Iron Bar Wreck. Sites 5019 and 5029 are both parts of the wreck of the London, a second rate ship-of-the line sunk in an explosion in 1665. As well as being subject to exclusion zones, both 5019 and 5029 are protected by Restricted Areas designated under the Protection of Wrecks Act 1973.

All three sites lie to the north of the proposed dredge channel and are, therefore, outside the area of dredging. The exclusion zones offer additional protection, and in all three cases also lie beyond the planned extent of dredging. The statutory designated areas for 5019 and 5029 are smaller than the exclusion zones and also lie, therefore, beyond the planned extent of dredging. The relationship between the Restricted Areas, AEZs and dredging area (which lies to the south of the Channel Toe Line) is shown in Fig. 1.

All three sites were subject to high-resolution multibeam bathymetric survey in 2006 as part of pre-clearance investigations. All three sites were re-surveyed using high-resolution multibeam equipment in February 2010. Dredging for London Gateway Port commenced in March 2010 with initial work concentrated around the new port, which is about 15 kilometres upstream of the three AEZs.

The surveys in both 2006 and 2010 were conducted by the PLA using a hull-mounted Reson 8125 system. The surveys were conducted as special order surveys (IHO S-44 5th Edition) that can be expected to produce a maximum error of c. 8cm in the water depths encountered at the three sites (10-12m). The data were made available to WA by the PLA as tidally-corrected x,y,z files.

WA has been asked to compare the multibeam data from 2006 and February 2010 and to comment on the results in order to establish the situation prior to the commencement of dredging.

The datasets were gridded using IVS Fledermaus (v. 7) at a horizontal resolution (i.e. cell size) of 0.5m to produce the surface models. The resulting surfaces were then compared and the surface-difference was calculated to indicate apparent changes in bed levels between 2006 and February 2010.

The surface-difference was coloured in bands, with the range +0.15 to -0.15 made transparent to represent neutral change. These values were chosen as the limit at which known archaeological features, whose absolute height is not thought to have changed, are not highlighted by the surface-difference analysis.

The surface models for 2006 and 2010, and the surface-difference between the datasets, are presented for each site in Figures 2-4, with sidescan data indicating the extent of structural material as a background.

In all three cases the apparent trend in the vicinity of wreck material between 2007 and February 2010 is generally neutral (± 0.15) or for bed levels to become higher. At 5019 and 5029 there has been fairly substantial but localised increases in bed level whereby scour marks evident in 2006 are less pronounced in 2010. There is, however, evidence of bed levels falling in close proximity to structural material, especially at 5029. There may also be falls in bed level close to structural material at 5020, but the overall pattern seems to be associated with lateral movement of sandwaves, which are apparent on the background sidescan data.

Overall, it is clear that all three sites are in a dynamic sedimentary environment and that change – both increases and decreases in bed level – has occurred prior to dredging.

It should be noted that the surface models represent snapshots only; whilst differences are apparent it is not possible to draw conclusions about overall trend or possible seasonal, annual or longer term cycles of change.

In addition to the comparison of datasets, profiles of all three sites have been prepared and are presented in Figure 5. The profiles are presented relative to the Channel Toe Line (i.e. planned northern extent of dredging), AEZ boundaries and Restricted Area boundaries. It is worth noting that whilst the three sites are typically referred to as lying on the side-slopes of the channel, the seabed in the vicinity of both 5020 and 5019 dips down to the wreck sites rather than rising; that is to say the wreck material is already lower than the channel bed where dredging is to take place.

Further monitoring surveys are planned for all three AEZs, to take place following dredging in the adjacent dredging zones. The survey data will be compared with the datasets reviewed here in due course, and the results reported.

Wessex Archaeology
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