



LONDON GATEWAY: GERMAN AIRCRAFT, ZONE 105

**Archaeological Monitoring:
Written Scheme of Investigation**

Prepared for:
London Gateway Port Ltd
The Manorway
Stanford-le-Hope
Essex
SS17 9PD

By:
Wessex Archaeology
Portway House
Old Sarum Park
Salisbury
SP4 6EB

Report ref: 72437.01

April 2012

LONDON GATEWAY: GERMAN AIRCRAFT, ZONE 105**Archaeological Monitoring and Mitigation:
Written Scheme of Investigation**

REPORT REF: 72437.01

Title:	London Gateway: German Aircraft, Zone 105 Archaeological Monitoring: Written Scheme of Investigation
Principal Author(s):	Toby Gane
Managed by:	Toby Gane
Origination date:	17 th April 2012
Date of last revision:	19 th April 2012
Version:	1
Wessex Archaeology QA:	Nikki Cook
Status:	Draft
Summary of changes:	
Associated reports:	
Client Approval:	Gill Andrews for LGPL
Client Representative:	Marcus Pearson

LONDON GATEWAY: GERMAN AIRCRAFT, ZONE 105

Archaeological Monitoring: Written Scheme of Investigation

Report ref: 72437.01

Contents

1	INTRODUCTION	3
1.1	Project Background	3
1.2	Development Description	4
1.3	Development Programme.....	4
1.4	Anticipated Impacts	5
2	ARCHAEOLOGICAL BACKGROUND	6
2.1	Previous Archaeological Assessments.....	6
2.2	Summary of Known and Potential Historic Assets	6
3	RESPONSIBILITIES AND COMMUNICATION	8
4	ARRANGEMENTS FOR MONITORING AND REVIEWING THE WSI	9
4.1	Monitoring and Reviewing the WSI	9
5	HEALTH AND SAFETY	10
6	WSI AIMS AND SCOPE.....	11
6.1	Aims and objectives.....	11
6.2	Scope	11
7	DESK-BASED ASSESSMENT OF DREDGING RECORDS.....	11
7.1	introduction	Error! Bookmark not defined.
7.2	Desk Based Assessment Methodology: Dredging.....	Error! Bookmark not defined.
8	ARCHAEOLOGICAL WATCHING BRIEFS.....	13
8.1	Overview.....	13
8.2	Watching Brief Methodology: Dredging	13
9	ACTIVITIES SUBSEQUENT TO ARCHAEOLOGICAL INVESTIGATIONS	14
9.1	Finds Processing and Sampling	14
9.2	Archives.....	15
9.3	Reports	15
9.4	Publication	16
10	ADDITIONAL METHOD STATEMENTS.....	16
10.1	General Archaeological Practices	16
11	REFERENCES	19
	APPENDIX I: ARCHAEOLOGICAL WRECK RECORDING LEVELS.....	21

Figure 1 Location plan of PLA/LGPL area of archaeological interest

LONDON GATEWAY: GERMAN AIRCRAFT, ZONE 105

Archaeological Monitoring: Written Scheme of Investigation

Report ref: 72437.01

1 INTRODUCTION

1.1 PROJECT BACKGROUND

- 1.1.1 Wessex Archaeology (WA) has been commissioned by London Gateway Port Ltd (LGPL), to prepare a Written Scheme of Investigation (WSI) for archaeological works associated with the investigation and recovery of the German Aircraft in Zone 105 of the Thames navigational channel.
- 1.1.2 During the course of the London Gateway Port dredging operations in the Black Deep, Thames Estuary, and within the navigational channel, 45 pieces of aircraft wreckage of varying size were recovered by the dredger which have been identified as the partial remains of a World War II German Junkers 88 reconnaissance aircraft (WA 2011), possibly a 'D', 'H' or 'T' variant (Moody 2006). The site (encompassing anomalies WA7534 & WA7535) was surveyed with a suite of geophysical techniques (multibeam echo sounder, side scan sonar and magnetometer) in autumn 2011 and assessed by Wessex Archaeology (WA 2012). This survey confirmed the location of several anomalies that were presumed to be aircraft wreckage and in spring 2012, two dives were undertaken on the site by WA with support from the Port of London Authority (PLA). The dives confirmed the presence of aircraft wreckage from which small samples were taken and corroborated with artefacts recovered during the dredging works.
- 1.1.3 The site is now subject to the requirements of the Protection of Military Remains Act 1986. The two discrete sites lies in a water depth of 16m and it is anticipated that dredging is still required to achieve the full navigable depth of 16.5m. Therefore recovery of the wreckage, at least partially, to achieve the dredge depth is required.
- 1.1.4 Preliminary discussions to determine the appropriate course of action have already taken place with representatives from Ministry of Defence (MoD), English Heritage (EH), PLA, LGPL and WA. Documentary information pertaining to this aircraft has been requested from the German High Commission but with no serial number obtained to date, the archaeological significance is as yet unknown and a staged approach to recovery is proposed, subject to a recovery license being issued by the MoD.
- 1.1.5 EH has also recommended that an archaeological watching brief be undertaken during any initial recovery works. EH also noted that the methodology for the archaeological works should be set out in a WSI to be agreed by EH and LGPL.
- 1.1.6 MMO licensing conditions are superseded by PLA licensing due to the PLA acting as the statutory authority for development work in this area of the Thames.

- 1.1.7 This document constitutes the WSI for LGPL in relation to the required scope of archaeological works as specified in the *London Gateway Port: Channel Clearance and Dredging; Maritime Archaeology Methods and Procedures* document (WA 2008a), and sets out the aims, methods and standards which will be applied to the archaeological works.
- 1.1.8 This document also references the *London Gateway Port: Channel Clearance and Dredging; Archaeological Exclusion Zones and Monitoring Regimes* document (WA 2008b) produced for the scheme by WA.
- 1.1.9 In line with accepted best practice, EH's Marine Team Planning Archaeologist was consulted regarding the scope of this document. This WSI will be submitted to, and approved by, the LGPL Archaeological Liaison Officer (ALO) and EH prior to any development work commencing on the site.

1.2 DEVELOPMENT DESCRIPTION

- 1.2.1 London Gateway Port is being developed under a variety of consents, including a Harbour Empowerment Order. The application for consents was accompanied by a range of Environmental Statements, which included assessment of the effects on the historic environment and set out a framework for their mitigation, namely the Archaeological Mitigation Framework (AMF – Appendix T, March 2003). The AMF made provision for the appointment of an Archaeological Liaison Officer (ALO) who is responsible for providing archaeological advice to LGPL. The archaeological methods and procedures that accompany clearance and dredging will accord with the AMF.
- 1.2.2 The proposed LGPL development broadly comprises a multi-modal development including a major port development, a new logistics park, a rail terminal and feeder vessel services providing links to the rest of the UK and regional distribution centres.
- 1.2.3 These works involve a major ongoing dredge programme preparing the navigational channel for tidal access by deep-drafted vessels. The port will have six berths and the capability to handle Ultra Large Container Ships. Aspects of the works associated with the Port include:
- Construction of a new port including land reclamation;
 - Deepening of the shipping channel to allow for deep-drafted vessels;
 - Dredging of the maintained dredge box, which feeds the requirements of the reclamation process.
- 1.2.4 The main effect on marine archaeological and heritage assets has been, and will continue to come from, the dredging programme. The dredge involves the removal of bed levels down to 16.5m below chart datum across the length of the navigational channel from as far out as Sunk Outer in the outer Thames Estuary, right up to the port development itself.

1.3 DEVELOPMENT PROGRAMME

- 1.3.1 Development on the port started in 2006. The first phase of the dredging programme had been completed by the end of August 2011 and the second phase

commenced in January 2012. It is intended that dredging will be substantially complete by the end of 2012. To achieve this programme, LGPL has stated that dredging in Zone 105 needs to restart by the middle of May (but could possibly be pushed back until the end of May 2012).

- 1.3.2 The construction timetable for the remaining works continues unabated, with the new port facilities operational by winter 2013/14.

1.4 ANTICIPATED IMPACTS

- 1.4.1 The known site of aircraft wreckage is limited in size to an area of the seabed approximately 25 x 10m in size. Other material may be scattered around a limited area of the site, and may be buried on or around the site. The impacts to the known site are likely to be limited to removal during clearance operations and subsequent dredging. However, for the purposes of completeness, a range of possible impacts are considered in this section.

- 1.4.2 Within the Environmental Statement the London Gateway Port and the navigational channel are considered to be located within an area of high archaeological potential. Unknown archaeological sites have the potential to be of high, medium or low sensitivity. Nonetheless, any installation and subsequent works that disturb the seabed within the scheme have the potential to negatively impact archaeological deposits.

- 1.4.3 The most obvious way in which archaeological deposits could be negatively impacted during construction is by direct impact damage, for example from the dropping of anchors, the use of grapnels, dredging or clearance work. However, there are a number of other ways in which they could be negatively impacted. These impacts may occur immediately or may be long term post-development processes, such as scouring or prop-wash. They may be summarised as follows:

- Displacement, which disturbs the context of the archaeological deposit (the relationship between the structures or artefacts that make up the deposit and their surroundings) and thereby reduces the amount of archaeological information that can be gained from it;
- Erosion of the deposit or surrounding/covering seabed, resulting in damage and possibly prompting further erosion or instability;
- Destabilisation, resulting in accelerated deterioration of the deposit through corrosion, erosion, etc.

- 1.4.4 Dredging is invasive and is likely to have a negative impact upon archaeological deposits of all types, including submerged prehistoric land surfaces or shipwreck or aircraft material. The severity of the impact will depend upon the horizontal and vertical extent of the impact, and therefore the depth of the sediment removal. The destruction or removal of archaeological deposits within the dredged areas is inevitable and impacts will be limited to primary activities (dredging) and secondary activities such as anchor patterns.

- 1.4.5 Marine operations ancillary to dredging are also likely to impact upon surface or shallow buried archaeological deposits. The use of mooring anchors for positioning installation and support vessels will create the following potential impacts:

- Impact damage and possibly displacement as anchors are dropped during positioning or repositioning by anchor handlers;
- Seabed scarring and impact damage from the movement of anchors as cables are pulled taught;
- Seabed scarring from the movement of cables under load (subject to dredging contractor's methodology).

1.4.6 The extent and seriousness of the impact damage and seabed scarring depends upon a number of factors, including:

- Vessel size and type and the number of anchors used;
- Anchor size, type and weight;
- Nature of the seabed sediment;
- Load placed upon the vessel and hence anchors by prevailing weather and currents;
- Vessel and anchor handler crew skill.

1.4.7 The use of a jack-up barge is likely to have the following impacts upon surface or shallow buried archaeological deposits:

- Impact damage and possible displacement caused by spud feet (the degree of impact will depend upon the number of the spuds and the size of their footprint and depth of penetration);
- Similar impacts to the above from the use of additional anchors;
- Destruction and/or displacement during debris clearance of the anticipated spud footprints.

2 ARCHAEOLOGICAL BACKGROUND

2.1 PREVIOUS ARCHAEOLOGICAL ASSESSMENTS

2.1.1 A Baseline review of the known and potential archaeology of the Development was carried out and a Maritime Archaeology Summary Report produced by WA and included within the Environmental Statement for the project (WA 2008c).

2.1.2 A range of archaeological assessments have been carried out encompassing Desk Based Assessment, diving assessment and Clearance Mitigation Statements have been produced, along with synthesis reports, such as London Gateway Port: Strike and Track-plot Report (WA 2011).

2.1.3 In addition a number of geophysical surveys have taken place across the navigation channel, the latest one in November 2011 (WA 2012).

2.2 SUMMARY OF KNOWN AND POTENTIAL HISTORIC ASSETS

Geological and Morphological Background

2.2.1 The underlying solid (Tertiary) geology of the Thames Estuary region is predominantly the London Clay Formation. This formation reaches approximately 150m thick in the Thames Estuary region, and consists of stiff dark or bluish grey clayey silts, silty clays and silts. The sequence is identified on seismic data by

numerous small extensional faults, created by dewatering and resulting soft-sediment deformation during compaction.

2.2.2 The shallow geology of the area is dominated by the London Clay Formation. This is a thick deposit of marine clays and silty clays of Eocene (Ypresian) age. Dating to c. 53 - 51 Ma, the formation pre-dates the earliest evidence of hominin activity in Britain and thus has no potential for the presence of archaeological material within it, though it may have provided surfaces upon which archaeological material has been deposited, especially during periods when the Study Areas were dry land.

2.2.3 Superficial deposits consist of a thin seabed of sandy gravels and gravelly sands with isolated large sandbanks and areas of sandwave formation. These deposits can be compacted in nature, although more mobile deposits are also present. Whilst the thin nature of these sediments reduces their potential to cover archaeological structures such as wrecks, in practice these sediments - both sandwave and firmer sands and gravels - have been demonstrated to be instrumental in the preservation of a great deal of wreck material.

Study Area Definition

2.2.4 A 200m (radius) Study Area should be applied from the centre of mass of anomalies 7534 and 7535, Zone 105 of the navigation channel, in the area known as Black Deep.

Historical Background

2.2.5 The aircraft remains have been identified as belonging to a Junkers Ju 88 (WA 2011). The Ju 88 was known as the workhorse of the *Luftwaffe*, and originated in 1935 for a requirement for a 3 seat bomber capable for speeds in excess of 298 mph. The prototype flew in late 1936, with the first production variant flying in September 1939 (Mondey 2006).

2.2.6 The Ju 88 was developed into a wide range of roles, which has led it to be viewed as the most versatile aircraft in the *Luftwaffe*. Roles and variants ranged from A to S and included bomber (dive and level), day-fighter, night-fighter, ground attack and of course reconnaissance (Mondey 2006). The usual compliment of crew was three or four.

2.2.7 The aircraft wreckage in Zone 105 included reconnaissance camera parts (FK.30 camera system). The most ubiquitous (and basic) photo-reconnaissance variant was the Ju 88D-1 to D-5 based on the Ju 88A-4 and A-5, of which 1,500 were produced between 1941 and 1944 and saw service in all theatres (Mondey 2006).

2.2.8 Following the success of the Ju 88D series, a longer aircraft with extended fuselage was developed with a greater range (3,200 miles), creating the G and H series. From this, Ten Ju 88H-1 long-range maritime photo-reconnaissance aircraft were built, that carried camera and radar equipment (Mondey 2006). The H-3 variant only made it to prototype stage.

2.2.9 The final photo-reconnaissance variant to be built was the high-speed Ju 88T-1 and T-3, based on the Ju-88S high-speed bomber with a crew of three. This variant included the ability to carry a nitrous oxide boost system to help it outrun enemy fighters. They were made in only very small numbers (Mondey 2006).

2.2.10 There are known to be Ju 88D variants of the photo-reconnaissance aircraft in museums around the world. Statistically this is the most likely of the variants as so many of them were made and their use from 1941 to 1944. However, at present no known surviving examples exist of the H or T variants of the aircraft (although a more extensive search should be made).

3 RESPONSIBILITIES AND COMMUNICATION

3.1.1 LGPL have employed the services of Wessex Archaeology (the Retained Archaeologist), overseen by the ALO, to ensure the effective implementation of the WSI and other contractual commitments in relation to archaeology.

3.1.2 Interaction with EH will be administered by LGPL's Environmental Manager, advised by the ALO.

3.1.3 LGPL's Environmental Manager is:

- Marcus Pearson, LGPL

3.1.4 The ALO is:

- Gill Andrews, Gill Andrews Archaeological Consultant

3.1.5 The Archaeological Curator and advisor to the regulator is:

- Dr Chris Pater, English Heritage Marine Planning Team.

3.1.6 The MoD advisor in relation to the Protection of Military Remains Act 1986 is:

- Sue Raftree, Post Death Administration, JCCC, SPVA.

3.1.7 In relation to the implementation of the WSI the Retained Archaeologist will report to LGPL's Environmental Manager.

3.1.8 Interaction with LGPL's Construction Team/Contractors will be administered by the LGPL's Environmental Manager, advised by the ALO.

3.1.9 The Environmental Manager will advise the Retained Archaeologist of their requirements or responsibilities under any Environmental Management Plan and the Construction Method Statement produced for the project.

3.1.10 The responsibilities of the Retained Archaeologist, in conjunction with the ALO will include:

- Maintaining, reviewing and updating this - and subsequent - WSIs, as required;
- Advising LGPL's Contractor(s) which elements warrant archaeological involvement;

- Advising LGPL on the necessary interaction with third parties with archaeological interests, including Archaeological Curators;
- Advising LGPL on the implementation of generic archaeological requirements applicable to all construction activities;
- Advising LGPL's Environmental Manager on Method Statements for archaeological investigations;
- Implementing and monitoring the Protocol for Reporting Finds of Archaeological Interest;
- Ensuring that the Environmental Manager copies Method Statements to Archaeological Curators for approval;
- Monitoring the submission of Archaeological Reports as appropriate and making them available to Archaeological Curators;
- Preparing provisions for the management of the project archives; and
- Advising LGPL on final arrangements for analysis, archive deposition, publication and popular dissemination.

3.1.11 All Contractors engaged in the construction of the project shall:

- Familiarise themselves with the generic requirements of the WSI and make them available to their staff;
- Obey legal obligations in respect of 'wreck' and 'treasure' under the Merchant Shipping Act 1995 and the Treasure Act 1996 respectively;
- Respect constraint maps and AEZs;
- Assist and afford access to archaeologists employed by LGPL;
- Inform the Retained Archaeologist of any environmental constraint or matter relating to health, safety and welfare of which they are aware that is relevant to the archaeologists' activities; and
- Implement the Protocol for Archaeological Discoveries.

4 ARRANGEMENTS FOR MONITORING AND REVIEWING THE WSI

4.1 MONITORING AND REVIEWING THE WSI

4.1.1 At each stage of the project, the Retained Archaeologist will advise LGPL's Environmental Manager as to the potential requirements for archaeological investigations as outlined in the WSI. Appropriate method statements will be prepared for any additional elements not covered by the present WSI and will be submitted to EH. If required, provision for the relevant Archaeological Curator(s) to monitor the progress of the archaeological investigations will be arranged, comprising site visits or meetings with LGPL's Environmental Manager, the Contractor(s) and the Retained Archaeologist.

4.1.2 Provision will be made for the WSI to be revised as appropriate should elements of the project change or particular archaeological issues come to light. Any revisions will be prepared by the Retained Archaeologist and submitted to LGPL's Environmental Manager who will ensure they are submitted to and approved by the relevant Archaeological Curator(s).

4.1.3 The performance of the WSI will be monitored through the provision of a series of archaeological reports prepared to inform on the results of various activities undertaken under its auspices. These include a review of geotechnical data (borehole records); results of any watching brief and the implementation of any

protocol for reporting finds of archaeological interest during dredging or construction. These reports will be submitted to LGPL's Environmental Manager who will ensure their dissemination to the relevant Archaeological Curator(s).

- 4.1.4 The responsibility for ensuring the implementation of the archaeological protocol rests with LGPL, who will ensure that its agents and contractors are contractually bound to implement the protocol.
- 4.1.5 A formal structure for reporting to EH based on project phases will be agreed by LGPL's Environmental Manager and the Retained Archaeologist. The relevant Archaeological Curator(s) will be informed by LGPL of outstanding works timetables.
- 4.1.6 The relevant Archaeological Curator(s) will be notified in advance by LGPL's Environmental Manager of the commencement of any outstanding works on site that may impact on the archaeology and will be informed at this time of the Retained Archaeologist's key staff.
- 4.1.7 A programme of monitoring visits (if deemed appropriate) by EH and LGPL will be agreed in advance of the commencement of work on site.
- 4.1.8 During any site evaluation/investigation or construction work that has the potential to impact on the archaeology the Retained Archaeologist may liaise directly with EH with regard to site monitoring and reporting. LGPL's Environmental Manager will be kept informed of all contact between the Retained Archaeologist and the relevant Archaeological Curator(s).

5 HEALTH AND SAFETY

- 5.1.1 LGPL's Environmental Manager will ensure that the Retained Archaeologist is made aware of the relevant requirements of all Health and Safety Plans that are put in place.
- 5.1.2 The Retained Archaeologist will ensure that any method statements prepared to meet the requirements of the WSI are compliant with the requirements of LGPL's Health and Safety Plans for the project.
- 5.1.3 Health and Safety considerations will be of paramount importance in conducting all fieldwork. Safe working practices will override archaeological considerations at all times.
- 5.1.4 All work will be carried out in accordance with the Health and Safety at Work etc. Act 1974 and the Management of Health and Safety Regulations 1992, and all other relevant Health and Safety legislation, regulations and codes of practice in force at the time.
- 5.1.5 The Retained Archaeologist will supply a copy of their Risk Assessment to LGPL and their on-site contractors before the commencement of any fieldwork. This document will be read and acknowledged by all members of staff involved in the fieldwork. This will incorporate an interface document between the Health and

Safety system of the Retained Archaeologist and that of the construction/installation contractor.

6 WSI AIMS AND SCOPE

6.1 AIMS AND OBJECTIVES

6.1.1 The aims of this WSI are to set out the methodologies to be employed in respect of the archaeological conditions placed on the LGPL development and to ensure that cultural heritage interests are properly recorded and reported.

6.1.2 The objectives of the WSI are as follows:

- To fulfil the requirements in the consented licences for an archaeological protocol and desk-based assessment of dredge records;
- To propose measures for the mitigation of archaeological remains encountered during construction work associated with the project;
- To establish the reporting and archiving requirements for the archaeological works undertaken during the construction of the port/channel; and,
- To provide information on the progression of the required scheme of works.

6.1.3 The methodology for dredging to some extent does not generally support a watching brief. The mitigation measures proposed below for that element of the work are therefore considered to be the most effective means of obtaining archaeological information for the Study Area, and are supported by the Protocol for Archaeological Discoveries already in operation on the site.

6.1.4 Each phase of work required will be agreed and carried out in consultation with the Client and relevant Curator. The results of each phase will inform the possible requirement for further investigations.

6.1.5 If deemed appropriate, a programme of monitoring visits by EH will be agreed in advance of the commencement of work on site.

6.2 SCOPE

6.2.1 This WSI is being implemented as part of the programme of archaeological work outlined in *Maritime Archaeology Methods and Procedures* (WA 2008b), and in respect of the conditions attached to the marine consents issued by the IPC for Marine Dredging and Marine Construction Works.

6.2.2 This WSI will outline the methodologies to be employed for the following aspects of the archaeological investigations at the LGPL site:

- Undertaking a watching brief for diving investigations/preliminary site clearance by PLA divers;
- Undertaking a watching brief during dredging operations;
- Recommendations for further work based on the findings of the above stages.

Monitoring AEZs

- 6.2.3 Development related activities shall not be undertaken within an exclusion zone. If activities are shown to have been undertaken within any excluded zone, the construction contractor responsible will ensure that the consenting authority is aware of the incident and seek archaeological advice from the archaeological curatorial authority and/or Retained Archaeologist. A monitoring programme will check the integrity of the exclusion zones to determine if they have been affected by the development.
- 6.2.4 Should a breach of an Archaeological Exclusion Zone be suspected this may be resolved by further investigation, which may include carrying out more detailed geophysical or diver/ROV survey of the area thought to be affected.
- 6.2.5 On completion of the construction phase, the Retained Archaeologist will compile a report on the effectiveness of the AEZs, any alterations to them, and the results of monitoring, if relevant.

Further Surveys that will Require Archaeological Work

- 6.2.6 Information concerning the implementation of underwater obstruction surveys/clearance work and ordnance surveys is not currently available. If these do take place, an appropriate archaeological response to such surveys will be as follows:
- If taking place, diver/ROV obstruction surveys of areas of archaeological potential will require an archaeological assessment of the survey dataset (video and positional data);
 - If seabed clearance (by trenching or grappling) of areas of archaeological potential is to be employed then an archaeological watching brief will be required during these works. LGPL will make provision for a the Retained Archaeologist to be on the survey vessel during these works;
 - Should archaeological material be encountered, sufficient time and resources will be made available to ensure the archaeological assessment of such material. This assessment will take place as soon as possible after seabed clearance works. Such an assessment would serve as compensatory work to mitigate the damage to the site/s caused by seabed clearance. The scope of the assessment will be agreed with EH and, where necessary, further suitable mitigation measures will be instigated in agreement with EH;
 - If any geophysical surveys are conducted in response to material encountered during the construction phase, the survey data should be submitted for review by the Retained Archaeological Contractor, subject to a separate WSI, and in agreement with EH and LGPL;
 - If an unexploded ordnance (UXO) survey is conducted, the magnetometer data set will be subject to archaeological analysis in order to clarify the nature and extent of the known sites and anomalies and to identify as yet unknown buried sites.

7 ARCHAEOLOGICAL WATCHING BRIEFS

7.1 OVERVIEW

- 7.1.1 It is a requirement of the consents for the London Gateway Port that an experienced maritime archaeologist should carry out an archaeological watching brief during the dredging operations that coincide with areas of archaeological potential.
- 7.1.2 The methodologies for both these watching briefs are outlined below. Any finds will be reported in line with the provisions set out in the Protocol for Reporting Finds of Archaeological Interest (**Appendix I**).
- 7.1.3 In areas where no Watching Brief is proposed, the Protocol for Archaeological Discoveries, will be used to deal with any finds of archaeological material that come to light during construction.

7.2 WATCHING BRIEF METHODOLOGY: DREDGING

- 7.2.1 A watching brief will be conducted during dredging works in the navigation channel that coincide with areas of archaeological potential in order to identify and record artefacts that may be present in the dredged arisings. An experienced maritime archaeologist will be present on the work vessel during dredging operations in order to implement the procedures to follow if material of archaeological interest is identified and further material is thought to be present on the seabed.
- 7.2.2 It is proposed that initially an intensive watching brief is maintained during all dredging works, particularly in areas which lie outside the current maintained dredge boxes. However, based on the progress/results of the watching brief and the indications from the borehole assessment, this may be reduced to an intermittent watching brief, with mitigation for the dredging operations being the Constructor's observance of the Protocol for Archaeological Discoveries. Any reduction from an intensive to intermittent watching brief will be discussed and agreed with LGPL's Environmental Manager and EH's Heritage Officer.
- 7.2.3 In the event that material which may be of archaeological interest is observed, either in the bucket of the backhoe or in the hopper barge the operation will stop, the material will be recovered, examined and photographed, and placed in passive storage. If an archaeologist is not present when the discoveries are made, a report form will be completed and sent to Wessex Archaeology for assessment and the finds reported in accordance with the Protocol for Archaeological Discoveries.
- 7.2.4 Locations for artefacts identified in the upcast dredge arisings will be estimated from the position of the dredge-head at the time of retrieval. Positions will be obtained from the onboard survey system.
- 7.2.5 If material of archaeological interest is observed in consecutive loads, the dredger will move to a different location at a distance of at least 100m from the location where material was recovered from.

- 7.2.6 Material recovered from the dredging operation that may be of archaeological interest will be retained. It will be lightly washed in water, wrapped and sealed in polythene, and will be stored in safe location onshore.
- 7.2.7 Material of undoubtedly modern date will be discarded on instruction from the Retained Archaeologist.
- 7.2.8 Material that is of archaeological interest will be treated in accordance with the relevant guidance given in the Institute for Archaeologist's *Standard and Guidance for Archaeological Excavation* (IfA 2001c).
- 7.2.9 Objects that require immediate conservation treatment to prevent deterioration will be treated according to guidelines laid down in *First Aid for Finds* (Watkinson, D. 1987, 2nd. ed.) and *First Aid for Underwater Finds* (Robinson 1998). A full record will be made of any treatment given.

Human Remains

- 7.2.10 In the event of discovery of any human remains within the dredged arisings, the dredger will relocate to a position not less than 50m from the location of discovery and a temporary exclusion implemented. Following discussions with the Coroner and EH's Archaeological Advisor, further action will be determined.
- 7.2.11 As of 1st June 2007 the requirement for, issuing and conditions attached to licences for the excavation of human remains is subject to legal review.
- 7.2.12 Therefore, until such time as the legal position has been clarified by the Ministry of Justice, the Archaeological Contractor will, in the event of discovery of any human remains, immediately inform the client, the Coroner, the Police and the Ministry of Justice via submission of an application form for the 'Archaeological/Accidental/Site Investigation Licence regarding the disturbance of human remains'.
- 7.2.13 The human remains will initially be left *in situ*, covered and protected. Where a licence for their excavation is issued by the Ministry of Justice, the requirements of that licence will be followed.

8 ACTIVITIES SUBSEQUENT TO ARCHAEOLOGICAL INVESTIGATIONS

8.1 FINDS PROCESSING AND SAMPLING

- 8.1.1 All finds and environmental samples will be processed according to professional standards for finds analysis, environmental sampling and archive preparation, and in accordance with the Institute for Archaeologists' *Standard and Guidance for the collection, documentation, conservation and research of archaeological materials* (IfA 2005, revised 2008).
- 8.1.2 Finds and other items of archaeological interest recovered in the course of investigation are the property of the landowner, with the exception of items that are 'treasure' for the purposes of the Treasure Act 1996 and 'wreck' for the purposes of the Merchant Shipping Act 1995.

- 8.1.3 LGPL will seek permission from the landowner to donate finds to an appropriate Museums Service prior to depositing the archive.

8.2 ARCHIVES

- 8.2.1 As appropriate in terms of their remit, EH will be notified of each archaeological investigation in advance of fieldwork and any specific requirements relating to the preparation and deposition of project archives will be accommodated as appropriate.
- 8.2.2 Written archives will be on clean, stable materials, and will be suitable for photocopying. The materials used will be of the standard recommended in *Guidelines for the Preparation of Excavation Archives for Long-term Storage* (Walker 1990).
- 8.2.3 Archives will be prepared in accordance with procedures outlined in Standards in the Museum Care of Archaeological Collections (Museum and Galleries Commission 1992), Archaeological Documentary Archives, Preparation, Curation and Storage (Ferguson and Murray 1997) and in accordance with the requirements of the recipient museum.
- 8.2.4 Written, drawn and photographic archives will be compiled to a standard that allows for the publication of a summary report.
- 8.2.5 Archives, including written, drawn, photographic and material elements (together with a summary of the contents of the archive), will be deposited in accordance with the requirements of the appropriate Museums Service.
- 8.2.6 The timetable for depositing archives will be agreed with LGPL's Environmental Manager and EH.

8.3 REPORTS

- 8.3.1 A report on each archaeological investigation will be prepared following completion of fieldwork. Each report will contain, as a minimum:
- Non-technical summary;
 - Introduction;
 - Aims and objectives;
 - Methodology;
 - Summary of archaeological results;
 - Conclusions;
 - Supporting illustrations at appropriate scales;
 - Supporting data, tabulated or in appendices;
 - Index to and location of archive; and
 - References.
- 8.3.2 Each draft report will be sent to LGPL's Environmental Manager and will satisfy the Method Statement for the investigation. The Environmental Manager will forward one copy of each report to the relevant Archaeological Curator. Each report will

present the project information in sufficient detail to allow interpretation without recourse to the project archive.

- 8.3.3 Full copyright of each report shall be retained by the originator under the Copyright, Designs and Patents Act 1988 with all rights reserved, excepting that LGPL will be licensed to use each report in all matters directly relating to the project as described in the specification.

8.4 PUBLICATION

- 8.4.1 The collected results of all archaeological investigations undertaken in connection with the project will be published in an integrated manner, where appropriate.

9 ADDITIONAL METHOD STATEMENTS

9.1 GENERAL ARCHAEOLOGICAL PRACTICES

Survey and Recording

- 9.1.1 All finds and seabed archaeological deposits will be recorded using a *proforma* recording system, and a running matrix of assigned contexts will be maintained for each site.
- 9.1.2 A full photographic record will be maintained using video and digital stills photography. The photographic record will illustrate both the detail and the general context of the principal features, finds excavated, and the site as a whole.

Positioning

- 9.1.3 Surveys should be carried out to a single datum and co-ordinate system, preferably WGS84 UTM (zone 31N) for the offshore elements of the scheme and OSGB36 in 12 figure National Grid reference for the onshore elements.

Finds

- 9.1.4 Finds and/or environmental samples may be recovered to assist with site characterisation, identification and dating. Finds and environmental samples will be treated in accordance with the relevant guidance given in the Institute for Archaeologist's *Standard and Guidance for Archaeological Field Evaluations* (IfA 2001b, revised 2008), excepting where they are superseded by statements made below.
- 9.1.5 Finds will be primarily conserved, bagged and boxed in accordance with guidelines set out in the United Kingdom's Institute for Conservation's *Conservation Guidelines No 2* (UKIC 1983); the Museum of London's *Standard for the Preparation of Finds to be permanently retained by the Museum of London* (Museum of London 1992) and *First Aid for Underwater Finds* (Robinson 1998).
- 9.1.6 In consultation with LGPL, the Receiver of Wreck and EH as appropriate, the Retained Archaeologist will assist in the implementation of passive conservation for smaller objects pending more detailed conservation strategies. LGPL will make provision for a professional conservator to undertake a conservation assessment of the assemblage.

Human Remains

- 9.1.7 In the event of discovery of any human remains, it is proposed that they will be left *in situ*, covered and protected, until the Client, Coroner and MOD have been informed. The police will also be informed. Where development will unavoidably disturb them they will be fully recorded, excavated and removed from the site subject to compliance with the relevant Ministry of Justice Licence (if applicable), under the terms of the Burial Act 1857 which will be obtained by Wessex Archaeology, and the MOD Licence provided by JCCC.
- 9.1.8 Should human remains be excavated and recovered, all excavation and post-excavation will be in accordance with the standards set out in *IfA Technical Paper 13 Excavation and post-excavation treatment of cremated and inhumed remains* (IfA, 2004, revised 2008). The final placing of human remains following analysis will be subject to the requirements of the Ministry of Justice and/or MOD Licence.

Reporting

- 9.1.9 In the event that little of significance is found during the course of the scheme construction, within four weeks of completion, the Archaeological Contractor will prepare and submit a report for approval to LGPL.
- 9.1.10 If significant archaeological sites and finds are recorded then this final report will be preceded by an assessment report that establishes the value of the recorded archaeology and provides a costing for analysis, publication and archiving (including deposition of archive). Decisions regarding the level of publication required will be taken following consultation by LGPL and the Retained Archaeologist with EH.
- 9.1.11 The report will also be prepared in accordance with the guidance given in the Institute for Archaeologist's *Standard and Guidance for Archaeological Watching Briefs* (IfA 2001a revised 2008). The report will include:
- A non-technical summary;
 - The aims and methods of the work;
 - The results of the work including finds and environmental remains;
 - A statement of the potential of the results;
 - Proposals for further analysis and publication; and
 - Illustrations and Appendices to support the report.
- 9.1.12 The Archaeological Contractor will publish the results of the fieldwork, at least to summary level, within one year of completion of fieldwork. Publication will be in an appropriate local or national journal. Other forms of publication (e.g. 'popular publication', electronic media/Internet) may be employed where appropriate.
- 9.1.13 An overarching final report on the archaeology of the scheme area will be produced by the Retained Archaeologist after the completion of the archaeological works relating to the scheme.
- 9.1.14 Publication media and all publication matters will be discussed and agreed in advance with EH and LGPL, as appropriate.

Archiving

- 9.1.15 The completed project archive will be prepared by the Retained Archaeologist in accordance with the guidelines outlined in the Management of Research Projects in the Historic Environment (MoRPHE) (EH 2006) and in accordance with the *Guidelines for the preparation of excavation archives for long term storage* (Walker 1990). The archive from the project, including the finds and environmental samples and subject to the wishes of the landowner, and the requirement for any further stages of fieldwork in mitigation, will be deposited with the appropriate Museum. Where required, an accession number will be obtained from the relevant museum.

10 REFERENCES

- English Heritage, 1991, Management of Archaeological Projects, English Heritage
- Ferguson, L. and Murray, D., 1997, Archaeological Documentary Archives, Paper No.1, Manchester
- Institute for Archaeologists, 2001a (revised 2008), Standard and Guidance for Archaeological Watching Briefs, Reading
- Institute for Archaeologists, 2001b (revised 2008), Standard and Guidance for Archaeological Field Evaluations, Reading
- Institute for Archaeologists, 2001c (revised 2008), Standard and Guidance for Archaeological Excavation, Reading
- Institute for Archaeologists, 2004 (revised 2008), Technical Paper No 7 Guidelines to the Standards for Recording Human Remains, Reading
- Institute for Archaeologists, 2005 (revised 2008), Standard and Guidance for the collection, documentation, conservation and research of archaeological materials, Reading
- Joint Nautical Archaeology Policy Committee, 2006, Code of Practice for Seabed Development, JNAPC
- Mondey, D., 2006, Axis Aircraft of World War II, Bounty Books
- Museum and Galleries Commission, 1992, Standards in the Museum Care of Archaeological Collections, London Museums and Galleries Commission
- Robinson, W., 1998, First Aid for Underwater Finds, Nautical Archaeology Society and Archetype Publications
- United Kingdom Institute of Conservation (UKIC), 1984, Environmental Guidelines for the Permanent Storage of Excavated Material from Archaeological Sites, Conservation Guidelines No. 3, UKIC
- Walker, K., 1990, Guidelines for the preparation of excavation archives for long-term storage, UKIC
- Wessex Archaeology, 2008a, London Gateway Port: Channel Clearance and Dredging; Archaeological Exclusion Zones and Monitoring Regimes, Unpublished Report
- Wessex Archaeology, 2008b, London Gateway Port: Channel Clearance and Dredging; Maritime Archaeology Methods and Procedures, Unpublished Report
- Wessex Archaeology, 2008c, London Gateway Port: Channel Clearance and Dredging; Maritime Archaeology Summary Report, Unpublished Report
- Wessex Archaeology, 2011, London Gateway Port: Strike and Track-plot Report, Unpublished Report

Wessex Archaeology, 2012, London Gateway Port; Interim Archaeological Geophysical Survey, Unpublished Report Ref: 79800.02

APPENDIX I: ARCHAEOLOGICAL WRECK RECORDING LEVELS

Level	Type	Objective	Sub-level	Character	Scope	Description
1	Assessment	A record sufficient to establish the presence, position and type of site.	1a	Indirect (desk-based)	A basic record based on documentary, cartographic or graphic sources, including photographic (incl. AP), geotechnical and geophysical surveys commissioned for purposes other than archaeology.	Documentary assessment / inventory of a site, compiled at the start of work on a site, and updated as work progresses.
			1b	Direct (field)	A basic record based on field observation, walkover survey, diving inspection etc., including surveys commissioned specifically for archaeological purposes.	Typically a 1-2 dive visit to the site (to assess a geophysical anomaly, etc.).
2	Evaluation	A record that provides sufficient data to establish the extent, character, date and importance of the site.	2a	Non-intrusive	A limited record based on investigations that might include light cleaning, probing and spot sampling, but without bulk removal of plant growth, soil, debris etc.	Typically a 2-4 dive visit to assess the site's archaeological potential, backed up by a sketch plan of the site with some key measurements included.
			2b	Intrusive	A limited record based on investigations including vigorous cleaning, test pits and/or trenches. May also include recovery (following recording) of elements at immediate risk, or disturbed by investigation.	Either an assessment of the buried remains present on a site; the recovery of surface artefacts; or cleaning to inform for example a 2a investigation.

Level	Type	Objective	Sub-level	Character	Scope	Description
3	In situ	A record that enables an Archaeologist who has not seen the site to comprehend its components, layout and Sequences.	3a	Diagnostic	A detailed record of selected elements of the site.	The first stage of a full record of the site. This would include a full measured sketch of the site and a database (or equivalent) entry for all surface artefacts.
			3b	Unexcavated	A detailed record of all elements of the site visible without excavation.	Full site plan (i.e. planning frame or equivalent accuracy) with individual object drawings, and full photo record (possibly including a mosaic).
			3c	Excavated	A detailed record of all elements of the site exposed by open excavation of part or whole of the site.	This may take the form of full or partial excavation of a site.
4	Removal	A record sufficient to enable analytical reconstruction and/or reinterpretation of the site, its components and its matrix.	-	-	A complete record of all elements of the site in the course of dismantling and/or excavation.	-
5	Intra-site	A record that places the site in the context of its landscape and other comparable sites.	-	-	A complete record of all elements of the site, combined with selective recording of comparable sites and investigation of the surrounding area.	-