

REPORT ON A DESK STUDY

at

LAND ADJACENT TO 29, HARBOUR ROAD, PAGHAM,
BOGNOR REGIS, SUSSEX

for

PAGHAM BEACH (HOLDINGS) Ltd

CHARTERED SURVEYORS:
J. HIGHAM ASSOCIATES

Report No 06/7782/GO

August, 2006

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CONTENTS

Foreword

I	Introduction
II	Site Location and Topography
III	Envirocheck Report
IV	Geology
V	Hydrology and Hydrogeology
VI	Discussion
	a) Conceptual Site Model
	b) Groundwater
	c) Further Investigation

APPENDIX I	-	Site Location Plan
APPENDIX II	-	Current and Proposed Site Layout Plan
APPENDIX III	-	Envirocheck Report
APPENDIX IV	-	Environment Agency Extract
APPENDIX V	-	Photographs

FOREWORD

The following notes should be read in conjunction with the report. Any variations on the general procedures outlined below are indicated in the text.

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General

The recommendations made and opinions expressed in the report are based on the strata conditions revealed by the fieldworks as indicated on the boring and trialpit records, together with an assessment of the data from insitu and laboratory tests. No responsibility can be accepted for conditions, which have not been revealed by the fieldworks, for example, between borehole and/or trialpit positions. While the report may offer opinions on the possible configuration of strata, both between the excavations and below the maximum depth achieved by the investigation, these comments are for guidance only and no liability can be accepted for their accuracy. For investigations, which include environmental issues, the data obtained relate to the conditions which are relevant at the time of the investigation.

Boring Techniques

Unless otherwise stated, the light cable percussion technique of soft ground boring has been used. This method generally enables the maximum information to be obtained in respect of strata conditions, but a degree of mixing of some layered soils, for example, thin bands of coarse and fine granular soils, is inevitable. Specific attention is drawn to this occurrence where evidence of such a condition is available.

The penetration resistances quoted on the boring records have been determined generally in accordance with the procedure given in BS1377 : 1990. The suffix '+' denotes that the results has been extrapolated from less than 0.3m penetration into undisturbed soil.

Routine Sampling

During construction of boreholes, sampling and insitu testing will be completed in general accordance with BS5930 : 1999. Variations to this code of practice will only occur where the strata conditions preclude implementation or the contract specifies alternatives.

Samples which are required for environmental testing will be stored in suitable glass containers in accordance with current guidelines.

Groundwater

The groundwater observations entered on boring and trialpit records are those noted at the time of the investigation. The normal rate of progress does not usually permit the recording of any equilibrium water level for any one water strike. Moreover, groundwater levels are prone to seasonal variation and to changes in local drainage conditions. The table on each boring record shows the groundwater level at the quoted borehole and casing depths usually at the start and finish of a day's work. The word 'none' indicates that groundwater was sealed off by the borehole casing, or that no water was observed in the borehole.

Trialpits

The method of construction employed to form the trialpits is entered in their records. In general, it is not possible to extend machine excavated trialpits to depths significantly below the water table, especially in predominantly granular soils. Except for manually excavated pits, and unless otherwise stated, the trialpits have not been provided with temporary side support during their construction, hence personnel have not entered them and examined the insitu exposed strata.

Window Sampling

Window sampling comprises driving a probe into the ground. On extraction of the probe the strata encountered are logged and representative disturbed samples recovered. In general, window sampling cannot be completed in granular soils, or below the water table.

Laboratory Testing

Unless stated in the tests, all laboratory tests have been performed in accordance with the requirements detailed in BS1377 (1990) : Parts 1-9, or other standards or specifications that may by appropriate.

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Prepared by	G C D Owens BSc Hons Geotechnical Engineer	
Reviewed by	C V Sweby CEng MICE Managing Director	

I INTRODUCTION

Pagham Beach (holdings) Ltd proposes to construct 3 bungalows on the land adjacent to 29, Harbour Road, Pagham. A desk study has been completed in order to ascertain whether previous activities on site or immediate environs could adversely affect this development such that remedial measures would be required prior to development.

The programme of this work comprised the completion of a walkover survey and preparation of an Envirocheck Report from Messrs Landmark Information Group. This report presents the work undertaken and provides a conceptual site model in respect of potential sources of contamination.

II SITE LOCATION AND TOPOGRAPHY

The location of the site is given on drawing 06/7782/1 and is presented in Appendix I to this report. The current site layout is shown on drawing no 06/7782/2 in Appendix II. The Ordnance Survey national grid reference for this site is 489020 97250.

The site under consideration currently comprises a boat and yacht storage compound. The site inspection and walkover survey were undertaken on Monday 14th August 2006. The site is currently in use and no obvious visible sources of contamination were apparent. During the visit a number of photographs were taken and are presented in Appendix V to this report.

III ENVIROCHECK REPORT

Messrs Landmark Information Group has completed an Envirocheck Report. This document is provided either as a compact disc or as a paper copy and is presented as Appendix III to this report. This document contains historical map data as well as information regarding the underlying geology, hydrogeology and potential sources of contamination within the site area that could adversely affect this development. A summary of the historical map data contained in this document is presented in Table 1 on the following page.

Table 1 – Summary of Historical Map Information

Date	Scale	Information
1875	1:2,500	The site comprises of groynes and coarse/rough shingle, with a farm 200m to the north of the site
1880	1:10,560	No significant change
1898	1:2,500	The site now comprises of rough pasture and shingle
1899	1:10,560	No significant change
1911	1:2,500	There is now a sand pit within 200m to the north east of the site.
1912	1:10,560	No significant change
1933	1:2,560	The site has two tracks/roads running through it and the surrounding area has been developed into Pagham beach estate, comprising of a number of residential dwellings. The sand pit to the north east now has residential dwellings located upon its former location.
1938	1:10,560	There is a notable increase in the number of residential properties in the vicinity.
1961	1:10,000	There is a small increase in the number of residential properties in the vicinity.
1962	1:1,250	The area immediately to the south of the site is now designated as a car park.
1965	1:1,250	No significant change
1968	1:1,250	The site is now incorporated as part of the car park and yacht club compound, which now has a small structure to the south.
1969	1:10,560	There is a small increase in the number of residential properties in the vicinity of the site.
1970	1:1,250	There is a small increase in the number of residential properties in the vicinity of the site.
1975	1:1,250	No significant change
1975	1:1,250	No significant change
1976	1:10,560	There is a small increase in the number of residential properties in the vicinity

1991	1:1,250	No significant change
1994	1:1,250	There is now a pumping station adjacent to the immediate north east corner of the site
2005	1:10,000	No significant change

A summary of the above table notes that at the time of the first available map the site consisted of a shingle beach with groynes. The surrounding areas generally consisted of shingle beaches, open farmland, a small coastal channel and open sea. Subsequent maps have indicated that the site remained unchanged until the construction of the Pagham beach estate between 1912 and 1933. The structures constructed in the surrounding area have been of a purely residential nature.

IV GEOLOGY

An examination of the records of the British Geological Survey sheet no 332, Bognor, Solid and Drift Edition 1:50,000, indicates that the site is underlain by alluvium which is of recent and Pleistocene age, this is in turn underlain by London Clay which is of Eocene age.

V HYDROLOGY AND HYDROGEOLOGY

There are no significant hydrological or surface water features within the general vicinity of the site.

The site area is noted to be underlain by a minor aquifer of variable permeability and high leaching potential which corresponds to the alluvium that underlies this site.

The flood map of the area indicates that the site is within an area at risk of extreme flooding from rivers or sea without defences.

An examination of the Environment Agency's website indicates that the site is not underlain by a source protection zone. An extract from the Environment Agency website is included in Appendix IV to this report.

VI DISCUSSION

It has been proposed that the land adjacent to 29, Harbour Road, Pagham be developed by the construction of 3 bungalows with associated garages. A proposed site layout plan is shown on drawing no 06/7782/3 in Appendix II. A conceptual site model has been prepared for this site and this is presented below together with the various aspects of the proposed development.

a) Conceptual Site Model

In accordance with the code of practice BS101175 entitled investigation of potentially contaminated site code of practice a conceptual site model has been prepared for this site. This model which is presented in tabular form below identifies any potential contamination, the receptors and the pathways between the two.

Table 2 – Conceptual Site Model

Contaminant/Source	Pathway	Receptor
Hydrocarbons from boat repairs/maintenance etc	Dermal Contact	Site Workers and Visitors. End Users/Occupiers
	Ingestion	
	Inhalation	
	Migration through gravel	Groundwater
Old paint/anti-fouling compounds from boat maintenance	Uptake by roots	Vegetation
	Dermal contact	Wildlife
	Ingestion	
	Dermal Contact	Site Workers and Visitors. End Users/Occupiers
	Ingestion	
	Inhalation	Groundwater
	Migration through gravel	
	Uptake by roots	
	Dermal contact	Vegetation
	Ingestion	Wildlife

It is evident from the above table that there may be significant sources of contamination at this site. Pressure washing of boat hulls can produce waste water containing compounds such as anti-foulant and anti-rusting protection additives. In addition dust containing these compounds can be created from sanding of yacht hulls. Other chemicals may also have been stored on the site that may have been used for boat repair and construction.

b) Groundwater

The depth to the groundwater is not known however the underlying alluvium is a minor aquifer of high leaching potential. The groundwater is not thought to be at risk at this site.

c) Further Investigation

The site in question has historically been used over the past 30 years as a yacht storage compound. Many wastes can be produced from the maintenance of yachts and boats, such as poor storage of paints and engine oils. Also painting, sanding and cleaning of yacht hulls can produce waste water containing heavy metals and anti-foulants such as cuprous oxide. Engine maintenance also has a number of contaminants associated with it which may have built up on this site over the past 30 years.

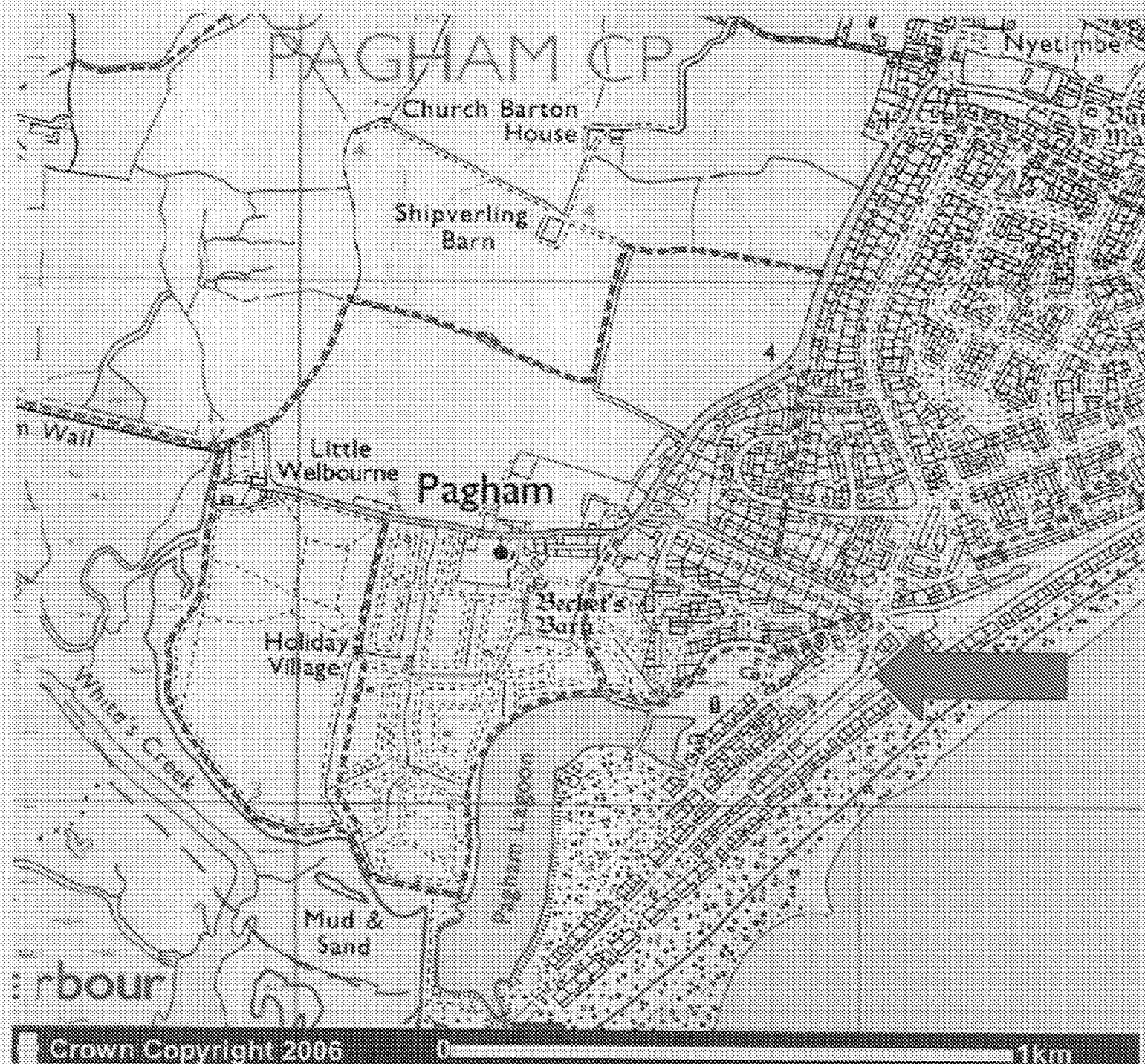
Therefore specific investigation works with regard to contamination should be undertaken to ascertain the degree and extent of any contamination resulting from the former use of the site. This may need to include an appreciation of the ground water quantity.

Prior to completing further investigation work it is recommended that the scope and extent of any proposed investigation be discussed with both the Local Authority and the Environmental Agency to ensure that it meets with their approval.

APPENDIX I

Site Location Plan

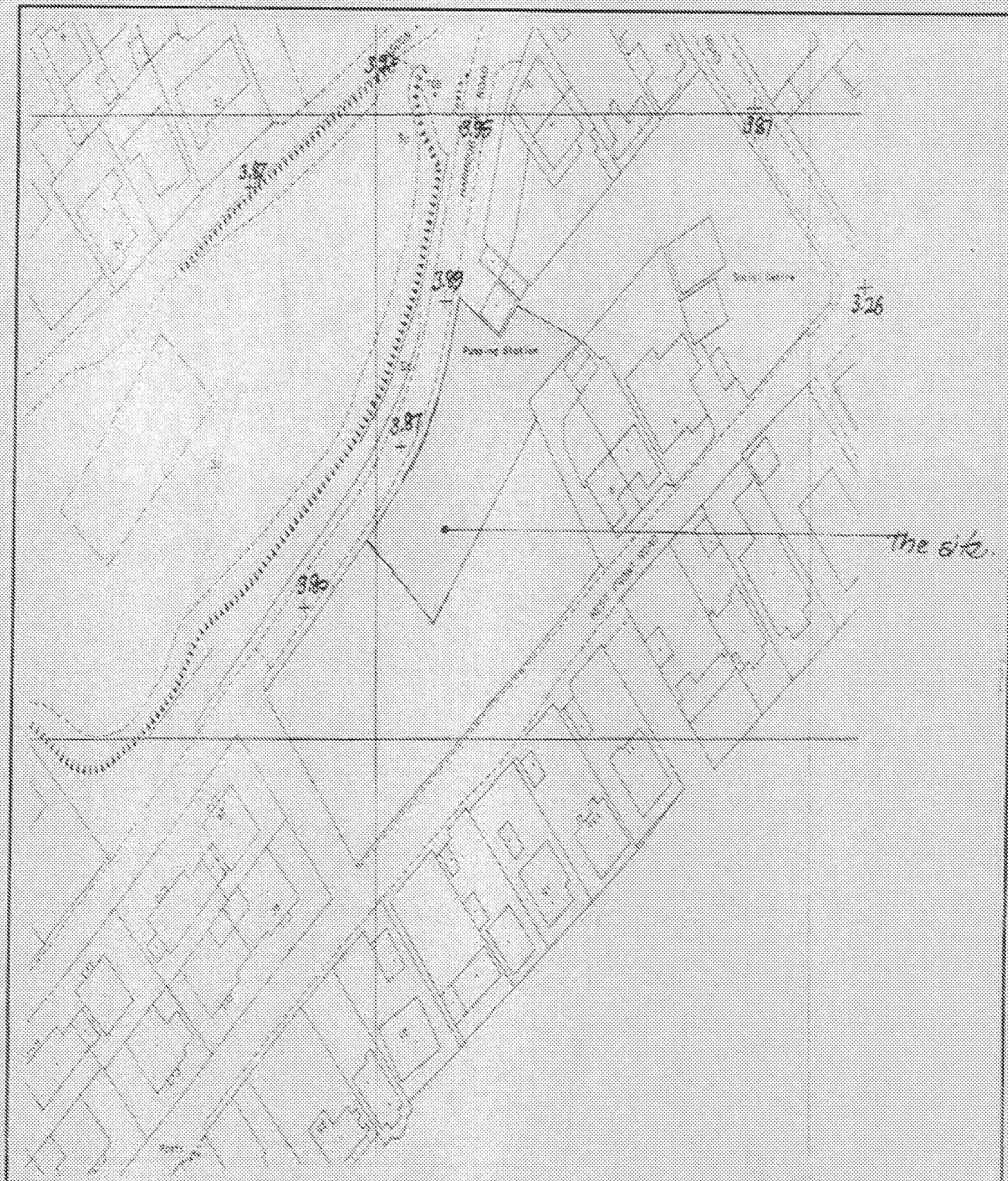
Land Adjacent to 29, Harbour Road, Pagham, PO21 4TF
Site location plan



Drawing no.06/7782/1

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APPENDIX II
Current and Proposed Site Layout Plan



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Land adjacent to 29, Harbour Road, Pagham
Current Site Layout

Scale	N.T.S
Draw No	06/7782/2



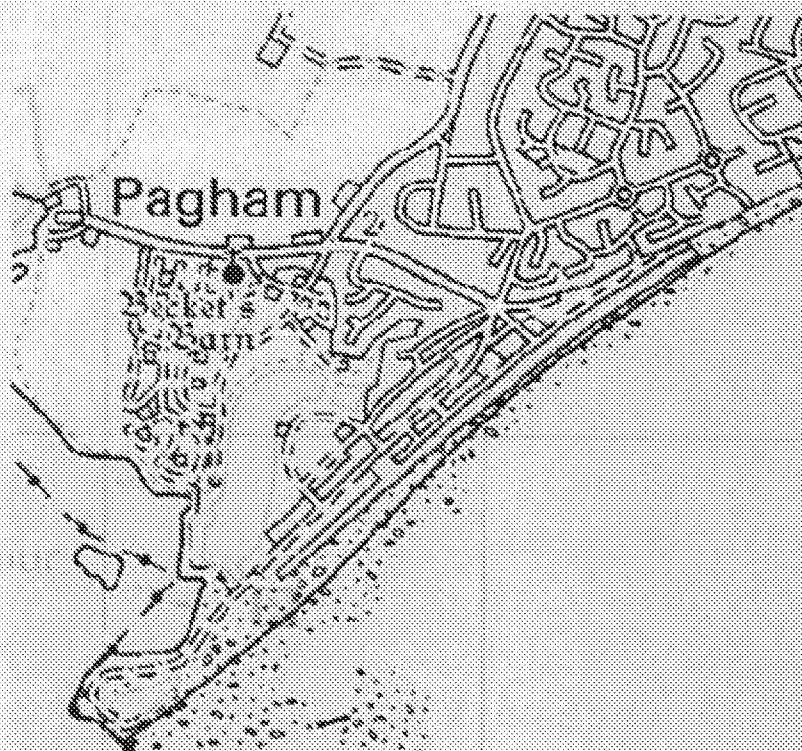
APPENDIX III

**Envirocheck report
(C.D. attached to back cover of report)**

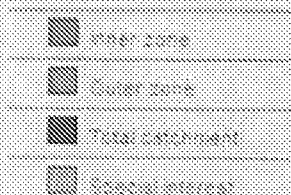
APPENDIX IV
Environment Agency Extract

Land adjacent to 29 Harbour Road, Pagham, PO21 4TF
Detail of Source Protection Zone

Current map scale: 1:20,000



Groundwater Source Protection Zones:



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APPENDIX V

Photographs

Land adjacent to 29, Harbour Road, Pagham, PO21 4SY
Photographs Taken During Site Inspection – 14th August 2006



View of the site looking north east



View of the site looking south west

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View of the site boundary looking south west along Harbour Road

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