GLOUCESTER
CITY COUNCIL

ENVIRONMENTAL PROTECTION ACT 1990, SECTION 78B

RECORD OF DETERMINATION THAT LAND IS CONTAMINATED LAND

In accordance with Part 2A of the Environmental Protection Act 1990 Gloucester City Council has determined that the land at:

10 ALNEY TERRACE, ALNEY ISLAND, GLOUCESTER, GL1 2RZ
(Identified on the attached plan as land within the blue boundary)

National grid reference 382412, 219162

is **CONTAMINATED LAND**, as defined by section 78A(2) of the Environmental Protection Act 1990, because:

Gloucester City Council has identified the presence of a contamination source, a pathway, and a receptor with respect to the current use of the land. The Council is satisfied that as a result of this pollution linkage a significant possibility of significant harm exists, with no suitable and sufficient risk management arrangements in place to prevent such harm.

A summary of the basis on which this determination has been made is set out in the Schedule to this record.

Dated 5th August 2008

Julie Wight
Environmental Health Manager
Gloucester City Council

Environmental Health
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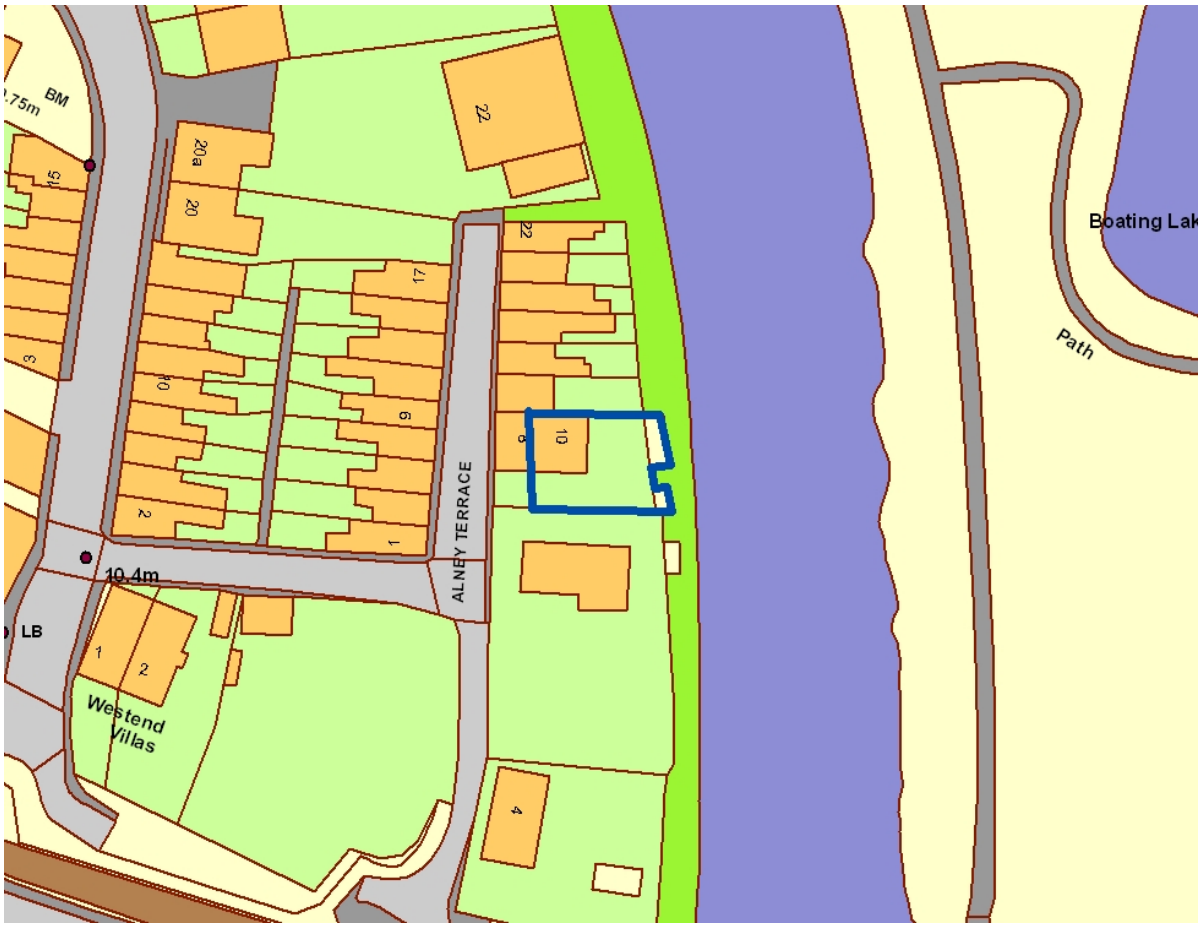
10 ALNEY TERRACE, ALNEY ISLAND, GLOUCESTER, GL1 2RZ

(Identified on the plan below as land within the blue boundary)



SCHEDULE

1 - DESCRIPTION OF THE SIGNIFICANT POLLUTION LINKAGE

Pollutants: Benzo(a)Pyrene in surface soils

Pathways: Direct soil/dust ingestion
Consumption of homegrown produce and soil
Consumption of soil attached to homegrown produce
Indoor dermal uptake from dust
Outdoor dermal uptake from soil contact
Indoor dust inhalation
Outdoor dust inhalation

Receptor: Young child (age 1-6 years) potentially resident at the determined property

In combination these source-pathway-receptor linkages are considered to represent a Significant Pollution Linkage, indicative of a significant possibility of significant harm to human health.

2 - SUMMARY OF THE EVIDENCE UPON WHICH THE DETERMINATION IS BASED

SHALLOW SOIL RESULTS FROM THE PROPERTY (mg/kg)

Benzo(a)Pyrene: **120.0 62.0 57.0 35.0 33.0 25.0 21.0 18.0 13.0 9.3 5.1 4.9 4.8 1.9**

Sample Mean: 29.3mg/kg US95%: 44.55mg/kg

Assuming Normal Distribution
97% confidence that population mean exceeds 11mg/kg
98% confidence that population mean exceeds 9mg/kg
99% confidence that population mean exceeds 6mg/kg

Assuming Non-normal Distribution (using Chebychev)
87% - 97% confidence that population mean exceeds 11mg/kg
85% - 98% confidence that population mean exceeds 9mg/kg
88% - 99% confidence that population mean exceeds 6mg/kg

Alney Island Flood Defence – Site Investigation Interpretative Report [DRAFT]
- by Fugro Engineering Services Ltd, for the Environment Agency *(Sep 2005)*

Phase 1 Assessment of the Alney Island Site – Phase 1 Assessment
- by Land Quality Management, for Gloucester City Council, *(Apr 2007)*

Phase 2 Assessment of the Alney Island Site – Factual Report
- by Land Quality Management, for Gloucester City Council, *(Apr 2008)*

Phase 2 Assessment of the Alney Island Site – Interpretative Report
- by Land Quality Management, for Gloucester City Council, *(Apr 2008)*

Appendix 3 of Alney Island Ground Investigation – Exploratory Hole Logs
- by Geotechnical Engineering Ltd, for Land Quality Management, *(Dec 2007)*

Appendix 4 of Alney Island Ground Investigation – Soil & Leachate Analysis
- by Land Quality Management, for Gloucester City Council, *(Apr 2008)*

Appendix 5 of Alney Island Ground Investigation – Groundwater Analysis
- by Land Quality Management, for Gloucester City Council, *(Apr 2008)*

Consultation response letter concerning assessment of risk at Alney Island
- by the Health Protection Agency, *(Jul 2008)*

3 - DESCRIPTION OF POTENTIALLY CONTAMINATIVE ACTIVITY AT THE ALNEY ISLAND SITE

The site being determined: **10 ALNEY TERRACE** is located within an area of Gloucester known as Alney Island, at grid reference: **382412, 219162**.

Within the area of Alney Island investigated, a variety of former potentially contaminative land uses existed including; boat building/maintenance, saw mills/timber yards, brickworks, lime kilns, lorry parks and an area used for power station ash storage/disposal. Various other potentially contaminative activities existed in close proximity including; a coal-fired power station and an iron works. There are significant anecdotal accounts of localised waste disposal, infilling and earthworks across the Alney Island site. It is possible that wastes from former gasworks sites may also have been deposited at the site.

4 - SUMMARY OF THE RELEVANT ASSESSMENT OF THE EVIDENCE

Land Quality Management undertook a comprehensive investigation of Alney Island, on behalf of Gloucester City Council, to characterise the amount and extent of contamination present, and advise whether any parts of the site should be determined to be 'contaminated land'.

These investigations considered all available existing information, including the previous Fugro Engineering Ltd site investigation undertaken for the Environment Agency. Previous investigations of adjacent sites, including the former Town Ham Allotment site, were also considered.

The sampling strategy was designed to evaluate risks to human health arising principally from shallow soils, and an unbiased sampling pattern applied with the aim of providing good coverage across the Alney Island.

The assessment of sample data followed a tiered approach, with data first being compared with relevant generic assessment criteria. A residential with plant uptake land use scenario was applied for the residential properties, and a residential without plant uptake scenario for the Showmans' sites.

Comparison with generic screening values (DEFRA/EA SGVs or CIEH/LQM GACs) indicated widespread exceedance for several contaminants, including: antimony, arsenic, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, tin, zinc and all speciated PAHs. Several other contaminants were identified locally across the site.

Gloucester City Council recognises that exceedance of an SGV/GAC does not equate to an unacceptable level of risk, as defined by Part 2A.

All of these potential contaminants of concern were subject to a statistical review, initially as specified in CLR 7, then again following publication of the CL:AIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration.

Following further consideration of the antimony, arsenic, boron, cadmium, chromium, copper, mercury, nickel, selenium, tin and zinc results from the Alney Island site, it was possible to establish these contaminants were unlikely to represent a significant possibility of significant harm, and were excluded as a possible basis for determination as contaminated land. Similarly it was also possible to exclude the majority of other non-metal contaminants.

The investigations concluded that the heavy metal lead and the polycyclic aromatic hydrocarbon benzo(a)pyrene were the principle risk drivers for the Alney Island site.

The results of the investigation were assessed to identify possible 'zones' of contamination, clusters or hotspots. Considering the extent of distribution and reworking of soil materials across the site, however, Gloucester City Council has concluded that it is most appropriate to assess the data relating to each individual property/plot in its own right, in considering whether a significant possibility of significant harm is likely to exist.

Benzo(a)Pyrene

At **10 Alney Terrace** a total of 14 soil samples were analysed for Benzo(a)Pyrene. The analysis of these samples recorded a maximum concentration of **120mg/kg**, a sample mean of **29.3mg/kg,** and a US95% value of **44.6mg/kg** (assuming a normal distribution).

The minimal risk Generic Assessment Criteria (GAC) for Benzo(a)Pyrene is 1.1mg/kg, for residential properties with gardens.

Assuming a normal distribution for the data there is a 97% confidence level that the population mean exceeds 11mg/kg, 98% confidence level that the population mean exceeds 9mg/kg and 99% confidence level that the population mean exceeds 6mg/kg.

Assuming a non-normal distribution for the data (using Chebychev Theorem) the relevant confidence level ranges are 87% to 97% (for 11mg/kg), 85% to 98% (for 9mg/kg) and 88% to 99% (for 6mg/kg).
Establishing an assessment criteria for benzo(a)pyrene representative of a significant possibility of significant harm for human health is not at the present time straightforward. No clear authoritative guidance is available, and there is no locally established precedent. Guidance is continually emerging on the subject from several sources, but there is no clear indication for when an established position may emerge.

Given the current uncertainty regarding what level of benzo(a)pyrene might represent a significant possibility of significant harm, Gloucester City Council is faced with the choice of either waiting for firmer guidance to emerge before making a determination decision, or making a determination decision based on consideration of the range of guidance available at the present time.

It is the decision of Gloucester City Council that a determination decision should be made based on the currently available guidance, rather than prolonging the period of anxiety and hardship faced by the residents affected.

Part 2A clearly makes Local Authorities responsible for deciding whether or not land is contaminated land, and allows them to exercise their judgement, so long as decisions are based on sound science and reasonable consideration of the site and local circumstances.

In deciding upon a suitable Benzo(a)Pyrene concentration indicative of a significant possibility of significant harm, Gloucester City Council has adopted a 'lines of evidence' approach, considering the full range of published guidance, without placing total reliance on any one source. The 'lines of evidence' considered include:

- DEFRA - CLAN 6/06 Way Forward discussion document,
- Environment Agency - Draft proposals for revisions in the technical methodology of the CLEA model,
- Health Protection Agency – Alney Island consultation response letter,
- Health Protection Agency – Contaminated Land Clarification Note: Benzo(a)Pyrene, Use of excess lifetime cancer risk estimates
- Health Protection Agency – Margins of exposure approach discussion document,
- Land Quality Management – Alney Island phase 2 interpretative report,

Gloucester City Council is aware of the draft, or non-status of several of the above documents, at the time of writing, but considers that they nevertheless provide approaches, useful for consideration as 'lines of evidence'.

Considering these 'lines of evidence', the additional requirement to keep the intake of non-threshold substances such as benzo(a)pyrene as low as reasonably practicable and local conditions and factors, Gloucester City Council considers the quantity of benzo(a)pyrene identified at 10 Alney Terrace to represent a significant possibility of significant harm.

5 - REFERENCES

Site Specific Information, Reports and Documents

Fugro Engineering Services Ltd
Alney Island Flood Defence: Site Investigation Interpretative report [DRAFT] *(September 2005)*

Land Quality Management
Alney Island Investigations: Phase 1 Assessment *(April 2007)*

Land Quality Management
Alney Island Investigations: Phase 2 Assessment Factual Report *(April 2008)*

Land Quality Management
Alney Island Investigations: Phase 2 Assessment Interpretative Report *(April 2008)*

Geotechnical Engineering Ltd
Alney Island Investigations: Appendix 3 Exploratory Hole Logs *(December 2007)*

Land Quality Management
Alney Island Investigations: Appendix 4 Soil and Leachate Analysis *(April 2008)*

Land Quality Management
Alney Island Investigations: Appendix 5 Groundwater Analysis *(April 2008)*

Health Protection Agency
Consultation response letter concerning assessment of risk at Alney Island *(July 2008)*

Statutory Guidance

DEFRA
Circular 01/2006 Environmental Protection Act 1990: Part 2A, Contaminated Land *(September 2006)*

Procedural Guidance

Chartered Institute of Environmental Health
Professional Practice Note: The determination of contaminated land; deciding what is an 'unacceptable intake' *(May 2006)*

Chartered Institute of Environmental Health
Local Authority Guide to the Application of Part2A of the Environmental Protection Act 1990 *(July 2001)*

DEFRA
Applying the Definition of contaminated land under Part 2A of the EPA 1990 *(July 2008)*

DEFRA
Improvements to Contaminated Land Guidance: Outcomes of the 'Way Forward' Exercise on Soil Guideline Values *(22nd July 2008)*

Gloucester City Council
Contaminated Land: An Inspection Strategy for Gloucester [CL-01] *(March 2006)*

General Technical Guidance

CL:AIRE
Guidance on Comparing Soil Contamination Data with a Critical Concentration *(May 2008)*

DEFRA/Environment Agency
TOX 2 Benzo(a)Pyrene: Collation of Toxicological Data and Intake Values for Humans *(April 2002)*

Environment Agency
CLEA Model Publications *(Various)*

Health Protection Agency
HPA –CLCN-1: Contaminated Land Clarification Note, Benzo(a)Pyrene *(2008)*

Drafts, Consultations, Emerging and Forthcoming Guidance [with no official status]

DEFRA
Published Discussion Paper - CLAN 6/06: Assessing Risks from Land Contamination – a Proportionate Approach. Soil Guideline Values: the Way Forward *(November 2006)*

Environment Agency
Published Consultation Draft - Updated Technical Background to the CLEA Model *(April 2007)*

Health Protection Agency
Published Discussion Paper – Margins of Exposure approach (*2008)*

Health Protection Agency
Unpublished External Consultation Draft – Contaminated Land and Public Health *(June 2008)*