

Completion Report

**Former Osborne Refrigeration Site
'Rosewood' Development
Rose Green Road
Bognor Regis
West Sussex**

Client

Barratt David Wilson Homes Southampton
(a trading name of BDW Trading Ltd)

J08112a

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REMEDIATION SUMMARY PLAN

EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

This report provides a record of the remediation supervision and and watching brief supervision that has been carried by Wilson Bailey Partnership Limited, on the instructions of Barratt David Wilson Homes Southampton.

SUMMARY OF THE ISSUES OF CONCERN

A number of issues of concern with regard to soil and groundwater contamination were identified as part of the various phases of ground investigation carried out by others;

Zone A

The southern part of the site was identified as formerly being used as a fuel filling station with underground fuel storage tanks and dispensing pumps with hydrocarbon contamination identified within the soil and groundwater.

Zone B

The central eastern part of the site was identified as having been used for oil and paint storage, with the presence of solvents and hydrocarbon contaminants identified within the near surface soils.

Remainder of the Site

The general light industrial usage of the site results in the potential for localised contamination. As a result of only a relatively limited ground investigation being possible the site remained in use, it was agreed that a geo-environmental watching brief was to be maintained during the demolition phase of the redevelopment.

SUMMARY OF THE WORK CARRIED OUT TO ADDRESS ISSUES OF CONCERN

Zone A

- Decommissioning of the underground fuel storage tanks, pipe work and fuel pumps;
- Removal of the fuel dispensing pumps and pipe work together with the removal of two of the five underground fuel
- Three tanks were required to remain insitu in order to avoid destabilising the adjacent public highway, these tanks were cleaned and then slurry concrete filled;
- Investigation and localised removal as necessary of hydrocarbon impacted soils, together with post remediation validation sampling of the soils that remain;
- Post remediation groundwater monitoring on the down hydraulic gradient boundary of the site; and
- Installation of hydrocarbon resistant gas protection measures as a precaution into new buildings constructed in this part of the site.

Zone B

- Investigation and removal of an underground concrete built chamber and its contents together with post remediation soil validation sampling;

Remainder of the Site

- Documentation of the demolition watching brief maintained across the remainder of the site;
- Supervision and monitoring of the on-site bioremediation of hydrocarbon impacted soils, in accordance with the terms of an agreed Materials Management Plan; and
- Supervision and documentation of the reuse on site of remediated soils following completion of the bioremediation.

CONCLUSIONS

It is considered that the range of potential issues of concern that were identified during the various phases of ground investigation have been investigated and appropriately dealt with such that the site has been rendered suitable for the proposed residential end use.

1.0 INTRODUCTION

Wilson Bailey Partnership has been commissioned by Barratt David Wilson Homes Southampton (a trading name of BDW Trading Ltd) to liaise with regulatory authorities and agree a remediation strategy for this site, together with the subsequent supervision of the remediation works and demolition watching brief.

The requirement for remediation was established on the basis of the findings of the various phases of ground investigation carried out by others, records of which were provided by the Client;

- Land Contamination Preliminary Risk Assessment by Bureau Veritas, reference LSOX0217/R1/Rev0, dated October 2006;
- Site Investigation and Assessment by Bureau Veritas, reference LSOX0295/EKN/Report 1/Rev 0, dated December 2006;
- Supplementary Ground Investigation Factual Information by WD Environmental, reference 20163; and
- Remediation Strategy by WD Environmental Limited, reference 20163/DB/01, dated 3 June 2008.

Supplementary information is also included within the Materials Management Plan, report reference 08112 by Wilson Bailey Partnership Limited, dated December 2008.

1.1 Purpose of Work

The principal technical objectives of the work carried out were as follows;

- to provide independent supervision of the appointed contractor carrying out the remediation work at this site;
- to provide independent supervision of the demolition phase watching brief; and
- ensure liaison with the regulatory authorities with regards to the progress of the remediation in order to facilitate the discharge of contamination related conditions.

1.3 Scope of Work

In order to meet the above objectives, the following activities were carried out;

- part time supervision of the appointed contractor through regular site visits;
- recovery of soil samples for independent laboratory analyses;
- organisation of, and attendance at, regular on site meetings with the regulatory authorities and ensuring regular correspondence; and
- provision of a report to summarise the work carried out in order to facilitate an assessment of the success of the remedial works.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried, the number of locations where the ground was sampled and the number of soil and groundwater samples tested; out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by the Wilson Bailey Partnership.

2.0 REMEDIATION ZONES

Due to the complexity of the various issues, the site has been divided into separate zones that are described as follows and shown on the appended remediation zone plan.

2.1 Zone A

As part of the initial desk study research this part of the site was identified as being formerly occupied by a fuel filling station with a range of underground fuel storage tanks, fuel dispensing pumps and an associated network of underground fuel filler pipes.

The initial phases of ground investigation indicated the ground conditions in this part of the site to comprise a limited thickness of made ground overlying predominantly clayey River Terrace Deposits to a depth of about 1.00 m below ground level. Underlying these clayey soils the River terrace Deposits were found to comprise a fine silty sand with scattered gravel, beneath which firm brown London Clay was encountered at a depth of about 3.00 m below ground level. The results of the ground investigation work carried out across the former forecourt area indicated the general absence of elevated hydrocarbon vapours near to the surface, together with apparently localised pockets of relatively limited hydrocarbon impacted soils between about 1.00 m and 3.00 m below ground level.

Groundwater was encountered at a depth of about 1.50 m below ground level within the granular River Terrace Deposits. On the basis of monitoring carried out upon installed standpipes, a southwards groundwater flow direction was subsequently assessed and groundwater testing indicated the presence of hydrocarbon contamination of the groundwater at the southern, down hydraulic gradient, boundary of the site.

It was therefore concluded that limited leakage from the underground fuel tanks and potentially the associated pipework had occurred and was confined primarily within the water bearing granular River Terrace Deposits. On the basis of discussions with the regulatory authorities a requirement for remediation was established in order to ensure the protection of end users and groundwater within the minor aquifer of the River Terrace Deposits.

Full details of the work carried out are included within the appendix to this report, although in summary the remediation was effected through the removal / decommissioning of underground tanks and the localised removal of hydrocarbon impacted soils. Due to the physical limitations of the site this work was carried out in two phases and three of the five underground fuel storage tanks were left insitu, cleaned and slurry concrete filled as their removal would have resulted in the destabilisation of the adjoining public highway.

Copies of correspondence with the regulatory authorities are also included in the appendix to this report and confirm that the work carried out is considered to be sufficient to render the site suitable for the consented residential redevelopment scheme.

As a further precaution hydrocarbon resistant gas protection measures were to be installed into the new buildings to be constructed within this part of the site.

2.2 Zone B

The initial desk study research and walkover survey indicated that this part of the site was used for oil and paint storage with a number of workshops also located in this area.

The initial phases of ground investigation detected the presence of albeit low concentrations of solvents and hydrocarbon related contamination within the near surface soils, which warranted further investigation.

Following the demolition of the buildings a square concrete chamber was encountered measuring approximately 4 m square with the depth to the slightly sloping base of between approximately 1.20 m and 1.50 m. This chamber was found to contain a mixture of machine parts, oily waste, rubble and oily water. The contents were removed and segregated; the liquid was pumped out and disposed of by tanker whilst the solid material was segregated for disposal. Once emptied and cleaned, the structure was excavated and removed, being broken up and crushed on site under geo-environmental supervision.

The soils surrounding the chamber were sampled and the results of the validation testing together with waste disposal documentation and photographic records are appended.

2.3 Remainder of the Site

Across the remainder of the site only a relatively limited ground investigation was possible prior to the demolition of the former light industrial buildings due to their continued use.

The findings of the ground investigation did not generally indicate the presence of contamination outside of Zones A and B of the site. Apparently localised relatively low concentrations of heavy fuel related hydrocarbon contamination were identified within the near surface soils within the northwestern part of the site, although these have been subsequently assessed as being associated with sample cross contamination with fragments of the directly overlying tarmac surfacing and therefore not to be of concern.

Concerns were also raised about the potential presence of solvent DNAPLs, which were not adequately considered as part of the initial phases of ground investigation. Three cable percussion drilled boreholes were therefore drilled in locations across the site in order to facilitate the installation of deep groundwater monitoring standpipes in order to allow the recovery of water from the Bognor Sand Member and the inspection of the presence of any DNAPLs at the interface of these soils and the underlying low permeability London Clay. The results of the water analyses are appended and indicate the absence of solvents and the on site monitoring did not indicate the presence of non-aqueous phase contaminants.

It was agreed that in view of the relatively low level of general concern across the remainder of the site a geo-environmental watching brief would be appropriate as part of the demolition works. This would ensure that any suspicious soils that may be encountered would be appropriately identified, investigated and dealt with.

The records of the site visits carried out as part of the geo-environmental watching brief are included in the appendix to this report and do not indicate that any suspicious soils were encountered such that further work was not required across the main part of the site.

3.0 ON SITE BIOREMEDIATION

Under the terms of the agreed Materials Management Plan on site bioremediation was carried out on the hydrocarbon impacted arisings from the remediation excavations within Zones A and B. This bioremediation was successfully carried out within the agreed designated area by the groundwork contractor under the part time supervision of Wilson Bailey Partnership.

Once completed the final set of biopile monitoring samples were submitted to the regulatory authorities together with proposals for on site reuse of the treated soils within the northwestern area of public open space

Copies of the correspondence, test results and the location of reuse of the treated soils are included within the Appendix.

4.0 CONCLUSIONS AND FURTHER WORK

It is considered that the range of potential issues of concern that have been raised during the initial phases of ground investigation have been investigated and appropriately dealt with.

As part of the ongoing redevelopment of this site the geo-environmental watching brief should be maintained during the ground work in order to ensure the identification, investigation and appropriate action to deal with any suspicious soils.

Supplier certification confirming the suitability of imported topsoil that has been imported to date are appended. Further certification should be provided for any subsequent topsoil imported onto the site as part of the completed development.

APPENDICES

APPENDIX 1- ZONE A

Excavation Plan
Photographic Records
Laboratory Soil Validation Test Results
Confirmation of Installation of Gas Protection Measures

APPENDIX 2 – ZONE B

Photographic Records
Site Visit Records
Soil Validation Test Results

APPENDIX 3 – REMAINDER OF THE SITE

Email Correspondence with Regulatory Authorities
Site Visit Records
Photographic Records
Deep Borehole Location Site Plan
Groundwater Solvent Analyses

APPENDIX 4 – MATERIALS MANAGEMENT DETAILS

Email Correspondence with Regulatory Authorities
Biopile monitoring results and assessments

Supplier Certification of Imported Topsoil

Remediation Zone Plan