CAMLEY STREET NATURAL PARK
Application ref: 2017/6011/P
Planning Condition 5

Introduction
This note sets out the survey and remediation strategy for dealing with the ground contamination within the Camley Street Natural Park pursuant to Condition 5 of the Planning Approval reference 2107/6011/P which states:

"Ground Investigation - Prior to commencement of any works on site, a written programme of ground investigation for the presence of soil and groundwater contamination and landfill gas shall be submitted to and approved by the local planning authority in writing.

Site investigation shall be carried out in accordance with the approved programme and the results and a written scheme of remediation measures [if necessary] shall be submitted to and approved by the local planning authority in writing.

The remediation measures shall be implemented strictly in accordance with the approved scheme and a written report detailing the remediation shall be submitted to and approved by the local planning authority in writing prior to occupation.
Reason: To protect future occupiers of the development from the possible presence of ground contamination arising in connection with the previous industrial/storage use of the site in accordance with policies G1, D1, A1, and DM1 of the London Borough of Camden Local Plan 2017."

Background
A Combined Geotechnical and Quantitative Contamination Risk Assessment and Waste Classification report was commissioned in June 2017 from Ashdown Site Investigation report (reference R17-12131) and submitted with the Planning Application.

The ground investigation confirmed the underlying soils to comprise a significant thickness of made ground, overlying the undisturbed soils of the London Clay Formation. The London Clay Formation is classed as an "Unproductive Stratum". The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply.

Further information on the ground conditions can be found in the Ashdown Site Investigation report (reference R17-12131).

The report further identified the presence of asbestos materials (Chrysotile and Amosite fibres) within made ground and that the depth of made ground encountered could be a potential source of ground gas generation.

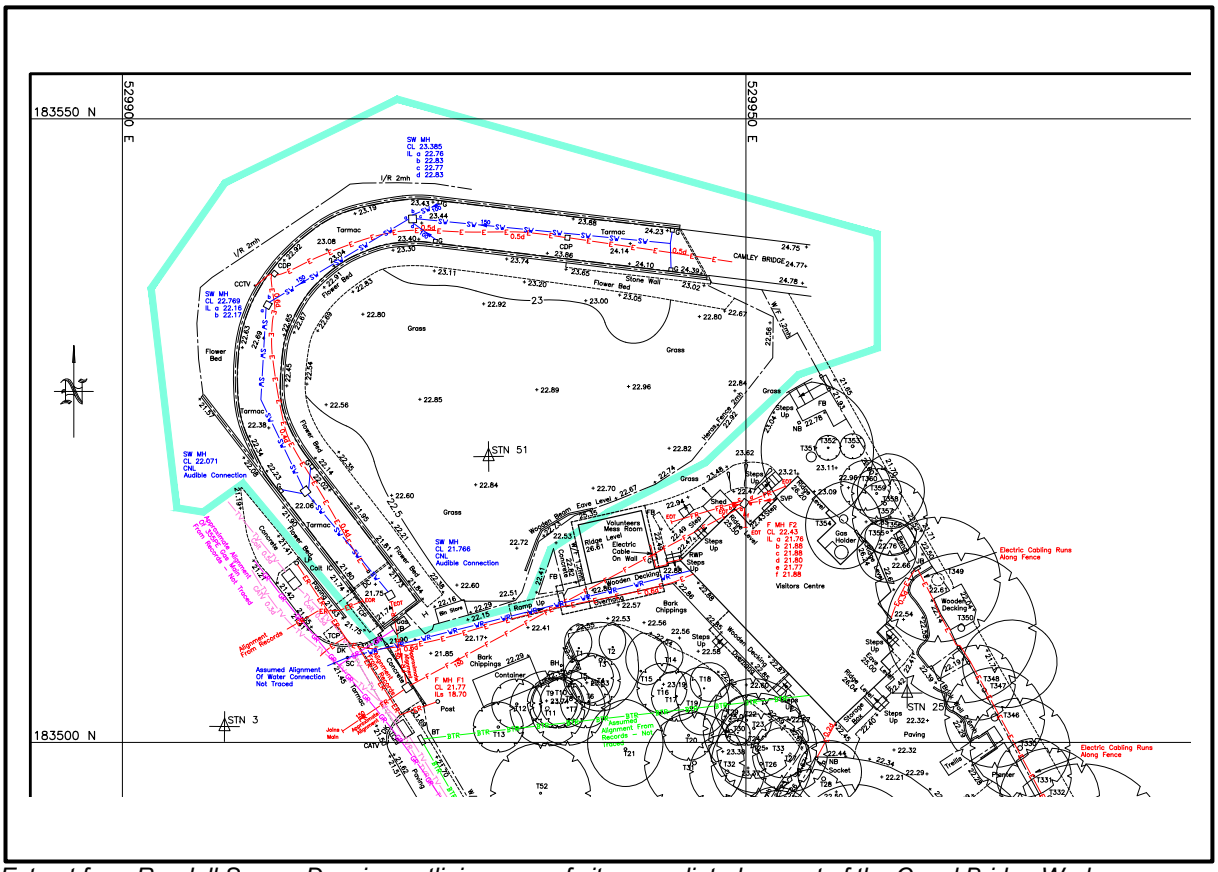
Programme of Additional Ground Investigation
A Supplementary Quantitative Ground Contamination Risk Assessment was carried out in August 2018 the objective of this work was to:

1. Further investigate the shallow ground across the site;
2. Test supplementary samples of soils for the presence of contaminants identified by the quantitative conceptual model;
3. Undertake gas monitoring at the site; and
4. Develop a supplementary quantitative conceptual model of the site, refining the quantitative model to identify any remaining pollutant linkages.

The site investigation works involved 17nr additional trial pits and the installation of 3nr boreholes to monitor ground gas and water levels.

The results of the Supplementary Quantitative Ground Contamination Risk Assessment are set out in the Ashdown Site Investigation Supplementary Ground Contamination Risk Assessment (reference R18 – 13059) dated August 2018.

It should be noted that that the northern area of the site beyond the hoarding (locations of trial holes TP101 – TP106) was remediated by others as part of the Canal Bridge works and that the investigation was restricted to the area affected by the proposed works and did not extend to areas of the Park south of the works area.



Extract from Randall Survey Drawing outlining area of site remediated as part of the Canal Bridge Works

The proposed remediation measures have been prepared using the information obtained from the supplementary report. The conclusions reached are therefore necessarily restricted to those which can be determined from the information consulted and may be subject to amendment in the light of additional information and or conditions encountered during the course of the works.
Further information on the history of the site can be found in the Ashdown Site Investigation report (reference R17-12131)

A Demolition and Refurbishment survey of the existing building has been undertaken by Salvum Ltd (report reference J002240 dated 16th August 2018) and no asbestos containing materials were found.

Ground Conditions
The ground investigation confirmed the underlying solid to comprise a significant thickness of made ground overlying the undisturbed soils of the London Clay Formation. The London Clay Formation is classed as an unproductive stratum. The site does not lie within an Environment Agency Source protection Zone with regard to the protection of the quality of ground water that is abstracted for potable supply. Further information on the ground conditions can be found in the Ashdown Site Investigation report (report reference R17-12131).

Summary of Contamination Investigation and Findings from Supplementary Quantitative Ground Contamination Risk Assessment

Methodology
The assessment has been made against SSVs calculated for the generic 'Public Park' (POSpark) land use, where land use is intended to be representative of an open space provided for recreational use. The assumptions made are considered, by Ashdown Site Investigation, to be "highly conservative" given the proposed end use of the site.

Heavy metals and PAH compounds
13 Samples were taken across the site. No elevated concentrations of heavy metals or PAH compounds were recorded in the made ground soils in comparison to generic soil screening values.

The concentrations of petroleum hydrocarbons within the made ground soils are in excess of the threshold values for the use of PE pipework at the development. The recommendations from the Water Supply Authority will be sought and followed, it is anticipated that the water pipe will be installed within a barrier pipe.

Asbestos Containing Materials

The initial Site Investigation in June 2017 reported chrysotile and amosite fibres and debris were found in the made ground soils in the vicinity of the proposed visitors' centre.
A further site investigation was carried out during the August 2018. The Quantitative Ground Contamination Risk Assessment found ACMs in 6 (out of 27) samples at shallow depths varying between 0.15m and 0.4m in the immediate vicinity around the existing building.

The asbestos material found around the building was consistent with the previous finding of Chrysotile fibres and Amosite fibres and debris, from the earlier reports prepared for the Bridge Works. The concentrations of asbestos were mostly low and with most below the detection limit. In order for asbestos found within soils to pose a risk to health it has to be present in a form that can release fibres to the atmosphere for inhalation. Advice form the CI:AIRE report "Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials notes that potential for release is likely to be lower, possibly by several orders of magnitude than airborne fibre releases from equivalent ACMs encountered in buildings.

No ACM's were found in the area of the site remediated during the Regents Canal bridge works (trial pits TP 101 to 106).

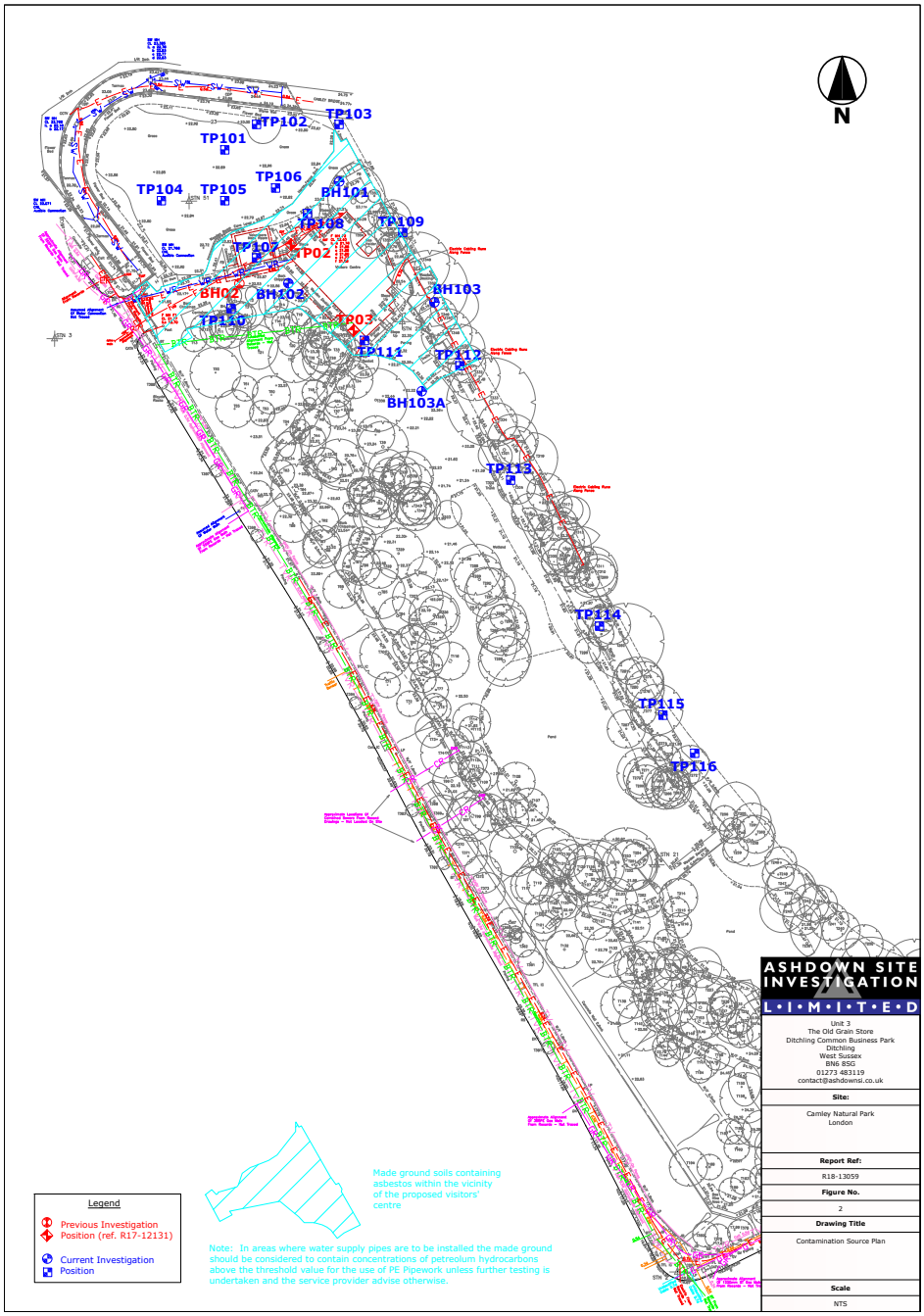
The locations where asbestos was found is summarised below.

Sample / depth (m)	Asbestos Identified	Result
BH02 /0.10	Not Detected	
TP02 /0.20	Yes	Chrysotile Fibres
TP03 /0.15	Yes	Chrysotile / Amosite Fibres
BH101 / 0.20	Not Detected	
BH102 /0.20	Not Detected	
BH103 /0.20	Not Detected	
TP101 /0.20	Not Detected	
TP102 /0.20	Not Detected	
TP103 /0.20	Not Detected	
TP104 /0.20	Not Detected	
TP105 /0.20	Not Detected	
TP106 /0.20	Not Detected	
TP107 /0.20	Not Detected	
TP108 /0.20	Yes	Chrysotile Fibres / Debris
TP108 /0.40	Not Detected	
TP109 /0.20	Yes	Amosite Fibres / Debris
TP109 /0.20	Not Detected	
TP110 /0.20	Not Detected	
TP110 /0.40	Yes	Chrysotile Fibres
TP111 /0.20	Not Detected	
TP111 /0.40	Not Detected	
TP112 /0.40	Yes	Chrysotile Fibres / Amosite Debris
TP113 /0.20	Not Detected	
TP113 /0.40	Not Detected	
TP114 /0.20	Not Detected	
TP115 /0.20	Not Detected	
TP116 /0.40	Not Detected	

Table 6 from Ashdown report R18 -13059 – Samples screened for asbestos

The advice from Ashdown Site Investigation is that the presence of these ACM's is considered to be an unacceptable risk to users in the soft landscaped areas.

CAMLEY STREET NATURAL PARK
Application ref: 2017/6011/P
Planning Condition 5



Ground Gases

Three standpipes were installed as part of the investigation works and each was monitored on 4 occasions, the peak concentration of Carbon dioxide , by volume recorded was 2.3%. No detectable traces of methane or gas flows were recorded.

The site is within an area where less than 1% of properties require radon gas protection. No radon protection measure are reported by the British Geological Survey to be necessary.

The site specific gas screening values have been calculated in the Quantitative Ground Contamination Risk Assessment and it has concluded that no protective measure will be required within the building.

CAMLEY STREET NATURAL PARK
Application ref: 2017/6011/P
Planning Condition 5

Remediation Strategy

ACM contaminated ground
The presence and type of asbestos containing materials has been confirmed by the investigations carried out to date with Chrysotile and Amosite fibres being detected. The management of and working with Asbestos is set in the Control of Asbestos Regulations 2012. The proposed strategy for dealing with the asbestos ground contamination has been developed with reference to the Approved Code of Practice and Guidance and the CL:AIRE (Contaminated Land: Applications in Real Environments) report "Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials".

The decision support Tool for the Categorisation of Work Activities involving Asbestos in Soil and Construction & Demolition Materials in accordance with the Control of Asbestos Regulations 2012 has been used to inform and categorise the work according to the CAR 2012 the results of the decision tool are:

Probable Licencing Status:	Non-Licenced Work
RPE:	EN140 with P3 filter half mask
Dust Suppression:	Localised mechanical dust suppression
Hygiene/ Decontamination:	Localised and enhanced decontamination facilities

In advance of the redevelopment works the site has been closed and the building dismantled. Any remediation works will therefore be carried out in a controlled environment where there is no public or LWT staff access.

A suitable management regime will be needed to manage the risk of any asbestos fibres becoming airborne using water dust suppression. A series of air monitoring points will be set up on the western side of the site to suit the prevailing wind direction. Research by the HSE (HSG248) into exposure risk suggests that the risk of exposure is significantly less when dealing with asbestos contaminated soils than when working with construction and demolition materials and that a significant visible quantities of bound ACM's need to be present for to give rise to exposures above 0.01f/ml, which equates to one tenth of the control limit[1].

Any work near the canal will need to be done so that there is no risk of asbestos contaminated material entering the Regents Canal so any work near the canal will be done with suitably adept machinery and a watchman.

The remediation works will be carried out by suitably experienced contractors and operatives.

Plan of Work
To remediate the asbestos contamination the intention is to do the following works:

Preparatory works
Access to the site will controlled and only be permitted from the Camley Street entrance and the asbestos impacted area will be fenced and screened off with a further controlled entrance

Dust suppression measures will be installed, including a mains connected hose pipe and, as necessary, hand held sprays.

Site welfare with any necessary decontamination accommodation will be set up

Safety signage will be installed at the site boundary and around the asbestos impacted areas.

The ground will be inspected prior to commencement and walkover survey completed. walkover will require a systematic visual inspection across the surface and for completeness this could be carried out across a grid. Any asbestos debris found will be collected and placed in double bags for disposal.

[1] CL:AIRE: Contaminated Land: Applications in Real Environments, paragraphs 69 -71

CAMLEY STREET NATURAL PARK
Application ref: 2017/6011/P
Planning Condition 5

A careful watching brief will be maintained throughout the works on site for any further previously undiscovered asbestos containing materials. If found they will be disposed of accordingly.

Soft Landscaped areas
The Ashdown Site investigation report concluded that the presence of ACM's in the soft landscaped areas was an unacceptable risk to users. The soils in the soft landscaping areas within the un-remediated area of the site will be removed and replaced with clean materials and will involve the following works:
Pre-excavation:
Site walkover to establish the presence of asbestos
The soils will be excavated and separated into stockpiles as material likely to be suitable for re-use or unsuitable for re-use and will be tested at a rate of 1 test per 10m3. The soil samples will be sent for analysis any material found to contain ACM's will be removed from site to a licenced tip or recycling facility.
Within the soft landscaped areas a geotextile "deter to dig" membrane will be laid across all proposed soft landscaping areas.
Clean imported, or "clean" site won topsoil will then be placed within the soft landscape areas.

Hard Landscaped Areas and below the building.
The full extent of the asbestos contamination in the hard landscaping and below the building area is not known, it is thought to be restricted the area immediately beyond the original demolished building.
The approach for these areas will be:
Pre-excavation:
Site walkover to establish the presence of asbestos
The soils will be excavated to the required formation and separated into stockpiles as material likely to be suitable for re-use or unsuitable for re-use. The material will be tested at a rate of 1 test per 10m3. The soil samples will be sent for analysis any material found to contain ACM's will be removed from site to a licenced tip or recycling facility.
A geotextile "deter to dig" membrane will be laid across all affected areas
The new construction will then commence.

Testing of imported and re-used soils
Any imported fill, topsoil and subsoil will be appropriately verified to ensure that it is suitable for use at the proposed location and depth. Recycled aggregates brought to site will be tested for asbestos.

Suspicious material
It is recognised that further contamination may be discovered. If suspect soils are identified during remediation or construction, the area will be assessed and addressed individually, and documented accordingly.

Site safety and control during construction
The measures outlined below will be implemented during the works:

- The works will be undertaken in a fashion to prevent the creation of dust and hence prevent fibre inhalation on site and dust emissions from the works. All Made Ground will be kept damp when being handled or when exposed at the surface. Dust prevention will be proactive, not reactive. Dust prevention measures will be in place before work commences and surfaces wetted before and during excavation works as necessary;
- As stated previously, low levels of asbestos were identified in the Made Ground although on occasion the concentrations were higher and did include friable ACM that might release fibres more easily compared to bound forms of ACM. The requirements described in CAR 2012 will be adhered to where they apply. Based on most of the results the asbestos identified would generally not be visible to the naked eye. However, should pieces of ACM or particular asbestos hotspots be encountered, these will be segregated, stored and disposed of where practical to do so;
- The principal contractor should appoint a specialist asbestos specialist to advise on the works and status in relation to notifications and licenses. An occupational risk assessment will be undertaken by a competent assessor (asbestos specialist) in accordance with CAR 2012 and the associated code of practice to determine the likely exposure resulting from the works and the level of protection and management required by CAR 2012, this will also identify if the works with asbestos will be licenced, notifiable non-licensed work or non-licensed work and what notifications and health surveillance is required;

- Air monitoring will be undertaken during the works to confirm the absence of respirable fibres above the Car 2012 action levels.
- Sufficient hygiene units and PPE will be provided for the works. Suitably competent personnel will advise on and supervise the works and all staff will be briefed on the working methods. Working methods that control human exposure to soils will be adopted and access to the site will be controlled during the works with the Made Ground;
- Stockpiles and arisings of soils from construction will be appropriately managed to prevent the spread of material and potential cross contamination; and

All staff involved in the site works, regardless of role, will have awareness training in asbestos and contamination. The contractor(s) will undertake an appropriate level of awareness training, inductions and tool box talks. Inductions, risk assessments, method statements and tool box talks will emphasise the specific ground conditions encountered or potentially present.

The relevant risk assessments, method statements, health and safety plans and tool box talks will be subject to regular review and revision where deemed necessary. If more asbestos is identified during the excavation works then the assessments and methods should be updated to reflect those findings.)

Conceptual model and risk assessment
The conceptual model in appendix F and G of the Ashdown Supplementary Quantitative Ground Contamination Risk Assessment identifies the sources of potential contamination and the behaviour of the contamination. The potential human health and environmental risks after completion of the works have been considered.

Human health during construction
Construction workers are likely to be exposed to Made Ground during construction. The results were generally low and below concentrations generally associated with acute risks to adult workers, however some areas of slightly elevated concentrations of lead. Asbestos was confirmed at 6 locations, and could be elsewhere.

During the construction phase, appropriate mitigation measures to prevent risk of harm to human health will be implemented as detailed above. It will be necessary to adhere to good site management practices, undertake site briefings and implement dust suppression measures. In addition, appropriate personal protection equipment (PPE) will be provided along with hygiene facilities.

During construction there is a potential for operatives and site neighbours to come into contact with contaminated materials by the inhalation of dusts. This will be mitigated by proactive damping down and materials management. The release of asbestos fibres from the soil into the air can occur via wind-blown disturbance or physical disturbance. The concentration of airborne fibres released is influenced by many factors, there is limited data on the release of airborne fibres from soils, but soil moisture content has a particularly significant impact. In laboratory studies, the addition of 5% moisture to a dry soil reduced airborne fibre release by 80% to 95% and no airborne fibre were detected when the soil moisture content was greater than 15%.

The Control of Asbestos Regulations (CAR) 2012 requires that exposures are prevented or minimised through the use of risk assessments and the adoption of appropriate control measures. Additional precautions due to asbestos for the construction stage will be taken.

A watching brief will be undertaken for all excavation works, particularly those in the areas where asbestos was previously identified. A discovery strategy for the identification of visible asbestos encountered during the works will be put in place, in line with the CAR 2012.

Assuming enhanced risk management and mitigation procedures are implemented during the works, the risk to human associated with the works during development will be **low**.

Human health after construction
The building and hard landscape will be hard cover with no potential PPL to underlying soils. There are small landscaped areas, these are in areas previously remediated or will be provided with new soil cover that will prevent exposure to end users. A maintenance plan will be required to protected ground workers in the future. There are some existing trees to be maintained in the Camley Street Natural Park

following development and hence residual soils (Made Ground and topsoil) will remain. Exposure to soil will be very low and sporadic in these areas and in general the public will be cut off from these areas. There is a potential for asbestos in the shallow soils so these areas will be managed accordingly.

Once the enhanced risk management and mitigation procedures are implemented the risk of harm to human associated with the works after development is reduced to **very low**.

Previously unidentified contamination
If previously unidentified areas of potential contamination such as hydrocarbon impacted soils, coloured soils, unusual odours or additional ACM are encountered the following steps will be taken:

- The asbestos specialist will be consulted and client notified;
- Soil will either be sampled in-situ in the ground (and left undisturbed while the samples are tested and the results interpreted) or be excavated and stockpiled separately in an appropriate manner (i.e. bunded and covered stockpile); and
- Measures will be taken to restrict dust and surface water run-off. On receipt of the results, soils will be disposed off-site to a suitable licensed treatment facility or landfill.

Sampling will be undertaken by suitably qualified and experienced personnel aware of the remediation design objectives. The laboratory testing and a strategy for undertaking such work will be established. Inspection records and testing will be included in the verification report.

End.

Additional Documents
Ashdown Site Investigation Supplementary Quantitative Ground Contamination Risk Assessment
Decision Support Tool for CAR2012 Work Categories