Contaminated Land
Air Quality
Environmental Audit

SMITH GRANT Environmental Consultancy LLP

Partnership No: OC 300776

urbanregen

Upper Heyford
New Settlement Area
Development for Residential-led Uses
(Planning Consent 10/01642/OUT)

REMEDIATION STRATEGY

For: Urban Regen Ltd.

May 2014

R1742-R01-v3

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DOCUMENT CONTROL SHEET

Report Title:	Upper Heyford, New Settlement Area (Planning Consent 10/01642/OUT) Remediation Strategy
Client:	Urban Regen Ltd. Ltd.
Report Reference Number:	R1742-R01
Issue	Final
Version:	Version 3
Report Date:	15th May 2014

Signed For Smith Grant LLP

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Document Revision Record:

Version	Report Status	Date	Details of Revision
v1	draft	05/01/2014	issued for comment
v2	draft	27/02/2014	edit following developer comments
v3	final	15/05/2014	inclusion of development responsibilities

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1. Introduction

1.1. The former RAF/USAF Upper Heyford airbase New Settlement Area (NSA) has been granted outline planning consent for residential-led redevelopment. Bovis Homes and Dorchester Group intend to redevelop parts of the site and have requested Urban Regen Ltd. to carry out remediation works at the site to manage historical contamination resulting from previous uses and to facilitate residential development.

1.2. Urban Regen instructed Smith Grant LLP (SGP) as Environmental Consultant to prepare a Remediation Strategy for the NSA site. The Remediation Strategy is based upon extensive site investigations and risk assessment carried out by various consultants on the site, and takes account of consultations with the Cherwell District Contaminated Land Officer and Environment Agency. This document updates the previously-approved Remediation Strategy and Contractor's Method Statement, reflecting the subsequent appointment of Urban Regen.

1.3. The site comprises an area of the former Upper Heyford Airbase, latterly developed and used by the United States Airforce, which has been decommissioned and is used in part for civilian purposes, including commercial and residential uses as part of Heyford Park. A substantial part of the site comprises retained residential housing where remediation and redevelopment is not planned or required. Substantial areas are either disused or include commercial tenants who will remain in occupation during the remediation works. The project is therefore complex in terms of phasing and access and with regard to the isolation or maintenance of services, and will to some degree need a flexible approach.

1.4. Site details are:

Address	Upper Heyford, Oxfordshire
National Grid Reference	451185 226775
Local Authority	Cherwell District Council
Site Area	~74.1 ha
Current Use	~45% retained residential and commercial, with ~55% redundant buildings, hard-standings and landscaping that is subject of remediation
Site Access	off Camp Road
Planning Permission	10/01642/OUT
Proposed Use	residential-led

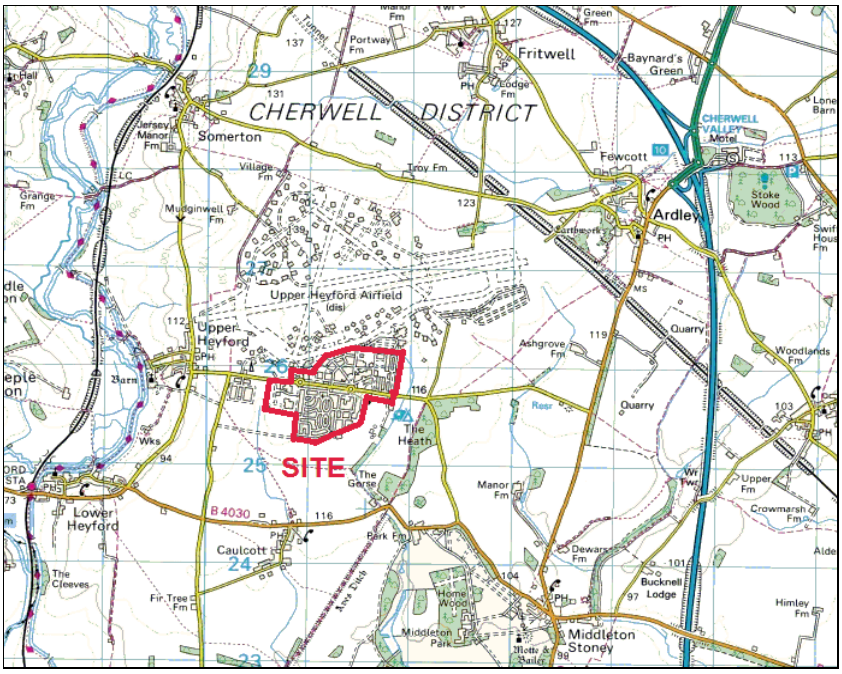

Figure 1.1: Site Location

1.5. The site boundary and layout is shown on drawing D01.

1.6. Conditions of the planning permission relevant to contamination remediation are worded as follows:

24 No operational development approved by this planning permission shall take place (or such other date or stage in development as may be agreed in writing with the Local Planning Authority), until the following components of a scheme to deal with the risks associated with contamination of the site shall each be submitted to and approved, in writing, by the local planning authority:
(a) A preliminary risk assessment which has identified:
(i) -all previous uses.
(ii) -potential contaminants associated with those uses.
(b) A conceptual model of the site indicating sources, pathways and receptors.
(c) Potentially unacceptable risks arising from contamination at the site.
(d) A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.
(e) The site investigation results and the detailed risk assessment (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.
(f) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.
Any changes to these components require the express consent of the local planning authority. The scheme shall be implemented as approved.

25 Prior to occupation of any new build dwellings, a verification report demonstrating completion of the works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved, in writing, by the local planning authority. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the

site remediation criteria have been met. It shall also include any plan (a "long-term monitoring and maintenance plan") for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action, as identified in the verification plan, and for the reporting of this to the local planning authority.

26 If during development contamination not previously identified is found to be present at the site then no further development within 20m of the contamination shall be carried out until the developer has submitted to and obtained written approval from the local planning authority for an addendum to the method statement. This addendum to the method statement shall detail how this unsuspected contamination will be remediated (if necessary) and thereafter this will be carried out as approved before any development within 20m recommences. Following completion of any such additional remediation, a verification report shall be submitted within 3 months of the completion of the works for the approval of the Local Planning Authority in writing.

27 Piling or any other foundation designs using penetrative methods shall not be permitted other than with the express written consent of the Local Planning Authority, which may be given for those parts of the site where it has been demonstrated that there is no resultant unacceptable risk to groundwater.

1.7. The Local Planning Authority (Cherwell District Council) approved the discharge of the Contamination Risk Assessment part of Condition 24 on 2/11/12 (i.e. Condition 24 parts (a) to (e)). This was on the basis of the Remediation Strategy submitted by Waterman Energy, Environment and Design Ltd. (Waterman) and the Demolition and Remediation Method Statement produced by Vertase F.L.I Ltd..

1.8. Given that the original roles of Waterman and Vertase as set out in the previously submitted Remediation Strategy and Method Statement are no longer relevant to the current remediation contractor's obligations, this document has been produced for the purposes of clarity, however it should be noted that the fundamental objectives and methods previously set out with respect to contamination remediation are unchanged. This report details the Remedial Strategy for ground contamination to be implemented by Urban Regen (Remediation Phase) and developers (Construction Phase). The assessment methodology follows the framework described in the EA / DEFRA Contaminated Land Report 11: 'Model Procedures for the Management of Land Contamination' 2004. The Remediation Strategy will be submitted to Cherwell DC and the Environment Agency for approval.

2. Information Sources

2.1. The principal sources of information consulted in the preparation of this report include:

Table 2.1: Information Sources

date and reference	author and title	purpose and information content
November 2011 P8219J107 v0.1	Jomas Associates Ltd.	intrusive site investigations and monitoring, factual report (phase 1)

date and reference	author and title	purpose and information content
April 2012 P8251J128 v1.1	Jomas Associates Ltd.	intrusive site investigations and monitoring, factual report (phase 2)
EED10658-109-R-13.2.2_FA	Waterman "Preliminary Generic Quantitative Risk Assessment New Settlement Area, Upper Heyford"	interpretative report on Jomas intrusive investigations and risk assessment
July 2012 EED10658-14.1.7_FA	Waterman "Controlled Waters Detailed Quantitative Risk Assessment New Settlement Area, Upper Heyford"	assessment of groundwater contamination risks, remediation options, objectives and target concentrations
September 2012, EED10658-109_S_12.2.3_FA	Waterman "Remediation Strategy New Settlement Area, Upper Heyford"	remediation strategy – LPA approved document
September 2012, ref: 3035	Vertase FLI "Demolition and Remediation Method Statement Upper Heyford"	remediation method statement (includes remedial strategy details on validation testing) – LPA approved document

2.2. Review of Investigations

2.2.1. The scope of investigations was drawn up by Waterman on the basis of previous desk studies and investigations, including those forming part of an Environmental Statement for the site redevelopment, and have satisfied the requirements of the local authority and Environment Agency.

2.2.2. The Jomas Associates investigations were principally targeted to address previously identified contamination sources associated with various underground and above ground fuel storage tanks (ASTs and USTs) dispersed across the site. These largely supplied heating oil for boiler houses or individual heating systems for buildings, but also included two groups of tanks associated with former vehicle fuelling facilities where petrol and motor diesel were also stored and dispensed.

2.2.3. Jomas sought to identify tank contents and volumes where possible. This work has been checked and updated by URL and SGP, with summary details provided in Appendix A.

2.2.4. Jomas also carried out aquifer groundwater monitoring and provided factual information to enable the assessment of groundwater remediation requirements and source removal. These specifications were subsequently agreed between Waterman on behalf of the landowners Dorchester Group, and the Environment Agency as regulatory authority for controlled waters.

3. Site Characterisation

3.1. Historical Development and Use

3.1.1. The earliest maps show the site as undeveloped apart from a small quarry located in the vicinity of buildings 492/493 immediately south of Camp Road. The site development as a military facility originated as a first world war RAF airfield to the north of Camp Road. The oldest buildings within the site are found in this area, however much of the building layout and infrastructure north of Camp Road dates from the Second World War when the site was a training facility.

3.1.2. Post 1950 the base was taken over by the USAF and expanded with extensive residential facilities, a hospital and other infrastructure to the south of Camp Road. Buildings to the north of Camp Road included various offices and social facilities including a cinema, residential quarters to the east, and hangers / workshops to the north and northwest.

3.1.3. The site was decommissioned by 1994, and works to remediate the military petrol oil and lubricant (POL) storage and delivery system within the flying field area were completed by February 2012 (ref: Vertase FLI - POL System Contract Completion Report). Major fuelling facilities associated with the airfield and aviation fuel storage were largely located outside the site, but one designated fuel store (POL19) lies inside the NSA site. POL19 does not feature within the NSA remediation as it remains partly in use, and its future decommissioning and remediation are to be undertaken separately at a future date.

3.1.4. No major fuel pipelines are known to traverse the site, and any pipelines that do exist are likely to be of limited extent, connecting storage tanks with the point of use in adjacent boiler houses, buildings or forecourts. The various investigations have not found evidence of significant waste disposal or abandoned ordnance within the NSA site, and in most respects, the site represents a typical urban / suburban development.

3.2. Geology

3.2.1. The site is underlain by a generally thin layer of made ground comprising sub-base to buildings and hard-standings, overlying a thin stony clay subsoil. Deeper fill is recorded within the former quarry where about 3-4m of clay, ash and rubble fills may be present according to investigation logs within the BGS borehole archive; Jomas trial pit logs TP NSA 201 and TP NSA 202 failed to reach the base of the made ground at 2.4 and 2.6m depth respectively.

3.2.2. Weathered bedrock of Jurassic Limestone (Great Oolite Group) is generally present at shallow depth, typically varying between 0.3 and 1.0m (average ~0.6m) below ground level, across the entire site. The limestone typically becomes less weathered below 2m depth and is a thinly bedded but hard rock with a shallow dip, and with occasional sandstone or mudstone bands.

The rock is likely to be vertically jointed but there are no recorded faults, and no reports of significant solution voids or features.

3.2.3. It follows that most underground structures across the site (basements, cable and pipe tunnels and USTs) will have been excavated into the bedrock.

3.3. Hydrogeology

3.3.1. Groundwater is stratified below the site due to the presence of low permeability mudstone layers. The shallow aquifer is generally found at around 3m below ground level, with a small gradient down to the southeast. Groundwater entry to excavations is expected to normally be slow, but ponding within backfilled excavations or on clay subsoil may occur.

3.3.2. The major hydrogeological feature is the Principal Aquifer within the Great Oolite limestone. This is used for private water supplies and provides baseflow to a number of springs located to the southeast of the site. Given the thinness or absence of significant soil cover, the aquifer is considered to have high vulnerability to contamination from surface or shallow sources.

3.4. Current Condition

3.4.1. The aerial photograph below shows the recent land condition, including a mix of occupied and disused buildings and landscaping / open space.

Figure 3.1. Recent Aerial Photograph

3.4.2. Bulk storage tank locations, or tank clusters, have been resurveyed and results are provided in Appendix A. All USTs and two ASTs contain varying quantities of hydrocarbon contaminated water and/or free product. The remaining ASTs are empty.

3.5. Contamination

3.5.1. The key potential source of contamination within the site is associated with bulk fuel storage tanks. A nominal total of 35 USTs arranged in 14 locations, singly or in clusters, and 8 ASTs were identified by Waterman. Some of the USTs previously recorded as single tanks appear to be multiples of tanks, the majority of which are water-filled, and URL have also identified several redundant petrol interceptor tanks. Following previous convention, the tanks are referenced UG NSA 1 to 35, sub-divided with letter suffixes as necessary for USTs, and AG NSA 1- 9 for ASTs.

3.5.2. The following observations of contamination within soils or bedrock have been made by Jomas:

Table 3.1. Contamination Observations

entry ref.	depth (m)	observation	soil vapour VOC concentrations (by PID, ppmv)	location
Jomas, 2011				
TP NSA 230	0.1 - 1.4	made ground, seep	238	E of POL19
TP NSA 231	0.4 - 1.9	soil with faint odour, occasional staining	2.4	E of POL19
TP NSA 238	0.15 - 0.4	made ground, occasional odour	32	S of UG NSA 24/25
BH NSA 30	3.0 - 3.2	staining in bedrock	0	SE of UG NSA 27-30
BH NSA 43	2.4 - 3.1	sand, faint odour	0.3	S of UG NSA 1-3
Jomas 2012				
TP NSA 228	0.7	faint odour in MG	1.4	E of POL21
SI 01A	1.1 - >1.5	strong odour in soil and bedrock	76 - 158	location uncertain, probably E of POL19
BH NSA 02	2.0 - 3.1	faint odour in bedrock	3.8	SE of UG NSA 16-20
BH NSA 03	3.9 - 4.2	moderate odour in bedrock	14.2	SE of building 493 (southern filling station)
BH NSA 06	2.5 - 3.5	staining in rock	51	S of UG NSA 1-3
BH NSA 10	2.7 - 3.1	faint odour in bedrock	2.3	S of UG NSA 5-7
BH NSA 21	3.4	staining in rock	8.4	S of UG NSA 8 (building 581 - supermarket)
BH NSA 22		stain / faint odour in bedrock	17	S of UG NSA 13-15

3.5.3. The only location where visible groundwater contamination was observed, in the form of an intermittently present free product layer or sheen, was BH NSA 06 to the south / southeast of the UG NSA 1-3 tank cluster.

3.5.4. Ground gas monitoring combined with the generally minimal depths of made ground indicate negligible risks from ground gas across the site, and no general requirement for building gas protection. However, no monitoring is available for the backfilled quarry and this location is also the site of the petrol station USTs UG NSA 16-20. Other fuel tank locations could be associated with locally elevated VOC levels as indicated by PID monitoring in Table 3.1. Contamination by degreasing solvents has not been found in the shallow groundwater, therefore risks from vapours to human health under the continuing and future uses of the site appear minimal. Given the above localised uncertainties, examination of the quarry fills for evidence of degradable organic fills and PID monitoring in and around potential zones of fuel and solvent storage and use will be required. The excavation of fuel-contaminated soils, and validation by means of olfactory and PID assessment, and fractionated hydrocarbon analysis is specified within this Strategy for fuel storage tanks, and risk assessments in any areas of residual impact following remediation will be used to inform recommendations for building gas protection by the Environmental Consultant.

3.6. Adequacy of Information

3.6.1. The investigations have targeted the key concern at the site which is the release of petroleum hydrocarbons into the shallow aquifer from the various fuel stores and ancillary equipment located throughout the site. This work has demonstrated that whilst source removal is necessary, groundwater remediation is not required generally, although any occurrences of free product will be removed to the extent practicable. Given the apparent construction and setting of USTs (mostly expected to be steel tanks set in concrete within voids excavated into bedrock) it is considered that the site investigation has been sufficient for the controlled waters risk assessment.

3.6.2. Other non-fuel contamination appears to be minor, and mainly associated with the made ground (ashy fills) and potential for asbestos in pipe laggings and gaskets, insulation board and cement-bound products, or as dispersed fibre in made ground.

3.6.3. As noted above, there is potential for localised ground gas sources, in particular associated with the backfilled quarry, and further assessment in these areas will be undertaken.

3.6.4. For a site of such size, with little history of redevelopment or landfilling, and with live services and many buildings remaining intact, it is considered that the investigation is likely to have reasonably characterised the ground conditions, but that localised areas of contamination may not have been identified. This will require further targeted inspection and testing, with the onus

placed on inspections by the Environmental Consultant and other competent persons (URL Site Engineers), together with verification testing of stripped surfaces and spoil stockpiles prior to replacement of materials. Further site-wide investigations are not considered necessary at this time. In the event that unforeseen contamination is discovered during the works the provisions described in section 4.8 of this Strategy will apply.

3.6.5. The range of tests performed appears to have been generally adequate and to have covered the contaminants likely to be present. Testing of radiological substances (specifically radium from luminised paint residues and scrap materials) has not been undertaken, however no reference to the potential presence of such materials has been made in the Waterman reporting. There is no evidence to suggest the presence of munitions, propellants or pyrotechnic materials within the site, however a prudent approach will be required during earthworks operations.

4. Scope of Remediation

4.1. Remediation Objectives

4.1.1. The remediation objectives, strategy and implementation plan described below address the contamination identified to date and the likely requirements should further contamination be identified during the remediation works. The results of all additional investigations will be submitted to the Regulator or their representative. If additional contamination is encountered, and subsequent investigations/risk assessment indicates the requirement for any revisions to the strategy, these will be submitted to the Regulator or their representative for approval.

4.1.2. The key contamination remediation objectives are to:

- create a significant betterment of the groundwater environment thereby protecting groundwater quality at and beyond the site boundary;
- remove/remediate significant pollution sources such as hydrocarbon hot-spots, if present, that pose a risk to man and the environment, to the extent feasible;
- break significant or potentially significant future pollutant linkages resulting from the change of landuse, in particular related to shallow garden soils and human exposure;
- carry out further targeted soil investigations/inspections to complete gaps in the existing investigation coverage;
- respond appropriately to contingencies in particular the discovery of previously undisclosed contamination;
- remove development constraints and prepare the site physically to enable residential development with associated infrastructure;
- manage all emissions to air and water to protect surface waters and groundwater and the atmosphere during the remediation works;

- provide appropriate additional protection measures where necessary, to be implemented during construction, including building gas barriers, water mains protection, and garden / open space soil quality and thickness.

4.1.3. The potential risks identified will be managed in order to break any potential pollution linkages and allow development of the site for either continued commercial use or the intended residential use without harm to human health, property and the environment. Each of the potential contaminant linkages identified in the Waterman site conceptual model and risk assessment (Waterman "Controlled Waters Detailed Quantitative Risk Assessment", ref: EED10658-R-109_14.1.7_FA, July 2012; and "Preliminary Generic Quantitative Environmental Risk Assessment", ref: EED10658-R-13.2.2_FA, May 2012) will be addressed for the remediation strategy to be considered appropriate for the site and to allow construction to commence. This process will take place on a phased basis.

4.1.4. During the remediation works various contaminated materials may be exposed. Therefore mitigation to prevent exposure of site workers, local residents and workers, and site visitors to harmful or nuisance substances is a requirement of the remediation strategy. Similarly the works must not cause pollution of water by discharge of silt or other materials to the surface water or groundwater receptors linked to the site.

4.1.5. Risks to human health associated with potential contamination by asbestos, metals, PAHs and non-volatile hydrocarbons can be managed by isolation of affected soils from future residents and, to lesser extent, maintenance workers (whose exposure is likely to be limited). It is assumed that these substances could be present in the made ground across the site. Natural undisturbed soils are likely to be exposed following re-grading; other areas will be covered by permanent hard standing or buildings to provide physical isolation of any residual contamination. Specific measures to isolate humans from direct exposure to such contamination are only required in areas where gardens or soft landscaping is proposed and where significant levels of contamination are present.

4.1.6. The other exposure pathway with the potential to affect human health is the volatilisation, migration and indoor inhalation of volatile hydrocarbons associated with historical fuel spills or leaks (if present); additional assessments will be undertaken during tank and pipeline removal to confirm whether this pathway requires source remediation and/or building vapour protection.

4.1.7. The risk from migration of other hazardous soil gasses (methane and carbon dioxide) appears to be low, and sources are restricted to areas of deeper fill, probably limited to the infilled quarry. There is no present evidence for significant on-site sources, and these deposits are unlikely to generate significant volumes/flows. No potential off-site sources have been identified. It is therefore generally the case that where undisturbed clay or gravel subsoils or

bedrock are present at less than 2m depth then building gas protection should not be required. Any requirement for gas protection for buildings located over deeper fills should be re-assessed following the works, possibly supported by post-remediation gas monitoring from wells.

4.1.8. The potential for exposure of concrete to aggressive ground conditions and water supply pipes to damaging substances is considered to be low.

4.1.9. Off-site groundwater impacts are not considered to be significant on present monitoring evidence, however the substantial volume of hydrocarbon-contaminated water and relatively minor amounts of free product held in USTs within the site remains a significant potential pollution source. At least one UST (UG NSA 3) and one AST (AG NSA 07) remain partly or completely filled with fuel oil. As a priority the works must not cause the release of any polluting substances to controlled waters, either via sub-surface or overland flows.

4.1.10. Protected trees must be conserved throughout the duration of the remediation and development. Ecological constraints involving bat and bird roosts are being addressed separately.

4.1.11. The Remediation Strategy assumes controlled demolition of all buildings preceded by appropriate asbestos surveys and stripping by specialist contractors. These works will be fully contained and monitored, thus remediation works only need to consider the methods of handling and monitoring retained hard materials that are to be recovered for use as aggregate within the works.

4.1.12. The remediation works will also prepare the site for the proposed redevelopment. These entail modifying ground levels, improvement of the engineering properties of the ground by removing obstructions to foundations and services, and removal or treatment of deleterious materials, provision of supporting structures and suitable founding surfaces for infrastructure.

4.2. Options Appraisal

4.2.1. Options for the remediation of the identified and potential contamination sources are summarised below:

Table 4.1. Remediation Options

Method	Advantages	Disadvantages	Feasibility
Do nothing	No cost	Potential long-term human health risk remains from exposure to impacted soils in garden areas. Unacceptable risk to controlled waters from local sources	Not acceptable given the groundwater sensitivity and future residential uses of the site

Method	Advantages	Disadvantages	Feasibility
Physical Barriers	Well understood technology	Requirement to source, place and maintain cover layers, and accommodate cover thickness within development levels	Practical option for garden and landscaped areas where direct exposure to residual contamination is a possibility; use of a VOC membrane for breaking the indoor migration pathway if required
Emptying and cleaning of bulk storage tanks	Removal of key potential groundwater pollution source	Risk of accidental release (manageable)	Established procedure for decommissioning tanks
In-situ treatment (thermal/biological/ stabilisation)	Treat contamination at source, reducing disposal cost and waste generation	Only suitable for degradable organic residues, long term management and monitoring of the system may be required; this is not practicable given the development proposals. The different sources present would require multiple technology types. In situ treatment of hydrocarbon within bedrock is impractical	Not a practicable option
Excavation followed by ex situ treatment or disposal for hydrocarbon contaminated soils	Well understood technology. Method can reduce source volume and contaminant level, and can be validated on short timescale	Contamination may have migrated to substantial depth in free-draining ground, becoming inaccessible; ex situ treatment unsuitable or difficult for high molecular weight organics	Practical option for defined hot-spot shallow soils containing volatile / semi-volatile hydrocarbon contaminants

4.2.2. The ground on the site locally contains concentrations of contaminants that, in the absence of mitigation, could pose an unacceptable risk to the health of future site users if present in garden soils and where residents may be exposed by inhalation of harmful vapours. The "do nothing" option, containing no specific measure to remediate ground contamination or deal with further mobile substances, is therefore inappropriate and not acceptable.

4.2.3. A strategy involving removal of all contaminated soils for off-site treatment or disposal has the benefit of removing all potential contamination sources. However much of the soil present on the site is unlikely to pose an unacceptable risk to human health or controlled waters. This option would require the use of significant resources in the form of replacement fill materials and landfill space, and large additional lorry movement numbers, and is therefore regarded as unsustainable both economically and environmentally.

4.2.4. Risks to future site users from direct exposure to any residual contaminated soils can be managed by the use of barrier systems. Use of a suitable thickness of clean cover material over the site surface in areas where residual contaminants will remain and where human exposure could occur following remediation would provide physical isolation and break the relevant pollutant linkages. Minor risks to site users from tainting of water supplies could be managed by the use of high specification pollution-resistant materials.

4.2.5. Hydrocarbon contamination in the areas where potential sources of these substances were identified has only been confirmed in a few locations, and the results of the additional inspection

and validation works proposed will be used to confirm any contamination by these substances. It is envisaged that low concentrations can also be mitigated through the use of barrier systems, although further risk assessment will be needed to assess whether isolation, treatment or removal offer the best solution. It will be necessary to demonstrate that any residual contamination does not pose a significant risk to controlled waters by reference to the soil standards agreed by Waterman with the Environment Agency (Waterman Remediation Strategy Tables B2 and B3 and footnotes).

4.2.6. The preferred option involves elements of the all previously described techniques. This will entail:

- decontamination and removal of bulk storage tanks and associated pipelines;
- removal of un-treatable contaminated / deleterious materials (e.g. organic wastes, asbestos products or heavy hydrocarbon contamination) for off-site treatment / disposal;
- screening all other contaminated materials identified during the works and selection of those which present unacceptable risks to human health or are potentially significant long term diffuse pollution source; removal of these segregated materials for either on-site treatment or off-site treatment / disposal;
- in areas of the site where low-level residual contamination such as the metal and PAH affected fill materials are already characterised, provision of clean cover soils for gardens and landscape areas;
- no requirement has been ascertained at present for the provision of gas/vapour barriers to built development; this will be reviewed following the further assessments and monitoring as appropriate.

4.2.7. The remediation strategy involves provision for the removal of selected asbestos wastes and contaminated soils and liquids (where encountered) and the isolation of residual low-level contamination by barrier systems to each potential migration pathway identified. The site has potentially re-useable soils (topsoil and excavated sub-soils), and where natural, uncontaminated soils are present at shallow depth no separate cover system should be necessary. Screening and testing of any site-won materials, including topsoil, will be required where it is proposed to reuse such materials as garden / open space cover soil. Areas where no cover system is required must be demonstrably free from made ground or other contamination sources.

4.2.8. It is proposed to recover a substantial amount of crushed aggregate from the demolition arisings and foundation removal for re-use on the site. Although investigations to date have not recorded asbestos present in the relict slabs and foundations, the screening of samples of recovered aggregate for asbestos fibres will be undertaken.

4.3. General Approach

4.3.1. The general approach to Urban Regen site preparatory / remediation works (Stage 1) is described below:

Table 4.2. General Approach

Site security and supervision	The site will be securely fenced throughout the works; Urban Regen will provide a full-time Engineer on site.
Access	A number of compounds will be required at different stages of the works due to the dispersed nature of the site operations, with key access points being off Dow Street (Dorchester area south of Camp Road) and off Dacey Drive / former hospital site)
Tree protection	Trees subject to preservation orders will be fenced off to prevent root damage; where residual contamination may be present within the root zones of protected trees, then clean cover depths may be feathered out to avoid damage to the trees.
Ecological clearance	Bat and bird roosting measures addressed under Contractor's demolition plan; no specific requirements for external areas; no invasive weeds identified on site.
Asbestos clearance	Asbestos cement sheet or insulation board fragments / lagging / pipe gaskets will be removed by hand during systematic surveys by the specialist sub-contractor using suitably trained staff and in accordance with the contractor's method statements; asbestos will be double-bagged and placed in secure temporary storage (hazardous waste skips) pending off-site disposal; site staff will be trained in asbestos recognition and may hand pick further bonded asbestos where observed during the earthworks; in the event of significant unexpected deposits of asbestos containing materials being encountered then the specialist sub-contractor will revisit the site to carry out decontamination.
Vegetation strip	The vegetation strip will entail tree-felling and chipping / flailing to remove any tall plants, grass and turf stripping to a nominal 50mm depth; stripped vegetation with be stockpiled pending removal for reuse or disposal by the contractor.
Further investigations	Further investigations will be directed by the Environmental Consultant in areas of suspect contamination, notably former storage tank positions, recorded locations of spills / leaks and former quarry.
Soils stripping, handling and stockpiling	Soils will be carefully stripped by hydraulic excavator in panels to facilitate inspection of the exposed surfaces by the Site Engineer or Environmental Consultant; the Environmental Consultant will carry out appropriate further investigations / sampling in the event that suspect and unexpected contamination is discovered; stripping will progress down to the undisturbed natural subsoil surface or bedrock; internal site haulage will be by articulated dump truck; stockpiles will be placed in locations to be agreed with the developers, to be a maximum 5m in height and shaped to a smooth profile; stockpiles will be segregated to facilitate materials management and tracking.

Breaking out paved surfaces, foundations and sub-structures	Existing concrete slabs, tarmac roads, relict foundations, manholes and other sub-structures will be grubbed out by hydraulic excavator; all hard materials will be crushed and stockpiled for re-use by the contractor or developers; crushing and screening plant will be operated under a valid permit with appropriate controls over noise and dust, and will be located at least 100m from existing housing; hard materials stockpiles will be inspected for potential asbestos-containing materials before crushing, with any suspect materials being removed for disposal.
Treatment of deep fills	Any organic materials (i.e. timbers) within the former quarry or other fill areas will be carefully excavated, with groundwater pumping and treatment as necessary; suitable engineering fills will be replaced and compacted in accordance with the Waterman Remediation Strategy specifications (Tables B1-B4).
Treatment of storage tanks and pipes, contents, and associated contamination	Tank contents will be sampled and, where liquids are present, will be drained to tanker for subsequent treatment and disposal; tanks will be degassed prior to removal; any linking pipework will be similarly drained with collection of any contents and stripped out; the Environmental Consultant will inspect the excavations and advise upon the removal of unacceptable contamination and collect validation samples from the stripped surfaces prior to controlled filling
Earthworks completion	On completion of the Urban Regen remediation works, the site will be re-graded to -200mm, with deep excavations for USTs / interceptors etc. backfilled with suitable materials as specified in the Waterman Remediation Strategy (Tables B1-B4). Stockpiles of topsoil and recovered aggregate will be handed over to the respective developer.
Validation and Monitoring	The Environmental Consultant will be responsible for carrying out verification testing as detailed in section 6. The Site Engineers will be responsible for day to day environmental monitoring and recording of dust emissions; no groundwater monitoring is required under the approved Strategy

4.4. Phasing

4.4.1. Phasing of the works will be required in order to release part of the site for early use by the developers. A remediation / validation statement will be provided for each phase prior to release to the Developer. The current phasing plan is provided in Appendix B.

4.5. Fuel Tanks and Pipelines

4.5.1. A sequential approach will be taken to dealing with tank and pipeline contents prior to physical removal of the structures and backfilling UST voids. This will entail:

- inspection and survey (largely completed), including monitoring of VOCs using PID and sampling contents;
- emptying contents using a vacuum tanker for free liquids; where possible, free product and contaminated water will be separated for treatment or recovery/disposal; sludges will be removed when safe access can be gained (probably following tank demolition);
- following further vapour checks and venting, tanks will be removed either intact (in the case of ASTs) or broken out of their concrete containment using hydraulic breakers and metal

shears as necessary; particular care will be taken to pump out any liquids retained in the tank surrounds to avoid release to the ground;

- pipelines will be temporarily sealed pending draining / purging of any liquid contents;
- the Environmental Consultant will attend all UST removals and will advise on the requirements to remove residual contamination from the tank surrounds, and will observe and record the works and collect validation samples to the extent possible, noting that entry to the voids will not be permitted on safety grounds, and that sampling from intact bedrock surfaces will not be undertaken;
- following removal of the concrete bedding, samples of the surrounding soils (if any) will be obtained in order to visually assess the presence of hydrocarbon contamination; all significant hydrocarbon contamination in soils as determined by the Environmental Consultant on the basis of appearance or odour will be stripped back to a maximum vertical depth below ground level of 3m and laterally until the edges of the contaminated zone are judged to have been reached; validation samples will be taken from these surfaces as described in section 6;
- excavations will be backfilled with suitable materials meeting the validation criteria as set down in section 6; in the event that validation samples from the extents of the excavation exceed the validation criteria (Waterman Tables B2 or B3) then the results will be subject to further risk assessment and/or further excavation and validation will be undertaken, with the process repeated until the agreed completion criteria are achieved.

4.6. General Contamination

4.6.1. Any contamination “hot-spots” such as buried asbestos hazardous waste, oil or fuel free product, and deleterious materials such as scrap metal and timber will require remediation (removal) if present.

4.6.2. Topsoil may be present in sufficient quantity and quality within the site to provide a clean cover layer for future gardens where required; the minimum depth of clean subsoil and topsoil will be 600mm over residual or replaced made ground. Cover depth may be reduced in landscape areas to 300mm. The threshold criteria for determining suitability will be as specified in the Waterman Remediation Strategy Table B1, with the omission of standards for phenols, cyanide or cyanide compounds (given their absence as site contaminants), and the inclusion of asbestos fibre with a threshold of >0.001% (limit of detection for quantification). The revised cover soil criteria are presented in Table 6.2 below. Other substances may be included as deemed appropriate by the Environmental Consultant in response to any suspicions of additional contamination types. In the event that cover soils need to be imported to the site, then the full Waterman Table B1 test suite shall apply. Where the in-situ materials have been proven to be uncontaminated a nominal 150-200 mm cover of topsoil will be provided for all future gardens / landscaped areas.

4.6.3. If hydrocarbon contamination is found in additional investigations or during tank removals, specific measures to reduce or remove sources of contaminants will be implemented entailing the chasing out of impacted soils using a PID and visual inspection up to either site boundaries / retained buildings, services or intact bedrock. Impacted soils will be removed to a secure stockpile placed in a bunded area on an impermeable membrane liner or suitable impermeable paved surface; the stockpile will be sheeted to minimise leachate generation. The volume of material to be treated and/or disposed of will be minimised by segregation of contaminated and non-contaminated materials where possible. The side walls and bases of excavations where contaminated materials are removed will sampled to verify that contamination has been reduced as far as practicable or to acceptable concentration levels (specified below).

4.6.4. The extent to which hydrocarbon-contaminated soil will be generated remains unknown at this time, and therefore details of any planned on-site bioremediation of spoil cannot be finalised. Where the volume of spoil is less than 1,000m^3 then the options to remove the spoil off-site, or treat the spoil on-site to achieve target concentrations meeting the criteria in Waterman Tables B2 or B3 remain open. In the event that a greater volume of spoil is generated then a specialist sub-contractor will be retained to carry out bioremediation under an Environmental Permit with site-specific deployment details. If bio-remediation is undertaken then a detailed method statement will be issued for regulatory approval prior to commencement; this will detail the treatment location, methods of screening, mixing and handling the waste, containment and environmental protection measures, including runoff, leachate, dust and odour controls, and anticipated treatment programme and closure procedures for the treatment zone.

4.6.5. If asbestos fibre is detected in quantifiable amounts (over 0.001%) in fills, then this material will be excluded from use in soil cover and will be placed at depths over 1m below ground level within excavations (primarily within tank backfills) subject to geotechnical suitability. Locations of such fill will be agreed with the Developer so as to avoid future disturbance during subsequent construction activities. This provision will not apply to hazardous levels of unbonded asbestos (>0.1%) which will be removed for disposal off-site.

4.6.6. The natural superficial deposits are unlikely to be contaminated by organic substances outside potential hydrocarbon hot-spots, and in areas where the natural strata are exposed at the formation surface following levelling works, then the surfaces will be inspected for evidence of contamination. The Developer will be responsible for validating the natural soils and providing any additional topsoil needed as a growing medium for plants in gardens and landscaping, as described in section 7 below.

4.6.7. It is noted that the site lies within or adjacent to the "ironstone domain" as described in DEFRA Technical Guidance Sheet TGS01 "Arsenic", July 2012; the site lies within 1km of mapped outcrops of ironstones within the Jurassic sedimentary rocks. Within the ironstone domain, the

natural background concentration of arsenic is reported to be 220 mg/kg. The natural background concentration of vanadium within the ironstone domain is reported by BGS to be >128 mg/kg. Both values substantially exceed the Table B1 criteria for cover soils. Where natural mineralisation is present in the bedrock and rock-derived soils in excess of the Waterman Remediation Strategy Table B1 criteria then further consideration and risk assessment, possibly including bioavailability testing may be carried out to determine acceptability of the cover soils.

4.6.8. Assuming that no significant groundwater contamination is identified, specific measures to remediate the groundwater on the site are not required at this time. Any measurable occurrences of free phase hydrocarbon will be removed from the water table by skimming or absorbents as appropriate to the extent feasible.

4.7. Materials Management Plan

4.7.1. Materials management will be carried out so as to ensure the sustainable reuse of materials within the site, and the minimisation of waste disposal. A Materials Management Plan (MMP) has been produced by Urban Regen and will be submitted to the Environment Agency following confirmation of regulatory approval of the remediation strategy. The MMP follows the CL:AiRE Code of Practice for reuse of excavated soils within the site. The WRAP protocol will be followed with respect to the recovery by crushing and screening of concrete, brick and stone to produce aggregate. It should be noted that the remediation contractor will deliver stockpiles of topsoil, subsoil and aggregate to the developers for subsequent use during the construction phase. All waste transfer records will be retained for reference.

4.7.2. The site operations will be carried out to ensure that contaminated materials/runoff or discharge do not affect clean areas of the site or surroundings. In particular, soils and materials from any hydrocarbon remediation excavations will be segregated and placed inside lined bunds where appropriate.

4.7.3. Contaminated water will be removed from tanks or other containments by vacuum tanker for either off-site treatment or for temporary storage on site for treatment to a standard that allows for discharge to foul sewer, surface water drains or soakaway. The quantity and treatability of contaminated water is currently being evaluated and detailed proposals will be issued separately in due course. In the event that temporary dewatering of excavations is required then the necessary monitoring, risk assessment and regulatory permits will be obtained.

4.7.4. The backfilling of excavations, in particular the voids following removal of USTs and deep foundations will be undertaken using suitable site-won validated materials. The requirements for back-fill quality are set out in section 6. In the case of recovered aggregates, these will be re-used in accordance with the WRAP Protocol, requiring inspection and grading classification.

Additional chemical testing will be carried out on representative samples for recovered aggregate to demonstrate suitability for use to the developers. Where aggregate is to be used in sensitive locations (within 600mm of the site surface) then asbestos fibre screening will be carried out.

4.7.5. Only recovered uncontaminated concrete aggregate, inspected by the Environmental Consultant for absence of visual or olfactory evidence of contamination, will be used within the backfill following removal of USTs UG NSA 04 and UG NSA 05-07 (i.e. within 160m of the south/southeast site boundary). Alternatively, other site-won soils or fills complying with the criteria in Waterman Tables B1 and B4 may be used at these locations.

4.7.6. Elsewhere, if fills have to be placed within the saturated zone (below the local water table) they must be uncontaminated concrete aggregate or comply with the criteria in Waterman Tables B1 and B4, and must be inspected by the Environmental Consultant for absence of visual or olfactory evidence of contamination.

4.7.7. Where fills are to be placed between the saturated zone and underside of the 600mm clean cover layer, except as described in section 4.7.5 (i.e. <160m from the south/southeast site boundary), they must comply with the criteria in Waterman Tables B2 and B3 (see Table 6.1 below).

4.8. Unexpected Contamination

4.8.1. If previously uncharacterised materials or contamination sources (i.e. buried wastes) are identified during the works, then these will be investigated by the Environmental Consultant who will produce an addendum remediation method statement and verification plan to the Local Planning Authority for their written approval, as required under Planning Condition 26. The approved methodology would be implemented and a verification report submitted within 3 months of the completion of the works.

4.8.2. It is anticipated that immobile (low volatility/solubility) contaminants similar to the types described in the site characterisation would be retained below the proposed barrier system in garden areas and that other contaminants including asbestos hazardous waste, volatile or liquid hydrocarbons, drums, tanks or pipes will be excavated and removed from the site for waste treatment or disposal.

4.8.3. There is a very small potential for the presence of unexploded small arms ordnance within the site, and nothing has been found during the ground investigations. The Remediation Contractor is alerted to the potential for the presence of buried ordnance and will undertake all necessary health and safety measures, and make contingency arrangements for quarantining areas where suspect items are disclosed pending attendance by the appropriate services.

4.9. Programme

4.9.1. The anticipated remediation and preparatory earthworks programme is to be carried out in 3 phases; phase 1 is of 40 weeks duration, commencing November 2013. The length and structure of phases 2 and 3 remain to be determined.

4.9.2. Early release of initial phases will be required by the client; in this case, interim remediation earthworks phase verification reports will be prepared and submitted to the local authority to facilitate approval for the start of development activities.

5. Health, Safety and Environmental Management

5.1. Health and Safety Roles / Responsibilities

5.1.1. Urban Regen is Principal Contractor under the Construction Design and Management Regulations and is responsible for managing health, safety and welfare, and for producing a risk assessment and method statement for the Stage 1 Remediation Works. Following handover of the site to the Developers, Bovis Homes and Dorchester will respectively take on the roles of Principal Contractor for their areas.

5.1.2. Protection of site workers, local residents and visitors during the remediation works can be achieved by the adoption of appropriate health and safety practices, environmental management and site security. All site workers will be given a comprehensive health and safety induction and required to use appropriate personal protective equipment.

5.1.3. Asbestos clearance on the site will be carried out in accordance with the Control of Asbestos Regulations and Approved Code of Practice. The initial phase of clearance will be carried out by a specialist sub-contractor using suitably trained personnel in accordance with the Urban Regen remediation method statement.

5.2. Environmental Management Issues

5.2.1. The scope of remediation works is unlikely to have a significant impact upon the surrounding housing and environment provided that due care is taken to control dust, odour, noise and vibration, and to prevent surface water runoff onto the farmland to the south and east of the site and into site drainage system.

5.2.2. Noise emissions will be managed through the observation of approved working hours, use of silenced plant, and appropriate location of crushing plant.

5.2.3. The risk of dust emissions will vary across the site dependent upon the nature of activities (demolition, crushing and screening, materials handling and haulage, earthmoving and vehicle movements) and distance to sensitive receptors (local residents / commercial tenants). Assessed risks to any receptor are generally expected to be medium / low given the dispersed nature of the operations and limited / localised extent of earthworks, in accordance with IAQM "Guidance on the assessment of dust from demolition and construction", January 2014.

5.2.4. Crushing plant will be operated under an Environmental permit and will be equipped with mains water supply to provide conditioning of the stockpile and dust suppression where appropriate to avoid visible emissions.

5.2.5. Dust emissions and soiling will be subject to daily visual inspection and logging by the Site Engineer. Dust emissions will be assessed as below:

Table 5.1. Dust Observation

observation	significance
visible dust plume within 20m of site boundary	high
visible dust plume within 50m of site boundary	medium
visible dust at source	low
no visible dust emission	negligible

5.2.6. If dust emissions of medium or high significance occur then the element of the works contributing to this will be halted until appropriate mitigation (damping down, road sweeper, etc) can be deployed. A tractor and bowser with rain gun will be maintained ready for use if required to damp down dusty surfaces during the earthworks. A road sweeper will be deployed as necessary to keep internal site roads and the external highway free from track-out.

5.2.7. The Site Engineer will keep a log recording any complaints from site neighbours. In the event of a complaint, the Engineer will investigate the alleged source and will if necessary instruct monitoring of deposition rates or fine particulate matter (PM10) at upwind and downwind locations from the indicated source(s). All results of monitoring will be logged alongside weather data (wind speed, direction, temperature and rainfall). The results will be used to determine whether any changes to the dust management are required

5.2.8. The generation of contaminated perched water or free product is not anticipated during remediation, although silty runoff from paved surfaces could occur. All discharges of dewatering or surface runoff to surface waters will be passed through settlement ponds of sufficient capacity. Uncontaminated or marginally contaminated perched water (as might be encountered within excavations other than UST locations) may be discharged to foul sewer in

agreement with the utility provider. Any discharge to a controlled water body will require prior authorisation by means of an Environmental Permit.

5.2.9. If on-site storage and treatment of hydrocarbon-impacted soils is carried out, it is expected that polluted leachate will be generated; this will be contained by means of impermeable liners to the treatment area and may either be recirculated to the soils under treatment as part of the process, or removed for separate treatment / disposal in accordance with the general requirements for contaminated liquids.

5.2.10. Plant fuel and lubricant storage will take place using suitable containers, bunds and secured filling points. Oil spill kits and adsorbent materials to manage any accidental release of liquid pollutants will be provided at the locations where risks are judged likely (fuel stores and tank/pipeline remediation locations). Suitable sealed skips and containers will be used for the temporary storage of small quantities of asbestos or other hazardous wastes.

6. Inspection and Verification

6.1. Targeted Additional Investigation

6.1.1. Additional assessment is required in a number of specific areas associated with the former storage tank positions and former quarry together with site-wide inspection of ground conditions as floor slabs, paving and footings are broken out and removed. Due to the presence of structures that require removal, and the programme for demolition and remediation works, it is intended that these inspections and investigations will largely be carried out contemporaneously with the demolition and remediation works.

6.1.2. The programme for remediation works will incorporate inspection and investigations over all parts of the site and, specifically in the known or potential hotspots identified. All additional investigations and site inspections will be supervised by an appropriately experienced and qualified SGP Contaminated Land Consultant.

6.1.3. Records of all inspections and investigations will be reported within the respective phase completion reports; these will include descriptions of the remediation formation within proposed garden areas and assumed routes for water pipelines.

6.2. Verification Testing

6.2.1. Stripped surfaces within any hydrocarbon hotspot areas following removal of unacceptable contamination will be validated by visual inspection and PID screening to provide assessment of the efficiency of the works; additional soil samples will be collected for laboratory analysis. A minimum of 3 entries/samples will be taken where validation is required following any stripping

of contaminated soils; for larger areas where more than 3 samples will be collected, the testing rate will be 1 composite sample per 15m^2 of exposed surface. Composite samples will comprise 5 representative sub-samples collected by the Environmental Consultant.

6.2.2. Screening criteria for hydrocarbon hot-spots (as set out below) will be adopted to determine any requirement for additional excavation or risk assessment, although intact rock surfaces where contamination is apparent will be assessed and recorded but not excavated. Where the screening criteria are exceeded then the specified depth of clean soil cover and/or building gas protection measures will be deployed as appropriate following any additional source removal or remediation.

6.2.3. The hydrocarbons screening criteria are taken from the approved Waterman Remediation Strategy and have been developed so as to be protective of water quality outside the site. The criteria are organised in two tiers according to the distance of hot-spots from the southern / southeastern (down-gradient) boundary of the site.

Table 6.1. Screening Criteria, Hydrocarbon Hot-spots dependent on distance from southern / southeastern site boundary (from Waterman Tables B2 and B3)

Petroleum Hydrocarbon Fraction	Target Concentration 0-250m (mg/kg)	Target Concentration >250m (mg/kg)
Aliphatic C8-C10	80	240
Aliphatic C10-C12	1000	1000
Aliphatic C12-C16	1000	1000
Aliphatic C16-C21	1000	1000
Aliphatic C21-C35	1000	1000
Aromatic C10-C12	7	23
Aromatic C12-C16	120	1000
Aromatic C16-C21	440	1000
Aromatic C21-C35	1000	1000

6.2.4. A record of descriptions, supplemented by photographic records, of the exposed strata in all areas where natural soils are present will be maintained by the Environmental Consultant. The national grid coordinates and level of all sampling points will be recorded.

6.2.5. Urban Regen is contracted to leave the general site surfaces within redevelopment zones stripped of topsoil, at 200mm below existing ground levels. For the purposes of validation of the general development zones, this means that a 400 mm depth of subsoil will be left which would form part of the full 600 mm of garden soil cover after replacement of garden topsoil; the 600m depth is assumed as the soil mixing zone for human health risk assessment under the residential land-use scenario. Taking a nominal soil screening test frequency of 1 sample per 500m^3, the residual 400mm depth equates to 1 sample per 1250m^2 plan area of development,

or an approximate 35m grid spacing of sample points which will be used for validation, with samples collected from the upper 400mm of the soil profile.

6.2.6. Topsoils recovered during the site strip or cut and fill works will be tested for contamination suite (to include all contaminants of concern identified in the relevant source areas, i.e. metals, hydrocarbons, PCBs, PAHs and asbestos as a minimum) at an initial screening frequency of one sample per 500m^3. Analysis and acceptability criteria will be as set out below (using CLEA Soil Guidelines Values (SGVs) and LQM/CIEH Generic Assessment Criteria (GACs) 2nd edition, and the DEFRA C4SL for lead. Samples will be submitted to a laboratory with MCERTS accreditation as available.

Table 6.2. Cover Soil (0-600 mm depth) Validation Criteria (modified from Waterman Table B1)

Substance	Screening criteria for Residential Use (mg/kg unless stated)		
Asbestos fibre	<0.001% by mass (limit of detection)		
Antimony	550		
Arsenic*	32		
Barium	1300		
Beryllium	51		
Boron (water soluble)	291		
Cadmium	10		
Chromium (total)	3000		
Chromium VI	4.3		
Cobalt	240		
Copper	300		
Lead	200		
Mercury	1		
Molybdenum	670		
Nickel	130		
Selenium	350		
Vanadium*	75		
Zinc	300		
threshold dependent upon soil organic matter level	1%	2.5%	6%
aliphatic hydrocarbons			
C5-C6	30	55	110
C6-C8	73	160	370
C8-C10	19	46	110
C10-C12	93	230	540
C12-C16	740	1000	1000
C16-C35	1000	1000	1000
C35-C44	1000	1000	1000
aromatic hydrocarbons			
EC6-EC7	0.08	0.16	0.33
EC7-EC8	120	270	610
EC8-EC10	27	65	151
EC10-EC12	69	160	346

Substance	Screening criteria for Residential Use (mg/kg unless stated)		
EC12-EC16	140	310	593
EC16-EC21	250	480	770
EC21-EC35	890	1000	1000
benzene	0.08	0.16	0.33
toluene	120	270	610
ethylbenzene	65	150	350
o-xylene	45	110	250
m-xylene	44	100	240
p-xylene	42	98	230
methyl tert butyl ether (MTBE)	49	84	160
Naphthalene	1.5	3.7	8.7
Acenaphthene	170	400	850
Acenaphthylene	210	480	1000
Fluorene	160	380	780
Phenanthrene	92	200	380
Anthracene	2300	4900	9200
Fluoranthene	260	460	670
Pyrene	560	1000	1600
Benzo(a) anthracene	3.1	4.7	5.9
Chrysene	6	8	9.3
Benzo(b)fluoranthene	5.6	6.5	7
Benzo(k)fluoranthene	8.5	9.6	10
Benzo(a) pyrene	0.83	0.94	1
Indeno(123cd) pyrene	3.2	3.9	4.2
Dibenzo(ah) anthracene	0.76	0.86	0.9
Benzo(ghi) perylene	44	46	47

* naturally elevated concentrations may be present and could require further risk assessment

6.2.7. Where deep excavations (>600mm below finished ground levels) are to be back-filled following the removal of tanks, other sub-structures or contamination, the quality of the fills must be suitable for use and must comply with the following specifications, as set down in the approved waterman Remediation Strategy, dependent upon their relative positions to the water table and distance from the southern / southeastern boundary:

Table 6.3. Screening criteria, back-filled materials (from Waterman Tables B1, B2, B3 and B4 and Strategy section 4.2)

Depth	0-160m from S/SE boundary	160 - 250m from S/SE boundary	> 250m from S/SE boundary
0 - 600mm cover	Table 6.2	Table 6.2	Table 6.2
unsaturated zone (from water table to underside of cover	Table 6.2 and Waterman Table B4 or recycled aggregates (subject to visual/olfactory testing only)	Table 6.1 column 2 (Waterman Table B2) or recycled aggregates (subject to visual/olfactory testing only)	Table 6.1 column 3 (Waterman Table B3) or recycled aggregates (subject to visual/olfactory testing only)

Depth	0-160m from S/SE boundary	160 - 250m from S/SE boundary	> 250m from S/SE boundary
saturated zone	Table 6.2 and Waterman Table B4 or crushed concrete only (subject to visual/olfactory testing only)	Table 6.2 and Waterman Table B4 or recycled aggregates (subject to visual/olfactory testing only)	Table 6.2 and Waterman Table B4 or recycled aggregates (subject to visual/olfactory testing only)

6.3. Remediation / Preparatory Earthworks Completion Reporting

6.3.1. A report detailing the works carried out and the results of the validation / verification testing will be prepared by Smith Grant and submitted to the local authority for approval upon completion of the remediation / preparatory phase of works by Urban Regen.

7. Stage 2 Development Phase Remediation

7.1. Developer requirements for remediation associated with the development phase of work will be as follows.

7.2. Piled Foundations

7.2.1. In accordance with planning condition 27 a piling risk assessment will be required in the event that penetrative methods of foundation construction are proposed (driven / bored piles or vibro-replacement methods). The risk assessment should be submitted to and approved by the LPA.

7.3. Building Gas Protection

7.3.1. On present information, the majority of the site may be classed as “Green” based on the NHBC ‘traffic light’ characterisation, meaning that no special precautions against ground gases are required. It is expected that hydrocarbon hot-spots associated with UST positions can be remediated to sufficient standard to negate a requirement for gas protection.

7.3.2. However, where it is not feasible to remediate all residual hydrocarbon due to adsorption into bedrock then any such areas will be identified and may be classed as NHBC “Amber 1” as a precautionary measure. The options for the Developer will be to either pursue suitable building gas protection measures for Amber 1 in the potential risk areas, or undertake post-remediation gas monitoring to re-assess the situation.

7.3.3. Building gas protection proposals will be submitted by the Developer to the local authority for approval prior to the commencement of house-building in the relevant area of the site (over residual hydrocarbon hot-spots and the backfilled quarry).

7.4. Garden and Landscaping Cover Soils

7.4.1. The Developer is responsible for placing and validating the full thickness of cover soils as necessary to achieve finished levels which may incorporate the reduced level surfaces handed over by Urban Regen following completion of their works. These finished levels will be subject to the Developer's respective engineering designs. The cover soils will either be obtained from stockpiles formed from site-stripped soils produced by Urban Regen, or will be generated during the process of development, or will be imported from off-site sources by the Developer.

7.4.2. The Developer will be responsible for managing soils stockpiles and completed areas of soil cover so as to avoid cross-contamination of clean materials.

7.4.3. The general Developer responsibilities will be as follows:

- in areas where natural uncontaminated soils are present following the site re-grade, clean topsoil may be required as a growing medium of nominal 150-200 mm depth, but there will be no requirement for a full 600mm of placed soil cover;
- provision of 600mm of clean soil cover within garden areas, with a reduced thickness of 300mm in landscape areas, where the underlying soil contains one or more concentrations of substances in excess of contamination targets set out in Table 6.2;
- site-won materials to be used as the garden/landscape clean soil cover must be suitable for use and validated to comply with contamination targets set out in Table 6.2 at the rate of 1 sample per 500m^3, and validated for depth on the basis of 1 entry per 3 plots for gardens, or the equivalent of a 50m grid in POS / landscaping areas;
- imported soils used for cover purposes are to comply with contamination targets set out in Table 6.2 validated at a rate of 1 sample per 250m^3 with a minimum of 3 samples per source;
- potential cross-contamination of clean natural soils or cover soils due to secondary excavations for foundations construction or trenching must be avoided, with appropriate replacement or disposal of arisings.

7.4.4. Soils will be tested at an MCERTS or UKAS accredited environmental laboratory. Test pits will be measured and photographed in accordance with SGP standard protocols; an example validation pro-forma is attached as Appendix C.

7.5. Water Mains

7.5.1. It is considered unlikely that protected water mains will be required, however utilities provider guidelines require particular assessments which will be carried out as appropriate.

7.6. Concrete Protection

7.6.1. Requirements are as specified within the ground investigation reports.

8. Conclusions and Recommendations

8.1. Conclusions

8.1.1. SGP considers that the site has been adequately investigated for the purposes of devising a remediation strategy suitable to prepare the site for continued commercial uses and new residential-led development and that the likely key development constraints and requirements for remediation are understood.

8.1.2. Additional investigation and assessment will be carried out as described in specific parts of the site and any modifications to the Remediation Strategy will require agreement with Cherwell District Council. To this extent, the Remediation Strategy should be viewed as a process of iteration, to be amended by agreement if new issues or concerns arise.

8.1.3. The proposed management and programme for remediation and verification / validation testing regime will demonstrate that the proposed remedial works have been carried out and the site made suitable for the proposed development, subject to the execution of the additional requirements on the developers set out above.

8.1.4. The further environmental investigation and verification measures to be adopted are summarised as follows:

Table 8.1 Summary of Investigation / Verification Responsibilities

Remediation Stage 1 (preparatory earthworks) - Urban Regen works	
1. further investigations	former tank / quarry locations – identified positions to be inspected during remediation excavations; requirements for gas/vapour testing from residual contamination to be assessed
2. stockpile testing	recovered aggregate – testing for asbestos at 1/500m^3 where aggregate to be used at less than 600mm depth below finished surfaces recovered topsoil – screening tests for soil contaminants at 1/500m^3
3. regular inspections and site attendance	weekly site visits by Environmental Consultant during earthworks operations as required, and attendance for tank remediation and validation
4. response to unexpected conditions / occurrences	SGP available to attend site and investigate any occurrences at short notice; the local authority will be advised as soon as possible in event of discovery of new contamination
5. reporting	SGP will produce phased earthworks remediation completion reports

Table 8.1 (continued) Summary of Investigation / Verification Responsibilities

Remediation Stage 2 (development phase) - Bovis / Dorchester works	
6. cover soil verification	contamination testing will be carried out for placed site-won cover soils at rates of 1 sample / 500m^3; cover soil depths will be verified using test pits at 1 per 3 plots, or a 50m grid over POS; inspection and testing certification will be provided on plots as they are completed, copied to NHBC and the local authority; imported soils will be tested at 1 sample/ 250m^3, with a minimum 3 samples from each source
7. gas protection inspection	if gas protection measures are required, the developers will undertake inspections and record membrane installations and will provide inspection certificates as plots are completed, copied to NHBC and the local authority
8. water mains risk assessment	the developers will undertake standard water supply pipe risk assessments for the utility provider as required
9. piling risk assessment	the developers will provide a piling risk assessment in accordance with planning condition 27 and EA guidance in the event that piling or other penetrative foundations methods are proposed

8.1.5. With the adoption of the above normal practices for previously developed land, and on the information available to it, SGP considers that the site can be safely and economically redeveloped, and the existing environmental liabilities managed. It is concluded that submission and approval of this Remediation Strategy will satisfy the requirements of Planning Condition 24.

8.1.6. Condition 25 concerns the verification of implementation of the remediation scheme and reporting, the scope and content of which are described above.

8.1.7. Condition 26 describes the reporting of unexpected contamination and its investigation, risk assessment and remediation as necessary and as approved by the local authority. This remediation strategy describes how unexpected contamination will be reported, investigated and assessed. Any departure from the approved remediation strategy necessary will be agreed in advance with the local authority.

8.1.8. The hydrocarbon validation criteria for tank remediation are designed to negate a requirement for monitoring following completion of the site remediation and development. Maintenance duties will be limited to management of public open space areas under normal maintenance procedures.

8.2. Limitations

8.2.1. This report has been prepared by SGP for the sole and exclusive use of Urban Regen Ltd. All reasonable skill, care and diligence has been exercised within the budget available, and in accordance with the technical requirements of the brief. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible

that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.

8.2.2. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

DRAWINGS

N

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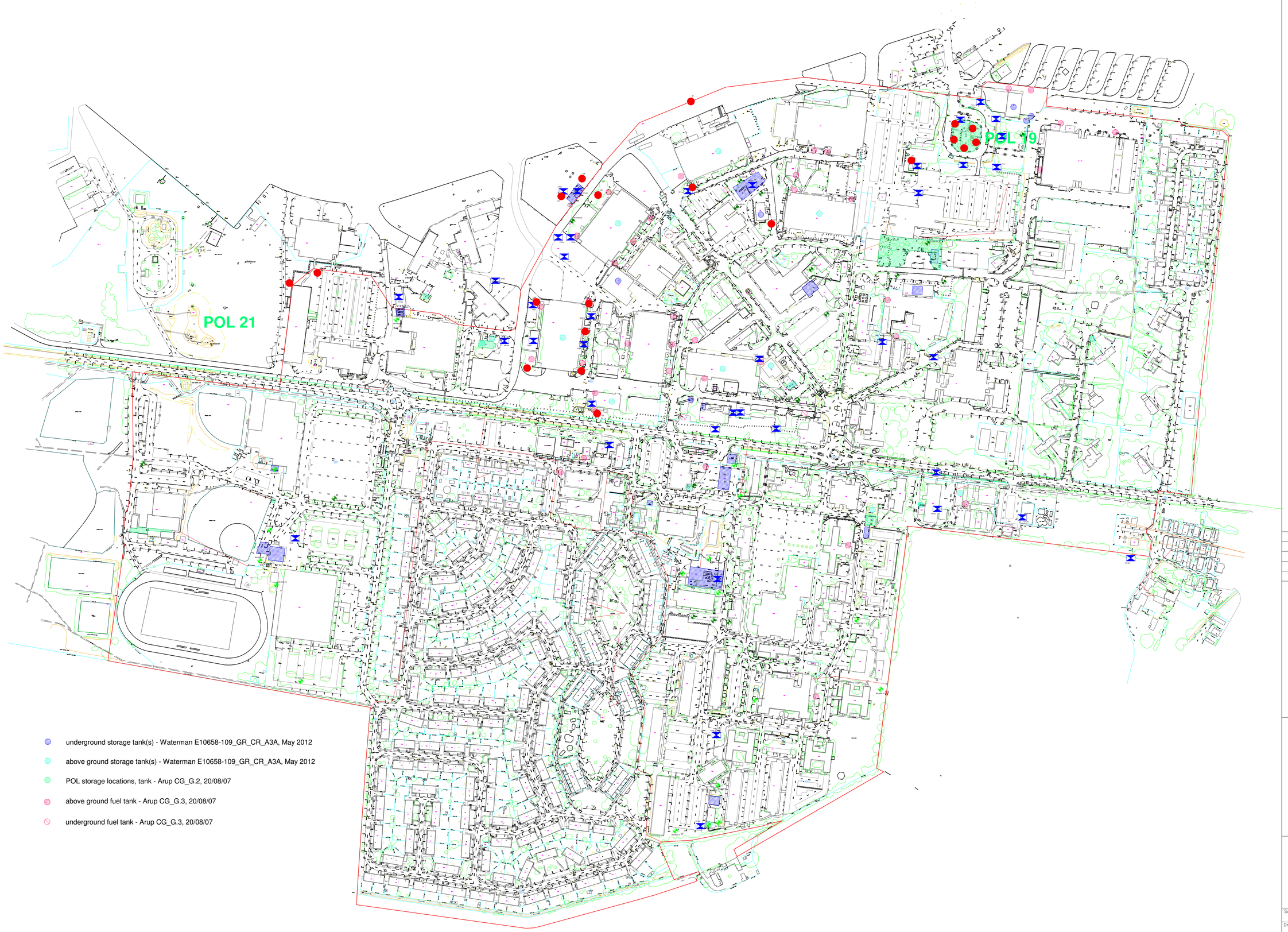
Project: Upper Heyford	
Drawing: Tank Locations	
Drawn: GC	Checked: AFS
Date: 19.12.2013	Scale: 1:10,000 @ A3
Job No: R1742	Drg No: D01



- underground storage tank(s) - Waterman E10658-109_GR_CR_A3A, May 2012
- above ground storage tank(s) - Waterman E10658-109_GR_CR_A3A, May 2012
- POL storage locations, tank - Arup CG_G.2, 20/08/07
- above ground fuel tank - Arup CG_G.3, 20/08/07
- underground fuel tank - Arup CG_G.3, 20/08/07

Notes:

REVISIONS

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HEYFORD PARK
NEW SETTLEMENT AREA

PREVIOUS SITE INVESTIGATIONS

Scale:	Date:
1:2,000 @ a1	03/03/2014
Drawn by: GC	Checked by: AFS
Plan No: R1742-R01-v2 D02	Rev:

APPENDIX A

Storage Tank Database

ref.	location	info source	size (litres)*	type	contents	ground investigations	UR observations	SGP inspection and sampling	vol water (litres)	water contam	vol product (litres)	product type	headspace VOC conc (ppm)	notes
UG NSA 1	E of bldg 467 boiler house (free product in bh-nsa-06 to south)	Jomas Sl, 2011	54553	steel; gauge 12000	possible concrete fill, free product in filler neck	BH NSA 4, 18m N; BH NSA 5, 35m W; BH NSA 6, 10m SE	2.4m dia, 9.1m long	20/11/2013	54533	UG1W 0.4 mg/l TPH	sheen		15.5	UR tank dimensions too small for gauge indicators - SGP assume tank volume as per gauge; UG1 is northernmost tank
UG NSA 2		"	54553	steel; gauge 12000	possible concrete fill, free product in filler neck		2.4m dia, 9.1m long	20/11/2013	54533	UG2W 1.26 mg/l TPH	sheen		0.7	UR tank dimensions too small for gauge indicators - SGP assume tank volume as per gauge; UG2 is central tank
UG NSA 3		"	54553	steel; gauge 12000	possible concrete fill		2.4m dia, 9.1m long	20/11/2013	0	nd	54533	heating oil	3	UR tank dimensions too small for gauge indicators - SGP assume tank volume as per gauge; only product detected in tank, but water may be present below product layer; UG3 is southernmost tank
UG NSA 4	fill point in car park, tank may be below building 454	"	28,000		possible water filled	TP NSA 204, 6m S; BH NSA37/TP NSA 204A, 15m S	2.7m dia,?long; liquid 2.3m deep	20/11/2013	26450	ns	439	heating oil	115	tank location is to east of UR drawing position; SGP assume volume as per gauge
UG NSA 5	N of bldg 441 boiler house	"	54553	gauge 12000 gall	rusted shut	BH NSA 9, 12m N; BH NSA 10 and BH NSA 11, 20m S	2.7m dia, 9.7m long; water 2.2m deep, with oily surface film	20/11/2013	50407	UG5W <0.01 mg/l TPH	sheen		2.7	assumed tank dimensions 2.7 dia, 9.7m long
UG NSA 6		"	54553	gauge 12000 gall	water-filled? no free product		2.7m dia, 9.7m long; water 2.7m deep, with oily surface film	20/11/2013	55478	UG6W 0.05 mg/l TPH	sheen		2.7	assumed tank dimensions 2.7 dia, 9.7m long
UG NSA 7		"	54553	gauge 12000 gall	rusted shut		2.7m dia, 9.7m long; water 2.2m deep, with oily surface film	20/11/2013	48457	UG7W <0.01 mg/l TPH	sheen		3.4	assumed tank dimensions 2.7 dia, 9.7m long
UG NSA 8	S of supermarket bldg 581	"	22276	gauge 4900 gall	water-filled? 0.15m of free product	BH NSA 21, alongside; TP NSA 4, 17m S	2.3 dia, 9m long	20/11/2013	20961	ns	1558	heating oil	6	UR tank length is excessive for gauge volume - SGP assume volume as per gauge, with 2.49m dia and 5.0m length
UG NSA 9	west of #979 boiler house	"	227305	gauge 50000 gall	water-filled? no free product	BH NSA 18, 9m S; BH NSA 17, 15m N; SI NSA 5, 15m NE	no info provided	sampled by URL 05/12/13	227305?	UG9 69.3 mg/l TPH	?		ns	tank gauge seems too large for plausible extent of tanks; Jomas gave depth to base of 4m, so assuming max. diam of 3m, cylindrical tanks would have to be 32.5m long for 50,000 imp.gall vol; if gauge value is actually litres, then tank size would be more realistic, at say 2.9m diam, 8m long
UG NSA 10		"	227305	gauge 50000 gall	water-filled? no free product		no info provided	sampled by URL 05/12/13	227305?	UG10 108.8 mg/l TPH	?		ns	"
UG NSA 11		"	227305	gauge 50000 gall	water-filled? no free product		no info provided	sampled by URL 05/12/13	227305?	UG11 65.7 mg/l TPH	?		ns	"
UG NSA 12		"	227305	gauge 50000 gall	water-filled? ~0.05m of free product		no info provided	sampled by URL 05/12/13	227305?	UG12 231.6 mg/l TPH	insignifcant, 50mm in filler?	heating oil	ns	"
UG NSA 13	S of bldg 295, boiler house, 13 may extend outside site boundary	"	gauge 11000		water-filled? no free product	BH NSA 22, 5m S; TP NSA 226, 8m N	2.7m dia, 7.6m long, liquid at 2.5m depth	20/11/2013	40341	UG13W <0.01 mg/l TPH	sheen		0.6	Jomas refer to gauges showing 11000 litres - this is too small a volume for the estimated tank dimensions - suspect reading should be 11000 gall.
UG NSA 14	"	"	gauge 11000		water-filled? no free product		2.7m dia, 7.6m long, liquid at 2.5m depth	20/11/2013	41950	UG14W <0.01 mg/l TPH	sheen		0	"
UG NSA 15	"	"	gauge 11000		water-filled? no free product		2.7m dia, 7.6m long, liquid at 2.5m depth	20/11/2013	42058	ns	sheen		0	"
UG NSA 16	filling station	"	5,000		probable concrete fill	BH NSA 3, 8m SE; BH NSA 2, 40m SE; BH NSA 45, 43m SW	2.1m dia;	20/11/2013	13854	UG16W 110 mg/l TPH	sheen (diesel)		0.9	Jomas refer to gauges showing 5000 litres - this is too small a volume for the estimated tank dimensions; volume calculated assumes 2.1m dia, 4m long.
UG NSA 17	"	"	5,000		probable concrete fill		2.1m dia	20/11/2013	13854	not sampled	sheen		526	Jomas refer to gauges showing 5000 litres - this is too small a volume for the estimated tank dimensions; volume calculated assumes 2.1m dia, 4m long.
UG NSA 18a	"	"	5,000		probable concrete fill		2.7m dia	20/11/2013	21373	not sampled	1529	petrol	569	Jomas refer to gauges showing 5000 litres - this is too small a volume for the estimated tank dimensions - suspect reading should be 5000 gall - fits tank dims of 2.7m dia 4m long
UG NSA 18b							2.7m dia	20/11/2013	21232	not sampled	1670	petrol	266	"
UG NSA 19a	"	"	5,000		probable concrete fill		2.7m dia	20/11/2013	19898	not sampled	3004	petrol	221	"
UG NSA 19b							2.7m dia	20/11/2013	17999	not sampled	4903	petrol	327	"
UG NSA 20a	"	"	5,000		probable concrete fill		2.7m dia	20/11/2013	20393	not sampled	2509	petrol	870	" ; product analysis - UG20P
UG NSA 20b							2.7m dia	20/11/2013	22020	not sampled	873	petrol	395	"
UG NSA 21	NW of bldg 442	"	8,000		inspection chamber flooded, tank not investigated	TP NSA 294, alongside N; TP NSA 295, alongside SW	2.3m dia, 5m long (SGP measured diam 1.5m)	21/11/2013	7269	UG21W 96.4 mg/l TPH	1350	heating oil	179	assumed volume 8000l (1.5m diam, 5m long)
UG NSA 22w	NW of bldg 345 (outside NSA boundary)	Jomas Sl, 2012	50000	gauge 11000 gall	empty	BH NSA 39, 26m S	2.7m dia, 18.5m long, but length is probably 2 tanks - assuming 8.8m long gives 50000l capacity	20/11/2013	12063	UG22WW <0.01 mg/l TPH			0	soft sediment in base
UG NSA 22e							"	20/11/2013	354	not sampled			0	
UG NSA 23w		"	50000	"	part water-filled (1.8m - 3.1m depth), no free product		"	20/11/2013	8535	UG23WW <0.01 mg/l TPH			0	
UG NSA 23e							"	20/11/2013		not sampled			0	
UG NSA 24	filling station, W of bldg 86	"	5,000	diesel	water-filled, sheen	BH NSA 24, 10m N; BH NSA 25, 20m S, TP NSA 236, 14m SE	2.2m diam, water with oily film to 2.2m	21/11/2013	5000	UG24W 27.8 mg/l TPH			487	assume 5000l capacity (may be too low for size of tank - 2.2m diam, say 1.4m long?)
UG NSA 25	"	"	5,000	petrol	water-filled, sheen		2.6m diam, water with oily film to 2.6m	21/11/2013	5000	UG25W 16.3 mg/l TPH			0.1	assume 5000l capacity (may be too low for size of tank - 2.2m diam, say 1.4m long?)
UG NSA 26	in building 88? used by tenants	"	?	boiler fuel oil	disused and rusted shut; no info on contents	BH NSA 23 to S	1.5m dia, ? long; 0.15m of oily liquid	21/11/2013	0		175	heating oil	419	capacity / length unknown - assume 3m, gives ~5000l
UG NSA 26b	interceptor, SW corner of B88				glass fibre		1.6m to base, 0.64 to water; estimate 1.5m dia, 3m long	21/11/2013	3321	UG26BW 1.2 mg/l TPH	sheen			tank dimensions assumed 1m cube
UG NSA 27	associated with boiler house, N of bldg 131	"	54553	gauge 12000 gall	part water-filled (to 1.6m bgl), no free product	BH NSA 29, 5m N; BH NSA 31/TP NSA 265, 18m SW; BH NSA 30, 10m SE; TP NSA 252, 16m S	2.7m diam, 10m long	21/11/2013	57256	UG27W 33.1 mg/l TPH			0	
UG NSA 28	"	"	54553	gauge 12000 gall	part water-filled (to 1.6m bgl), no free product			21/11/2013	57256	UG28W 27.8 mg/l TPH			0	
UG NSA 29	"	"	54553	gauge 12000 gall	part water-filled (to 1.6m bgl), no free product			21/11/2013	38231	UG29W 505 mg/l TPH	778	heating oil	0	
UG NSA 30	"	"	54553	gauge 12000 gall	sampling neck blocked			21/11/2013	57256	UG30W 5.2 mg/l TPH			1.3	
UG NSA 31	between bldgs 133 and 146	"	? depth 3.0m		water-filled, sheen	BH NSA 27, 17m N; BH NSA 28, 30mSE	no dims, water 1.8m deep	21/11/2013	5000	UG31W 1.6 mg/l TPH			0.3	SGP measurements ~1.5m diam, length? Assume 3m for 5000l tank
UG NSA 32		"	? depth 3.0m		water-filled, sheen		no dims, water 1.8m deep	21/11/2013	5000	UG32W 204.8 mg/l TPH			0.4	SGP measurements ~1.5m diam, length? Assume 3m for 5000l tank
UG NSA 32a	additional tank found by AG 5/12/13						2.4m dia, 2.3m long, liquid-filled	not inspected	10405	UG32A 0.67 mg/l TPH				sample provided to SGP
UG NSA 33		"	? depth 3.0m		water-filled, 0.02m of free product		no dims, water 3.1m deep	21/11/2013	5000	UG33W 78.7 mg/l TPH			0.3	depth to base measured as 1.3m, with top of tank at 0.5m - other tanks at >2m depth - assume latter for 1.5m diam
UG NSA 34	N of bldg 103	"	5,000?	waste oil		TP NSA 1, 40m W; TP NSA 277, 33m SE	concrete, 2.6m dia by 2.3m long, 0.2m of oily liquid and sediment	21/11/2013	298		floating layer	oil?	3.5	UR tank diam does ot match SGP depth to base of 1.8m - assume tank diam of 1.3m to give 3053l capacity
UG NSA 35		"	5,000?	varnish			concrete, 2.6m dia by 2.3m long, 0.25m of oily liquid and sediment	21/11/2013	0		1646	oil	0	UR tank diam does ot match SGP depth to base of 1.8m - assume tank diam of 1.3m to give 3053l capacity
POL 19	in use by Paragon tenant - to be decommissioned by tenant					TP NSA 292 15m W; BH NSA 35, 20m SW; BH NSA 34, 17m SE; BH NSA 33, 21m N								
A-UST 1	18m W of bldg 103, possibly refers to UG NSA 34/35, 22m to NE	Arup CG_G.3, 20/08/07				no adjacent investigation								
A-UST 2	8m NW of bldg 100					not investigated								
A-UST 3	in road island, W of bldg 133					not investigated								
A-UST 4	probably refers to UG NSA 27-30, 15m to E					no adjacent investigation								
			* note = where gauges indicate volume in gallons, this assumed to be imperial gallons - if US gallons, then volume in litres must be decreased by~10%							ns - not sampled				
										nd - not detected				

SGP confirmation (20-21/11/13)							
	size	vol (litres)	type	content	gas (ppm)	treatment	
AG NSA 01	0.9 dia X 1.33 (from plan)	846	steel, for kerosene	empty	4.8	open vents, drain off any water in pipes to container, remove tank as scrap metal	
AG NSA 02	2.47 dia X 4.27 (from plan)	20460	steel	empty	0	open vents, drain off any water in pipes to container, remove tank as scrap metal	
AG NSA 03	1.32 dia X 2.49 (from plan), 750 gall on label	3410	steel	449l est. water 79l est. heating oil	0.5	drain off water from tank base for treatment, then oil separately for recovery; when empty, open all vents to degas, check and demolish	
AG NSA 04	18550 l (Jomas)	18550	steel, for fuel oil	water and sludge in base	0	open vents, drain off any water in pipes to container, remove tank as scrap metal	
AG NSA 05	18550 l (Jomas)	18550	steel, for fuel oil	empty	0	open vents, drain off any water in pipes to container, remove tank as scrap metal	
AG NSA 06	~19000l (Jomas)	19000	steel	fuel and water in base	0	drain off liquid from tank base for treatment; when empty, open all vents to degas, check and demolish	
AG NSA 07	Jomas est 5400l; 1.08 dia X 2.41 (from plan) - gives 2190l	5400	steel, for heating oil	est. 4370 l oil with wet sludge in base (on assumption of tank dims 1.5 X 3.06)	0	recover oil, drain off water + sludge, clean, degas, remove for scrap	diameter from cad plan does not match measured product depth (1.13m) - Jomas vol. assumed
AG NSA 08							not surveyed yet

APPENDIX B

Current Phasing Plan (December 2013)

UPPER HEYFORD - DEMOLITION PHASING PLAN

DEMOLITION PHASES

BOVIS

- Phase B1A
- Phase B1B

BOVIS & DORCHESTER COMBINED

DORCHESTER

- Phase 1A
- Phase 1B
- Phase 2
- Phase 3
- Proposed Additional Works

BUILDINGS TO BE DEMOLISHED

- BULDING TO BE DEMOLISHED

0 40 100
20 60 200

N

Rev	Date	Revision

urban regen

Project	URBAN REGEN UPPER HEYFORD
Title	DEMOLITION PHASING PLAN
Scale	1:2000@A0
Date	SEPT 2013
Drawn	UR
Chk	
Drg No	UR/HEY/DPP
-	

APPENDIX C

Soil Validation Pro-forma

G:Jobs/

Topsoil Validation Record

One record sheet to be completed for each area validated and/or sample collected

job number	
date	
site name / location	
plot/ location:	
compiled by:	

Depth ref:		Quality ref:		Other documents attached					
Area use:	~~*Garden*~~		~~*landscaped*~~		*Stockpile*		~~*Other*~~		
Size area (m):		Approx Area (m^2):		Approx *Depth Topsoil (m):*		Approx *Volume Topsoil (m^3):*		Approx *Depth Subsoil (m):*		Approx *Volume Subsoil (m^3):*	
Number depth entries required						Number samples required:			

Quality Validation		inspection date/time:		inspected by:		photographed:	

	notes (see below)	✓	
Source Topsoil	1.		
Description Topsoil	2.		
Sample Topsoil	3.		
Source Subsoil	4.		
Description Subsoil	5.		
Sample Subsoil	6.		

Topsoil Validation Record

Stockpile Validation	inspection date/time:		inspected by:		photographed:	✓
Stockpile 1	Required Depth (mm)		Measured Depth (mm)			
Source Topsoil						
Source Subsoil						
Soil profile/description						
photograph (soil type)		photograph (depth profile)		photograph (location)		

Topsoil Validation Record

This area PASSED/~~FAILED~~ testing for quality.

This area has been sampled by Smith Grant LLP for quality.

An addition inspection visit IS/~~IS NOT~~ required for this material, for depth validation.

* Delete as appropriate

SGP Staff: Signed:

Checked by: Signed:

Guide notes:

1.	Source Topsoil	As much information as possible: Date Delivered, volume/weight delivery, supplier, certification, source address (yard), original source address (site).
2.	Description Topsoil	Full Description: Grading (Particle Size: clay, silt, sand, gravel), organic content, colour, odour, minerals, stone, glass, slate, ash, clinker, coal, coke, tarmac, plastic, other?
3.	Sample Topsoil	Date sampled, date submitted, sample reference, laboratory, laboratory job number
4.	Source Subsoil	As much information as possible: Date Delivered, volume/weight delivery, supplier, certification, source address (yard), original source address (site).
5.	Description Subsoil	Full Description: Grading (Particle Size: clay, silt, sand, gravel), organic content, colour, odour, minerals, stone, glass, slate, ash, clinker, coal, coke, tarmac, plastic, other?
6.	Sample Subsoil	Date sampled, date submitted, sample reference, laboratory, laboratory job number