PEAK ENVIRONMENTAL SOLUTIONS

Unit 10, Aston Industrial Estate
Parsons Lane, Hope, Hope Valley
Derbyshire, S33 6RB

Tel: 01433 620030
Fax: 01433 623235
info@peakenvironmentalsolutions.com
www. peakenvironmentalsolutions.com

ENVIRONMENTAL SITE ASSESSMENT
PHASE I INVESTIGATION

GISBOURNE YARD
OFF OLD ROAD, WHALEY BRIDGE
DERBYSHIRE
SK23 7HU

REPORT PREPARED FOR

Mr Colin Dunn
9 Cornwall Road
Heald Green
Cheshire
SK8 3ED

DOCUMENT REFERENCE: 41591R1
Final Issue A
May 2013

PEAK ENVIRONMENTAL SOLUTIONS	Document Verification Schedule			
Client	Mr Colin Dunn	**Project No**	41591R1	
Project	Gisbourne Yard	**Document**	Phase I Investigation	
Issue	**Issue Date**	**Prepared**	**Checked**	**Approved**
Issue A	May 2013	Michael Gennaro Principal Consultant	Clare Dainton Director	Clare Dainton Director
		Notes: Final		

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION 1

2.0 SCOPE OF WORK 2

2.1 SITE WALKOVER & DESK STUDY 2
2.2 PRELIMINARY RISK ASSESSMENT 2
2.3 CONCLUSIONS AND RECOMMENDATIONS 3

3.0 REPORTING 4

4.0 CONCLUSIONS & RECOMMENDATIONS 14

4.1 OVERVIEW 14
4.2 PRINCIPAL CONTAMINATION ISSUES 14
4.3 PRELIMINARY RISK ASSESSMENT 14
4.4 CONCEPTUAL MODEL UNCERTAINTIES 15
4.5 RECOMMENDATIONS 15

5.0 ADDITIONAL REFERENCES 17

TABLES

Table 1: Report Overview 4
Table 2: Site Description & Environmental Setting 5
Table 3: Site Walkover Observations and Comments 7
Table 4: Geology, Hydrogeology & Hydrology 8
Table 5: Permitted Operations & Pollution Incidents 9
Table 6: On-Site Historical Landuse 10
Table 7: Off-Site Historical Landuse 11
Table 8: Substances of Concern 12
Table 9: Initial Post-Development Conceptual Site Model & Preliminary Risk Assessment 13

FIGURES

Figure 1: Site Location Plan
Figure 2: Potential Areas of Contamination

APPENDICES

Appendix A: Limitations & Exceptions of Assessment
Appendix B: Site Walkover Photographs
Appendix C: Historical Ordnance Survey Maps
Appendix D: Risk Classification

1.0 INTRODUCTION

Peak Environmental Solutions Limited has been commissioned by Mr Colin Dunn to undertake a Phase I Environmental Site Assessment (contamination desk study) of a 0.23 hectare site located off Old Road, Whaley Bridge, Derbyshire, SK23 7HU (centred on National Grid Reference [NGR] 401171, 381059). A site location plan is presented in Figure 1 and the current site layout is reproduced in Figure 2.

This report has been written to support an outline planning application (Reference: HPK/2013/0055) to High Peak Borough Council (HPBC) for redevelopment of the site to a residential landuse. The works undertaken as part of this Phase I report include a site walkover, interpretation of readily available environmental site information & historical mapping, development of a preliminary conceptual site model (CSM) and the completion of a qualitative land contamination preliminary risk assessment (PRA).

The purpose of the report is to:

1. Determine the potential for onsite or offsite land contamination issues arising from the current or historical uses of the site and surrounding area; and

2. Provide an initial assessment of potential risks that any such land contamination may pose to sensitive receptors on the redeveloped site, including future site users, controlled waters and infrastructure.

The report has been produced in accordance with the umbrella framework laid out in NHBC/EA Publication R&D66 (*'Guidance for the Safe Development of Housing on Land Affected by Contamination'*), BSI 10175:2011 *'Investigation of Potentially Contaminated Sites'* Code of Practice and DEFRA/EA CLR-11 '*Model Procedures for the Management of Land Contamination'* (referenced in Section 5.0) as well as in general accordance with the National Planning Policy Framework 2012.

The report was finalised in May 2013 and should be read in the light of any subsequent changes in legislation, statutory requirements, statutory & non-statutory guidance, relevant research and industry practices, and should be read in conjunction with the documents detailed in Section 5.0.

Information obtained by Peak Environmental Solutions has been relied upon by Peak Environmental Solutions in good faith. This Phase I Report is subject to the standard terms & conditions of Peak Environmental Solutions and the limitations & exceptions detailed in Appendix A.

2.0 SCOPE OF WORK

2.1 Site Walkover & Desk Study

A site walkover was undertaken by Peak Environmental Solutions on the 8th April 2013 to assess the site environmental setting, review the site layout and check for visual evidence of contamination sources. The walkover survey did not include a detailed survey of asbestos containing materials (ACM), which falls outside of the scope of the report, or an assessment of invasive weeds such as Japanese knotweed, Himalayan balsam or Giant hogweed.

Selected photographs taken during the site walkover are presented in Appendix B.

The information considered as part of this Phase I desk study includes a Groundsure historical map pack spanning the years 1870 to 2012 (Appendix C) and review of a variety of data sources including available environmental site sensitivity data from public bodies including the Environment Agency (EA) and British Geological Survey (BGS). Where appropriate, third party information has been referenced in the report or reproduced in the Appendices, with additional references listed in Section 5.0.

The report includes a preliminary assessment of the potential for radon gas hazards. A detailed radon assessment falls outside of the scope of the report and the requirement for radon mitigation measures in the proposed development should be identified separately to the satisfaction of HPBC Building Control.

2.2 Preliminary Risk Assessment

The qualitative PRA presented in this report considers the proposed residential redevelopment landuse and includes development of a conceptual site model (CSM) to assess the significance of risks associated with relevant pollutant linkages (RPLs) identified by a source-pathway-receptor analysis.

The assessment of risk is based on a consideration of the following:

- The probability of an event occurring, taking into account both the presence of the hazard and receptor and the plausibility of the pathway (where probability is defined as the chance of a particular event occurring in a given period of time); and
- The severity of the potential consequence, taking into account both the potential severity of the hazard and the sensitivity of the receptor (where severity or consequence can be defined as the adverse effects (or harm) arising from a defined hazard, which impairs the quality of human health or the environment in the short or longer term).

The PRA uses the risk matrix, consequence, likelihood and R&D 66 risk classification scheme (Very Low to Very High) detailed in Appendix D. For the purposes of the qualitative assessment, identified Very Low to Low risks will be considered acceptable for the redeveloped site use.

2.3 Conclusions and Recommendations

The report presents the conclusions drawn from the Phase I study & risk assessment and makes recommendations for any further work likely to be necessary to support the proposed planning application.

3.0 REPORTING

The findings of the Phase I Environmental Site Assessment are presented in tabular form as outlined in Table 1.

Table 1: Report Overview

Tables & Sections	Aspect covered
Table 2: Site Description & Environmental Setting Table 3: Site Walkover Observations and Comments Table 4: Geology, Hydrogeology & Hydrology	Site Location & Description Contemporary Site Activities Contemporary Neighbouring Landuse Geology Hydrogeology Hydrology Environmentally Sensitive Areas
Table 5: Permitted Operations & Pollution Incidents Table 6: On-Site Historical Landuse Table 7: Off-Site Historical Landuse	Pollution Incidents Permitted Operations Historical Site Landuse Historical Off-Site Landuse
Table 8: Substances of Concern	Likely contaminants based upon history of site and neighbouring land
Table 9: Initial Post-Development Conceptual Site Model & Preliminary Risk Assessment	Relevant Pollutant Linkage Assessment Preliminary Risk Assessment
Section 4.0	Conceptual Model Uncertainties Principal Contamination Issues Conclusions and Recommendations

Table 2: Site Description & Environmental Setting

Aspect	Comments	Sensitivity
Site Location	- The site is located approximately 400 m to the south of Whaley Bridge town centre at NGR 401171, 381059, and is accessed from Old Road via Caldene Terrace that joins the site in its northeastern corner. - A site location plan is presented in Figure 1.	Not applicable
General Site Description and Contemporary Site Activities	- The 0.23 hectare site is triangular in shape and can be sub-divided into two distinct areas. A concrete-surfaced yard with several buildings currently forms the southern half of the site. The northern half is characterised by a single-storey building on its western side and a small concrete-surfaced yard area. The current site layout is presented in Figure 2. - The site is generally flat, though at a level approximately 1.5 m lower than a railway line that immediately borders the site to the west. Land to the east slopes steeply up to Old Road. The site boundaries are demarcated by breeze-block walls approximately 1.5 m in height. - The building in the northern half of the site is constructed from breeze-block walls with a cement-bonded asbestos and corrugated plastic roof. The building is sub-divided into 2 separate units, a smaller (southern-most) unit currently used for the storage of horse jumps and a larger unit to the north that is currently forms a workshop for vehicle maintenance purposes. At the time of the site walk-over, the larger unit contained a vehicle inspection pit, tool storage areas and several smaller rooms used for site office/welfare facilities. The smaller unit was not inspected during the site walk-over. The remainder of the northern site area is given over to yard areas, and is separated from the southern part of the site by a breeze-block wall topped by wire mesh fencing and lockable gates. - The flooring inside the main vehicle maintenance workshop is concrete surfacing of a high integrity. The yard areas are predominantly concrete-surfaced, with small un-surfaced areas (stone cover or bare earth) on the eastern part of the northern site and immediately south of the workshop building. - The southern half of the site is currently used for the storage, construction and maintenance of vehicles used for banger-racing. Four buildings are present on the southern part of the site, a breeze-block building with timber doors and corrugated cement-bonded asbestos roof at the southern end of the site, an open-sided corrugated steel maintenance building on the eastern side and a shipping container (forming an office) and adjoining breeze-block toilet building in the northeastern corner. - The southern site area is entirely surfaced by concrete of good integrity and is understood to have been constructed since its acquisition by the current site owner in 2003. This is understood to be in excess of 200 mm in thickness with sealed expansion joints, although showing heavy hydrocarbon staining in many areas (see Table 3 for further details). - Although a detailed review of site services is outside the scope of this assessment, it is assumed that the works building and the southern office building are serviced by mains electricity off Caldene Terrace. The site owner advised that all foul sewerage from the site is conveyed to a connection in Caldene Terrace to the north. Yard drainage from the northern site area is managed by way of a surface drain on its eastern side that passes through an interceptor located at the boundary with the southern site before being conveyed southwards (final discharge point unknown) beneath the southern site area. Run-off	Not applicable

Aspect	Comments	Sensitivity
	from the southern site area is assumed to drain into the surrounding ground. - Observations made during the walkover are summarised in Table 3 and photographs are presented in Appendix B.	
Contemporary Neighbouring Landuse	- The site lies within a mixed commercial/industrial/residential setting. Adjacent land uses comprise: - North: commercial premises of Stanways Lighting & Heating with residential premises beyond. - East: residential premises. - South: undeveloped land. - West: the Chapel-en-le-Frith to Stockport railway line with residential & commercial premises beyond.	**Moderate**
Environmentally Sensitive Areas	- The nearest designated sites are as follows: • The Local Nature Reserve of Brookfield Pond ~340 m to the west northwest • The Site of Special Scientific Interest (SSSI) of Toddbrook Reservoir ~350 m to the west. - There are no other statutory protected nature sites known to be present within 1 km of the site.	**Low** - Given their distance from the site, any on-site contamination is unlikely to have a significant impact on the identified environmental receptors.
Proposed Site Use	- The proposed development comprises the removal of the existing industrial buildings and the construction of 8/9 three-bedroom terraced houses and 5 two/three-bedroom detached houses. - Surface cover will comprise building cover, access roads, gardens and hard & softstanding areas.	**High** - The proposed residential landuse represents a High sensitivity receptor to site contaminative sources.

Table 3: Site Walkover Observations and Comments

The following observations were made during the site walkover. Observations relate to accessible areas and should be used with the figures & site photographs
- The current site owner advises that the site was owned by Wade Construction from at least the 1960s until they went into liquidation in the 1980s. It was then purchased by Stevenson Dean, who sold the southern site to the current owner in 2003. The northern site was sold to an engineering firm (Safe Systems) in the 1990s who in turn sold it to the current site owner in 2006.
- A number of above-ground storage tanks (ASTs) were observed around the site, as follows: • An un-labelled polypropylene tank is located on the eastern boundary of the southern site, and is assumed to contain diesel for fuelling the vehicles used for banger-racing. Although of double-skinned construction, there was no secondary containment of the draw line in the event of failure of the supply nozzle. • An un-labelled and un-bunded steel tank is also located on the eastern boundary of the southern site. It was not possible to inspect the tank to ascertain whether it was empty. No fill points or draw points were noted. • A single-skinned steel tank located immediately south of the works building was originally used to store heating oil for use in a burner within the workshop. Although there was minor staining of the stone surfacing beneath, it is understood that the tank is empty and no longer used. • Used engine oil from vehicle maintenance operations is stored within an oil drum inside the workshop prior to collection by a third party for heating use. • Small quantities of oils, lubricants and antifreeze are stored within manufacturer's containers within the workshop.
- Only minor hydrocarbon staining was noted on the hardstanding of the northern site area within the workshop. The hardstanding on the southern site was heavily stained in many areas due to the vehicle breaking/construction/maintenance operations.
- Asbestos-containing materials (ACMs) were noted in the form of cement-bonded asbestos sheets used to roof the main northern building and the building on the southern site boundary. Broken and whole cement-bonded asbestos sheets were also observed in both the northern and southern site areas. The presence of other forms of asbestos in any of the site buildings should be confirmed by specialist asbestos survey prior to any demolition works associated with site redevelopment.
- A skip located in the southwestern corner of the northern site is used for the storage of wastes from vehicle maintenance operations. Uncontained waste materials were evident adjacent to the toilet building on the southern site, with evidence of burning of waste materials within an oil drum in the centre of the southern site.
- Limited vehicle washing (parts only) is understood to be undertaken on the northern site area. The site owners reported that the interceptor had been subject to infrequent maintenance during their ownership.
- No obvious evidence of remnants of previous buildings or depressions in the site surfacing indicating potential areas of fill was noted.
- No obvious evidence of pits, sumps or manhole covers/vent pipes that could be indicative of underground storage tanks (USTs) was noted.
- No electricity substations / transformers were identified on the site.
- There was no obvious surface evidence of any previous intrusive investigations (borehole covers, areas of reinstated hardstanding etc) having been undertaken on the site.
- There were no significant land contamination concerns associated with the immediate site setting e.g. adjacent fuel filling stations, landfill sites etc.
- There are no identified surface watercourses immediately adjacent to the site.

Table 4: Geology, Hydrogeology & Hydrology

Aspect	Comments	Sensitivity
Geology	- Information on the geological profile beneath the site has been reviewed via the BGS online data-base. - It is likely that a thin layer of made ground is present as part of historic and / or more recent development of the site, however this is unlikely to be of significant thickness. - No superficial deposits are reported as underlying the site. - Bedrock geology underling the site is reported to comprise mudstones, siltstones and sandstones of the Pennine Lower Coal Measures Formation of Carboniferous age.	**Low** - The underlying solid strata are not an important geological resource. - The Lower Coal Measures strata may allow migration of surface contaminants, especially via its secondary permeability (fissuring and fracturing).
Geological Hazards	- UK Radon indicates that the site lies within a radon affected area, with an estimate of 3 - 5% of homes at or above the action level of 200 becquerels per metre cubed (200 Bq m^{-3}). - No obvious visual indications of ground instability were noted during the site walk-over. - The site falls within a Coal Authority-defined Coal Mining Reporting Area, but does not fall within a Development Referral Area i.e. no defined mining risks have been recorded and no Coal Mining Risk Assessment is required.	**Low - Moderate** - Radon protection measures are likely to be required for the development. - Although there is no evidence of ground instability, stability issues may require further investigation during site redevelopment.
Hydrogeology	- Environment Agency-defined aquifer maps indicate that the Pennine Lower Coal Measures Formation bedrock is designated as a 'Secondary A Aquifer'. The depth to groundwater was not determined as part of this assessment. - The site is not within EA-defined Source Protection Zone (SPZ). The closest SPZ (Zone 3 - Total Catchment) is ~5.5 km to the southwest. - There are two BGS-recorded borehole records within a 250m radius of the site. The closest lies ~85m northeast of the site and relates to a borehole associated with the Whaley Bridge Colliery (BGS Ref: SK08SW/8), although no information relating to its depth or date of drilling are available. A second borehole (BGS Ref: SK08SW/467) is ~125 m to the northwest, however no information is available. It is unlikely that either borehole is used to abstract groundwater for potable purposes.	**Low** - The bedrock geology is designated a 'Secondary A' aquifer, however there are no SPZs within a 5 km radius of the site that might be affected by the presence of contamination from the site.
Hydrology	- The closest identified surface water feature is the River Goyt which flows northwards ~140 m to the southwest. Randal Carr Brook forms a confluence with the Goyt ~225 m to the southwest and Toddbrook Reservoir lies ~350 m to the west. - The Environment Agency appears to monitor the quality of the River Goyt at 2 locations within a 1 km radius of the site as part of its River Quality Assessment Programme, however no historical river quality data is currently available. - The EA website does not identify the site as lying within an area at risk of flooding from rivers or reservoirs. - The site does not lie within an area covered by EA flood warnings.	**Low** - The nearest surface water features are unlikely to be impacted by lateral contaminant migration given their proximity to the site.

Table 5: Permitted Operations & Pollution Incidents

Aspect	Comments	Sensitivity
Permitted Sites	- Reference to the Environment Agency website indicates that one Industrial Operator (Clover Chemicals Limited) has been identified within a 1 km radius of the site, at a location ~600 m to the south. This facility is currently assigned a Compliance Rating Score of 'Very Good'.	**Low** - On the basis of its Compliance Rating Score and proximity to the site, this operation is unlikely to pose a significant risk to the proposed development.
Waste Operations & Landfills	- Information on the EA website indicates that there is only one EA recorded active or historical landfill sites within a 1 km radius of the site. - This relates to a historic landfill located ~0.9 km northeast of the site at 'Silk Hill Farm' off Bings Road. No records relating to the site operator, the accepted waste types or the dates of operation are held on the EA website.	**Low** - There are no landfill sites sufficiently close to the site to pose a significant risk to the proposed development.
Industrial Pollution Incidents	- Information on the EA website indicates that there have been no pollution incidents within a 1 km radius of the site. - The nearest pollution incident was a 'Significant Impact' incident to water (Ref. 3659) arising from oils and fuels that occurred in April 2001 approximately 1.3 km to the north. A second 'Significant Impact' pollution incident (Ref. 530997), also to water, occurred in September 2007 approximately 1.3 km to the southwest. - Neither incident is likely to have been attributable to activities on the site.	**Low** - No pollution incidents to controlled waters or land have been identified in close proximity to the site. - The closest recorded pollution incidents occurred at locations that are unlikely to either have been caused by, or result in a detrimental impact to, the site.

Table 6: On-Site Historical Landuse

Aspect	Comments	Sensitivity
On-Site Landuse	- Selected Historical Maps spanning the years 1870 to 2012 are presented in Appendix C. - 1870: No mapping of site footprint is available. - 1880: Site is predominantly characterised by the line and associated embankment of a branch line off the main Chapel-en-le-Frith to Stockport railway. - 1898: An un-named building, assumed to be part of Gisbourne Colliery to the north, crosses the northern site boundary otherwise no significant changes. - 1899 - 1909: No significant changes. - 1921: The colliery building crossing the northern site boundary has now been removed. The branch line is indicated as being the Cromford & High Peak Line of the London & Northwestern Railway (L & N.W.R). - 1938: The on-site rail infrastructure is indicated as belonging to the London, Midland & Scottish Railway (L.M.S.R), otherwise no significant changes. - 1968: The branch line has now been removed, and a significant building (corresponding to the footprint of the current building) now occupies the northwestern part of the site. Another building crosses the northern site boundary. Both buildings appear to form part of a '*depot*' with further buildings off-site to the north. - 1989 - 1994: No significant changes. - 1995: The building to the north now terminates at the site's northern boundary. The main building in the northwest corner of the site is now indicated as '*works*'. - 2012: The site is now shown in its current configuration with two distinct northern & southern areas, otherwise no significant changes.	**Moderate - High** - Potential contaminants arising from the rail and colliery operations include metals & other inorganic contaminants, hydrocarbon fuels & lubricants and polyaromatic hydrocarbons (PAHs). - The works building constructed after rail operations ceased has a concrete floor slab, and should have reduced the potential for ground contamination from leakages and spillages. - Construction & engineering operations within yard areas may have resulted in localised impact to shallow soils. - Demolition of previous buildings may have resulted in metal, hydrocarbon and asbestos contamination of shallow soils. - The site is currently largely hard-surfaced, which should mitigate the majority of typical human health direct exposure pathways. Soil vapour issues arising from spillage of fuels & oils are unlikely to pose a potential risk to current site users where they have occurred beneath yard areas or well-ventilated buildings. - Historical contamination (soils/shallow groundwater) will require further consideration to ensure they do not pose a potential redevelopment constraint.

Table 7: Off-Site Historical Landuse

Aspect	Comments	Sensitivity
Off-Site Landuse	- Selected Historical Maps spanning the years 1870 to 2012 are presented in Appendix C. - 1870: No mapping of immediate site environs is available. River Goyt shown running under a railway embankment ~1 km to the north of the site. - 1880: Site bordered immediately to the west by a rail line with residential premises beyond. Gisbourne Colliery is present to the north of the site. Residential premises off Old Road & Horwich Road to the east. - 1898 - 1909: No significant changes. - 1921: Gisbourne Colliery no longer present. Further residential development & a school shown beyond the railway line to the west. - 1938: No significant changes. - 1968: The site of the former Gisbourne Colliery to the north is now indicated as being a '*depot*'. Further industrial development ('*warehouse*' & '*engineering works*' beyond railway line to the northwest. - 1989 - 2012: Further residential development adjacent to southeastern part of the site, otherwise no significant changes.	**Moderate** - Evidence of potentially contaminative off-site historical land uses have been identified. - The closest of these are the rail line immediately to the west of the site and Gisbourne Colliery / the depot facility immediately to the north. - These land uses may have resulted in contamination of the adjoining site from migration of contaminants via surface run-off, fugitive dust or shallow groundwater flow.

Table 8: Substances of Concern

Group	Substances	Comments
Inorganic Substances	- Metals: semi metals & non metals: arsenic, cadmium, total chromium, copper, lead, inorganic mercury, nickel, selenium, vanadium, zinc - Asbestos	- From rail, colliery, depot, construction & engineering operations. - ACMs may also be present due to the demolition of historical buildings. - ACMs may also be present in existing buildings.
Organic Substances	- Total petroleum hydrocarbons (TPH): aliphatic & aromatic fractions C5-C44 - BTEX & TMBs: benzene, toluene, ethylbenzene, xylenes (trimethylbenzenes often found associated with BTEX compounds on brownfield sites) - Priority 16 polyaromatic hydrocarbons (PAHs): naphthalene, acenaphthene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo-a-anthracene, chrysene, benzo-b-fluoranthene, benzo-k-fluoranthene, benzo-a-pyrene (BaP), dibenzo-a,h-anthracene, benzo-g,h,i-perylene, indeno-1,2,3-c,d-pyrene - Volatile and Semi-Volatile Organic Compounds	- Potentially associated with made ground deposits. - From storage, use, spillage, leakage, &/or disposal of hydrocarbon fuels & lubricants associated with the rail, colliery, depot, construction & engineering operations. - From disposal of ash & clinker associated with the rail and colliery operations.
Ground Gases	- Methane - Carbon Dioxide - VOC vapours (includes hydrocarbon vapours)	- From degradation of potential on-site organic made ground deposits. - From spillages of hydrocarbons and solvent products from historical industrial processes.
Notes: The selection of the potential specific substances and hazards of concern has been guided by our experience of brownfield sites, the site history, the primary sources present and information/guidance provided in published DOE industry profiles, CLR-8 (officially withdrawn, but still a valuable resource), Environment Agency publication R&D66:2008 and other relevant references. These documents have been used as an additional screening tool to help assess the significance of contaminants and contaminant/hazard groupings and help decide which contaminants/hazards warrant consideration by the ESA as potential substances and hazards of concern.		

Table 9: Initial Post-Development Conceptual Site Model & Preliminary Risk Assessment

Relevant Pollutant Linkages			Risk Assessment		
Sensitive Receptor	**Sources**	**Primary Pathways**	**Consequence**	**Likelihood**	**Risk Classification**
Human Health **Site Residential Use** (Critical receptor characterised as future on-site female child between the ages of 0-6)	Made ground and inorganic & organic substances in impacted shallow soils & groundwater	Direct contact (Ingestion & Dermal) Inhalation of dust Inhalation of organic vapour	Medium	Likely	Moderate Risk
	Soil vapours generated by impacted shallow soils & groundwater	Inhalation of organic vapour	Medium	Likely	Moderate Risk
Human Health **Adjacent Residential Use** (Off-site critical residential receptor characterised as a female child between the ages of 0-6)	Made ground and inorganic & organic substances in impacted shallow soils & groundwater	Inhalation of dust Inhalation of organic vapour	Medium	Unlikely	Low risk
	Soil vapours generated by impacted shallow soils & groundwater	Inhalation of organic vapour	Medium	Unlikely	Low risk
Controlled Waters Off-site surface waters Groundwater underlying site *(solid geology designated Secondary A aquifer)*	Made ground, soil & groundwater sources	Surface run-off Soils leaching to groundwater Perched water discharge to groundwater Lateral groundwater flow Discharge to surface waters	Medium	Low Likelihood	Moderate/low risk
BBM&S Buildings, Building Materials and Services	Made ground, soil & shallow groundwater sources	Direct contact Contact with contaminated pore water	Mild	Low Likelihood	Low risk
		Potable water pipes	Medium	Likely	Moderate risk
	Soil vapours generated by impacted shallow soils & groundwater	Gas/vapour intrusion/accumulation	Medium	Low Likelihood	Moderate/low risk

Notes:

1. Conceptual model for the site based upon post-development residential end use.
2. Identified Very Low and Low risks are considered acceptable for the redevelopment end use.

4.0 CONCLUSIONS & RECOMMENDATIONS

4.1 Overview

The Phase I ESA has been undertaken to support an outline planning application to HPBC for the redevelopment of the site to a residential landuse. Where detailed recommendations are required, these have been provided in Section 4.5. The report has fulfilled the primary objectives of the assessment to:

1. Determine the potential for onsite or offsite land contamination issues arising from the current or historical uses of the site and surrounding area; and

2. Provide an initial assessment of potential risks that any such land contamination may pose to sensitive receptors on the redeveloped site, including future site users, controlled waters and infrastructure.

Evidence of potentially contaminative historical on-site landuse has been identified, substances associated with which may have the potential to affect sensitive receptors.

4.2 Principal Contamination Issues

The identified main potential on-site contamination sources relate to organic and inorganic contamination arising from historical and contemporary activities including vehicle maintenance and fuel storage. Demolition of previous on-site buildings may have also resulted in metal, hydrocarbon and asbestos contamination of near-surface soils. There is also the potential for ground gases and soil vapours arising from degradation of potential on-site organic made ground deposits and spillages of solvents and other hydrocarbons to pose a risk to future site occupants.

Evidence of potentially contaminative off-site historical land uses have been identified in the form of the rail line immediately to the west and the former Gisbourne Colliery and depot facility to the north. These may have resulted in contamination of the site from migration of contaminants via surface run-off, fugitive dust or shallow groundwater flow, albeit to a lesser extent than the identified historical and contemporary on-site operations.

4.3 Preliminary Risk Assessment

Based upon the findings of the Phase I desk study, the PRA indicates:

- There is a *Moderate Risk* to future site users from potential site contamination.
- There is a *Low Risk* to off-site receptors from potential site contamination.
- There is a *Moderate/Low Risk* to surface waters and groundwater (controlled waters) from potential site contamination.
- There is a *Low Risk* to BBM&S from direct contact with potential site contamination.
- There is a *Moderate* to BBM&S from potential site contamination affecting potable water pipes.
- There is a *Moderate/Low Risk* to BBM&S from ground gas & soil vapours.

Identified Very Low and Low risks are considered acceptable for the redeveloped use. The potential Moderate and Moderate/Low risks to future site users, controlled waters and BBM&S are discussed in the recommendations presented in Section 4.5.

Given the findings of the Phase I investigation, the capacity for site to be determined as Contaminated Land under Part 2A of the Environmental Protection Act 1990 is considered low. Under the 2012 Contaminated Land Statutory Guidance, the site is likely to be considered Category 3 or 4 based on the likely level of risk posed by the potential site contaminants & vapours to sensitive receptors.

4.4 Conceptual Model Uncertainties

Various uncertainties have been identified in the CSM that require clarification to enable a more accurate assessment of potential risk associated with the redeveloped site use. The main uncertainties are considered to comprise:

- The presence, thickness and nature of any made ground deposits.
- The presence, concentration and leachability of substances of concern in shallow soils (including made ground) on-site.
- The presence of substances of concern in any perched water or shallow groundwater beneath the site.
- The likelihood of significant ground gas and/or soil vapour intrusion into future on-site and off-site buildings.

These have the potential to affect the risk assessment findings and any conclusions subsequently drawn.

4.5 Recommendations

Based on the findings of the Phase I desk study and preliminary risk assessment, Peak Environmental Solutions recommend that the following actions be considered to manage the identified potential land contamination risks:

- Commissioning a targeted Phase II Environmental Site Assessment and Generic Quantitative Risk Assessment (GQRA) to identify the presence, character, extent and significance of the potential contamination sources identified. These works would be expected to be the subject of appropriately worded condition(s) should planning permission be granted. The work would allow the potential contamination risks posed by the site to future site users, controlled waters and BBM&S to be more clearly understood. The initial CSM would be refined, reducing the uncertainties highlighted by this report.

  The Phase II should also aim to outline the necessary measures to be implemented, including any further characterisation, risk assessment and remediation to enable the site to be rendered suitable (in relation to land contamination issues) for the intended use. The Phase II works would also give the opportunity to undertake a combined geotechnical

assessment of ground conditions beneath the site to provide data to assist preliminary foundation design. It is recommended that the scope of the Phase II assessment be agreed in advance with HPBC.

- Production of a Remediation and Verification Strategy. These works would be expected to be the subject of appropriately worded condition(s) should planning permission be granted. The strategies would be expected to include:

  - *Discovery Strategy for use during the redevelopment should impacted made ground deposits &/or natural soils and waste deposits be encountered. The strategy should include a protocol for characterising and dealing with any encountered contamination, including liaison with* HPBC.

  - *Verification Strategy for shallow soils in garden and landscaping areas against relevant human health Generic Assessment Criteria (GACs) to demonstrate that relevant substances in shallow soils in exposed soil areas do not pose an unacceptable risk to human health.*

  - *Requirements for Verification Report.*

- Specialist asbestos survey of site buildings/structures prior to demolition.
- Liaison with Building Control to determine the requirements for ground gas, radon and/or soil vapour protection measures for the development.
- New site services should be laid in clean service corridors.
- Water supply services should comply with industry best practice for site development.

It is assumed that these works, where deemed necessary by HPBC, would not be required to support a planning application for the site but would be conditioned as part of a granted planning permission.

5.0 ADDITIONAL REFERENCES

1. Environment Agency, 1994. CLR-2, Guidance on the Preliminary Site Inspection of Contaminated Land. Volumes 1 and 2.
2. National House Building Council (NHBC). 2000. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D P66
3. Environment Agency. 2004. Model Procedures for the Management of Land Contamination. Contaminated Land Report CLR-11
4. Department for Environment, Food & Rural Affairs (DEFRA) and the Environment Agency. 2002. Environment Agency R&D Contaminated Land Report CLR-8. Potential Contaminants for the Assessment of Land.
5. Environment Agency. 2001. Assessment and Management of Risks to Buildings, Building Materials and Services from Land Contamination. R&D P5-035/TR/01
6. Department for Communities and Local Government. 2012. National Planning Policy Framework.
7. Department for Communities and Local Government. 2012. Technical guidance to the National Planning Policy Framework.

FIGURES

FIGURE 1: SITE LOCATION PLAN

FIGURE 2: POTENTIAL AREAS OF CONTAMINATION

APPENDICES

APPENDIX A: LIMITATIONS & EXCEPTIONS OF ASSESSMENT

LIMITATIONS AND EXCEPTIONS OF ASSESSMENT

The Desk Study was conducted and this report has been prepared for the sole internal use and reliance of Mr Colin Dunn. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Peak Environmental Solutions limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. Findings & opinions conveyed in the services should only be used by competent persons acting on the behalf of the behalf of Mr Colin Dunn and the findings & opinions conveyed in the services should only be used for the intended use. Copyright of reports and documents remains with Peak Environmental Solutions Limited.

The findings and opinions conveyed via this Phase I Investigation Report are based on information obtained from a variety of sources, as detailed within this report, which Peak Environmental Solutions Limited believe to be reliable. Nevertheless, Peak Environmental Solutions limited cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced geo-environmental consultants. Peak Environmental Solutions Limited does not provide legal advice and the advice of lawyers may also be required.

The opinions presented in this report are based on findings derived from a site inspection and walkover, obtained recorded & services, a review of provided records and historical sources. Peak Environmental Solutions Limited has found indicators that suggest that hazardous substances are present at the site at levels that may warrant mitigation or consideration appropriate to the end use stated by Mr Colin Dunn. Not finding such indicators does not mean that hazardous substances do not exist at the site.

The most recent site inspection/walkover survey was performed on 8th April 2013. Mr Colin Dunn is advised that the conditions observed by Peak Environmental Solutions limited are subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance and may subsequently have become observable.

It is possible that Peak Environmental Solutions' research, while fully appropriate for the ESA, failed to indicate the existence of important information sources. Assuming such sources actually exist, their information could not have been considered in the formulation of Peak Environmental Solutions' findings and opinions.

Any interpretation of the results of the ESA have been based on the proposed site usage and the findings are not valid should the proposed land use and/or the regulatory regime/guidance change. Where interpretation is based on public domain guidance/protocols/models/software/code, Peak Environmental Solutions are not liable for errors in the guidance/protocols/models/software/code.

Peak Environmental Solutions Limited believes that providing information about limitations is essential to help Mr Colin Dunn identify and thereby manage its risks. These risks can be mitigated, but they cannot be eliminated, through additional research. Peak Environmental Solutions Limited will on request, advise Mr Colin Dunn of the additional research opportunities available, their impact on risk, and their cost.

In preparing this report, it has been assumed that all past and present occupants have provided all relevant and other information, especially relating to known or potential hazards. This report is not required to identify insufficiencies or mistakes in the information provided by the user/owner or from any other source, but has sought to compensate for these where obvious in the light of other information.

The work is also subject to Peak Environmental Solution's standard terms and conditions.

APPENDIX B: SITE WALKOVER PHOTOGRAPHS

APPENDIX C: HISTORICAL ORDNANCE SURVEY MAPS

APPENDIX D: RISK CLASSIFICATION

Qualitative Risk Classification

Probability (likelihood)	Consequence			
	Severe	**Medium**	**Mild**	**Minor**
High Likelihood	Very high risk	High risk	Moderate risk	Low risk
Likely	High risk	Moderate risk	Moderate/low risk	Low risk
Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk
No Pollutant Linkage	No potential risk			
Risk Classification				
Very High Risk	**High Risk**	**Moderate Risk**	**Low Risk**	**Very Low Risk**
There is a high probability that severe harm could arise to a designated receptor from a hazard at the site. This level of risk would warrant immediate emergency corrective action.	Harm is likely to arise to a designated receptor from a hazard at the site.	Possible that harm could arise to a designated receptor from a hazard at the site. Relatively unlikely that harm would be severe, or if any harm were to occur, it is more likely that harm would be relatively mild.	Possible that harm could arise to a designated receptor from a hazard at the site. It is likely that, at worst if any harm was realised, any effects would be mild.	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor or where the risk is negligible or immeasurably low.

Consequence Ratings			
Minor	**Mild**	**Medium**	**Severe**
- No measurable effect on humans - Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems - Repairable effects of damage to buildings, structures and services	- Exposure to human health unlikely to lead to "significant harm" - Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce - Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long term maintenance of the population - Minor damage to crops, buildings or property	- Elevated concentrations which could result in "significant harm" to humans health as defined by EPA 1990, Part 2A if exposure occurs - Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce - Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long term maintenance of the population - Significant damage to crops, buildings or property	- Highly elevated concentrations likely to result in "significant harm" to humans health as defined by EPA 1990, Part 2A if exposure occurs - Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce - Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long term maintenance of the population - Catastrophic damage to crops, buildings or property
Classification of Probability			
Unlikely	**Low likelihood**	**Likely**	**High likelihood**
Improbable that exposure/event would occur even in the long term	Possible that exposure/event could occur. However, not certain that even over a long period that exposure/event would occur and is less likely in the shorter term	Probable that exposure/event would occur. However, exposure/event is not inevitable, but is possible in the short term and likely over the long term.	Exposure/event very likely in the short term and almost inevitable over the long term, or evidence at the receptor of harm or pollution