BARHAM COURT FARMS

BARHAM COURT FARM, BARHAM

GEOENVIRONMENTAL REPORT

Reference: 1044/SI

5th December 2017

CLIENT: Barham Court Farms
Church Lane
Barham
Kent
CT4 6PB

SITE: Barham Court Farms Development
Church Lane
Barham
Kent
CT4 6PB

GEOENVIRONMENTAL REPORT

Reference: 1044/SI

5th December 2017

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REFERENCES

Reference 1 Envirocheck Desk Study Data 145426731_1_1

Reference 2 BS 5930: Code of Practice for Site Investigations, BSI 2015

Reference 3 BS 1377: Methods of Tests for Soils for Civil Engineering Purposes

Reference 4 CLR 11 Model Procedures for the Management of Land Contamination

Reference 5 BS10175 Investigation of Potentially Contaminated Sites 2011

Reference 6 BS8004 Code of Practice for Foundations 1986

Reference 7 NHBC Standards Chapter 4.2 Building Near Trees

Reference 8 BRE Special Digest 1:2005

Reference 9 LQM/CIEH S4ULs for Human Health Risk Assessment 2016

Reference 10 C4SLs, DEFRA 2014

Reference 11 Dutch Soil Guidelines, Dutch Ministry of Housing 2000

Reference 12 CIRIA 574 Engineering in Chalk

Reference 13 Design Manual for Roads and Bridges, Highways Agency

FIGURES

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APPENDICES

1.0 SUMMARY

1.1 A former farmyard approximately 1 ha in area, off Church Lane, Barham Kent CT4 6PB (the Site) is to be redeveloped with new low rise detached and terraced housing and refurbishment of some existing barn buildings. The Site is currently occupied by eleven agricultural barns and sheds, which are part used for storage. The Site has historically been used for agriculture.

1.2 Peter Baxter Associates (PBA) was commissioned by the Client; Barham Court Farms, to carry out a combined geotechnical and environmental site investigation. The investigation comprised the review of historical data and six trial pits up to 2.2m deep. The objectives of the investigation were to obtain sufficient data for foundation and road design and to determine the level of any contamination of the Site.

1.3 This Site Investigation Report is a combined geotechnical and contamination assessment report. It describes the Site's geology, history and environmental setting, field works, visual observations and laboratory testing, assesses the environmental risks and recommends foundation types, soakaway design parameters, a design CBR value, the design sulphate class and environmental mitigation measures.

1.4 There are no historic or current sources of environmental risk within 1000m of the Site. The Site overlies a major aquifer and its use history has been agricultural, with the current structures erected between the 1930s and the 1990s. The risk of geological hazards was reported as very low. No radon gas protection measures were required and no coal mining issues affect the Site.

1.5 The site investigation was carried out on 14th November 2017. The Site soils were topsoil or made ground, predominantly concrete hardstanding, generally over stiff Clay over structureless Chalk at between 0.2m and 1.6m depth. No groundwater was encountered. In one trial pit; TP5, in the south west corner of the Site, the Clay extended to 2.2m depth. The Clay was found to be of medium volume change potential.

1.6 Trench fill foundations bearing on the Chalk are recommended for the development, with a minimum depth of 0.9m. The recommended allowable bearing pressure on the Chalk is 125kPa. If the Clay is used as a foundation stratum, a minimum depth of 0.9m applies and if the foundations are within the

zone of influence of trees, the minimum depths specified in NHBC's Specification Chapter 4.2 (Reference 7) apply.

1.7 A soil infiltration rate of 1 x 10^{-8} m/s is recommended for the Chalk subsoil and a design CBR value of 5% for the clay and structureless chalk. The road formation must be a minimum 0.45m deep.

1.8 The recommended design sulphate class for concrete in contact with the soils is DS-1.

1.9 Soil samples were analysed for the presence of oils, heavy metals, polyaromatic hydrocarbon (PAH) compounds and organophosphate pesticides. Contamination levels of some PAH compounds exceeded the adopted Acceptance Criteria for residential use with gardens and vegetable uptake at one location. The environmental risk to Site Occupants from this on-site source was assessed as low to moderate. The environmental risk to groundwater and other receptors from this on-site source was assessed as low. The environmental risk to all receptors from off site sources was assessed as low.

1.10 Environmental mitigation measures are recommended. The soils around the hotspot at trial pit location TP1 must be removed to a depth of 500mm and an extent of 5m x 5m, subject to boundary constraints. The validation protocols are outlined in Section 6.5 and should be agreed with the local planning authority and a validation report produced. Barrier water pipes are recommended.

1.11 An asbestos survey is recommended for the existing structures and any asbestos removed from Site in accordance with legislation.

1.12 It is possible that undetected contamination is present beneath the concrete hardstanding and it is recommended that the Site be visually inspected on removal of this hardstanding, with further testing if contamination is suspected.

2.0 SITE DESCRIPTION

2.1 Site Location and Description

2.1.1 Barham Court Farm CT4 6PB (the Site) is a farm yard approximately 1 ha in extent situated to the south of Church Lane on the eastern outskirts of the village of Barnham, Kent. The National Grid coordinates of the Site are 620890E, 149960N. The Site is shown on Figure 1 and photographs illustrating the Site are presented in Appendix D.

2.1.2 The Site is currently occupied by twelve barns and sheds, which are currently used for storage. The structures are denoted “Barn 1” to “Barn 9” on Figure 1, for the purpose of this report. The Site is bounded to the north by residential property, to the east by Church Lane, the parish church and churchyard and agricultural land, to the south by a distribution warehouse and to the west by open fields sloping down towards a stream that runs through Barham village centre. The southern, western and northern boundaries have mature trees and bushes. The western boundary trees were poplars, and other trees were ash and sycamore.

2.1.3 Some structures appear to be roofed and clad with asbestos containing materials. A buried petrol tank, reportedly sealed, is understood to be adjacent to location TP2 on Figure 1. All barns were inspected except Barn 7. Some barns contained bulk drums of lubricating oils and fluids, but no significant leaks or signs of contamination were observed. Barn 1 contained an active metalworking workshop. Between the barns was concrete surfacing of varying ages and condition.

2.2 Published Geology

2.2.1 The geological map of the area indicated that the Site geology is Chalk of the Lewes Formation. Geological maps detailing the strata are presented in Appendix A1.

2.3 Geological Hazards and Radon

2.3.1 Reference 1 indicated very low risks of geological hazards. There was no reported hazard of compressible ground, landslide, running sand and shrinking and swelling clay. The potential for collapsible ground and ground dissolution was considered very low. The Site was in a lower probability radon area and no radon protection measures were reported necessary. The Datasheet from Reference 1, listing these assessments, is reproduced in Appendix A4.

2.4 Coal Mining

2.4.1 The Site overlies coal measures. Coal was deep mined from nearby pits of the Kent Coalfield during the 20th Century until 1987. A mining report was obtained from the Coal Authority and is presented in Appendix A5. It confirms that there has been no coal mining under the Site, no coal mining subsidence on the Site and no mine gas issues.

2.5 Proposed Development

2.5.1 It is proposed to develop the Site with twenty seven new housing units, including the conversion of some existing barns and the building of new detached and terraced low rise houses. All properties will have gardens.

2.6 Site Investigation Objectives

2.6.1 The site investigation objectives were to establish the extent and nature of land contamination on the Site, to confirm the Site geology, including groundwater conditions and to establish foundation, road and soakaway design parameters.

2.6.2 Peter Baxter Associates (PBA) developed an investigation methodology that is detailed in Section 3.

2.6.3 The field works tests and observations are detailed in Sections 3 to 5 of this report and their implications discussed in Section 6 and summarised in Section 1.

3.0 FIELDWORK

3.1 Description of Field Works

3.1.1 A desk study walkover survey was conducted on 7th November 2017 by a PBA engineer. Six trial pits were excavated on 14th November to depths between 1.2 and 2.2m by an excavator supplied by the Client. Five contamination samples were recovered from shallow depths at each trial pit location. The investigation was supervised by a PBA geologist. The trial pits were backfilled after logging and sample recovery.

3.1.2 The site investigation was carried out in accordance with BS5930 (Reference 2). The trial pit locations are shown in Figure 1. The trial pit logs are presented in Appendix B.

3.2 Ground Conditions and Observations

3.2.1 The Site soils comprised topsoil or made ground over a firm to stiff Clay over Chalk at between 0.2m depth and 1.6m depth in five trial pits. In Trial Pit 5, the firm to stiff Clay extended to 2.2m depth. The Chalk was structureless and very weak and classified as Grade Dm over Grade Dc (Reference 12). TP1 was terminated at 1.2m depth following the discovery of a drain.

3.2.2 No signs or smells of contamination were observed in the soil samples recovered. There were no above ground fuel tanks. A buried petrol tank, reportedly sealed, is understood to be adjacent to TP2.

3.3 Groundwater Conditions

3.3.1 Groundwater was not encountered in any pit.

3.4 Intrusive Environmental Investigation

3.4.1 Six soil samples were recovered on 14th November, one from each location and at depths between 0.2.and 0.3m. The samples were stored and transported in accordance with best practice guidelines. The sampling frequency of one sample per 1600m^2 was defined in accordance with Reference 5.

3.4.2 The samples were tested for a range of contaminants informed by the preliminary Desk Study data and environmental risk assessment discussed in Section 5. The parameters were asbestos trace, the "CLEA" suite of heavy metals, oils and selected volatile organic compounds (TPH-CWG) and polyaromatic hydrocarbons (PAH). Three samples were also tested for organophosphate pesticides. The

results of this testing are summarised on Table 1 and are discussed along with their environmental implications in Section 5.

4.0 LABORATORY TESTING

4.1 General

4.1.1 Geotechnical testing was carried out by Peter Baxter Associates Laboratories, Gillingham, Kent, in accordance with BS 1377 (Reference 3). Contamination testing was carried out by QTS Environmental, Lenham, Kent.

4.2 Chalk Saturation Moisture Content Testing

4.2.1 Saturation Moisture Content tests were carried out on five chalk samples recovered from depths between 0.8 and 2.0m. The results are presented in Appendix C1 and indicated saturation moisture content values (SMC) ranging from 26.9% to 29.1%. Two of the SMC values correspond to a definition of “low density” chalk, with SMC values over 27.5% (Reference 12). The other samples were defined as “medium density” chalk.

4.3 Atterburg Limits Testing

4.3.1 One clay sample, from trial pit TP3 at 1.0m depth, was tested to determine the clay’s liquid and plastic limits. The test report is included in Appendix C2. The plasticity index is 21%, indicating a clay with borderline medium volume change potential (Reference 7). Plotting the liquid limit and plasticity limit against the “A Line” given in Reference 2 confirmed that the soil is a Clay of intermediate plasticity.

4.4 Sulphate and pH Testing

4.4.1 Water soluble sulphate and pH testing was carried out on two samples of Clay recovered from trial pits TP3 and TP5 at 1m depth. The laboratory test report are included in Appendix C3 and indicate sulphate contents ranging from 0.0 to 0.1g/l, indicating a design sulphate value of DS-1.

4.5 Contamination Testing

4.5.1 Table 1 summarises the contamination test results of six soil samples recovered from each trial pit location. The samples were taken at shallow depths from the topsoil or Made Ground. The test reports are included in Appendix C4. The samples were stored and transported in accordance with best practice guidelines. The sampling frequency of one sample per 1600m^2 was defined in accordance with Reference 5. The parameters were asbestos trace, the "CLEA" suite of heavy metals, oils and selected volatile organic compounds (TPH-CWG) and

polyaromatic hydrocarbons (PAH). Three samples were also tested for organophosphate pesticides.

4.5.2 Asbestos was not detected at any location. Heavy metals were detected at levels below the adopted generic acceptance criteria at all locations. Levels of TPH and selected volatile organic compounds were lower than the selected Acceptance Criteria. PAH compounds were detected at three locations and levels of benzo(a)pyrene and benzo(b)fluoranthene were above the Acceptance Criteria at location TP1. These results and the derivation of the Acceptance Criteria, are discussed further in Section 5.

5.0 CONTAMINATION RISK ASSESSMENT

5.1 Desk Study and Preliminary Risk Assessment

5.1.1 The Site history was established from historic maps in Reference 1, which are presented in Appendix A2. The Site was agricultural land for all of its history. A timber frame barn denoted "Barn 1" on Figure 1 is shown on an 1873 map. A structure corresponding to "Barn 4" is shown on a 1937 map. Barns 4A, 6 and 7 are shown on a 1971 map and Barn 5 appears to date from 1978. Barns 8 and 9 are first shown on a 1999 map. These dates correspond to PBA's estimates of the structure's ages from the site walkover.

5.1.2 Reference 1 indicated that the Site is underlain by a major aquifer of high permeability. There were no water abstraction consents shown within 1000m from the site. The nearest surface water feature was 155m west of the Site. The Site was classified as having a limited potential of groundwater flooding (Appendix A4). A flood map is included in Appendix A3.

5.1.3 Reference 1 indicated that the Site is within an area of sensitive land use. The Site is an Area of Outstanding Natural Beauty and within a Zone 2 Source Protection Zone and a nitrate vulnerable zone. An area of ancient woodland is 850m away (Appendix A4).

5.1.4 There are no recorded landfill sites within 1000m of the site. Six gravel brickearth and chalk pits were listed within 1000m. All have been closed and the nearest was at 554m. A natural cavity (sinkhole) was listed as 330m away. No pollution incidents or prosecutions were reported within 1000m of the Site. There were two discharge consents listed within 100m with the closest at 431m distance. Both consents had lapsed. The nearest PPC consent, for small scale waste oil burning, was at 712 m from the site.

5.1.5 There were four trade directory entries within 1000m of the Site, of which one, a blacksmith at 903m, remained active. The nearest fuel station was 711m from the Site and listed as obsolete.

5.1.6 The Site was visited on 14th November 2017 by an engineer from Peter Baxter Associates Ltd. The weather was overcast and dry. The existing structures were denoted "Barn 1" to "Barn 9" for the purpose of this report and are shown on Figure 1. Some structures appear to be roofed and clad with asbestos containing materials. A buried petrol tank, reportedly sealed, is understood to be adjacent to location TP2 on Figure 1. All barns were inspected except Barn 7. Some barns

contained bulk drums of lubricating oils and fluids, but no significant leaks or signs of contamination were observed. Barn 1 contained an active metalworking workshop. Between the barns was concrete surfacing of varying age and condition. There was no fly tipping observed and the Site was secure against pedestrian and vehicle access. Photographs illustrating the Site are included in Appendix D.

5.1.7 A preliminary environmental risk assessment was carried out in accordance with CLR11 (Reference 4). A conceptual model was developed from available information sources, listing source, pathway and receptor. This conceptual model and risk assessment is given as Table 2. The conceptual model is illustrated in Figure 2.

5.1.8 The preliminary risk assessment from this conceptual model indicated that the risk from off-site sources was low. No sources were identified within 1000m of the Site.

5.1.9 The preliminary risk assessment from this conceptual model indicated that the risk from on-site sources to on and off-site receptors was low to moderate. A risk from leaking oils and solvents was possible from stored fuel and lubricating oils and from plant maintenance. A risk of leaked pesticides was also considered a possibility, as was the presence of asbestos and asbestos containing materials.

5.1.10 From the guidance given in Reference 4, further investigation and testing, comprising six near surface soil samples tested for the range of contaminants listed in Table 1, was conducted. The recovery of samples is detailed in Section 3.4 and the laboratory results in Section 4.5. The measured concentrations of contaminants were compared against the generic Acceptance Criteria discussed in the following section.

5.2 Acceptance Criteria

5.2.1 The generic Acceptance Criteria for the Site were derived from several sources; the LQM/CIEH S4UL levels for human health risk assessment (Reference 9), recently published “C4SL” limits (Reference 10) and Dutch guidelines for soil contamination (Reference 11). The S4UL and C4SL levels given for residential use with vegetable uptake were adopted along with the “Intervention Levels” from the Dutch guidelines. The Soil Organic Matter content was assumed to be 1%. The adopted Acceptance Criteria are given in Table 1, shaded in yellow.

5.2.2 The lowest Acceptance Criteria were generally adopted when contaminants had varying criteria from multiple sources.

5.3 Contamination Test Results

5.3.1 Asbestos was not detected at any location. Heavy metals were detected at levels below the adopted generic acceptance criteria at all locations. Levels of TPH and selected volatile organic compounds were lower than the selected Acceptance Criteria. PAH compounds were detected at three locations and levels of benzo(a)pyrene and benzo(b)fluoranthene were above the Acceptance Criteria at TP1. The location of this non-compliant test sample is shown on Figure 1.

5.4 Generic Environmental Risk Assessment

5.4.1 A generic environmental risk assessment based on the results discussed above and the recommendations of Reference 4 is presented in Table 3 and concluded that the environmental risk to Site Occupants was low to moderate. The risks to groundwater and construction workers was considered low, due to the relatively small exceedances over the Acceptance Criteria and the distance to the nearest abstraction point.

5.5 Environmental Risk Mitigation

5.5.1 To reduce the environmental risk to Site Occupants to low, it is recommended that a 5m x 5m square of the soils around the localized hotspot of TP1 are removed to a depth of 0.5m and a distance of 2.5m around the TP1 location. The exposed soils to the sides and base of this excavation should be tested to demonstrate that they comply with the Acceptance Criteria. This soil handling should be recorded and validated with waste transfer notes for soils exported from the Site. A Remediation Method Statement is given in Section 6.

5.5.2 The contents of the existing structures must be cleared and a building asbestos survey carried out prior to demolition. Asbestos containing materials should be removed by a licenced contractor in accordance with legislation.

5.5.3 The results of this investigation indicated limited contamination but further undetected contamination particularly of oils and asbestos containing materials may be present on Site. It is recommended that the Site be re-inspected with further sampling and testing if necessary, on removal of the existing structures and hardstanding.

5.5.4 Barrier water pipes are recommended for mains water supply.

6.0 CONCLUSIONS

6.1 Recommended Foundation Type

6.1.1 Trench fill foundations founding on the structureless Chalk are recommended for the development. The trial pits indicate that the Chalk is present over most of the Site at between 0.8 and 1.6m depth. Reference 12 suggests a yield strength of 250 to 500kPa for grade Dm Chalk. From this, an allowable bearing capacity of 125kPa is recommended. This compares to a range of 125kPa to 250kPa given in Reference 6 for Grade 5 Chalk.

6.1.2 Trial pit 5 indicates that the Chalk is at more than 2.2m depth in the south west corner of the Site. If it is not cost effective to excavate deep trench fill foundations to such depths, the stiff Clay would be a suitable bearing stratum. The clay is of medium volume change potential and a minimum foundation depth of 0.9m is specified in Reference 7 (NHBC Standards chapter 4.2, Building Near Trees) Where the foundations lie within the zone of influence of trees, the minimum foundation depths specified in Reference 7 must be followed. As a guide, and assuming the trees on the south-eastern boundary to be high water demand poplars 10m high and 4m from the nearest property, a foundation depth of 2.3m is required. An allowable bearing capacity of 125kPa is recommended for the Clay.

6.2 Recommended Soil Infiltration Rate

6.2.2 Reference 12 gives soil infiltration rates of 1×10^{-7} m/s to 1×10^{-9} m/s for Grade Dc and Dm Chalk. A borehole soakaway penetrating deeper structured chalk and situated more than 6m from the nearest structure may be more effective than a shallow soakaway.

6.3 Recommended Design Sulphate Class

6.3.1 The soil sulphate tests discussed in Section 4.3 and reported in Appendix C3 indicate water soluble Sulphate levels of 0.1 to 0.1g/L. The maximum value corresponds to the recommended design Sulphate class of DS1 (Reference 8).

6.4 Recommended CBR Value

6.4.1 The Clay encountered at shallow depths has a plasticity index of 21%. Reference 13 suggests a CBR value of 5% for such clays, above the water table with “thin” construction conditions. A design value of 5% CBR is recommended for the Clay and Chalk formation, which must be at least 0.45m deep for frost protection.

6.5 Remediation Method Statement

6.5.1 The generic risk assessment based on contamination testing discussed in Section 5 concluded that the environmental risk to Site Occupants was low to moderate, due to elevated levels of polyaromatic hydrocarbon compounds found at one location.

6.5.2 To reduce the environmental risk to Site Occupants to low, it is recommended that a 5m x 5m square of the soils around the localized hotspot of TP1 be removed to a depth of 0.5m and a distance of 2.5m around the TP1 location, within the limits of the Site boundary and excluding any tree root protection zones. The soils shall be exported from Site to a suitable licenced facility and the waste transfer notes retained for the verification report.

6.5.3 The exposed soils to the sides and base of this excavation shall be tested to demonstrate that they comply with the Acceptance Criteria. One sample on each face of the square excavation and one sample from the base shall be tested. If any test exceeds the Acceptance Criteria, further soil removal and testing shall be carried out.

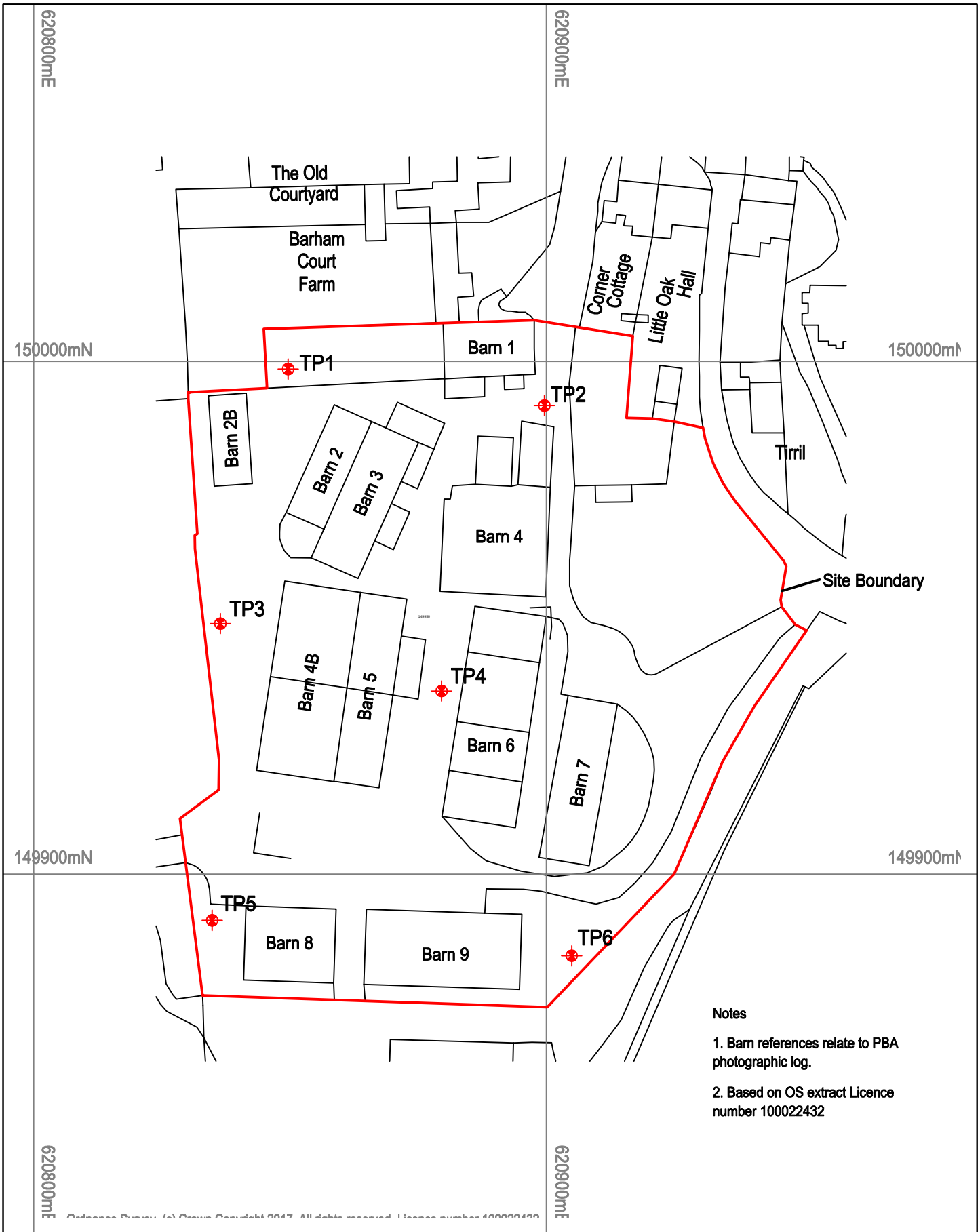
6.5.4 The contents of the existing structures shall be cleared and an asbestos survey carried out prior to demolition. Asbestos containing materials shall be removed during the demolition phase by a licenced contractor in accordance with legislation.

6.5.5 Further undetected contamination particularly of oils and asbestos containing materials may be present on Site. The Site shall be re-inspected with further sampling and testing if necessary on removal of the existing structures and hardstanding.

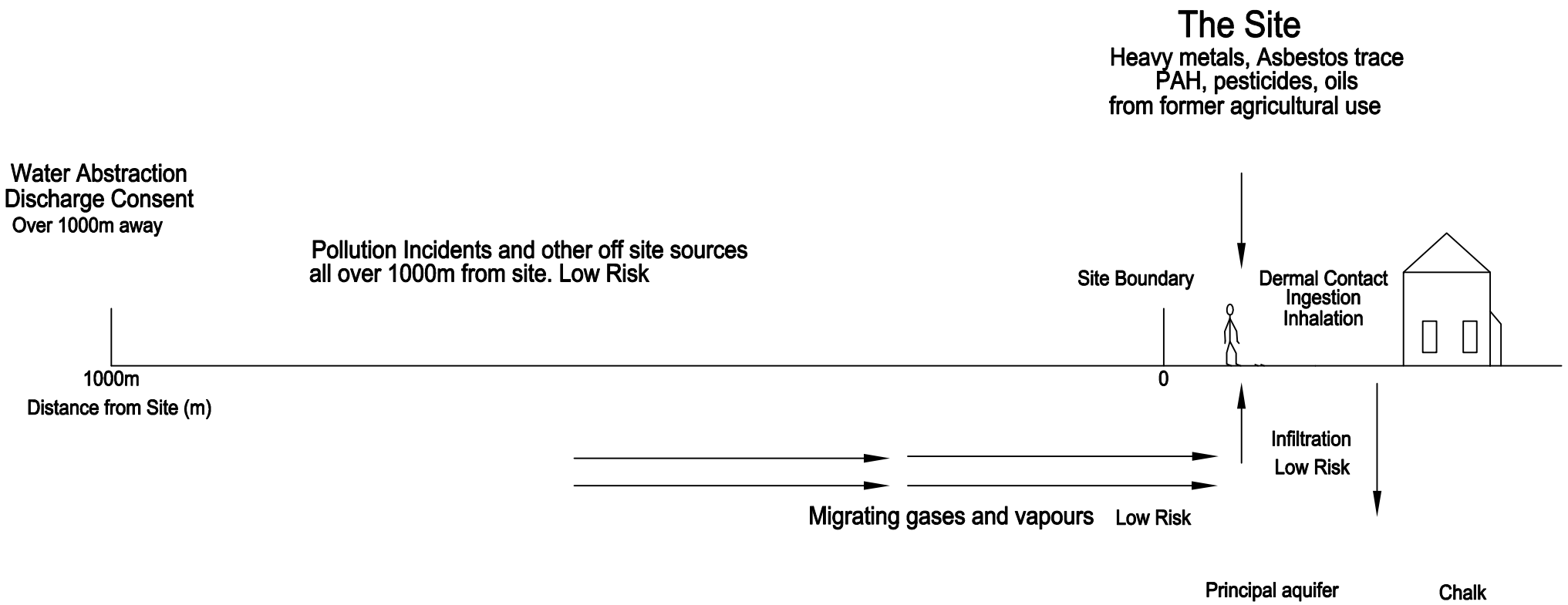
Peter Baxter BEng CEng MICE

For and on behalf of Peter Baxter Associates Ltd

FIGURES



Client: Barham Court Farms LLP	Drawn: PB	Checked: PB	
	Size: A4	Scale: 1:1000	Status: Information
Project: Barham Court Farm Development	Drawing No.: 1044/Figure 1		Rev.: A
Title: Trial Pit and Existing Structure Location Plan	Peter Baxter Associates Ltd, Suite 7, Beaufort House, Sir Thomas Longley Road, Medway City Estate,		



Rev.	Date	Drn.	App.	Revision
A	04.12.17	PB	PB	Information

Client: Barham Court Farms

Project: Barham Court Farm Development

Title: Illustration of Conceptual Model

Drawn: PB | Checked: PB

Size: A4 | Scale: N.T.S. | Status: Information

Drawing No.: 1044/Figure 2 | Rev.: A

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PETER BAXTER ASSOCIATES

TABLES

Project: **Barham Court Farm Development** **Job No. 1044**

Client: **Barham Court Farms** **Date: December 2017**

Table 1 - Summary of Acceptance Criteria and Chemical Analysis Results

TP/BH Depth (m) Lab Sample Ref Date Sampled	**Generic Acceptance Criteria (mg/kg)**			TP1 0.30 302005 14/11/17	TP2 0.20 302006 14/11/17	TP3 0.30 302007 14/11/17	TP4 0.30 302008 14/11/17	TP5 0.20 302009 14/11/17	TP6 0.30 302010 14/11/17
Parameter	**LQM/CIEH S4UL (10)**	**C4SL (11)**	**Dutch Soil Guidelines 2000 (12)**	**Measured Values (mg/kg)**	**Measured Values (mg/kg)**	**Measured Values (mg/kg)**	**Measured Values (mg/kg)**	**Measured Values (mg/kg)**	**Measured Values (mg/kg)**
Asbestos Screen				Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Arsenic (As)	37	37	55	7	4	9	5	< 2	< 2
Barium (Ba)			625	102	41	80	40	11	9
Beryllium (Be)	1.7		30	0.5	< 0.5	0.8	< 0.5	< 0.5	< 0.5
W/S Boron	290			< 1	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	11		12	0.3	0.2	0.7	0.3	< 0.2	< 0.2
Chromium (Cr)	910		380	13	8	15	11	3	3
Copper (Cu)	2400		190	32	13	37	18	10	8
Lead (Pb)		82	530	44	43	95	24	4	3
Mercury (Hg)	1.2		10	< 1	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	180		210	11	6	14	9	< 3	< 3
Selenium (Se)	250		100	< 3	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	410		250	20	10	25	18	5	5
Zinc (Zn)	3700		720	244	51	207	92	20	15
TPH	1600		5000	244	51	207	92	20	15
Benzene	0.087	0.42	1	< 2	< 2	< 2	< 2	< 2	< 2
Toluene	130		130	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	47		50	< 2	< 2	< 2	< 2	< 2	< 2
xylene	60		25	< 2	< 2	< 2	< 2	< 2	< 2
MTBE			100	< 5	< 5	< 5	< 5	< 5	< 5
PAH Total			40	**46.6**	< 1.6	1.9	< 1.6	< 1.6	< 1.6
Benzo(a)pyrene	2.2	2.4		**3.42**	< 0.1	0.19	0.14	< 0.1	< 0.1
Benzo(b)flouranthene	2.6			**4.51**	< 0.1	0.29	0.23	< 0.1	< 0.1
Organophosphate Pesticides				< 0.1			< 0.1		< 0.1

Notes

Adopted Generic Acceptance Criteria are shaded in yellow
Red shaded values exceed the adopted Generic Acceptance Criteria
Residential land use with homegrown produce adopted
Dutch Soil Guidelines Intervention Values Selected

(10) (11) (12) Refer to contents page for Full References

TABLE 2

Conceptual Model and Preliminary Environmental Risk Assessment

Source	Pathway	Receptor	Assessed Environmental Risk
On site contaminants from agricultural TPH, BTEX, PAH, Heavy Metals, asbestos trace, organophosphate pesticides	Leakages into soil. Ingestion, dermal contact, inhalation of dust and vapours	Human occupants of the site. Construction workers.	Moderate risk to Site Occupants and construction workers.
On site contaminants from agricultural (as above)	Leakages into soil Leaching into groundwater	Groundwater	Low/moderate risk. Site overlies a major aquifer
On site contaminants from agricultural (as above)	Leakages into soil Ingestion, dermal contact, inhalation of dust and vapours	Property including pets and livestock and adjoining land	Low/moderate risk
On site contaminants from agricultural (as above)	Leakages into soil Leaching into groundwater. Runoff into surface water. Airborne dust and vapours	Surface waters, ecological systems, archaeological sites, ancient monuments	Low The listed receptors are far from the Site.
Offsite contaminants.	Migrating gases and vapours. Inhalation of vapours	Human occupants of the Site	Low. The Desk Study indicated no potential sources within 1000m of the Site.

TABLE 3

Conceptual Model and Generic Environmental Risk Assessment

Source	Pathway	Receptor	Assessed Environmental Risk
On site contaminants from agricultural TPH, BTEX, PAH, Heavy Metals, asbestos trace, organophosphate pesticides	Ingestion, dermal contact, inhalation of dust and vapours	Human occupants of the site. Construction workers.	Low/moderate. The measured concentrations of on site PAH contaminants exceeded the generic Acceptance Criteria at one location
On site contaminants from agricultural TPH, BTEX, PAH, Heavy Metals, asbestos trace, organophosphate pesticides	Infiltration	Controlled groundwaters	Low. The measured concentrations of on site contaminants exceeded the generic Acceptance Criteria but not significantly. The closest abstraction point was over 1000m from the Site.