Wesson Environmental

Contaminated Land Solutions

PHASE 1 SITE INVESTIGATION

Dairy Farm, East Grimstead, Salisbury

For

Charles Wilkinson

April 2023

Project No. 001TEFIP1

Prepared by

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The material and data in this report were prepared under the supervision and direction of the undersigned.

Wesson Environmental



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15th May 2023

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1.0 Introduction

1.1 General

Wesson Environmental were commissioned to carry out a Phase 1 Site Investigation of the site located at Dairy Farm, East Grimstead, Salisbury.

The report uses documentary data (refs. 1, 2, 3).

The purpose of this report is to assess the potential risks to human, controlled water receptors and to the wider environment arising from past and present land use, and naturally occurring features present at or near the site.

1.2 Scope of report

This report aims to identify and address the following issues related to the use of the site for a residential property:

1. The potential presence of any contaminants.
2. Pathways which may feasibly exist between contaminant sources and receptors.
3. Potential impact on human, controlled waters and the wider environment.

The report will conclude with a preliminary risk assessment which will address issues associated with potential contaminants on the site based on the collation of documentary data.

2.0 Site Location and Description

The site is located at National Grid Reference 422592 127863 and covers an area of approximately 0.13 ha.

Current Site Use:

The site comprises agricultural buildings and associated land.

Site Boundaries:

The site is bordered by residential properties and associated land on all sides except for the south where an access road is present.

Surrounding Site Use:

The surrounding area is predominantly residential with some agricultural land present.

Storage Tanks:

No storage tanks are present on site.

3.0 Site History

Historical maps have been procured from the Ordnance Survey, which show development of the site and its surrounding area from 1881– 2023.

These maps are contained in Appendix B. Please note that maps showing no significant change to the site or surrounding area are not referred to in this section.

Site Area	Date	Scale	Surrounding Area
An agricultural building is present on the western part of the site which conforms to current layout. A smaller building is present on the eastern part of the site. The site forms part of a farm.	1881	1:2500	A pond is present immediately to the north east. The surrounding area is largely agricultural with a small number of residential properties. A smithy is shown 30m to the east and 40m to the south. Orchard is present 30m to the north.
A building is present on the south eastern boundary of the site that appears to be agricultural.	1901	1:2500	
The buildings on the eastern part of the site have now merged with the main building.	1925	1:2500	The smithies are no longer shown.
The building on the south eastern part of the site is no longer shown.	1972	1:2500	A number of residential properties are shown in the wider area. A small area of orchard is shown to the south.
	1991	1:2500	No orchard is present on mapping.

3.1 Areas of Disturbed Ground

No disturbed ground is indicated on mapping.

3.2 Intended Site Use

A residential property is planned on the site.

3.3 Historical Industrial sites

3.3.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping.

10 records found within 500m. Nearest:
0n site. Smithy. Date: 1872.
27m E. Smithy. Date: 1908.
27-33m S. Smithy. Date:1872-1908.

3.3.2 Historical Tank Database

2 records found. Nearest:
415m SE. Tanks. Date:1991.

3.3.3 Historical Energy Features Database

No records found.

3.3.4 Historical Petrol and Fuel Site Database

No records found.

3.3.5 Historical Garage and Motor Vehicle Repair Database

No records found.

3.3.6 Historical military sites

No records found.

4.0 Geological Setting

4.1 Geology

Current geological maps of the region[2] have been consulted to provide information on geological conditions associated with the site.

Artificial/Made Ground:
No records within 500m.

Superficial Geology:
No superficial deposits are recorded underlying the study site.

Bedrock/solid geology:
Bedrock is shown as Sand, Silt And Clay of the Wittering Formation. Intergranular flow is present and permeability is classified as low to high.

4.1.1 Man Made/ Induced Hazards

Hazard	Risk
Natural cavities	1 record found: 460m SE. Type: Swallow Hole.
BritPits	1 record found: 421m S. Commodity: Sand and gravel. Type: surface mineral working. Ceased.
Surface ground workings	2 records found. Both: On site. Pond. Date: 1872-1902.
Underground workings	No records found.
Non-coal mining	3 records found. Nearest: 493m S. Chalk. Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered.
Mining cavities	No records found.
Coal Mining	No records found.
Brine extraction	No records found.
Gypsum extraction	No records found.
Tin Mining	No records found.
Clay mining	No records found.

4.1.2 Natural Hazards

Hazard	Risk
Shrinking/Swelling clay	Moderate
Running Sand	Very Low
Compressible deposits	Negligible
Collapsible deposits	Very Low
Landslides	Very Low
Ground Dissolution	Negligible
Radon	Less than 1% of properties are above the Action Level. No radon protective measures are necessary.

5.0 Environmental Setting

5.1 Hydrology and Hydrogeology

Groundwater:

The bedrock on the majority of the site is classified as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The bedrock on a small part of the east of the site is classified as Unproductive.

Groundwater Vulnerability:

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one-kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

The bedrock aquifer is classified as high vulnerability due to a flow mechanism of well connected fractures.

Soils are classified as low leaching class with an infiltration value 40-70% and a dilution factor of 300-550mm/year.

5.1.1 Surface and Groundwater Abstraction Points

No groundwater abstractions are shown within 1000m.

No surface water abstractions are shown within 1000m.

No potable water abstractions are shown within 1000m.

5.1.2 Source Protection Zones

No Source Protection Zones are shown with 500m.

5.1.3 Surface water

2 records found within 250m:

63m S. Unnamed. Inland river not influenced by normal tidal action.
178m S. Unnamed. Inland river not influenced by normal tidal action

5.1.4 Surface Water Flooding

There are no Risk of Flooding from Rivers and The Sea (RoFRaS) records within 50m of the study site.

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e., land naturally vulnerable to surface water ponding or flooding and classifies the highest risk on site as a 1 in 30 year 0.1-0.3m flood.

5.1.5 River and coastal flooding - Flood Zones

No flood zones are located within 50m of the study site.

5.1.6 Groundwater flooding

The highest risk on site is classified as Moderate.

5.2 Sensitive Land Uses

Uses within 1km.

Designation	**Details**
Sites of Special Scientific Interest (SSSI)	1 record found: 449m E. Name: Bentley Wood.
Ramsar sites	No records found.
Special Areas of Conservation (SAC)	No records found.
Special Protection Areas (SPA)	No records found.
National Nature Reserves (NNR)	No records found.
Local Nature Reserves (LNR)	No records found.
Ancient Woodland	3 records found. Nearest: 449m E. Tytherley Common. Ancient Replanted Woodland.
Biosphere Reserves	No records found.
Forest Parks	No records found.
Marine Conservation Zones	No records found.
Green Belt	No records found.
Nitrate Sensitive Areas	No records found.
Nitrate Vulnerable Zones (NVZ)	1 record found: Onsite. Name: Hamble Estuary Eutrophic NVZ. Type: Eutrophic Water
World Heritage Sites	No records found.
Areas of Outstanding Natural Beauty (AONB)	1record found: On site. Name: Chilterns.
National Parks (NP)	No records found.

5.3 Landfill and Other Waste Sites

Uses within 1km.

Records Searched:	**Details**
Active or recent landfill	No records found
Historical landfill (BGS records)	No records found
Local Authority and Mapping Records	No records found
Historical Landfills from EA/NRW	No records found
Historical waste sites	No records found
Licensed waste sites	No records found
Waste exemptions	No records found

5.4 Current Land Use

There are no current potentially contaminative industrial sites identified within 250m of the study site.

Full details are contained in Appendix C.

5.5 Petrol and Fuel Sites

No records found:

5.6 Electricity cables

No records found.

5.7 Underground Gas Pipelines

No records found.

5.8 Environmental permits, Incidents and Registers

Industrial Sites Holding Licences/ Authorisations:	**Records Held:**
Sites Determined as Contaminated Land under Part 2A EPA 1990	No records found
Control of Major Accident Hazards (COMAH)	No records found
Regulated explosive sites	No records found
Hazardous substance storage/usage	No records found
Historic IPC Authorisations	No records found
Part A (1) Licensed industrial activities	No records found
Licensed pollutant release (Part A(2)/B)	No records found
Radioactive Substances Authorisations	No records found
Licensed Discharges to controlled waters	18 Record Found. Nearest: 461m SE. Effluent Type: Sewage Discharges -Final/Treated Effluent –Water Company/ Sewage Discharges -Stw Storm Overflow/Storm Tank - Water Company.
Pollutant release to surface waters (Red List)	No Records Found
Pollutant release to public sewer	No records found
List 1 Dangerous Substances	No records found
List 2 Dangerous Substances	No records found
Pollution Incidents	2 records found. Nearest: 86m SW. Pollutant Description: Other General Biodegradable Material or Waste. Land Impact: Category 3 (Minor).
Pollution inventory substances	No records found
Pollution inventory waste transfers	No records found
Pollution inventory radioactive waste	No records found

6.0 Walkover survey and other information

The site was visited on 21st March 2023. The site comprised former agricultural buildings with turfed areas present to the north east and south west. The building on the site was observed to be used for storage of hay and logs and was of breeze block construction with a metal roof and concrete floor. It is understood that this had been used as a cattle shed. The south eastern part had a dirt floor and was used for dry storage. A soil pile was indicated on the eastern part of the site adjacent to the pond as indicated in figure 1. This was observed to comprise topsoil and logs.

It is understood that the site was used as a dairy farm until the 1960s. A poultry farm was located 500m to the south west that was used to raise chicks. The area to the south west of the building which was turfed with some raised vegetable beds present is understood to have been previously used as an orchard.

7.0 Preliminary Conceptual Site Model

7.1 Introduction

To enable risks from contamination in soils, a preliminary conceptual site model (CSM) has been developed. This is based on documentary data sources such as site history, contemporary land use data, landfill records, geological mapping and hydrogeological/hydrological data.

The CSM allows the identification of potential pollution linkages and comprises the following three elements:

Source - Potential contaminants associated with former and current land use.

Receptor – who or what could be affected. May include site users, the water environment. Ecosystems and construction or building materials including services.

Pathway – How the receptor may be exposed to the source.

A pollution linkage is only considered to exist if all three elements are present. If a pollution linkage exists, then further assessment may be necessary.

7.2 Potential Sources of Contamination

The historical mapping that the site was used as a farm from the earliest records. Whilst the available data suggests that a smithy was located on the site dated 1872, we believe this to be erroneous and due to inaccuracy of the small scale mapping. This appears to refer to the smithy located approximately 30m to the east, with the label coinciding with the site, but not the feature.

It is understood that the site was previously a dairy farm. The DEFRA document CLAN4/044[6], discusses various potential sources of contamination relating to these activities. These will be dealt with individually in relation to the study site:

1. Metals and other elements. These can arise from a) animal manures, b) fertilisers and agrochemicals and b) sewage sludge and other waste. This would be relevant to areas of farmland where these applied in high concentrations, with copper and zinc accumulating where pig or poultry manure was applied in substantial amounts. Rates of total cadmium accumulation are low where phosphate fertilisers have been applied – especially in comparison to copper accumulation where fungicides have been applied at high rates. The document states that the latter may be present in former orchards and hop gardens but even here the concentrations in soils are likely to be low. In both cases, the history of the site indicates animal manures and agrochemicals are unlikely to have been applied in high rates on the farmland. Furthermore, even it had been applied, this would have impacted adjacent land as opposed to the site itself. Likewise, given the use of the farm for livestock, it is unlikely that sewage sludge was applied to the site itself.

2. Organic contaminants. These may include modern pesticides and petroleum hydrocarbons (TPH). In the case of pesticides CLAN/04 states ‘Pesticides applied according to their approved use do not constitute a significant contamination risk’. Furthermore, the use previously of the farm for cattle would mean that use of such pesticides would be limited. Organo-phosphates have been used historically for control of external pests in cattle and other livestock. Whilst is possible that spillages may have occurred locally and as a consequence of excess pesticides dripping from animals following treatment, this would be expected to in relatively small quantities. Organo-phosphates have a high degradability in environmental media, and consequently would not be expected to represent a significant source term in soils[7]. Other organic contaminants that are associated with agricultural land use are petroleum hydrocarbons. There is no evidence that land use has taken place that may have released TPH into site soils.

The area of orchard that was mentioned during the walkover survey on the southern part of the site appears to be consistent with the orchard shown to the south of the site on 1972 mapping. Whilst pesticides such as lead arsenate and Paris Green (copper (II) acetate triarsenite or copper(II) acetoarsenite) were used in the late 19th century, they were replaced by more modern pesticides by the early-mid 20th century and the same comments above apply. Furthermore, this was a small feature and therefore, the usage of pesticides would be expected to be correspondingly small.

The distance to offsite land uses such as smithies indicates that they are unlikely to have impacted site soils.

7.3 Preliminary Risk Assessment

In developing the conceptual model, it is critical that not just the source of any potential contamination is assessed but also potential receptors and pathways. The future use of the site may introduce new pathways to any contaminants that may be present. A change in use of the site may also introduce human receptors to different exposure scenarios.

The use of risk assessment methodologies such as CLEA allows assessments to be made of whether concentrations of potential contaminants exceed a particular guideline value. The exceedance of a particular guideline value does not however, in itself enable an evaluation to be made of whether or not the subsequent risk posed to receptors is acceptable.

The risks from a particular pollutant linkage should therefore be evaluated to enable a determination of whether or not the risks are acceptable. This requires classification of:

The magnitude of the severity of the risk occurring (Table 7-1)
The magnitude of the likelihood of the risk occurring (Table 7-2)

Classification	Definition
Severe	Short term risk to human health which is likely to result in 'significant harm' as defined by the Environmental Protection Act 1990, Part IIA. Short term risk of pollution of sensitive water resources. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such an organism
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming part of such ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent effects to human health which may easily be prevented by measures such as personal protective clothing, etc. Easily repairable effects of damage to buildings, structures and services

Table 7-1: Classification of severity of risk after CIRIA 552

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

Table 7-2: Classification of likelihood of risk after CIRIA 552

To evaluate the risk that each pollutant linkage present on the site poses to a specified receptor, the classifications from each table are compared. It is important that this is only applied where the possibility of an existing pollutant linkage exists. This enables a risk category to be produced that range from 'very high risk' to 'very low risk' (Table 7-3.)

		Consequence			
		Severe	Medium	Mild	Minor
Likelihood	High Likelihood	Very High Risk	High Risk	Moderate risk	Moderate/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

Table 7-3: Comparison of consequence with likelihood of risk occurring, after CIRIA 552.

The classification gives a guide to the severity and consequence of risks that have been identified at the site. It is not possible to classify a risk that has been identified as presenting 'no risk'. 'Very low risk' is the lowest risk ranking classification. Whether action is required depends on how acceptable the stakeholder views that risk as being. Table 7-4 shows the action required for specific risk classifications.

Risk classification	Action
Very high risk	A high probability that severe harm could arise to a specified receptor from an identified hazard OR there is evidence that severe harm is currently happening. If the risk is realised it is likely to result in substantial liability If not already undertaken, urgent investigation is required, and remediation measures are likely to be required.
High risk	Harm is likely to arise to a specified receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. If not already undertaken, urgent investigation is required, and remedial works may be necessary in the short term and are likely over the longer term.
Moderate risk	It is possible that harm could arise to a specified receptor from an identified hazard. It is relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild. If not already undertaken, investigation is normally required to clarify the risk and determine potential liability. Some remedial works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild
Very low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Table 7-4: Description of the classified risks and likely action required after CIRIA 552.

As discussed in the previous section, a contaminant source from past land use is considered to be unlikely to be present in site soils. Therefore, in the absence of a source, a discussion of pathways and receptors is not considered to be relevant. Risks to future site users and controlled waters are therefore classified as **NEGLIGIBLE**.

7.4 Ground Gas

No potential ground gas sources are identified within 250m of the site. Risks from ground gas are therefore considered to be **NEGLIGIBLE**.

7.5 Mining

No mining risks are indicated in the vicinity of the site.

8.0 Conclusions and Recommendations

The review of documentary information indicates that there is a NEGLIGIBLE risk to human health and to controlled waters. Risks from ground gas are considered to be NEGLIGIBLE.

All site investigations carried out in the UK should follow the principles set out in LCRM. This specifies that a phased approach should be used with a desk top study carried out in the first instant in all cases. Where this does not indicate the potential for a pollutant linkage, there is not considered to be a requirement for further stages such as intrusive investigations that involve the physical sampling of soils[4].

There are no recommendations for further investigations.

Should during any works on the site, evidence of contamination become apparent, this should be reported to the Local Authority contaminated land officer.

9.0 Statement of Limitations

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project, without an independent check being carried out as to its suitability, and prior written authority of Wesson Environmental being obtained. This document can be relied upon by Charles Wilkinson. Wesson Environmental accepts no responsibility or liability for the consequences of this document being used for any purpose other than the purpose for which it was commissioned. Any person using or relying on the document for such other purpose, agrees, and will by such use or reliance, be taken to confirm his acceptance, to indemnify Wesson Environmental for all loss or damage resulting therefrom. Wesson Environmental accepts no responsibility or liability for this document to any other party.

10.0 References

1. Ordnance Survey Maps – Collated for Wesson Environmental by Groundsure. Ref: WES-RRT-3JA-48D-HGD.
2. Groundsure Enviro and Geo Insight. Ref: WES-RXS-RB8-DHZ-SMC.
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4. RB17 – A pragmatic Approach to Ground Gas Risk Assessment (2012). CL: AIRE.
5. Wilson and Card 2011. A pragmatic approach to ground gas risk assessment for the 21st Century. EPG Group Limited.
6. CLAN 4/04. Contamination Of Agricultural Land & Part IIa Of The Environmental Protection Act 1990. 2004. DEFRA Contaminated Land Branch
7. Manahan S.E. (2000). Fundamentals of Environmental Chemistry.

APPENDIX A

Figures



Figure 1. Site features



Figure 2. Current site building from the north.



Figure 3. The current building from the south.



Figure 4. Interior of southern part of building

APPENDIX B

Historical Maps

APPENDIX C

Environmental Reports