Tivoli Consulting Limited

Tivoli Consulting

Losito Stud

Potential Ground Contamination – Desk Study, Losito Stud, Near Marston, Herefordshire

April 2011

Tivoli Consulting Limited
2 Loweswater Road
Cheltenham
Gloucestershire
GL51 3AZ
(07796) 333 201
sales@tivoliconsulting.co.uk
www.tivoliconsulting.co.uk

Losito Stud
Losito Stud
Near Marston
Herefordshire

Tivoli Consulting Limited

Table of Contents

Authorisation Sheet

Client: Losito Stud

Project: *Potential Ground Contamination – Desk Study*

Version: v1.0

PREPARED BY

Signature:

Name: Mark Roberts

Position: Associate

Date: April 2011'

AUTHORISED FOR ISSUE

Signature:

Name: Andrew McKenzie

Position: Director

Date: April 2011

DISTRIBUTION

Losito Stud

Tivoli Consulting Limited

Report Summary

A desk study has been undertaken to determine the potential ground contamination at the Losito Stud site near Marstow, Herefordshire. The site is currently laid for grazing land. However the site was a former quarry with landfill operations.

Through the planning consultation process Herefordshire Council has requested further information on the potential ground contamination at the site associated with these former land uses.

This report has been prepared following a site visit undertaken on 11 April 2011 and a review of the licence surrender reports provided by the Environment Agency.

The report concludes that the previous monitoring indicates that there is a relatively low risk to human health associated with contamination associated with the previous landfill operations undertaken on part of the site.

2 Review of Data

2.1.1 The two most recent waste management completion reports (2007 & 2008) have been reviewed and a summary of the evidence for contamination is provided below.

2.1.2 This report will contribute toward fulfilling the requirements of PPS23 with regard to soil and air pollution.

2.1.3 The statutory definition of contaminated land is defined in the Environmental Protection Act 1990 and the Environment Act 1995 as:

- Land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that
  - Significant harm is being caused or there is a significant possibility of such harm being caused; or
  - Significant pollution of controlled waters is being, or there is significant possibility of such pollution being caused

2.1.4 After a discussion with the case planning officer it was suggested that the greatest concern lies around the pathways for contamination that will directly influence humans, and to a lesser extent, animals. The potential sources of contamination were considered to be landfill gas, landfill leachate, contaminated soil. The main linkages reviewed in this report are as follows:

- Contaminated soil – direct ingestion – human and animals
- Contaminated soil – dermal contact – human and animals
- Contaminated soil – dust inhalation – human and animals
- Contaminated soil – plant uptake – site landscaping
- Contaminated soil – ingestion of affected plants – animals
- Landfill gas – vapour inhalation – humans and animals
- Landfill gas – accumulation and inhalation – humans
- Landfill gas – accumulation and explosion – humans and property

2.2 The Waste Management Licence Completion Report 2007

2.2.1 The report undertook a review of data provided by trial pits, two (2) groundwater monitoring boreholes, six (6) gas and leachate monitoring sites, soil analysis and settlement surveys (section 6). A summary of the key findings together with evidence from the Tivoli site visit can be found below.

Pathway 1: Contaminated soil – direct ingestion – human and animals

2.2.2 Analysis of soil from the site shows only low or non detectable levels of contamination. The location of the soil analysis is not clear from the report but it is clear that there is a sufficient clean capping layer in place to prevent direct ingestion. The capping layer of soil is reported to be 0.7 – 1.25m deep (section 9.1.1). The report noted that sheep have been grazing on the site for over 10 years and have shown no ill effects.

Pathway 2: Contaminated soil – dermal contact – human and animals

2.2.3 The report states that due to the thickness of the capping layer it is unlikely to be plausible that there is a feasible dermal contact pathway on site (section 9.1.1).

Pathway 3: Contaminated soil – dust inhalation – human and animals

2.2.4 The report states that due to the thickness of the capping layer it is unlikely to be plausible that there is a feasible inhalation pathway on site (section 9.1.1).

Pathway 4: Contaminated soil – plant uptake – site landscaping

2.2.5 The report states that due to the thickness of the capping layer it is considered that there is unlikely to be a detrimental effect on the local plant life. The Environmental Agency did note an area of discolouration on an early site visit but this was not seen on subsequent visits. The report states there were no visible signs of vegetation distress on or around the site (section 4.2.3).

2.2.6 No visible signs of vegetation stress were noted on or around the landfill area during the Tivoli site visit on the 11th April 2011. (See Appendix 1)

Pathway 5: Contaminated soil – ingestion of affected plants – animals

2.2.7 As mentioned in the sections above, there is no evidence of distress to animals that have been grazing the site for over 10 years.

Pathway 6: Landfill gas – vapour inhalation – humans and animals

2.2.8 The report states there is no evidence of odours or visible impact on the surface, which would indicate no valid pathway for land fill gas in the vicinity of the development site (section 9.1.1).

2.2.9 During the site visit on the 11th April 2011 again no evidence of odours or surface impacts were present (See Appendix 1).

2.2.10 The 2007 report states that landfill gas levels were well below the completion guidelines but do not show an obvious downward trend. The 2007 report highlights that CO_2 levels are being produced above the short term exposure limit although it is stated that there will be rapid dilution once at the surface. In the light of these findings additional monitoring was advised. Information on further monitoring is summarised in the 2008 supplementary report.

Pathway 7: Landfill gas – accumulation and inhalation – humans

2.2.11 Concentrations of CO_2 are being produced at 5% higher levels than the short term exposure limit of 1.5% (section 9.1.1). Due to the high production levels of CO_2, the 2007 report suggested a potential need for an additional risk assessment due to the proximity of human receptors (Hill Farm and Dry Arch Cottage). Given the distance to human receptors and the semi porous nature to the geological pathway, it was considered unlikely that levels would be sufficient to cause significant harm.

2.2.12 Please see section 2.2.10 for discussion on landfill gas.

2.2.13 With plans to build a dwelling on site the proximity to human receptors has changed, and indeed moved closer. Therefore the need for a further risk assessment may be required to understand the concentration of gases near the current building site.

Pathway 8: Landfill gas – accumulation and explosion – humans and property

2.2.14 Methane (one of the primary components of landfill gas) production has ranged from 4% to 19% thus between the lower and upper explosive limit. Rapid mixing occurring at the surface results in methane concentrations well below the lower explosive limit. Due to the distance to the nearest receptor and the semi porous nature of the geological pathway the report concluded that concentrations at the receptor would not be sufficient to cause harm.

2.2.15 Again due to the human receptor distance being significantly smaller with the current building plans a further risk assessment may be prudent to ascertain the true risk at site, especially if new buildings will be build on foundations dug into the surface.

2.3 The Waste Management Licence Supplementary Completion Report 2008

2.3.1 This report was published to show recommendations from the 2007 report had been acted on.

2.3.2 Four monitoring visits were made between July 2007 and January 2008. The report noted that there were no visible signs of discolouration or odour coming from the landfill site. All vegetation on and around the landfill appeared healthy and showed no sign of stress (section 4.2.3).

2.3.3 Further monitoring took place as recommended by the Environment Agency in the 2007 report. Three exploratory holes were drilled to allow additional monitoring of groundwater and landfill gas concentrations. They were sampled 3 times between July 2007 and January 2008 (section 6.2).

2.3.4 Levels of leachate in the landfill were recorded as being very low. Iron, Manganese, Ammoniacal Nitrogen and Total Organic Compounds (TOC) were recorded above the completion criteria but were only deemed a risk to downstream receptors during extreme rainfall events. Consequently it is unlikely any harm will occur at the receptor due to dilution.

2.3.5 No significant patterns were identified at the monitoring sites over the alluvium and brownstones formation geology. Most sample parameters were below the completion criteria. The monitoring well over the alluvium recorded elevated TOC in November 2006 and January 2008. This was reported as possibly representing infiltration from the limited water in the landfill. The monitoring well situated over the brownstone formation recorded slightly elevated Nitrite and elevated pH in August 2007. This, again, was reported as minor interactions between the groundwater and landfill, and posed no threat to the aquifer.

2.3.6 Further assessments of gas were undertaken on existing and new boreholes. The results showed no change from the previous data and no adverse results were encountered.

2.3.7 The three pathways of concern for this report are as follows:

- Landfill gas – vapour inhalation – humans and animals
- Landfill gas – accumulation and inhalation – humans
- Landfill gas – accumulation and explosion – humans and property

Pathway 1: Landfill gas – vapour inhalation – humans and animals

2.3.8 Based on further monitoring the 2008 report states there is no alteration to the original pathway assessment. Based on the new results no further assessment is required.

Pathway 2: Landfill gas – accumulation and inhalation – humans

2.3.9 New monitoring indicated no unacceptable levels of landfill gas. It was considered that levels are not sufficient enough to cause significant harm if the receptor remains the same.

Pathway 3: Landfill gas – accumulation and explosion – humans and property

2.3.10 The report states the due to the distance to the nearest receptor and the semi porous nature of the geological pathway, levels would not be sufficient to cause significant harm at the receptor.

3 Conclusions and Recommendations

3.1 Conclusions

3.1.1 Significant monitoring of the site has taken place as part of Waste Management Licence Completion Reports from 2007 and 2008

3.1.2 Comprehensive assessments of contaminated land, leachate production, and land fill gas have been undertaken across the site.

3.1.3 Risk to human and animal receptors is deemed small. There were no elevated concentrations of contamination in the soil. Leachate production was low and may only be a minor problem to "water" based receptors during extreme rainfall events. Additional assessments of landfill gas concentrations were undertaken on the advice of the Environment Agency. Additional monitoring showed no adverse results and minimal risk for human and animal receptors.

3.1.4 The original human receptors for the Waste Management Licence Completion Reports were at Hill Farm and Dry Arch Cottage approximately 150m to the west of the site. The reports stated that the landfill gas source would not cause a significant problem to human receptors due to the distance between them and the source.

3.1.5 This report has been prepared in response to a retrospective application for planning permission by Losito Stud who has constructed a timber-framed domestic dwelling on site. A covered yet open (open ends, timber slatted upper wall sections) stable block has also been constructed on site for which planning approval has already been granted. These structures have been constructed on the route of the former landfill site access road and are understood to be outside of the original landfill boundary.

3.1.6 The timber-framed dwelling has been constructed on a raised platform resulting in a void-space approximately 60cm in height. This void-space is open-sided and enables air flow under the property. Essential services (oil, water, electricity) are provided by underground and above ground connections into the property.

3.1.7 These human receptors are now significantly closer and it would be prudent to revisit this issue with a further additional monitoring of landfill gas in and around the location of the building.

3.2 Recommendations

3.2.1 It is recommended that further monitoring of land fill gas is considered around the site of the building referred to in paragraph 3.1.5 above. The monitoring undertaken as part of previous work stated the risk to human and building receptors was small. This conclusion is still valid but additional data especially from borehole GM6 located approximately at grid reference 355620,218580 would help to show that pathways for landfill gas at that location do not exist.

3.2.2 This report has not considered ground stability issues. Therefore construction of any further structures on the site should consider the potential for ground movement as a result of material settlement within the landfill due to additional loading.

3.2.3 It is recommended that any further construction should occur outside of the original landfill area where possible to minimise risk (such as landfill gas accumulation, opening up a possible contamination pathway) and to minimise project complications. However, this desk study and the others referenced indicate that the risks associated with the former landfill operations are relatively low. Consequently should a development on the landfill area be considered in the future, appropriate solutions and techniques can be implemented to minimise further the potential significance of these risks. It is also considered prudent to design any further buildings that may be located in the immediate vicinity of the site to have adequate ventilation to prevent the build up of landfill gas within confined spaces.

Appendix 1 Supporting Photographs

The following are a selection of photographs taken during the Site visit undertaken on 11 April 2011 by Tivoli Consulting.

Photograph 1 *Panoramic view of the site looking south west from the highest point on the landfill. No visible signs of vegetation distress.*

Photograph 2 *Panoramic view of the site looking north east toward the landfill site. No visible signs of vegetation distress.*

Photograph 3 *Timber-framed dwelling has been constructed on a raised platform providing ventilation.*