CLC4: Contaminated land planning guidance

Ground gas and vapour protection for extensions

1. Introduction

This guidance has been developed to help developers and consultants discharge the ground gas and vapour protection condition. It is important that the requirements of the condition and this guidance are adhered to during development. Failure to discharge a planning condition may result in enforcement action, additional expenditure and prevent property from being sold.

"CLC4: Ground gas and vapour protection for extensions condition:

A. No development shall commence until a ground gas and vapour strategy (GGVS) is submitted to and approved in writing by the local planning authority.
B. No occupation or use of the development shall commence until the approved GGVS is implemented and a verification report is submitted to and approved in writing by the local planning authority.

Where physical remedial measures are implemented to protect end-users of the development they shall be maintained. The GGVS, VR and any unexpected contamination identified during the development shall be addressed in line with the Council's Ground Gas and Vapour Protection for Extensions guidance."

This condition applies to residential developments where small extensions (i.e. up to about 50m^2) are proposed and a risk from ground gases or vapours may exist due to a past contaminating use on or near to the development (i.e. typically within about 10m or 20m). More recent developments may already incorporate appropriate protective measures, in which case the existing measures may simply be extended into the new extension.

The guidance presents the option of either undertaking ground gas and vapour monitoring, to identify whether additional protection is needed, or simply installing additional protective measures from the outset. Protective measures will usually include incorporating a gas and vapour proof membrane into the foundation of the extension.

This is guidance only and is intended to provide an indication of what will normally enable the Council to make decisions under planning. Other relevant industry guidance and standards should also be consulted where appropriate.

It is the responsibility of the developer to ensure that they comply with the requirements of Contaminated Land, Health & Safety, Waste Management, Environmental Damage and the Control of Asbestos Regulations. The responsibility to properly address contaminated land issues, including safe development and secure occupancy, and irrespective of any involvement by this Authority, lies with the owner/developer of the site. Whilst all reasonable care has been taken to ensure the accuracy of the information and data provided within this guidance, the Council accepts no liability for any loss or damage, howsoever caused, arising from any reliance placed by any other person upon the information and data contained herein.

2. Why action is needed

The Royal Borough of Kensington and Chelsea (RBKC) has a long industrial history, some of which is captured by historical records such as historical mapping, trade directories and records of above ground and underground storage tanks.. Some industries and activities

are more likely to be associated with the storage of chemicals and fuels, which in some cases will result in significant soil contamination, groundwater pollution and ground gas and vapour production. Other activities, such as landfilling, may be associated with ground gas. Where gases and vapours are produced they may migrate through the soil and into buildings resulting in harm to occupants, for example toxic chemicals may result in illness and flammable gases and vapours may explode.

Common ground gases and vapours include:

- **Methane:** Methane is a colourless, odourless, flammable gas, formed via anaerobic degradation of organic material. Methane may explode between its lower and upper explosive limits (LEL and UEL) of 5% volume in air (v/v) LEL and 15% v/v UEL respectively. When present in sufficient concentrations methane is also an asphyxiant.
- **Carbon dioxide:** Carbon dioxide is a colourless, odourless, toxic gas, which can be formed by aerobic and anaerobic degradation of organic material. It is an asphyxiant which causes headaches and shortness of breath at 3% v/v and is severe at 5% v/v, resulting in the loss of consciousness at 10% v/v and being fatal at 22% v/v.
- **Vapours:** A range of hydrocarbon compounds, known as volatile hydrocarbon compounds, evaporate quickly at room temperature forming gases, which are known as vapours. These include compounds such as benzene, toluene, ethyl benzene, xylene and naphthalene and chlorinated solvents such as tetrachloroethene (PCE) and vinyl chloride. Many of these compounds are toxic and compounds such as benzene, PCE and vinyl chloride are known carcinogens. Hydrocarbon vapours can also be explosive at certain concentration in the air.

When deciding whether to attach the ground gas and vapour condition, the Council will check the details of the development and consider whether the proposed extension is likely to result in a significant additional risk if ground gases and vapours are present. The following provides examples of where a condition may and may not be added.

Examples of where a condition may and may not be added:

1. **Condition likely to be added**
   - Property situated on a past industry commonly associated with hydrocarbon contamination, for example a works, chemical factory or petrol filling station.
   - Where limited evidence is available on the history of an industrial area on, or within, about 10m or 20m of a site.
2. **Condition may not be added**
   - Property situated on smaller industry that is less likely to be associated with hydrocarbon contamination, for example, small scale industries such as dairies, shoemakers and builders.
   - A very small extension that is considered less likely to result in a significant pathway by which ground gas and vapours may migrate into a building.
   - Evidence is provided to demonstrate that ground gases and vapours are unlikely to pose risks at the site.

Where a condition is not added usually an informative will be attached to the decision notice of the planning application, providing advice on work the developer should consider undertaking.

3. Information needed to satisfy the planning condition

The Planning Authority requires the following information to discharge the ground gas and vapour protection for extensions condition:

- Ground gas and vapour strategy: identifying how the risk from ground gas/vapours is to be addressed
- Verification report: providing information to demonstrate that the ground gas and vapour strategy has been implemented and including a statement regarding unexpected contaminated land.

In many cases the ground gas and vapour strategy will be to appropriately install a ground gas and vapour membrane into the foundation of the extension. In such cases, the verification report will largely comprise a simple written confirmation that the membrane has been appropriately installed along with details of any unexpected contamination encountered. In a few instances, developers may decide to undertake a ground investigation to identify whether ground gas or vapour issues exist.

Where a satisfactory ground gas and vapour strategy is provided at the planning application stage, Part A of the ground gas and vapour protection of extensions condition will be removed. Where evidence is provided demonstrating that there is unlikely to be a source of ground gas or vapours at the site, a condition will not usually be required. It is therefore important to check the final wording of any condition attached to the decision notice.

4. Ground gas and vapour strategy

The strategy should address how the risk from ground gases and vapours is to be addressed within the extension. While not required by the condition, it is recommended that applicants undertake appropriate historical checks (see **Appendix 1**) and include this information within the ground gas and vapour strategy.

Ground gas and vapour measures already installed in the main property:
In a few cases, ground gas and vapour protection measures will already be fitted in the property that is to be extended. This may include measures such as a ground gas and vapour membrane and a subfloor void vented to the atmosphere. For more recent developments (i.e. 1970s to present) it is worth checking the foundation details to identify whether any ground gas and vapour protection measures have been installed.

Where existing measures are to be extended into a proposed extension, the following information should be provided within the ground gas and vapour strategy:

- Full details of the measures already installed in the existing property, including details of membranes and vented subfloor voids. Where available, plans and cross sections illustrating how the measures have been installed and details of any membranes that have been used and what gases and vapours they are resistant to should be provided.
- Foundation details of the extension, including plans and cross sections, illustrating how the existing protection measures will be continued into the extension. This must include how any membranes will be appropriately keyed into the existing buildings.

Fitting of a gas and vapour proof membrane:
For many developments the easiest approach to satisfying the ground gas and vapour condition will be to install a gas and vapour proof membrane. This will avoid the cost of undertaking intrusive site investigation work.

Where a ground gas and vapour membrane is to be installed into the proposed extension, the following information should be provided within the ground gas and vapour strategy:

- Manufacturers details of the proposed membrane demonstrating that it is resistant to methane, carbon dioxide and hydrocarbon vapours.
- Plans and cross sections of the extension showing how the membrane will be installed and appropriately keyed into the existing building.

Undertaking ground gas and vapour monitoring:
For larger extensions, it may be cost effective to undertake ground gas and vapour monitoring, especially where this identifies that mitigation measures are not needed. In some instances, the Council may require that monitoring is undertaken.

Where ground gas and vapour monitoring is to be undertaken, the following information should be provided within the ground gas and vapour strategy:

- Ideally historical information identifying sources of ground gas and vapours (see **Appendix 1)**.
- Details of the intrusive site investigation work to be undertaken including the number, type and depth of the monitoring positions, the gases and vapours to be monitored for, the duration of monitoring and a location plan showing the proposed monitoring locations.
- Actions that will be undertaken if a ground gas or vapour issue is identified, for example, agreeing the appropriate installation of a ground gas and vapour proof membrane with the Planning Authority.

The CLC3 guidance for 'Small-scale ground gas and vapour protection' sets out how to design a ground gas investigation for basement extensions and so may also be used to design an investigation for smaller extensions. For smaller extensions, where vapours are the main concern, an alternative cost-effective approach to monitoring would include the use of shallow vapour monitoring wells (refer to BS10175).

5. Verification Report

Once the extension is completed and the requirements from the ground gas and vapour strategy are implemented, a verification report must be submitted to the Planning Authority including:

- The results of any intrusive site investigation work including investigation logs, monitoring results, chemical analyses certificates and assessment and conclusions. Reference should be made to the CLC3 guidance.
- Evidence to demonstrate that any agreed ground gas/vapour protection measures (e.g. membrane/sub floor ventilation) have been installed; including as built drawings, photographs, receipts proving the purchase of the relevant membrane and written confirmation.
- A clear and unambiguous written and signed statement from the onsite manager/developer identifying whether any evidence of unexpected contamination

was encountered during the course of groundworks and where it was, providing full details of the contamination encountered and how it was dealt with (see **Section 6**).
- Any ongoing maintenance that is required.

Regarding the ongoing maintenance of any measures implemented to protect end-users of the development, to ensure they remain effective, the future owner/occupier of the property should:

- Maintain the integrity of any gas or vapour resistant membranes for the lifetime of the development.
- Ensure that where the membrane is punctured for any reason it is appropriately fixed in line with manufactures guidelines.
- Service and where necessary replace passive/active ventilation measures to ensure they remain functional.
- For commercial and managed property, ensure the verification statement forms part of the Health and Safety file for the property.

Ideally this information should be included within the Verification Report.

6. Action and evidence of unexpected contamination

Where unexpected contamination is encountered the following actions must be taken by the developer:

- All development shall cease in the affected area;
- The Planning Authority and Pollution Regulatory Team must be contacted within 2 working day or sooner if the contamination poses a significant risk to health;
- Any additional or unforeseen contamination shall be dealt with as agreed with the Contaminated Land Officer (including a contamination risk assessment, remediation strategy and verification report, as required) ; and
- Where development has ceased in the affected area, it shall only recommence upon written notification of the Planning Authority or Contaminated Land Officer.

Examples of unexpected contaminated land include soils stained by oil/fuel, uncharacteristically coloured liquids/soils or groundwater, debris such as asbestos and pungent or pleasant odours arising from the soil or groundwater. It would also include where Made Ground is found to be consistently deeper than 2m below ground level across the property and where there is a high proportion of putrescible material found in the soil.

Upon completion of all groundworks, the onsite manager/builder must provide a clear and unambiguous written and signed statement to the Planning Authority identifying whether any significant unexpected contamination was encountered during the development. Where significant unexpected contamination was encountered, full details of the contamination and how it was dealt with must be provided. This information must be included within the Verification Report.

Appendix 1

Further work to consider

Environmental and historical information

The applicant should consider collecting the following information, particularly if intrusive site investigation work is to be undertaken.

- An environmental search collating available sources of information such as historical mapping, geology and hydrogeology, statutory registers, records of historical contaminating uses, unexploded ordnance, etc. Several commercially available EHI searches are available.
- Available intrusive site investigation information on, and in the vicinity of, the site. Where historical information is to be used, it should be relevant to the on site conditions and typically be recent (i.e. within 5-10 years).
- Searches of British Geological Survey 'Onshore Borehole Records' available at http://www.bgs.ac.uk/data/boreholescans/home.html.
- Contaminated land search with the Pollution Regulatory Team (PRT) at the RBKC - contact EH-Pollution@rbkc.gov.uk.
- Searches of planning records on RBKC's website - https://www.rbkc.gov.uk/planning/searches/default.aspx.
- Anecdotal information from current owners and occupiers of the site.

Searches of the planning records for the address should include:

- A simple or advanced search
- Planning history of individual properties from 1948-2009
- Microfiche records for 1948-1996

Should the EHI identify more significant past or present uses, a more detailed preliminary risk assessment for ground gas and vapours will be required in line with the Environment Agency's Land Contamination: Risk Management Guidance and RBKC's Main Contaminated Land Guidance.