Stanton Harcourt Parish Council

Report on proposed housing development adjacent to Dix Pit Landfill, Stanton Harcourt

Final Report by

Phillip Crowcroft
Partner
ERM

5th June 2017

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Reference: 0399537/1_pc

Prepared by: Phillip Crowcroft

Written by:	Phillip Crowcroft
Signed:	
Position:	Partner/Technical Fellow
Date:	5th June 2017

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A. INTRODUCTION

EXPERIENCE AND QUALIFICATIONS

1. My name is Phillip Crowcroft, and I am a Partner and Technical Fellow in the firm Environmental Resource Management Ltd (ERM). I have a Bachelors Degree in Civil and Structural engineering, a Masters Degree in Geotechnical Engineering. I am a Chartered Engineer and a Member of the Institution of Civil Engineers. I am also a Specialist in Land Condition (SiLC). I have over 35 years' experience in development of brownfield land and landfills. My qualifications and experience are set out in Annex 1.

INSTRUCTIONS

2. I have been asked by Stanton Harcourt Parish Council to consider and advise on the risks to health arising from the possible future use of land adjoining Dix Landfill Site in the village of Stanton Harcourt for housing. The location of the landfill site and the proposed housing site are set out in Figure 1 at the end of this report.

B. PROPOSED HOUSING DEVELOPMENT AND EXISTING ENVIRONMENTAL SETTING

3. Gladman Developments Limited have proposed that two housing developments shown on Figure 1 be included in the draft Local Plan as future use for housing. The site is part of the former Stanton Harcourt airfield and will include approximately 50 dwellings with private garden areas and public open space in the area outlined in red, and an unknown layout of houses in the area outlined in blue. The site is on the edge of the village and is bounded by Main Road to the east and Dix Pit Landfill to the west. All of the proposed new housing in the area outlined red lies within 250m of the edge of the landfill, with the blue area lying about 250m to 350m away.

4. The landfill has been in operation for many years, with early phases now capped and restored but is moving towards closure of remaining areas now, with an anticipated closure and aftercare period of up to 60 years during which leachate and landfill gas management will be required. The landfill is fitted with a network of extraction wells and joining pipework, and gas and leachate are pumped back to a compound to the south where gas is used to power engines or flared. In the village of Stanton Harcourt, the nearest existing housing to the landfill is about 260m distant, but even with such a separation, odours from the landfill have been the subject of complaints of nuisance from the residents of the village in past years. In 2007, a record was kept of odours from the landfill, with odours being reported from Black Ditch through The Green and over to Steadys Lane (Ref 1). 17 complaints were recorded on 13 separate dates over a 3 month period. The record of complaints was held by the Environment Agency. The prevailing wind direction is from the south/southwest, which takes odours from the landfill directly across the village. The topography of the landfill is raised above adjoining land levels and the capping slopes down to the site boundary and the village to the north and east. This places the proposed new housing area in the worst position possible with respect to overground migration of gases and run off of water from the capped landfill.

5. I have spoken with two villagers very recently (March and May 2017). One described a very serious discharge of gas from the landfill site, probably a failed valve or section of pipework where gas could be heard hissing loudly from the landfill, accompanied by a very strong unpleasant odour. The incident occurred early in the morning of 24th December 2016 and was heard from the public footpath alongside the landfill on its northern boundary. The second person advises that they smell gas regularly at distances of 300 to 400 metres from the landfill, the odour being unpleasant and causing running of the eyes and nose and coughing.

6. The landfill has accepted biodegradable waste over much of its lifetime, and this has led to the production of leachate and landfill gas. The gas is managed by a pumped extraction and flare/power generation system. The power generation will remain viable for some years to come (possibly 10 to 15 years), but when the quality and rate of production of the gas gets below a certain level, only the flaring option will remain to manage the strong odours associated landfill gas. Flaring will also only be viable for a certain time before gas quality is too poor or flow rate too low and venting of dilute landfill gas to air will be the only option. This might be 20-30 years in the future.

7. More detailed information on the design of the gas control system and its performance in terms of preventing gas migration has been requested from the Environment Agency and some information has been received.

8. The geology of the area comprises Summertown-radley Sand and Gravel overlying Oxford Clay (Ref 2). The sand and gravel has been quarried from the footprint of the landfill in years gone by, and the hole in the ground then infilled with waste to its current form, which is a gently sloped mound rising above the proposed housing site. The ground below the housing site comprises undisturbed natural sand and gravel, and this gravel deposit underlies most of the village of Stanton Harcourt. This continuous layer provides a highly permeable pathway for movement of soil gas, including landfill gas should it escape from the landfill. The landfill may be lined with clay along its sides, with a possible additional geomembrane but the standard of lining is unknown as it will have been placed when the landfill was first operated many years ago. This would be partially effective in preventing gas migration, but is rarely wholly effective, and would not be expected to remain fully effective for the next 60 years of aftercare period. By way of example, geomembranes are generally only guaranteed for a period of 25 years at most, and any such liner placed in the early phases of the landfill, next to the proposed housing development site, would need to remain effective until all gas production has ceased (up to 60 years). I have not seen any information regarding the type of liner used for the phases of the landfill that adjoin the proposed housing site or its duration of guarantee, but this is likely to be well into the guarantee period by now, and likely only have another 10-15 years remaining.

9. Data provided by the Environment Agency (Ref 3) indicates that the landfill site has been the subject of regular inspections by their officers, as well as self-reporting of gas and leachate control systems by the current operator, FCC. Examples of the level of control for landfill gas achieved over the period 2012 to 2016 are set out below.

    - In 2012, the Annual Monitoring Report (Ref 4) produced by FCC showed 100% compliance of methane control for 10 out of 12 months - that is to say that none of the perimeter monitoring boreholes showed methane above the agreed trigger level. However, the remaining two months were non-compliant with a maximum

methane concentration of 19.6% (methane is explosive in the range of 5 to15%).

- In 2014, the Report (Ref 5) showed 100% compliance of methane and carbon dioxide control for the entire year.
- In 2016, the Report (Ref 6) showed 100% compliance of methane control. For carbon dioxide, 100% control was achieved in 7 out of the 12 months, with the remaining months showing control levels down to 90.3%.

10. These are relatively good compliance standards, and would not be of great concern to the EA, bearing in mind that there are very few properties close to the landfill which would be at risk from the gas migration. This circumstance would, of course, change radically if 50 new private dwellings were built on the proposed site, all within 250 metres of the landfill boundary, and a proportion built within 50m of the landfill.

C. NATIONAL PLANNING POLICY FRAMEWORK AND LOCAL PRECEDENTS

11. The National Planning Policy Framework (NPPF) (Ref 7) provides guidance in the form of Planning Practice Guidance (PPG) (Ref 8) on the preparation of Local Plans in relation to siting sensitive land uses (such as housing) alongside existing hazardous land-uses (such as landfills). It is well established that landfills generate gas that is explosive in air (methane), asphyxiative (carbon dioxide), toxic (various trace compounds including hydrogen sulphide) and a nuisance through strong odours. Gas may escape below ground and migrate through permeable soils to below buildings nearby, and then collect in unventilated spaces such as service ducts, basements, subfloor voids and small rooms, for example toilets. This presents risk of explosion and asphyxiation of people using buildings. In addition it may migrate away from the landfill above ground in air, and create at the very least, odour nuisance, and at worst, health effects due to toxic compounds or injury or death as a result of explosion.

12. At present, it is unclear whether gas migration is affecting the proposed housing site, and intrusive ground investigation would be needed to establish this. However, establishing the current condition of the site in 2017 does not help establish what the condition might be like in 20 or 30 years' time. The ability of any lining to retain gas will reduce over time as the ground settles and clay dries out or the membrane develops cracks. The effectiveness of the gas extraction system will reduce with time, as extraction wells clog with biological matter, and the landfill settles, creating a greater likelihood of gas migration. It is my view that the proposed housing site should be considered very likely to be impacted by landfill gas at some stage over the coming 60 years of active aftercare that the landfill will require maintenance and management.

13. I recognize that houses can be protected from landfill gas migration in the ground by use of subfloor void vents and membranes in floors. Such measures are often employed in housing development, but they cannot be applied with confidence to external temporary structures in private gardens such as sheds and greenhouses, which fall outside building regulation control. Furthermore, no mitigation is available to prevent odours affecting people living near the landfill, and the closer the dwelling, the worse the likely odour and exposure to toxic trace gases.

14. A number of extracts from the PPG produced by the Department for Communities and Local Government in 2016 are set out below, and are directly relevant to decisions about siting new housing near landfill sites. The full text of these sections of the PPG are provided as Ref 8.

15a. "*Consideration of land contamination in Local Plans will vary between places and the type of issues that the plan needs to cover, but it can be helpful to:*

- *allocate land which is known to be affected by contamination only for appropriate development – and be clear on the approach to remediation;*
- *have regard to the possible impact of land contamination on neighbouring areas (eg by polluting surface water or groundwater);*

Paragraph: 005 Reference ID: 33-005-20140306"

15b. In my view, it would not be helpful to allocate land for private housing immediately alongside a large gassing landfill which relies upon active gas extraction for gas control, and must vent unburnt gas to air when the engine and flare system are not operating effectively. Furthermore, the Local Plan should have regard to the possibility of land contamination on neighbouring areas. An absence of gas impact at present is no guarantee of an absence of gas impact over the next 60 years. In addition, the landfill gas control system is bound to have times when it is not operating effectively, as has been the case in the past for existing villagers, who have suffered odour nuisance on a number of occasions, and more recently (in December 2016) what appears to have been a failure of the pipework system and subsequent major emission of gas to air when a pipe/valve failed.

16a. "*What should a Local Plan contain?*
…Local Plans should be tailored to the needs of each area in terms of their strategy and the policies required. They should focus on the key issues that need to be addressed and be aspirational but realistic in what they propose.

Paragraph: 002 Reference ID: 12-002-20140306"

16b. A Local Plan should be realistic in what it proposes, but also aspirational. I believe that placing private housing immediately adjacent to a gassing landfill is not aspirational. It is not realistic to imagine that no gas emissions will occur both above and below ground from the landfill onto the proposed housing site at some stage over the next 60 years. If such emissions occur, at best this would be a nuisance in terms of odour and sub-acute health effects, and at worst, it could put the properties at risk of explosion, with possible death or injury to occupants.

17a "*When preparing Local Plans, local planning authorities are required to have regard to the prevention of major accidents and limiting their consequences. They must also consider the long-term need for appropriate distances between hazardous establishments and population or environmentally sensitive areas. They must also consider whether additional measures for existing establishments are required so that risks to people in the area are not increased.*"

Paragraph: 002 Reference ID: 39-002-20161209

17b. Whilst this aspect of the planning system is aimed at industrial installations regulated by the COMAH Regulations where dangerous substances are stored, the principle holds good for placing housing near a gassing landfill. The risks to householders over the next 60 years are significant, even taking into account measures which might be put in place to prevent below ground gas migration.

18a "*What are the links between health and planning?*

The range of issues that could be considered through the plan-making and decision-making processes, in respect of health and healthcare infrastructure, include how:

- *development proposals can support strong, vibrant and healthy communities and help create healthy living environments which should, where possible, include making physical activity easy to do and create places and spaces to meet to support community engagement and social capital;*
- *potential pollution and other environmental hazards, which might lead to an adverse impact on human health, are accounted for in the consideration of new development proposals;*

Paragraph: 002 Reference ID: 53-002-20140306"

18b. Choosing to locate new housing on land alongside a large actively gassing landfill is contrary to the objective above of creating a healthy living environment. The odour of landfill gas is sickly and cloying, and generally unpleasant. The risks to health are unquantifiable without assessing the trace gas compounds being created by this particular landfill, but given a choice of locating housing near a source of noxious gas, or out of the zone of influence of such a source, the advocate of healthy living environments would likely choose to stay well clear of landfill. Finally, the second paragraph above is clear in stating that decisions on new development proposals should take account of potential pollution and other environmental hazards which might lead to an adverse impact on human health. If this site was allocated for housing in the Local Plan, it would be to ignore the potential pollution and environmental hazard that the PPG warns about.

19. In summary, Government advice is to avoid allowing housing development through Local Plan allocations in locations where pollution or contamination may negatively impact on the health and well-being of future occupiers of that housing. There has been a long-established principle on civil law regarding the order in which land uses occur. If a housing estate exists, and it is then proposed to build a landfill next to the housing estate, then the landfill operator will be liable for all emissions which escape from the site and affect the housing. However, if a landfill site exists, and a housing site is built next to it, then it is a matter for the developer to ensure that all appropriate precautions are taken to prevent gas emissions from the landfill causing harm to the occupiers of the houses. The important point to note here is, of course, that the developer will be responsible only during the period of time taken to build the houses and sell them. Thereafter, it becomes the

householder's problem, and the householder will have no resources or skills to manage this potential liability. The principle is that if you come to a nuisance, then you must live with it…..

LOCAL PRECEDENTS

20. A planning application to build 15 houses on land at Hobbyhorse Lane, Sutton Courtenay in 2016 was refused by Vale of White Horse Council in October 2016 (Ref 9). The site lies adjacent to two landfills with operational gas control systems. Reasons for refusal include:
    - The application fails to provide sufficient evidence to demonstrate that the occupiers of the proposed development would not be adversely affected by odours arising from the existing composting plant and landfill facility located to the east of the site. As such the proposal is contrary to Saved Policy DC10 of the Vale of White Horse Local Plan 2011.
    - The application does not include a suitable contaminated land assessment or an assessment of landfill gas to demonstrate that the site is suitable for a residential use and that that the occupiers of the proposed dwellings would not be harmed by the effects of contamination or landfill gas. As such the proposal is contrary to Core Policy 43 of the Local Plan 2031 Part One and Saved Policy DC10 of the Local Plan 2011.

21 The Council acknowledges that it may be possible to overcome these refusal reasons through the submission of additional information and mitigation proposals. In my view, such mitigation would need to include assurances from the landfill operator that they will continue to operate the gas control schemes on the landfills for the next 50-60 years (being the typical lifetime of both modern houses and the gas generation potential period of landfills). A Developer would need to gain such assurances with guaranteed durations, and there is no reason why the landfill operator should give such assurances to a Developer who is bringing a sensitive land use to an existing hazard, creating unnecessary risk.

D. RISKS TO HEALTH FROM CO-LOCATION OF HOUSING AND LANDFILL IN THE UK

22. The UK has a long record of development of land on or near landfill sites. In the late 1980s, Her Majesties Inspectorate of Pollution issued warning letters to Local Authorities setting out the risks of allowing development to occur on or near landfill sites, and advising that surveys should be carried out around the boundaries of all closed landfill sites to check for possible gas migration. Waste Management Paper 27 was issued by the Department of the Environment in 1989 and updated in 1991 (Ref 10). Chapter 9 dealt with development on or around landfill sites, and defined a zone around landfills in which the risk from gas migration could exist. This was a distance of 250m from the landfill boundary, and this distance has remained industry standard since 1991. The guidance particularly noted that no house, garden shed, greenhouse or any domestic extension should be constructed within 50m of the boundary of the infilled wastes. Essentially, developers of housing are not expected to take account of the presence of landfills if they lie more than 250m away from the proposed new housing site boundary. Conversely, the Developer is required to ensure that land is made suitable for use for a permitted new use, but only remains liable until the properties are sold. Any changes in land condition thereafter become the responsibility of the house owner. Whilst they might look to the landfill operator for action if gas starts to migrate, they would still suffer substantial stress and personal cost in pursuing remedy.

23. The risks to health for people occupying houses close to landfills and other sources of toxic or explosive ground gases such as coal mines are primarily associated with the following:

- Risk of explosion and direct injury of people as a result of migration of methane through the ground entering a confined space with a source of ignition;
- Risk of asphyxiation, or derogation of well-being associated with exposure to elevated levels of carbon dioxide;
- Risk of toxic effects in people associated with exposure to toxic compounds, for example hydrogen sulphide;
- Risk of exposure to unpleasant smells and irritant gases which would be viewed as a nuisance rather than a direct health effect; and
- Risk of stress effects associated with the worry of being close to a landfill when gas control systems start to fail, or when houses become difficult to sell as a result of proximity to landfill.

24. Examples of the above risks are set out below:

- Risk of explosion: House destroyed by explosion of landfill gas migrated from nearby landfill at Loscoe, Derbyshire in 1986 (Ref 11);
- Risk of asphyxiation: death of person in disused factory in NE England enveloped in a cloud of carbon dioxide from a former

mine shaft, 1991; and, evacuation of 65 houses in Gorebridge in 2012 after entry of carbon dioxide from underground mine workings, all properties demolished in 2016 (Ref 12);

- Risk of toxic effects: generally very difficult to prove, but one example which underwent detailed examination was the death of two 18 month old girls at Leftwich, Cheshire in 2006 from acute myeloid leukemia living in houses built on a former landfill, deaths possibly associated with exposure to benzene (Ref 13); and in addition, Weston Quarries landfill in NW England where hexachlorobutadiene (HCBD) from a former ICI landfill was implicated in mild effects on liver function of villagers which were reversed when exposure ceased by people moving away from village, 2000 (Ref 14);
- Risk of exposure to unpleasant smells: Stanton Harcourt village where strong and noxious odours were recorded by many villagers over a 3 month period in 2007 emanating from Dix Pit landfill (Ref 1) , and despite substantial investment in control systems by the operator, still, in 2016/17 are affected by odours from the landfill; and
- Risk of stress effects: eight houses in West Manchester where the rear portion of houses was built over a landfill edge, and houses became unsaleable, and remediation was very slow to gain funding and implementation, resulting in long term (ten years) stress for householders, 2011 (Ref 15).

25. These examples have all occurred when housing is built on or near landfills or mine areas and the soil gases have escaped from the normal control measures. When housing already exists, then it is right and proper to look for remedial solutions to mitigate the effects of gas on human health. However, such work inevitably leads to severe stress on householders while the work is progressed, and often on-going stress when properties become difficult to sell, even after remediation has been undertaken. Much better to avoid the risk of gas impacts on people and property in the first place by not building on land immediately alongside a major gassing landfill or other source of hazardous gas.

E. CONCLUSIONS

26. The proposal to include provision for 50 houses on the land adjacent to Dix Pit Landfill runs counter to the advice in the Planning Policy Guidance produced by the Department for Communities and Local Government (Ref 8). Specific reasons why this allocation would be contrary to Government advice include:
    a) land which is known to be affected by contamination should only be allocated for appropriate development and should be clear on the approach to remediation – and whilst this principle admits the idea of building on contaminated sites with appropriate remediation, it is silent on how to deal with future changes in contamination status if landfill gas migrates in the future as the landfill lining and control systems deteriorate;
    b) the allocation of land in the Local Plan should have regard to the possible impact of land contamination on neighbouring areas ;
    c) Local Plan allocations should be aspirational but realistic in what they propose – it seems unlikely that many house owners would aspire to live next to a major gassing landfill;
    d) Local planning authorities are required to have regard to the prevention of major accidents, and whilst landfills are not covered by this legislation, the principle of avoiding bringing housing to a such a large potential source of risk of health effects and nuisance follows the same philosophy;
    e) Planning Authorities are encouraged to help create healthy living environments, and choosing to site a new housing development next door to such a large source of potential air pollution is counter to the direction provided by Government advice; and
    f) potential pollution and other environmental hazards, which might lead to an adverse impact on human health, should be accounted for in the consideration of new development proposals. I accept that remediation is possible to manage current risks to permanent structures, but would not be able to protect temporary structures outwith Building Regulations control, take account of future changes in gas migration or mitigate against above ground gas migration in air.

27. There are many examples of how the theoretical risks to human health of landfill gases have been realized in practice. Whilst engineering remediation measures can be used to mitigate the risks, they cannot provide full certainty, especially in relation to above ground gas migration in air. The allocation of this site for housing in the Local Plan would bring a completely unnecessary elevation of future risk to householders who buy properties there, and run contrary to national guidance. The decision to refuse permission for a similar proposed housing site next to a gassing landfill in the Vale of White Horse area is recognition of the unsuitability of land next to gassing landfills for use as new housing land.

F. REFERENCES

Number	Reference
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2	British Geological Survey, Geology of Britain Viewer, http://mapapps.bgs.ac.uk/geologyofbritain/home.html, 2017;
3	Environment Agency email, reference folder of reports and data on Dix Pit, 2017;
4	FCC Environment, Dix Pit Landfill Annual Environmental Summary Report, 2012;
5	FCC Environment, Dix Pit Landfill Annual Environmental Summary Report, 2014;
6	FCC Environment, Dix Pit Landfill Annual Environmental Summary Report, 2016;
7	Department for Communities and Local Government, National Planning Policy Framework, 2012, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf ;
8	Department for Communities and Local Government, Planning Practice Guidance, 2016;
9	Vale of White Horse District Council, Planning Decision note, Refusal of Planning Permission at Christ Church Hobbyhorse Lane Sutton Courtenay ABINGDON OX14 4BB, Ref P16/V2306/O , 2016;
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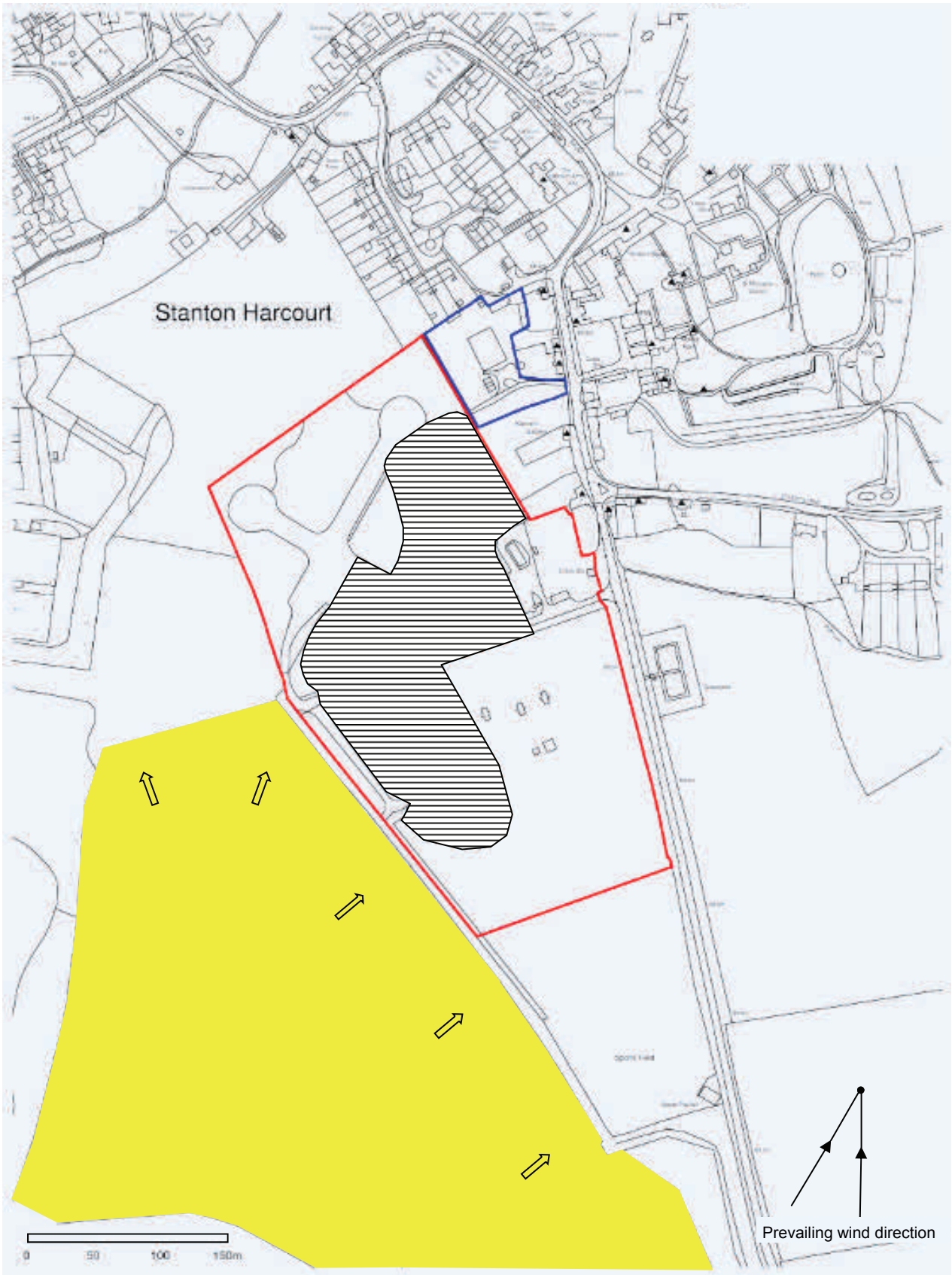
13	The Incident Team (Central and Eastern Cheshire NHS, Vale Royal Borough Council and the HPA), Report into the circumstances around two cases of Acute Myeloid Leukaemia, 2008
14	The Independent, Chemical dump village faces total disintegration, 2000, http://www.independent.co.uk/environment/chemical-dump-village-faces-total-disintegration-710457.html
15	Manchester Evening News, Timeline for the old Hancock tip in Boothstown, 2011, http://www.manchestereveningnews.co.uk/news/greater-manchester-news/timeline-for-the-old-hancock-tip-in-boothstown-867421



Boundary of proposed housing development

Boundary of proposed housing development

Dix Pit Landfill location

Sloped Direction of landfill capping

Proposed housing

Note: Gas Extraction compound off drawing to south

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Figure 1: Location of Dix Pit Landfill with respect to proposed housing development

SIZE: A4
PROJECT: 0399537
DATE: June 2017

VERSION: 1
DRAWN: HC
CHECKED: PC
APPROVED:

ERM

Client: Stanton Harcourt Parish Council

SOURCE: Map produced by FPCR Environmental and Design Ltd.

Phillip Crowcroft

Partner – Contaminated Site Management

Phillip Crowcroft is a Civil and Geotechnical Engineer and a Partner in the Contaminated Site Management team based in the Edinburgh office. He has over 30 years experience in dealing with land contamination and brownfield regeneration. This experience has been developed through work as a specialist contractor, an environmental consultant and as a regulator. He has specialised in regulatory issues, keeping abreast of both UK and European legislation and providing advice on liability for landowners and users. A major area of work relates to design and implementation of remediation systems to deal with contaminated soils, landfills, soil gas and vapour intrusion into built development. He has also worked extensively on wate management projects including scrap yards and landfills and chemical and manufacturing sites in the UK, and MOD sites in the UK and overseas.

During his career, he has undertaken project direction for brownfield regeneration schemes, scrap yard and landfill site permitting and restoration and remediation, Part 2A assessments, radiological contamination clean-up, environmental liability reviews of major industrial facilities, PPC Site Condition Reports and investigation and remediation on brownfield sites for all types of end-use. He has been an expert witness on over 35 projects subject to either Planning Inquiries or litigation, in jurisdictions including England, Scotland, Wales and Eire, dealing with issues associated with waste management, landfill gas, landfill closure and restoration, soil contamination, vapour intrusion into buildings, risk assessment and remediation of sites for built development.

He has completed joint authorship of National Guidance on the risk-based approach to dealing with contaminated sites for both the Environment Agency and the Welsh Development Agency, and in advising the Environment Agency and Defra on the development of a new regulatory regime for dealing with radioactively contaminated land. He has been project director and manager on Ministry of Defence Land Quality Assessment projects through term contracts to Defence Estates. In addition to Central Government and Agency clients, he has directed projects for major private sector clients including Kemira, Ametek, Lubrizol, Avecia, BP, McIntyre, Cable and Wireless, UKAEA, BNFL, BAA, Dresser and Syngenta. Projects have ranged from ground investigation and risk assessment through to fullscale remediation of contaminated sites and landfills. He has recently dealt with the consequences of two contaminant spills which have impacted surface water, and two further sites where the effects of longterm slow leakage of process chemicals to ground has impacted groundwater quality. He has completed the design and installation of retrofitted soil gas vent and barrier systems in a housing estate built on former landfill.

Prior to joining ERM, Phillip spent three years as Director of Contaminated Land at Entec UK Ltd, a multi-disciplinary consultancy, where he led a 40 strong team of consultants dealing with waste management and land contamination projects in both public and private sectors. From 1999 to 2001, he was the Contaminated Land Policy Manager at the Environment Agency, a national role dealing with all aspects of contaminated land policy during the introduction of the Part 2A Contaminated Land regime.

He has a strong understanding of environmental regulation, having worked for both public and private sector. He provides advice to corporate multinational clients on the implications for business of the new European Directives which affect land ownership, such as the Water Framework Directive and the Environmental Liability Directive.

Phillip regularly presents technical papers at conferences and seminars on contaminated land and waste issues including CONSOIL 2005 in Bordeaux and CABERNET 2005 in Belfast. He has been a member of several Environment Agency and CIRIA research contract steering groups and the Land Condition Record Steering Group. He has represented the Environment Agency at an inter-governmental workshop in Brazil, leading a joint team from the Agency and the Pesticides Safety Directorate. He represents the Institution of Civil Engineers (ICE) on the Professional and Technical Panel of the Specialist in Land Condition (SiLC) initiative, supported by eight of the major professional institutions. He is Chairman of the SiLC PTP, and was Chair of the Land Forum for its first year of activity in 2011. He is Deputy Chair of the Service Providers Group of NICOLE, the Network for Industrial Contaminated Land in Europe.

He has been a member of two Cabinet Office Task Forces. The first of these dealt with Remediation Permitting, and was charged with developing a new remediation permit system for dealing with land contamination. The second looked at the development of Soil Guideline Values for the UK. He has also been a member of the Steering Committee overseeing the preparation of industry guidance on definition of waste in the context of brownfield development.

Professional Affiliations and Registrations

- Member the Institution of Civil Engineers, 1984
- Chartered Engineer, 1984
- Specialist in Land Condition (SiLC), 2001

Education

- BSc (Eng) Civil and Structural Engineering, University of Sheffield, 1975
- MSc Geotechnical Engineering, University of Surrey, 1982

Fields of Competence

- Contaminated land and landfill investigation and remediation
- Risk assessment
- Design and implementation of gas/vapour protection measures for structures
- UK policy and regulation on land contamination
- Expert witness

Languages

- English, native speaker
- French, basic

Recent Further Projects of interest

Environment Agency
Joint author of the Model Procedures for Management of Contaminated Land. Investigation of a number of potential special sites. Assistance to Agency on developing an approach to new radioactively contaminated land regime to complement existing Part IIA regime. Support to Agency in developing a review of the Part 2A regime.

Muir Group Housing Trust
Design and implementation of a retrofitted soil gas/vapour protection system on housing estate built on former landfill, where two children had died of leukaemia with possible links to soil contamination. Successful completion of works and discharge of Part 2A requirements.

Major landfill operator
Investigation of soil gas intrusion into large country house near landfill site, installation of venting and barrier systems below existing floors and provision of positive pressure air blanket exclusion system for structure.

Esso Petroleum/Granada
Design and supervision of installation of active gas control systems for new motorway service area built on 18m deep gassing landfill, including operational and emergency procedures, and gas exclusion measures for motel and restaurant.

Confidential major Japanese Industrial client
A member of the team assisting Japanese client in the potential purchase of a major nuclear fuel manufacturer, including dataroom assessment and site visits at operational facilities.

Polish State Oil Company
Undertook dataroom review of TUPRAS, the Turkish State Oil Company, as part of potential purchase process for four oil refineries and a chemical plant.

DEFRA Radioactive Substances Division
Director and joint author of Profiles of Radioactively Contaminated Land Use

Welsh Development Agency
Director and joint author of the 2nd edition of the Manual for Management of Land Contamination on WDA Sites

ONE Northeast, Regional Development Agency
Director of decommissioning project for 10 hectare site where an electronics manufacturing plant had gone into liquidation, including works to decontaminate building, wet waste removal, making safe E&M services, advising on redevelopment and land contamination.

MoD
Project Director for investigation of RAF installation where contamination (hydrocarbons, pesticides, metals and EOD) may form the basis for determination of the site as contaminated land under Part IIA of the EPA (1990). Radiological contamination presents a health and safety issue at the site.

UK Ministry of Defence – Christmas Island
Director of the first phase of intrusive investigation of chemical and radiological contamination on Christmas Island, related to the use of the island by the MoD as a base for atom bomb testing, issues identified through desk review and first stage sampling on the island included radioactive residues at the washdown area at the end of the runway, bitumen contamination of soil and groundwater from road construction plant (asphalt batching plants) and asbestos contamination from derelict structures, pipework and construction plant.

UK Ministry of Defence – Compass Manufacturing Facility
Project Director for investigation and clean-up of 50 hectare country house estate which had been used by the MoD for research and manufacture of compasses since the 1930s, and where luminisng paints had been used on dials. Paints were also used on kerbstones to help navigation across the site during blackouts in WW2 and waste paints had been burnt in the on-site boiler-house, the resulting ashes and cinders used to form pathways across the estate, and to make good areas of boggy ground. Site now fully remediated and used as offices and potential residential land. Radium 226 was the key radionuclide of concern.

UKAEA
Project Director for term contract to provide ground investigation services at the Dounreay Nuclear facility.

Committee on Clearance and Exemption Principles, Processes and Practices for use by the Nuclear Industry (committee members include UKAEA, BNFL, AWE, Rolls Royce, MOD, British Energy, Magnox, Amersham)
Project Manager and joint author of guidance to be included in Industry Code of Practice dealing with the statistical approach to sampling materials subject to radioactive sentencing.

Avecia
Project Director for soil and groundwater investigation and remediation of chlorinated hydrocarbons, using steam enhanced DPVE and chemical oxidation.

Bilfinger Berger
Project Director for investigation and remediation of travellers site on gassing landfill.

Tarmac
Project Director for due diligenace for purchase of 14 concrete manufacturing plants.

BP
Project Director for investigation of BP Saltend site.

Novartis
Project Director for investigation of three sites as part of vendor due diligence.

Land Restoration Trust
Development of integrated environmental risk management tool for assessing purchase of new land for public opne space use, and application to four sites, including three collieries and a chemical plant.

CIBA/Huntsman
Director of project to undertake phase 2 baseline investigations across a worldwide portfolio of sites including plants in Southeast Asia, Europe and North America.

History

2001 - 2004 Director of Contaminated Land, Entec UK Ltd
As Director of Contaminated Land at Entec, Phillip was responsible for contaminated land teams in five offices across the UK, with a total complement of over 40 multi-disciplinary staff. Clients included Defence Estates, the Environment Agency, Defra, Welsh Development Agency, local authorities, AMEC, Morgan Est, BNFL and UKAEA.

Some specific projects include:
Britannia Zinc - assessment of land contamination liabilities and remedial options for large zinc smelter prior to closure and demolition;
ONE Northeast - comprehensive desk review and development feasibility study for over 20 sites in the ONE portfolio prior to inviting private sector investment;
Environment Agency – first stage desk review under Part IIA of over thirty sites to develop a conceptual model and assess whether any of the sites should be taken forward to more detailed site reconnaissance stage;
Environment Agency – detailed desk review of one square kilometre industrial estate to generate conceptual model and GIS-based database of land uses and ownership, and advice on fate and transport of main chemicals of concern;
Morgan Est – advice and site support on dealing with multiple contaminated sites on line of new road project, and specific advice on definition of waste in the context of contaminated soils.
Halliburton Kellog Brown and Root – rapid turnaround intrusive investigation of North Sea Oil support facility and dockland site prior to sale of land, advice on potential environmental liability.

1999 – 2001 National Land Policy Manager, Environment Agency (England and Wales). Prior to joining Entec, Phillip was the National Land Policy Manager at the Environment Agency (England and Wales), where he was responsible from 1999 to 2001 for development and implementation of all aspects of policy on contaminated land. His work involved liaison with many external bodies, including Government Departments, professional institutions, trade associations and NGOs, as well as operational staff in Regions and Areas of the Agency, the National Centres of Excellence and Policy Specialists in Head Office. He has played a key role in implementing the new UK Contaminated Land regime. Undertaking a national role at the Agency has required a focus on the broad issues facing the country in seeking to promote the re-use of brownfield sites, whilst ensuring an appropriate

level of protection to the environment and human health. Phillip has been involved in setting Agency policy for the Part IIA contaminated land regime, and has steered and contributed to both internal and external guidance on a range of technical and procedural subjects, including CLEA human health guidelines, model procedures and site inspection. Phillip also worked closely with Agency wide multi-functional groups, and chaired national meetings on a regular basis. He has made presentations to Government bodies and international conferences in Germany, Republic of South Africa and Brazil.

1987 – 1999 Enviros Aspinwall, Walford Manor, Shrewsbury. Commercial Head, Land Sector (1993 - 1999) Manager, Land Sector (mid 1988 - 1993) Senior Civil Engineer (to mid 1988). Over a period of 12 years at Enviros dealing with development and assessment of derelict and contaminated land, Phillip has worked on projects throughout the UK in addition to projects in Hong Kong, Republic of South Africa and Spain. Major work areas included assessment of industrial land (MOD sites, gasworks, metal processing works, foundries etc) and landfill sites for redevelopment and restoration. This has involved risk assessment leading to risk management work, involving the design of remedial measures for contaminated land, control of gas from gassing landfills, investigation of gas emissions in buildings to determine source and cause and design of appropriate control systems. One area of specialism has been the provision of expert evidence at public inquiries and in litigation, where he has provided evidence on more than ten occasions.

Phillip directed and managed liability and risk assessments for a variety of industrial and commercial facilities, for both acquisition and divestiture purposes, including many multi-site projects such as five gas works, eight railway yards and numerous landfills. Assessment of new landfill sites has included site investigation through programming phasing and waste inputs.

Specific projects include:

Birmingham Canals - Design of clean-up strategy for heavily-contaminated section of canals, cost/benefit analysis of options which has lead to selection of soil washing and lime stabilisation of contaminated sediments. Four contracts completed.
Defence Estate Organisation Term Contract - Director of all projects under 3 year contract to undertake land quality assessments on MOD land, including assessment of explosive ordnance risks, chemical warfare agents and radiological contamination.

Republic of South Africa - Investigation and quantitative risk assessment of proposed residential golf complex on and next to a gassing landfill, leading to successful planning approval.

Newtown Gasworks - Nominated Engineer for the reclamation of former gasworks site adjoining River Severn. Overall responsibility for design of works and implementation.

Hong Kong Government - Preparation of guidance on development around landfill sites as basis for government policy and statutory guidance.

Gin Drinkers Bay Landfill, Hong Kong - Investigation of chemical, gas and physical characteristics of landfill, and advice on design of elevated section of Route 3 and it's foundations and piling system.

Gin Drinkers Bay Landfill, Hong Kong - Investigation on landfill along route of airport railway, assessment of characteristics of waste along line of 15 metre deep cutting, advice on landfill gas and leachate control systems.

Petrol filling station (PFS) sites, Kent - Audit of design for new PFS sites in Inner Protection Zones to public drinking water supply boreholes, risk assessment in relation to possible fuel leakage, provision of expert witness services at public Inquiry on behalf of Environment Agency.

East Scotland - Investigation of chemical works with mixed usage such as pesticides, fertilisers, gas works, drilling muds and generation of low activity wastes. Assessment of liability and preliminary costing of remedial works.

Closed Gasworks, London - Risk assessment of closed gasworks with respect to adjoining park and residential area, including detailed review of site investigations, assessment of surface and groundwater vulnerability, and advice to Local Authority on risk and liability.

Channel Tunnel Rail Link project - Project Manager and later Project Director for specialist contaminated land study of proposed new rail line, leading to preparation of Environmental Statement.

Environmental liability assessments - Direction of more than twenty multi-site liability assessments to assist in acquisition/divestiture decisions. Sites have included railway depots, metal and engineering works, chemical industry sites, petrol filling stations,

fuel storage depots, wire works, landfills and gasworks.

Yorkshire - Expert witness on design of protection measures for building superstore on gassing landfill at Public Inquiry.

North London - Design audit of landfill gas investigations and gas protection measures for new leisure centre (ice rink, bowling, cinemas, restaurants) built on gassing landfill.

Research - Department of the Environment (DoE) - sponsored research into building gas protection measures to assist in redrafting UK Building Regulations.

Research - DoE - Preparation of profiles of contaminated land use, including gasworks, landfills, tanneries, sewage works and chemical plants.

South East England - Design of remedial measures to mitigate impact of process waste lagoons on groundwater and nearby drinking water abstraction borehole.

Southern Scotland - Investigation of underground fire in landfill adjacent to railway embankment.

South East England - Investigation of gas emissions in housing estate built on old landfill, and design of remedial measures including venting systems and gas detectors.

Essex - Design of landfill gas control system for new motorway service area and petrol station on deep gassing landfill, including landfill gas generation assessment, design of gas collection system, specification of plant and equipment, supervision of installation and compilation of procedures and maintenance manuals for site.

South Wales - Investigation design of gas and leachate control measures for infilled dock in major residential, commercial and leisure development at Penarth Docks. Design of one of UK's largest membrane reinforced slurry walls.

Southern Scotland - Design of new landfill in Coal Measures, including leachate and gas control systems.

North West England - Investigation of land adjacent to landfill to determine extent, if any, of gas migration, and recommendations for remedial works. Preparation of evidence for litigation.

North Wales - Assessment of aggregate resources and production of phased working plans for planning application.

North Wales - Assessment of method of working limestone quarry and stability analysis of faces.

1978 – 1987 Ground Engineering Ltd Deputy Manager (to 1987) Senior Soils Engineer (to 1986) Soil Engineer (to 1982). Responsible for the design and implementation of over 250 site investigations into a range of projects which include motorways (A1 (M), M54, M25), industrial complexes (several gasworks, sugar silos, cement works, food production facilities), airports (Gatwick T2 and Stansted), housing developments, telecommunications system (Saudi Arabia) and the rehabilitation and development of derelict or contaminated land.

Analysis of soil and rock slope stability for road construction and industrial premises, and for temporary and permanent works problems such as deep basement excavation and borrow pits. Foundation design including conventional shallow strips and rafts, piles and caissons, and assessment of settlements. Aggregate surveys to provide estimates of volumes of resource, quality and suitability for use together with design of extraction, processing and restoration schemes.

Investigations of contaminated land to assess the extent of both solid and liquid contamination, and to detect the presence of explosive or noxious gases. This included design and carrying out of a major investigation of a gasworks site in London in the early 1980's. Design and implementation of remedial works to render such contaminated sites capable of being re-developed. Close relationship with large house builder on the development of former industrial land for use as housing. Provision of geotechnical advice to Laing Group, and lecturing on temporary works, pile design and contaminated land on internal courses, and in the case of contaminated land to external organisations. Liaison with developers and consultants in the design of remedial measures for contaminated land, design of foundations for the proposed developments.

1976 – 1978 Site Engineer, John Laing Construction Ltd. General site duties on multi-storey reinforced concrete structures and housing including setting out and levelling all aspects of the works, quality control of materials, temporary works control.