The Buncefield Investigation

Second progress report

Contents

Foreword

I present a second progress report that focuses mainly on the environmental impact on land, surface water and ground water of the fuel and fire water that escaped from the Buncefield site. It is important, in my view, that the vital work being done by the Environment Agency and others is brought to public attention.

My report also contains for completeness a brief update on progress with the investigation into how fuel escaped, thereby breaching the primary containment barriers. It reveals that cloning of a number of important computer records has been successful and that vapour formation modelling is underway. Although briefly stated, this is important new information – it was quite possible that these disks would be too badly damaged for the information on them to be recovered.

The report is, as I say, mainly a description of loss of containment of fuel and fire water from bunds (secondary containment) and from the site itself (tertiary containment).

There are important early observations that sealant used in some bund walls was not capable of withstanding fires and/or the hydraulic pressure in bunds or adjacent tanks. Bund performance during the incident forms an important but as yet inconclusive aspect of the investigation.

There was extensive loss of containment at the site boundaries and fuel and fire water escaped from the site to the surrounding lands. The report describes the monitoring work by the Environment Agency and others to identify whether or not short and long-term pollution of watercourses and ground waters has or is likely to occur, particularly potential contamination of the important chalk aquifer that underlies Buncefield. The pathways for pollutants are still being investigated. It is important to emphasise that if contamination of the aquifer occurs from the Buncefield incident, it could take months or years to materialise. However, we have been reassured by Three Valleys Water Company and the Drinking Water Inspectorate that drinking water is of a high quality and has not been affected by this incident.

A further report to the Board on the means of escape of the fuel and the formation of flammable vapours is suggested as possible within a month of this report, provided we are able to continue the good rate of progress that the investigation is making.

Taf Powell
Buncefield Investigation Manager and Member of Buncefield Major Incident Investigation Board

Part 1 Progress with the primary investigation

1.1 Loss of containment of fuel and contaminants

Background

1 Fuel depots such as Buncefield are strategic centres for the distribution of liquid fuels such as diesel, unleaded petrol and aviation fuel. Fuel comes to depots via pipelines from refineries and is stored according to fuel type before being distributed to other places (typically points of use, such as petrol stations and airports) either by road tanker, by rail, or by dedicated pipeline.

2 Fuel depots are designed to keep fuel within the vessels and pipework that store and distribute them. Should fuel escape, there needs to be provision for ensuring that fuels, and the contaminants associated with any emergency response to a fuel escape or fire, are prevented from running off site so as to protect the surrounding environment. The provisions for keeping escaped fuel and other contaminants within the site (referred to as containment) is described in the safety report that operators of large sites such as Buncefield must submit to the Environment Agency (EA) and the Health and Safety Executive (HSE) (the 'Competent Authority').

3 There are typically three levels of containment. **Primary containment** relates to the equipment and facilities that have direct contact with the products (eg tanks and pipework), and their operation and management.

4 **Secondary containment** relates to both the control of the product in the primary containment facilities (eg the provision of tank high-level alarms to prevent loss through overfilling) and any contingency provisions for the failure of the primary containment. The most important of these provisions are bunds, which are enclosures capable of holding liquids that may escape from the vessels and pipes within the bund wall.

5 There are a number of types of bunds across the Buncefield Depot, ranging from earth banks with earth bases to concrete walls with concrete bases. In the area most affected by the fire, the bunds were predominantly of concrete construction, although some had concrete walls and clay floors.

6 **Tertiary containment** relates to the site surface and associated drainage, boundary walls, roads, kerbs and any features such as road humps that can provide some retention of liquids. Proper design of drainage systems will limit loss of product out of the site and prevent lost product permeating into the ground with the potential risk that it can migrate to ground water, or contaminate surface waters and land.

7 At Buncefield, the site slopes downwards in a north-easterly direction towards Cherry Tree Lane, a public road running between the main site and the British Pipeline Agency Ltd (BPA) tank 12, at the north of the depot. There is a general slope from west to east. Cherry Tree Lane has a depression about half way along its length near to the to BPA's tank 12 area, before sloping away to the east and the junction of Green Lane and Hogg End Lane.

Loss of fuel from vessel(s)

8 The first *progress report*[1] noted that the explosions and fires on 11 December 2005 were the result of a massive escape of fuel in the vicinity of bund A on the Hertfordshire Oil Storage Ltd (HOSL) West part of the site. This escaped fuel formed

[1] www.buncefieldinvestigation.gov.uk

Figure 1 Site map showing bunds

a flammable mixture with the air. Little was known about how primary containment was lost or how the escaping fuel formed into a flammable mixture. (Figure 1 shows a schematic of the bunds.)

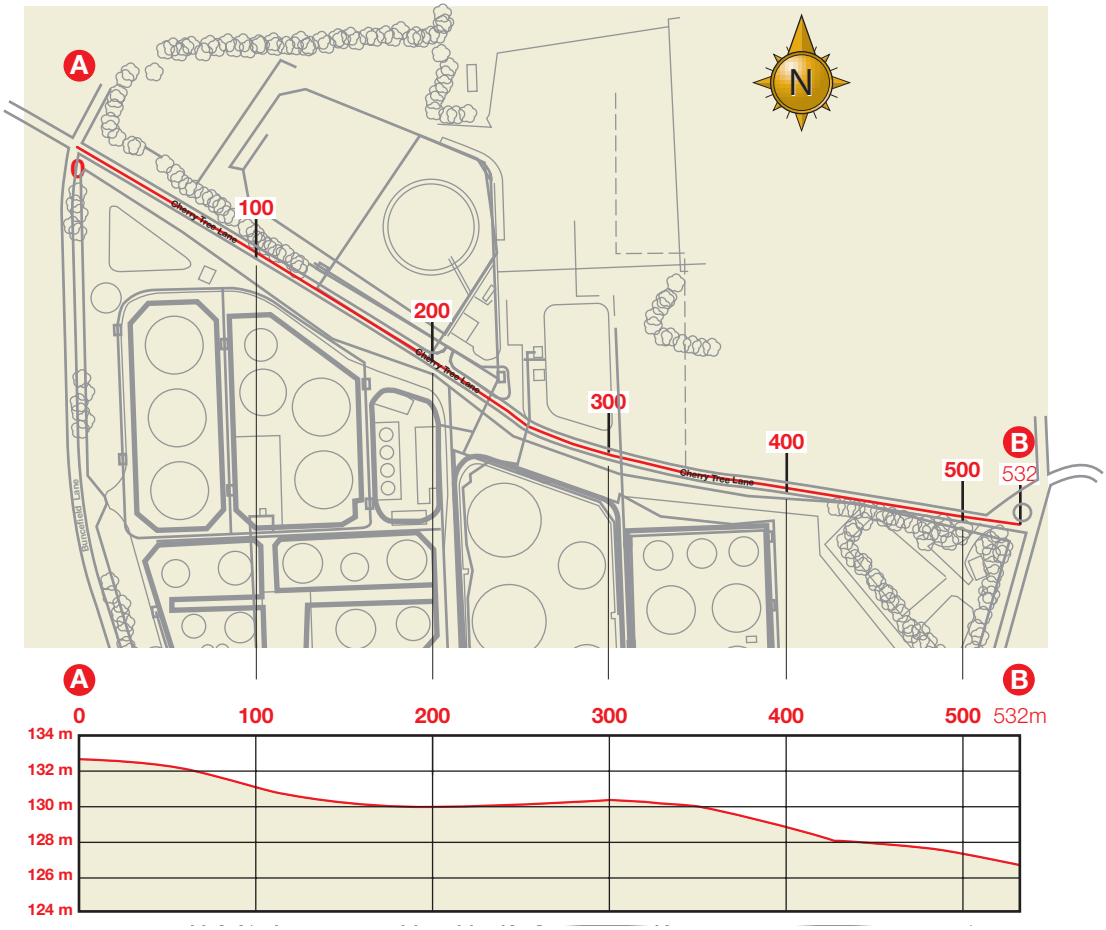
9 Progress has been made in determining the main source of escaped fuel. CCTV recordings recovered from the south side of the BPA site show the visible mist, associated with the loss of containment of the fuel, drifting eastwards onto the site from the adjacent HOSL West site shortly before the first explosion. This is consistent with the evidence obtained from other CCTV coverage and detailed in

the first *progress report,* and appears to confirm that the initial escape of fuel was from the HOSL West site. CCTV records from the Northgate building provide further confirmation of the spread of the flammable cloud away from the HOSL West site. This information also supports the initial forensic conclusions about the extent of the flammable cloud in this vicinity.

10 A significant amount of information has now been obtained from the extensive electronic equipment used to control and monitor the operations on site. Much of the equipment was housed in damaged buildings and great care had to be taken to ensure its safe removal and subsequent restoration and examination. This has revealed important information on key parameters such as fuel levels in tanks, flow rates and valve positions. Work is continuing to extract this information and to examine it in detail so as to conclude with confidence how the fuel escaped. It is hoped this work will be completed within five weeks of this report.

11 A key aspect of the investigation is to determine how the escaping fuel vaporised so rapidly. Work has been commissioned from the Health and Safety Laboratory (HSL) to assist with this. The work is being carried out as quickly as possible to enable feedback to the investigation team within the next month. In particular, priority is being given to the composition of the fuel and to modelling how the escaping fuel could have been vapourised under the prevailing weather conditions. This work should provide a link between the possible release events indicated by the control and instrumentation records and the clear evidence of mist formation coming from witness statements and CCTV records.

Figure 2 Schematic of topography at Cherry Tree Lane



Ground profile along Cherry Tree Lane (West to East)

12 In parallel with the work on vapour cloud formation, HSL is helping to determine the exact nature and composition of the flammable mixture and to determine the precise mechanism for generating such a violent explosion within an apparently unconfined vapour cloud. This work is supported by analysing other incidents from around the world and assimilating technical information from them.

13 Good progress on damage assessment, both on and off site, has given added momentum to the work to explain the high level of blast damage caused by the explosion.

14 A systematic fuel sampling programme is being carried out to confirm the composition of products being stored and transferred on site in tanks or pipes. This programme has had to be fitted into the remediation work being carried out on site by the operators, under the control of two Prohibition Notices issued by HSE.

Loss of fuel and contaminants from bunds

15 There was significant loss of secondary containment related to the bunds on the HOSL West and BPA sites. Investigators have not been able to gain access to every part of the sites, in particular to some of the bunded areas, because of continuing safety concerns. It has been possible, however, to identify some key issues related to the condition of the bunds after the fire. A more systematic examination of the bunds will be completed only when it is safe to do so, following final removal of product from a number of pipework sections.

16 While the bunds substantially remained standing throughout the incident, their ability to fully contain the fuel and fire waters was lost as a result of the explosion and subsequent fires. Figure 3 shows the damage caused to bund walls as a consequence of the incident. Pools of fuel were burning in the bunds as a result of loss of fuel from the tanks, along with fires from the tanks themselves. Figures 4 and 5 show a bund, where the concrete panels had been infilled with a joint sealant. This sealant has been lost as a result of the fire and/or hydraulic pressure within the bund.

Figure 3

Figure 4

Figure 5

Figure 6

17 Many of the bunds around the site have suffered varying degrees of sealant damage. Figure 6 shows fire water and product leaking from such a joint in the later stages of the incident.

18 Another two leakage mechanisms can be seen in Figure 7. Here a corner joint has opened up, releasing fire water and product. Visible along the lower edge of the bund wall, a 'tide mark' shows where liquids were seen to seep through the concrete itself.

19 Figure 8 shows the base of a bund where the concrete panels have undergone significant 'heave' which has resulted in the escape of product and fire water.

Figure 7

Figure 8

20 Figure 9 shows the inclusion of penetrating pipework in the construction. Here the sealing material surrounding the pipes has been lost.

Loss of contaminants from the site

21 There was extensive loss of tertiary containment and large amounts of contaminant went off site. The burning fuel formed an extensive plume of smoke. Ground and water contaminants include fuel and products of its degradation in the fire – hydrocarbons and polycyclic aromatic compounds (a group of chemicals commonly found in residues from burning coal, fuel and oil).

22 Some fire-fighting foam concentrate contains zinc (to act as a heat resistor) and a chemical called perfluorooctane sulphonate (PFOS), which is a surfactant to aid the spreading properties of the foam. Zinc and PFOS are useful tracers for the movement of fire-related contaminants off site.

23 There are lagoons on the site which provide a reserve of fire water for use in emergencies. One of the lagoons (to the north of bund A) shows evidence of significant damage to the lining that may have resulted from the explosion or the fire.

24 As a result of the breach to the lining, some of the liquids in the lagoon, which included contaminated run-off liquids from the bunds and fire fighting, may have escaped into the ground. The natural clay layer beneath the site would have helped to minimise the extent of any contamination of the ground from this source.

25 The pumphouse to the north of bund A, adjacent to the lagoon, was destroyed by the explosions. The control of water on the site was dependent on the use of the pumps located within the pump house. Because the initial explosions destroyed all of the fire-fighting equipment in the affected area, the lagoons were never brought into use and the fire services had to establish alternative arrangements.

Figure 9

Figure 10

26 During the incident, the internal roadways were submerged by fire water and fuel flowing to the lowest point. Fire water and fuels flowed through the site drainage and along the roads within the site perimeter. At the low point on the site perimeter the flows overtopped the road edge, which was not kerbed, and flowed into Cherry Tree Lane.

Figure 11 The three parallel bars show where the pumphouse stood before the incident

Figure 12

27 A large pool of liquid, consisting of fire water and fuels that escaped from tanks and pipes, collected in Cherry Tree Lane. It is estimated that this pool was 200 m in length and between 10 and 20 m wide. Road tankers removed the liquids in the pool by the first week in January this year.

28 The investigation has highlighted a number of potential pathways by which fuel and contaminated water could have entered the environment. Within the site, shallow boreholes of 4-5 m depth exist within the terminal, and a deep borehole is located in the Chevron/Texaco tanker park, directly due south of the HOSL and BPA sites that were on fire. This borehole is 42 m deep, extending into the chalk layer.

29 A number of places where contaminants could penetrate the ground have been found around the perimeter of the site: on the northern and southern verges of Cherry Tree Lane; on the western verge of Buncefield Lane; and the southern verge of Hogg End Lane. These drains and chambers were either submerged in fire water and fuel or had drains connected to them that delivered such contaminants.

30 Cherry Tree Lane has a number of road drains, some of which are connected to deep chambers. At the bottom of one appears to be a borehole at least 40 m deep penetrating the chalk aquifer. For a description of the local geology and aquifer, see paragraph 41.

Figure 13

1.2 Monitoring environmental impact

Air quality

31 Monitoring air quality impact of the incident was carried out by a number of organisations. The Health Protection Agency was chiefly responsible for organising the air quality monitoring in the vicinity of the Buncefield site. The Agency received the support of HSL and, via the Hertfordshire Fire Brigade, the London Fire Brigade Scientific Advisers. A Meteorological Office (Met Office)/Natural Environment Research Council aircraft also sampled the plume. This was supplemented by local monitoring organised by the Department for Environment, Food and Rural Affairs (DEFRA). DEFRA's Automatic Urban and Rural Network (AURN) and local authority air monitoring networks monitored the impact on air quality over the wider region of southern England, including London. French regional air networks monitored potential impacts in northern France. In addition, the Met Office carried out modelling of the plume and DEFRA's air quality information service published regular reports on air quality. The Environment Agency also carried out modelling of the short range impacts in support of the Met Office, which was used by the Health Protection Agency in part to develop the strategy for subsequent sampling of grass and soil.

32 DEFRA is planning to publish a report on *Air quality impact of the Buncefield Oil Depot explosion* in May. This report will describe the monitoring carried out in England and France during the incident, and assess the air quality impacts. It will also describe the modelling of the plume and estimate the emission of pollutants released in the fire. This will inform the considerations as to whether the Buncefield incident will be designated a major accident to the environment (MATTE) under COMAH as a result of the impact of the smoke plume.

33 DEFRA is keeping the Board informed of progress with its findings. DEFRA's website can be found at www.defra.gov.uk. The Health Protection Agency is also keeping the Board informed of progress of its findings. HPA's website can be found at www.hpa.org.uk.

Surface water

34 Extensive sampling of surface and ground waters around the site has been carried out to assess the environmental impact of the incident. Samples of liquids and contaminated soils have been sent to Environment Agency laboratories around the country for analysis.

35 Surface water monitoring has concentrated on the River Ver, as it receives surface water from the Buncefield site. Two balancing tanks (which provide buffers to prevent uncontrolled surges of water), the Maylands and Redbourn lagoons, receive surface water from the site and the surrounding area, and subsequently discharge into the River Ver.

36 The River Ver was monitored daily in the first two weeks after the incident. Two sites, one upstream and one downstream of the Maylands tank outfall, were tested. The balancing tanks and outfalls were also subject to daily sampling and analysis. The initial focus was on potential fuel and fire-fighting foam contamination which could impact on the ability of fish and other organisms to live in the river and on drinking water.

37 Two additional monitoring sites were added at the end of December, both on the River Colne, which is a tributary of the River Ver. These were both south of St Albans, 7 and 11 km downstream of the Maylands outfall. All of these points were sampled for PFOS.

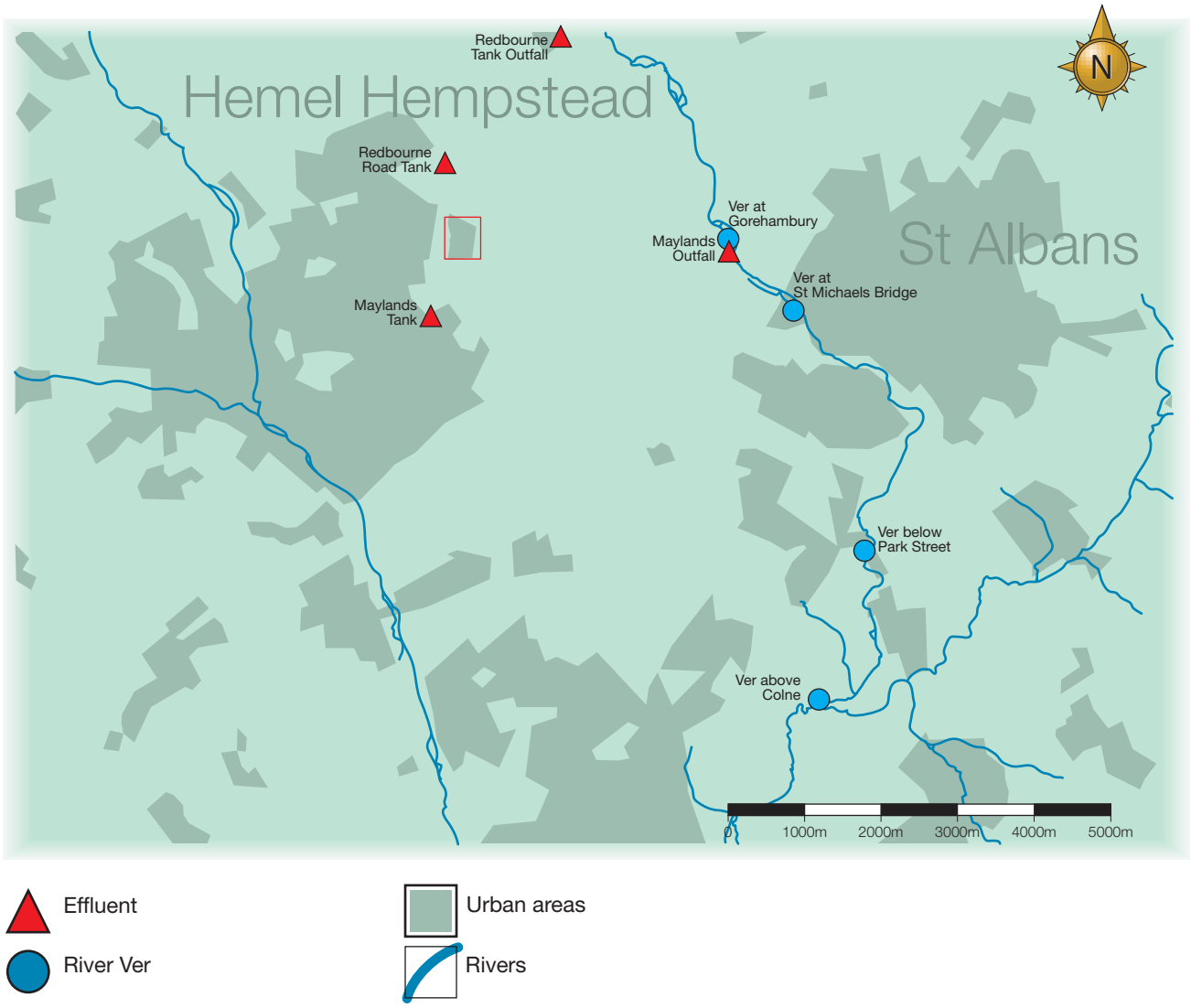


Figure 14

38 No direct impact of spills was found in the first days after the incident. By the third day of the incident, detectable but low concentrations of PFOS were noted in the balancing lagoons, at the Maylands outfall and in the River Ver downstream of the outfall. In addition, there was an increase in zinc above background concentrations.

39 PFOS was identified at all monitoring points, including in the River Colne. The PFOS concentrations, however, were less than the provisional water quality threshold concentration specified by the Drinking Water Inspectorate (DWI) and no identifiable environmental consequences have been observed in the river habitat.

40 Levels of PFOS started to drop in the River Ver in the middle of January, falling below detectable limits in February. The flow of water from the Maylands outfall stopped in February. However, the water that remains within this lagoon has low concentrations of PFOS.

Ground water

Geology

41 The Buncefield Depot and the immediate surrounding area are positioned on a variable layer of clay with flints over Upper Chalk. The clay with flints layer is classified as a low permeability surface deposit and is believed to be present at a variable thickness of between 2 and 10 m. This layer should inhibit the vertical and lateral migration of contaminants and protect the chalk aquifer below, where present in sufficient depth.

42 The Upper Chalk is classified as a major aquifer, which provides water supplies regionally. The Depot is located within the catchment of a ground water abstraction point located to the south and east of the depot. Ground water is present typically at a depth of 45 m below ground level and flow is generally towards the south-east. Natural holes in the chalk rocks, which allow quicker than normal water migration, may be present, but none have been positively identified in the Buncefield area. Ground water is water held naturally in the chalk rocks underground. This can be abstracted for drinking water and other purposes.

43 Regional ground water in the vicinity of the Buncefield site flows to the south east but there are possibly some local variations or preferential flow along dry valleys that may put Bow Bridge, Mud Lane/Holywell and Hunton Bridge pumping stations at a higher risk of contamination.

Monitoring

44 Ground water and ground water abstraction boreholes have been monitored up to 9 km surrounding the site. These include six pumping stations operated by Three Valleys Water Company, two private boreholes and a number of Environment Agency monitoring sites.

45 Three new observation boreholes have been drilled closer to the Buncefield site to provide early detection of any ground water pollution: Butlers Farm (between Buncefield and Bow Bridge Pumping Station); Breakspear House (south of Buncefield); and Hogg Lane (on the east boundary of Buncefield – see Figure 16). This is part of an ongoing monitoring regime that will provide further boreholes surrounding the site. They have each been sampled once, along with drinking water boreholes, and analysed for pollutants.

Figure 15 Picture of Maylands Tank outfall into River Ver

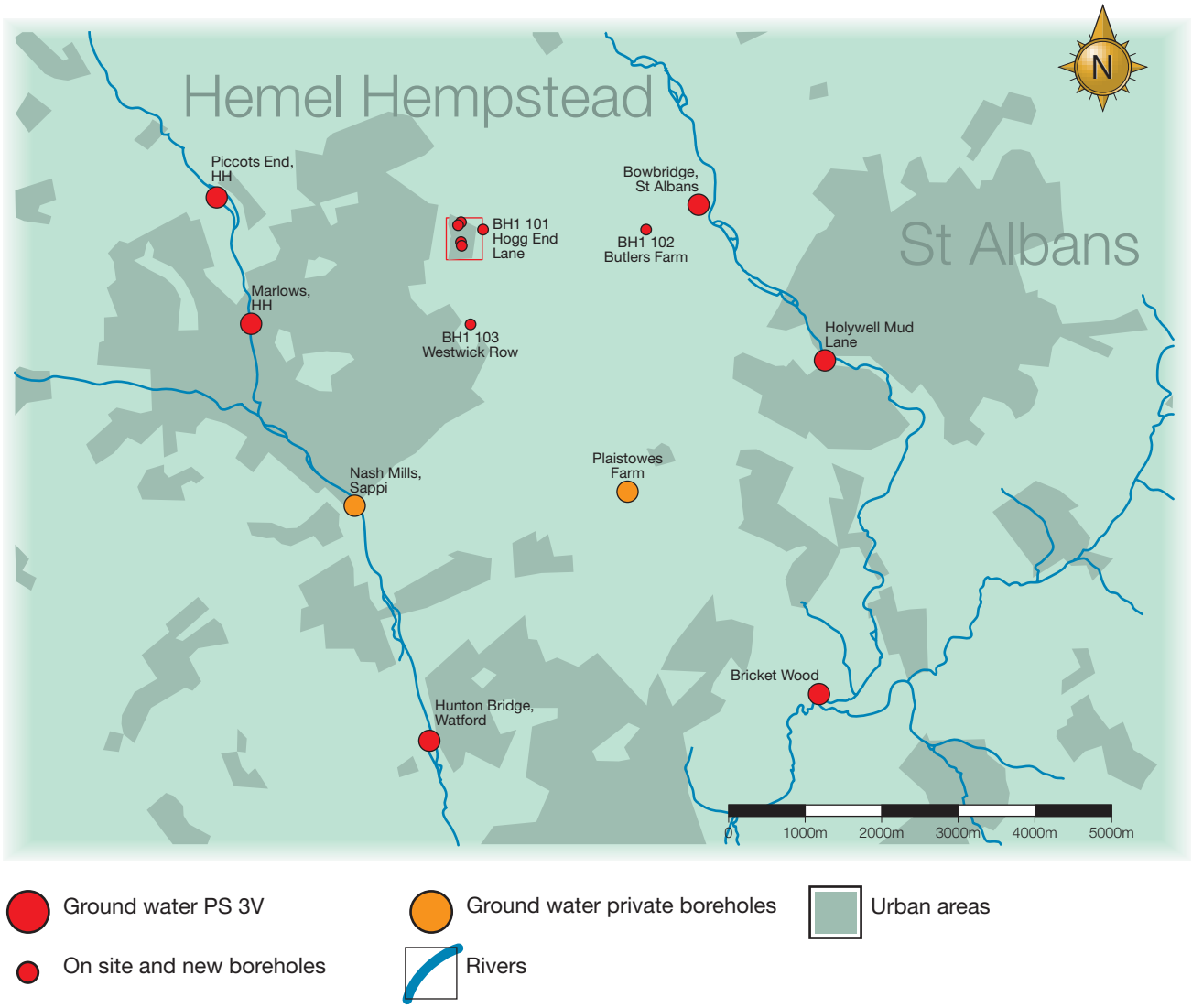


Figure 16 Map of ground water boreholes

Figure 17 A new borehole at Cherry Tree Lane

Results of monitoring

46 It is too early to rule out potential contamination of the ground water, as it can take many months or years for water to drain through the ground into the chalk aquifer. Overall, the results received to date do not suggest any identifiable contamination pattern which is directly attributable to pollution from the incident.

47 A limited number of results have indicated the presence, at limits just above detection, of PFOS and other contaminants such as oil or polycyclic aromatic hydrocarbons. These results need to be considered in relation to the overall picture for the whole of the aquifer, especially as the ground-water flow has not been established.

48 The 42 m deep borehole located on the Chevron/Texaco lorry park on the Buncefield site, south of HOSL West has been sampled (see paragraph 28). Initial results indicate fuel is present at low concentrations. It is not yet known if this contamination is historic or a result of the incident. Investigations continue.

49 The four points of ground penetration around the perimeter of the site reported in paragraph 29 are being investigated. Some of the chambers and deep boreholes associated with these entry points may contain contaminants from the incident.

Drinking water

50 The closest drinking water abstraction point to the Buncefield site is the Bow Bridge pumping station approximately 3 km due east. Drinking water was not being pumped from here prior to the incident and the station remains out of operation as a precautionary measure. As a further safeguard, non-return valves have been fitted to prevent any possible backflow of water from the site. Changes have also been made to the supply arrangements to ensure drinking water supplies are maintained. The other drinking water abstractions are located in a ring around Buncefield at a distance of more than 5 km.

51 Water supply in the area is the responsibility of Three Valleys Water Company which has the detailed operational knowledge required to manage the local response. The regulation of drinking water quality is the responsibility of DWI.

52 Three Valleys Water Company and DWI are working closely together to ensure that drinking water supplies remain of the highest quality. Water companies treat and monitor the quality of water before it is distributed to the public as drinking water, thus providing reassurance of its quality.

Land investigations

53 Investigations to assess the extent of land contamination started in February 2006 along Cherry Tree Lane. Trial pits were excavated at points along the Lane and on site and a number of samples taken for laboratory analysis. The locations of the trial pits are indicated in Figure 18.

54 The initial findings indicate that the surface layer of the soils, the top 30 cm approximately, was contaminated with fuel and fire-fighting products. No visible free product was detected in any of the trial pits at depth. PFOS, hydrocarbons and polycyclic aromatic hydrocarbons have been reported in the laboratory analysis.

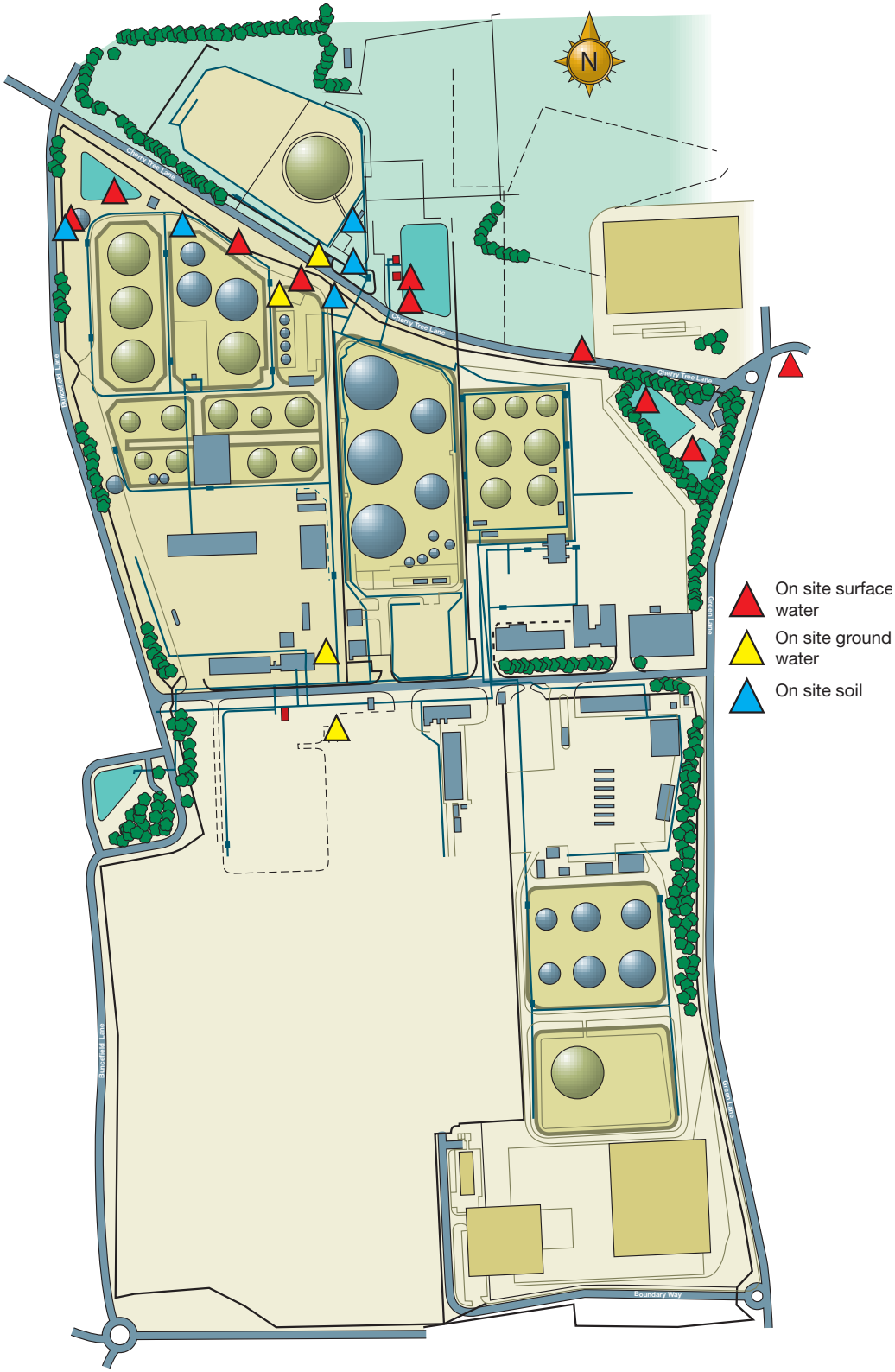


Figure 18 Location of trial pits

Disposal of fire water

55 All contaminated fire water has been removed from the site and is being safely and securely stored at a number of sites around the country. Thames Water holds the largest quantities. There are approximately twelve million litres at Maple Lodge Sewage Treatment works near Rickmansworth and four million litres at Blackbirds Treatment near Radlett.

56 The disposal of these fire waters is the responsibility of the oil companies. The Environment Agency await definitive risk assessments from the companies on their proposed best practicable disposal options to avoid risk of contamination of the environment.

57 Rainfall will give rise to more contaminated water within the Buncefield site. This will be contained on site before being safely removed.

1.3 Progress with other aspects of the major investigation

Acting on regulatory advice (Investigation term of reference two)

58 HSE issued an alert to fuel depot operators on 21 February 2006 in response to the first *progress report* to the Board, seeking a response from depot operators by Easter 2006. The Competent Authority has also begun a programme of depot inspections targeting the key findings in the first *progress report*. A report of the programme's findings is expected in late May. This will be of importance in improving the control of major hazards at fuel depots.

Working with others and communities (Investigation term of reference four)

59 Lord Newton has written to other agencies and authorities that may undertake reviews of the Buncefield incident. The investigation team is actively engaged with communities and businesses in the Buncefield area. See Part 2 of this progress report for further information on this aspect.

Report to the European Commission (Investigation term of reference seven)

60 A report has been sent to the European Commission by the Competent Authority to discharge a responsibility under the Control of Major Accident Hazards (COMAH) Regulations 1999.

Part 2 Current business and community issues

61 Four months on from the incident, the local community is still facing a variety of difficulties. In these challenging circumstances both individuals and businesses have demonstrated remarkable resilience.

62 The incident has had significant impact on some individuals' day-to-day lives, leading to changed circumstances, including in some cases unemployment. These factors contribute to heightened levels of stress and anxiety.

63 A number of properties that sustained significant structural damage are still being repaired, and in some cases residents are as yet unable to return home.

64 Many businesses forced to relocate away from Maylands Estate in the immediate aftermath of the incident are still facing challenges to deliver pre-incident levels of service. Some businesses based beyond Maylands have seen an associated drop in their levels of business.

65 The uncertain future of the Buncefield Oil Depot continues to cause concern to local businesses, employees and residents.

66 Dacorum Borough Council is working with community and voluntary sector organisations to provide a wide range of services, including advisory and training, to people affected by the incident. Business advice and support is being provided by both the Council and Hertfordshire Chamber of Commerce.

67 Board members have also met with local residents at Woodhall Farm and at Leverstock Green and will repeat the exercise at Adeyfield. A meeting with the Maylands business community will take place in April. The investigation team and Members of the Board have also met with representatives from Dacorum Borough Council, St Albans District Council and Hertfordshire County Council, as well as with Mike Penning (the local Member of Parliament), local councillors, Hertfordshire Police and Hertfordshire Fire and Rescue Service.

68 The investigation team and Dacorum Borough Council are working to ensure progress with the investigation is widely available to residents and businesses. Details of the first *progress report* were explained in Council newsletters to residents and business, such as *Dacorum Digest, Buncefield Update* and *Business Update*. The investigation team will continue to look for new and more effective means of communicating with people and businesses affected by the Buncefield incident.

69 An Investigation website contains useful information about the Investigation and the Board at www.buncefieldinvestigation.gov.uk.

70 Further meetings with residents and businesses in these areas will be arranged as the investigation progresses.

Part 3 Further work

3.1 Explosion and fire

71 The investigation priority is to establish how the fuel escaped from the vicinity of the HOSL site, and vapourised to form a flammable mixture that subsequently ignited with devastating results. Digital and other records, physical tracing of control systems, valve positions and other work on site, analysis of fuel samples and modelling of vapour formation under the prevailing conditions are therefore top priorities.

72 It is hoped that enough of the work will be completed within a month of publishing this second *progress report* to enable a further, third *progress report* to be made to the Board that describes with confidence how the fuel escaped and vapourised.

73 In parallel, further lines of investigation have been established. These include:

- pursuing information on other incidents of an apparently similar nature to Buncefield from around the world;
- completing an assessment of the extent of damage off site;
- modelling the ignition mechanism that generated massive overpressure from an apparently unconfined vapour cloud;
- modelling the dispersion of the flammable vapours; and
- development and propagation of the explosion.

74 Separately, work to ascertain why control of fuel was lost forms a continuing and key part of the primary investigation.

3.2 Environmental impact

75 The site drainage system was initially built when the site was commissioned in 1968 and has developed over the intervening years. A system of surface water drains and porous land-drains is evident but not yet fully mapped. A detailed examination of the site drainage system is underway. This will help to better define the flows during the incident.

76 Sampling of surface water will continue to monitor the potential effects of the Buncefield incident on surrounding watercourses (eg rivers and ponds).

77 Ground water monitoring by sampling of drains, subsurface chambers, pits and boreholes will continue. New boreholes will be sunk as further improved knowledge emerges of the drainage pathways from the site.

78 Analysis of fuel samples to get a ‘fingerprint’ has not yet been completed but it is one of the key steps in ascertaining whether contamination is a result of the incident (eg in determining whether the low-level contamination in the borehole sited in the lorry park south of the HOSL West site is new or historic).

79 Off-site, sampling of soil, sediment, and other materials, and CCTV examination of the drains around the perimeter of the Buncefield site is also continuing to develop a greater understanding of drainage and contamination.

80 DWI and Three Valleys Water Company will continue to work together to maintain supplies of high-quality drinking water.

81 The site operators are developing plans for the safe and environmentally sound disposal of fire water and other pollutants that have been removed to storage off site.

Annex 1 Further information

Useful links

Buncefield Investigation

Buncefield Major Incident Investigation
Marlowe Room, Rose Court
2 Southwark Bridge
London, SE1 9HS
Tel: 020 7717 6909
Fax: 020 7717 6082
E-mail: buncefield.inforequest@hse.gsi.gov.uk
Web: www.buncefieldinvestigation.gov.uk

Business support

Dacorum Business Contact Centre
Tel: 01442 867 805

Business Link Helpline
Tel: 01727 813 813

Hertfordshire Chamber of Commerce
Tel: 01727 813 680

Resident's support

Dacorum Community Trust Mayors' Fund
To apply, call the freephone helpline on 0800 131 3351. Lines are open from 9 am – 6 pm, 7 days a week.

Dacorum Borough Council
www.dacorum.gov.uk
Tel: 01442 228 000

Citizens Advice Bureau

Hemel Hempstead Citizens Advice Bureau, based in Hillfield Road, offers free, impartial, practical and confidential advice on a range of subjects.

Local authorities and emergency services

Dacorum Borough Council
www.dacorum.gov.uk
Tel: 01442 228 000

St Albans District Council
www.stablans.gov.uk
Tel: 01727 866 100

Hertfordshire County Council
www.hertsdirect.org
Tel: 01483 737 555

Hertfordshire Fire and Rescue Service
www.hertsdirect.org/yrccouncil/hcc/fire/buncefield

Hertfordshire Constabulary
www.herts.police.uk/news/buncefield/main.htm

Hertfordshire Chamber of Commerce
www.hertschamber.com
Tel: 01727 813 680

Government links

Office of the Deputy Prime Minister
Fire and Resilience Directorate: www.odpm.gov.uk

Government Office for the East of England
www.go-east.gov.uk

Environment Agency
www.environment-agency.gov.uk

Department of Trade and Industry
Oil and Gas Directorate: www.og.dti.gov.uk

Health and Safety Executive
Hazardous Installations Directorate: www.hse.gov.uk/hid
Control of Major Accident Hazards: www.hse.gov.uk/comah

Department for the Environment, Food and Rural Affairs
www.defra.gov.uk

Health Protection Agency
www.hpa.org.uk

Food Standards Agency
www.food.gov.uk

Drinking Water Inspectorate
www.dwi.gov.uk

Industry links

United Kingdom Petroleum Industry Association (UKPIA)
www.ukpia.com
Tel: 020 7240 0289

Chemical Industries Association
www.cia.org.uk
Tel: 020 7834 3399

Other useful sources of information

Dacorum Borough Council *Digest* newsletter, available monthly
Dacorum Borough Council *Buncefield Update* Newsletter

Annex 2 Investigation terms of reference

1 To ensure the thorough investigation of the incident, the factors leading up to it, its impact both on and off site, and to establish its causation including root causes.

2 To identify and transmit without delay to duty holders and other appropriate recipients any information requiring immediate action to further safety and/or environmental protection in relation to storage and distribution of hydrocarbon fuels.

3 To examine the Health and Safety Executive's and the Environment Agency's role in regulating the activities on this site under the COMAH Regulations, considering relevant policy guidance and intervention activity.

4 To work closely with all relevant stakeholders, both to keep them informed of progress with the investigation and to contribute relevant expertise to other inquiries that may be established.

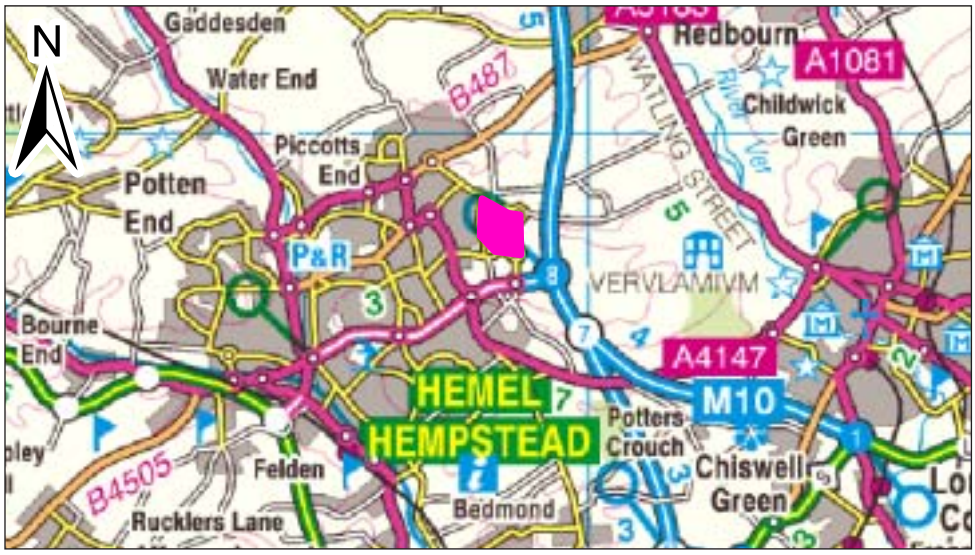
5 To make recommendations for future action to ensure the effective management and regulation of major accident risk at COMAH sites. This should include consideration of off-site as well as on-site risks and consider prevention of incidents, preparations for response to incidents, and mitigation of their effects.

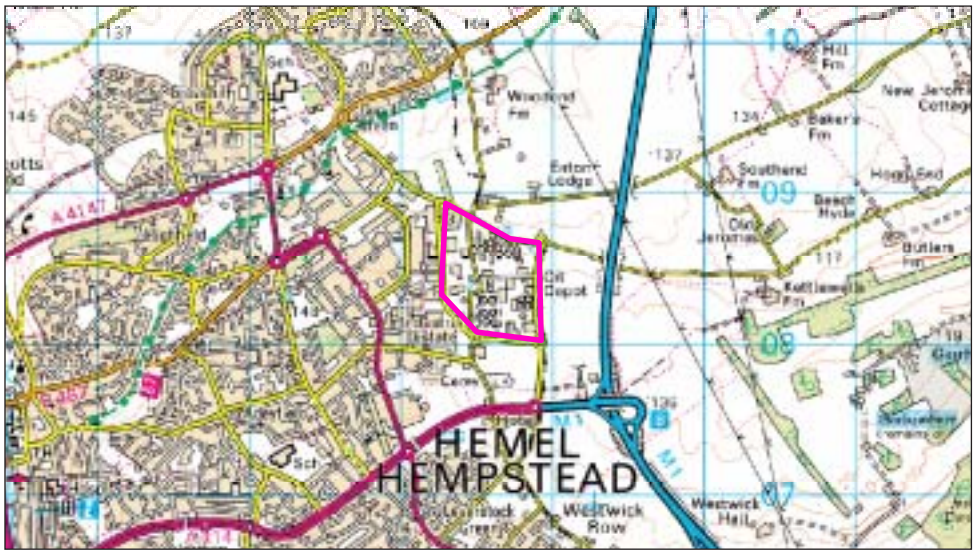
6 To produce an initial report for the Health and Safety Commission and the Environment Agency as soon as the main facts have been established. Subject to legal considerations, this report will be made public.

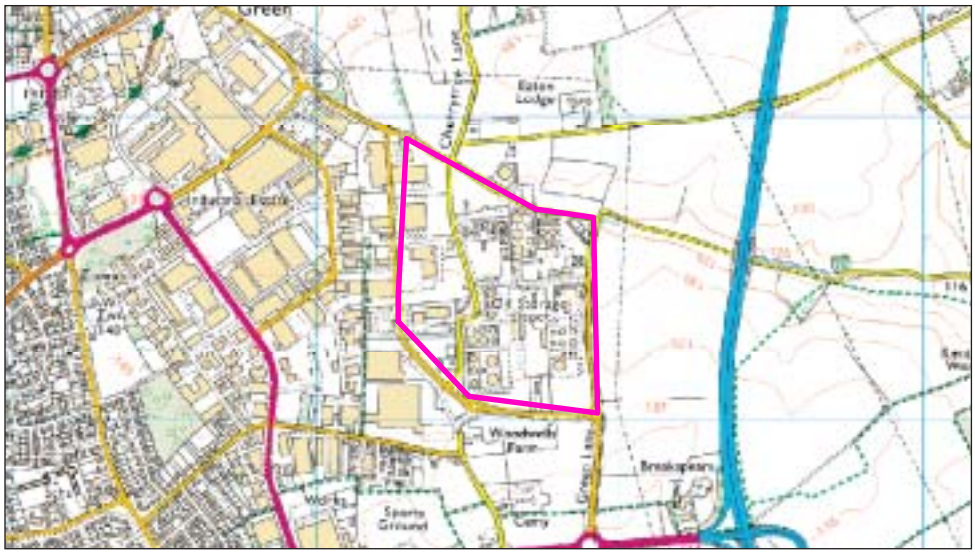
7 To ensure that the relevant notifications are made to the European Commission.

8 To make the final report public

Annex 3 Site maps







Glossary

The Health and Safety Commission (HSC) is responsible for health and safety regulation in Great Britain. The Health and Safety Executive and local authorities are the enforcing authorities who work in support of the HSC. Both are statutory bodies, established under the Health and Safety at Work etc Act 1974.

The Environment Agency is the lead regulator in England and Wales with responsibility for protecting and enhancing the environment. It was set up by the Environment Act 1995 and is a non-departmental public body, largely sponsored by the Department for Environment, Food and Rural Affairs (DEFRA) and the National Assembly for Wales (NAW). The Environment Agency's prime responsibilities include flood risk management, tackling pollution incidents, reducing industry's impact on the environment, restoring and improving rivers, coastal waters, contaminated land, and wildlife habitats. The Environment Agency also advises on sustainable drainage, water conservation and management, planning issues, nature conservation and waste management.

aquifer	A water-bearing stratum of porous rock, gravel or sand
borehole	A cylindrical shaft drilled into the ground, often for geological exploration or extraction
bund	An enclosure designed to contain fluids should they escape from the tank or vessel inside the bund
COMAH	The Control of Major Accident Hazards Regulations 1999 Regulations (COMAH). See Annex 1
COMAH sites	Sites to which the COMAH Regulations apply
Competent Authority	The COMAH Regulations are enforced by a joint Competent Authority comprising HSE and EA in England and Wales, and HSE and the Scottish Environment Protection Agency (SEPA) in Scotland. The Competent Authority operates to a Memorandum of Understanding which sets out arrangements for joint working
containment	Barriers which, in the event of a spill, can prevent spilled materials from reaching the environment
contaminants	Substances that have an adverse effect on air, water or soil
foam concentrate	In the context of this report, a concentrate used during operations to extinguish hydrocarbon fires
fire water	Water used during fire-fighting operations
hazard	Anything with the potential to cause harm
hydraulic pressure	Pressure exerted by water
hydrocarbon	An organic chemical compound of hydrogen and carbon. There are a wide variety of hydrocarbons such as crude oil (basically a complex mixture of hydrocarbons), methane, propane, butane, etc. They are often used as fuels

Northgate	A business whose premises were affected by the Buncefield incident
outfall	The point of discharge of water into a river, stream, pond, sea or other water body
PFOS	Abbreviation of perflourooctane sulphonate, a surfactant added to fire-fighting foam to aid it spreading
Polycyclic aromatic hydrocarbons and compounds	A group of chemicals commonly found in residues from burning coal, fuel and oil
pool fire	A fire over a pool of fuel and/or water or other liquids
primary containment	The equipment and facilities which have direct contact with the products under normal containment (eg tanks and pipe work), and their operation and management
Prohibition Notice	Issuing Improvement or Prohibition Notices are some of the range of means which enforcing authorities use to achieve the broad aim of dealing with serious risks, securing compliance with health and safety law and preventing harm. A Prohibition Notice stops work in order to prevent serious personal injury
risk	The likelihood that a hazard will cause a specified harm to someone or something
safety reports	The COMAH Regulations require operators of top-tier sites to submit written safety reports to the Competent Authority
secondary containment	The control of the product in the primary containment facilities (eg the provision of tank high-level alarms to prevent loss through overfilling) and any contingency provisions for the failure of the primary containment. The most important of these provisions are bunds
surface water	Water that sits or flows above land, including lakes, seas, rivers and streams
surfactant	A chemical added to fire-fighting foam which allows the foam to form a thin sealing film over the burning fuel
tertiary containment	The site surface and associated drainage, boundary walls, roads, kerbs and any features such as road humps that can provide some retention of liquids. Proper design of drainage systems will limit loss of product out of the site and prevent lost product permeating into the ground with the potential risk that it can migrate to ground water, or contaminate surface waters and land
watercourses	A natural or man-made channel along which water flows