# Contaminated Land Inspection Strategy

August 2001

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# 1 Introduction

Milton Keynes Council has a statutory duty to inspect all land in its area for possible contamination under new regulations (see 1.2), which came into force on the 1st April 2000. Further the council is required to produce and publish a '**Contaminated Land Inspection Strategy**' which details how this inspection will be carried out (see 1.2.1). This strategy document fulfils the latter requirement. Clicking on Figure references underlined in blue automatically links to the figures. Clicking on terms underlined in blue automatically link to a brief explanation in the glossary at the end of this document.

## 1.1 Contaminated Land within the overall strategy of Milton Keynes Council

### 1.1.1 Council objectives and priorities relevant to contaminated land

This strategy document is presented within the context of sustainable development, which is supported by the five strategic aims of Milton Keynes Council:

a) To promote a healthy and sustainable environment
b) To tackle disadvantage and promote equality
c) To work in partnership for the benefit of the people of Milton Keynes
d) To be open, accessible and consultative
e) To ensure excellence, efficiency and effectiveness.

Clearly dealing with contaminated land in an effective and efficient manner is a vital part of all the first three aims. Milton Keynes Council is nationally recognised as a leader in practising open, accessible and consultative local government. A recent example of this, which attracted nation-wide interest and a record number of responses was the Council Tax Referendum. This document will be initially presented as a consultation draft that will be made available to all interested parties within the council and the wider community. Comments received will be considered before the final version of the strategy is adopted and published (see 1.3.2 – 1.3.4).

### 1.1.2 Contaminated land within the Council's Environmental Strategy

This strategy has an important role within the Council's Environmental Policy, which aims to:

a) Protect and enhance the local environment, to ensure that Milton Keynes is a healthy and attractive place for people to live and work
b) Recognise and respond to its wider responsibilities by pursuing action which minimises further damage to the Earth whilst helping to repair existing damage.

Within this context the Contaminated Land Inspection Strategy forms part of a portfolio of environment related council strategies such as the transport, energy, waste and air quality strategies.

## 1.2 Regulatory context

### 1.2.1 Introduction to the regulatory regime

This new regime brings new statutory duties to local authorities who have the primary responsibility for contaminated land under the Contaminated Land (England) Regulations 2000. Of paramount importance in the new regulatory system is a rigorous procedure of risk assessment, which is used to determine if land is statutorily contaminated land according to a new definition. It is based on the suitable for use approach to remediation and the polluter pays dictum in terms of liability for remediation costs.

The underlying principles of the new regime are:

a) Return contaminated land to beneficial use
b) Prevent or minimise further contamination
c) Process must be reasonable, effective and transparent
d) 'Suitable for Use' approach requires remediation only where contamination poses unacceptable risks to health or the environment, taking into account the use of the land and its environmental setting
e) 'Polluter Pays' principle to determine liability for remediation costs
f) Procedure of risk assessment determines if land is recognised as contaminated in law

The main objective of the new regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the environment, assessed in the context of the current use and circumstances of the land. The stated objectives are to:

a) Improve the focus and transparency of the controls, ensuring authorities take a strategic approach to problems of land contamination
b) Enable all problems resulting from contamination to be handled as part of the same process (previously separate regulatory action was needed in respect of human health and the water environment)
c) Increase the consistency of approach taken by different authorities
d) Provide a more tailored regulatory mechanism, including liability rules, better able to reflect the complexity and range of circumstances found on individual sites
e) Encourage voluntary remediation by site owners helped by the improved clarity of the new regime.

### 1.2.2 The role of Milton Keynes Council

The council is a regulator, landowner and planning authority. It is essential that it investigates contaminated land not only in order to carry out its statutory duties under the new regime but also to identify and investigate council owned land which may be contaminated. This will also enable the council to effectively use the planning controls to require developers to investigate and remediate contaminated sites prior to development to ensure they are suitable and safe for their proposed use.

In the context of the contaminated land regulations the main responsibilities of Milton Keynes Council as a council are to:

a) Cause their areas to be inspected in order to identify contaminated land and prepare reports on local contamination
b) Determine whether any particular site is statutorily contaminated land
c) Act as enforcing authority for all contaminated land which is not designated a special site
d) Establish who may be the appropriate person or persons to bear responsibility for remediation of contaminated sites
e) Decide, after consultation, what remediation might be required in any individual case
f) Ensure that such remediation takes place, either through agreement with the appropriate person, or by serving a remediation notice if necessary, or carrying out the work themselves
g) Determine who should bear what proportion of the liability for meeting the costs of the work where a remediation notice is served, or the authority itself carries out the work
h) Record information on a public register about their regulatory actions.

### 1.2.3 The role of the Environment Agency

The Environment Agency has a secondary role with respect to contaminated land, which is:

a) To act as regulator for any land designated by the council as a special site
b) To provide site-specific guidance to local authorities
c) To publish periodic national reports on contaminated land
d) To carry out technical research and act as a centre of expertise.

### 1.2.4 Definition of contaminated land

The basis of the definition of contaminated land is complex and incorporates the concept of risk assessment procedures. It involves the identification of a contamination source together with a pollution pathway linking the source to a target or receptor. To be statutorily contaminated land there must be a source-pathway-receptor pollutant linkage.

It is summed up in the legislation as:

> Land is only “contaminated land” where it appears to **the council** to be in such a condition, by reason of substances in, on or under the land that:

a) significant harm is being caused; or
b) there is a significant possibility of such harm being caused; or
c) pollution of controlled waters is being or is likely to be caused

The regulations define the following situations where harm is to be regarded as significant:

a) chronic or acute toxic effect, serious injury or death to humans
b) irreversible or other adverse change to an ecological system
c) disease, or other physical damage or death of livestock or crops
d) the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter (includes all groundwaters, inland waters and estuaries)
e) substantial damage to, or failure of, buildings

The carrying out of these procedures will be assisted by new guidelines on toxicological properties which take into account the nature, degree and extent of harm, timescales, vulnerability of receptors, irreversibility and length of exposure, which will supersede the old Interdepartmental Committee on the Redevelopment of Land (ICRCL) publications (at the time of writing these guidelines have still not been published).

Specifically excluded from the definition of contaminated land in the legislation are cases where harm or pollution of land or controlled waters occurs:

a) due to any radioactivity from any substance or the affects of any radioactive material
b) on a site where new development is planned or taking place (this will be dealt with under the planning regime)
c) on a site subject to *Integrated Pollution Prevention & Control (* IPPC*)* or *Integrated Pollution Control (*IPC*)* or *Local Authority Air Pollution Control (*LAPC*)*, where contamination arises from part of the authorised process
d) on a site subject to a Waste Management Licence
e) at a site with a discharge consent under the Water Resources Act 1991
f) due to contamination by organisms (organisms are not recognised as substances by the regulations).

### 1.2.5 The approach to dealing with contaminated land

Potentially contaminated areas of land will be dealt with in the same manner irrespective of whether they are privately owned or are owned, or leased, by Milton Keynes Council. In essence there are five main stages to be undertaken by the council:

a) Determine if land is statutorily contaminated
b) Decide what remediation is required
c) Ensure that this remediation takes place by:
   - reaching a voluntary agreement
   - serving a remediation notice, if agreement cannot be reached
   - carrying out the work themselves, in certain circumstances
d) Determining who should bear what proportion of the liability for the costs of the work
e) Recording certain information about their regulatory actions on a public register

### 1.2.6 Identification of contaminated land

Milton Keynes Council may have or acquire information that suggests a particular site may be 'contaminated' by reason that a pollution linkage potentially exists. The council will need to consider if the available information provides a sufficient basis for determining if land is contaminated. If this is not the case then the council will have to consider carrying out a detailed inspection of the site to determine if it is statutorily contaminated land.

In the first place the council has to consider if the site is likely to be designated a special site. If so then the authority should seek to arrange for the Environment Agency to carry out the detailed investigation of the land. Otherwise the council needs to carry out any necessary investigations.

Such an investigation will require, as a minimum, a desk study to collate all available information on such things as past contaminative uses, investigations, pollution incidents, geology and hydrogeochemistry. An intrusive site investigation will only be required where the authority considers it likely (not just reasonably possible) that a

contaminant is present and that given the current use of the land there is a receptor present or likely to be present.

The determination of the status of the land depends on the application of risk assessment procedures. Land can only be classified as 'statutorily contaminated' where a pollution linkage can be demonstrated. Once any land has been identified as contaminated land detailed investigation of any identified significant pollution linkages can, if necessary, form part of an assessment action required under a remediation notice.

### 1.2.7 Special sites

The designation of a special site can only take place after the council has formally identified the site as contaminated land. In this case the Environment Agency should carry out any detailed investigation. Land can only fall into the special site category if it matches the descriptors in regulations 2 and 3 of the Contaminated Land Regulations 2000. These categories are mainly based on certain past uses of land, sites where there is the potential of harm to certain major aquifers and sites owned by the Ministry of Defence (see Section 7.2.5 and Appendix A).

### 1.2.8 Public Registers of Council information

Where land has been identified as contaminated land and consequent action taken, the council has to include specified details about the condition of the land, and the remediation actions carried out on it, in its public register. This is to make this information readily available to the public and to those with an interest in the land.

However, the council may be asked to provide information (for example in connection with property purchases) it has gathered about other areas of land which have not been identified as contaminated land. For example, whether the authority had inspected the land and, if so, details of any site investigation reports.

Such requests for information are subject to the controls of the Environmental Information Regulations 1992 (SI 1992/3240 as amended). Thus the authority might be obliged to provide such information when requested to do so, for which it can make a 'reasonable charge' in respect of the costs involved in providing such information (see section 9.2).

### 1.2.9 The principles of pollution linkages

The new regulatory regime is founded on a risk-based framework within which contaminated land can be identified, assessed and managed. This framework embodies the fundamental distinctions between toxicity**,** hazard and risk that are recognised throughout environmental science:

- ***toxicity*** is the potential of a material to produce injury in biological systems
- ***hazard*** is the nature of the adverse effect posed by the toxic material
- ***risk*** is the probability of suffering harm or loss under specific circumstances.

Risk is used in a multitude of ways in the context of contaminated land and it is essential to be clear about what form of risk is under consideration and what are its

components. Contaminated land risks to human health and the environment can be regarded as comprising these components:

- source - a substance or group of substances with the potential to cause harm
- pathway - a route by which a receptor can be exposed to, or effected by, the potentially harmful substance or substances
- receptor - a particular entity which may be harmed or adversely effected by the harmful substance or substances.

Hazards arising from chemical exposure are specifically characterised by the nature of the adverse effect, the pathway and the receptor they effect. Like physical hazards they are only realised when there is a linkage between the source, the pathway and the receptor. If this linkage does not exist, or can be broken, then there is no hazard.

As an illustration take a physical hazard such as loose roof slates (source), falling due to gravity (pathway), hitting pedestrians walking next to the building (receptor). This hazard can be dealt with by breaking the linkage in one of a number of ways including:

- removing the loose slates (remediating the source);
- erecting a barrier on the roof to intercept falling tiles (cutting the pathway);
- preventing pedestrians from walking near the building (protecting/removing the receptor).

In a similar way chemical hazards are dealt with by breaking the pollution linkage in one way or another.

The **probability** of a hazard being realised, i.e. the risk, depends on the context of this linkage, including site-specific factors such as contaminant concentration, its bioavailability, the ease of access to the exposure pathway and the duration of exposure. The consequences of the risk under consideration depend on site-specific factors such as the toxicological potency of the contaminant under consideration, the specific adverse effect on the receptor, the duration of exposure and the sensitivity of the receptor (e.g. a child is more sensitive than an adult).

### 1.2.10 The principles of risk assessment

Risk assessment put simply is an evaluation of the probability of harm. In the context of contaminated land it is concerned with gathering and interpreting information on the characteristics of sources, pathways and receptors at a specific site and attempting to understand the uncertainties inherent in the assessment of these specific risks. The requirements of the risk assessment control the nature of any site investigation and together they make up the scientific part of contaminated land investigation. In practice this involves the determination of the environmental geochemistry of the contaminants together with relevant properties of the host materials and wider site characteristics which influence the transport and final resting place of contaminants (see section 5.5.2).

### 1.2.11 The requirement for a strategic approach

The statutory guidance says that the council should take a strategic approach to the identification of land, which merits detailed individual study. In developing its strategic approach it has to consult with the Environment Agency and other appropriate public authorities. The council must set out its approach as a written strategy, which it has to adopt and publish within 15 months of the implementation of the new regime. A copy of the strategy must be sent to the Environment Agency.

The strategy must be kept under periodic review and the council should not await the publication of its strategy before commencing more detailed investigative work, for example on sites where it already has information suggesting they may be contaminated

## 1.3 Development of the strategy

### 1.3.1 The internal team responsible for contaminated land

The main responsibility for dealing with contaminated land lies with the Environmental Protection Team in the Environmental Health Division.
There are two full-time officers in this team whose principle purpose is dealing with the issue of contaminated land:

Dr Steve Moorhouse, Scientific Officer, Environmental Protection Team
Nicola Adshead, Technical Officer, Environmental Protection Team**.**

When taking enforcement action or where legal opinion is required advice will be sought from the Principal Solicitor: Housing & Environment and General Litigation (Mrs Marina Lipscombe).

### 1.3.2 Internal liaison within the council

Internal liaison has involved consulting the appropriate officers in the Planning, Building Control, Waste & Energy Management, Highways & Technical Services, Landscape & Countryside sections. They will be asked to comment on the draft strategy along with the various directorate heads and relevant heads of services.

### 1.3.3 Consultation with other statutory bodies

Contact has been made with the appropriate section in the following bodies who will be asked to comment on the draft strategy:

Anglian Water
Department of Transport, Local Government & the Regions
Department of the Environment, Food and Rural Affairs
English Heritage
English Nature
Environment Agency
Food Standards Agency

**Neighbouring Councils**
The following councils will be asked to comment on the draft strategy:

Aylesbury Vale District Council
South Northamptonshire Council
Mid Bedfordshire District Council
Bedford Borough Council
Borough Council of Wellingborough
South Bedfordshire District Council

Bedfordshire County Council
Northamptonshire County Council
Buckinghamshire County Council

### 1.3.4 Consultation with other organisations and the local community

The following organisations will be asked to comment on the draft strategy:

Berkshire, Buckinghamshire & Oxfordshire Wildlife Trust
Buckinghamshire Health Authority
Chamber of Commerce
Environment Body Milton Keynes (an organisation that distributes landfill tax credit to community projects)
English Partnerships
Government Office for the South East
Her Majesty's Customs and Excise Office
Milton Keynes Parks Trust
Milton Keynes Forum
The Countryside Agency

In addition copies of the draft strategy will be made available in local libraries and council offices for consultation and comment by members of the public.

## 1.4 Objectives of the strategy document

### 1.4.1 The principle objectives

Clearly the principle objective of the strategy document is to fulfil the statutory duty, to produce and publish a strategy within a defined timescale. Furthermore the document must demonstrate that the council meets the criteria laid out in Part 3 of the statutory guidance which states that the strategic approach to inspecting contaminated land should:

a) Be rational, ordered and efficient
b) Be proportionate to the seriousness of any actual or potential risk
c) Seek to ensure that the most pressing and serious problems are located first
d) Ensure that resources are concentrated on investigating in areas where the authority is most likely to identify contaminated land
e) Ensure that the council efficiently identifies requirements for the detailed inspection of particular areas of land
f) Take into account local circumstances of receptor types, geology, hydrogeology, available information on contamination, potentially contaminative industries, past redevelopment and remediation, interests of other regulatory authorities.

Producing the strategy also provides a valuable review of our systems and processes for dealing with contaminated land. Through the process of internal and external consultation it will be an extremely useful and effective means of providing information about contaminated land, and how the council is dealing with it, to a wide range of interested parties.

### 1.4.2 Informing all stakeholders of the authorities intentions

One of the objectives of the strategy document is to inform all stakeholders in the Milton Keynes Council area of the manner in which the Council is dealing with contaminated land. Prior to publication of the final strategy document the consultation phase (sections 1.3.3 – 1.3.4) will be an effective means of publicising to all stakeholders the implications of the new contaminated land regime. The widest possible availability of the final document to any concerned party is an integral part of the strategy itself (see section 6).

### 1.4.3 Providing information to the Environment Agency

This represents another key use of the strategy document in that it will provide the agency with clear information about the Milton Keynes Council approach to contaminated land and also useful information in that it also provides an overview of contamination issues in the Milton Keynes Council area (see section 2).

# 2 Characteristics of the Milton Keynes Council area

## 2.1 The development of Milton Keynes

### 2.1.1 Brief history and origins of Milton Keynes

Although Milton Keynes is one of the newest and most rapidly expanding communities in the United Kingdom the area covered by the council has a long and varied history. The earliest known occupation site in Milton Keynes dates from about 2000 BC at Heelands. Stone and bronze artefacts found in places such as Olney and Newport Pagnell show that Neolithic and Bronze Age peoples lived along the Ouse valley and its tributaries. Bronze Age burial sites at Ravenstone, Wolverton and Milton Keynes Village, and the remains of a large circular timber house dated at 1000 BC at Bancroft, are evidence of settled and ordered communities. Following this period there was an expansion of the local population and from about 500 BC Iron Age settlements developed in several places in the Milton Keynes area. A massive bank and ditch enclosed camp from this era is still visible near Little Brickhill.

At the time of the Roman conquest in AD 43 the area was probably extensively settled and farmed. In the Roman period life was good for the favoured few, as shown by the remains of a major Roman villa with fine mosaic floors, excavated at Bancroft Park. There were other Roman buildings and extensive settlements in places such as Haversham and Olney. In the south-easternmost part of Milton Keynes, south of Fenny Stratford, the Roman town of Magiovinium was established on Watling Street. This famous Roman Road, later to become the A5 highway, runs through the west of Milton Keynes from Little Brickhill in the south to Stony Stratford in the north.

Saxon settlements of the area date from around the 6$^{th}$ and 7$^{th}$ centuries, with a cemetery of this date located at Newport Pagnell. By the time of the 9$^{th}$ and 10$^{th}$ centuries the towns and villages, which now make up Milton Keynes, were established. In the 9$^{th}$ century the administrative area of Milton Keynes was within the Saxon Hundreds of Bunsty, Moulsoe and Secklow. Later these Hundreds were combined to form the Newport Hundred which covered almost the same area as the current Milton Keynes Council.

The Saxon precursors of Milton Keynes Council met outdoors at a specially constructed mound to deal with land management, collect taxes and dispense justice. In 1978 the Secklow Mound was reconstructed close to the present Civic Offices to be preserved as an ancient monument and a symbol of the continuation of local government in Milton Keynes through the ages.

### 2.1.2 Local government in Milton Keynes

The new town of Milton Keynes was designated in 1967 and accounts for about one third of the area, and 80 % of the population of the Milton Keynes Council area. The Borough of Milton Keynes was formed in 1974 from the former urban and rural authorities of Bletchley, Wolverton, Newport Pagnell and part of Winslow.

This new borough incorporated the six towns of Bletchley with Fenny Stratford, Newport Pagnell, Olney, Stony Stratford, Woburn Sands, Wolverton and 39 villages. Indeed Milton Keynes takes its name, not as is sometimes assumed from those icons of

economics Milton Friedman and John Maynard Keynes, but from the small village of Milton Keynes, which is within the designated area.

On the first of April 1997 Milton Keynes Council became a unitary authority, taking over total responsibility for all the local government services in its area of some 30,869 hectares of Buckinghamshire. To the north and west its boundary forms the county boundary with Northamptonshire and with Bedfordshire to the east whilst to the south is the Aylesbury Vale District of Buckinghamshire.

## 2.2 Geographical features of Milton Keynes

### 2.2.1 Geographical setting of Milton Keynes

Milton Keynes lies astride the major north-south road, rail and canal links approximately half way between central London and the West Midlands industrial conurbation (Figure 1). A potentially important east-west railway link between Oxford and Cambridge also passes through the district intersecting the west coast main line at Bletchley Station. Although now much reduced from the heyday of rail transport there are plans to upgrade this line to provide a major link between the port of Harwich in the east via Milton Keynes to Oxford and westwards to Bristol.

The valley of the Great Ouse, with an average gradient of 1 in 1500, runs southwest to northeast across the northern part of Milton Keynes, from Stony Stratford in the west through the important market town of Olney in the north. A major tributary, The River Ouzel or Lovat, with a steeper average gradient of 1 in 900, runs almost south to north through the eastern part of southern Milton Keynes and joins the Great Ouse at Newport Pagnell. A less important tributary the Loughton Brook runs south to north through the western part of Milton Keynes, via several man-made balancing lakes to join the Great Ouse at New Bradwell. In the north the River Tove forms part of the boundary of Milton Keynes as it flows south to join the Ouse (Figure 2).

In terms of topography the highest part of Milton Keynes, at just over 170 m, lies in the south where the Greensand Ridge runs through the Brickhills past Woburn Sands and into Bedfordshire. In places there are commanding views over the designated area into the northern part of Milton Keynes.

Most of the designated area is up to about 90 m high and forms part of the Oxford Clay vale of the east Midlands with the geological strata dipping south-eastwards under the escarpment of the Greensand Ridge. Northwards Milton Keynes includes part of the rolling foothills of the Cotswold Limestones within which is the valley of the Great Ouse.

Agriculturally Milton Keynes forms a transitional area between largely arable farming in the east, with wheat and oilseed rape being the main crops, to a more pastoral west with an increase in livestock farming. Farming is not restricted to the remote rural areas of the Borough, in addition to the famous ‘concrete cows’ sculpture, real cattle and sheep can be seen grazing in open fields within the designated area.

### 2.2.2 Size and population distribution

During the last 30 years Milton Keynes has experienced the fastest rate of growth in the country, both in terms of population and economic development with major new employers and facilities within its area. This population is increasing at a rate of some 3000 per year with around 1775 houses still being built each year. There is still potential

for further expansion in the area over the next 10 to 30 years, which has been acknowledged by SERPLAN (Southeast Regional Planing Authority).

In 2000 the population of Milton Keynes was approximately 210,000 living in just over 43,000 households with an average household size of 2.57. The demographic profile reflects the age of Milton Keynes itself with 22% of the population in the 0-14 years age group; 21% in the 15-29 years group; 25% in the 30-44 years group; 21% in the 45-65 years group and 12% in the over 65 years group: (Figure 3)

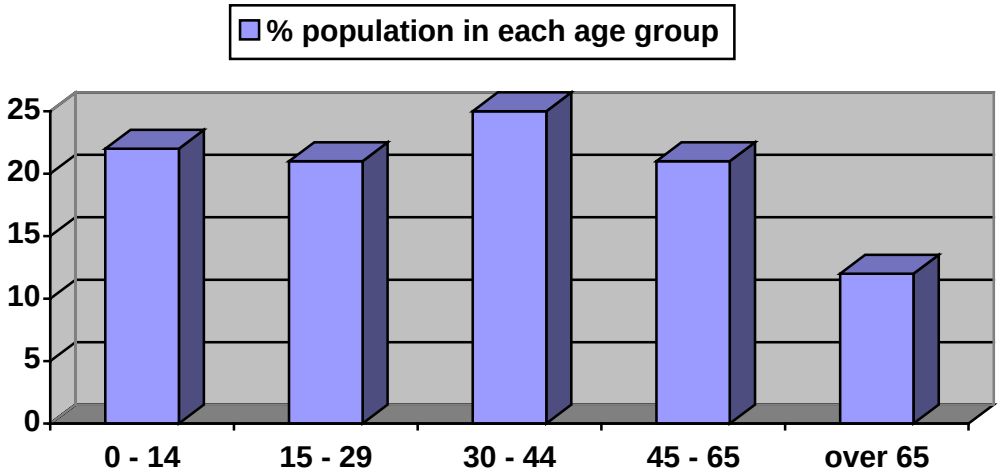



**Figure 3. Distribution of the population by age group In Milton Keynes.**

This skewing of the population profile means that Milton Keynes has an unusually high proportion of children, representing one of the most sensitive receptors in any potential pollution linkage.

## 2.3 Geological features of Milton Keynes

### 2.3.1 Introduction

In essence the surface geology of Milton Keynes comprises gently south-eastwardly dipping Jurassic strata unconformably overlain by the Lower Cretaceous Woburn Sands in the extreme south-east (Figure 4, Solid Geology; Figure 5, Drift Geology; Figure 6, Stratigraphy). The oldest exposed rocks crop out in the north of the area where the Upper Lias mudstones and thin limestones, together with the overlying Inferior Oolite Group and Great Oolite Group, are mainly exposed along the valley of the Great Ouse.

The topography of the area is strongly controlled by the geology. Most of the area represents part of a more or less dissected plateau of glacial Boulder Clay cut chiefly in Oxford Clay with Middle Jurassic limestones, and their associated beds forming strong scarp features along the Ouse Valley.

### 2.3.2 Legacy from the age of the dinosaurs

In Jurassic and Cretaceous times when reptiles, such as the dinosaurs, dominated the land areas of the world, the area of Milton Keynes lay under a sea whose depth fluctuated from time to time. The lowermost Jurassic rocks were deposited in relatively shallow water, especially during the times when oolitic and shelly limestone deposition

occurred. Occasional seat-earth beds indicate periods of land emergence, for example in the Upper Estuarine Series (Rutland Formation), Figure 6.

The deposition of the Oxford Clay mudstones, with occasional cement stone bands, took place in relatively deep water. These extensive deposits were to have a profound effect on the industrial environment of the Bletchley area, being one of the country's main sources of brick clay (see Section 2.4.3).

In late Jurassic and early Cretaceous times relatively minor earth movements raised the Upper Jurassic rocks above sea level where they were subject to weathering and erosion. Then in early Cretaceous time the sea returned to the area in the Lower Greensand marine transgression, which deposited the Woburn Sands on an eroded Upper Jurassic surface. These deposits have had a marked effect on the area around the small town of Woburn Sands. The sands are poorly cemented, medium to coarse grained and a good source of general purpose industrial sand. Within the lower 15 metres or so of these beds, partly within the boundary of Milton Keynes, lie two lenticular deposits of Fuller's Earth. These montmorillonite or bentonite clays are rare and much prized for a variety of industrial uses in addition to the 'fulling' or de-greasing of sheep's fleeces which was their original industrial use. They probably originated as volcanic ash falling into the sea from volcanic eruptions some distance away. The working of these clays became an important industry around Woburn Sands which still takes place today, just to the south of the Milton Keynes boundary.

### 2.3.3 Moulding of the landscape by earth movements, ice-ages and rivers

The present-day shape and disposition of the rock strata within this area is due to minor folding and deformation caused by earth movements in the mid-Tertiary period. It was after these earth movements that the Chalk, which formerly covered this area, was removed by erosion. It now crops out a short distance to the south of Milton Keynes from where it can be seen forming the famous escarpment of Whipsnade Down.

The final stages of landscape modification took place during Pleistocene times. Although it is known that there were several ice ages separated by warmer inter-glacial periods, locally there is only good evidence for one ice-sheet which deposited the Chalky Boulder Clay. This covers over the buried pre-glacial channels of the Great Ouse and Ouzel which are filled with alternations of lake sediments and Boulder Clays relating to alternating advances and retreats of the ice-sheet covering this area.

Following the final period of retreat of the Chalky Boulder Clay ice-sheet there was a period of river aggradation, caused by the rise in sea-level at the end of the ice age, during which two major River Terrace units were deposited (Figure 5). These sandy gravel deposits have both been exploited for commercial aggregate. The First Terrace in the Ouse valley and the Second Terrace in the Middleton – Broughton area. The resulting pits have frequently been used as landfills.

The present day Rivers Ouse and Ouzel have flood plains with deposits of alluvium, frequently silty clay with some gravel and thin peat layers, which in many places are entrenched into the underlying First Terrace deposits. Sheets of Head deposits, produced by periglacial solifluction, frequently blanket the upper valley sides above the First Terrace deposits. As it is produced locally the composition of the Head deposits closely reflects that of the immediately available materials and may contain river gravels, glacial sands and gravels or Jurassic rocks, particularly limestones or clay. Head deposits comprising soliflucted clay fans are probably common on the clay

deposits of the area, particularly the Oxford Clay, but these will be difficult or impossible to distinguish from the in-situ clay in site investigations.

There are minor but significant deposits of calcareous tufa and thin peat around many springs in the area. These occur mainly along the limestone outcrops of the Ouse valley where springs issue from the base of limestone layers (Figure 4; Figure 5). This spring water is saturated with bicarbonate which when it reaches the surface gives off carbon dioxide and deposits calcium carbonate. This carbonate tends to coat things such as plant stems or pebbles in the spring. Fragments of the carbonate may be carried into pools where they have accumulated into deposits, which reach about 2 metres thick in places. Seams of peaty sand and even thin peat may form in bogs developed between the springs.

### 2.3.4 Hydrogeological characteristics of the area

Although large parts of Milton Keynes, particularly in the north of the area, are classified as being underlain by major aquifers (Figure 7) there is no large-scale abstraction of groundwater. Jurassic limestones underlie most of the area classified as major aquifer, with a small area in the south-east underlain by the Cretaceous Woburn Sands Formation. The recent river alluvium and gravels are mainly classified as minor aquifers along with some of the glacial deposits. Areas where the Oxford Clay crops out and significant areas of Boulder Clay are classified as non-aquifers. This produces a marked north south disparity on an aquifer map of Milton Keynes (Figure 7).

The Great Oolite (Blisworth) Limestone is potentially a usable aquifer, and is used as a minor source of water, but it has a limited recharge potential as its surface outcrop area is quite small, and it has relatively low permeability. However, it does have a south-easterly dip and is presumably present below the overlying strata throughout most of Milton Keynes. Other minor abstraction sources are from river gravels and other superficial deposits.

### 2.3.5 Key water resource and protection issues

With no large natural lakes in the area and a limited volume of water available from streams and rivers and boreholes the lack of accessible sources of water was a major limitation on plans to greatly expand Bletchley before and just after the Second World War. Much of the water for this area was derived from a borehole into the Cretaceous Greensand located to the south of the council's area near Heath & Reach.

A reliable large-scale source of potable water was an essential pre-requisite to the building of the new Milton Keynes. At the present day most of the water supplied to Milton Keynes is piped in from Grafham Water in Cambridgeshire. Only a few of the more rural properties have private water supplies serviced from a total of twenty springs or wells which are monitored for quality by council officers.

There are now a significant number of large and small lakes in Milton Keynes. Most of these were excavated to act as balancing lakes for flood prevention purposes. Along with the Grand Union canal and the local rivers they have become focal points in a variety of recreational activity such as angling and sailing. They are also extremely important with respect to habitats for wild life. Much of the surface water run off, particularly within the designated area, flows into these lakes. Thus they are particularly vulnerable to run-off from contaminated sites. The surface water features map (Figure

2) gives an overall view of the location of the key surface water potential contamination targets.

## 2.4 Land use characteristics

### 2.4.1 Overview of current land use

Land use in Milton Keynes can be classified into eight main types (Figures 8 to 16):

1. Residential (potential pollution receptor) Figure 8
2. Educational (potential pollution receptor) Figure 9
3. Retail (Local, District, Town and Central Milton Keynes) Figure 10
4. Employment (Industrial, Non-Industrial) Figure 11
5. Health (Hospitals, Medical Centres, Nursing Homes etc.) (potential pollution receptor) Figure 12
6. Open Space & Recreation (including Milton Keynes Parks & Trust Land) (potential pollution receptor) Figure 13; Figure 14
7. Farmland Figure 15
8. Reserved for future development Figure 16

### 2.4.2 Exploitation of natural resources

**Soils**

One of the key natural resources, whose exploitation from pre-historic times to the present day has been of major importance, is soil. Often neglected or treated with disdain as 'dirt', soil is a basic natural resource essential for food production and as the foundation for natural ecosystems. Although there is a wide variety of soil types in Milton Keynes they can be grouped into three broad categories:

a) Dominated by clay
b) Mainly sandy
c) Developed on limestones

Clayey soils are the most common in Milton Keynes formed over the outcrops of the Jurassic clay formations and the Boulder Clay. Soils of the Boulder Clay areas although heavy can produce good arable crops where they are well drained, but where poorly drained they have mainly been used as permanent pasture. In the past most of the land overlying Boulder Clay was in pasture but modern drainage, mechanisation and fertilisers have enabled more of this land to be used for arable crops. In the latter part of the 20th century many hedges were removed to enable the enlargement of fields for the intensive production of crops such as barley and oil-seed rape.

Soils developed over the Oxford Clay are also tenacious and heavy and traditionally difficult to plough in wet winters. The smaller areas underlain by the Blisworth Clay are even more intractable. Even today these heavy clay soils mainly remain in pasture. In the south of Milton Keynes, in the areas below the Woburn Sand escarpment, the Oxford Clay soils are lightened by sandy downwash from the ridge.

Lighter sandy loams are less widely distributed mainly being found overlying the Kellaways Formation and the Grantham Formation (Lower Estuarine Series), most commonly along the Ouse Valley where they form good arable land.

Rather thin brashy soils are developed over the Blisworth Limestone and the Cornbrash again mainly along the Ouse Valley. River terrace deposits normally being well drained tend to have a loamy soil that produces good arable or pasturelands.

The Woburn Sands weather to produce rather impoverished podzolitic soils that are mainly used for coniferous woodland and a major golf course within the Milton Keynes boundary.

**Brick Clay**

Brickmaking, using the clays of the area, has a very long history. Overgrown and infilled brick pits, and the remains of kilns are common on the Oxford Clay outcrop. In more modern times two companies, Messrs Flettons and the London Brick Company, formerly carried out large-scale brickmaking. The former company ceased operations locally in 1967 whilst the London Brick Company's Newton Longville works continued in production until 1990.

The older brick-pits were mainly dug in the lower Oxford Clay with the later ones also working the basal part of the Middle Oxford Clay. Prior to about 1920 all the clay dug in the Bletchley area was used for brick production in the old 'plastic' process. In 1924 the then Bletchley Brick Company changed over to the 'new' fletton brick method. In this method the 'callow' or yellow weathered clay is not used. The underlying unweathered clay, known as 'knotts', is used to make the fletton type brick (named after the Fletton works near Peterborough). In this process carbonaceous material in the clay makes it partially self-firing and made the process much more fuel-efficient.

The pits left behind by the brick industry have been, and are still being, exploited as sites for landfilling of waste. The Bletchley (or Newton Longville) Landfill currently operated by Shanks Waste Solutions takes the vast majority of waste from the Milton Keynes area.

**Aggregates**

The sand and gravel resources of the area were formerly extensive and have been a long-term source of aggregates.

Most of the workings are in the First and Second Terrace deposits. The First Terrace deposits along the Ouse Valley near Cosgrove, Haversham-Linford and north-east of Newport Pagnell, have a history of exploitation going back at least to the 1960's and are still in limited production. The industrial legacy of these workings has been a string of lakes that now have a very high leisure and ecological importance to both the human population and the wildlife of Milton Keynes.

Mainly Second Terrace deposits of the River Ouzel were exploited in the late 1970's to early 1990's, in and around the Middleton area. The resulting pits were mainly landfilled with nominally 'inert' materials arising from the construction of the new Milton Keynes and were often restored to agricultural use within a year or two of gravel extraction. Unfortunately, although no domestic putrescible materials were included in these landfills, in the middle 1990's they began to produce landfill gas in sufficient quantities to require action. The then Commission for New Towns (CNT) undertook a programme of vent-trench emplacement around the landfills to control any off-site migration of gas (see Section 2.10.2).

**Fuller's Earth**

As outlined in section 2.3.2 Fuller's Earth was formerly mined within the Milton Keynes boundary at Woburn Sands and is still being exploited just to the south in Bedfordshire (Figure 4; Solid Geology Map).

Fullers Earth has been mined since Roman times in this country. At present in the United Kingdom Fuller's Earth is only mined at Redhill in Surrey, Woburn Sands and Clophill in Bedfordshire, Baulking in Oxfordshire and Maidstone in Kent. It has been mined in the Woburn Sands area since at least 1557 when Fuller's Earth pits are mentioned in a land grant.

There has been considerable debate about the origins of this scarce resource, however, it is now widely accepted that Fuller's Earth was originally volcanic ash that has been altered to clay minerals. It consists chiefly of hydrated aluminium silicate clay minerals that contain metal ions such as magnesium, sodium, and calcium within their structure. Montmorillonite is the principal clay mineral in Fuller's Earth, but other clay minerals such as kaolinite, attapulgite, and palygorskite also occur and account for its variable chemical composition.

Fuller's Earth has a substantial ability to adsorb impurities or colouring bodies from fats, grease, or oils. Its name originated with the textile industry, in which textile workers (or fullers) cleaned raw wool by kneading it in a mixture of water and fine earth that adsorbed oil, dirt, and other contaminants from the fibres. Fuller's Earth is used to refine and decolourise petroleum products, cottonseed and soy oils, tallow, and other fats and oils. Its high adsorptive power also makes it commercially important in the preparation of animal litter trays and assorted degreasing agents and sweeping compounds.

Although no longer worked in Milton Keynes Fullers Earth will be present at quite shallow depth over a significant part of the Woburn Sands area (Figure 4).

### 2.4.3 Historical industrial use

The main historical industrial centres in the area and their principle industries can be summarised as:

| | |
|---|---|
| **Wolverton** | - Railways, Printing |
| **Bletchley** | - Bricks, Brushes, light industry |
| **Newport Pagnell** | - Coach and car making, parchment making, light industry |
| **Olney** | - Leather, light industry |

Other than the railway works there is no history of heavy industry in the area. Industrialisation has been driven by a succession of transport developments linking London to the Midlands and beyond. In the 18$^{th}$ and early 19$^{th}$ centuries the coach traffic along Watling Street produced a boom in hospitality services with the great coaching inns, principally in Stony Stratford. Then came the canals in the late 18$^{th}$ and early 19$^{th}$ century to be followed by the railways in the middle to late 19$^{th}$ century leading to the first phase of industrialisation. The railway killed off the coaching trade but led to major developments in Wolverton and to a lessor extent Bletchley. The final transport link came in the 1960's with the Motorway network and the M1 running through Milton Keynes. It was the position of Milton Keynes, roughly mid-way between London and the English Midlands, straddling the arteries of communication, which was one of the main reasons for the designation of the area as a new town in the mid 1960's.

**Canals and Bricks**
The first significant industrial developments in this area took place as a result of the construction of the Grand Junction (now Grand Union) Canal in 1793 to 1800. Canal-side wharves were developed in the towns and most of the parishes through which the canal passed. The largest were at Wolverton, Great Linford and Fenny Stratford. Newport Pagnell was not on the canal but in 1817 a narrow canal was opened linking the town with the Grand Junction at Great Linford. The canal stimulated the growth of local industry especially brickmaking. Many local villages had their own small-scale brickworks from the 17th century onwards but new brickworks were developed in the canal-side villages of Little Woolstone and Simpson by the middle of the 19th century. Fenny Stratford had become an important coaching station on Watling Street and the arrival of the canal produced a phase of industrialisation, which saw significant growth in Fenny Stratford.

The Great Linford brickworks were probably the main suppliers of the bricks for the railway related building of Wolverton and New Bradwell in 1840 to 1880 (see below), and the expansion of Newport Pagnell in the last quarter of the 19th century, in both cases the bricks were transported by canal. The continuing demand for bricks resulted in the creation in 1919 of the Bletchley Brick Company, and its successors, whose brick works at Bletchley and Newton Longville finally ceased production in 1990 (see above).

**Railways and 'new towns'**
The new 'city' of Milton Keynes is not the first post-medieval new town to be built in this area. That honour must go to Wolverton which together with its dormitory satellite of New Bradwell was a direct result of the coming of the railways through Milton Keynes. The line from London to Birmingham was originally intended to pass through Buckingham but opposition from the Duke of Buckingham produced a revised route through Milton Keynes. It is this aristocratic opposition to progress that is directly responsible for Milton Keynes being where it is now.

When the London to Birmingham railway opened in 1838 a point approximately mid-way between the two was chosen to be a major 'service station' for the railway. That mid-point was Wolverton where in 1838 the railway works and the first Wolverton Station were opened in order to service, respectively, the engines and rolling stock, and the passengers. In those days engines could scarcely travel 50 miles without needing attention and the passengers, after 50 miles in unheated or even completely open carriages without any facilities, were greatly relieved when the train pulled into the station. This station only lasted two years. The great expansion of railway traffic required a new station, which was in operation from 1840 to 1881. During this time the works expanded and was a major producer of steam engines. It reached its peak in 1910 when it employed about 5000 men and remained the major employer in the town for well over half a century. The works survives today as a repair centre operated by Alstom Railcare and still employs about 1,000.

Another significant industry was printing, first established in 1878 by George McCorquodale next to the railway works in Wolverton for the express purpose of employing the wives and daughters of the railwaymen. Famous for printing government stationery it remained in the same premises until the 1980's and is still in operation in the area.

In 1846 the Bletchley to Bedford railway line was opened and four years later the line from Bletchley to Banbury. By 1862 the rail link from Cambridge to Oxford was

completed with Bletchley as a focal point. The fact that Bletchley was at this important railway junction was the spur to developing new industries such as brickmaking, brush making and gravel extraction which could take advantage of the new transport links. This was the beginning of the growth of Bletchley, which quickly eclipsed and then swallowed up its once much more significant neighbour Fenny Stratford. Bletchley's railway links were also important in the choice of Bletchley Park as a secret government code-breaking station in World War II.

**Brush making**
Although a minor industry, brush making began in Tavistock Street in Fenny Stratford in 1877. Within a few years there were several brush factories which by World War I had a significant presence in the area. Brush making continued for over 60 years but as an employer was eclipsed by the larger industries. In later years the famous Beacon brand was produced in Bletchley but when plastics took over from organic materials the factory closed and in the 1980's the Beacon Retail Park was built on the former factory site.

**Coaches, cars, paper and lace**
Newport Pagnell is an historic town whose origins date back to the 9th century, and local archaeological finds suggest that there were settlements here throughout the Iron Age and the Roman occupation. In the late 10th century, a Royal Mint was established here and the town became an important administrative centre for North Buckinghamshire. The town also became an important centre for the lace industry during the 18th century, which led to its development as a major coaching town.

In 1820 Salmon & Sons Limited started up in business as coachmakers to the nobility. By 1914 they were in the motor vehicle business and employed 350 men. In 1920 they were producing the NP cars but from then to the Second World War they were mainly famous for the Tickford bodies produced for a variety of motor vehicle chassis. In 1955 the factory was taken over and became part of Aston Martin Lagonda, which is still in business on the same site but now part of the Ford Motor Company.

Another industry with a long history, which still survives in Newport Pagnell, is the manufacture of paper, especially vellum and parchment. The factory of William Cowley, in Willen Road, is the only one of its kind still operating in Britain.

Olney is a small market town in the north of Milton Keynes. It was recorded in the Domesday Survey of 1086 as Olnei. It was once the centre for a thriving lace industry, and for tanning and leather goods production. The last tannery in Milton Keynes, the Cowper Tannery beside the River Ouse closed down in 1998 and is shortly due to be redeveloped for housing.

### 2.4.4 Current industrial use

The present day industrial scene has changed very substantially from the past. Brickmaking has completely gone, railway working is a shadow of its former self, and there is only a small amount of extractive industry now exclusively working sand and gravel. The agricultural industry now employs a mere fraction of the numbers in the pre-Milton Keynes era. Many of the small traditional industries have gone or are much reduced. Current employment statistics can be divided into four main categories, which reflect the major changes in this area in the last 30 years:

| | Number Employed | % total employed | Number of establishments |
|---|---|---|---|
| Agriculture | 1209 | 1.02 | 287 |
| Production | 23050 | 19.40 | 866 |
| Construction | 4261 | 3.59 | 576 |
| Service | 90322 | 76.00 | 5313 |
| **Totals** | **118842** | **100.00** | **7042** |

The service industry is by far the largest group with less than 20% of the working population involved in production industry. Just under half of the production workers are involved in metal and vehicle manufacturing, the largest sub-group of manufacturing.

Within the designated area, with the exception of the older parts of Wolverton and Bletchley, industrial areas are normally quite separate from residential areas. Outside the designated areas much of the industry is located on purpose built industrial estates, some of which are on redeveloped older industrial sites. In some of the older areas industry is still on traditional sites, which are often adjacent to other developments such as residential and retail areas.

See summary maps, Figure 10; Figure 11.

## 2.5 Council Owned Property, Land and Facilities

All the land owned by Milton Keynes Council is owned corporately and the responsibility for the property and the associated records lies primarily with the Property & Legal Division. Management of the land falls to different divisions depending on end use, or is managed by Parish Councils or leased on 999 year leases to The Parks Trust. Most of this information has been captured onto our GIS system, see summary map of council holdings Figure 17.

Council property can be classified as:

Residential properties
Commercial properties
Industrial properties
Waste disposal sites and the materials recycling facility
Educational properties (Figure 9)
Other community properties
Roads and transport related properties
Public open spaces and Leisure Facilities (Figure 13)

## 2.6 Land owned by English Partnerships in Milton Keynes

Significant areas of land within Milton Keynes are owned by English Partnerships (Figure 18). This is an ongoing effect of Milton Keynes being planned as a ‘New Town’. Originally special powers granted under the section 7(1) of the New Towns Act 1981

allowed the then Milton Keynes Development Corporation (MKDC) to make direct planning applications to the Secretary of State. The Development Corporation was superseded by the Commission for New Towns (CNT) in 1991 which then merged with English Partnerships in 1998, with the merged organisation using the English Partnerships (EP) name and inheriting the special powers as a planning authority.

These MKDC/CNT/EP planning applications are usually large, outline applications, often covering an entire Milton Keynes grid square. Detailed plans can be completed after the application has been approved however a list of uses is required.

Once an application had been approved English Partnerships can pass the development power onto another developer using section 7(2) of New Towns Act. External developers can produce the detailed plans as long as they are in line with the original outline plans. In the early days of Milton Keynes the Development Corporation did much of the development itself e.g. Bradville, Kiln Farm.

Although English Partnerships inherited the development powers of their predecessors their development plans have to correspond with the original outline permissions that MKDC received from the Secretary of State. If they wish to apply for changes they must do this through Milton Keynes Council Planning Department. Once English Partnerships have sold the land or it is on long term lease they relinquish their planning powers and planning applications must then be made to Milton Keynes Council as normal (see section 2.10.2).

English Partnerships are not obliged to consult the planning authority however they do so out of courtesy. If an objection to a planning application is raised they only have to report it to their board. They do still have to meet Building Regulation approval and they have to consult the Highways Authority.

See Figure 18 which shows land currently owned by English Partnerships in Milton Keynes.

## 2.7 Listed buildings, monuments and archaeological features

All these are on the council's MapInfo GIS system in the planning constraints section. These tables are used to cross correlate with the database of potentially contaminated sites. See Figure 19 for an outline map showing the location of these sensitive locations within Milton Keynes.

## 2.8 Redevelopment history and controls

Most of the recent history of Milton Keynes is about new development within the designated area rather then redevelopment of 'second-hand' sites. However the older towns of Bletchley, Wolverton and Stony Stratford are within the designated area and have all seen some redevelopment as part of the plan for the new town of Milton Keynes.

The 'Master Plan' for the designated area of Milton Keynes was drawn up in 1970. It was not meant as a map or blueprint, but was intended to lay down a framework which could be changed and adapted over the years. The Master Plan aimed at a balance

between housing and employment, so that the new town could be self-contained without large numbers of people having to commute to work.
The Master Plan also aimed to incorporate the existing towns and villages in the area into the new city, while trying to preserve their individuality as far as possible. This resulted in a certain amount of redevelopment particularly in Bletchley and Wolverton.

In Bletchley significant redevelopment of the central area, which began prior to the designation of Milton Keynes, has remodelled the main shopping street, Queensway, and produced a new leisure centre. There has also been extensive redevelopment of sites along Watling Street where former industrial sites, such as the Beacon Brush factory, have been replaced by new retail developments.

Three main land use classes have seen the bulk of redevelopment within Milton Keynes as a whole:

**a) Former Railway Land and Property:**
Wolverton: A new retail superstore was erected on part of the former Railway works in 1992 and some other parts of the former works have been redeveloped mainly for warehouse type use.
Newport Pagnell: The former railway station and goods yard is now occupied by offices, houses, and a fire station.
Olney: The former station and goods yard along Midland Road has been redeveloped for housing.

**b) Land used for gravel and brick clay extraction and associated works:**
A number of former brickfield sites have been redeveloped; for example, the Kiln Farm Industrial Estate (as the name suggests), and The National Bowl is on the site of an infilled former clay pit. Many of the older gravel pits have been built over, for example on Tavistock Road in Bletchley; whilst some of the newer gravel pits are just now being redeveloped, for example the Atterbury lakes development near Broughton.

**c) Former Sewage Works and Gas Works:**
The former Fenny Stratford sewage works has been redeveloped and is now a major distribution centre for a supermarket chain. Gasworks in Stony Stratford and Olney have been redeveloped for housing.

It is recognised that some of the earlier developments and redevelopments may not have been subject to the same strict planning controls as in recent years (see section 2.10.1) and some are on our list of potentially contaminated sites for future investigation.

## 2.9 Current state of information on contamination

The Environmental Protection Team within the Environmental Health Division has produced a working Environmental Information Database, with data derived from a wide variety of sources including historical map information, planning files, public registers, business directories etc. This database currently includes details of some 450 potentially contaminated sites (Figure 20) together with a further 206 sites used for storage of petroleum products (62 of which have current petroleum licences) (Figure 21) plus some 2,240 minor sites which may be significant in respect to potential contamination comprising 1,602 former ponds (Figure 22), which are now infilled, and 638 wells and springs many of which are no longer visible (Figure 23). All these sites

are linked to our Mapinfo Geographic Information System (GIS) which contains multiple layers of data such as surface water features, aquifers, geology, location of housing, schools, industry etc. See Figure 20 for a summary map of potentially contaminated sites.

The GIS system is organized such that there are three main groups of data layers:

- **Sources:** sites that are potential sources of contamination e.g. landfills, derelict industrial sites etc. Figure 20, Figure 21, Figure 22, Figure 24.
- Pathways**:** potential migration pathways e.g. drainage systems, geological features etc. Figure 2, Figure 4, Figure 5, Figure 6.
- **Targets:** receptor information e.g. current land use, location of houses, aquifers, etc. Figure 2, Figure 7, Figure 8, Figure 9, Figure 12, Figure 13, Figure 14, Figure 19.

The database is principally used to:

- Hold and display information used to screen potentially contaminated sites at the Inspection Stage of the Contaminated Land Strategy
- Hold and display data on contaminated sites such as location of pollutants, pollution pathways, pollution targets etc.
- Hold and display data on remediated sites, boundaries, areas of fill, nature of remediation etc.
- Screen of planning applications for location on or near potentially contaminated or contaminated land.

A number of these sites have already been subject to an initial inspection and there are site investigation reports (mostly prepared on behalf of developers) for a number of sites which have either been redeveloped and/or remediated or are in the process of redevelopment.

## 2.10 Action already taken to deal with contamination

### 2.10.1 Planning liaison

Until the new contaminated land regime came into force the public health implications of contaminated land (in a non-occupational context) were covered by Statutory Nuisance legislation. These nuisance provisions, when correctly used, could be very effective in dealing with certain aspects of contaminated land (for example dealing with the Folly Lane site see section 2.10.4). However, it is a fact that the regulatory management of contaminated sites has historically been largely achieved within the planning regime via land use planning and development control legislation, the main relevant provisions of which can be summarised as:

**Development of land use policies** – Town & Country Planning Act (TCPA) 1990; Planning & Compensation Act (PCA) 1991 – via Statutory Development Plans and in accordance with national planning policy guidance, including that relating to the return

of derelict and contaminated land to beneficial use, and in relation to contamination as a 'material consideration'.

**Definition of development** – TCPA 1990 – To include operations carried out in connection with the land or use of the land including, where appropriate, large-scale site investigation works, remedial works, redevelopment schemes.

**Development Control** – TCPA 1990; PCA 1991 – e.g. through conditional planning permissions, planning agreements or obligations.

**Enforcement of planning controls** – TCPA 1990; PCA 1991 – e.g. through Enforcement Notices, Stop Notices, Breach of Planning Conditions Notices, Injunctive Relief.

**Consideration of potential environmental impacts** – Town & Country Planning (Assessment of Environmental Effects) Regulations 1988 – Mandatory in relation to certain forms of development and discretional in certain other cases.

This situation will not change with the advent of the Part IIA regime, the vast majority of contaminated land sites will continue to be dealt with under the planning regime.

The Development Control section of the Planning Department deals with all planning applications in Milton Keynes in full consultation with the Environmental Protection Team. We now have a system whereby all planning applications, which involve intrusive activity into the ground, have the following conditions attached to any approval:

"Prior to any development taking place:

(1) The developers should be required to engage appropriately qualified personnel to carry out a geo-environmental survey to assess the ground conditions and determine if there is any ground and/or groundwater and/or gas contamination of the site.
(2) The results of this survey, together with plans for any remedial action deemed necessary, should be submitted to the Chief Environmental Health Officer for his written approval.
(3) Any such remediation deemed necessary should be carried out to the written satisfaction of the Chief Environmental Health Officer."

The Chief Environmental Health Officer delegates the responsibility for overseeing this process to the contaminated land specialist officers in the Environmental Protection Team.

### 2.10.2 Liaison with English Partnerships

English Partnerships acts as the planning authority for land that it owns within the boundaries of the Milton Keynes designated area (see section 2.6). Milton Keynes Council is a statutory consultee in this process. All planning application details submitted by English Partnerships are dealt with by the Milton Keynes Council Development Control section, again in full consultation with the Environmental Protection Team. The system is very similar to that adopted for Milton Keynes Council planning applications and the Environmental Protection Team recommends to English Partnerships, through Development Control, that the same conditions be attached to

any planning permission, involving intrusive activity into the ground, granted by English Partnerships.

A particular area of liaison between the Milton Keynes Council Environmental Protection Team and English Partnerships, together with a landfill specialist from the Environment Agency, has been in respect of potential contamination from gassing landfill sites in the Middleton and Broughton areas. These sites which are owned by English Partnerships are former gravel extraction pits which were infilled with nominally inert materials arising from construction works in the building of the designated area of Milton Keynes. However, in the early 1990's it became apparent that landfill gas (mainly methane and carbon dioxide) was being produced in these landfills (probably from topsoil and other natural organics) and was migrating beyond the landfill boundaries, particularly in the area of Milton Keynes Village in the Middleton grid-square. In the middle 1990's vent-trenches were installed around most of the edges of these landfills (Figure 24), by the Commission for New Towns to prevent any further migration of gas and a programme of monitoring of gas levels in an extensive network of wells continues to the present day.

The results of this monitoring, and plans for development on or close to the landfills, are discussed at regular meetings between representatives of the three agencies, English Partnerships, Milton Keynes Council Environmental Protection and the Environment Agency.

### 2.10.3 Provision of advice and information to developers

The Environmental Protection Team frequently provides advice and information to developers both in respect of developments subject to planning permission conditions (as outlined in section 2.10.1) and in respect of prospective developments prior to the submission of planning applications. In the latter case this is usually in connection with possible contaminated land problems or the results of surveys which are being or have been carried out prior to or after the acquisition of land for development.

In addition to the above all English Partnerships planning constraint details for developments in the area of the Middleton and Broughton gassing landfills advise developers to contact the Milton Keynes Council Environmental Protection Team for advice and information on the possible need for gas protection and appropriate gas protection measures for their particular development. The most recent development where the Milton Keynes Council Environmental Protection Team was fully involved in advising and liaising with the developer's consultants and approving gas protection measures was in the construction of an office block at the Atterbury Lakes development, which was the first building to be built directly on a gassing landfill in Milton Keynes.

### 2.10.4 Dealing with contaminated sites under earlier nuisance regime

An example of dealing with contaminated land sites under the earlier regime is an unauthorised scrapyard at Folly Lane, North Crawley. A public footpath runs across one side of the site and during periods of heavy rain, oil was washed down the footpath and onto the adjacent road. The oil then washed down the road, into gully drains and the roadside ditch and thence onto domestic gardens and ultimately into a surface watercourse. There was a clear and irrefutable significant possibility of harm to both public health and the environment.

Although dealt with under Statutory Nuisance legislation in many ways this site was a 'dress rehearsal' for the new contaminated land regime. We identified the site as 'contaminated', both literally and statutorily, by establishing a clear pollution linkage with a significant possibility of 'significant harm' to human health. We had to establish who is the 'appropriate person or persons'. In this case we identified the owner of the site and one other person who operated on the site with the owner's knowledge and permission. We served notices on both these persons. As no action was taken in respect of the notices the council carried out works in default to remediate and restore the site.

### 2.10.5 Dealing with contaminated sites under Part IIA regime

**Example of urgent action taken by Milton Keynes Council under Part IIA: Oil contamination of domestic property at George Street Bletchley**

This site was affected by significant diesel contamination. A desktop study using the Environmental Protection GIS system indicated that the most probable source of the contamination was a garage workshop site next door to the property, although there was no record of any diesel tanks on the site. On site investigation revealed the presence of two underground diesel storage tanks, which had not been in use for many years,

Living at the affected property was a housebound child, one of the most sensitive receptors imaginable. Therefore it was decided that this had to be dealt with as an urgent case with Milton Keynes Council undertaking the remediation of the site and then seeking reimbursement of the costs from whoever was deemed the appropriate person or persons.

The work was completed without delay and the final phase, which is now in operation, is to determine who is the responsible person in order to charge them with the costs of the works. A Company who previously owned the site and operated the diesel storage facility has been identified and the appropriate action is now in train to recover the Council's costs.

# 3 The Milton Keynes Strategy: Overall Aims

## 3.1 The aims of the strategy

### 3.1.1 Statutory Guidance

The Statutory Guidance states that in carrying out its statutory inspection duty the local authority should take a strategic approach to the identification of land which merits detailed individual inspection. This approach should:

a) be rational, ordered and efficient;
b) be proportionate to the seriousness of any actual or potential risk;
c) seek to ensure that the most pressing and serious problems are located first;
d) ensure that resources are concentrated on investigating in those areas where the authority is most likely to identify contaminated land; and
e) ensure that the local authority efficiently identifies requirements for the detailed inspection of particular areas of land.

In developing this strategic approach the local authority should reflect local circumstances. In particular it should consider:

a) any available evidence that significant harm, or pollution of controlled waters, is actually being caused;
b) the extent to which any receptor is likely to be found in any of the different parts of the authority's area;
c) the extent to which any of those receptors is likely to be exposed to a contaminant, for example as a result of the use of the land or of the geological and hydrogeological features of the area;
d) the extent to which information on land contamination is already available;
e) the history, scale and nature of industrial or other activities which may have contaminated the land in different parts of its area;
f) the nature and timing of past redevelopment in different parts of its area;
g) the extent to which remedial action has already been taken by the authority or others to deal with land contamination problems or is likely to be taken as part of an impending redevelopment; and
h) the extent to which other regulatory authorities are likely to be considering the possibility of harm being caused to particular parts of the local authority's area.

### 3.1.2 Milton Keynes Council priorities in dealing with contaminated land

The Council's priorities in implementing its contaminated land strategy are:

a) to protect human health and the natural and built environments from the immediate and long term effects of land contamination;
b) to ensure that where development or redevelopment of land takes place the planning process deals effectively with land contamination issues so that the land is suitable for its intended use;
c) to address the liability issues associated with the Council's existing and former land holdings (some of which may have been inherited from predecessor councils) and avoid any new unforeseen liability associated with land transactions;
d) to encourage voluntary remediation and re-use of brownfield land.

### 3.1.3 Priorities in respect of work carried out to date

**Contaminated sites**
Sites where the council has already taken action in respect of contamination (see sections 2.10.4, 2.10.5), have the highest priority. This is the case both where remediation work is ongoing (e.g. Bletchley Railtrack Light Maintenance Depot; remediation of diesel contaminated ground), and where remediation has already been completed but checks must still be carried out to confirm that the contamination has been properly dealt with (e.g. George Street where periodic sampling and testing of groundwater in the installed sampling wells is undertaken).

The next priority is sites where there is already good evidence that contamination is present to such an extent that the site may be unfit for its present or proposed purpose (e.g. Olney Tannery; contamination with chromium). Many of these sites are being, or it is expected they will be, dealt with under the planning regime and will be voluntarily remediated. The priority here is to ensure that all available information has been assembled and collated to fully inform that process.

**Collection and collation of data**
A great deal of data has already been collected and most of it is accessible via our GIS system (section 2.9). The initial stage of data collection is now almost finished and the main priority now is to check and collate this data, in some cases it requires revising and bringing up to date.

## 3.2 Objectives and milestones

### 3.2.1 Identification of potentially contaminated sites

A great deal of work has already been undertaken here including:

a) checking all planning applications back to 1948 for potentially contaminative uses, cross-correlating them with business directories and plotting on GIS;
b) locating sites with potentially contaminative uses from four 'eras' (1880's; 1900's; 1920's; 1930-50's) of 25 inch to the mile and 6 inch to the mile historical maps;
c) plotting locations of all industries with permits/authorisations for emissions of potential pollutants to the environment;
d) reviewing and plotting all information from current and historical petroleum licensing files;
e) reviewing and plotting information from Environmental Health files concerning pollution incidents and potentially contaminated sites;
f) editing, collating and plotting information obtained from the Environment Agency (e.g. Figure 25).

All this information is now accessible as database tables through our GIS system with associated geographic points or regions (as appropriate) plotted for each record (Figure 11, Figure 20, Figure 21, Figure 22, Figure 24, Figure 25). Work is currently ongoing

checking and cross-correlating this information with an estimated completion of December 2001.

### 3.2.2 Identification of possible receptors (Table A)

The location of all the broad categories of receptors shown in Table A of the Statutory Guidance on the Definition of Contaminated Land has already been identified.

**Category 1, human beings**, we have identified all areas of housing and all schools and educational buildings in our GIS system (Figure 8, Figure 9).

**Category 2, ecological systems** we have identified all the relevant special areas of ecological relevance in our GIS system (Figure 14).

**Property in the form of crops and livestock** we have broadly identified as agricultural areas in our GIS system (Figure 15).

**Property in the form of buildings** is included in our base digital maps in our GIS system. In addition we have identified and plotted all Ancient Monuments, listed buildings and conservation areas (Figure 19).

Further work to be carried out includes:

Reviewing information from the Local Plan 2001 to relate the various policy areas, for example areas earmarked for future housing development considered as possible receptors (Figure 8), to identified potentially contaminated sites – estimated completion December 2002.

A detailed review of possible receptors related to specific potentially contaminated sites – estimated completion by December 2002.

### 3.2.3 Assessment of possible risk to those receptors

Using our GIS system a preliminary assessment of possible risk has been undertaken by cross correlating those areas identified as potentially contaminated (3.2.1) with the location of possible receptors (3.2.2). Those areas which show a positive correlation (i.e. possible receptors on or near potentially contaminated sites) are given the highest priority in the next more detailed stage of risk assessment – estimated completion within twelve months and ongoing.

### 3.2.4 Collation and review of evidence of actual harm or water pollution

**Actual harm** to humans can be considered under two headings (a) potential harm; (b) harm that has already occurred. Further it may be classified into two possible types (i) acute or (ii) chronic - harm.

a) Potential harm will be reviewed in our risk based assessment procedure (section 5.5)

b) Harm that has already occurred is currently being investigated by a review of records in the Environmental Health Division and by liasing with the Buckinghamshire Health Authority – estimated completion February 2002.

(i) Currently we are not aware of the existence of any evidence relating to acute harm to humans being caused by land contamination in Milton Keynes.

(ii) Evidence for chronic harm would require sophisticated and complex epidemiological studies, which as far as we are aware have not been undertaken in Milton Keynes.

**Water pollution** incidents, derived from information supplied by the Environment Agency, have been plotted on our GIS system. They have been assessed on two levels:

a) Could any of these incidents have their source in contaminated land?
b) Could any of these incidents have caused land contamination?

See Figure 25.

Information was obtained from the Environment Agency regarding complaints about pollution received between April 1999 and July 2000. During this time 152 complaints were recorded. This review has indicated that 43 of the 152 complaints received correlate with sites already identified as potentially contaminated in our GIS database. Some 45 of the complaints have initially been identified as having the potential to result in contamination of land. Further investigation of the individual complaints is required. The estimated completion of this review is August 2002 and ongoing as further data is obtained from the Environment Agency.

### 3.2.5 Assessment of land for which Milton Keynes Council may be the "appropriate person"

Work is in hand to identify land which is or was owned by Milton Keynes Council or its predecessors. It is believed that the vast majority of currently owned land has been identified and data captured to the GIS system (see summary map Figure 17). The biggest problem is identifying land that was formerly owned by the predecessors to Milton Keynes Council. The estimated completion date is December 2002. This task is made more difficult by the use of several systems of holding land information within the Council. Most information regarding Council property is kept in three different forms, various data management systems, MapInfo the corporate geographical information system, and paper file form.

Property Services currently use the data management system Estateman. This database is not exhaustive but covers the majority of council owned property. Estateman is an address-based system designed primarily to record commercial premises. Pieces of land, for example Highway corridors and Linear Parks, are not recorded on Estateman.

Other property databases used within the council are "Genesis" used by education planning and "First Housing" used by Neighbourhood services. The "Genesis" data management system is soon to be adopted by Property Services to allow for increased

flexibility in report production and search parameters. First Housing provides the definitive list of council housing stock.

The MapInfo GIS software is managed by the Information Monitoring & Research section of the Council with the support of IT, Environment Project Support. Each division manages its own data sets

Information, Monitoring & Research are responsible for the shared data and OS base maps as well as producing numerous data sets used in the local plan and planning constraints. These include housing stock, recreation & open space, & employment. It is from these data sets that possible receptors have been identified.

Land under the management of Landscape & Countryside is also recorded in detail on the MapInfo GIS. The data sets are arranged by job type as opposed to land use, however general data is also available from Information, Monitoring & Research.

### 3.2.6 Summary of objectives and milestones

| Objective | Requirement | Timescale for completion |
|---|---|---|
| Collection of data on potentially contaminated sites | Finish cross-checking and correlating data | December 2001 |
| Initial prioritisation of sites | See section 4.1.4 | December 2001 |
| Review of assumptions & inspection priorities | Continuing assessment as more information is available | Ongoing with brief formal assessment report every 12 months |
| Relate information from Local Plan to potentially contaminated areas | Review Local Plan policy areas & cross-correlate with land database | February 2002 |
| Risk to receptors | More detailed assessment | July 2002 and ongoing |
| Actual harm or water pollution | Review of available data | July 2002 and ongoing |
| Identification of receptors | Detailed review possible receptors related to specific sites | December 2002 |
| Assessment Council owned land | Finish identifying and risk assessment | December 2002 |
| Inspection of category 1 sites | See Section 4.1.5 | December 2002 |
| Inspection of category 2 sites | See Section 4.1.5 | December 2003 |
| Inspection of category 3 sites | See Section 4.1.5 | December 2004 |
| Finalise detailed inspections | See Section 4.1.5 | December 2005 |
| | | |

# 4 Milton Keynes Council Priority Actions and Timescales

## 4.1 Priorities for actions to meet the requirements of the Statutory Guidance

The Statutory Guidance does not set specific dates for local authorities to undertake specific tasks. It places the authority under an obligation merely to “inspect its area from time to time” and also requires that the strategy and the available information about land contamination should be periodically reviewed.

The following priorities are listed in a logical order of progression. However, it is not intended that these tasks will be done in a strictly consecutive manner, rather the work is undertaken in a concurrent way with progress being made in a number of areas simultaneously.

### 4.1.1 Action one: Establishing effective information systems

The first priority has been to set up a GIS system for storage, display and cross-correlation of the various data sets. This system is now operational and contains a great deal of data and is being used very effectively both for carrying out the Council’s duties under the Part IIA regime and to effectively inform the planning process (Sections 2.9, 3.2.1 – 3.2.3).

However, the structure of the main database holding information on potentially contaminated sites, which in its essentials is some 5 to 6 years old, is in need of revision and updating in the light of recent developments. In addition we are also in the process of checking, validating and updating all the data acquired to date. There is also a significant amount of data that is currently being obtained from a number of sources, which needs to be fully integrated within our system.

Together with our Information Systems Officer work is underway on interfacing the Environmental Health premises based database (Flare) to our MapInfo GIS to enable two way interchange of information. We are also investigating producing an automatic report generating system using the information in the GIS.

This work on our GIS system will be a main, but far from exclusive, priority in the six months following the adoption of the strategy and will continue to be an ongoing task.

### 4.1.2 Action two: Dealing with emergencies and urgent sites

The Council has already dealt with a number of contaminated sites since the new regime came into force (Section 2.10.5). It is manifestly obvious that when emergency situations arise (e.g. Newport Pagnell M1 Services petrol contamination) or information is obtained indicating that a site requires urgent action (e.g. George Street diesel contamination), that site assumes top priority. Indeed such work has even taken priority over completing writing this document. This is in line with the guidance, which states that work on urgent sites should not be delayed until the strategy is finished. Implicit in this guidance is that such work might delay the completion of the strategy document.

### 4.1.3 Action three: Production of the Contaminated Land Strategy document

There are a number of steps involved in producing this document:

a) Development of the outline strategy structure
b) Gathering the necessary information for the strategy document
c) Writing the draft strategy document
d) Consultation and review of the draft strategy (internal & external)
e) Formally adopt and publish the strategy document
f) Deposit a copy of the adopted strategy with the Environment Agency

The deadline for completion of this work is July 2001.

### 4.1.4 Action four: Initial prioritisation of sites for detailed inspection

There is a requirement in the regulations that the inspection of potentially contaminated sites should be prioritised. The initial prioritisation of sites into the order in which they will be subject to detailed inspection will use the information layers in the GIS database, plus in some cases an initial walk-over survey, to prioritise the sites via a risk based assessment of their sensitivity.

In essence this will be carried out using a simple 'point-scoring' system based on the historical and current site use, use of neighbouring sites, underlying geology, underlying groundwater resources, proximity to local surface water resources etc. to determine if a plausible pollutant linkage could exist (Section 5.5).

Initially the sites will be characterised into four categories in order of priority:

**Category 1:** probably not suitable for present use and environmental setting, the available evidenced suggests the site is in a contaminative state and a plausible pollution linkage can be demonstrated, the site requires further investigation or action as a matter of urgency.

**Category 2:** possibly not suitable for present use and environmental setting, the available evidence suggests the site may be in a contaminative state and there may be a plausible pollution linkage, the site requires further investigation in the short to medium term. If there is any change of risk factors (e.g. change of use) then the site should be re-prioritised.

**Category 3:** the site may have some contamination, but the available evidence suggests it is unlikely there is a pollution linkage. The site is probably suitable for its present use and environmental setting, but further investigation should be undertaken in the long term for confirmation of its status. If there is any change of risk factors (e.g. building of houses nearby) then the site should be re-prioritised.

**Category 4:** although there is some evidence that the site may have been used for a potentially contaminative purpose, investigation has shown that the site is essentially uncontaminated and/or there is no plausible pollution linkage. The site is suitable for its present purpose, no action is likely to be necessary unless there is a substantial change in risk factors.

This prioritisation will be under continuous review to take account of any new information. The first round of initial prioritisation of sites should be completed by the end of December 2001.

### 4.1.5 Action five: Detailed inspection of sites

This will begin by a further risk assessment, categorisation and prioritisation of the sites that fall in category 1 (Section 4.1.3); this may result in some sites being downgraded to a lower category. It is possible that a commercial risk assessment package may be used at this stage but a decision has not yet been taken on this. The aim of the detailed inspection is to obtain sufficient information either (a) to progressively downgrade sites to priority category 4; or (b) to show that some form of remediation is necessary to render the site fit for its present or proposed purpose.

**Priority category 1 sites** will be inspected in order of priority in a number of stages of increasing detail. In some cases this may require the council to engage competent and experienced contractors to undertake one or more intrusive investigations into the site. At each stage the principal question to be answered will be “is there a plausible pollution linkage capable of causing actual harm or pollution of controlled waters”. If at any stage the answer to that question, assessed on the balance of probabilities, becomes “it is unlikely” then the site will be downgraded to the next lowest priority category and attention will then be focussed on the next site in the highest remaining priority category.

When all the category 1 sites have been dealt with they will either (a) have undergone, or be in the process of, remediation; or (b) have been downgraded to category 2. It is anticipated that this stage should be reached by the end of 2002, but it may take longer depending on the outcome of site investigation.

**Priority category 2 sites**, now including any site in initial category 1 that has been downgraded, will be re-prioritised by carrying out the risk assessment procedure. Should this process upgrade any site to priority category 1 it will be investigated first. It may be that some sites are regraded to priority category 3 or 4. Once again the sites in category 2 will be investigated in order of priority and downgraded to category 3 once it is possible to confidently state that it is unlikely that a plausible pollution linkage exists on this site. It is anticipated that this stage should be reached by the end of 2003.

**Priority category 3 sites**, now also including any sites that have been downgraded, will be re-prioritised by carrying out the risk assessment procedure again. Should this process upgrade any sites to priority category 1 or 2 they will be investigated first in order of their determined priority. It may be that some sites are downgraded to priority category 4. Once again the sites in category 3 will be investigated in order of priority and downgraded to category 4 once it is possible to confidently state that that a plausible pollution linkage does not exist on this site. It is anticipated that this stage should be reached by the end of 2004.

**Priority category 4 sites**, now including any sites that have been downgraded, will be re-prioritised by carrying out the risk assessment procedure again. Should this process upgrade any sites to priority category 1, 2 or 3 they will be investigated first in order of their determined priority. Once sufficient evidence has been obtained to show that the site is essentially uncontaminated, and/or there is no plausible pollution linkage, the site will be declared suitable for its present purpose and no further action will be taken unless there is a substantial change in risk factors.

By the end of stage five all sites should have been remediated, or be in the process of remediation, or have been regraded to category 4. This stage should be reached by the end of 2005. This will be followed by a process of ongoing review (Section 8).

## 4.2 Timescales for the prioritised actions

The overall strategic inspection of potentially contaminated land in Milton Keynes should be completed by the end of 2005. A timetable summarising the target timeframes is shown in Section 3.2.6.

The contaminated land strategy will be subject to an annual review (Section 3.2.6)

# 5 Procedures

## 5.1 Internal management arrangements for inspection and identification

The main responsibility for dealing with contaminated land lies with the Environmental Protection Team in the Environmental Health Division, which is part of Regulatory Services within the Environment Directorate of Milton Keynes Council. There are two officers in this team whose principle purpose is dealing with contaminated land. They are assisted as and when necessary by other officers within the team, and officers from other Environmental Health teams, Planning and Building Control, the Legal section and elsewhere in the council as appropriate.

For contaminated land enquiries, advice or to report land, which it is believed may be contaminated, please contact:

Dr Steve Moorhouse, or Ms Nicola Adshead
Environmental Protection Team, Environment Directorate,
Civic Offices, 1 Saxon Gate East, Milton Keynes MK9 3HH
Tel: 01908 252635 or 252097
Fax: 01908 252259
e-mail contaminated.land@milton-keynes.gov.uk

## 5.2 Milton Keynes Council interests in land

### 5.2.1 Categories of land

These interests fall into two clear groups:

a) land currently owned or leased by the Council;
b) land formerly owned, leased or used by the Council, or its predecessors.

In each case all these areas of land will have to be assessed to determine if:

i. the land is contaminated; and
ii. there is any Council liability in respect of that contamination.

This exercise will be carried out in parallel with the prioritisation of potentially contaminated sites (Sections 4.1.4, 4.1.5) as this latter process does not distinguish particular categories of ownership but treats all sites equally.

Two areas of concern which have already been identified are:

1) former Council owned domestic refuse disposal sites which were in operation prior to Waste Management legislation being introduced in 1976 (e.g. Stonebridge former Wolverton UDC refuse tip); and
2) Council properties partially constructed from asbestos containing materials which have fallen into disuse and disrepair and caused asbestos contamination of the ground (e.g. Castlethorpe Railway water-tower).

### 5.2.2 Inspecting and assessing Milton Keynes Council owned or leased land

Current Council land holdings are shown in summary on Figure 17. The land holding records are currently being cross-correlated with our database of potentially contaminated land. Where possible any Council owned sites that are found to be potentially contaminated will be ranked higher in the priority list in order that they are dealt with sooner. This is on the grounds that it is good practice for the Council to be seen to be 'putting its own house in order' as expeditiously as possible when we may be requiring other land-owners to deal with contamination on their land holdings. The estimated completion date is December 2002 (see Section 3.2.6).

### 5.2.3 Inspecting and assessing former local authority landholdings and other areas where Milton Keynes Council may be the appropriate person

A number of landholdings of Milton Keynes Council's predecessor councils have been identified and work is currently in hand to finalise these records, estimated completion date (December 2002).

In addition to the standard assessment of these sites any which are deemed to be potentially contaminated will have to be further investigated to determine if there might be any residual Council liability even though this council no longer owns these sites. This will require liaison with the legal department, which is already under way.

## 5.3 Information collection and management

### 5.3.1 Sources of information

In order to implement the contaminated land strategy and in particular to carry out the detailed inspection stage a great deal of information is necessary. This information is drawn from a wide variety of sources and is not always complete or immediately available in a form suitable for incorporation into a GIS. In the latter case the data has to be 'captured' i.e. rendered into a form which can be read into the GIS.

For example old maps can be digitally scanned to produce a 'raster image' and then recognisable locations on the map given grid co-ordinates, which allows the map to be spatially recognised by the GIS. This then allows layers of 'vector data' such as roads, houses etc. to be displayed overlaid on the image of the map. Any sites on the map of interest, e.g. old now infilled quarries, can then be outlined and details added to the potentially contaminated sites layer. The Environmental Protection Team (EPT) has the equipment and expertise to carry out this process which has been used for a variety of maps and photographs to add information to our database. However, the majority of the historical maps which have been used for 'capturing' information about old potentially contaminated site were purchased ready scanned and formatted for our GIS (see Table below).

**Table 5.1 Information sources, type and use**

| Information Source | Information type | Use |
|---|---|---|
| Ordnance Survey Landline map data | Digital geographic map data | Present-day base map used in GIS system as reference for current and historical data |
| Historical Ordnance Survey map data from Landmark | Digitised 25-inch and six-inch to the mile maps from 1880's to 1940's | Location of sites with potentially contaminative uses |
| Trade directories & historical records | Information about industries | Confirmation of potentially contaminative uses |
| Environmental Protection Files | Register of proscribed processes | Digitised by EPT, location of sites with potentially contaminative uses |
| Petroleum Licence files, current and 'dead' files | Details of sites licensed to store petroleum. 'Dead' files contains incomplete data on former sites back to 1970's | Digitised by EPT, location of sites with potentially contaminative uses |
| Environmental Protection Files | Register of landfill and waste disposal sites, incomplete pre-1976 | Digitised by EPT, location of sites with potentially contaminative uses |
| Planning Department plotting sheets | Maps outlining sites with details of application for planning permission back to 1948 | Digitised by EPT, location of sites with potentially contaminative uses |
| Environmental Protection Files | Site investigation reports and reports on pollution incidents | Digitised by EPT, location of sites with potentially contaminative uses |
| British Geological Survey | 1:50000 digital solid and drift maps and artificial deposits | Information on ground conditions, possible pathways and receptors |
| Environment Agency | Licensed ground and surface water abstraction points (digital) | Information on possible receptors |
| British Geological Survey | Groundwater Vulnerability Map major and minor aquifers (digital) | Information on possible receptors |
| Environment Agency | Water pollution incidents (digital) | Information on possible sources |
| Environment Agency | Water Abstraction Licences (digital) | Information on possible receptors |
| | | |

### 5.3.2 The corporate Geographic Information System for data management

MapInfo Professional is the main corporate GIS system. This is the main tool for managing data relating to contaminated land. The Council's Information Monitoring & Research section together with the IT, Environment Project Support section, manage the MapInfo software. Each division within the Council is responsible for managing its own data sets.

## 5.4 Complaints and voluntary information provision

It is expected that from time to time there will be complaints, or information, about allegedly contaminated land from members of the public, community groups or businesses. The procedures to be taken to deal with such information are as follows.

### 5.4.1 Handling complaints

The Environmental Protection Team specialist officers will deal with complaints or information (termed service requests by the Environmental Health Division) regarding contaminated land in the first instance. It may be that in some cases the information is better dealt with using other powers or by other agencies, for example in the case of 'fly-tipping', or alleged pollution from a site holding a waste disposal licence (see Section 5.6). The information will be assessed and a response made as swiftly as possible, but in all cases:

a) The complaint/information will be logged and recorded as a service request in the Environmental Health Flare database in the first instance.
b) There will be a response to the complaint within five working days of receipt; or
c) There will be an immediate response if the complainant reports that a significant act of pollution/contamination is occurring at the time of notification.
d) The complainant will be kept informed of progress towards resolution of the problem.
e) If the complaint relates to a site already identified as potentially or statutorily contaminated the complainant will be sent a summary of the information known about the site and any action being, or proposed to be, taken about the site (there may be some exceptions to this due to data confidentiality see section 9.3).
f) Sites not previously identified as potentially contaminated will be subjected to the risk evaluation procedure in order to place the site in one of the risk categories (see Section 4.1.4).
g) Action will then be taken appropriate to the assessed risk rating of the site.

### 5.4.2 Confidentiality

All service requestors will be asked to supply their name and address and details of the site in question. The identity of all service requestors will remain confidential, which is standard practice in the Environmental Health Division.

### 5.4.3 Voluntary provision of information

Where an individual or organisation provides information relating to potentially contaminated land which is not directly affecting their own health or property as far as is possible it will be treated like any other service request.

### 5.4.4 Anonymously supplied information

The Environmental Health Division does not guarantee to take action in respect of anonymously provided information. However, the Division's officers use discretion in deciding whether an investigation is desirable. This policy is followed by the EP Team officers in respect of contaminated land information. If the information received is believed to be genuine and of value then as far as possible it will be treated like any other service request.

### 5.4.5 Anecdotal evidence

Such evidence may be of value in confirming data already acquired or in suggesting a possible line of investigation. However, anecdotal evidence in the absence of any corroborating evidence is of very limited, if any, value. All such evidence received will be assessed by EP Team officers who will use their knowledge and experience to determine if the evidence warrants any further action.

### 5.4.6 Provisions of the Data Protection Act 1998

All information obtained must be handled in accordance with the provisions of this act. This requires compliance with the eight enforceable principles of good practice which state that data must be:

a) Fairly and lawfully processed
b) Processed for limited purposes
c) Adequate, relevant and not excessive
d) Accurate
e) Not kept longer than necessary
f) Processed in accordance with the rights of the data subject
g) Secure
h) Not transferred to countries without adequate protection

(See also section 9.3)

### 5.4.7 Personal information on Public Registers

Where personal information about an individual or group of individuals must appear on a Public Register, e.g. where land has been designated Contaminated Land and the persons have been identified as Appropriate Persons; written notice will be given stating that their details will be so registered.

## 5.5 Information Evaluation

### 5.5.1 Guidelines to assessing potentially contaminated sites

The information used to assess potentially contaminated sites, as part of the risk assessment and management process, will be evaluated in line with current UK Government technical guidelines.

Amongst the current guidelines, "*Contaminated Land Research (CLR) Report No. 6, 1995*" presents a simple systematic approach to deciding the level of priority of action on a potentially contaminated site. This guidance has been adapted as the basis for the MK Council approach to risk assessment (Sections 1.2.10; 4.1.4; 4.1.5).

UK guidance on acceptable concentrations of various pollutants has always been incomplete and rather unsatisfactory and is now very out of date (*Interdepartmental Committee on the Redevelopment of Land (ICRCL) 59/83 2nd edition, July 1987*). This document gives incomplete information on so-called 'trigger levels' and **'**action levels**'.** In essence a trigger level is a concentration of a pollutant above which further investigation may be necessary, and an action level is a concentration above which some remediation action is normally required. Because of their incomplete and unsatisfactory nature other sources of guidance on acceptable pollution levels are frequently used to assess UK sites. For example the so-called Dutch list values ("*Intervention values and target values – soil quality standards*". Published by The Ministry of Housing, Spatial Planning and Environment, Department of Soil Protection, The Hague, The Netherlands), unfortunately are often misused and indeed were derived for the conditions in the Netherlands which in most cases are rather different to typical British conditions.

To rectify this situation new guidance has long been promised by the DETR and the new risk assessment model "*The Contaminated Land Exposure Assessment (CLEA) Guidelines"* are due to be published in 2001, but at the time of writing we are still waiting. When this becomes available full use will be made of these guidelines in the risk assessment and prioritisation of sites in Milton Keynes.

One very useful recent publication is "*Guidance for the Safe Development of Housing on Land Affected by Contamination, Environment Agency & NHBC R & D Publication 66, 2000".* The recommendations therein are fully in line with the process adopted in Milton Keynes.

### 5.5.2 The principles of risk assessment and management

Risk assessment put simply is an evaluation of the probability of harm. In the context of contaminated land it is concerned with gathering and interpreting information on the characteristics of sources, pathways and receptors at a specific site and attempting to understand the uncertainties inherent in the assessment of these specific risks. The requirements of the risk assessment control the nature of any site investigation and together they make up the scientific part of contaminated land investigation. In practice this involves the determination of the environmental geochemistry of the contaminants together with relevant properties of the host materials and wider site characteristics which influence contaminant fate and transport (paragraph repeated from section 1.2.10).

Soil is a multi-media environment with solid, liquid, gaseous and biotic components. It is essential to understand the relative distribution and flux (movement) of contaminants amongst and between these components in order to formulate logical site investigation, risk assessment and remedial plans.

It is the geochemical properties of the materials found at contaminated land sites that determine how a contaminant will be transported around and off the site and where the contaminants are likely to occur on the site. This is referred to as a chemical's 'distribution'; i.e. will a particular chemical occur in solid inorganic soil minerals or carbonaceous biotic materials, or in the gases or liquids in the soil pore spaces. For example chemicals which have:

a) high aqueous solubility (dissolve easily in water) will tend to be transported via surface and/or ground water and end up in ponds and streams, possibly impacting people through drinking water e.g. phenol;
b) high vapour pressure (easily evaporate and form gases) will tend to travel through the pore spaces in soil and end up in the air, possibly being breathed in by people e.g. benzene;
c) low aqueous solubility, low vapour pressure and a high organic carbon-water partition coefficient (tendency to bind to organic carbon in soil) will tend to travel as wind blown dust and end up in soil, possibly sticking to root vegetables and being eaten by people e.g. hexachlorodibenzo-*p*-dioxin.

### 5.5.3 The process of risk assessment

The process of risk assessment may be viewed as four key stages:

a) Hazard **Identification**. What hazards, in terms of sources pathways and receptors are present at the site, taking into account its actual or intended use and environmental setting.

b) **Hazard Assessment**. What are the key pollutant linkages and what are the concentrations of substances at the point of exposure?

c) **Risk Estimation**. Estimation of the risk(s) that identified receptors will suffer adverse effects under defined conditions. May include dose-response assessment (i.e. how potent are the toxic substances that may reach the receptor?). Expression of risk may be in qualitative form (i.e. the risks are low or high) or more rarely in quantitative (numerical) terms.

d) **Risk Evaluation**. Evaluates the need for risk management action (i.e. risk reduction or control measures) having regard to the nature and scale of actual or anticipated risk, the uncertainties of the assessment procedure and a broad cost-benefit analysis of any proposed actions.

### 5.5.4 The staged approach to risk assessment

There are a wide variety of methodological approaches to contaminated land risk assessment used by different practitioners and in different situations. However, it is usually carried out using a staged or tiered approach and may involve purely qualitative, semi-quantitative and quantitative steps. A typical approach may be summarised as:

**a) Phase 1a Risk Assessment: Hazard Identification**
- Desk study
- Site reconnaissance

**b) Phase 1b Risk Assessment: Hazard Assessment**
- Additional desk study
- Exploratory site investigation

**c) Phase 2 Risk Assessment: Risk Estimation & Risk Evaluation**
- Staged intrusive site investigation
- Supplementary site investigation

Risk assessment has to be a flexible process that can be applied in a variety of situations. It must allow assessors to make the best possible use of resources. Therefore, it should be possible to exit the process when a justifiable basis for doing so exists; revise earlier judgements as more detailed information becomes available; rapidly move through the process so that resources are used to develop effective remedial solutions rather than to prove beyond all reasonable doubt that unacceptable risks exist.

In most cases a qualitative assessment of risk is sufficient to identify the key issues at a site. However, it must include all the hazardous materials on the site, take account of all direct and indirect exposure pathways and consider all relevant receptors both on and off the site.

When all the potential source-pathway-receptor pollutant linkages have been established for a site the qualitative approach can be used to provide an initial subjective ranking of risks into four categories: insignificant, low, medium and high, depending on the site-specific factors. Semi-quantitative and quantitative methodologies will be used in situations where greater resolution is required between risks in order to select relevant risk management options. Quantitative risk assessment is a highly specialised approach that relies heavily on an expert understanding and interpretation of baseline toxicological data. It can only be used when a contaminated site has been very well characterised and the hazards are well defined.

### 5.5.5 Risk management

Risk management involves evaluating alternative options within a political, regulatory, social, economic, scientific and technological framework, in order to determine the most appropriate and practical means of reducing risk to an acceptable level. In practice the overriding principle is that risk is managed by breaking the source-pathway-receptor pollutant linkage(s). This may be done by such means as removing or isolating pollutant sources, intercepting exposure pathways and/or by protecting or removing receptors. Risk management is based on the scientific output of the risk assessment procedures but takes into account other factors such as risk perception by the general public, planning constraints and the economic and technological feasibility of particular remediation technologies.

## 5.6 Interaction with other regulatory regimes

The Part IIA contaminated land regime has replaced the statutory nuisance provisions of the EPA 1990 Act, which were formerly used to deal with contaminated land. However, there are a number of other regulatory regimes and Acts of Parliament, which deal with certain aspects of contaminated land.

### 5.6.1 The planning regime

As stated in section 2.10.1 it is a fact that the regulatory management of contaminated sites has historically been largely achieved within the planning regime via land use planning and development control legislation, the main relevant provisions of which are summarised in section 2.10.1. This will continue to be the case with most contaminated land remediation being achieved as part of the redevelopment process. Milton Keynes Council has put in place robust and effective measures to ensure that all relevant land

developments or redevelopments are properly screened for possible ground contamination prior to development being permitted (2.10.1). There is a close and effective relationship between the officers in the Environmental Protection Team and those in Development Control and Building Control, which ensures that potentially contaminated land is properly dealt with, at all stages of the development process.

### 5.6.2 Pollution of controlled waters

The Environment Agency has powers to deal with harm to controlled waters being caused by land contamination, under the Water Resources Act 1991. These powers have not been revoked by the Part IIA legislation. However, government guidance has indicated that such matters would be better dealt with as part of the contaminated land regime. Obviously this will require close liaison with the Environment Agency, therefore:

a) Milton Keynes Council will always consult the Agency prior to taking any action as a result of contaminated land posing a risk to controlled waters, and
b) The Environment Agency will notify Milton Keynes Council whenever it believes there may be a risk to controlled waters resulting from land contamination, whereupon
c) Milton Keynes Council will urgently assess the risk and take whatever action under Part IIA is appropriate, in full consultation with the Agency.

### 5.6.3 Waste management regime

The Waste management Licensing Provisions of the Environmental Protection Act 1990 provide powers to deal with land contamination that results from a breach of an operating licence. The Environment Agency is normally responsible for enforcement of these powers.

There is an agreement in force between the Environment Agency and Milton Keynes Council which categorises fly-tipping and details which agency will take action in respect of each category (Fly-tipping Response Matrix).

### 5.6.4 Integrated Pollution Prevention and Control (IPPC)

New legislation was recently introduced to regulate pollution from industrial processes. Operators of relevant processes are required to undertake a site condition survey prior to receiving a licence to operate. If this survey indicates that the land is contaminated then it may trigger action under the Part IIA process. Existing processes will be brought under this legislation in stages over the next seven years, although it will apply immediately to any new processes or where there is a substantial change to an existing process.

# 6 Liaison and Communication

## 6.1 Statutory consultees

Contact has already been made with all statutory consultees.

The statutory consultees are:

a) Environment Agency Anglian Region
b) English Nature
c) English Heritage
d) Ministry of Agriculture Fisheries and Food
e) Food Standards Agency
f) English Partnerships

All these organisations will be invited to comment on a draft copy of the strategy document.

## 6.2 Non-statutory consultees

All Parish and Town Councils in Milton Keynes will be invited to comment on the draft strategy document. Other community bodies will also have the opportunity to comment on the draft document, copies of which will be lodged in Public Libraries.

## 6.3 Communication with owners, occupiers and other interested parties

### 6.3.1 Voluntary remediation

In general Milton Keynes Council always seeks to encourage voluntary action before taking enforcement action. This approach is specifically recommended in the government guidance about contaminated land. It is generally recognised that in many cases more effective remediation can be achieved when proceeding by agreement rather than by enforcement.

The contaminated land regime provides two incentives to undertake remediation voluntarily:

a) Materials requiring disposal as a result of voluntary remediation are exempt from landfill taxes (this does not apply when a remediation notice is served), and
b) Sites are only entered on the contamination register when a remediation notice is issued (except Special Sites), therefore voluntarily remediated sites are not entered on the register which avoids any possible issue of ‘blight’.

### 6.3.2 Determination of contaminated land and communication with stakeholders

Except in a case where urgent action is required (section 4.1.2), when formally determining that certain land is statutorily contaminated, Milton Keynes Council will:

a) Write to the owners and/or the occupiers and/or the appropriate persons of the contaminated land at least 5 working days prior to the determination of that land, explaining the Council's intention and summarising the reasons for the determination.
b) Write to the owners and/or the occupiers and/or the appropriate persons explaining that the land has been formally determined as contaminated land and that, initially, the Council is seeking appropriate remediation voluntarily without the service of a remediation notice.
c) Notify the Environment Agency of the formal determination.
d) If requested by one of the stakeholders, dispatch a copy of the formal determination document within 5 working days of receipt of the request.
e) Write to the owners and/or the occupiers of neighbouring properties and/or the complainant within 5 working days of the determination summarising the reasons for the determination.

### 6.3.3 Serving a remediation notice

If appropriate voluntary remediation cannot be agreed in a timely manner, a remediation notice will be served on the owners and/or the occupiers and/or the appropriate persons, as required, specifying what remediation actions are deemed necessary.

## 6.4 Powers of entry

Section 108(6) and Schedule 18 of the Environment Act 1995 grants the Council powers of entry to carry out investigations. At least seven day's notice will be given of proposed entry onto premises, unless it is believed that urgent action (section 4.1.2) is necessary because of an immediate risk of harm to health our serious environmental pollution.

Where it is considered possible that a site might eventually be designated a Special Site the Environment Agency will be invited to co-operate in the investigation (see section 7.2.2 and Appendix A).

## 6.5 Enforcement action

Milton Keynes Council ensures that consistent, fair and transparent practices are used when taking enforcement action. Contaminated land investigations will fully comply with this approach.

## 6.6 Risk communication

The communication and effective comparison of the extent of risk from a complicated scientific and technical matter such as contaminated land is not easy. Even experts in the field frequently disagree about the exact nature of the risks involved. Therefore the development of effective methods of risk communication to members of the public is a difficult but essential topic. In this respect Milton Keynes Council will adopt the measures recommended in the publication *'Communicating Understanding of Contaminated Land Risks, Scotland & Northern Ireland Forum for Environmental Research - Sniffer (1999)'.*

Milton Keynes Council will always treat any concerns raised by members of the public seriously and with respect. It is always recognised that if someone has taken the trouble

to contact the Council then the matter raised is significantly important to that person. Communication with members of the public regarding matters of concern and the possible risks of contaminated land will be undertaken by the specialist officers of the EP Team who have undergone training in risk communication. They recognise and will try to overcome the critical barriers to effective risk communication:

a) **Familiarity** there is increased concern about unfamiliar issues
b) **Control** there is increased concern where the individual feels unable to exert any control over events
c) **Proximity in space** there is increased concern about nearby events
d) **Proximity in time** there is increased concern about perceived immediate consequences rather than long term effects
e) **Scale** can often be distorted, particularly by media coverage, where one large event appears much worse than a number of smaller events
f) **'Dread factor'** lack of understanding may cause concerns to be exaggerated, leading to stress making further explanation more difficult.

One thing that may be difficult for some members of the public to understand is that the contaminated land regulations only grant limited powers to local authorities to deal with materials present in, on or under the ground. Many people believe that any material that is not naturally present in the ground should be completely removed, particularly if it is near their own homes. Whilst this is perfectly understandable it will be critical to explain that remedial action can only be taken where there is a risk of **significant** harm, and even then only to the point where the land is fit for its purpose and the risk is reduced to an **acceptable level**. There is, unfortunately, a deal of scope for disagreement as to what is, or is not, an acceptable level of risk.

We live in a culture where readily understandable risks, such as road accident injury, are to a great extent accepted and even minimised, whilst the less easily understandable risks, such as from pollution, are considered unacceptable. Indeed it is often naively considered that such risks should be completely eliminated even though the risk of death or serious harm from pollution is many orders of magnitude less than that from road accidents. Thus it is to be expected that some members of the public will have difficulty accepting the limitations of the Council's powers in dealing with land contamination.

## 6.7 The public register

The Council is required by the regulations to maintain a public register of its regulatory actions in respect of contaminated land (see section 9.2).

The information to be held on the register is limited and it is clearly specified by the regulations that it should include:

a) Remediation notices
b) Details of site reports obtained by the Council in relation to remediation notices
c) Remediation declarations
d) Remediation statements
e) Notifications of claimed remediation
f) Determination of sites as 'special sites'
g) Appeals lodged against remediation and charging notices
h) Convictions.

The public register will be held by the Environmental Health Division within the Civic Offices in Central Milton Keynes and will be accessible by prior request during office hours Monday to Friday.

The public register will not include details of land use and other data and records used and accumulated in the investigation of potentially contaminated land. However, all environmental information held by the council, including the above, (with the exception of a small amount of confidential material) is available by means of a request made under the Environmental Information Regulations 1992 (see below).

## 6.8 Requests for environmental information

Under the Environmental Information Regulations 1992, all environmental information held by the Council (with the exception of a small amount of confidential material) is available to the public. Such information can be obtained from the Environmental Protection Team by writing to the address below, preferably enclosing a map or plan of any site or land of interest, and citing the above regulations (see section 9.4). There is a charge made for supplying such information, details are available on request from:

Environmental Protection Team, (Environmental Information Request),
Environment Directorate, Civic Offices,
1 Saxon Gate East, Milton Keynes, MK9 3HH.
Tel: 01908 252097

## 6.9 Provision of information to the Environment Agency

The Environment Agency is required to prepare an annual report for the Secretary of State on contaminated land in England and Wales. Their report will include:

a) A summary of local authority inspection strategies, including progress of the strategy and its effectiveness
b) The amount of contaminated land and the nature of the contamination
c) Measures taken to remediate land

Local authorities are the lead regulators on contaminated land, thus the national survey will be highly reliant on information provided by those authorities. A memorandum of understanding has been drawn up between the Environment Agency and the Local Government Association describing how information will be exchanged between the local authority and the Agency. The Council will provide information to the Agency following the guidelines in this memorandum.

The Council must also provide information to the Agency whenever a site is designated as contaminated land, and whenever a remediation notice, statement or declaration is issued or agreed. The Environment Agency has provided standard forms allowing this information to be provided in a consistent format and the Council will use these to provide the necessary information.

# 7 Programme for Inspection

## 7.1 Activities and timetable

The programme for gathering information and the arrangements for detailed inspection of potentially contaminated sites has been presented in sections 3, 4 and 5 of this document.

A timetable of activities is given in section 3.2.6. This will satisfy the statutory requirements detailed in parts B.9 and B.10 of the Statutory Guidance.

## 7.2 Arrangements for detailed inspections

Detailed inspections are carried out on sites which have been recognised as potentially contaminated by applying the procedures contained in this document (see especially sections 1, 3 & 5). The statutory guidance states that the local authority should carry out a detailed inspection of such potentially contaminated sites. This detailed inspection should be such as to obtain sufficient information for the authority:

1) To determine, in accordance with the guidance on the manner of determination in Chapter B Part 4 of the guidance, whether the land appears to be contaminated land; and
2) To decide whether any such land falls within the definition of a special site prescribed in regulations 2 and 3 of the Contaminated Land (England) Regulations 2000, and is therefore to be designated a special site (Appendix A).

### 7.2.1 Compliance with Statutory Guidance

The detailed inspection process has to comply, in particular, with paragraphs B19 to B25 of the statutory guidance. For land to “appear to be contaminated” there should be evidence, in particular, of the actual presence of a pollutant. The detailed inspection may include any or all of the following:

- The collation and assessment of documentary information, or other information from other bodies;
- A visit to the particular area for the purposes of visual inspection and, in some cases, limited sampling (for example of surface deposits); or
- Intrusive investigation of the land (for example by exploratory excavations).

If at any stage of the inspection for a particular pollutant linkage (section 1.2.9) it appears to the Council, that the evidence shows that there is no longer a reasonable possibility that the particular pollutant linkage exists, then the Council is not required to carry out any further detailed inspection in respect of that pollutant linkage.

Before the Council can carry out an inspection using statutory powers of entry (section 6.4) it should be satisfied, on the basis of any information already obtained:

- In all cases, that there is a reasonable possibility that a pollutant linkage (section 1.2.9) exists on the land; and
- Further in cases involving an intrusive investigation,
  - that it is likely that the contaminant is actually present, and

- given the current use of the land that the receptor is actually present or is likely to be present.

The Council should not carry out any inspection using statutory powers of entry, which takes the form of intrusive investigation if:

- It has already been provided with detailed information on the condition of the land, whether by the Environment Agency or some other person such as the owner of the land, which provides an appropriate basis upon which the Council can determine whether the land is statutorily contaminated land; or
- A person offers to provide such information within a reasonable and specified time, and then provides the information within that time.

The Council should carry out any intrusive investigation in accordance with appropriate technical procedures for such investigations. It must also ensure that it takes all reasonable precautions to avoid harm, water pollution or damage to natural resources or features of historical or archaeological interest which might be caused as a result of its investigation. Before carrying out any intrusive investigation on any area notified as a site of special scientific interest (SSSI), the Council should consult English Nature on any action, which if carried out by the owner or occupier, would require the consent of English Nature under section 28 of the Wildlife and Countryside Act 1981.

### 7.2.2 Site specific liaison with interested parties

**Owners**
Once a site has been identified as requiring detailed inspection all reasonable efforts will be made to contact the owner or occupier through:

- Land registry records
- Milton Keynes Council records
- Trade directories
- Telephone directories
- Visiting premises
- Public and site notices

If contact can be made with the owner or occupier an explanation of the legislation, and the reasons for identifying the land as requiring an inspection, will be given in writing. A request will be made to arrange a suitably convenient time for the inspection to take place.

With the exception of urgent cases, a total period of 28 days will be allowed for a response to be made to a request for a site visit. It is hoped that any inspections will always take place with the willing co-operation of the landowner and/or occupier who may accompany the inspecting officer. If there is no response within 28 days to the request for a visit, or the owner and/or occupier is unwilling to allow an authorised officer access to undertake an inspection, then statutory powers of entry will be used.

Appropriate persons
If it is found that the appropriate person or persons is the owner and/or occupier then they will be consulted as above. If someone else appears to be an appropriate person then reasonable efforts will be made to make contact and inform them of the need to conduct an investigation. The explanation of the legislation and reasons for the

investigation will be given in the same manner as for a landowner. However, it is the landowner that can give consent for an inspection to take place. Failure to obtain such consent from an appropriate person will not be allowed to delay the investigation.

**Environment Agency**
When the information about a particular site suggests it might be designated as a special site the statutory guidance suggests it might be useful for the Environment Agency to have a role at the inspection stage. Therefore in such cases contact will be made with the contaminated land officer at the agency and any inspection will be arranged for a mutually convenient time.

If it appears likely that there is a pollutant linkage on a site such that it would require the designation of the site as a special site then the Council can seek to make arrangements with the Agency to carry out the detailed inspection of the land. If during such an inspection by the Agency, on behalf of the Council, it is necessary to use statutory powers of entry then the Council will authorise a person nominated by the Agency to make the inspection.

**English Nature**
If it appears that a potentially contaminated site may be affecting ecosystems on land on or in the vicinity of any site under the jurisdiction of, or which may be of interest to, English Nature they will be contacted at the earliest possible opportunity and fully informed of the situation. Their advice will be sought regarding the most appropriate means of carrying out any necessary investigation in order to minimise the potential for causing any further harm to the ecosystem concerned. The advice provided by English Nature will be used to write appropriate procedures into any tender document or contract entered into by the Council for such an investigation.

**Possible historical or archaeological interest and English Heritage**
Where the possibility arises that contaminated land may be affecting historical or archaeological features, in the first instance the expert opinion of Milton Keynes Council Archaeology Officer will be sought. Further action will be taken in the light of his advice. If the land in question falls under the jurisdiction of English Heritage they will be contacted and fully informed of the situation and the opinions of the Council's officers. Their advice and guidance would be sought and used in a similar manner to that of English Nature (above).

### 7.2.3 Methods of inspection

Section 7.2.1 outlines the statutory guidance in respect of inspection procedures.

**Site visits**
Where information has been obtained suggesting a site is potentially contaminated a site visit will normally be made to verify visually, as far as possible, that the information is correct. No site will be designated as contaminated land without a site visit.

During the preliminary site visit observations will be made in accordance with guidance such as *"CLR Report 2, Preliminary Site Inspection of Contaminated Land"* and utilising the specialist officer's extensive experience of such sites. Particular factors, which will be noted, include:

- Records or indications of any industrial use, from desk research, street names, site debris or artefacts
- Indicative odours
- Coloured or oily deposits on soil surface
- Condition of any water bodies or water courses
- Obvious discontinuities within the site or between the site and its surroundings, in terms of vegetation, topography, soil type etc.
- Presence of bare or sparsely vegetated patches of ground
- Plant assemblages which are uncharacteristic for the location, climate, soil type and period of colonisation
- Lack of normal species diversity
- Visible signs of plant stress or discoloration
- Poor root and nodule development
- Presence of indicator species, particularly plants and aquatic macroinvertebrates
- Litter build up on soil surface
- Absence of worm casts (except on naturally acid soils)
- Poor soil structure

Photographs and video records may be made of aspects of the site, particularly in respect of the factors listed above. Limited surface sampling of suspect materials, particularly any exhibiting these factors, may be made for laboratory analysis. The main purpose of the preliminary site visit is to help confirm or deny the need for any further more detailed investigation.

**Intrusive investigation**
This may take many forms including the mechanical or manual digging of trial pits for sub-surface visual inspection and sampling. Auguring, window-sampling and other types of drilling may also be used.

Such an investigation may be carried out where the preliminary evidence suggests more detailed investigation is necessary or for detailed risk assessment purposes, for example where sub-surface solid or liquid samples are required to establish the levels of pollutants on a site.

Where it becomes necessary for the Council to carry out detailed intrusive investigations outside consultants will normally be contracted to carry out the work. In any case provisions will be drawn up to ensure investigations are carried out in line with best practice such as *"BS 10175 (2001): Code of practice for the investigation of potentially contaminated sites"* and *"BS 5930 Code of practice for site investigations"*.

Specialist officers from the Council's Environmental Protection Team or other suitably qualified Council representatives will be responsible for overseeing intrusive investigations to ensure they comply with such best practice and do not cause any harm to the surrounding environment.

### 7.2.4 Health and safety procedures

All inspection activities carried out by Council employees, or contractors engaged by the Council, will be undertaken in full compliance with industry standard good working practices. Special attention will be given to the specific contaminated land related advice detailed in *"A guide for safe working on contaminated sites", CIRIA Report 132,*

*Steeds J. E. et al., 1996*". All investigation will be carried out in line with the relevant codes of practice such as BS 10175 and BS 5930, as in section 7.2.3.

### 7.2.5 Potential Special Sites

There are certain categories of land use, pollutant type and so forth which require that a site should be designated a special site. These are detailed in Regulations 2 and 3 of the Contaminated Land (England) Regulations 2000 together with Schedule 1 of those regulations (Appendix A).

Land cannot be designated a special site unless it has been identified by the Council as statutorily contaminated land. In order to do so the Council has to establish that there is a feasible pollutant linkage connected to the land. However, whenever the Council becomes aware that land it is investigating might, if declared statutorily contaminated, be a special site it will contact the Environment Agency suggesting in the first instance a joint investigation.

Where the Environment Agency (or their agents) wishes to carry out a formal investigation on behalf of the Council their officers will need to be appointed as, suitable persons. The Environment Agency does not have the power under Part IIA to investigate land, which may be contaminated land, without the authorisation of the Council.

**Council designation of land as a special site**

When the Council believes a site may be designated a special site it has a duty to contact the following in writing:

- The Environment Agency
- The owner of the land
- The person who appears to be the occupier of the land; and
- Each person who appears to be an appropriate person.

If the Council informs the Environment Agency of its intention to designate a site as a *special site*, the Agency has twenty-one days to respond to the written notification stating whether or not it agrees with the intended designation. If the Agency agrees with the Council, or it fails to notify the Council of its disagreement within twenty-one days, the contaminated land in question will be designated a *special site*.

If the Agency disagrees with the notification, it should provide the Council with a written statement of its reasons and copy the notification and statement to the Secretary of State. The Council must then refer its decision to the Secretary of State.

When a site is designated a *special site* the effect is that the Environment Agency takes over as the enforcing authority for that site. For the owner or occupier of the land the main difference resulting from the land being designated a *special site* would be that any appeal against a remediation notice would be to the Secretary of State and not the magistrate's court.

**Environment Agency designation of land as a *special site***

The Environment Agency will also consider whether it believes any contaminated land should be designated as a special site. It must make its decision on whether contaminated land is a special site on the same basis as the Council i.e. the

descriptions prescribed in the Regulations. The Agency is not allowed to apply any different tests to those that the Council is required to apply. The Council must decide if it agrees with the Agency, if it does it must notify in writing the same classes of persons as listed above. If the Council agrees with the Agency then the land in question is designated as a special site.

If the Council disagrees with the Environment Agency, the Agency has an opportunity to reaffirm its view that the land should be designated. To do this it must notify the Council, in writing, within twenty-one days of receiving from the Council notification of its decision. The Agency must provide a statement of the reasons why it considers the land should be designated and send this information to the Secretary of State. The Council must then refer its decision to the Secretary of State.

### 7.2.6 Arrangements for appointment of external consultants

Whenever it becomes necessary to appoint external consultants or contractors to carry out work on behalf of the Council this will be done in accordance with the Council's *"Contracts, Tenders and Quotations Handbook"*.

# 8 Review Mechanisms

## 8.1 Ongoing review

### 8.1.1 Review of assumptions and information

Reviewing all assumptions and the status of information gathered will be a continuing process and part of the ongoing inspection programme. At the strategic level, as experience is gained (for example about particular classes of site) it will be used to review previous assumptions about similar matters. At the tactical, site specific, level, as more information becomes available on an individual site the level of uncertainty and inference will decrease and any site-specific models will become more refined and rely less on assumption.

### 8.1.2 Triggers for undertaking non-routine inspection

The normal routine for inspections has been outlined in section 7. However, there may be occasions when a requirement for inspection is triggered by an event outside this normal routine. Such events could include:

- New information or data becomes available about a site, provided by a member of the public, other statutory bodies, landowners etc., suggesting there may be significant contamination.
- New receptors or potential pathways are introduced or there is a proposal that could result in new receptors or pathways such as: designation of a new protected ecosystem, persistent trespass by young people, new service trenches across a site, etc.
- There are proposed, unplanned or unauthorised changes in the use of the site.
- Unplanned events such as flooding, landslip, fire, chemical spill or other incidents.

### 8.1.3 Triggers for reviewing inspection decisions

At any time reasons may occur for reviewing the findings and decisions of particular inspections, for example:

- New information or data becomes available about a site, suggesting the status of the site may differ significantly from that deduced from previous information.
- New research or new guideline values for a particular pollutant require reassessment of decisions regarding that pollutant.
- Significant new case law or other precedent becomes established.
- Legislation is significantly changed.

## 8.2 Periodic review of the strategy and audit of inspection procedures

### 8.2.1 Review timetable and triggers for early review

The operation of the inspection strategy will be reviewed at the end of one year after adoption of the strategy. Experience gained in operating the strategy over the first year may necessitate changes to some of the timetabled activities (section 7.1).

Reasons may also occur for an early review of the strategy such as:

- Inability to meet timetabled targets due to unforeseen events
- The ongoing inspection reveals unexpected results e.g. much greater areas of contamination than expected, individual site inspections take much longer than expected
- Staff changes reduce the level of expertise available to the Council, necessitating the engagement of consultants to carry out inspections

### 8.2.2 Audit of inspection procedures

Although the implementation of the strategy will be effectively under continuous review (see 8.1) and the timetable will be reviewed at the end of year one (see 8.2.1) a thorough formal review and audit of the inspection procedures will be undertaken at the end of a two year period following adoption of the strategy. At this time sufficient experience of operating the strategy will have been gained to make a formal audit and review worthwhile.

# 9 Information Management

## 9.1 General principles

Carrying out the contaminated land inspection strategy will generate a great deal of information which, amongst other things, is expected to be of great interest to many individuals and organisations. As one of the stated principles of the new regime is to improve the focus and transparency of controls it is desirable that wherever possible this information should be made freely available to stakeholders and the public generally. However, this can only be done within the constraints of the Data Protection Act 1998 (section 9.2.4) and the Environmental Information Regulations 1992 (section 9.2) and some information will not be made available on the grounds of national security or commercial confidentiality (section 9.2.2, 9.2.3).

## 9.2 Classification of information

### 9.2.1 Public register or non-public register information

Section 78R of the EPA 1990 lays a duty on the Council to maintain a public register, which is available for inspection. However, it does **not** require the Council to place **all** the information gathered as a result of the inspection of land on the register. The requirement is that the register contains details of the enforcement history of each site where the Council takes action. The register is not intended to be a list of all potentially contaminated sites inspected by the Council. Once information is entered onto the register it will remain there in perpetuity and will not be removed at any time.

Details of contaminated land, which is remediated as part of the planning regime because of the imposition of contamination related planning conditions, will not be included on the register as this falls under the Town and Country Planning Act 1990.

Information which is intended for the register must first be assessed to determine if it needs to be excluded on the basis that it would be against the interests of national security to include it, or the information is deemed to be commercially confidential.

### 9.2.2 Information deemed to be against the interests of national security

The Secretary of State may issue directions to the enforcing authorities specifying information that must be excluded from public registers on the grounds of national security. In addition any person who considers that the inclusion of information on the register would be against the interests of national security may notify the Secretary of State and Milton Keynes Council (see section 10 for contact details) of that belief. The Secretary of State will then consider whether such information should be included or excluded from the register. Until the Council is notified of his decision such information will be excluded from the register.

### 9.2.3 Information deemed to be commercially confidential

Information can only be excluded from the register, on the grounds that it is commercial confidential, where it is deemed to be so by the enforcing authority or by the Secretary of State on appeal. In order to be considered commercially confidential the information would have to be such that it would prejudice, to an unreasonable degree, the

commercial interests of the relevant party. Information relating to the value of land, or to its ownership or occupation, will not normally be considered as commercially confidential. The Secretary of State can give directions concerning the inclusion of information on the register, notwithstanding any commercial confidentiality, where he considers that the inclusion of such information is in the public interest.

Where the Council believes that any information it intends to include on the register may be commercially confidential it will notify the relevant person or persons in writing giving them 28 days to make representations requesting the exclusion of the information if they so wish. Such representations must be in writing giving a full explanation of why the information should be treated as commercially confidential. The Council will then determine whether the information is deemed to be commercially confidential. If so the information will not be included on the register. However, a statement will be included on the register indicating the existence of the excluded data and the reason for its removal, for example:

*"The details of this Remediation Notice have been excluded from the register on the grounds of commercial confidentiality".*

If the Council determine that the information is not commercially confidential the appropriate person or persons will be notified in writing. They will be allowed 21 days to appeal to the Secretary of State if they disagree with the Council's decision. Should such an appeal be made the information will not be included on the register until the Secretary of State's determination is made. If the Secretary of State determines that the information is not commercially confidential, or the appeal is withdrawn, the information will be included on the register after seven days.

Under normal circumstances information which has been excluded from the register on the grounds of commercial confidentiality will no longer be considered as such after the expiry of four years from the determination of the information and it will then be included on the register. An extension of the period of exclusion may be granted if a relevant party applies to the Council for an extension of the four-year period.

### 9.2.4 Information to be included on the public register

The public register must include details of the following:

**1.** Remediation Notices **served by the Council** with the following details:

a) Name and address of the person on whom the notice is served
b) Location and extent of the contaminated land to which the notice relates, sufficient to allow identification of the land whether by a plan or otherwise
c) The significant harm, or pollution of controlled waters, by reason of which the land is designated contaminated land
d) The substances by reason of whose occurrence the land is contaminated land and, if any of the substances have escaped from other land, the location of that other land
e) The current use of the land
f) What each appropriate person is to do by way of remediation and the periods within which they are required to do each of the things
g) The date of the notice.

2. **Appeals** against remediation notices served by the Council and details of any decisions reached on such appeals.

3. **Remediation Declarations** prepared and published by Milton Keynes Council, under S78H(6), including details of the location and extent of the land, sufficient to enable it to be identified, and the information in points 1c), d) and e) above.

4. **Remediation Statements** prepared and published by responsible persons, under S78H(7), or by the enforcing authority, under S78H(9), including details of the location and extent of the land, sufficient to enable it to be identified, and the information in points 1c), d) and e) above.

5. **Appeals** against Charging Notices and details of any decisions reached on such appeals.

6. **Notices** of Milton Keynes Council, under S78C(1)(b) or (5)(a), or by the Secretary of State, under S78D(4)(b), which have the effect of designating any land as a Special Site, and the reasons for that designation.

7. **Notices** of, or given to, Milton Keynes Council, under S78Q(4), terminating the designation of any land as Special Site.

8. **Notifications** given to Milton Keynes Council of what has been done by way of remediation by a person served with a Remediation Notice or who is required to publish a Remediation Statement.

9. **Notifications** given to Milton Keynes Council by owners or occupiers of contaminated land sites of what has been done to the land by way of remediation.

10. **Convictions** of persons for any offence of failure to comply with a Remediation Notice served by the enforcing authority, including the name of the offender, the date of conviction, the penalty imposed and the name of the Court.

11. **Date of any guidance** given to Milton Keynes Council by the Environment Agency in respect of any particular contaminated land site.

12. **Any other matters** relating to contaminated land as may be prescribed by the Secretary of State.

### 9.3 Confidentiality of information – Data Protection Act 1998

Information obtained by the Council in the course of implementing the strategy must be kept in a manner consistent with the principles of the Data Protection Act 1998. There are eight enforceable principles of good practice which state that the data must be:

- Fairly and lawfully processed
- Processed for limited purposes
- Adequate, relevant and not excessive
- Accurate
- Not kept longer than necessary
- Processed in accordance with the rights of the data subject
- Secure

- Not transferred to countries without adequate protection.

In essence the Act seeks to give some protection to persons (data subjects) in three key areas:

- Use of personal information which is inaccurate, incomplete or irrelevant
- Possible access to personal information by unauthorised persons
- Use of personal information in a context or for a purpose other than that for which the information was collected.

Personal information is defined as data comprising information relating to a data subject who can be identified from the information either on its own or in combination with other data held by the data user (i.e. Milton Keynes Council).

## 9.4 Access to information – Environmental Information Regulations 1992

Information gathered by the Council in the execution of its contaminated land strategy will be 'controlled information' under these regulations. The regulations require local authorities to make any environmental information they hold available upon request, subject to certain exemptions and possible charges. Therefore, wherever possible, this information will be made available to anyone making a written request for information under the above regulations. As allowed in the regulations a 'reasonable charge' will be made for supplying this information (for details of application for information, charges etc. see section 6.8).

The exclusions to the right to environmental information are detailed in the regulations, but broadly they are:

- Where disclosure would affect legal proceedings, or where investigations are being undertaken with a view to instituting legal proceedings or enquiry
- Where disclosure would affect international relations, national defence or public security
- Where disclosure would affect the confidentiality of deliberations by a relevant person, or the confidentiality of commercially sensitive matters
- Where it would involve the supply of a document or record of information which is still in the course of completion
- Where the information is not accessible.

At the time of writing precisely what information can or cannot be released is rather a 'grey area'. Some have held that all information gathered as a result of the inspection phase can be considered as 'information still in the course of completion' and therefore should not be disclosed. It is possible that no information will be released concerning ongoing investigations about particular sites until the conclusion is reached that no enquiry or legal proceedings will be undertaken in respect of that site. However, information should not be withheld without good reason, partly because that is against the intention of the regulations but also because it could lay the Council open to legal action. For example, if a third party purchases land about which the Council has refused to supply information it holds that the land is potentially, or actually, contaminated, that party may be able to take action against the Council if the site is subsequently declared statutorily contaminated and in consequence loses value.

All requests for the supply of information will be assessed in accordance with our current understanding of the regulations. In any case where there are uncertainties about the release of particular information a legal opinion will be sought from the Council's legal section.

## 9.5 Storage systems

As much of the information as possible will be stored electronically in databases and files linked to the GIS system. However, there will inevitably be large amounts of paper files such as detailed site reports etc. These will be stored in a dedicated contaminated land filing system.

Efforts will be made to persuade, or where possible require, consultants and the like to supply reports and results of investigations in electronic format compatible with the systems used by the Council. The main software used for storage and manipulation of data is Microsoft (c) Word, Excel and Access, together with MapInfo GIS. Details of all complaints, requests for information etc. will also be held in the Regulatory Services Flare database.

The GIS system can automatically import geographically located data in a range of formats including Excel spreadsheets and Access databases providing that the data includes British National Grid references. Data without grid references can often be 'geocoded' by reference to other spatially located data or if necessary manually.

## 9.6 Administration

All the data and information acquired as a result of the Council's inspections and investigations will be held within the Environmental Health Division. The two officers within the Environmental Protection Team who are principally responsible for implementing the Contaminated Land Strategy will mainly administer this information. These officers will be responsible for quality control of the data including regular updating and review of the data in line with the various timescales given elsewhere in this strategy document (section 3.2.6).

## 9.7 Use by other sections of Milton Keynes Council

All requests for information relating to contaminated land, including advice and expert opinion based on available information, will be routed through the dedicated officers in the Council's Environmental Protection Team. Other sections of the Council will not be allowed to directly access the information. There are two principle reasons for this:

- Data confidentiality (section 9.3)
- Without the necessary technical and scientific background and expertise incorrect or unwarranted conclusions could be drawn

Information for use elsewhere in the Council, for example in the planning process, will continue to be provided, as is the current practice, by the EP Team officers together with professional opinion and advice about contamination matters as requested by other sections of the Council.

# 10 List of Figures

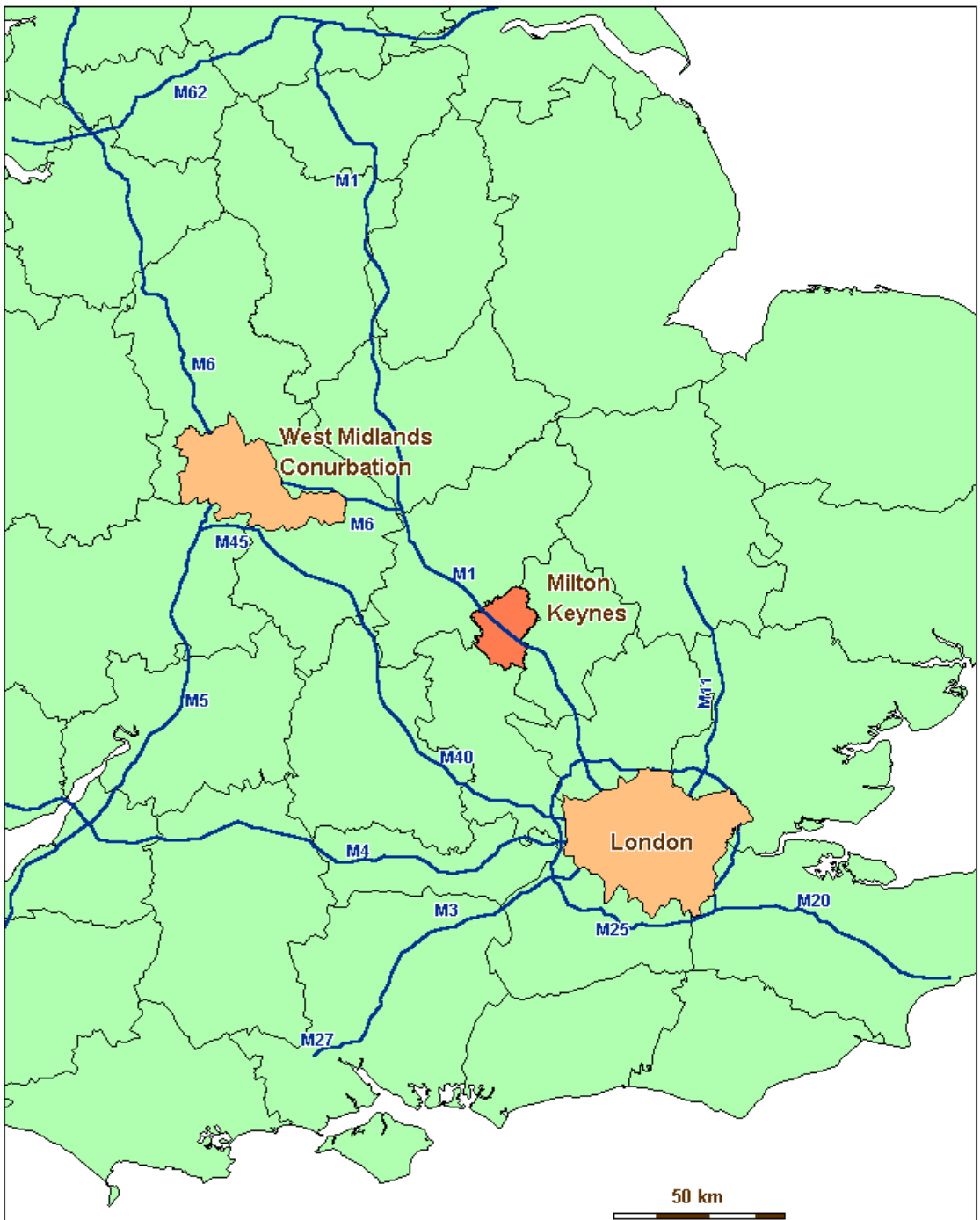
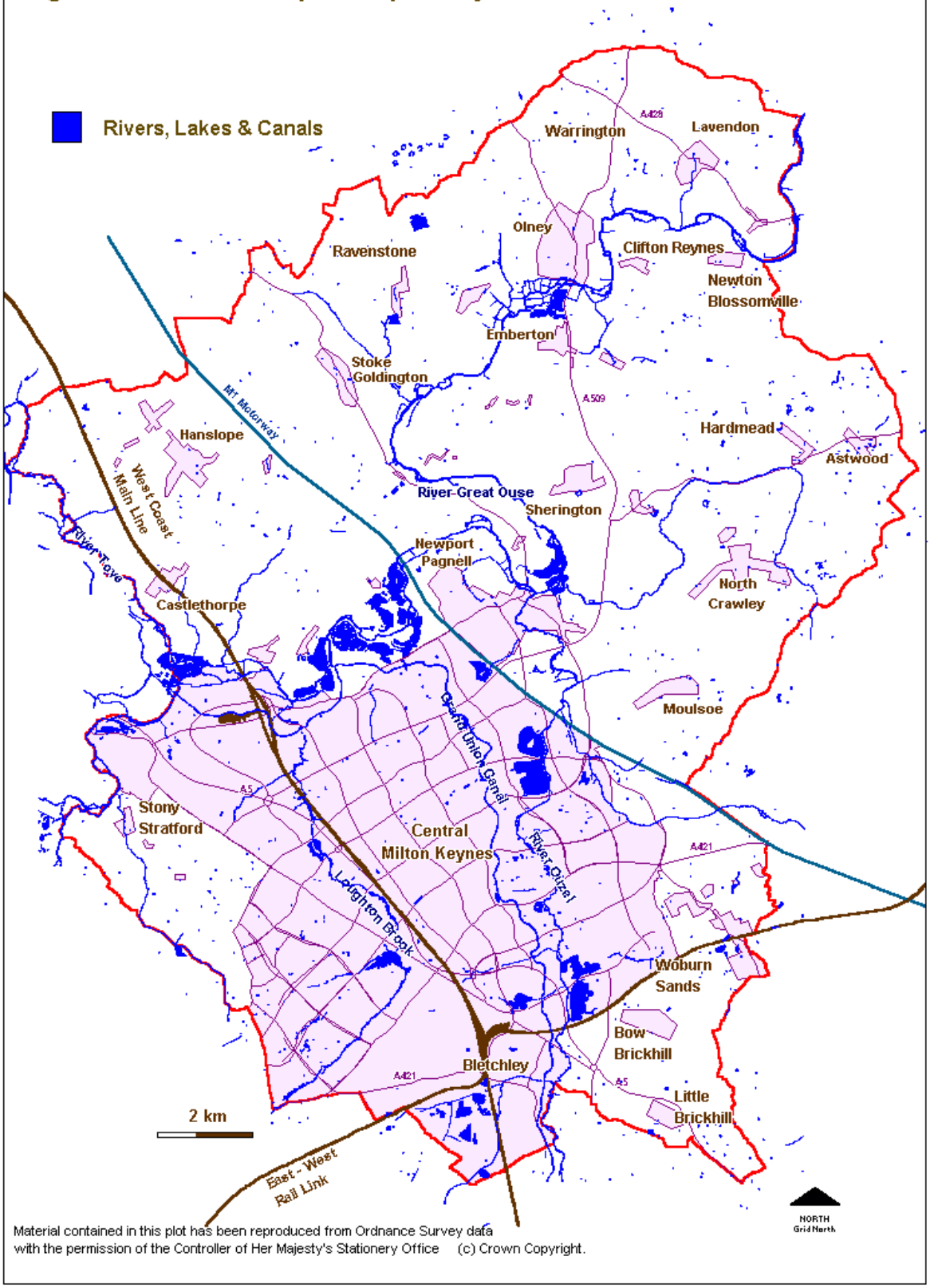



**Figure 1. Location of Milton Keynes**

## Figure 2. Potential receptors & pathways: Surface water features



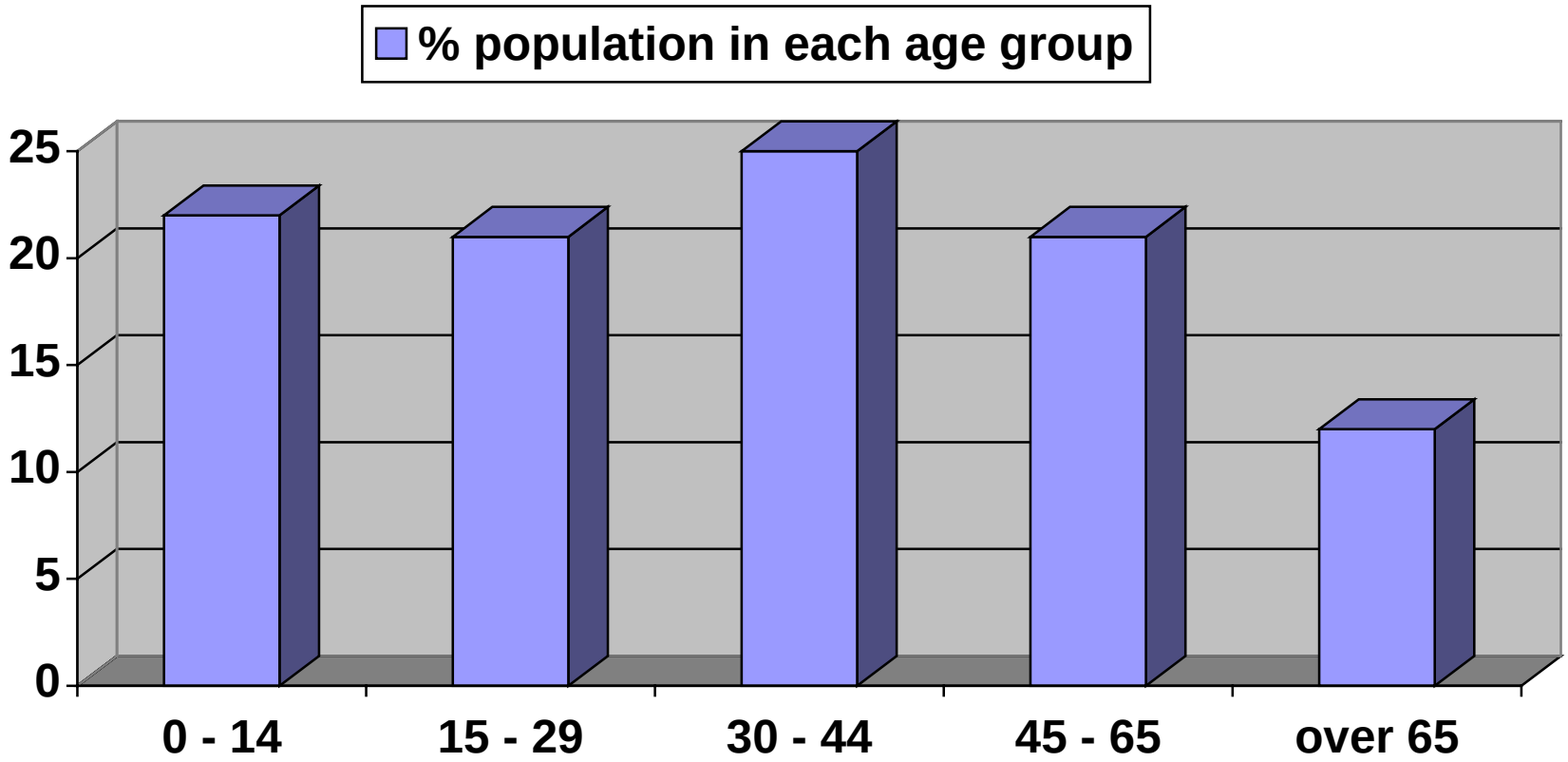



**Figure 3. Distribution of the population by age group In Milton Keynes.**

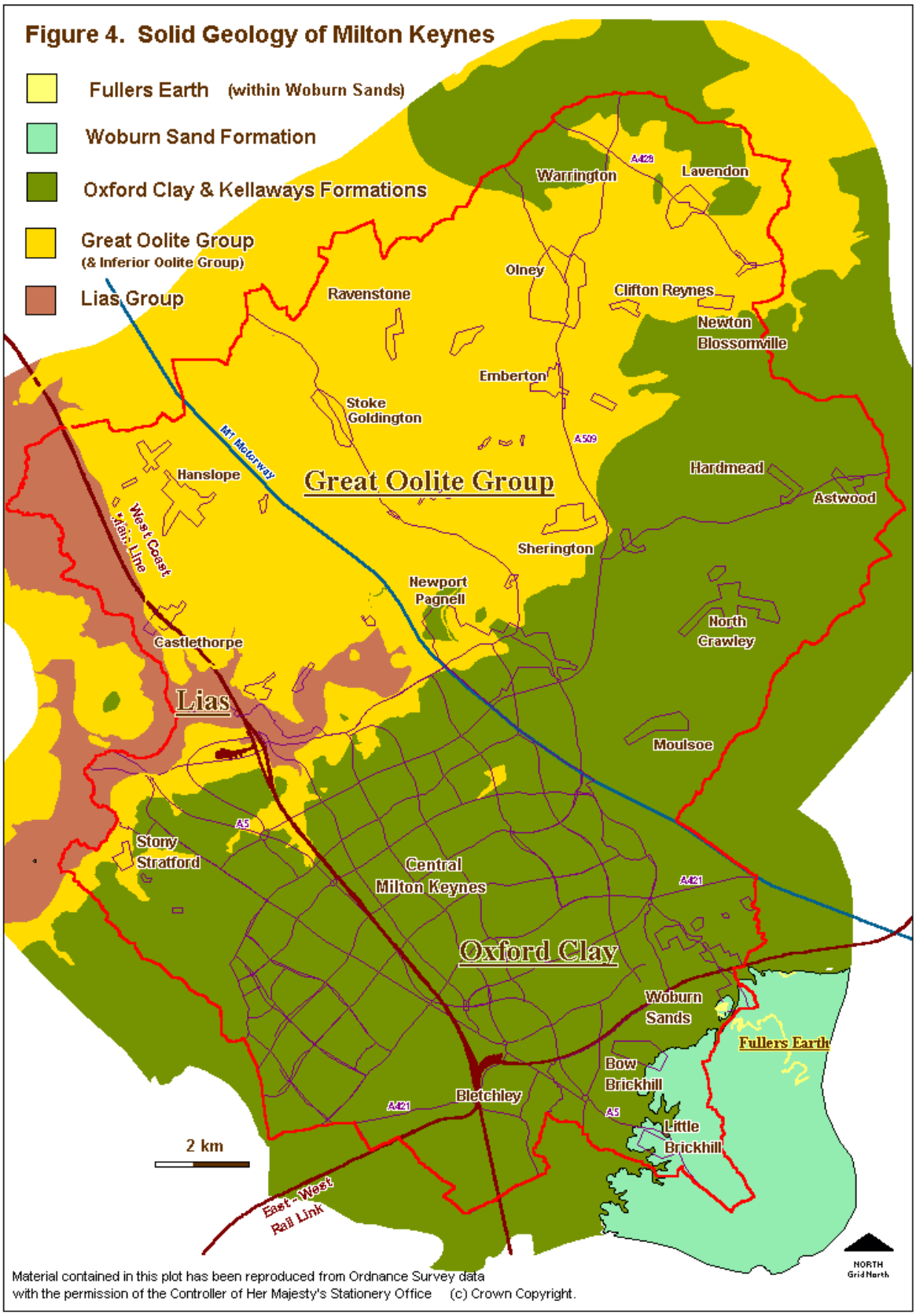


Figure 4. Solid Geology of Milton Keynes
Fullers Earth (within Woburn Sands)
Woburn Sand Formation
Oxford Clay & Kellaways Formations
Great Oolite Group
(& Inferior Oolite Group)
Lias Group
Warrington
A428
Lavendon
Olney
Ravenstone
Clifton Reynes
Newton
Blossomville
Emberton
Stoke
Goldington
M1 Motorway
A509
Hanslope
Great Oolite Group
Hardmead
Astwood
West Coast
Main Line
Sherington
Newport
Pagnell
North
Crawley
Castlethorpe
Lias
Moulsoe
A5
Stony
Stratford
Central
Milton Keynes
A421
Oxford Clay
Woburn
Sands
Fullers Earth
Bow
Brickhill
Bletchley
A421
A5
Little
Brickhill
2 km
East - West
Rail Link
NORTH
Grid North
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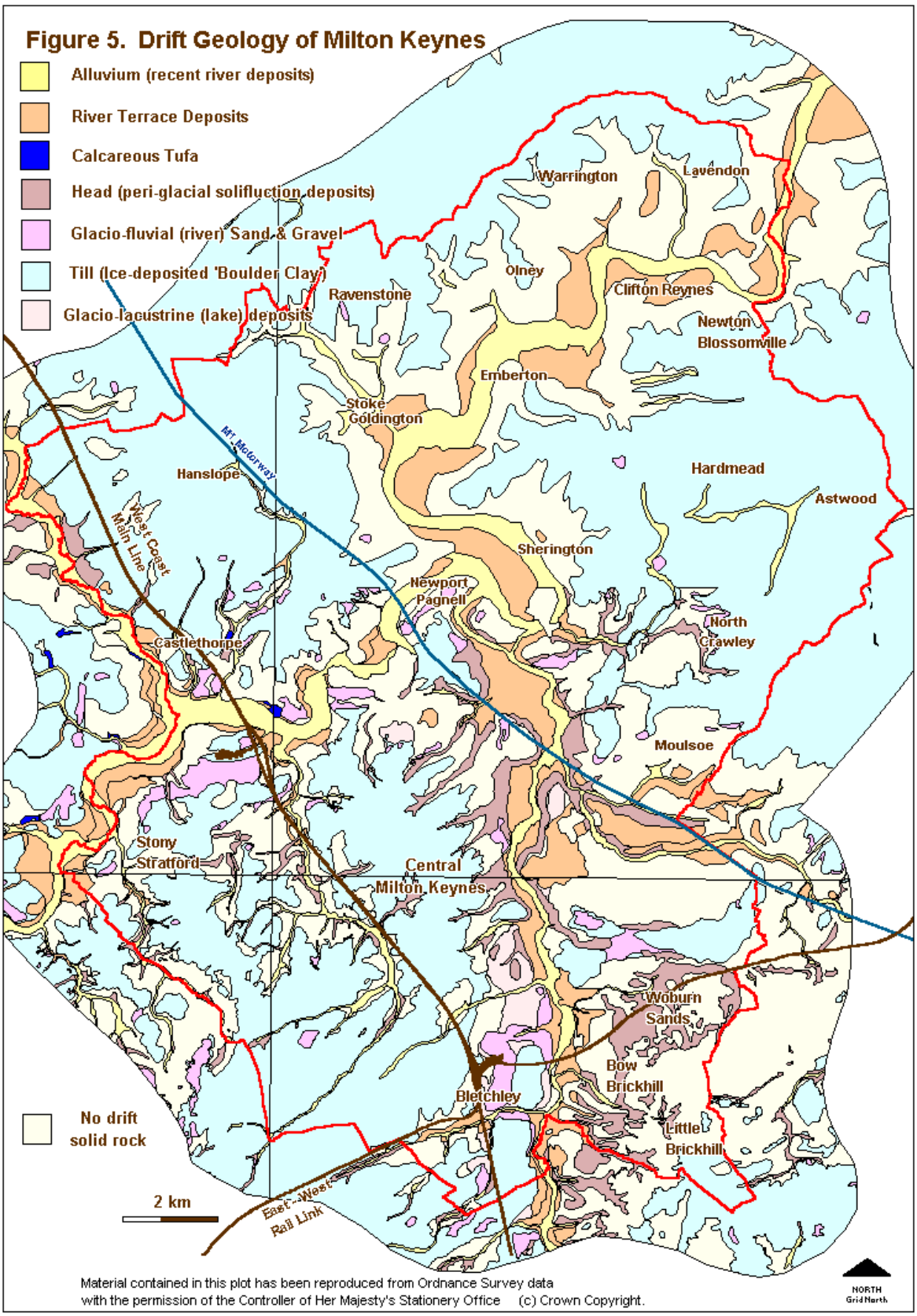
Figure 5. Drift Geology of Milton Keynes
Alluvium (recent river deposits)
River Terrace Deposits
Calcareous Tufa
Head (peri-glacial solifluction deposits)
Glacio-fluvial (river) Sand & Gravel
Till (Ice-deposited 'Boulder Clay')
Glacio-lacustrine (lake) deposits
No drift solid rock
Warrington
Lavendon
Olney
Ravenstone
Clifton Reynes
Newton Blossomville
Emberton
Stoke Goldington
M1 Motorway
Hanslope
West Coast Main Line
Hardmead
Astwood
Sherington
Newport Pagnell
North Crawley
Castlethorpe
Moulsoe
Stony Stratford
Central Milton Keynes
Woburn Sands
Bow Brickhill
Bletchley
Little Brickhill
East - West Rail Link
2 km
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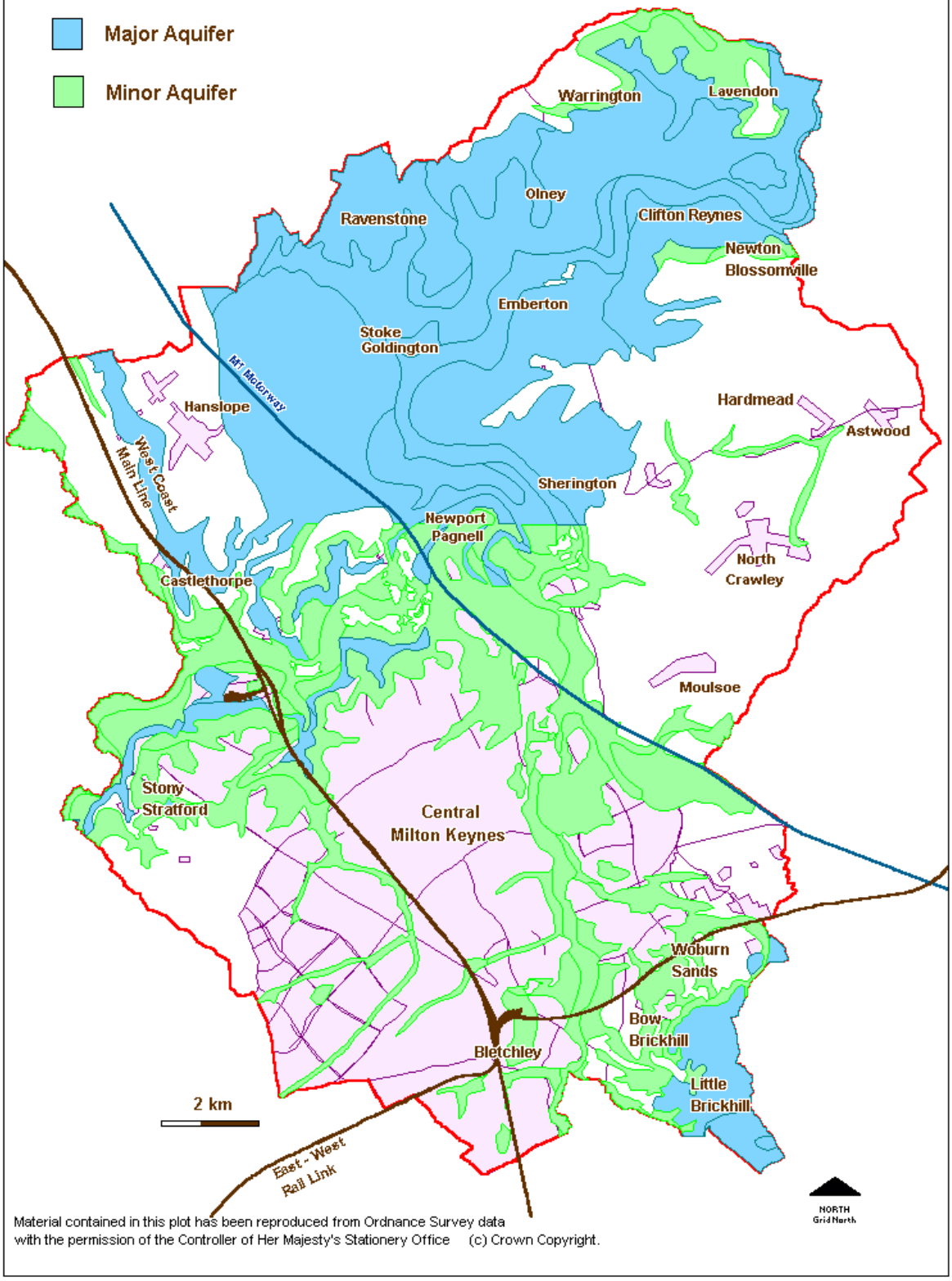
NORTH
Grid North

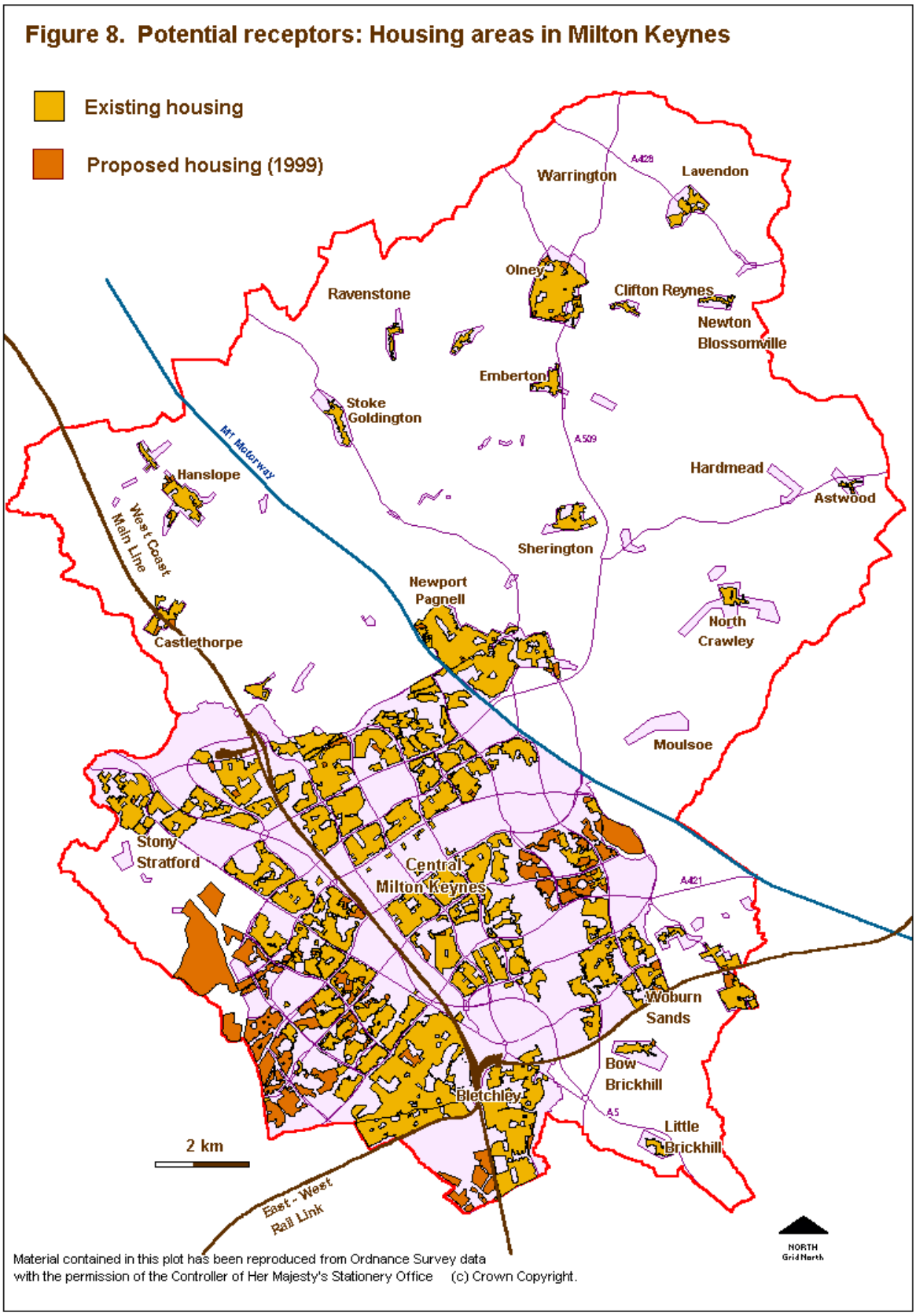
## Figure 6. Simplified Stratigraphy of the Solid Geology of Milton Keynes

| | | Formation Name | Obsolete Name | Lithology | Key on Figure 4 |
|---|---|---|---|---|---|
| *LOWER CRETACEOUS* | GREENSAND GROUP | Woburn Sands Formation | Woburn Sands | Sand, sandstone, locally Fuller's Earth | |
| | | ~~~~~~~~~~~~~~~~~~~~Unconformity~~~~~~~~~~~~~~ | | | |
| *MIDDLE JURASSIC* | ANCHOLME GROUP | Oxford Clay Formation<br>Kellaways Formation | Oxford Clay<br>Kellaways Beds | Mudstones<br>Sands & Clay | |
| | GREAT OOLITE GROUP | Cornbrash Formation<br>Blisworth Clay Formation<br>White Limestone Formation<br>Rutland Formation | Cornbrash<br>Blisworth Clay<br>Blisworth Limestone<br>Upper Estuarine Series | Limestone<br>Mudstone & thin Limestones<br>Limestone with thin Marls<br>Mudstone & Limestone | |
| | | ~~~~~~~~~~~~~~~~~~~~Unconformity~~~~~~~~~~~~~~ | | | |
| | INFERIOR OOLITE GROUP | Grantham Formation | Lower Estuarine Series & Sandstone | Mudstone, Siltstone | |
| | | ~~~~~~~~~~~~~~~~~~~~Erosional boundary~~~~~~~~~~ | | | |
| *LOWER JURASSIC* | LIAS GROUP | Whitby Mudstone Formation<br>Marlstone Rock Formation | Upper Lias<br>Middle Lias | Mudstone & Siltstone<br>Limestone, Ironstone & Sandstone | |

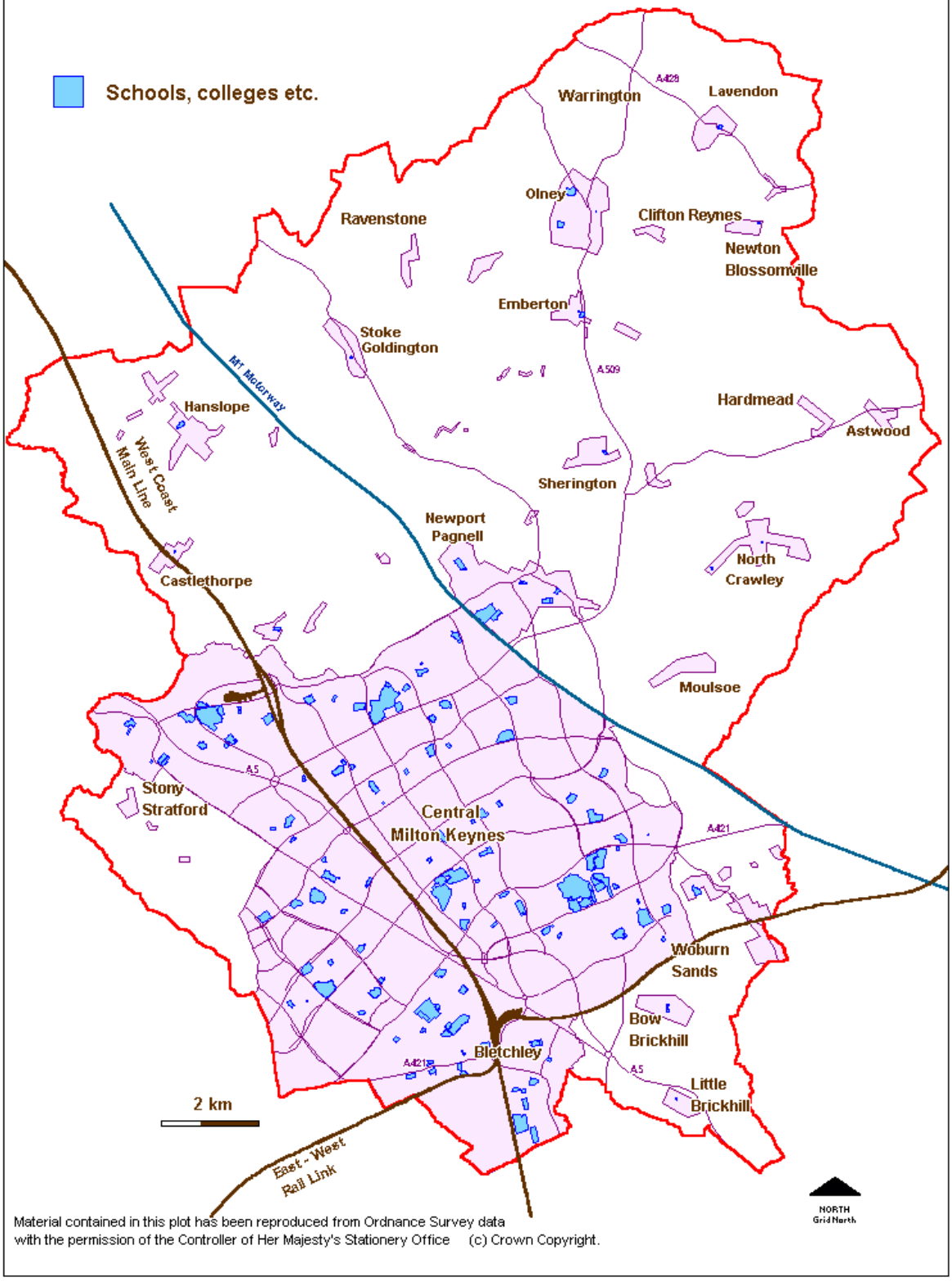
## Figure 7. Distribution of Aquifers



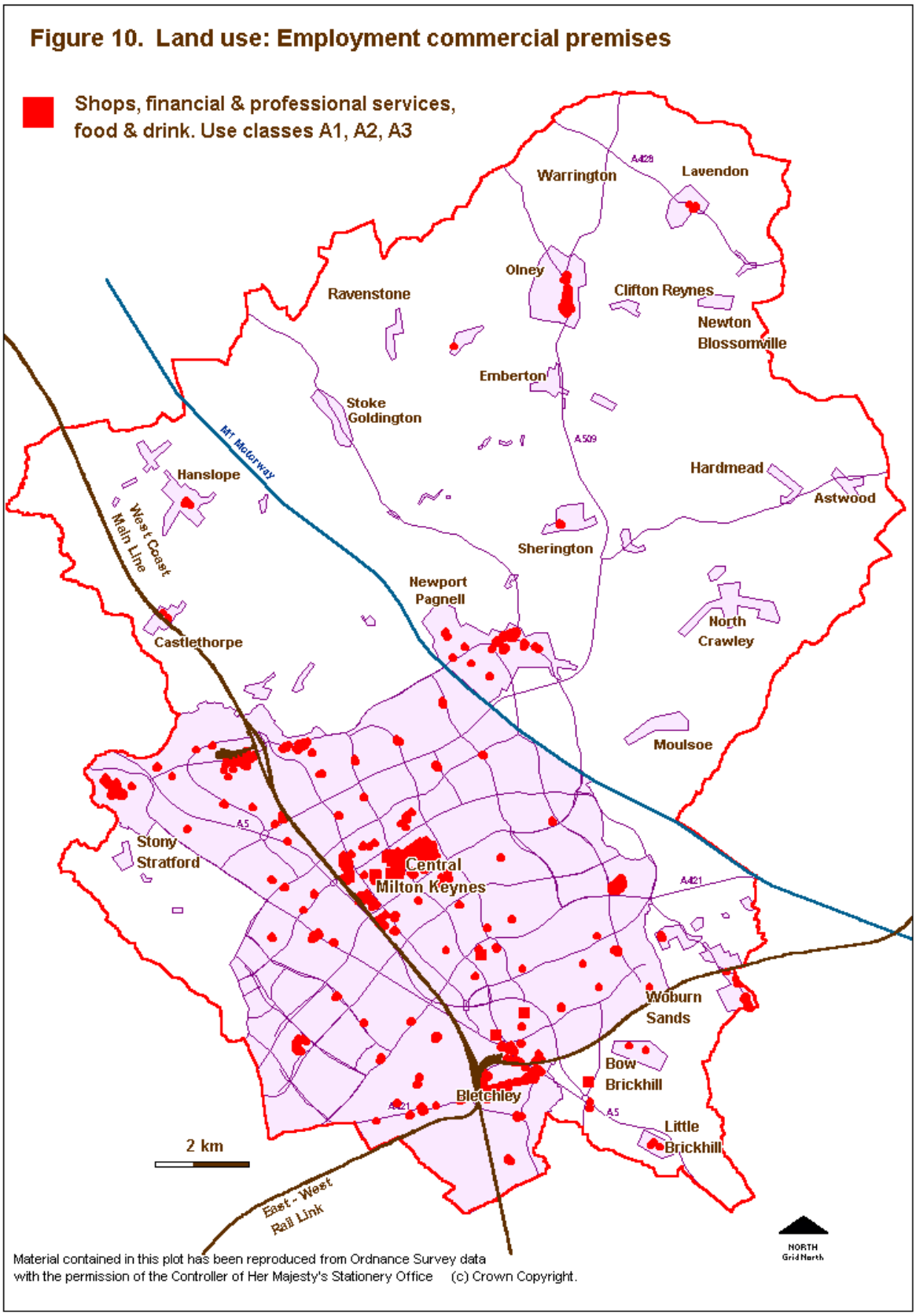
## Figure 8. Potential receptors: Housing areas in Milton Keynes



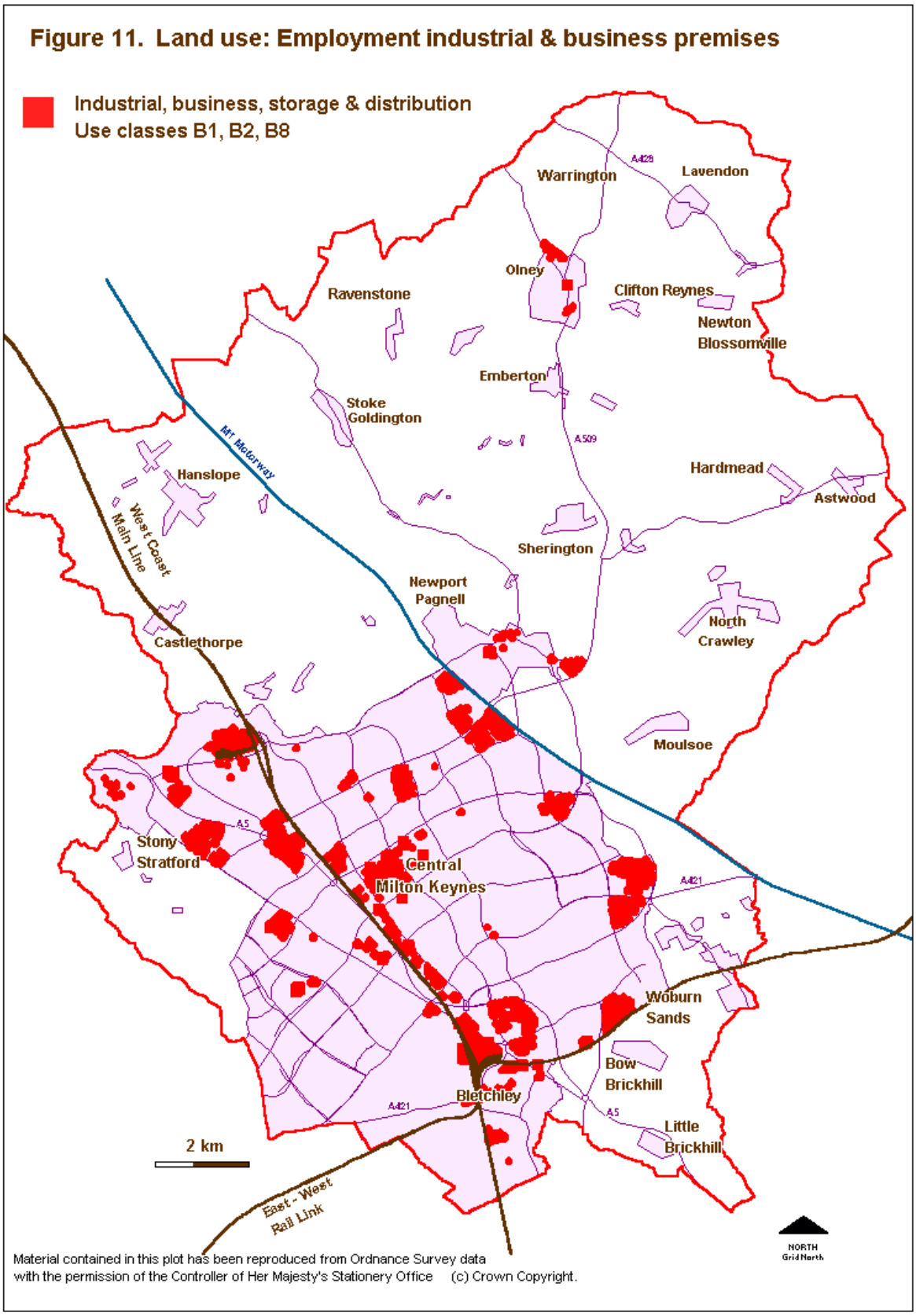
## Figure 9. Potential receptors: Educational facilities in Milton Keynes



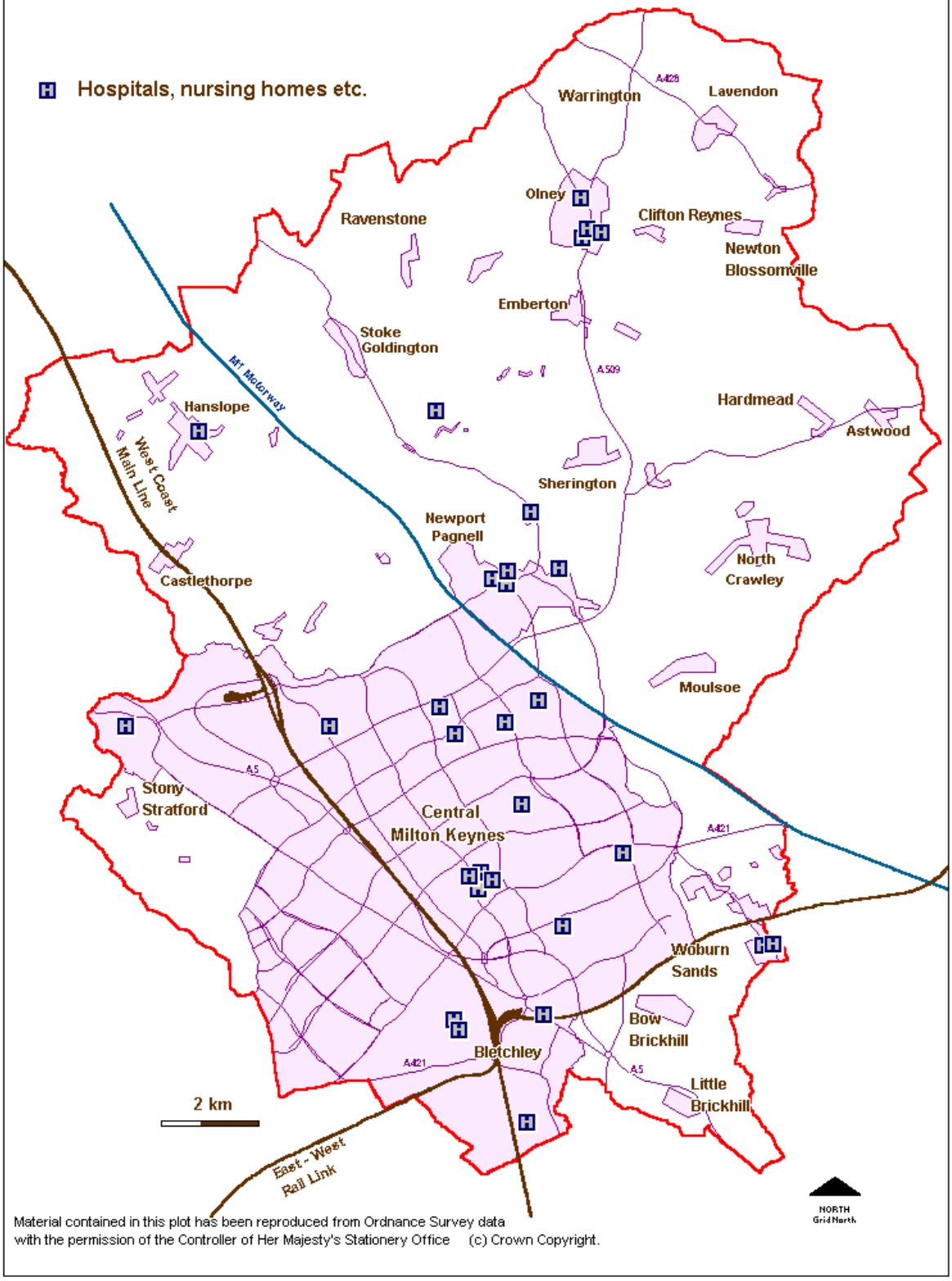
## Figure 10. Land use: Employment commercial premises



## Figure 11. Land use: Employment industrial & business premises



## Figure 12. Potential receptors: Residential health facilities



## Figure 13. Potential receptors: Public open & recreational spaces

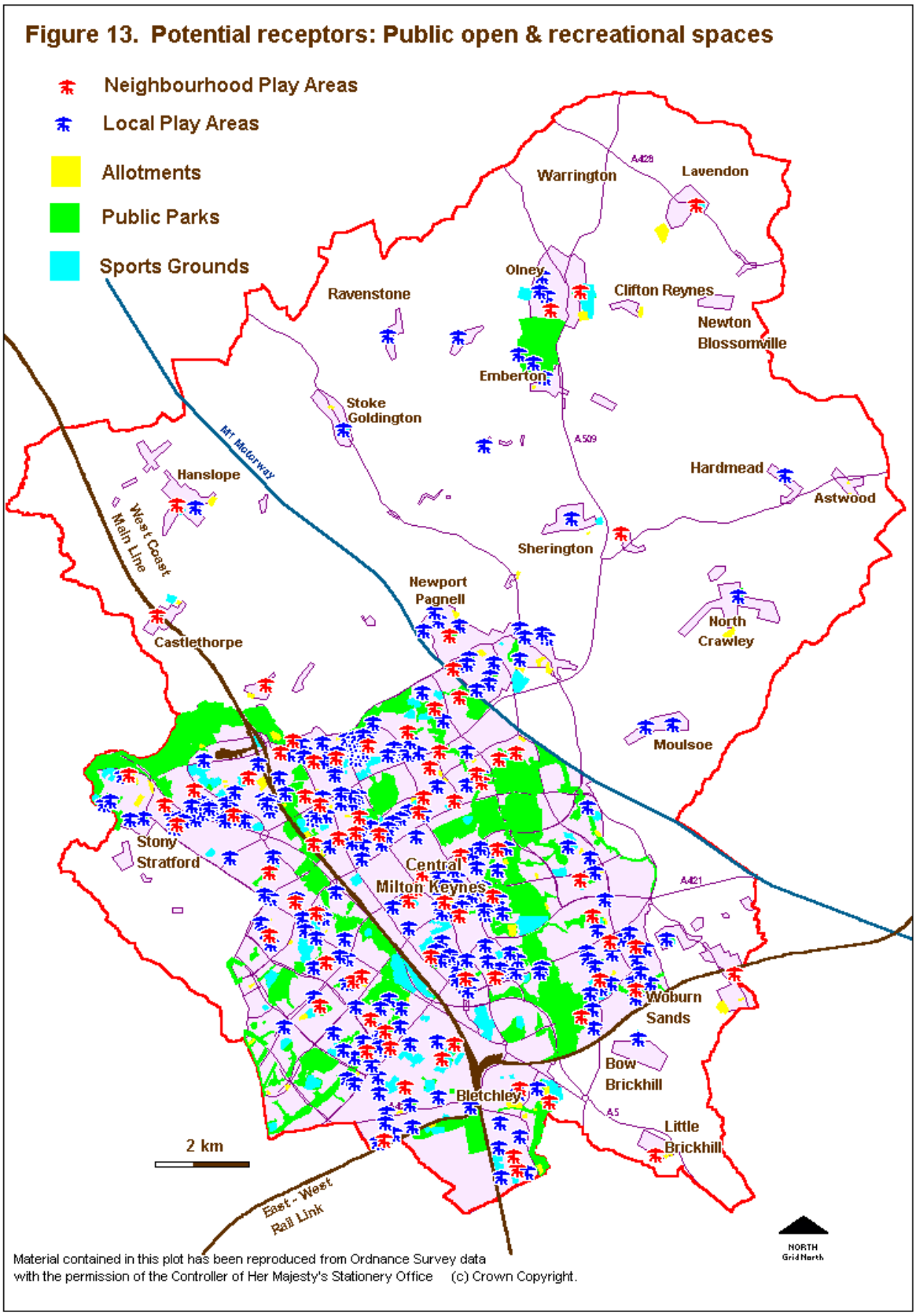
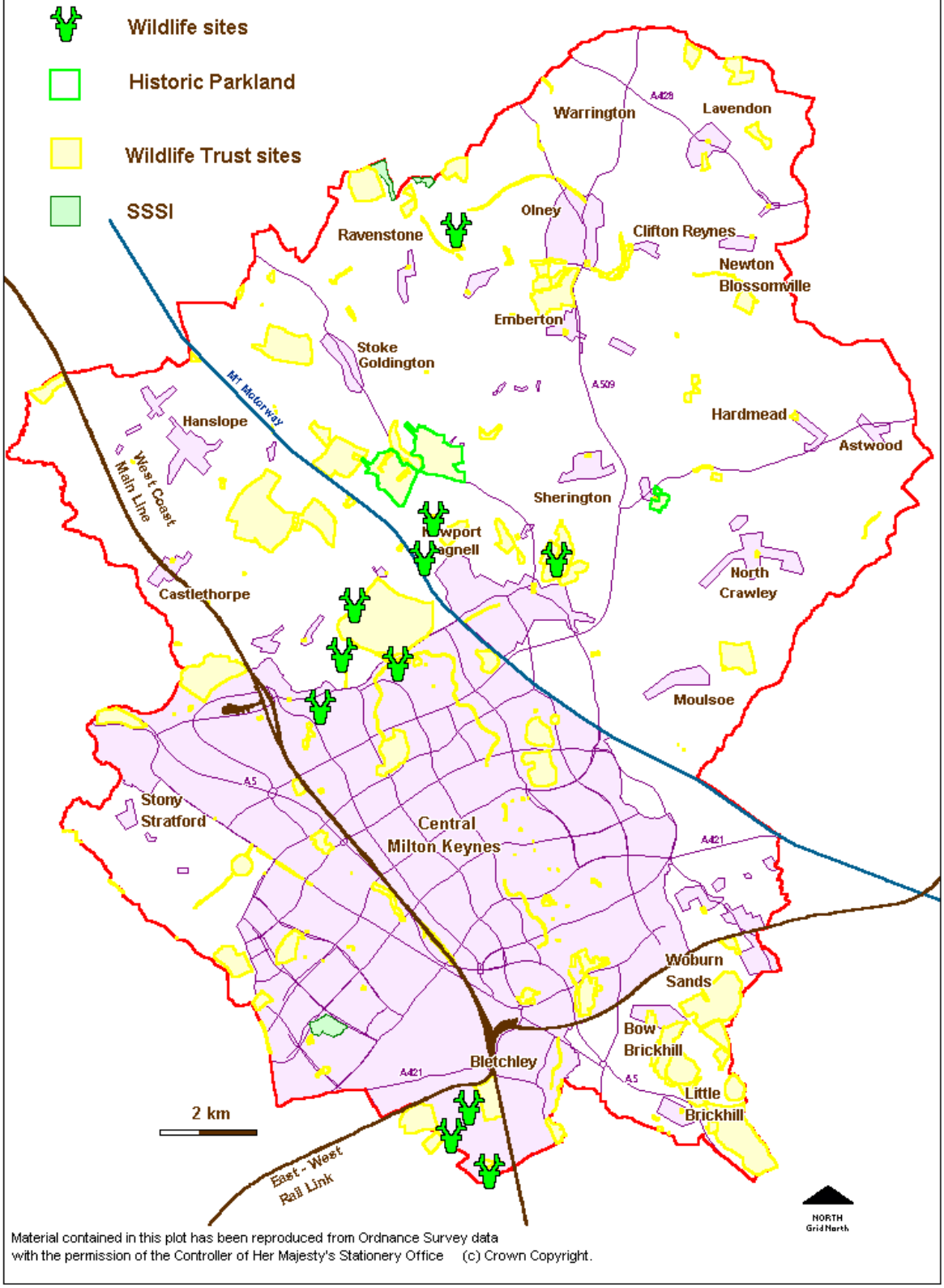


Figure 14. Potential receptors: Sites of Special Scientific Interest (SSSI), Natural History & Wildlife Sites



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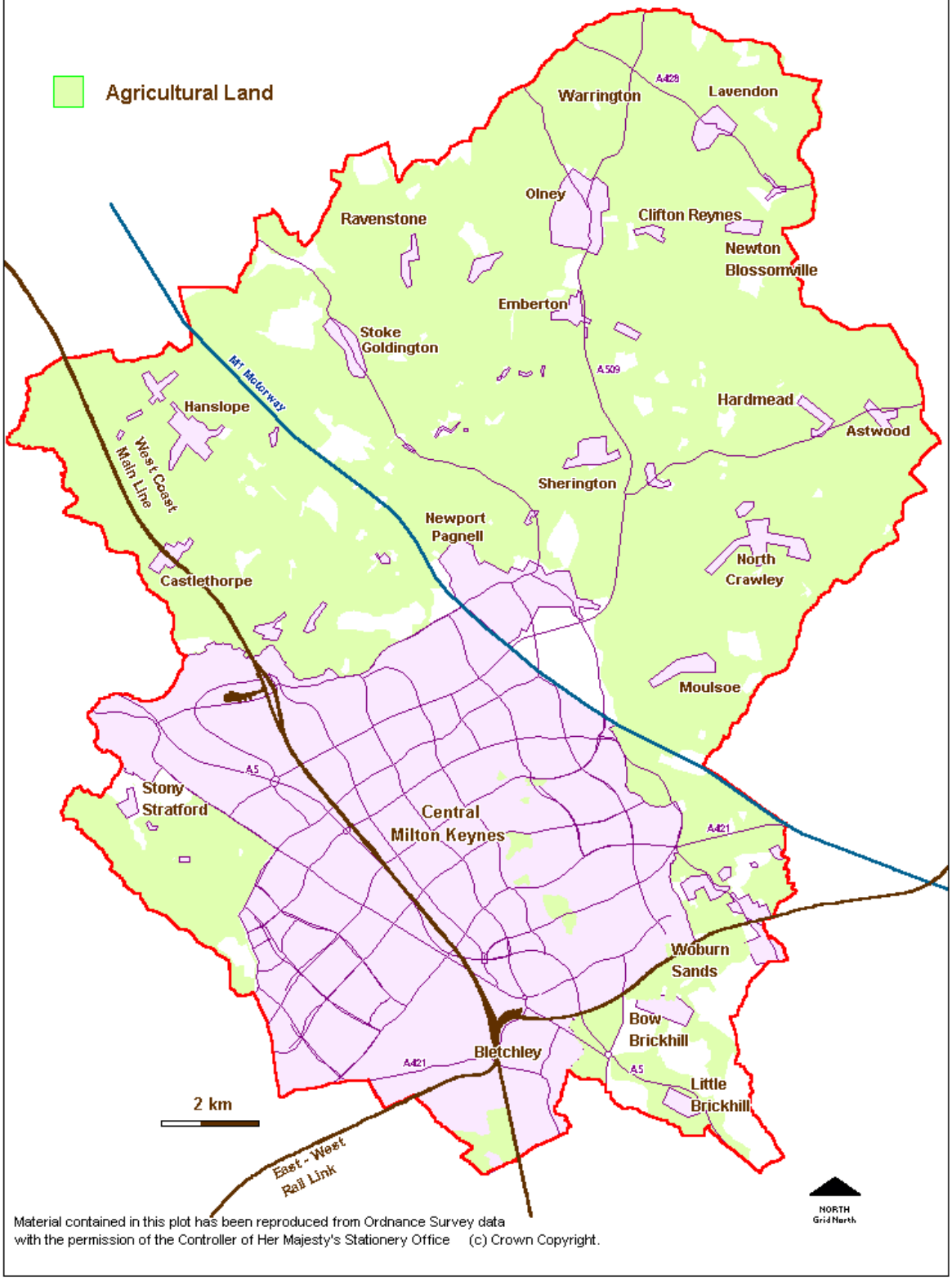

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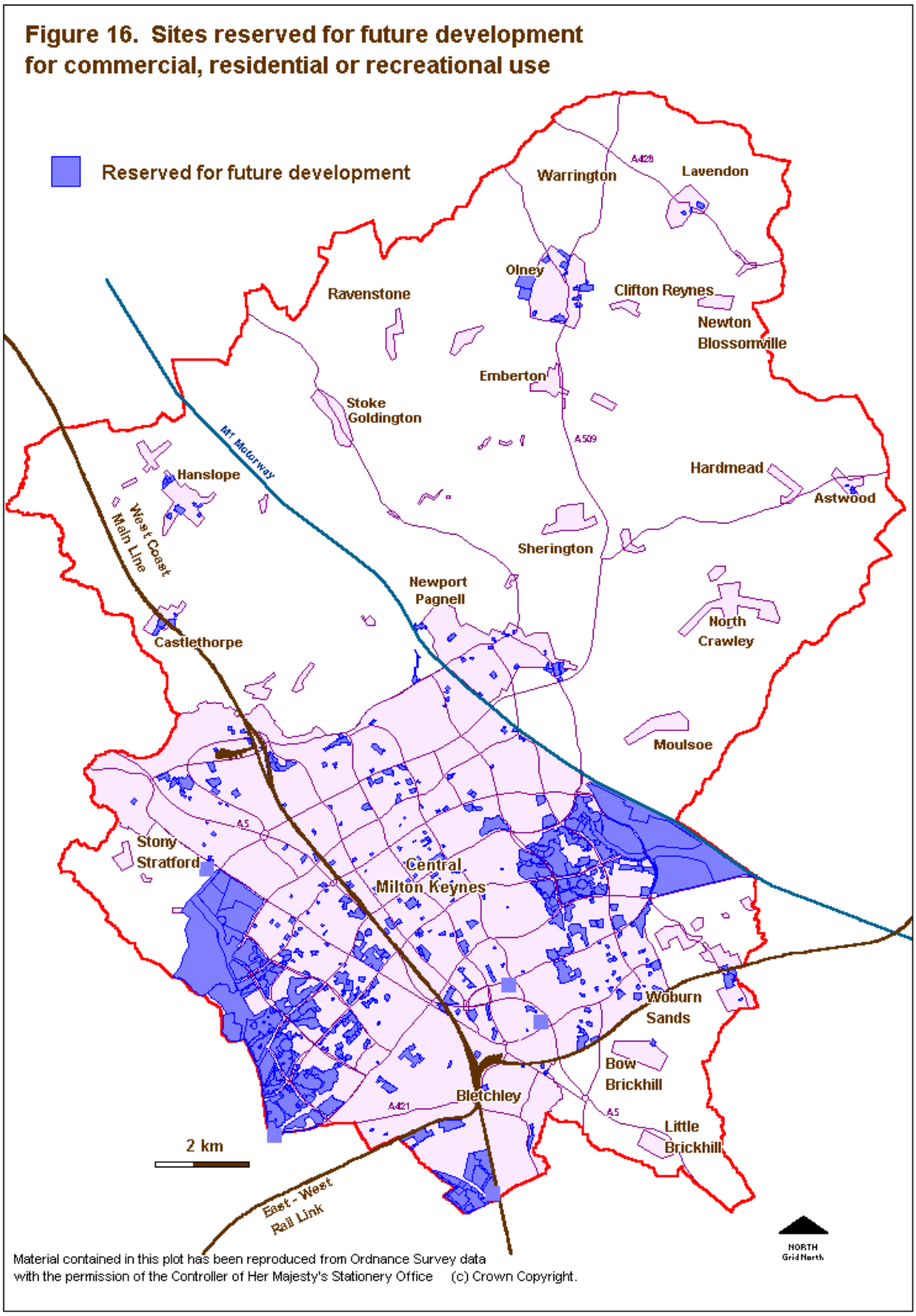
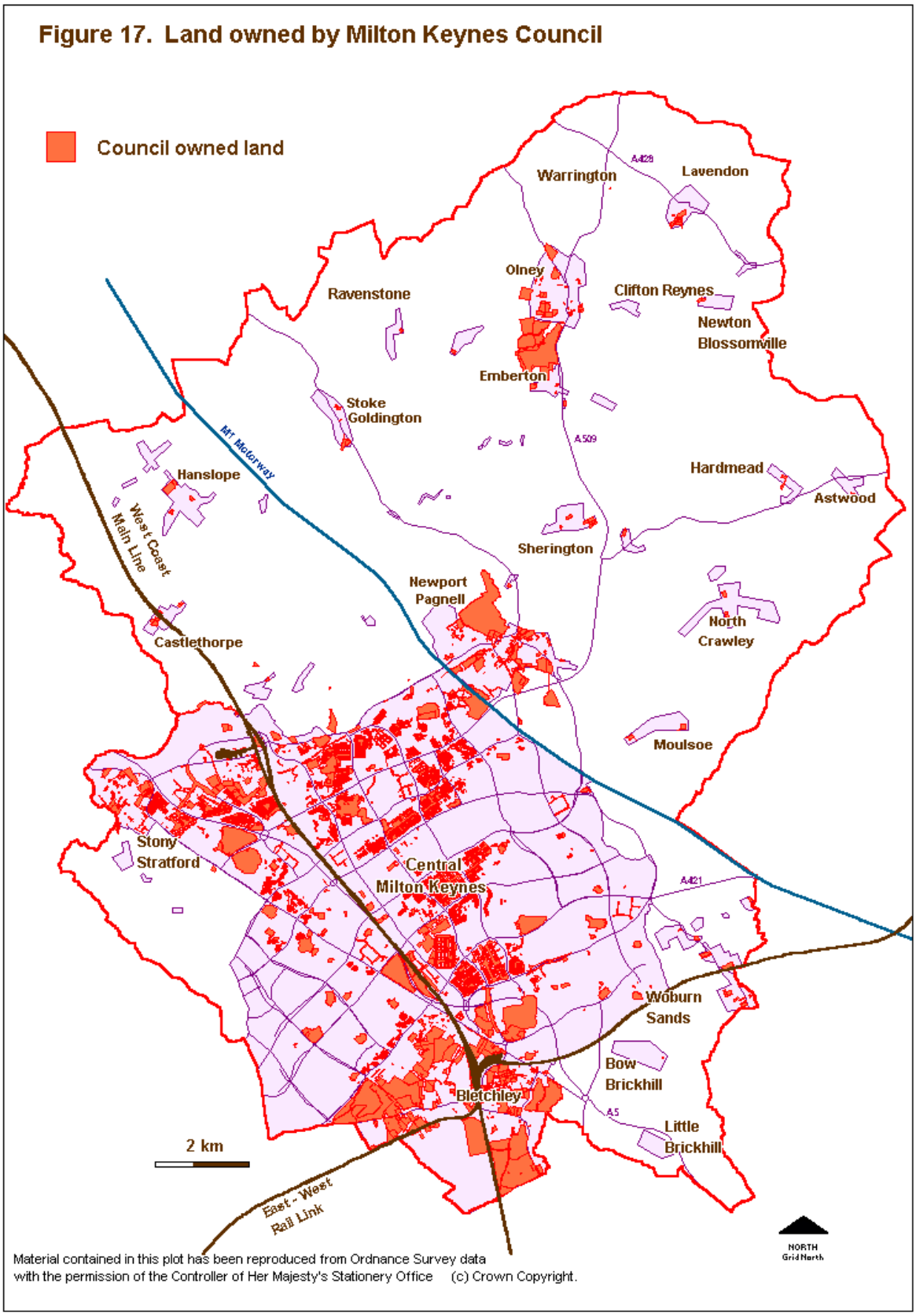


## Figure 17. Land owned by Milton Keynes Council



## Figure 18. Land owned by English Partnerships in Milton Keynes

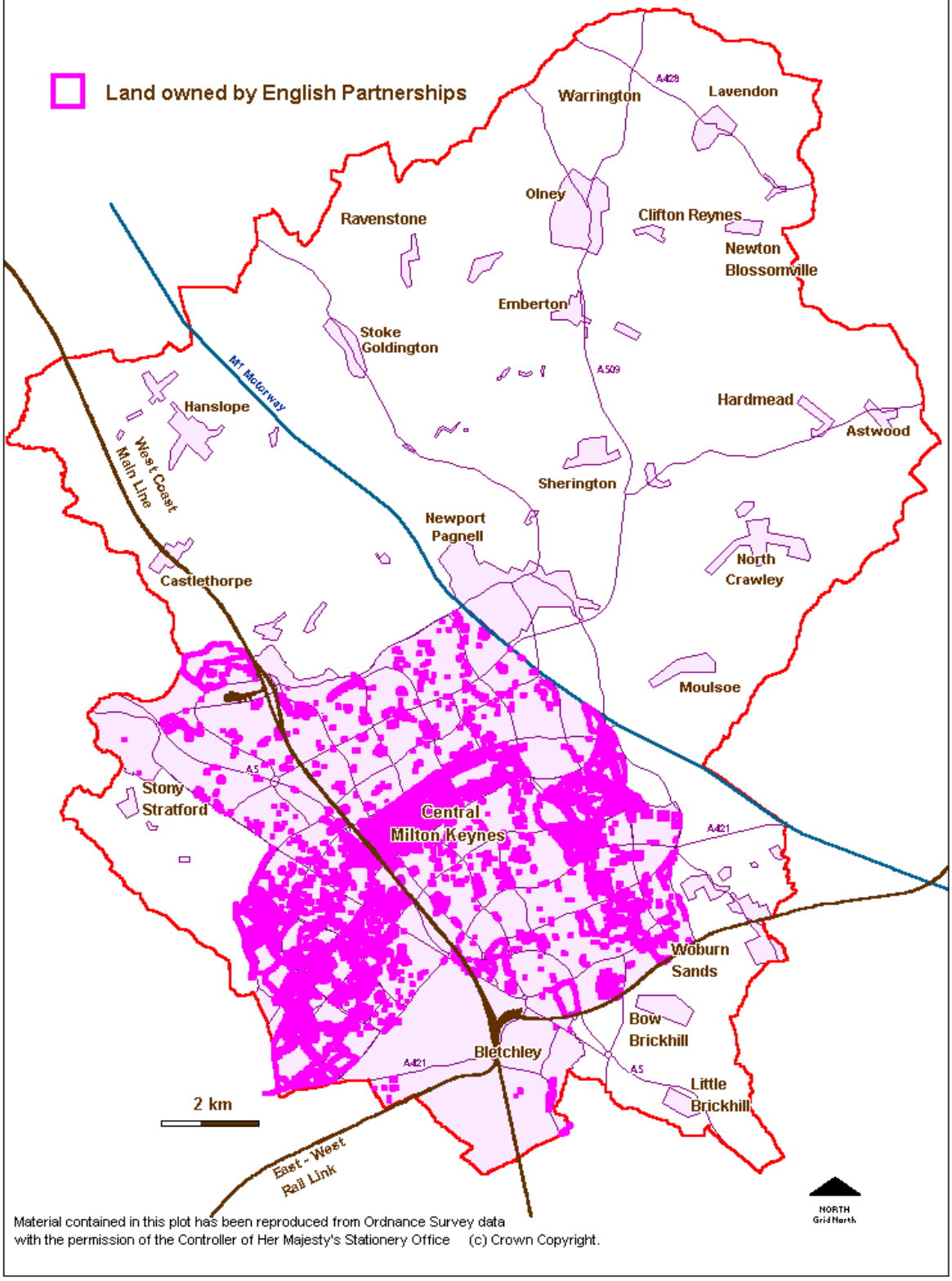
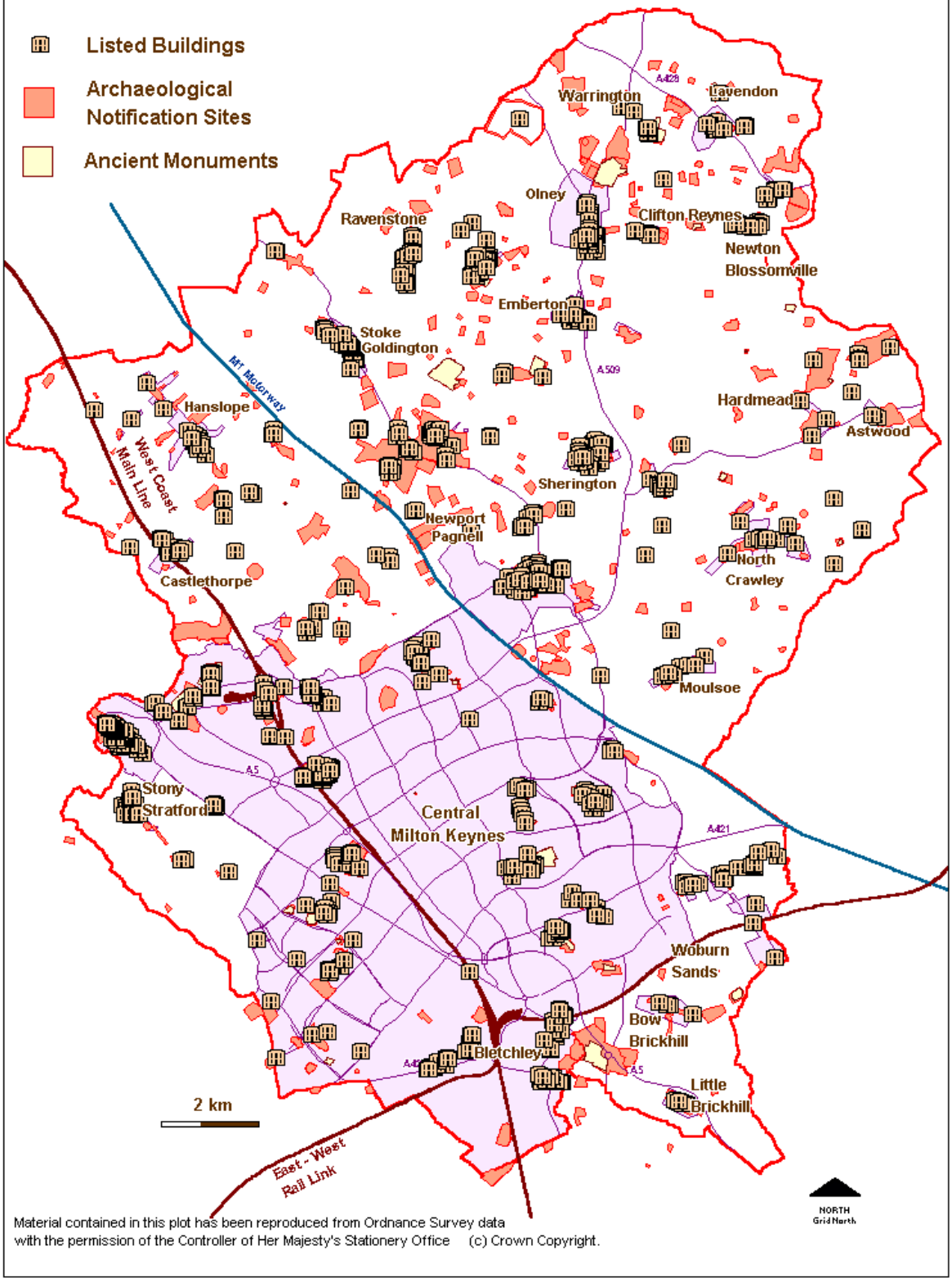


**Figure 19. Potential receptors: Ancient Monuments, Archaeological Sites and Listed Buildings**



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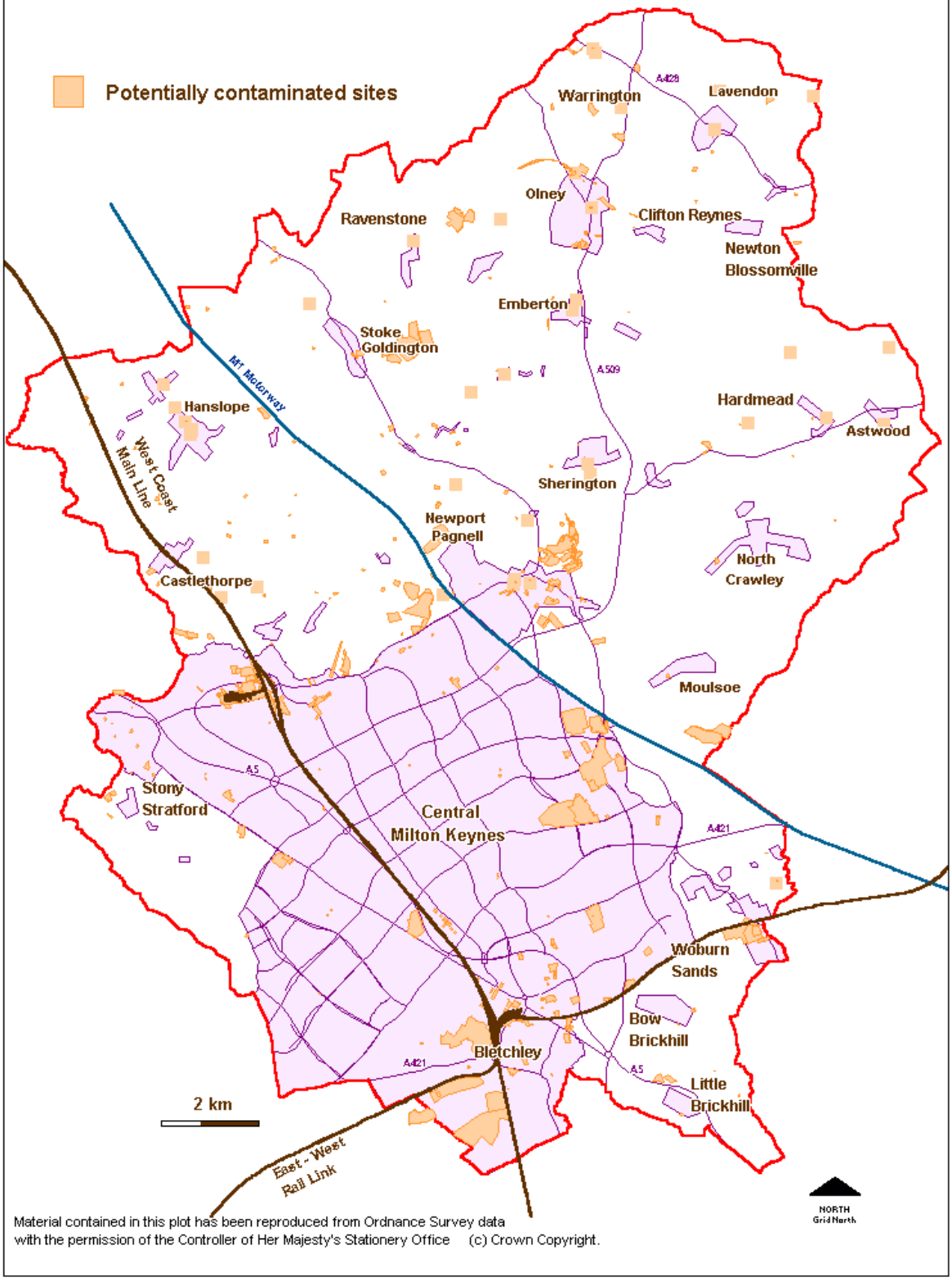
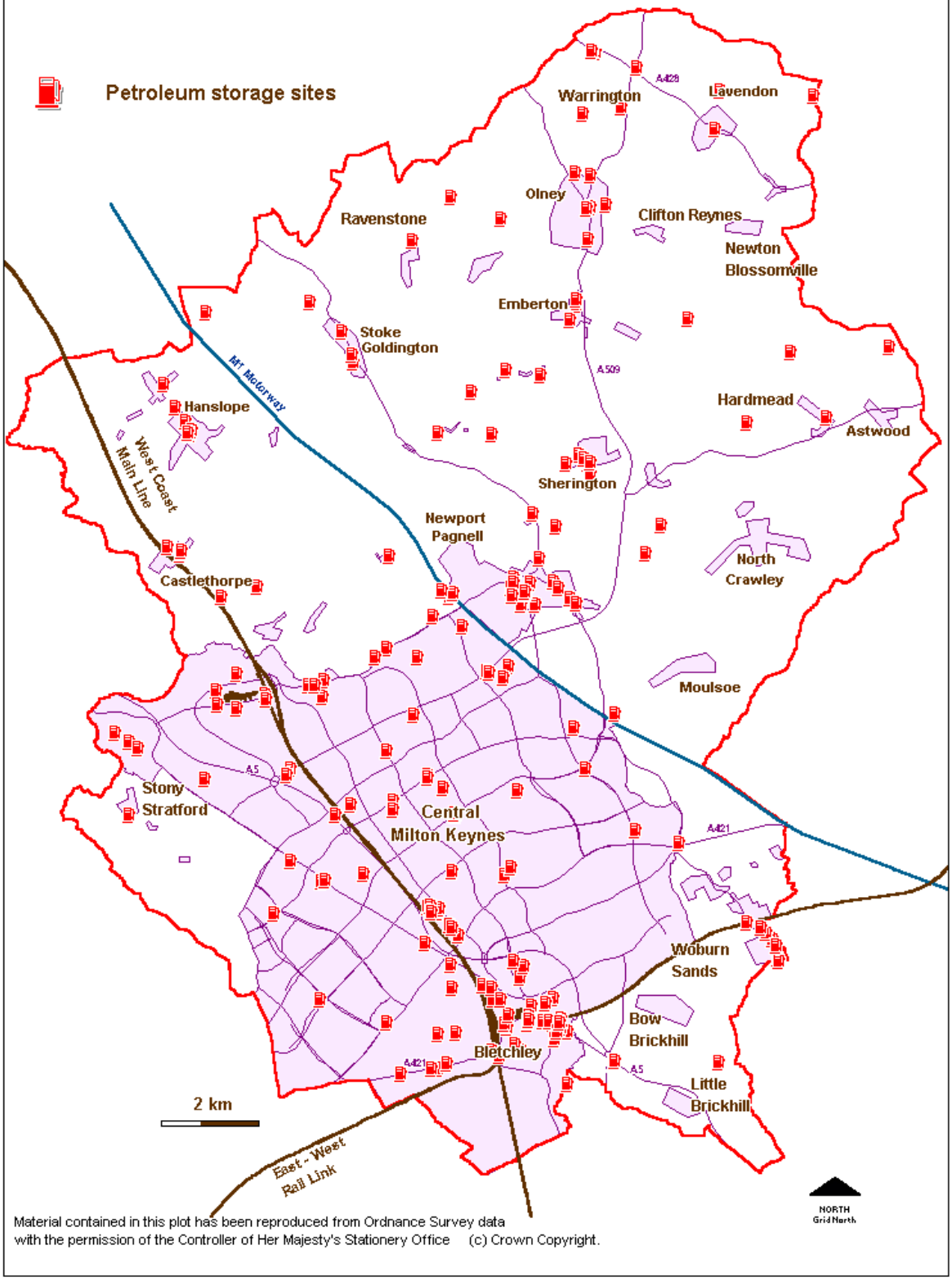


## Figure 21. Potential sources: Storage of petroleum products



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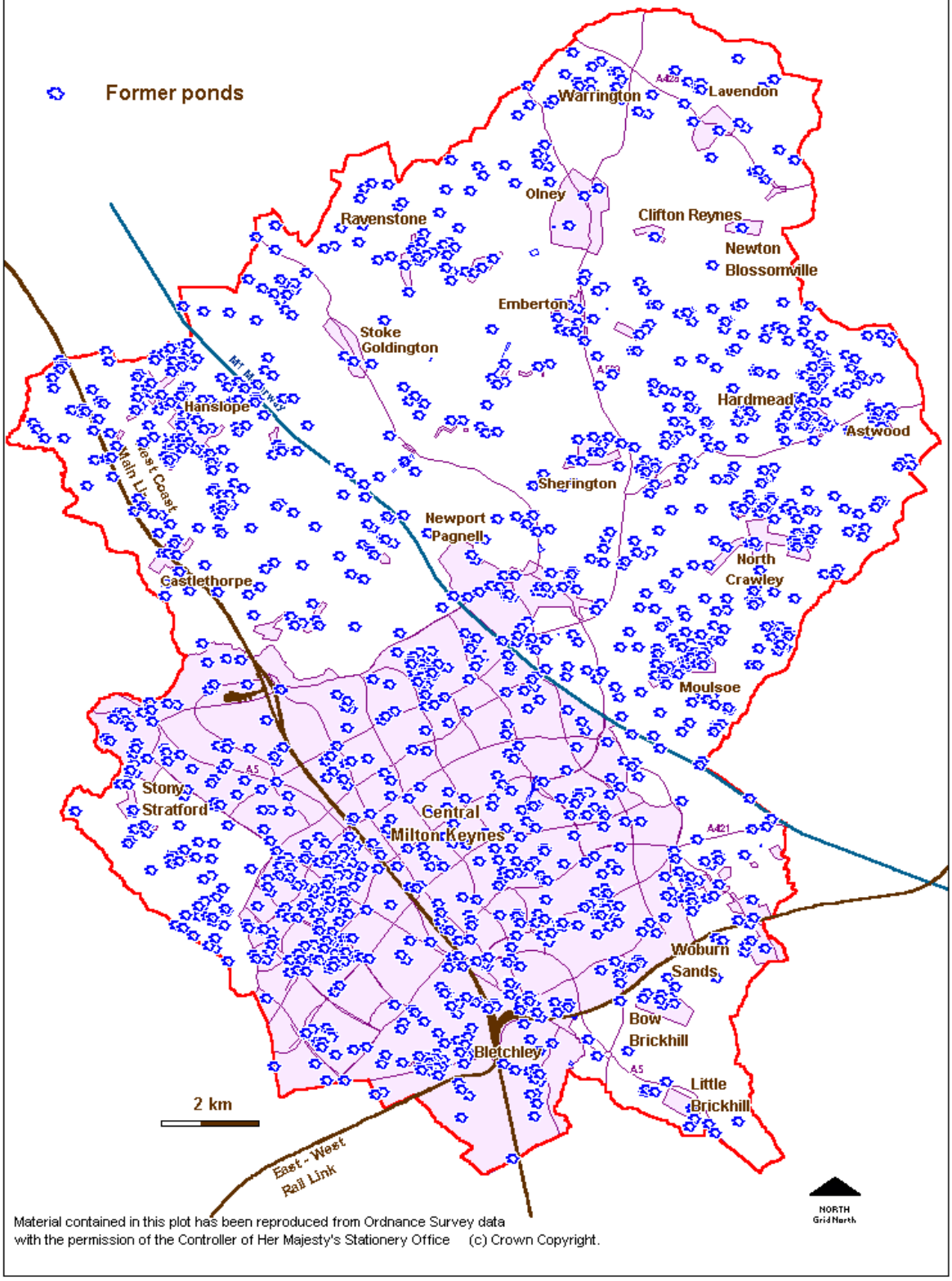
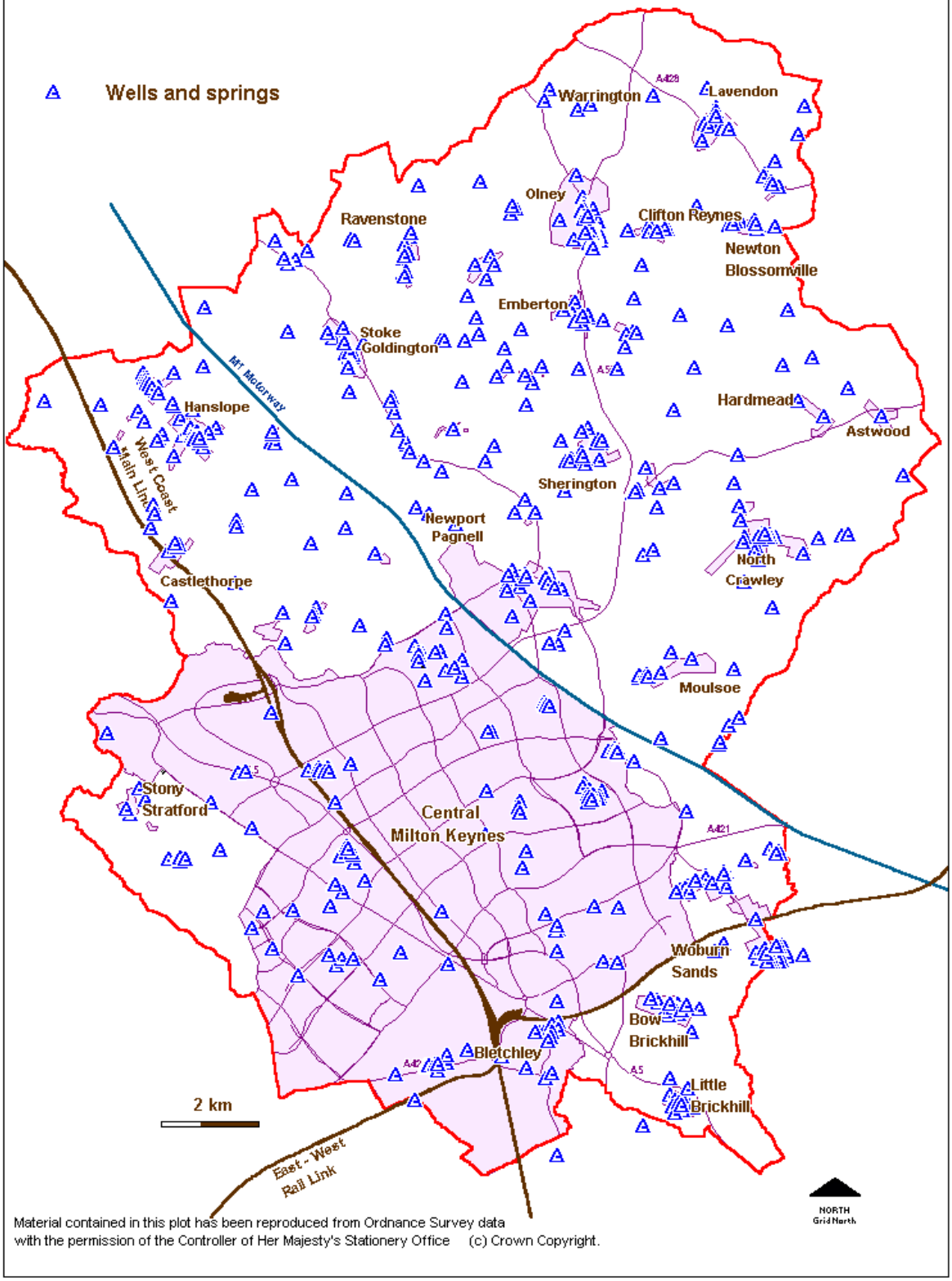


## Figure 23. Potential pathways and receptors: Wells and springs



## Figure 24. Potential sources: Landfill sites

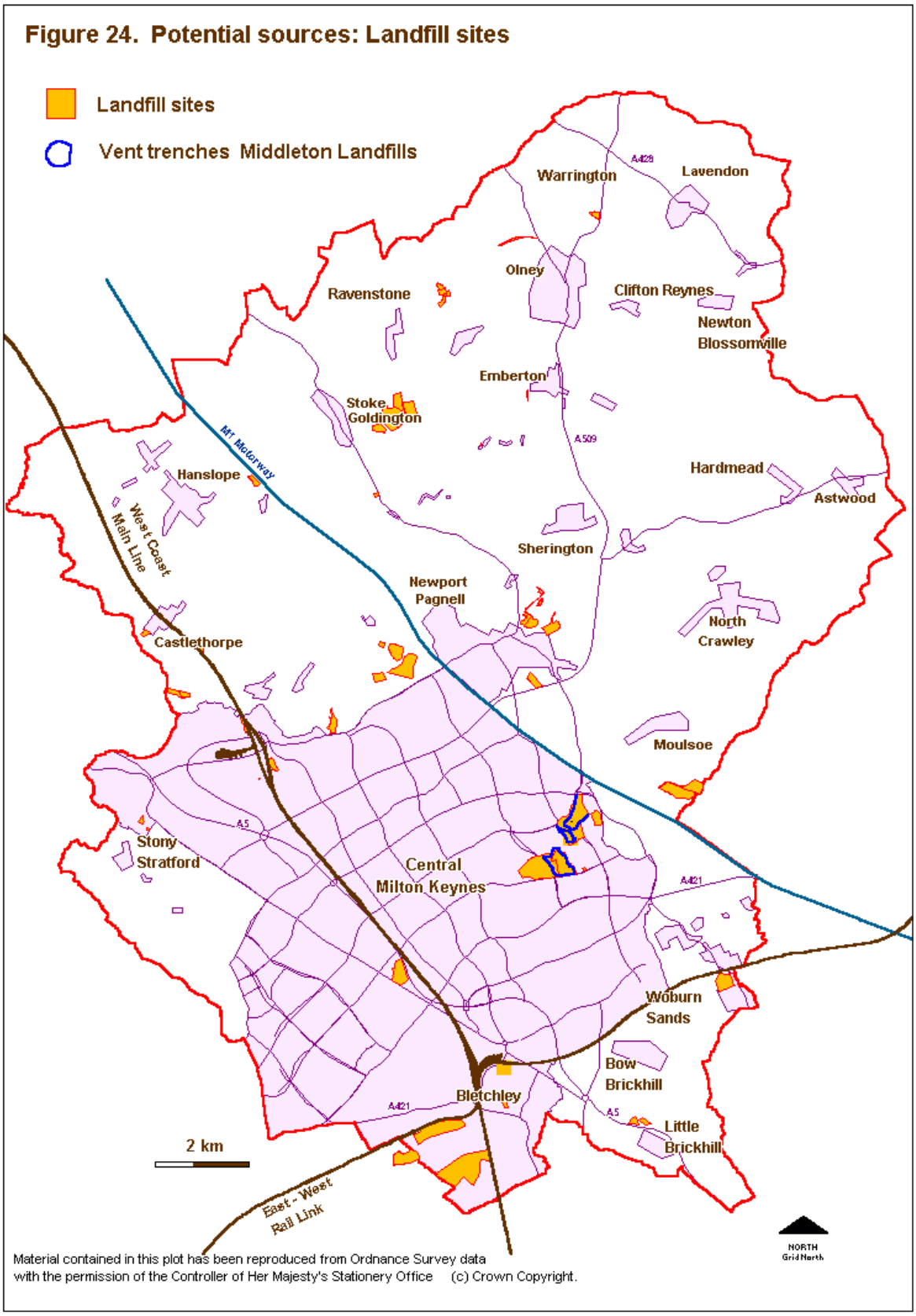
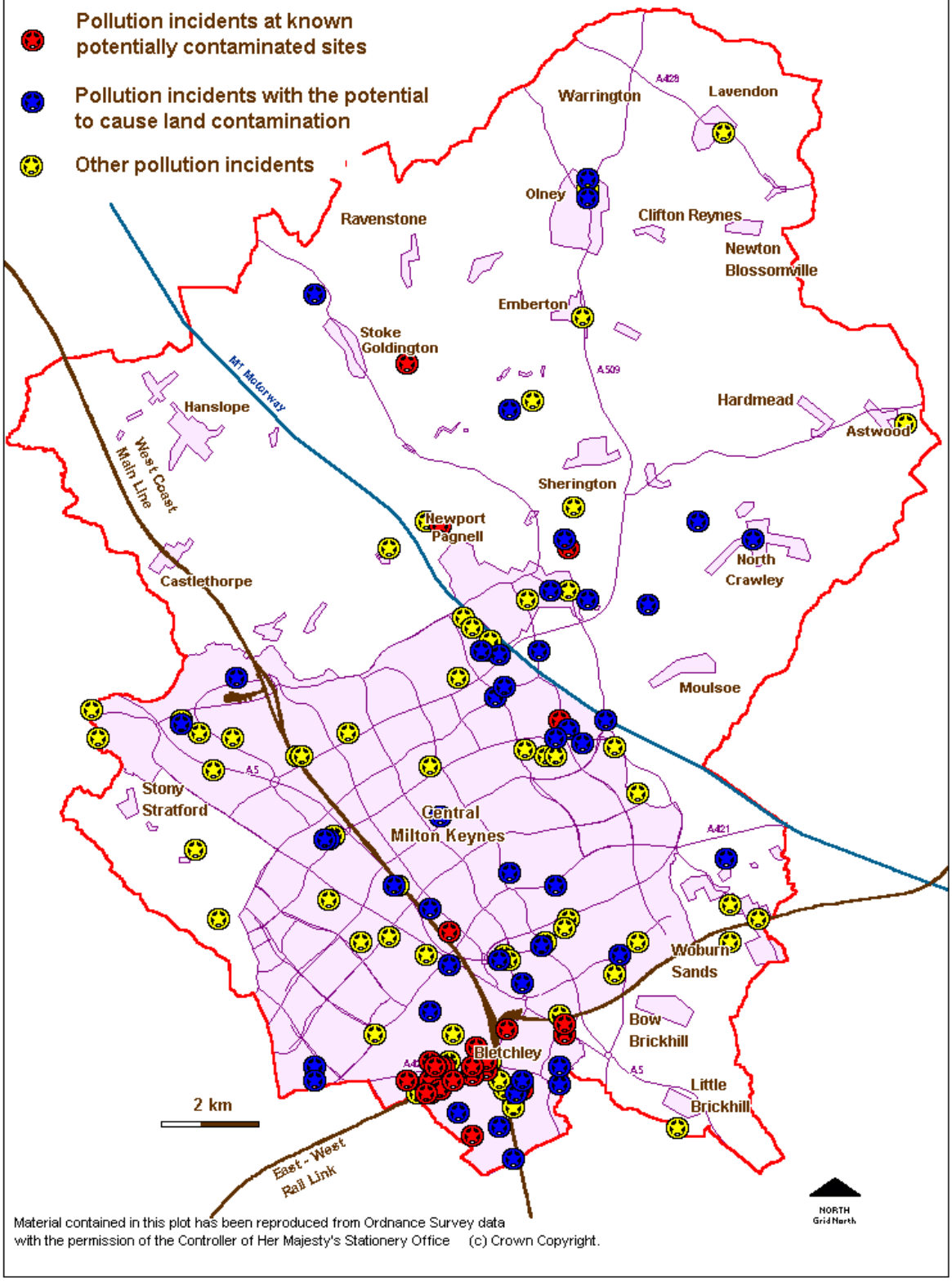


**Figure 25. Potential sources: Correlation of pollution incidents reported by the Environment Agency with known areas of potentially contaminated land**



# Appendix 1. Definition of Special Sites

The Contaminated Land (England) Regulations 20000 define land required to be designated as a special site as follows (quote):

Land required to be designated as a special site

**2.** -(1) Contaminated land of the following descriptions is prescribed for the purposes of section 78C(8) [of the Environmental Protection Act 1990] as land required to be designated as a special site:-

a) land to which regulation 3 applies;

b) land which is contaminated land by reason of waste acid tars in, on or under the land;

c) land on which any of the following activities have been carried out at any time-

i) The purification (including refining) of crude petroleum or of oil extracted from petroleum, shale or any other bituminous substance except coal; or
ii) The manufacture or processing of explosives;

d) land on which a prescribed process designated for central control has been or is being carried on under an authorisation where the process does not comprise solely things which are being done which are required by way of remediation;

e) land within a nuclear site;

f) land owned or occupied on behalf of –

i) the Secretary of State for Defence;
ii) the Defence Council;
iii) an international headquarters or defence organisation; or
iv) the service authority of a visiting force, being land used for naval, military or air force purposes;

g) land on which the manufacture, production or disposal of –

i) chemical weapons;
ii) any biological agent or toxin which falls within section 1(1)(a) of the Biological Weapons Act 1974 (restriction on development of biological agents and toxins); or
iii) any weapon, equipment or means of delivery which falls within section 1(1)(b) of that act (restriction on development of biological weapons),

has been carries on at any time;

h) land comprising premises which are or were designated by the Secretary of State by an order made under section 1(1) of the Atomic Weapons Establishment Act 1991 (arrangements for the development etc of nuclear devices);.

i) land to which section 30 of the Armed Forces Act 1996 (land held for the benefit of Greenwich Hospital) applies; and

j) land which-

i) is adjoining or adjacent to land of a description specified in sub-paragraphs (b) to (i) above; and

ii) is contaminated land by virtue of substances which appear to have escaped from land of such a description.

**Pollution of controlled waters**

**3.** For the purposes of regulation 2(1)(a), this regulation applies to land where-

a) controlled waters which are, or intended to be, used for the supply of drinking water for human consumption are being affected by the land and, as a result, require a treatment process or a change in such a process to be applied to those waters before use, so as to be regarded as wholesome within the meaning of Part III of the Water Industry Act 1991 (water supply);

b) controlled waters are being affected by the land and, as a result, those waters do not meet or are not likely to meet the criterion for classification applying to the relevant description of waters specified in regulations made under section 82 of the Water Resources Act 1991 (classification of quality of waters); or

c) controlled waters are being affected by the land and-

i) any of the substances by reason of which the pollution of the waters is being or is likely to be caused falls within any of the families or groups of substances listed in paragraph 1 of Schedule 1 to these Regulations [see below]; and

ii) the waters, or any part of the waters, are contained within underground strata which compromise wholly or partly any of the formation of rocks listed in paragraph 2 of Schedule 1 to these regulations [see below].

SCHEDULE 1

**SPECIAL SITES**

1. The following families and groups of substances are listed for the purposes of regulation 3(c)(i) –

organohalogen compounds and substances which may form such compounds in the aquatic environment;
organophosphorus compounds;
organotin compounds;
substances which possess carcinogenic, mutagenic or teratogenic properties in or via the aquatic environment;
mercury and its compounds;

cadmium and its compounds;
mineral oil and other hydrocarbons;
cyanides.

2. The following formations of rocks are listed for the purposes of regulation 3(c)(ii) –

Pleistocene Norwich Crag;
Upper Cretaceous Chalk;
Lower Cretaceous Sandstones; [Woburn Sands Formation in Milton Keynes]
Upper Jurassic Corallian;
Middle Jurassic Limestones; [Gt Oolite Group limestones in Milton Keynes]
Lower Jurassic Cotteswold Sands;
Permo-Triassic Sherwood Sandstone Group;
Upper Permian Magnesian Limestone;
Lower Permian Penrith Sandstone;
Lower Permian Collyhurst Sandstone;
Lower Permian Basal Breccias, Conglomerates and Sandstones;
Lower Carboniferous Limestones.

(Unquote)

**N.B.** Within Milton Keynes only the Woburn Sands Formation, which is a lower Cretaceous sandstone unit, and the limestones in the Middle Jurassic Great Oolite Group (see Figure 5) fall within the defined geological units shown above.

# Appendix 2. References relevant to contaminated land


**Legislation and Guidance**

*Environmental Protection Act 1990*, Part IIA [Inserted into the Act by Section 57 of the Environment Act 1995].
DETR Circular 02/2000. *Environmental Protection Act 1990: Part !!A. Contaminated Land.*
Statutory Instrument 2000 No 227. *The Contaminated Land (England) Regulations 2000.*
*The Environment Act 1995.*
*Water Resources Act 1991.*
*Planning Policy Guidance: Planning and Pollution Control* (PPG23). DoE 1994.

**ICRCL (Inter-departmental Committee on the Redevelopment of Contaminated Land) Publications**

ICRCL 59/83 *Guidance on the assessment and redevelopment of contaminated land.* 1987.
ICRCL 17/78 *Notes on the development and after-use of landfill sites.* 1990.
ICRCL 18/79 *Notes on the redevelopment of gasworks sites.* 1986.
ICRCL 23/79 *Notes on the redevelopment of sewage works and farms.* 1983.
ICRCL 42/80 *Notes on the redevelopment of scrap yards and similar sites.* 1983.
ICRCL 61/84 *Notes on the fire hazards of contaminated land.* 1986.
ICRCL 64/85 *Asbestos on contaminated sites.* 1990.
ICRCL 70/90 *Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing.* 1990.

**Contaminated Land Research Reports (CLR)**

CLR1 *A framework for assessing the impact of contaminated land on groundwater and surface water.* Report By Aspinwall & Co. Volumes 1 & 2. DoE, 1994.
CLR2 *Guidance on preliminary site inspection of contaminated land.* Report by Applied Environmental Research Centre Ltd. Volumes 1 & 2. DoE 1994.
CLR3 *Documentary research on industrial sites.* Report by RPS Group plc. DoE 1994.
CLR4. *Sampling strategies for contaminated land.* Report by The Centre for Research into the Built Environment, The Nottingham Trent University. DoE 1994.
CLR5 *Information systems for land contamination.* Report by Meta Generics Ltd. DoE 1994.
CLR6 *Prioritisation and categorisation procedure for sites which may be contaminated.* Report by M J Carter Associates. DoE 1995.
CLR12 *A quality* (sic) *approach for contaminated land consultancy.* Report by the Environmental Industries Commission in association with the Laboratory of the Government Chemist. DoE 1997.

N.B. CLR7 to CLR11 have never been published.

**Health and Safety Executive (HSE)**

HSG 66 *Protection of workers and the general public during the development of contaminated land.* HSE 1991.

**Construction Industry Research and Information Association (CIRIA)**

CIRIA R149 *Protecting development from methane.* G.B. Card. CIRIA 1995.
*Appendix to Report 149: A new approach to the design of gas protection measures.* S.A. Wilson & G.B. Card, Card Geotechnics 1998.
CIRIA SP 101 to SP 111 *Remedial Treatment for contaminated land. Volumes I to XI.* CIRIA 1995.

**Department of the Environment**

Waste Management Paper No 27 *Landfill Gas.* DoE 1991.

**Institute of Waste Management**

*The monitoring of landfill gas.* IWM Landfill Gas Monitoring Group 1998.

**British Standards Institute**

British Standard BS 10175 *Code of practice for the investigation of potentially contaminated sites.*
British Standard BS 5930 *Code of practice for site investigations*.

**Environment Agency**

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# Glossary

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| **action levels** | concentration of a pollutant above which some remediation action is normally required |
| **acute (pollution effects)** | produces an effect over a short time period |
| **aggradation** | raising of the land surface by rivers, especially due to rise in sea-level at the end of the Pleistocene |
| **alluvium** | sediment deposited by rivers |
| **appropriate person** | defined in section 78A(9) as “any person who is an appropriate person, determined in accordance with section 78F…to bear responsibility for anything which is to be done by way of remediation in any particular case” i.e. person required to pay all or part of the costs of remediation |
| **aquifers** | water-saturated rock layers which may be used as source of water |
| **assessment action** | a remediation action falling within the definition of remediation in section 78A(7)(a) |
| **attapulgite** | clay mineral, a hydrous silicate with a sheet-like structure |
| **bentonite** | clay formed by weathering of volcanic ash |
| **Blisworth Clay** | part of Great Oolite Group, mainly clay, Figure 4, Figure 6 |
| **Blisworth Limestone** | part of Great Oolite Group, mainly limestone, Figure 4, Figure 6 |
| **Boulder Clay** | informal term for material deposited by an ice sheet containing a wide range of sediment particle sizes, correctly termed a diamicton or till |
| **brashy soil** | thin free-draining brittle soil derived from limestone |
| **Bronze Age** | phase of human cultural development between the Stone Age and the Iron Age, lasting in Britain from about 2000BC to 500BC |
| **calcareous tufa** | deposits of calcium carbonate precipitated from water |
| **cement stone** | a type of calcareous mudstone or muddy limestone |
| **chalk** | a type of fine grained pure white limestone formed predominantly from microscopic fossil material |

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| **Chalk** | formal term for that part of the Cretaceous System which in western Europe comprises mainly chalk rock |
| **Chalky Boulder Clay** | Boulder Clay containing many fragments of chalk rock |
| **Chronic (pollution effects)** | produces an effect over a long time period |
| **contaminant** | substance which causes pollution or contamination of a material, most often used for potentially toxic substances |
| **contaminated land** | land polluted by one or more contaminants; 'statutorily contaminated land' is defined in section 1.2.4 |
| **Cornbrash** | part of Great Oolite Group, mainly limestone, Figure 4, Figure 6 |
| **Cretaceous** | the youngest period of the Mesozoic Era, it follows the Jurassic and precedes the Tertiary periods |
| **DETR** | Department of the Environment, Transport & Regions, replaced by DEFRA |
| **DEFRA** | Department for Environment, Food & Rural Affairs, replaced DETR in 2001 |
| **discharge consent** | Environment Agency authorisation to discharge effluent to a water course |
| **ecological system** | a particular sub-system of living things and the specific environment they live in |
| **English Partnerships** | a government development agency, which has taken over the responsibilities of the Commission for New Towns |
| **Environment Agency** | government organisation charged with protecting and improving the environment in England & Wales |
| **Environmental Health Division** | a division of the Regulatory Services Department of the Environment Directorate of Milton Keynes Council |
| **Environmental Protection Team** | team within the Environmental Health Division with the main responsibility for contaminated land, air quality, noise and other aspects of pollution in Milton Keynes |
| **First Terrace** | youngest terrace in a system of former river terraces, see Figure 5 |
| **Fuller's Earth** | a clay deposit rich in clay minerals such as montmorillonite |
| **Geographic Information System (GIS)** | computer database system capable of showing spatial data orientated on a map base |

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| **Great Oolite Group** | division of the middle Jurassic, Figure 4, Figure 6 |
| **Greensand Group** | division of the lower Cretaceous, see Figure 4, Figure 6 |
| **Hazard** | nature of the adverse effect posed by the toxic material |
| **Head** | periglacial solifluxion deposit formed by mass movement of material down-slope in perma-frost areas during the Ice Age |
| **ICRCL** | Interdepartmental Committee on the Redevelopment of Land, publishers of reports on contaminated land, see References section |
| **IPC** | Integrated Pollution Control |
| **IPPC** | Integrated Pollution Prevention and Control |
| **Inferior Oolite Group** | division of the middle Jurassic, Figure 4, Figure 6 |
| **in-situ** | in place, unmoved |
| **Jurassic** | period of the Mesozoic Era preceding the Cretaceous Period, spanning approximately 208 to 146 million years before the present |
| **Kaolinite** | hydrous aluminium silicate clay-mineral produced by weathering of other aluminium silicate minerals |
| **Kellaways Formation** | (obsolete term Kellaways Beds), mainly sands & clay comprising the lowermost part of the Ancholme Group of the Middle Jurassic, Figure 4, Figure 6 |
| **landfill gas** | mainly comprising carbon dioxide and methane, formed by bacterial degradation of organic materials |
| **LAPC** | Local Authority Air Pollution Control |
| **Local Plan** | The Local Plan sets out proposals and policies for the development and use of land and buildings in the Borough in accordance with the broad strategy set out by the county Structure Plan. The present plan covers the period 1995 to 2001. |
| **Lower Estuarine Series** | obsolete term for the Inferior Oolite Group, Figure 4, Figure 6 |
| **marine transgression** | gradual advance of the sea over a landscape due to a relative rise in sea-level |
| **montmorillonite** | hydrous aluminium silicate clay-mineral produced by weathering of other aluminium silicate minerals, 'swelling- |

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| | clays' able to absorb water and other fluids, principle component of bentonite and fuller's earth |
| **Neolithic** | last period of the Stone Age (New Stone Age), earliest farming began, polished flint tools and weapons were used |
| **oolitic** | limestone rock containing ooliths (ooids), spherical bodies formed by the precipitation of (normally) carbonate layers around a nucleus |
| **Oxford Clay Formation** | uppermost part of the Ancholme Group, see Figure 4, Figure 6, dominantly clay or mudstone, used as source of brick earth |
| **palygorskite** | hydrous aluminium silicate clay-mineral produced by weathering of other aluminium silicate minerals |
| **pathway** | route by which a receptor can be exposed to, or effected by, a potentially harmful substance or substances |
| **permeability** | ability of a rock to allow fluids and gases to pass through, determined by the extent to which the pore spaces are interconnected |
| **periglacial solifluction** | mass movement of material down-slope caused by summer melting of upper layer of permanently frozen ground in an area bordering an ice-sheet |
| **Pleistocene** | earlier part of Quaternary Era, extending from about 1.8 million years ago to beginning of the Holocene or Recent (post Ice-Age last 10000 years), often referred to as the 'Ice Age' |
| **Podzolitic** | soil produced by leaching of a brown earth (forest soil), common in soils overlying coarse materials or where forest clearance has occurred |
| **pollutant linkage** | where a contaminant is linked via a pathway to a receptor or target |
| **polluter pays** | principle underlying UK government approach to dealing with contaminated land |
| **public register** | collection of information maintained by a local authority which is accessible by any member of the public |
| **receptor** | particular entity which may be harmed or adversely effected by the harmful substance or substances |
| **remediation** | in the context of Part IIA includes assessment action, remedial treatment action and monitoring action, see Annex 3 Chapter C of DETR Circular 02/2000 |

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| **remediation notice** | notice specifying what an appropriate person is to do by way of remediation |
| **risk** | probability of suffering harm or loss under specific circumstances |
| **risk assessment** | evaluation of the probability of harm, see section 5.7 |
| **River Terrace** | remains of a former river valley floor formed when sea-level was higher than now, covered with a veneer of sand and gravel deposits, see Figure 5 |
| **scarp** | steep slope formed by differential erosion of series of dipping strata |
| **seat-earth** | layer of sedimentary rock originally formed by leaching below a soil horizon |
| **Second Terrace** | occurs below first terrace in a system of river terraces, see Figure 5 |
| **source** | substance or group of substances with the potential to cause harm |
| **special site** | category of statutorily contaminated site, see Appendix 1 |
| **statutorily contaminated land** | defined in section 1.2.4 |
| **Statutory Nuisance** | legally defined circumstances where something is 'prejudicial to health or a nuisance', see section 79(1) of the Environmental Protection Act 1990 |
| **suitable for use** | site which may be in a 'contaminative state' but is not statutorily contaminated with regard to its present purpose and use |
| **suitable persons** | persons authorised to carry out an investigation on behalf of a local authority according to the specific powers invested in the authority by section 108 of the Environment Act 1995 |
| **Tertiary** | period of Quaternary Era immediately following the Mesozoic Era |
| **toxicity** | potential of a material to produce injury in biological systems |
| **toxicological** | pertaining to ‘poisons’ i.e. toxic materials |
| **trigger levels** | concentration of a pollutant above which further investigation may be necessary |

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| **Upper Estuarine Series** | mudstones, silts and thin limestones, obsolete term for lowermost part of Great Oolite Group see Figure 4, Figure 6 |
| **Upper Lias** | bluish grey mudstones with some thin limestones, obsolete term for lowest unit of Jurassic system exposed in Milton Keynes, see Figure 4, Figure 6 |
| **vent-trench** | trench filled with permeable material, with one side lined with an impermeable membrane, to intercept migrating landfill gas and cause it to be harmlessly discharged to the atmosphere |
| **Waste Management Licence** | licence issued by the Environment Agency in connection with the disposal of waste materials |
| **Woburn Sands** | village in south east Milton Keynes |
| **Woburn Sands Formation** | ferruginous sands, lowest unit of Cretaceous system in Milton Keynes |