

Soil and Geology

1.1 Introduction Soil and Geology

Policy context

Environment 2010: Our Future, Our Choice (EU Sixth Environment Action Programme)

The latest Environment Action Programme gives a strategic direction to the Commission's environmental policy over the next decade, as the Community prepares to expand its boundaries. The new programme identifies four environmental areas to be tackled for improvements:

- Climate Change;
- Nature and Biodiversity;
- Environment and Health and Quality of Life; and
- Natural Resources and Waste.

Objectives, Targets and Indicators

To protect soils against erosion and pollution.

PPS 9 – Biodiversity and Geological Conservation

PPS9 sets out planning policies on protection of biodiversity and geological conservation through the planning system. The policies will need to be taken into account by regional planning bodies in the preparation of regional spatial strategies.

Geological conservation relates to the sites that are designated for their geology and/or geomorphological importance

Objectives, Targets and Indicators

To ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered.

- Development plan policies and planning decisions should be based upon up-to-date information about the environmental characteristics of their areas (biodiversity and geological resource).
- To maintain, and enhance, restore or add to geological conservation interests.
- The form and location of development should take a strategic approach to the conservation, enhancement and restoration of geology.
- Promote opportunities for the incorporation of beneficial geological features within the design of development.
- Prevent harm to geological conservation interests.

Regional Spatial Strategy (RSS14) of the East of England (Draft Revision)

Bedfordshire now lies within the East of England region for planning purposes. RSS14 is based on the principles of the UK's Strategy for Sustainable Development and sets out a strategy to guide planning and development in the East of England to the year 2021. This includes the scale and distribution of provision for new housing and identifying priorities for the environment, transport, infrastructure, economic development, minerals and waste management. It aims to improve the quality of life and sets out proposals which will influence where people choose to work and live and how to move about the region. RSS14 is currently under review – the final RSS14 is due to be published in early summer 2007.

Objectives, Targets and Indicators

- To maintain and enhance the resilience and quality of soils.
- To encourage the sustainable use of soil resources and, where soil and land have been

degraded, maximise the opportunities for restoration to beneficial after-uses including agriculture, woodland, amenity and habitat creation schemes

Regional Planning Guidance for the South East (RPG9)

Bedfordshire and Luton have recently moved from the South East and become part of the East of England Region, but RSS14 is still a draft document and will not be published until late 2006. Bedfordshire and Luton now neighbour the South East, therefore, it is useful to understand their policies and plans to prevent cumulative impacts across the region from occurring.

Objectives, Targets and Indicators

Development should be located and designed to enable more sustainable use of the Region's natural resources. Ensure there is an adequate supply whilst regarding the objectives of sustainable development

Mayor of London Draft Early Alterations to the London Plan

The Mayor's Draft Early Alterations to the London Plan were considered by an Examination in Public in June 2006. The Mayor has proposed that each borough will be allocated an apportionment comprising the waste arisings within the borough plus or minus an obligation to manage/treat waste from central London boroughs. This should go some way to reducing London's reliance on other areas.

Objectives, Targets and Indicators

The need for a progressive reduction in waste imports from London and the South East over the period to 2015, with a steady-state provision for landfill of post treatment residues thereafter.

Designing for Sustainability – Luton Borough Council Supplementary Planning Guidance

This document sets out what the Borough Council expects it terms of sustainable design and energy conservation.

Objectives, Targets and Indicators

Avoid damage to soils

Luton Local Plan (2001 – 2011)

The Local Plan is to guide development and the use of land. It contains policies and proposals for land use and transportation.

Objectives, Targets and Indicators

Enhance sites of geological interest.

Bedford Borough Council Development Plan Document (DPD): Core Strategy and Rural Issues Plan (Submission version)

The Core Strategy & Rural Issues Plan sets out the long term spatial vision for the borough and the objectives and policies needed to deliver that vision. The DPD was submitted to the Secretary of State on 3 July 2006 and a six week consultation period followed. An independent Inspector will be appointed in May 2007 to consider all representations received in response to the consultation. It is

expected that this DPD will be adopted in December 2007.

Objectives, Targets and Indicators

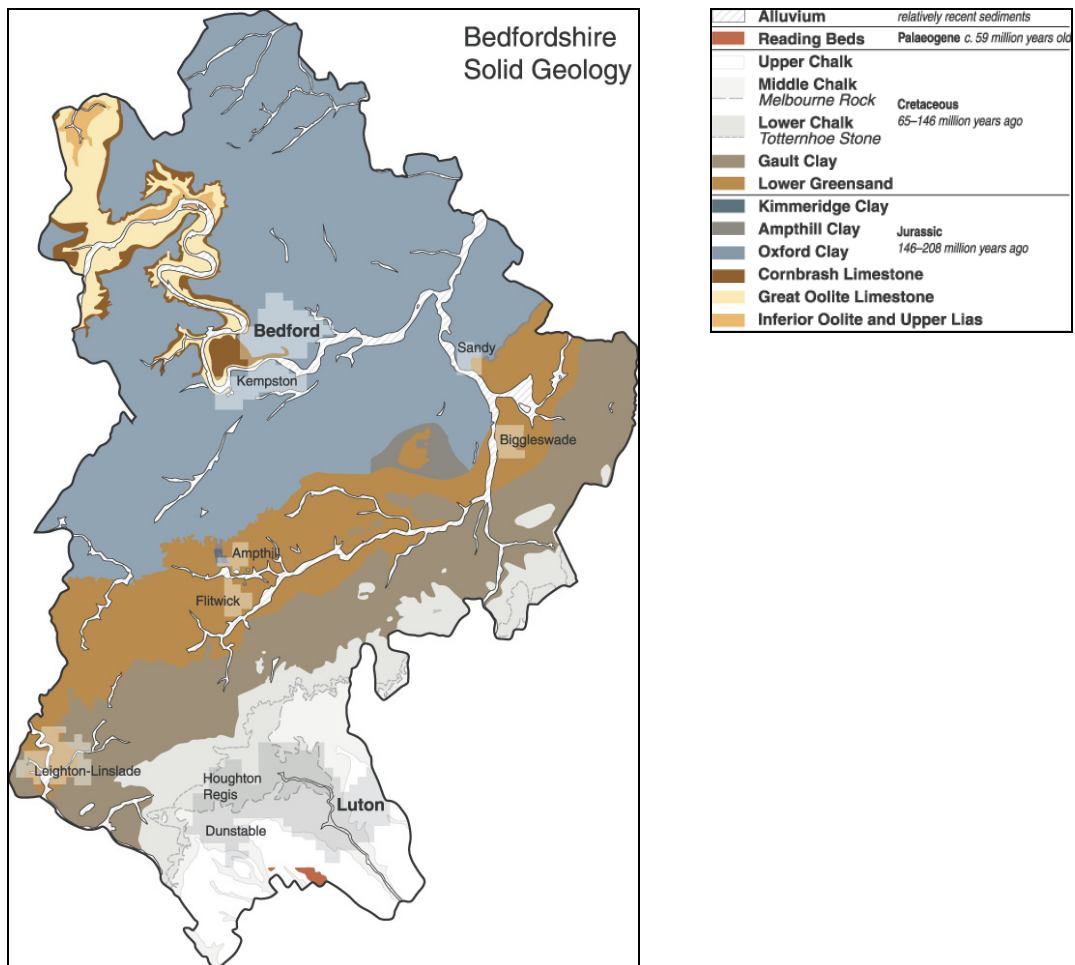
Policy CP26 - The geodiversity of the borough will be protected and where appropriate enhanced. Appropriate mitigation and/or compensation will be required where damage results from the development.

Baseline Review

- 1.1.1 This section reviews generic baseline soils and geology in Bedfordshire and Luton. The next section of the topic paper outlines how these issues specifically relate to waste management.

Geology

- 1.1.2 Mid-Bedfordshire has a gentle, undulating countryside. It is dominated by Greensand Ridge, which runs from the northeast to southwest across the area. A map of the solid geology of the county is shown below.



Source: Bedfordshire and Luton Geology Group (<http://www.bedsrigs.org.uk/>)

1.1.3 To the south is chalk escarpment, part of the Chilterns which runs from the south coast to Norfolk. Clay to the north of the county has been used for many years for brick making.

1.1.4 Most of the rock types in Bedfordshire were formed during the Jurassic or Cretaceous geological Periods.

Jurassic	- 208 million years ago	Cretaceous	- 145 million years ago
Cornbrash	- Lower period	Gault Clay	- Lower Period
Oxford Clay	- Middle Period	Woburn Sands	- Lower Period
Amphill Clay	- Upper Period	Chalk	- Upper Period

Cornbrash (Limestone)

1.1.5 The Cornbrash is a Jurassic limestone, which often has an orange colour due to iron staining.

Oxford Clay

1.1.6 Oxford Clay was formed 160 million years and has been extensively used by the Bedfordshire brick industry to make Fletton bricks. Some layers of the clay contain hard limestone nodules. The clay also contains shell beds these beds often contain the golden coloured mineral iron pyrites.

Amphill Clay

1.1.7 The Amphill Clay was deposited about 155 million years ago. It was named after the village of Amphill in Bedfordshire. In many areas it was weathered away completely during the late Jurassic and early Cretaceous periods.

Woburn Sands (Lower Greensand)

1.1.8 The Lower Greensand forms a prominent ridge across Bedfordshire and has long been a source of sand. The sands contain iron and are often yellow, orange or brown with the purer sands being white. Some layers are cemented with iron to form nodules and sandstone.

1.1.9 Within the sands are layers of fuller's earth which are the product of a volcanic explosion. This material was used to extract grease from wool, a process called fulling. Fuller's earth is now used for a variety of chemical processes.

1.1.10 At the base of the sands is a module bed, derived from earlier Jurassic rocks. The nodules used to be quarried as a source of phosphate, formerly a flourishing industry.

Gault Clay

- 1.1.11 The Gault Clay was formed about 100 million years ago. It rests on top of the Lower Greensand and so can be seen in Bedfordshire in the numerous sand quarries on the Greensand Ridge.

Chalk Deposits

- 1.1.12 The chalk found in Bedfordshire is an Upper Cretaceous deposit found in the south of Bedfordshire from an extremely pure limestone. The chalk also contains flint deposits and fine clay particles - Chalk Marl, which is found in the lower levels of the chalk
- 1.1.13 During the ice age the chalk was eroded by glaciers. The fine mud formed was swept away but the hard flint nodules were left behind as gravel. This has been quarried for building purposes.

Land Use

- 1.1.14 74% of the total land use in Bedfordshire is for agriculture. The quality of agricultural land is very high in Bedfordshire, with 44% in the top two grades (Grades 1 Excellent and Grade 2 Very Good); this is the highest of any South East County and nearly double the Rest of the South East (ROSE) average.
- 1.1.15 Around 2% of Bedfordshire's land use is for mineral workings, water and waste facilities.

Geological Designations

- 1.1.16 UK Regionally Important Geological and Geomorphological Sites (UKRIGS) recognise that the maintenance of geodiversity is fundamental to a balanced environment and a key measure of the sustainable use of our urban and rural landscapes. The aim of UKRIGS is to "...encourage the appreciation, conservation and promotion of Regionally Important Geological and Geomorphological Sites for education and public benefit"
- 1.1.17 The first UKRIGS Development Strategy (2001-2005) emerged after a decade of RIGS activity and at the end of UKRIGS's first year in existence. This second UKRIGS Development Strategy (2006- 2010) builds on this. Six principal objectives are set out in full in their Development Strategy 2006-2010, including:
- To create a centralised national RIGS database and promote standards within RIGS groups for recording, assessing, nominating and notifying RIGS sites.
 - To raise awareness, appreciation and promotion of RIGS and other geoconservation sites for education at all levels, public benefit and the development of geotourism.
- 1.1.18 Bedfordshire and Luton Geology Group exists to identify and protect RIGS, to encourage understanding of the geology and geomorphology of the county and to undertake site recording, interpretation, advice and education.
- 1.1.19 Particular regionally important sites include:

- Jurassic Clays - The Oxford, Amptill and Kimmeridge clay sequence;
 - Cretaceous Chalk, for instance, the Totternhoe Stone or 'Clunch';
 - The Reading Beds;
 - The Lower Greensand;
 - The Inferior Oolite and Upper Lias; and
 - The Cornbrash.
- 1.1.20 The county also has four geological SSSIs– Biddenham Pit, Kensworth Chalk Pit, Nine Acres Pit and Double Arches Pit.

Issues associated with Waste Management

Issues associated with Waste Management

- 1.1.21 Landfill of municipal waste can only take place where suitable void space exists. The existing major municipal waste landfill sites in Bedfordshire (those which are used for Bedfordshire waste rather than imports), have only relatively short remaining life-spans.
- 1.1.22 Restoration of waste landfill sites should reflect the nature of the local soils and geology involved and opportunities for using both active and restored landfill sites for furthering local landscape, historical and geological education should be explored.
- 1.1.23 The vast majority of the MSW arisings in Bedfordshire are currently disposed of to landfill, although the proportion of waste that is recycled and composted has increased. There are currently three operational landfill sites in Bedfordshire capable of accepting biodegradable wastes, two of these at Stewartby and Brogborough are located in the Marston Vale clay fields. The third site is located at Arlesey in a former clay pit to the south of Biggleswade. The planning permission for the landfill site at Brogborough expires in 2008, whilst the permission at the Arlesey site expires in 2010. The landfill capacity at Stewartby is estimated to be full by 2014. When considering possible future locations for new waste management facilities the sensitivity of mineral and soil deposits will need to be considered, in addition to increasing the recycling and reuse of construction materials.
- 1.1.24 Alternative options need to be tested as part of the plan considering efficient resource use and use of recycled / secondary materials / aggregate and minimise the use of new aggregate in construction.
- 1.1.25 There are groundwater bearing strata "at risk" or "likely to be at risk" in Luton and in parts of Bedfordshire. Soil and groundwater must be protected from damage by waste activities.
- 1.1.26 Certain waste management techniques can also be used to produce soil conditioner / compost which could improve the condition of soil without the need for peat. In addition to this, the digestate, produced by anaerobic digestion has a range of potential uses on land, including as a fertiliser or soil improver. Defra has asked WRAP and the Environment Agency to develop a standard and protocol for the digestate to help build market confidence in its recovery on land. Defra is working to establish the full potential, while

WRAP is charged with developing this market along with its work to establish markets for waste-derived compost. The Environment Agency intends to have an operational protocol for anaerobic digestate by Spring 2008.

- 1.1.27 Construction and Demolition Waste (C & D data are difficult to obtain due to the fact that a large proportion of it is re-used on site so doesn't enter the conventional waste stream. The ODPM (2004) Survey of Arisings and Use of Construction, Demolition and Excavation Waste as Aggregate in England in 2003 set out regional data which showed that the majority of the C & D Arisings was either recovered or used for beneficial purposes, with only 14% going to landfill (presumably because it was contaminated).
- 1.1.28 A study was undertaken in the region by ERM (2005) which discusses the net arisings of Construction and Demolition Waste at a regional level. This report makes the assumption that the growth rate for this waste stream will remain relatively constant over time. This assumption reflects, in part, the impact of the landfill tax and the Aggregates Levy.

Trends

- The existing major municipal waste landfill sites in Bedfordshire (those which are used for Bedfordshire waste rather than imports), have only relatively short remaining life-spans (estimated lifespan is between 2008 and 2014).
- There are groundwater bearing strata "at risk" or "likely to be at risk" in Luton and in parts of Bedfordshire.

Scoping Consultation

Key Issues and Implications for Waste Planning

- Monitor effects on sites of geological importance (including RIGs and geological SSSIs)

Comments on the Objectives for the SA

- No comments made.

Relevant objectives for the SA

Taking into account all of the above information the following objectives and indicators have been chosen for the SA.

SA Objectives	Appraisal Questions. Does the plan...
<ul style="list-style-type: none"> • Identify and encourage the increased use of recycled waste aggregate in the construction industry. • To minimise the impact of waste management facilities on sensitive areas or those valuable for mineral deposits. 	<ul style="list-style-type: none"> • Help to reduce the amount of new aggregate required in construction? • Avoid damage to sensitive / valuable soils and geology?

Sources of data

- ODPM (2004) Survey of Arisings and Use of Construction, Demolition and Excavation Waste as Aggregate in England in 2003.
- ERM (2005) Study of Existing Waste Facilities Capacity and Future Needs in East of England: Final Report.
- www.magic.gov.uk/website/magic/ (GIS mapping data for Bedford)
- www.environment-agency.gov.uk Groundwater Source Protection Zone
- www.bgs.ac.uk
- www.bedfordmuseum.org
- Bedfordshire RIGGS group
- Datasets at Bedfordshire County Council

Data Gaps

- There is little evidence of any changes in the area and quality of the sensitive areas or those valuable for mineral deposits.