

**Minerals & Waste Core  
Strategies**

Joint Technical Evidence Paper  
WCS-MCS-3

Flooding & Hydrological Issues

Living Draft

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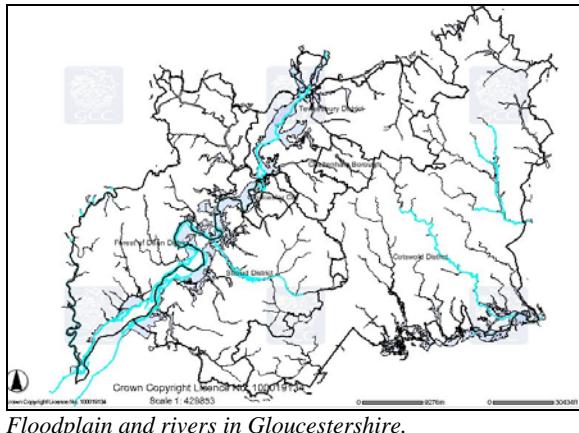
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Floodplain and rivers in Gloucestershire.

## Section 1 Introduction

1. The purpose of this report is:
  - (a) Provide evidence and background information on hydrological and flooding issues in Gloucestershire in general terms and specifically in relation to minerals and waste operations.
  - (b) Consider the requirements of National and Regional Policy on hydrological and flooding issues and comments made by stakeholders on these issues.
  - (c) To recommend preferred policy options in relation to flooding and the water environment to be included in the emerging Waste Core Strategy (WCS) and Minerals Core Strategy (MCS).

## Section 2 Gloucestershire Context<sup>1</sup>

### Groundwater / Aquifers

2. Much of Gloucestershire is underlain by a major aquifer with high to intermediate vulnerability. (See Appendix 1 for maps of areas of floodplain & groundwater (major – minor aquifers) for Gloucester, Cheltenham and Tewkesbury). Groundwater is an important resource and forms part of the natural water cycle that is present within underground strata.

3. The Environment Agency (EA) is responsible for managing water resources in England and Wales. Their policy document *Groundwater Protection: Policy and Practice (GP3)* was consulted on earlier this year (2007). This document sets out the EA's approach to protecting and managing groundwater in England and Wales. One of the ways in which the EA aims to achieve this is through the use of Groundwater Source Protection Zones. (For more details see the following web link:

[http://www.environment-agency.gov.uk/subjects/waterres/groundwater/?version=1&lang=\\_e](http://www.environment-agency.gov.uk/subjects/waterres/groundwater/?version=1&lang=_e)

4. Groundwater is particularly susceptible to nitrate pollution caused by agricultural fertilizer. In order to protect groundwater against nitrate

<sup>1</sup> Much of this information is from the Gloucestershire Biodiversity Partnership website. In particular the 'Rivers, Streams & Associated Habitats Action Plan'. See the link: [http://www.swbiodiversity.org.uk/Habitats/Rivers/Rivers\\_glouc.htm](http://www.swbiodiversity.org.uk/Habitats/Rivers/Rivers_glouc.htm)

pollution certain areas of the County have been identified as groundwater nitrate vulnerable zones.

5. There are major aquifers associated with the carboniferous limestone geology of the Cotswold hills and parts of the Forest of Dean. The two broad areas of mineral working in the County are the Forest of Dean and the Upper Thames Valley. Mineral working can affect the future availability of groundwater resources by materially restricting recharge, diverting flow, causing particulate or the introduction of chemical pollutants. Surface water regimes can also be adversely affected in terms of diverted flows, overloaded watercourses and the introduction of chemical and suspended solids contaminants.<sup>2</sup>

6. Associated with the limestone aquifer in the Forest of Dean are limestone *karst* features such as Slade Brook. This is an SSSI located close to Clearwell quarry. English Nature together with Clearwell Quarries carry out a detailed monitoring program of the Slade Brook. For more details see the following web link:

<http://www.natureonthemap.org.uk/map.aspx>

7. Waste management facilities are located throughout the County and, like mineral sites, they also have the potential to pollute surface and groundwater resources and to interrupt water flows. Applicants for waste development are required to provide an assessment of the potential risks to the water environment, and may have to undertake a hydrological and

<sup>2</sup> The Environment Agency provided extensive comments on the Minerals Core Strategy Issues & Options consultation on these matters. For details see Appendix 4.

geological survey appropriate to the nature of the proposal.

8. Landfill sites are particularly significant in terms of their potential to have a detrimental impact on the water environment - if not properly managed and monitored. Damage to the water environment can occur in terms of leachate release, surface water run off, discharge of waste water, interference with drainage and water movement in flood plains. Major landfill sites are generally located on (or in) areas of impermeable clay which acts as a natural seal or barrier.

9. There are currently 4 landfill sites in Gloucester. One at Frampton on Severn (due to close in 2008), two at Wingmoor Farm in Bishops Cleeve and one at Hempsted (west of Gloucester – which is in the flood plain). For more details on landfills see Technical Evidence Paper (WCS-A) Data and Technical Evidence Paper (WCS-G) Waste Facility Types).

10. The EA is a statutory consultee and has records of floodplains, water course, areas of ground water, sensitive water abstraction points and zones that require protection. These areas will vary over time due to changing conditions, including climate, permeability of the ground strata, and the proximity of other groundwater sources which exert competing abstraction forces.

## Gloucestershire's Rivers

11. Gloucestershire is estimated to have 5284 km of watercourse, a widespread and important resource. They vary in character and quality from rivers of international importance such as the Wye, designated as Special Area of

Conservation (SAC), to those which have been degraded and constrained by river engineering and various forms of development.

12. There is a strong relationship between rivers and particular minerals in that sand and gravel resources are often present in river valleys.

13. There are three main catchments into which all Gloucestershire's rivers and streams flow: the Lower Severn; the Lower Wye and the Upper Thames.

14. The physical character of rivers is strongly influenced by geology, landscape and land use in terms of factors such as channel slope, size, flow type and associated habitat diversity. As a result there is a strong relationship between river type and Natural Areas. (For more information on these issues, and in particular the relationship between Natural Areas and 'Nature Map' see Joint Technical Evidence Paper (WCS-MCS-5) Ecology and Joint Technical Evidence Paper (WCS-MCS-4) Landscape and AONB). The watercourses found in the different Natural Areas in the County are listed below:

## Cotswolds

15. Rivers: Churn, Coln, Windrush, Dikler, Eye, Sherborne Brook, Leach, Evenlode; (Upper Thames catchment) Frome, Slad Brook, Painswick Brook, Isbourne (Lower Severn Catchment).

16. Cotswold streams generally have a high water quality supporting a diverse range of aquatic life and as a result hold species such as the white-clawed crayfish, caddis flies and the

dipper, indicative of high quality streams. This Natural Area is a key area for otter recolonisation into southern England, water vole populations and white-clawed crayfish. The Dikler, Churn and Coln are important for water voles. The River Windrush falls into the Upper Thames Tributaries ESA.

## Thames and Avon Vales

17. Rivers: Thames, Coln, Churn, Ampney Brook (Upper Thames Catchment). The source of the Thames is in the Natural Area and all of the rivers in this Natural Area eventually flow into the River Thames. These rivers all flow through the Cotswold Water Park and link with the various wetland habitats found there.

## Severn and Avon Vales

18. Rivers: Severn, Avon, Cam, Wicksters Brook, Little Avon River, Swilgate, Leadon, Chelt (Lower Severn Catchment ).

19. The River Severn is the longest river in Britain. In Gloucestershire it flows through a broad flat floodplain, the natural character of which has been altered through the construction of weirs and locks and much of the river is impounded. The Severn Vale has extensive ditch/rhine systems associated with the washlands and the hams. Where these have naturally or artificially maintained high spring and summer water levels they provide valuable wildlife habitats. Stretches of the Rivers Leadon, Frome and Little Avon are designated as salmon fisheries under the EC Fisheries Directive. Stretches of the Rivers Severn and Cannop Brook are designated cyprinid fisheries under this directive. Wicksters Brook, a tributary

of the River Cam is particularly important for water voles.

## Dean Plateau and Wye Valley

20. Rivers: Wye; (several smaller brooks such as Cinderford Brook, Cannop Brook and Ell Brook drain the central Dean plateau and flow into the Wye or the Severn). The River Wye forms the Western Boundary of this Natural Area and is one of the most significant features. The Wye is identified as an SAC as it is regarded as an internationally important river system. It holds populations of many threatened species including Biodiversity Action Plan (BAP) priority species. The combination of relatively good water quality and rich and diverse in-river and bankside habitats enables the river to support such a wide range of fish and other species. The tidal and the saline influence of the Lower Wye is evident past Brockweir.

## River Quality

21. River water quality is adversely affected by direct and diffuse pollution from industrial, domestic and agricultural sources, including from minerals and waste related development. Some watercourses, of poor water quality through sewage inputs, include tributaries of the Leadon and a stretch of the Chelt downstream of Cheltenham. Some streams in the Forest of Dean (such as Cannop Brook and the River Lyd) receive minewaters from abandoned coal mines.

22. Diffuse pollution from agriculture through pesticides, fertilizers and soil erosion has been identified as having a significant effect on water quality in the River Wye SAC and is probably a widespread issue affecting many, if not most

lowland river systems. Damage and disturbance to soil from livestock, cultivation and machinery can cause sediment laden water to enter watercourses. Farmers are becoming more aware of the potential risks of diffuse pollution, the use of buffer zones, for example, are being promoted. River quality is monitored by the Environment Agency.

## Biological Quality

23. In 1990 in Gloucestershire, 68.53% of rivers were of 'good' biological quality, but in 2004 the figure had declined to 66.62%. Biological quality tests look at macro invertebrates, including mayflies, caddis-flies, snails, shrimps and worms. These animals do not move far and respond to everything contained in the water, as well as to physical damage to their environment. They can be affected by pollutants that occur infrequently or in very low concentrations and which may be missed by chemical sampling.

## Chemical Quality

24. In 2001 in Gloucestershire, the % of rivers of specifically 'good' chemical quality was 84.02%. In 2004 this figure had declined to 68.33%.<sup>3</sup> Chemical water quality reflects pollutants, primarily dissolved oxygen, biochemical oxygen demand and ammonia. These are indicators of pollution that apply to all rivers, first because of the widespread risk of pollution from sewage or farms, and second because of the toxicity of ammonia and the requirement for dissolved oxygen for aquatic life, including fish. Chemical water quality tests

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<sup>3</sup> Figures from 'State of the Environment in the South West 2006' – Environment Agency.

primarily include: dissolved oxygen, biochemical oxygen demand and ammonia.

## Section 3

### Flooding in Gloucestershire

25. *“Flooding is a natural process. However, it can endanger lives, damage buildings and infrastructure, historic structures, archaeology and settlements. It can also adversely affect health, the characteristics of landscapes and habitats. It also disrupts the lives and livelihoods of those people affected.*

*Poorly designed development in a floodplain area can reduce the space available to store floodwater, affecting not just the development itself but also surrounding areas.”<sup>4</sup>*

26. The major rivers in Gloucestershire (the River Severn in particular) frequently flood in the winter months particularly after heavy and prolonged rain upstream. But intense summer rainfall events (potentially as a result of a changing climate) are also leading to extreme flooding.

27. The recent floods of the summer of 2007 (June & July) severely affected many communities in the County. Particularly hard hit were Tewkesbury, Gloucester and Cheltenham as well as many villages. Many areas of the County were left without tap water for over two weeks in floods as bad, if not worse, than the severe event of 1947 along much of the River Severn.

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<sup>4</sup> State of the Environment in The South West 2006 / flooding, Page 28.



Flooding in Gloucester near County Council Offices - July 20<sup>th</sup> 2007 after the River Severn burst its banks.

28. Figures relating to damage and numbers of properties / businesses affected from the recent (June & July 2007) flood events are not yet available but for the River Severn around Gloucester it is estimated that about 300 properties (residential and commercial) are at risk in a 1 in 100 annual chance event. Damages (pre 2007) of about £16 million have been estimated.<sup>5</sup>

29. As the climate changes flooding is an increasing threat in the County and the issues are increasingly complex. Flooding is no longer resultant just from heavy winter rainfall causing rivers and streams to burst their banks. Flash floods from extreme summer rainfall events are now a major flooding risk for areas that would have otherwise not have been considered at risk. Linked to this are issues of increased runoff from urbanised environments and the

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<sup>5</sup> River Severn at Gloucester Study – Environment Agency (December 2005).

inability of old and damaged drainage systems to cope massive volumes of water generated in extreme events.



*Burst manhole in Gloucester during the July 2007 floods.*

30. In addition to those properties affected when rivers and streams burst their banks, many of the properties affected in June and July 2007 were flooded as a result of flash flooding, rising groundwater, blocked drains and culverts and sewer and storm drains being unable to cope with the huge volumes of excess water.

31. There was also considerable damage to the road network in the County with an estimated highways bill of c.£27 million. Some of this will be paid for by the Department for Transport after lobbying by Gloucestershire County Council.

32. In September 2007, Gloucestershire County Council launched a Scrutiny Inquiry into the flooding focusing on how the emergency services, councils and utility companies dealt with the flooding and the consequent water emergency in the County during June and July.

33. The results of this Inquiry will feed in to the National flood inquiries and aims to gather the views and experiences of a wide range of individuals and organisations. The committee has set a deadline of late November for reporting back. Clearly the final report will be important in terms of feeding into the evidence base for Local Development Frameworks in the County.

## **Section 4**

### **Flooding / Hydrological Policy Requirements & Considerations relating to both Minerals and Waste Development**

#### **EU Water Framework Directive (2000/60/EC)**

34. In October 2000 the 'Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy' (EU Water Framework Directive or WFD) was adopted. The purpose of the Directive is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. It will ensure all aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands meet 'good status' by 2015. The Directive requires Member States to establish river basin districts and for each of these a river basin management plan. The Directive envisages a cyclical process where river basin management plans are prepared, implemented and reviewed every six years.

There are four distinct elements to the river basin planning cycle: characterisation and assessment of impacts on river basin districts; environmental monitoring; the setting of environmental objectives; and the design and implementation of the programme of measures needed to achieve them.<sup>6</sup>

### **Planning Policy Statement: Planning and Climate Change – Supplement to Planning Policy Statement 1 (PPS1)**

35. Throughout this PPS there is reference to the fact that as the climate changes one of the significant environmental issues for the UK will be an increase in flooding. The PPS states:

*“There is a compelling scientific consensus that human activity is changing the world’s climate. The evidence that climate change is happening, and that man-made emissions are its main cause, is strong and indisputable. If these changes deepen and intensify, as they will without the right responses locally and globally, they will increasingly change the environment. For the UK, this could mean more extreme weather events, including hotter and drier summers, flooding and rising sea-levels leading to coastal realignment. There will be permanent changes in the natural environment but also, and increasingly, substantial challenges to national prosperity and social cohesion. It is quite likely that the impacts of climate change will be felt first, and disproportionately so, by the most vulnerable in*

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<sup>6</sup> Joint Nature Conservation Committee (JNCC) at: <http://www.jncc.gov.uk/page-1375>

society.”<sup>7</sup>

### **Planning Policy Statement 25: Development and Flood Risk (PPS25)**

36. Planning Policy Statement 25 (PPS25) *Development and Flood Risk* replaces Planning Policy Guidance Note 25: It sets out Government policy on development and flood risk. Its aims are to “ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall”<sup>8</sup>.

### **The Requirement for Flood Risk Assessment (FRA) for Certain Developments in High Risk Areas**

37. PPS25 indicates that FRAs should be carried out at all levels of the planning process and take climate change into account. A sequential risk-based approach should be used to determine the suitability of land for development in flood risk areas.

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<sup>7</sup> PPS1 Planning and Climate Change, Page 12, Paragraph 1. Emphasis added.

<sup>8</sup> DCLG Summary at:

<http://www.communities.gov.uk/publications/planningandbuilding/pps25floodrisk>

38. The basic aim of the risk-based Sequential Test is to steer new development to areas with the lowest probability of flooding i.e. Flood Zone 1.

39. Where there are no reasonably available sites in Flood Zone 1, decision-makers should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should decision-makers consider the suitability of sites in Flood Zone 3, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

40. The zones are classified in detail in Appendix 2 of this report and Appendix 3 details the Flood Risk Vulnerability Classification and the Exception Test.

41. Annex E of PPS25 contains details of the minimum requirements of flood risk assessment including Regional Flood Risk Appraisals, Strategic Flood Risk Assessments and Site-specific Flood Risk Assessments.

#### **New Requirements for Strategic Flood Risk Assessment (SFRA) for Plans**

42. PPS25 indicates that Local Planning Authorities should prepare SFRA in consultation with the Environment Agency and other relevant bodies.

43. The SFRA should be used to inform knowledge on flooding, refine information on the flood map and determine variations in flood risk from all sources of local flooding. This should form the basis for the preparation of Development Plan Documents. The SFRA

should be used to inform the Sustainability Appraisal of Local Development Documents.

#### **Planning Policy Statement 25: Development and Flood Risk (PPS25) A Practice Companion Guide (Consultation Draft)**

44. Table 2.3 of the Draft Companion Guide to PPS25 gives details of the three levels of FRA studies required for development areas, these are summarized below:

##### **Level 1 – Screening Study**

45. Assesses if there are any flood related issues relating to a development site that may warrant a Level 2 FRA.

##### **Level 2 – Scoping Study**

46. More detailed, qualitative study undertaken if Level 1 FRA indicates site may lie within an at risk area of flood and/or site may increase risk of flooding.

##### **Level 3 – Detailed Study**

47. Quantitative study undertaken if Level 2 FRA further quantitative analysis required to assess flood risk issues on development sites.

48. PPS25 also outlines the benefits of several LPAs joining together to undertake a sub-regional Strategic Flood Risk Assessment to help consider issues raised by flooding on a wider scale.

#### **Specific Comments on Minerals & Waste Development in PPS25 & Companion Guide**

49. In Table D.2. Flood Risk Vulnerability Classification it states that “*Landfill and sites used for waste management facilities for hazardous waste*” are in the ‘more vulnerable’ class.” Waste treatment (except landfill and hazardous waste facilities) are in the ‘less vulnerable’ class. (See Appendix 3 of this report).

50. “*Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operational and redundant industrial processes including mining, quarrying and sand and gravel extraction, as they may increase floodwater depths and velocities in adjacent areas. The potential effects of flood risk management infrastructure and other structures also need to be considered. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure. The latter can happen suddenly resulting in rapidly flowing, deep water that can cause significant threat to life and major property damage. Industrial flooding can also occur when pumping ceases and groundwater returns to its natural level, for example in former mineral workings and urban areas where industrial water abstraction is reduced from its former rate. Some of this flooding may be contaminated.*<sup>9</sup>”

51. Waste and mineral planning authorities (including County Councils) should develop their policies and plans with due regard to Regional Spatial Strategies (RSS), Regional Flood Risk Appraisals (RFRAs) and any available SFRAs. They should apply the sequential approach to allocation of sites for waste management, mineral extraction and

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<sup>9</sup> PPS25, Page 20, Paragraph C9. Emphasis added.

processing. Sand and gravel extraction is defined as ‘water compatible development’ in PPS25 (Table D.2)<sup>10</sup>

52. In Table D.2. Flood Risk Vulnerability Classification Minerals working and processing (except for sand and gravel working) is classified as ‘less vulnerable’. Sand and gravel working is under the category ‘water-compatible development’.

### **Planning Policy Statement 23 (PPS23) Planning and Pollution Control Annex 1: Pollution Control, Air and Water Quality**

53. This annex states: “*Water policy in England aims to protect both public health and the environment by maintaining and improving the quality of water. In England, the Department for Environment, Food and Rural Affairs (Defra) oversees water policy. The Environment Agency makes sure that these policies are carried out. The Agency has a responsibility to protect and enhance the environment as a whole, monitoring and enforcing aspects not only of water quality, but of air quality and waste management as well.*<sup>11</sup>

54. The Annex lists a number of EC Directives relevant to protecting the water environment and the legislation transposing them into national law. Of particular note<sup>12</sup> in relation to mineral development are:

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<sup>10</sup> PPS25 Companion Guide, Page 24, Paragraph 1.39.

<sup>11</sup> Appendix 1D, Page 24, Paragraph 1D1.

<sup>12</sup> This is not an all inclusive list.

**55. The Water Framework Directive**  
(2000/60/EC) transposed into UK law by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.

**56. The EC Groundwater Directive**  
(80/68/EEC), transposed by the Groundwater Regulations 1988, is related to the Dangerous Substances Directive and applies to groundwater protection. It prohibits discharge of certain substances to groundwater and the pollution of groundwater by some other substances. Groundwater is water held underground in rock formations. This legislation is enforced mainly through the PPC Regulations (see Appendix 1A). The European Commission published in September 2003, under Article 17 of the Water Framework Directive, a proposal for a new Groundwater Directive. The existing Groundwater Directive is due to be repealed by 2013 under Article 22 of the Water Framework Directive.

**57. The Mines (Notice of Abandonment) Regulations 1998** covering abandoned mines and the threat of pollution to controlled waters from rising mine waters. The statutory defence against prosecution for pollution offences of owners and operators of abandoned mines was also removed by these Regulations.

### **Environment Agency (EA) Catchment Area Management Plans (CAMS)**

**58. The EA** is responsible for managing water resources in England and Wales. This is done through a variety of means – one of which is

through licensing water abstraction. The EA developed CAMS to:

- to inform the public on water resources and licensing practice
- to provide a consistent approach to local water resources management
- to help to balance the needs of water users and the environment
- to involve the public in managing the water resources in their area.

**59.** CAMS are six-year plans and a number have been completed for the South West whilst others are in progress. Apart from the Bristol Avon CAMS (which includes tributaries which rise in the Cotswolds) those relevant to Gloucestershire are not yet available. For more information see the following web link:

[http://www.environment-agency.gov.uk/subjects/waterres/564321/309477/?version=1&lang=\\_e](http://www.environment-agency.gov.uk/subjects/waterres/564321/309477/?version=1&lang=_e)

### **EA Policy Document: Groundwater Protection: Policy and Practice (GP3)**

**60.** The EA has produced this document in a number of parts as follows:

- Underground, under threat – the State of Groundwater Report
- GP3 Part 1 – Overview
- GP3 Part 2 – Technical Framework
- GP3 Part 3 – Tools
- GP3 Part 4 – Legislation and Policy

For details see the following web link:

[http://www.environment-agency.gov.uk/subjects/waterres/groundwater/1463256/?version=1&lang=\\_e](http://www.environment-agency.gov.uk/subjects/waterres/groundwater/1463256/?version=1&lang=_e)

61. GP3 Part 4 was out to consultation until 30<sup>th</sup> June 2007. In Section C there are a number of draft policies, including on areas such as Solid Waste Management and Mining.

#### **P3-1 Landfill Location Policy (Planning) states:**

62. “(i) The Environment Agency will object to any proposed landfill site in groundwater Source Protection Zone 1. (ii) For all other proposed landfill site locations, a risk assessment must be conducted based on the nature and quantity of the wastes and the natural setting and properties of the location. (iii) Where this risk assessment demonstrates that active long-term site management is essential to prevent long-term groundwater pollution, the Agency will object to sites:

- below the water table in any strata where the groundwater provides an important contribution to river flow or other sensitive surface waters;
- on or in a Major/Principal Aquifer;
- within Source Protection Zones 2 or 3.”<sup>13</sup>

#### **Draft RSS Policy SD2 – Climate Change**

63. This draft policy includes a reference to reducing the Region’s contribution to climate change by: “*Avoiding the need for development*

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<sup>13</sup> EA, Draft GP3 Part 4, Legislation & Policy, Page 16.

*in flood risk areas and incorporating measures in design and construction to reduce the effects of flooding.”<sup>14</sup>*

#### **Draft RSS Policy F1 – Flood Risk**

64. This draft policy states that in:

*“Taking account of climate change and the increasing risk of coastal and river flooding, the priority is to:*

- *Defend existing properties and, where possible, locate new development in places with little or no risk of flooding;*
- *Protect flood plains and land liable to tidal or coastal flooding from development;*
- *Follow a sequential approach to development in flood risk areas;*
- *Use development to reduce the risk of flooding through location, layout and design;*
- *Relocate existing development from areas of the coast at risk, which cannot be realistically defended, and;*
- *Identify areas of opportunity for managed realignment to reduce the risk of flooding and create new wildlife areas.”<sup>15</sup>*

65. The supporting text to draft Policy F1 states that:

*“In implementing Policy F1, LDDs will need to:*

- *Require strategic flood risk assessments to guide development away from floodplains, areas at risk or likely to be at risk in future from*

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<sup>14</sup> Draft RSS, Page 12.

<sup>15</sup> Draft RSS, Page 151.

- *flooding, or where development would increase the risk of flooding elsewhere;*
- *Ensure that the location of new development is compatible with relevant Shoreline Management Plans (SMPs) and River Basin Management Plans (RBMPs), and other existing relevant strategies, and takes account of the Environment Agency's Flood Map.*
- *Seek to reduce the causes of flooding by requiring that all developments and, where subject to planning control, all land uses (including agricultural activities and changes to drainage in existing settlements) should not add to the risk of flooding elsewhere and should reduced flooding pressures by using appropriate Sustainable Drainage Systems (SUDS);*
- *Require that all developments on the perimeter of towns and villages take account of local flooding risks from agricultural run-off;*
- *Ensure that development proposals do not prejudice future coastal management or the capacity of the coast to form a natural sea defence, or to adjust to changes, without endangering life or property;*
- *Include proposals which allow for the relocation of existing development from areas of the coast at risk, which cannot be realistically defended.*<sup>16</sup>

66. In January 2007 the SWRA asked the 9 sub-regions for assistance in conducting a Regional Flood Risk Assessment.

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<sup>16</sup> Draft RSS, Page 152, Paragraph 7.2.21.

67. According to the SWRA:

*"the aim of the RFRA is to direct development away from areas at highest risk of flooding. To inform this process, all available data has been considered and has provided an indication of the following:*

- *Where existing flood risk is a significant issue in the Sub-Regions*
- *Where in the Sub-Region the future problem of flood risk is likely to be the greatest*
- *How much of the Sub-Regions are protected by major flood risk management infrastructure, including drainage infrastructure, and emergency planning procedures*
- *Whether new development in the Sub-Region is likely to add to that risk"*

68. The Cheltenham and Gloucester Joint Study Area (CGJSA) officer working group provided the RBP with information in relation to flood risk areas in Gloucestershire.

## Draft RSS Policy RE6 – Water Resources

69. This draft policy states:

*"The region's network of ground, surface and coastal waters and associated ecosystems will be protected and enhanced, taking account of the Environment Agency's 'Regional Water Resources Strategy', catchment abstraction management strategies, groundwater vulnerability maps, groundwater source protection zone maps and river basin management plans. Surface and groundwater pollution risks must be minimised so that environmental quality standards are achieved and where possible exceeded. Local Planning*

*Authorities, through their LDDs, must ensure that rates of planned development do not exceed the capacity of existing water supply and wastewater treatment systems and do not proceed ahead of essential planned improvements to these systems.”<sup>17</sup>*

## Section 5 Gloucestershire’s progress on SFRA

70. On 16<sup>th</sup> May 2007 Gloucestershire County Council and representatives from the District Councils in Gloucestershire met with officers from the Environment Agency specifically to discuss the need to undertake a SFRA for the Minerals and Waste Core Strategies and for District LDDs within LDFs. There was some discussion related to the need to undertake SFRA for minerals (given the reference in PPS25 Practice Companion to sand and gravel extraction minerals being a water compatible activity).

71. The outcome of the meeting was that it would be beneficial for GCC (and those Districts Councils who wanted to participate in a joint exercise) to undertake a Level 1 SFRA to assist in the preparation of Core Strategies for the County. Level 2 SFRA might then be required for each District in the preparation of detailed DPDs such as for site allocations.

72. In the following weeks, a brief was submitted to the EA based on a brief which had been used in Shropshire.

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<sup>17</sup> Draft RSS, Page 158.

73. Subsequent to the severe flooding in Gloucestershire in June and July 2007, the Environment Agency responded to the brief, highlighting the need for a more detailed Level 2 SFRA to be undertaken. It was recommended that this be a joint enterprise i.e. GCC and the six District Councils covering the whole of the County.

74. GCC is currently looking to commission a Level 1 & 2 SFRA in conjunction with the six Districts Councils<sup>18</sup> and this will inform the MWDF and all LDFs within the County.

## Section 6 Flooding /Hydrological Issues & Mineral Working

### ◆ Policy Requirements

#### Minerals Planning Statement 1: Planning and Minerals (MPS1)

75. MPS1 states that MPAs should: “*Consider in association with the Environment Agency, the potential for mineral developments, individually or cumulatively, to affect the flow, quality and quantity of surface and groundwater supplies and the water table, taking account of best available options in preventing leachate generation and water pollution*”

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<sup>18</sup> It should be noted that a number of District Councils (such as Stroud and Gloucester) had already started specific SFRA / FRAs in their administrative areas.

*Ensure, in association with the Environment Agency, that in areas at risk of flooding, mineral extraction proposals do not have a significant adverse impact on flood flows or flood storage capacity. Operators should demonstrate that mineral working should not materially increase the risk of flooding at other properties or locations and, where practicable, should increase flood storage capacity.*<sup>19</sup>

### **Minerals Planning Statement 1 Planning and Minerals (MPS1) Practice Guidance**

76. This guidance states that:

*"The principal impacts of mineral working, and the environments on which they may have an effect, are considered to be: noise, dust/air quality, blasting/vibration/fly rock, mineral waste, visual intrusion into the local setting and the wider landscape, archaeological and heritage features, traffic, groundwater, surface water, land instability, landscape character, internationally or nationally designated, protected or sensitive species and plant and wildlife habitats, nationally protected geological and geomorphological features.*<sup>20</sup>

### **Minerals Planning Statement 2: Controlling and Mitigating the Environmental Effects of Mineral Extraction in England (MPS2)**

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<sup>19</sup> MPS1, Pages 10-11.

<sup>20</sup> MPS1 Practice Guidance, Pages 13 & 14, Paragraph 46.

77. This guidance indicates that Development Plan Policies and proposals for minerals extraction and associated development should take into account the impacts of mineral working which includes dewatering and water pollution.

78. It suggests that developers should consult the Environment Agency as part of the pre-application discussions to evaluate the hydrological, chemical and ecological impact of any workings on groundwater and surface water supplies.

### **Minerals Local Plan Policy E11**

79. This policy states:

*"Mineral development which is likely to have a significant negative quantitative and or qualitative impact on the water environment, will not be permitted unless appropriate measures can be imposed to mitigate any harmful effects."*<sup>21</sup>

80. The Secretary of State has approved GCC's application to 'save' this policy until it is replaced.

### **Minerals Local Plan Policy E12**

81. This policy states:

*"Mineral development which increases the risk of flooding and has a material negative impact on the storage or flow capacity of the floodplain, will be permitted only where the risk or impact can be obviated".*<sup>22</sup>

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<sup>21</sup> Gloucestershire MLP, Page 26.

<sup>22</sup> Ibid.

82. The Secretary of State determined against GCC's request to 'save' this policy until it is replaced. The reason given is that it is superseded by PPS25.

### Minerals Local Plan Policy E13

83. This policy states:

*"Where mineral working is to be permitted an appropriate buffer zone must be retained between the mineral working and adjacent significant watercourses to preserve the integrity of the water corridor in terms of conservation and landscape. The size and landscape treatment of the buffer zone will depend on the characteristics of the area and details of the proposals."*<sup>23</sup>

84. The Secretary of State has approved GCC's request to 'save' this policy until it is replaced. MLP Policies E11 and E13 will form part of the Development Plan until replaced by appropriate policies within new Development Plan Documents. However Policy E12 lapsed on the 28<sup>th</sup> September and therefore is not included within the Development Plan.

85. See the Gloucestershire MLP for more details on crushed rock quarries and proposals (MLP Inset Maps) in water resource areas. Clearwell Quarry in the Forest of Dean (for example) has a depth restriction due to hydrological issues.

### ◆ Responses to MCS Issues & Options Consultation on Hydrological / Flooding Matters

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<sup>23</sup> Ibid.

86. The MCS Issues and Options consultation took place over an eight week period between the weeks of the 22<sup>nd</sup> September and the 17<sup>th</sup> November 2006.

87. There were no *specific* questions in the consultation relating to hydrological/flooding matters but the issue was covered to some extent under 'Climactic Factors' in the Spatial Portrait of Gloucestershire.

88. Generally there were very few comments on flooding / hydrological issues from stakeholders however the Environment Agency<sup>24</sup> provided a detailed response on hydrological issues associated with mineral workings. Generally their comments related to Groundwater protection and the practical measures in which to safeguard such water resources. The comments are listed in full in Appendix 4.

89. The main flooding / hydrological issues raised by stakeholders are summarized below:

- Sewage from on site facilities
- Pollution from oil and fuel storage tanks
- Contaminated run-off (including spillages and dust issues)
- Leachate from land reclamation
- Dewatering/altering water levels
- Groundwater protection

90. The following are other comments that are hydrologically related:

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<sup>24</sup> The response came from the EA's Environmental Management Team and was actually a response to the MCS Issues & Options Sustainability Appraisal Report.

*“Shouldn’t Objective 3 consider the natural environment including water resources, as quarries tend to be constructed into major aquifers (i.e. limestone / sandstone which have high water resource potential where water can be used for e.g. public drinking water supply) This aspect doesn’t seem to have been considered.”<sup>25</sup>*

**91.** *“The responsibilities of local authorities and government departments (particularly the EA) must be more closely defined, so that issues of huge national importance (such as water quality and conservation) are properly addressed. It is vital to avoid gaps in responsibility. At present it seems to us that it is too easy for a potential disaster to be overlooked. (‘Not my department etc...’). Saying sorry after the event is not good enough.”<sup>26</sup>*

**92.** *“The existing policies of the MLP appear to have worked well and probably only require minor amendments. Nevertheless, it considered that it is worth reviewing this element of the plan to reflect the changing objectives for restoration and in particular the Water Park area. The emphasis on ‘earliest’ opportunity for restoration can be unhelpful when looking at larger schemes where an ‘interim’ restoration may be acceptable until the overall scheme is completed. This may be particularly relevant when dealing with water issues in the restoration of sand & gravel areas. In view of the number of stakeholders involved in the Cotswold Water Park (and no doubt repeated on a smaller scale at most quarries) there is*

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<sup>25</sup> The Environment Agency – Environmental Management Team.

<sup>26</sup> Crossways & Scowles Action Group.

*benefit in seeking a pre-determined restoration strategy for various sites which should also retain flexibility to reflect the longer-term nature of mineral extraction in order that any changing objectives can be incorporated.”<sup>27</sup>*

### ◆ SA Flooding Objective

**93.** SA Objective 10 of the 15 SA Objectives in the Gloucestershire MWDF SA Framework is: *“To prevent flooding, in particular preventing inappropriate development in the floodplain and to ensure that development does not compromise sustainable sources of water supply.”*

**94.** This Objective was developed through consultation with stakeholders and in particular through fairly detailed comments from the EA.<sup>28</sup>

**95.** Thus through the SA process every issue/option in the MCS Issues & Options has been tested against this specific objective.<sup>29</sup>

### ◆ SA Test of Issues & Options

**96.** Given that there were no specific questions in the consultation relating to hydrological/flooding matters there is no specific

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<sup>27</sup> The Co-operative Group. For further details about these and other responses to the MCS consultation see the Minerals Core Strategy Issues and Options Consultation Response Report at: [http://www.goucestershire.gov.uk/index.cfm?article\\_id=14094](http://www.goucestershire.gov.uk/index.cfm?article_id=14094)

<sup>28</sup> For details see MWDF SA/SEA Response Report: [http://www.goucestershire.gov.uk/index.cfm?article\\_id=11577](http://www.goucestershire.gov.uk/index.cfm?article_id=11577)

<sup>29</sup> Preferred Options and Submission documents will also be tested.

scoring on this issue. But see the above paragraph and footnote 24.

## ◆ Policy Options

97. Specific policy options are not suggested in this report, but what it has made clear is that:

- A SFRA is being undertaken by the County Council that will inform the MCS and subsequent Minerals DPDs.
- The Secretary of State has made the decision not to 'save' MLP Policy E12 as it repeats Government policy in PPS25.
- The SA process tests developing options in terms of their potential for increasing flooding and their impacts on the water environment.

98. Given that the MLP was only fairly recently adopted MLP Policies E11 and E13 (or similarly worded policies) may be able to be rolled forward into the MCS or other DPDs as appropriate.

- The Environmental Constraints Hierarchy in the current MLP includes 'The Water Environment' as a Primary Constraint.<sup>30</sup> It may be appropriate for this term to be clarified, specifically stating that this means: Major aquifers, Groundwater Source Protection Zones, Groundwater Nitrate Vulnerable Zones (and anything else suggested by the EA or in EA policy document *Groundwater Protection: Policy and Practice (GP3)*). More detailed DPDs will clearly contain

additional appropriate water environment / flooding policies.

- Minerals can only be worked where they are found, therefore the water environment and SFRA will have implications in terms of identifying future mineral resource areas and related restoration strategies. See also Technical Evidence Papers A & B and 'After Minerals' restoration paper.

## Section 7

### Flooding /Hydrological Issues & Waste Management Facilities

## ◆ Policy Requirements

### Planning Policy Statement 10: Planning for Sustainable Waste Management (PPS10)

99. PPS10 indicates that the control of processes are a matter for the pollution control authorities who will ensure that ambient air and water quality meet standards that guard against impacts to the environment and human health.

100. "Waste planning authorities should work on the assumption that the relevant pollution control regime will be properly applied and enforced."<sup>31</sup>

101. Annex E provides criteria for the waste planning authorities to use when testing the suitability of sites and areas. Paragraph (a) of

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<sup>30</sup> MLP, Page 18.

<sup>31</sup> PPS10, Page 13, Paragraph 27.

Annex E relates to the protection of water resources and states: “*Considerations will include the proximity of vulnerable surface and groundwater. For landfill or land-raising, geological conditions and the behaviour of surface water and groundwater should be assessed both for the site under consideration and the surrounding area. The suitability of locations subject to flooding will also need particular care.*”

### **Planning Policy Statement 10: Planning for Sustainable Waste Management (PPS10) Companion Guide**

102. The Companion guide to PPS10 provides a section relating to various pieces of waste legislation. It highlights Regulation 5 of the Landfill (England and Wales) Regulations 2002, which places a specific responsibility on planning authorities to consider Schedule 2, paragraph 1(1) which states:

*“The location of a landfill must take into consideration requirements relating to –*

- a) the distances from the boundary of the site to residential and recreational areas, waterways, water bodies and other agricultural or urban sites;*
- b) the existence of groundwater, coastal water or nature protection zones in the area;*
- c) the geological or hydro geological conditions in the area;*
- d) the risk of flooding, subsidence, landslides or avalanches on the site; and*
- e) the protection of the natural or cultural heritage in the area.”<sup>32</sup>*

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<sup>32</sup> PPS10 Companion Guide, Page 88, Paragraph 8.21.

103. It further points to the indicators for determining whether an application is a Schedule 2 project under EIA regulations. These include:

- Installations for the disposal of waste (where not Schedule 1 projects); where the disposal is by incineration; or the area of the development exceeds 0.5 hectare; or the installation is to be sited within 100 metres of any controlled waters.
- Waste water treatment plants (where not Schedule 1 projects); where the development exceeds 1,000 square metres.
- (viii) Sludge-deposition sites and storage of scrap iron, including scrap vehicles; where (i) the area of deposit or storage exceeds 0.5 hectare or (ii) a deposit is to be made or scrap to be stored within 100 metres of controlled waterways.

### **Draft Regional Spatial Strategy**

104. The waste policies in the Draft RSS do not specifically refer to the water environment or to flooding issues. Please see Section 4 of this report for the general flooding and water related policies within the Draft RSS.

### **Waste Local Plan Policy 33 – Water Resources - Pollution Control**

105. This policy states:  
*“Proposals for waste development will only be permitted where there would be no unacceptable risk of contamination to surface*

*watercourses, bodies of water or groundwater resources.*<sup>33</sup>

106. GCC applied to 'save' this policy and the Secretary of State deemed that it should be saved until replaced.

## **Waste Local Plan Policy 34 – Water Resources - Flood Control**

107. This policy states:

*"Proposals for waste development will only be permitted where there would be no unacceptable risk of development impeding the flow of surface or groundwater, reducing flood storage capacity or increasing the rate of surface water runoff, which would result in flooding near the site or elsewhere."*<sup>34</sup>

108. GCC applied to 'save' this policy and the Secretary of State deemed that it should not be saved as it duplicates the requirements of PPS25.

### **◆ Responses to WCS Issues & Options Consultation on Hydrological / Flooding Matters**

109. Within the WCS Issues & Options papers there were no *specific* flooding issues or options raised. Background contextual information was provided in the WCS Issues & Options Paper (Part B), under background information on rivers and floodplains and under climatic factors.<sup>35</sup> Stakeholder comments on

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<sup>33</sup> Gloucestershire WLP, Page 119.

<sup>34</sup> Gloucestershire WLP, Page 120.

<sup>35</sup> WCS Issues & Options Part B, Page 15, Paragraph 2.21 and Paragraph 2.30.

hydrological and flooding issues were not extensive. A summary of all stakeholder comments, and a more detailed schedule can be viewed in the reports: Waste Core Strategy – Stakeholder Responses Summary Report & Waste Core Strategy Stakeholders Responses Complete Schedule at:

<http://www.goucestershire.gov.uk/index.cfm?articledid=13349>

### **◆ SA Flooding Objective**

110. As mentioned in Section 6 under this sub-heading, the SA process fully tests emerging options in terms of potential impacts on the water environment and flood risk etc.

### **◆ SA Test of Issues & Options**

111. Given that there were no *specific* questions in the consultation relating to hydrological/flooding matters there is no specific scoring on this issue. But see the above paragraph.

### **◆ Policy Options**

112. In a similar vein to recommendations for the MCS, specific policy options are not suggested in this report. What this report has made clear is that:

A SFRA is being undertaken by the County Council that will inform the WCS and subsequent Waste DPDs.

- The Secretary of State has made the decision not to 'save' MLP Policy 34 as it repeats Government policy in PPS25.
- The SA process tests developing options in terms of their potential for increasing flooding and their impacts on the water environment.
- It may not be appropriate to have a specific policies on flooding or groundwater protection in the WCS, but the locational strategy should avoid development in the floodplain and advice should be taken from the EA in terms of major aquifers, Groundwater Source Protection Zones, Groundwater Nitrate Vulnerable Zones and anything else as per the EA policy document *Groundwater Protection: Policy and Practice (GP3)*. More detailed DPDs will clearly contain additional appropriate water environment / flooding policies.
- Given that the WLP was only fairly recently adopted (October 2004), WLP Policy 33 may be able to be rolled forward into the WCS.
- There are issues in terms of the location of some strategic waste sites. There is choice over where such facilities are located. This is addressed in Technical Evidence Paper (WCS-C) Broad Locational Analysis. This may be further informed by the outcomes of the SFRA mentioned in Section 5.

## Section 8

### Conclusion

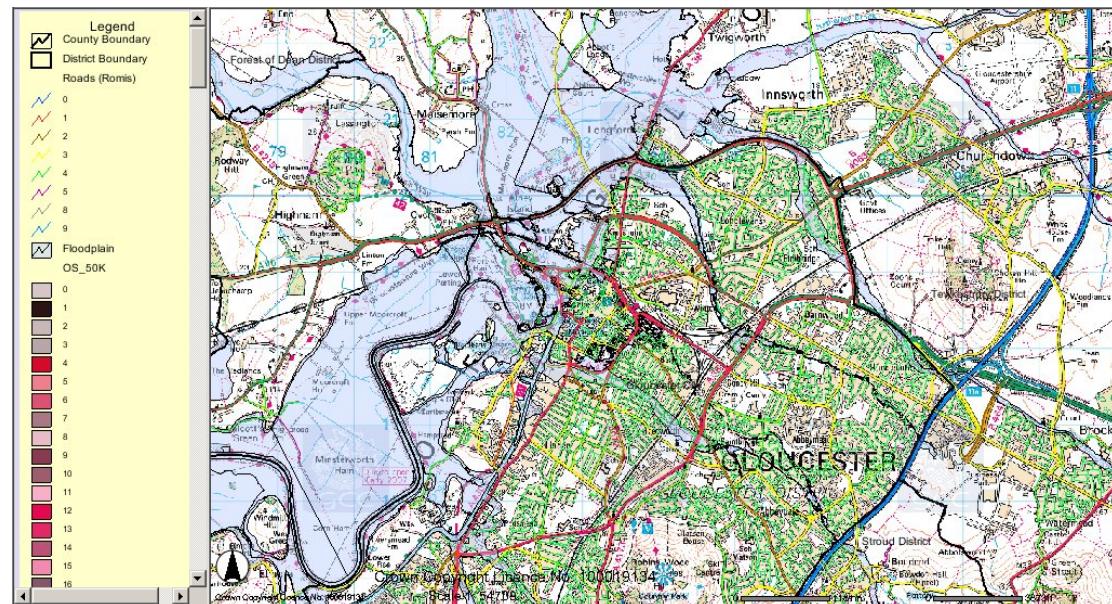
113. This report has provided background information on flooding and hydrological issues in Gloucestershire. It has also consider changes in National and Regional policy with respect to flooding (the requirements of PPS25 in particular) and the way in which this will impact on mineral working and waste management in Gloucestershire.

114. It has outlined the important fact that flooding is considered within the SA process and that Gloucestershire County Council is undertaking a SFRA (in partnership with the six District Councils) that will inform the emerging MCS and WCS documents. Other hydrological issues such as ground water protection are also important and these will need to be considered in the WCS / MCS as appropriate.

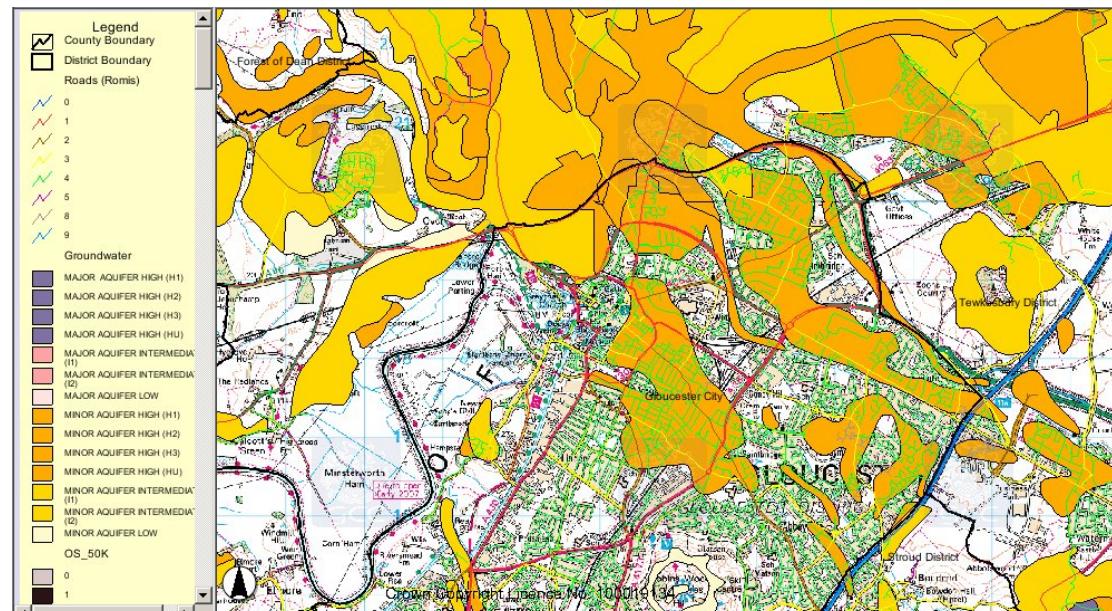
## **Appendix 1: Areas of Floodplain & Ground Water (Major – Minor Aquifers) for Gloucester / Cheltenham / Tewkesbury**

### **Gloucester**

#### **Floodplain**

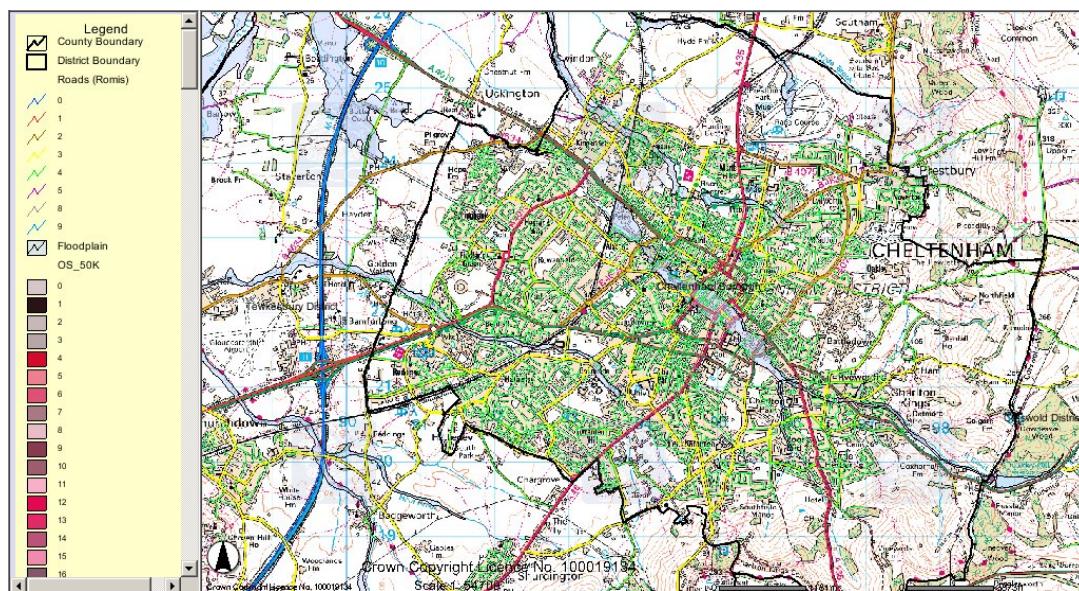


#### **Groundwater**

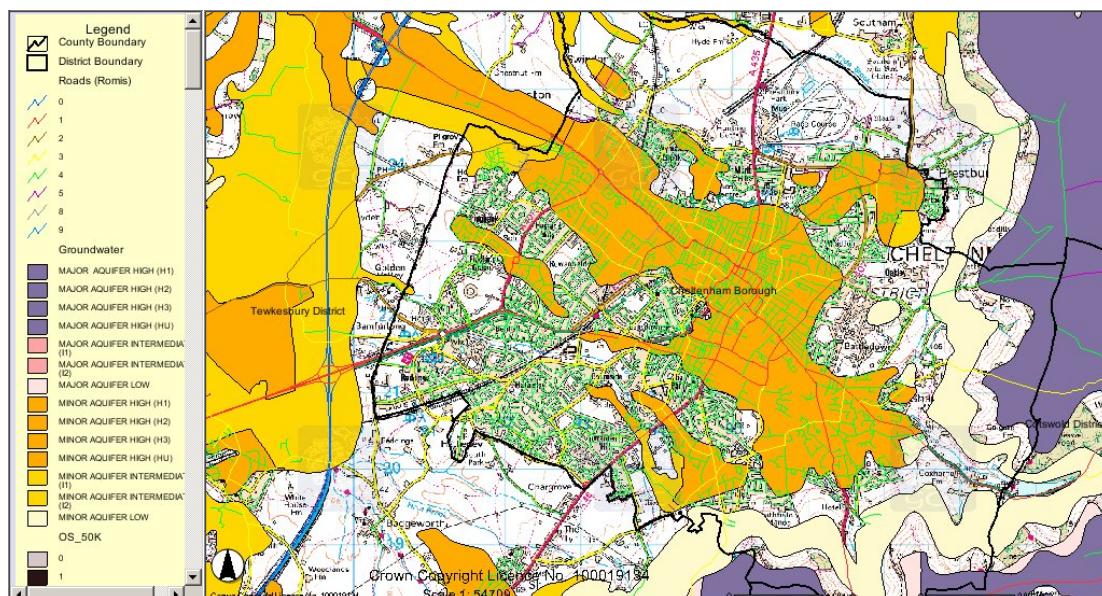


## Cheltenham

### Floodplain

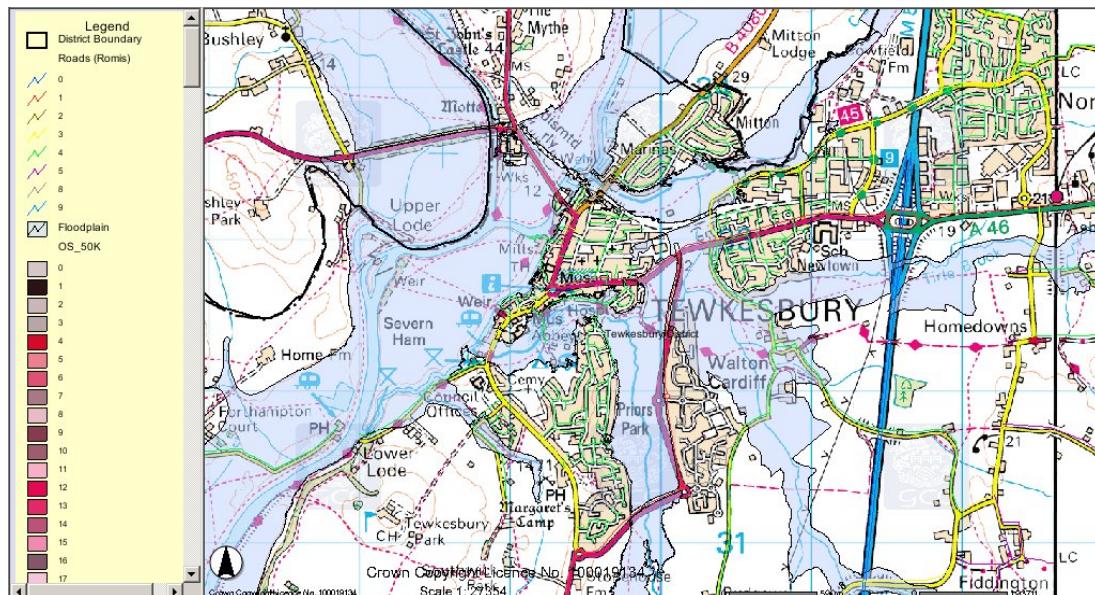


### Groundwater

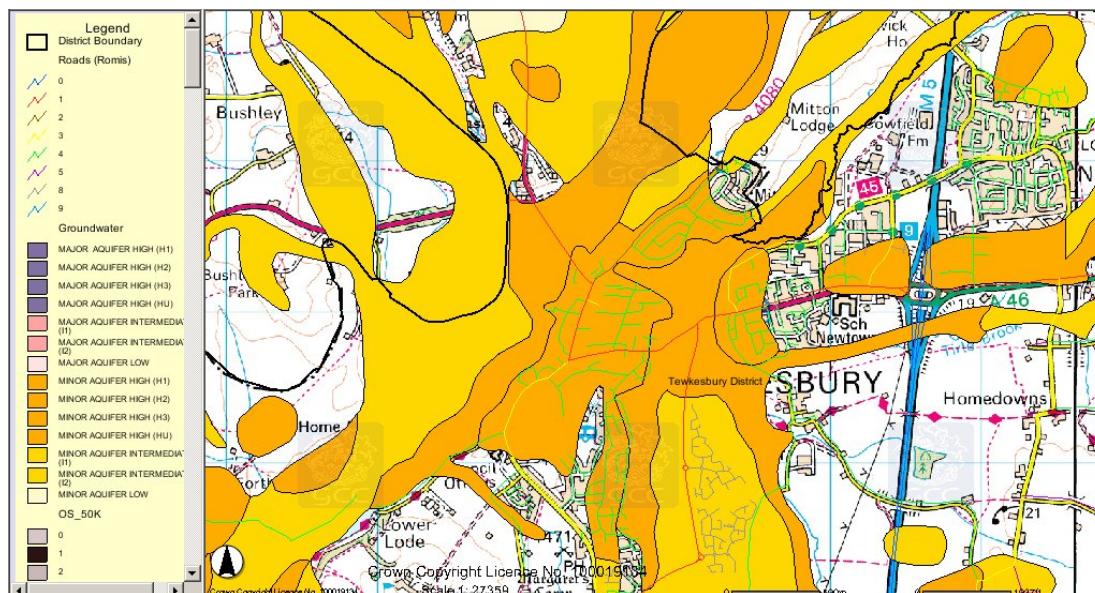


## Tewkesbury

### Floodplain



### Groundwater



## **Appendix 2: Environment Agency Flood Zones (Table D1 of PPS25 Annex D)**

### **Zone 1: Low Probability**

#### **Definition**

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).

#### **Appropriate uses**

All uses of land are appropriate in this zone.

#### **FRA requirements**

For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention. See Annex E for minimum requirements.

#### **Policy aims**

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

### **Zone 2: Medium Probability**

#### **Definition**

This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.

#### **Appropriate uses**

The water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in Table D.2 are appropriate in this zone.

Subject to the Sequential Test being applied, the highly vulnerable uses in Table D.2 are only appropriate in this zone if the Exception Test is passed.

#### **FRA requirements**

All development proposals in this zone should be accompanied by a FRA.

#### **Policy aims**

In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

### **Zone 3a: High Probability**

#### **Definition**

This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

#### **Appropriate uses**

The water-compatible and less vulnerable uses of land in Table D.2 are appropriate in this zone. The highly vulnerable uses in Table D.2 should not be permitted in this zone.

The more vulnerable and essential infrastructure uses in Table D.2 should only be

permitted in this zone if the Exception Test is passed. Essential

infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

### **FRA requirements**

All development proposals in this zone should be accompanied by a FRA.

### **Policy aims**

In this zone, developers and local authorities should seek opportunities to:

- i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques;
- ii. relocate existing development to land in zones with a lower probability of flooding; and
- iii. create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

## **Zone 3b: The Functional Floodplain**

### **Definition**

This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

### **Appropriate uses**

Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

### **FRA requirements**

All development proposals in this zone should be accompanied by a FRA.

### **Policy aims**

In this zone, developers and local authorities should seek opportunities to:

- i. reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and
- ii. relocate existing development to land with a lower probability of flooding.

### **Appendix 3: Flood Risk Vulnerability Classification (Table D2 of PPS25 Annex D)**

#### **Essential Infrastructure**

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.

#### **Highly Vulnerable**

- Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent.

#### **More Vulnerable**

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

#### **Less Vulnerable**

- Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment plants.
- Sewage treatment plants (if adequate pollution control measures are in place).

#### **Water-compatible Development**

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel workings.
- Docks, marinas and wharves.
- Navigation facilities.
- MOD defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	x	Exception Test Required	✓
	Zone 3b 'Functional Floodplain'	Exception Test Required	✓	x	x	x

✓ Development is appropriate

x Development should not be permitted

For the Exception Test to be passed:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared. If the DPD has reached the 'submission' stage – see Figure 4 of PPS12: *Local Development Frameworks* – the benefits of the development should contribute to the Core Strategy's Sustainability Appraisal;
- the development should be on developable<sup>23</sup> previously-developed land or, if it is not on previously developed land<sup>24</sup>, that there are no reasonable alternative sites on developable previously-developed land; and
- a FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

The Exception Test should be applied by decision-makers only after the Sequential Test has been applied and in the circumstances shown in Table D.1 when 'more vulnerable' development and 'essential infrastructure' cannot be located in Zones 1 or 2 and 'highly vulnerable' development cannot be located in Zone 1. It should not be used to justify 'highly vulnerable' development in Flood Zone 3a, or 'less vulnerable'; 'more vulnerable'; and 'highly vulnerable' development in Flood Zone 3b.

The Exception Test should be applied to LDD site allocations for development and used to draft criteria-based policies against which to consider planning applications. Where application of the Sequential Test indicates it needs to be applied, this should be done as early in the plan-making process as possible – in LDDs, including Supplementary Planning Documents (such as site development briefs). This will minimise the need to apply it to individual planning applications.

Where the Exception Test has been applied in LDD allocations or criteria-based policies, the local planning authority should include policies in its LDDs to ensure that the developer's FRA satisfies criterion c) in para. D9. The Environment Agency and other appropriate operating authorities such as Internal Drainage Boards should be consulted on the drafting of any policy intended to apply the Exception Test at a local level.

Compliance with each part of the Exception Test should be demonstrated in an open and transparent way.

Criterion b) of para. D9 reflects the Government's commitment to making the most

efficient and effective use of land in line with the principles of sustainable development. Reflecting this, Planning Policy Statement 3 (PPS3): *Housing25* sets out the Government's objectives for a flexible, responsive supply of land for housing which gives priority to the use of previously-developed land for development. However, flood risk should be taken into account in determining the suitability of the land for development.

#### **Appendix 4: Environment Agency Response to MCS Issues & Options Consultation on Water Resources Issues**

**"Effects of Quarrying on Water Resources -** The EA has a duty under the Water Resources Act 1991 to protect and conserve water resources and where appropriate, enhance the conservation of water resources as a statutory consultee under the Town & Country Planning Acts and it is through this route that we will make appropriate representations to protect the water environment from quarrying activities which could have the potential to cause harm to the water environment. The remit of the Agency is to achieve the management and protection of water resources on a sustainable basis. The Agency would object to any mineral extraction which leads to harm of water resources - quarries normally on major aquifers - decisions need to be made on locations with respect to groundwater resources and possible impacts. High risk sites to groundwater should be avoided.

The Agency recognises the economic importance of these activities and the fact that the minerals industry needs these raw materials for construction and building. There are potential conflicts for interest with groundwater aquifers. The Agency would like to see water supply aquifers protected and borehole/wells/springs also afforded protection. Aquifer vulnerability maps and Source Protection Zone Maps should be used to define zones of high risk. We also have a Groundwater Protection Policy (GPP) - 'Policy and Practice for the Protection of Groundwater' which lays out stance on how quarries can impact groundwater unless measures are put in place to provide protection through - S106 - mitigation - re-site where inappropriate. In fissure flow aquifers - i.e. in the Cotswold Limestone - the whole aquifer can be a Source Protection Zone.

**Physical disturbance of the aquifer -** this can lead to loss of water supply boreholes as water table is intercepted and also impede flows by causing local drawdowns in the water table around the voids which can leads to loss of water supply to boreholes/ wells/ springs and rivers.

Quarries can drain aquifers particularly if sited in poor locations i.e. at the bottom of the hydraulic gradient and fill out like a bath tub. They can also interconnect separate aquifers i.e. in the Cotswolds the Great Oolitic and Inferior Oolitic limestones. This can have major implications for groundwater resources as water flows are diverted and the groundwater regime is altered. This can affect water supply users.

Quarries need 'dewatering' (normally over substantial periods of time) so this can lead to groundwater being intercepted and drawn into the quarry void produced. 'Dewatering' locally lowers water tables and can lead to a loss of water in boreholes, wells, springs and baseflows to rivers in the locality. This can affect drinking water supplies, wetlands (SSSIs), wet woodlands (SSSIs), ecological habitats which rely on water i.e. rivers , other water users e.g. irrigation, recreational

We would like to see S106 agreements setup through the planning regime for monitoring the surface water/groundwater environment. These agreements will enable the Agency to help protect water users and monitor quarry activities through out the lifetime of the quarry. The quality and quantity of water needs to be protected and monitored through a network of boreholes/springs and rivers. If damage to the water environment is apparent - 'mitigation' measures should be put in place to safeguard water users. We would like this agreed up front to planning permission being granted. Recharging schemes to groundwater from trenches and boreholes. 'Environmental/Hydrogeological Assessment' of water resources in relation to the newly proposed quarry development which discusses the resultant impacts and mitigation measures. Of particular concern is sub-water table quarries which intercept groundwater - this will lead to interception and dewatering of the aquifer.

Discharge Consents maybe required to discharge any dewatered waters into controlled waters and these will have to meet the criteria set out in the consent.

**Pollution Prevention -** quarries normally sited on Major aquifers which are at high risk. Fuels/oils/chemicals should be adequately stored/bunded to prevent pollution of aquifers/water resources. Toilet and sewage facilities should be adequately constructed and sited to prevent pollution of the aquifers and the wider environment.

**Other - after use** The removal of the rock leads a void which is often used for landfilling. These would be mainly sited on major aquifers which can lead to pollution of the aquifer and drinking water supplies. The Agency will object to landfilling within high risk areas e.g. major aquifer in a Source Protection Zone."



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