

# Oxfordshire County Council Minerals & Waste Development Framework

## Level 1 - Strategic Flood Risk Assessment

**'Living Document'**

October 2010



Prepared for

## Revision Schedule

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**Level 1 Minerals & Waste Strategic Flood Risk Assessment**  
October 2010

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## Acronyms and Abbreviations

| Abbreviation | Description  |
|--------------|--|
| AONB         | Area of Outstanding Natural Beauty                 |
| BGS          | British Geological Society                         |
| CFMP         | Catchment Flood Management Plan                    |
| CLG          | Communities and Local Government                   |
| Defra        | Department for Environment, Food and Rural Affairs |
| DPD          | Development Plan Document                          |
| DTM          | Digital Terrain Model                              |
| FRA          | Flood Risk Assessment                              |
| GIS          | Geographical Information System                    |
| IDB          | Internal Drainage Board                            |
| LDDs         | Local Development Documents                        |
| LDF          | Local Development Framework                        |
| LDS          | Local Development Scheme                           |
| LiDAR        | Light Detection and Ranging                        |
| LPA          | Local Planning Authority                           |
| ODPM         | Office of Deputy Prime Minister                    |
| PCPS 2004    | Planning and Compulsory Purchase Act 2004          |
| PPS          | Planning Policy Statement                          |
| RBMP         | River Basin Management Plan                        |
| RFRA         | Regional Flood Risk Appraisal                      |
| RPG          | Regional Planning Guidance                         |
| RSS          | Regional Spatial Strategy (South East Plan)        |
| SA           | Sustainability Appraisal                           |
| SAC          | Special Area for Conservation                      |
| SFRA         | Strategic Flood Risk Assessment                    |
| SPA          | Special Protection Area                            |
| SPD          | Supplementary Planning Document                    |
| SPZ          | Source Protection Zone                             |
| SUDS         | Sustainable Drainage Systems                       |
| WAG          | Welsh Assembly Government                          |
| WCS          | Water Cycle Study                                  |
| WFD          | Water Framework Directive                          |

## Glossary

| Term                              | Definition  |
|-----------------------------------|---|
| Aquifer                           | A source of groundwater comprising water-bearing rock, sand or gravel capable of yielding significant quantities of water.  |
| Attenuation                       | In the context of this report - the storing of water to reduce peak discharge of water.   |
| Catchment Flood Management Plan   | A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.  |
| Culvert                           | A channel or pipe that carries water below the level of the ground.   |
| Drift Geology                     | Sediments deposited by the action of ice and glacial processes  |
| Exception Test                    | The Exception Test is described in PPS25 and should be applied following the application of the sequential test. Conditions need to be met before the exception test can be applied.  |
| Flood Defence                     | A 'formal' flood defence is infrastructure that is designed and used to protect an area against flooding. An 'informal' flood defence is a structure that has often not been specifically built to retain floodwater and is not maintained for this specific purpose. Boundary walls and industrial buildings situated immediately adjacent to rivers often act as informal flood defences. |
| Floodplain                        | Area adjacent to river, coast or estuary that is naturally susceptible to flooding.   |
| Flood Resilience                  | Measures that minimise water ingress and promotes fast drying and easy cleaning, to prevent any permanent damage.   |
| Flood Resistant                   | Measures to prevent flood water entering a building or damaging its fabric. This has the same meaning as flood proof.   |
| Flood Risk                        | The level of flood risk is the product of the frequency or likelihood of the flood events and their consequences (such as loss, damage, harm, distress and disruption)  |
| Flood Risk Assessment             | A FRA is required for any planning application at a potential risk of flooding to ensure the proposed development is not at an unacceptable risk of flooding and does not increase the risk of flooding elsewhere.  |
| Flood Storage                     | A temporary area that stores excess runoff or river flow.   |
| Flood Zone                        | Flood Zones show the probability of river and sea flooding, ignoring the presence of existing defences (PPS25)  |
| Flood Zone 1                      | Low probability of fluvial flooding. Probability of fluvial flooding is < 0.1%  |
| Flood Zone 2                      | Medium probability of fluvial flooding. Probability of fluvial flooding is 0.1 – 1%.  |
| Flood Zone 3a                     | High probability of fluvial flooding. Probability of fluvial flooding is 1% (1 in 100 years) or greater.  |
| Flood Zone 3b                     | Functional floodplain. High probability of fluvial flooding, >5%  |
| Fluvial                           | Relating to the actions, processes and behaviour of a water course (river or stream)  |
| Freeboard                         | Height of flood defence crest level (or building level) above designed water level  |
| Functional Floodplain             | Land where water has to flow or be stored in times of flood.  |
| Groundwater                       | Water that is in the ground, this is usually referring to water in the saturated zone below the water table.  |
| Local Development Framework (LDF) | The core of the updated planning system (introduced by the Planning and Compulsory Purchase Act 2004). The LDF comprises the Local Development Documents, including the development plan documents that expand on policies and provide greater detail. The development plan includes a core strategy, site allocations and a proposals map.   |

| Term                                    | Definition  |
|---|---|
| Local Planning Authority (LPA)          | Body that is responsible for controlling planning and development through the planning system.  |
| Main River                              | Watercourse defined on a 'Main River Map' designated by DEFRA. The EA has permissive powers to carry out flood defence works, maintenance and operational activities for Main Rivers only.  |
| Mitigation measure                      | An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.   |
| Overland Flow                           | Flooding caused when intense rainfall exceeds the capacity of the drainage systems or when, during prolonged periods of wet weather, the soil is so saturated such that it cannot accept any more water.  |
| Planning Policy Statement 25 (PPS25)    | Planning Policy Statement 25 (PPS25) 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.  |
| Residual Flood Risk                     | The remaining flood risk after risk reduction measures have been taken into account.  |
| Return Period                           | Average time period between rainfall or flood events with the same intensity and effect.  |
| River Catchment                         | The areas drained by a river.   |
| Sequential Test                         | Aims to steer new development to areas of lowest flood risk. The Sequential Test is described in PPS25.   |
| Sewer flooding                          | Flooding caused by a blockage or overflowing in a sewer or urban drainage system.   |
| Solid Geology                           | Solid rock that underlies loose material and superficial deposits on the earth's surface.   |
| Source Protection Zone                  | Defined areas in which certain types of development are restricted to ensure that groundwater sources remain free from contaminants.  |
| Sustainability                          | To preserve /maintain a state or process for future generations   |
| Sustainable drainage system             | Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques. These systems endeavour to mimic the natural movement of water from a development and in doing so reduce flood risk, improve water quality and often provide an attractive feature. |
| Sustainable development                 | Development that meets the needs of the present without compromising the ability of future generations meeting their own needs.   |
| Sustainable Flood Risk Management       | Sustainable Flood Risk Management promotes a catchment wide approach to flooding that uses natural processes and systems (such as floodplains and wetlands) to slow down and store water.   |
| Topographic survey                      | A survey of ground levels.  |
| Tributary                               | A body of water, flowing into a larger body of water, such as a smaller stream joining a larger stream.   |
| Watercourse                             | All rivers, streams, drainage ditches (i.e. ditches with outfalls and capacity to convey flow), drains, cuts, culverts and dykes that carry water.  |
| 1 in 100 year event                     | Event that on average will occur once every 100 years. Also expressed as an event, which has a 1% probability of occurring in any one year.   |
| 1 in 100 year event plus climate change | 1 in 100 year flood event that would occur if peak river flows increased by 20% to simulate the impacts of climate change. This increase is set out in PPS25 and includes a 30% increase in rainfall and 20% increase in river flow.  |
| 1 in 100 year design standard           | Flood defence that is designed for an event, which has an annual probability of 1%. In events more severe than this the defence would be expected to fail or to allow flooding.   |

## Strategic Flood Risk Assessment Pro Forma

The following table has been reproduced from the Level 1 SFRA outputs outlined in the practice guide companion to Planning Policy Statement (PPS) 25 'Living Draft'. It is presented here to demonstrate that the objectives of the Level 1 Minerals and Waste SFRA under PPS25 have been met and to provide those who review this SFRA a ready reference to where responses to the questions raised below can be found within this document.

| Topic Area and Question  | Location in Document    |
|--|-------------------------|
| Plans showing the LPA area, main rivers, ordinary watercourses and flood zones, including functional floodplain (if appropriate), across the County, as well as all previously allocated minerals, waste and secondary and recycled aggregate development sites (or sites to be considered in the future) and Strategic Minerals Resource Areas. | Appendix A, B, C & D    |
| An assessment of the implications of climate change for flood risk at allocated development sites over an appropriate time period  | Appendix A, B, C & D    |
| Plans to show areas at risk from other sources of flooding such as surface water and groundwater flooding  | Appendix A, B, C, D & E |
| Flood risk management measures, including location and standard of infrastructure and the location of flood warning systems  | Appendix A, B, C & D    |
| Locations where additional development may significantly increase flood risk elsewhere through the impact on existing sources of flooding, or by the generation of increased surface water runoff (a surface water management plan may be needed)  | Section 7, 8 & 11       |
| Guidance on the preparation of FRAs for allocated development sites  | Section 12              |

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## Executive Summary

Scott Wilson has been commissioned to prepare a Level 1 Strategic Flood Risk Assessment (SFRA) on behalf of Oxfordshire County Council (OCC). The SFRA report will be used by the Council to assess flood risk posed to potential minerals and waste site allocations and inform the council's application of the Sequential Test to these sites.

This report incorporates all relevant information from the Cherwell and West Oxfordshire SFRA finalised in April 2009 including associated minerals and waste maps and should now be used as the sole point of reference for minerals and waste allocations and flood risk in Oxfordshire.

The study area is largely rural and has the lowest population density in the South East with almost 40% of the County designated as an Area of Outstanding Natural Beauty or an Area of High Landscape Value.

The County includes a number of large main rivers and associated tributaries including the River Thames, The River Windrush, River Evenlode, River Cherwell, River Ock and River Thame.

In 2007 severe flooding was experienced across the County which was attributed to a mixture of fluvial, surface water and groundwater flooding.

The main minerals worked in Oxfordshire are sharp sand and gravel, soft sand, limestone and ironstone, all mainly for aggregate use. Chalk, clay and fullers earth have also been worked in the area. These minerals are worked predominantly to supply local markets, except for fuller's earth which is a nationally scarce mineral.

Oxfordshire currently relies heavily on landfill for disposing of its waste, although the Joint Municipal Waste Partnership (comprising the County Council and the 5 District Councils) has been able to record increasing success in the rate at which waste is recycled and composted. The main landfill sites are at Alkerton, Finmere, Stanton Harcourt, Ardley and Sutton Courtenay.

In accordance with the Practice Guide Companion to Planning Policy Statement 25 Development and Flood Risk (PPS25) recommendations, the SFRA has been structured in a two level approach. This report forms the Level 1 SFRA providing an overview of flood risk issues in relation to possible minerals and waste development across all five Districts within the study area being Cherwell (CDC), West Oxfordshire (WODC), Vale of White Horse (VWHDC), South Oxfordshire (SODC) and Oxford City Council (the City).

Information collated as part of the Cherwell and West Oxfordshire SFRA and Vale of White Horse and South Oxfordshire SFRA have been used in this study. In addition, data has been obtained from the Environment Agency, Thames Water and British Waterways where updates to original data sets are available.

The primary objective of the study is to enable OCC to undertake sequential testing in line with the Government's flood risk and planning policy statement (PPS25) to inform development of OCC's emerging LDF documents.

PPS25 requires that all development is steered to areas of lowest risk. Development is only permissible in areas at risk of flooding in exceptional circumstances where it can be demonstrated that there are no reasonable available sites in areas of lower risk and the benefits of that development outweigh the risks from flooding. It must be demonstrated that such development will

be 'safe'. In order to ensure a development is 'safe', mitigation/management measures to minimise risk to life and property should flooding occur will be required.

The SFRA forms an essential reference tool providing the building blocks for future strategic planning.

The core output of this study is a series of maps (included in Appendices A to E) which include a narrative of flood risk issues and a presentation of key facts for four key data groups lying with the Flood Zones being:

- Crushed Rock Resource Areas
- Sand and Gravel Resource Areas
- Individual Minerals Sites
- Individual Waste Sites

In addition to flood risk, planning issues and policies that are pertinent to the County and that may affect the potential minerals and Waste sites have also been examined and reported. Much of the mineral development taking place in Oxfordshire will comprise sand and gravel workings. In accordance with PPS25, these are mainly categorised as 'water compatible development'. However, the County will still need to ensure the Sequential Test is followed before any sites in the flood plain are identified as suitable for extraction.

Waste development (except landfill and hazardous waste facilities) is classified as 'less vulnerable development' and in accordance with PPS25 guidelines may take place in Flood Zone 1 to 3a if the Sequential Test is satisfactorily undertaken. However, landfill and sites used for hazardous waste management facilities will need to pass the Exception Test before being considered acceptable in Flood Zone 3a. No waste development is permitted in Flood Zone 3b.

The SFRA will be used for LDF strategic planning and to inform development control decisions. It is imperative that the SFRA be adopted as a 'living document' to be reviewed regularly in light of emerging policy directives and an improved understanding of flood risk within the Study Area, including any significant changes in flood risk information supplied by the Environment Agency (for example where the Flood Map covering Oxfordshire is updated or if there are any significant flood events). It is suggested that as monitoring and reporting of the LDF takes place every year any change in flood risk knowledge should be reviewed as part of this process to determine whether the SFRA needs to be updated.

# 1 Introduction

## 1.1 Background

- 1.1.1 Oxfordshire County Council (OCC) is the responsible authority for minerals and waste planning and is required to produce a Local Development Framework (LDF) following changes to the local planning system. Once adopted, the Minerals and Waste Development Framework will replace the current Minerals and Waste Local Plan.
- 1.1.2 The LDF is a portfolio of documents known as Local Development Documents (LDDs) that collectively deliver the spatial planning strategy for each local authority area. The LDDs have to undergo a Sustainability Appraisal (SA) which assists LPAs in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments (SFRA's) are one of the documents to be used as the evidence base for planning decisions; they are also a component of the SA process.
- 1.1.3 Scott Wilson prepared a SFRA for Cherwell District Council (CDC), West Oxfordshire District Council (WODC) and OCC in April 2009. This included an assessment of the flooding issues affecting possible minerals and waste sites that might be allocated as suitable for development in those Districts. In May 2009 OCC approached Scott Wilson to request that the minerals and waste element of this work be extended to include the rest of the County i.e. to extend the work to the administrative areas of Vale of White Horse District Council (VOWHDC), South Oxfordshire District Council (SODC) and Oxford City Council (the City).
- 1.1.4 Although originally intended to serve as a follow on report in the style of an addendum to the earlier Cherwell and West Oxfordshire study, this report now forms the primary evidence base with regard to flood risk for minerals and waste sites across the County. Original plans included in the Cherwell and West Oxfordshire SFRA with regard to minerals and waste sites are included in this report (see Appendix C and D). The layout of the plans included in the Cherwell and West Oxfordshire SFRA are slightly different to those prepared for this new report and reflect comments received as the process has evolved.
- 1.1.5 This Minerals and Waste SFRA has been prepared in full accordance with the Government's Planning Policy Statement 25 Development and Flood Risk (PPS25), and its supporting Practice Guide. The Minerals and Waste SFRA has involved consultation with stakeholders and will build upon information gathered as part of the Level 1 & 2 South Oxfordshire District Council & Vale of White Horse District Council SFRA (JBA 2008), Level 1 Cherwell and West Oxfordshire SFRA (Scott Wilson April 2009) and Didcot SFRA completed in 2007.

## 1.2 SFRA Aims & Objectives

- 1.2.1 The main aim of this study is to **assess and map the different levels and types of flood risk** within the OCC study area to be used in the strategic minerals and waste land use planning process.

1.2.2 The aims of the SFRA will be met through the following objectives:

- To provide an assessment of the impact of all potential sources of flooding in accordance with PPS25 using the information available, including an assessment of any future impacts associated with climate change;
- Enable planning policies to be identified to minimise and manage local flooding issues;
- Provide information required to apply the Sequential Test for identification of land suitable for development in line with the principles of PPS25;
- To provide baseline data to inform the SA of the Development Plan Documents (DPDs) with regard to catchment-wide flooding issues which affect the study area;
- To provide sufficient information to allow OCC to assess flood risk for minerals and waste development proposal sites, thereby setting out the requirements for site specific Flood Risk Assessments (FRAs) and the sites where they may be necessary;
- Enable the relevant authorities to use the SFRA as a basis for decision making at the planning application stage;
- Provide information on flood risk associated with other forms of development taking place at minerals sites and potential methods of restoration/after use of mineral extraction workings including habitat creation and flood alleviation capacity.
  - Assess the comparative flooding merits of the various strategic minerals resource areas identified by OCC to identify the key differences between the resource areas in terms of flood risk.
  - Identify any opportunities for flood risk reduction, particularly from sand and gravel workings;
  - Be consistent with the Thames Catchment Flood Management Plan and its policy units, incorporating their recommendations into the study.

## 1.3 SFRA Structure

1.3.1 The PPS25 Practice Guide (DCLG 2009) recommends that SFRA's are completed in two consecutive stages. This provides LPAs with tools throughout the LDF process sufficient to inform and update decisions regarding development sites. The two stages are:

- Level 1 SFRA – Study Area, Flood Source & Data Review to enable application of the Sequential Test;
- Level 2 SFRA – Increases scope of SFRA to include development site assessments for Exception Testing.

1.3.2 The results of the Level 1 SFRA will enable OCC to apply the sequential approach to their potential mineral and waste sites and to inform the scope of their SA.

1.3.3 A Level 2 SFRA facilitates the application of the Exception Test where required by providing more detailed information and mapping. The more detailed information would include information on the flood hazard, rate of onset of flooding, velocity and depth of potential flood waters in order for development to be located at the lowest area of risk within a Flood Zone.

1.3.4 The need for a Level 2 assessment will be established following completion of the Level 1 SFRA and application of the Sequential Test by OCC (the Sequential and Exception Tests are discussed in more detail in Sections 5 and 6). For minerals extraction it is acknowledged that

deposits have to be worked where they are located, but their working *'should not increase flood risk elsewhere and need to be designed, worked and restored accordingly'*.

- 1.3.5 This report comprises the Level 1 Oxfordshire County Council Minerals and Waste SFRA and supersedes information contained in the Cherwell and West Oxfordshire SFRA with regard to minerals and waste development.
- 1.3.6 Detailed mapping of individual minerals and waste sites are included in Appendices C and D respectively. For the purpose of this study, construction and demolition recycling sites have been included in Appendix C.

## 2 Study Area

### 2.1 Overview

2.1.1 Oxfordshire is a largely rural County with 635,000 residents across 1,006 square miles. The County has the lowest population density in the South East with almost 40% of the area designated as an 'Area of Outstanding Natural Beauty' or 'Area of High Landscape Value'.<sup>1</sup>

2.1.2 The Study Area includes the following five Councils:

- Cherwell District Council (CDC);
- West Oxfordshire District Council (WODC);
- Vale of White Horse District Council (VWHDC);
- South Oxfordshire District Council (SODC), and;
- Oxford City Council (the City).

**Figure 2-1 Oxfordshire County Council Study Area**



<sup>1</sup> Statistics obtained from OCC website dated 22<sup>nd</sup> July 2009

- 2.1.3 Cherwell District falls within three major river catchments. The River Cherwell forms part of the larger Thames catchment, which comprises about 80% of the District's total area. The District's major urban and rural development areas are within the Upper Thames catchment. The Great Ouse catchment covers approximately 15% of the total area and the Warwickshire Avon catchment, approximately 5%. Banbury is the largest town (population 43,000) located close to the County boundary with Warwickshire and Northamptonshire. Bicester and Kidlington are the other notable urban areas.
- 2.1.4 West Oxfordshire District lies to the west of the City of Oxford and adjoins the Gloucestershire County Council border. The majority of the population resides in the southern section of the District. The largest settlement is the market town of Witney which has a population of approximately 25,000 and has experienced flooding in recent years. The District has a total population of approximately 100,000. Almost all of the land area across the West Oxfordshire District drains into the River Thames. This forms the southern border of the District, flowing in a west to east direction. There are numerous other watercourses across the District (notably the Windrush and the Evenlode), the majority of which form part of the Upper Thames catchment.
- 2.1.5 The Vale of White Horse District although lying south of the City includes an area of the Thames floodplain that extends to the northern limits of the City. Abingdon (population 32,000) is the largest town which sits on the confluence of the Ock with the Thames. The town experienced significant flooding in July 2007 particularly in areas close to the Ock. Other significant towns in the Vale are Faringdon (which forms the western extent of the belt of soft sand extending from the City's western boundary) and Wantage/Grove.
- 2.1.6 South Oxfordshire District forms the south eastern part of the County but, like the Vale, extends to include land adjoining the northern limits of the City. The River Thames forms part of the boundary between South Oxfordshire and the Vale before flowing in a south easterly direction through Wallingford and on to Reading. The River Thame is a significant tributary of the Thames which joins the main river south of Dorchester (between Abingdon and Wallingford). Didcot is the largest town (population 24,000) and is only a few miles from Abingdon. Other significant market towns are at Thame, Henley and Wallingford, the latter being at the centre of the District.
- 2.1.7 The City of Oxford sits roughly at the centre of the County, with a population of some 142,000. The boundary of the City is tightly drawn to include little of the surrounding Green Belt. Only part of one possible mineral site sits within the City area and only a small number of possible waste sites have been identified (mainly existing waste uses). The Thames flows directly through the City and flooding problems are not uncommon from one or more of the channels that have formed. The Environment Agency has recently completed a public consultation on the Oxford Flood Risk Management Strategy, which seeks to reduce flood risk in Oxford through a range of structural and non structural measures. Any works or proposals within Oxford should be cross-checked with EA proposals to ensure that there are no conflicts.

## 2.2 Mineral working in Oxfordshire

- 2.2.1 The main minerals worked in Oxfordshire are sharp sand and gravel, soft sand, limestone and ironstone, all mainly for aggregate use. Chalk, clay and fullers earth have also been worked.

These minerals are worked predominantly to supply local markets, except for fuller's earth which is a nationally scarce mineral.

- 2.2.2 In 2008 the County produced 780,000 tonnes of sand and gravel and 0.5 million tonnes of crushed rock (limestone and ironstone). These levels are significantly lower than the sub-regional apportionments for Oxfordshire that were included in the (recently revoked) Regional Spatial Strategy (1.82 million tonnes per annum for sand and gravel and 1.0 million tonnes per annum for crushed rock). Much of the aggregate extracted comes from two of the four areas identified in the previous Oxfordshire Structure Plan 2011 i.e. at Stanton Harcourt (Lower Windrush Valley) and the Eynsham – Cassington – Yarnton area. Production at the other two areas (Sutton Wick and Sutton Courtenay) is less.
- 2.2.3 New permissions were granted in 2008 for 1.04 million tonnes of sharp sand and gravel and 175,000 tonnes of soft sand. The land banks of permitted reserves for soft sand and sharp sand and gravel at the end of 2008 were 4.0 and 3.8 years respectively, both being substantially below the Government policy level of at least 7 years. This is, however, an improvement on previous years; the low level of these landbanks reflects, but may not be solely due to, the lack of remaining provision for those minerals in the current development plan.
- 2.2.4 Over the period 2003 to 2008 production of crushed rock in Oxfordshire has averaged 0.58 million tonnes per annum (mtpa), comprising about 60% limestone and 40% ironstone. New permissions for 618,000 tonnes of crushed rock were granted in 2008, and the land bank is currently 12.6 years (above the Government policy level of at least 10 years for this mineral). Most of the limestone production comes from the limestone resources in the Oxford – Bicester / Ardley area and the Witney – Burford area, but limestone is also produced from the soft sand quarries near Faringdon. Both of the main production areas are well located to meet needs for crushed rock arising in the central Oxfordshire area and can be accessed from strategic routes. Both areas also lie outside the Cotswolds Area of Outstanding Natural Beauty, which otherwise covers much of the limestone resource of Oxfordshire. Ironstone is only worked in the northern part of the County around Banbury.

## 2.3 Waste Management in Oxfordshire

- 2.3.1 According to the OCC Annual Monitoring Report, Oxfordshire manages approximately 1.8 million tonnes of waste each year; of this:
- 48% is construction demolition and excavation waste (CDE),
  - 35% is commercial and industrial waste (C&I), and
  - 17% is municipal solid waste (MSW).
- 2.3.2 Most CDE waste is recycled (28%) or recovered (29%), mainly for use in restoration of mineral workings and landfills, land improvement and engineering works. The remainder of this waste (approximately 47%) is disposed to landfill.
- 2.3.3 About 32% of C&I waste is recycled and some 21% is treated in some other way. The remainder (47%) is disposed to landfill.
- 2.3.4 Information about these waste streams is not as reliable as the information available for MSW, which is managed by the County and District Councils. Much of this waste is still sent to landfill, but 48% of household waste was recycled or composted in 2009-10 and this has been



increasing year by year. Oxfordshire has no facilities at present for the treatment of residual waste, but there are plans to provide such facilities in order that the Council will be compliant with the Government's landfill diversion targets.

- 2.3.5 Oxfordshire has for many years also received waste for disposal (mainly by rail) from London, which at present does not have sufficient facilities to deal with all its own waste. To move towards a more sustainable approach to waste management, London will begin to deal with a larger proportion of its own waste, and the amounts of waste exported to Oxfordshire will progressively decline. Most of the waste from London is disposed of at Sutton Courtenay landfill, although very small amounts (mostly inert waste) are disposed of at the other main landfill sites in Oxfordshire at Ardley, Stanton Harcourt (Dix Pit) and Finmere. A fifth landfill site at Alkerton (north of Banbury) has remaining void but is currently closed.
- 2.3.6 In addition to a number of active landfills, the County has a number of other waste management facilities – largely recycling and transfer facilities of various types, including facilities that also manage metal wastes and hazardous wastes such as oil and other chemicals. These are generally well distributed across the County in facilities of varying sizes, although many of the sites only have a temporary planning permission.
- 2.3.7 Planning permissions have been given for a number of new waste management facilities in the study area that have not yet been built and further applications continue to be submitted. In the financial year 2008-09 extensions to the composting facilities at Worton Farm, Cassington and Ashgrove Farm, Ardley and Sutton Courtenay landfill were granted along with a major improvement to one of the County's Household Waste Recycling Centres at Oakley Wood (amongst others). In addition to the County Council's intention to let a contract for the construction of a facility to enable its residual waste to be treated before final disposal in an Energy from Waste (incinerator) facility, the Council has entered into contracts for the construction of facilities that will allow food waste to be treated before final disposal.

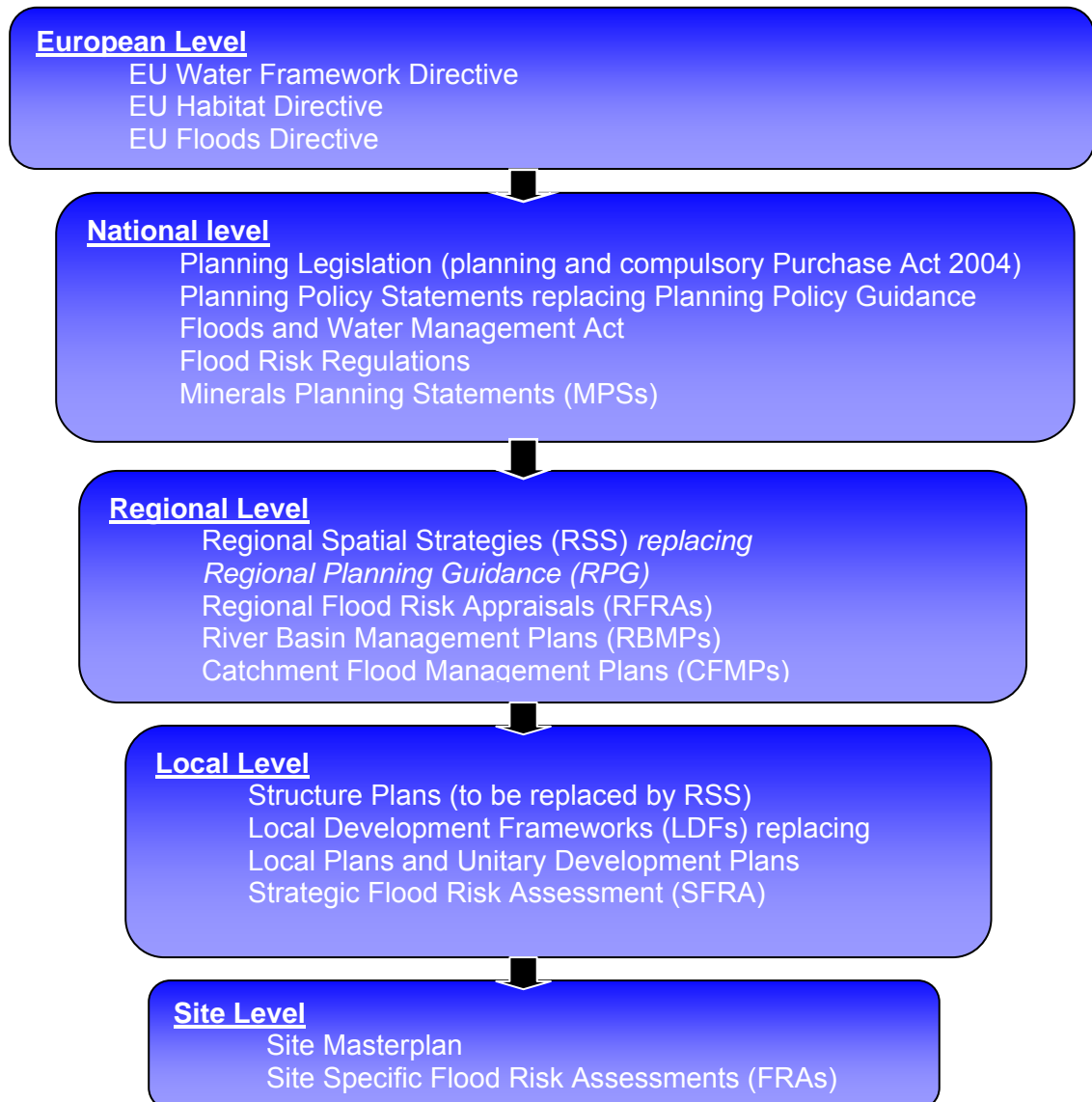
## 3 Policy Context

### 3.1 Introduction

3.1.1 The following sections provide a summary of national, regional and local policy in relation to the provision of minerals and waste sites in OCC's administrative area.

3.1.2 Figure 3-1 below outlines the structure of the current planning system including supporting documents such as the River Basin Management Plans and Catchment Flood Management Plans. It should be noted that the Regional Spatial Strategies (RSS) introduced in 2004 were revoked on 6<sup>th</sup> July 2010 by the new Conservative/Liberal Democrat government. The RSS is still referred to in Figure 3-1 as new guidance is still being developed. Further information is provided in Section 3.4 Regional Policy

**Figure 3-1 Planning System Structure**



## 3.2 European Policy

### Water Framework Directive (December 2000)

- 3.2.1 The Water Framework Directive (WFD) is a substantial piece of EC legislation and the largest directive related to water to date. The directive came into force on 22nd December 2000, and establishes a new integrated approach to the protection, improvement and sustainable use of Europe's rivers, lakes, estuaries, coastal waters and groundwater. The directive requires that all member states manage their inland and coastal water bodies so that a 'good status' is achieved by 2015. This aims to provide substantial long term benefits for sustainable management of water.
- 3.2.2 The Directive introduces two key changes to the way the water environment must be managed across the European Community:
- 3.2.3 Environmental & Ecological Objectives. The WFD provides for Protected Areas and Priority Substances to safeguard uses of the water environment from the effects of pollution and dangerous chemicals. In addition, important ecological goals are set out to protect, enhance and restore aquatic ecosystems.
- 3.2.4 River Basin Management Plans (RBMPs). RBMPs are the key mechanism to ensure that the integrated management of rivers, canals, lakes, reservoirs and groundwater is successful and sustainable. RBMPs aim to provide a framework in which costs and benefits can be properly taken into account when setting environmental and water management objectives.
- 3.2.5 Each RBMP must apply to a 'River Basin District' (RBD) (a geographical area which is defined based on hydrology – see Annex 1, DEFRA & WAG (Welsh Assembly Government) River Basin Planning Guidance (RBPg), August 2006). The main RBD that is relevant to Oxfordshire is the Thames RBD (equivalent to the EA Upper Thames Region and including several major river catchments). The Anglian and Severn RBD's are also affected by the northern fringes of the County.
- 3.2.6 The river basin planning process involves setting environmental objectives for all groundwater and surface water within the RBD, and designing steps and timetables to meet these objectives. The EA is responsible for implementing the WFD in England and Wales and published the Thames RBMP in December 2009.
- 3.2.7 According to the DEFRA and WAG River Basin Planning Guidance (August 2006), a RBMP should be a strategic plan that gives all stakeholders within a RBD some confidence about future water management in their District. It should also set the policy framework within which future regulatory decisions affecting the water environment will be made.
- 3.2.8 Although RBMPs specifically address sustainable water management issues, the WFD also requires that other environmental considerations and socio-economic issues are taken into account. This ensures that the policy priorities between different stakeholders are balanced to ensure that sustainable development within RBDs is achieved.
- 3.2.9 As a result of the strategic nature of RBMPs, they are inherently linked to and can both influence and be influenced by planning policy within their areas. The following sections are extracted from the DEFRA and WAG River Basin Planning Guidance (August 2006).

### EU Floods Directive (November 2007)

- 3.2.10 The Floods Directive aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive requires Member States to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding.
- 3.2.11 For each zone, member states need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015. The directive applies to inland waters as well as all coastal waters across the whole territory of the EU.

### Spatial Plans Influencing RBMPs

- 3.2.12 Emerging development plans will be an important source of information on future water management pressures that can inform the EA and refine its understanding of the current status of water bodies, and how this might change if no action was taken. The RBPG stresses the importance of taking into account the continuation of sustainable human development (including ports, recreational uses, water storage and flood risk management schemes) within RBDs and the setting of water management frameworks.
- 3.2.13 The EAs Catchment Flood Management Plans (CFMPs) and Catchment Abstraction Management Strategies (CAMS) are examples of such high-level planning tools that can inform development of RBMPs. Using CFMPs, the Regional Flood Risk Assessments (RFRA) and Strategic Flood Risk Assessments (SFRAs) will build upon existing flood risk and planning information to present current and potential future development within RBDs in relation to flood risk. In addition, policies that emerge from these studies (for example SuDS, Flood Risk Management procedures and mitigation options) will inform the development of the water management frameworks in RBMPs.
- 3.2.14 The Oxfordshire Minerals and Waste SFRA should therefore play an important role in informing the water management framework in the emerging Upper Thames RBMP.

## 3.3 National Policy

- 3.3.1 National Policy is constantly evolving. Following the flood event of July 2007 and Sir Michael Pitts review of this event, the Flood and Water Management Act has been created. It is intended that this will provide a better, more comprehensive management of flood risk to people, homes and businesses. One of the key features of this Act which will impact on the Council is the requirement for '*...unitary and county councils to lead on the management of the risks of all local floods*'.

### Flood and Water Management Act (2010)

- 3.3.2 With regard to flooding, the Flood and Water Management Act aims to provide a more comprehensive management of flood risk in the future through the implementation of recommendations made by Sir Michael Pitt in his review of the 2007 floods.
- 3.3.3 The biggest change is the recommendation by Sir Michael Pitt that 'the role of Local Authorities be enhanced so that they take on responsibility for leading the co-ordination of flood risk management in their areas'.

3.3.4 In order to work towards the goals of the Flood and Water Management Act, the lead local Flood Authority needs to:

- Form partnerships with other relevant authorities including the Water Utilities, Environment Agency, Highway Teams etc. This may be in the form of a 'Flood Group' that holds regular meetings to discuss local flood risk issues. This is a process that can be started at any time, but a Surface Water Management Plan (SWMP) will support and document the partnership.
- Develop, maintain and monitor a strategy for local flood risk management in their area – this can be done through, or informed by a SWMP.
- Consult on the strategy with partners and the public – this measure is further down the line and again may be informed by a SWMP

3.3.5 In addition, if the information is not already documented, the Lead Flood Authority need to:

- Investigate and record flood incidents in the area, clearly identify who is responsible and what has been done or is proposed to mitigate the risk.
- Create a new, or maintain the existing register of structures or features which are considered to have a significant effect on flood risk in the area. This record should have details of ownership and state of repair of any structures.
- It would be advisable to investigate the location of any Ordinary Watercourses that are not maintained by the Environment Agency, try to establish ownership and responsibility for maintenance so that if at any time the watercourse falls into disrepair the Council knows directly who to contact.

### **The Flood Risk Regulations 2009**

3.3.6 These regulations aim to translate the EU Floods Directive on the assessment and management of flood risks into domestic law and to implement its provisions. In particular, it places duties on Local Authorities to prepare flood risk assessments, flood risk maps and flood risk management plans. There is some overlap between these objectives and the Flood and Water Management Act so it is advised that a clear way forward be proposed before multiple reports are created referring to the same thing. This is especially important when dealing with local stakeholders.

3.3.7 With relation to the Flood Risk Regulations 2009, Local Authorities must:

- Prepare a preliminary assessment report in relation to flooding in its area. This must include maps illustrating the risk.
- Use the preliminary assessment report to determine whether there is a significant flood risk in its area.
- If the area is deemed to be at risk, the LA must prepare flood risk and flood hazard (speed and direction of flow) maps in order to quantify the risk.
- The LA should prepare a flood risk management plan including mitigation measures and responsibility

### **MPS1 Planning and Minerals (November 2006)**

3.3.8 MPS1 states in paragraph 9 that the Government's objectives are to secure working practices which prevent or reduce as far as possible, impacts on the environment and human health arising from the extraction, processing, management or transportation of minerals.

- 3.3.9 Paragraph 15 adds that local authorities should identify sites and preferred areas having taken account of environmental considerations to provide greater certainty of where future sustainable mineral working will take place. In addition, it states that local authorities should consider the benefits, in terms of reduced environmental disturbance and more efficient use of mineral resources including full recovery of minerals, or extensions to existing mineral workings rather than new sites.
- 3.3.10 Paragraph 17 states that local authorities should ensure, in association with the EA, 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 also demonstrate that mineral workings should not materially increase the risk of flooding at other properties or locations and, where practicable, should increase flood storage capacity.

### **MPS2: Controlling and Mitigating the Environmental Effect of Minerals Extraction in England**

- 3.3.11 Minerals Policy Statement 2 sets out the policies and considerations that the Government expects Mineral Planning Authorities to follow when preparing development plans and in considering applications for minerals development.

### **MPG7: The Reclamation of Minerals Workings**

- 3.3.12 MPG7 provides guidance on policies, consultation and conditions which are relevant to achieving effective reclamation of minerals workings. It also provides guidance on the location of storage mounds with relation to flood risk.
- 3.3.13 The following national policy documents are also of some relevance when considering flood risk associated with minerals and waste development.

### **PPS1 (2005) & PPS1 Supplement "Climate Change and Sustainable Development" (December 2007)**

- 3.3.14 PPS1 is the Government's overarching statement on the purpose of the planning system, and which identifies sustainability as a key tenet of policy formulation. Paragraph 3 of the PPS makes clear that 'sustainable development is the core principle underpinning planning'.
- 3.3.15 The PPS 1 Supplement on Climate Change sets out important objectives in order to tackle climate change, sea level rise and to avoid flood risk. The purpose of design policies should, it states, be to ensure that developments are sustainable, durable and adaptable to natural hazards such as flooding.

### **PPS7 Sustainable Development in Rural Areas (July 2004)**

- 3.3.16 PPS7 sets out the Government's planning policies for rural areas, with the protection and enhancement of the natural and historic environment, the quality and character of the countryside and existing communities all being of crucial importance. The PPS states that any development in rural areas should consider flood risk at all stages of the planning process in order to reduce future damage.

### **PPS9 Biodiversity and Geological Conservation (August 2005)**

- 3.3.17 The Government's planning policies on the protection of biodiversity and geological conservation via the planning system are outlined in PPS9. Crucially, many protected sites fall within Flood Zones. There is also an imperative to consider the impact of removing woodland both upon carbon sinks and on flooding.
- 3.3.18 The PPS emphasises that development plan policies and planning decisions should be based on up to date information about the environmental characteristics of an area and that the avoidance of significant harm to features of biodiversity and geological interest should be prevented or, if unavoidable, counteracted through suitable mitigation and compensation measures. Inability to mitigate or compensate for significant harm should result in applications being refused.
- 3.3.19 Changes in farming practices and land management may lead to areas of set aside that have increased capacity for biodiversity and flood storage. At the same time pressure to develop some Greenfield sites may lead to the loss of higher grade more versatile and more productive agricultural land and the consequent increased pressure to utilise presently less productive or versatile land.

### **PPS 10 Planning for Sustainable Waste Management (September 2005)**

- 3.3.20 PPS10 provides guidance on the identification of sites and areas that might be suitable for waste management facilities. Waste planning authorities (WPAs) should assess their suitability of sites and areas against a number of physical and environmental constraints on development, as set out in a separate Annex (E). Amongst these considerations, reference is made to the need to protect water resources and in particular:
- *“...The suitability of locations subject to flooding will also need particular care”*

### **PPS11 Regional Spatial Strategies (September 2004)**

- 3.3.21 PPS11 sets out the Government's policy on the preparation of Regional Spatial Strategies – what they should cover and how they should be prepared and revised. The RSS should articulate a spatial vision of what the region will look like by the end date of the strategy, and how it will contribute to achieving sustainable development objectives. The RSS must, importantly for flood risk, address regional or sub-regional issues that cross local authority boundaries, working in consultation with LPAs and other stakeholders to identify the circumstances in which a sub-regional approach should be applied. Annex 4 of PPS11 sets out the policies and guidance that should be considered and covered by the RSS, including climate change, water, and the requirements of PPS25.
- 3.3.22 PPS25 outlines that regional planning bodies should prepare Regional Flood Risk Assessments (RFRAs) in consultation with the EA to inform their RSS on flood risk issues.

### **PPS 12 – Local Spatial Planning (Adopted June 2008)**

- 3.3.23 This national policy statement replaces PPS 12: Local Development Frameworks (2004) and the companion guide Creating LDFs (2004).
- 3.3.24 PPS12 sets out the Government's policy on the preparation of local development documents, which together comprise the Local Development Framework. Key issues include the

consideration of climate change, the need to identify local areas at risk from flooding and to highlight the geographical location of such areas on the adopted proposals map. The preparation of all local development documents must be informed by a Sustainability Appraisal. Gathering information on flood risk is an important element of assembling the baseline information for these assessments.

3.3.25 Finally, PPS12 states that LPAs should publish proposals maps which should:

- identify areas of protection (locally and nationally designated) and Green Belt land;
- show areas at risk of flooding; and,
- allocate sites for particular land use development proposals included in any adopted development plan documents.

3.3.26 A Core Output Indicator which must be reported on in the Annual Monitoring Report is the number of planning permissions granted contrary to the advice of the EA.

3.3.27 In addition it states that District planning authorities should include on their adopted proposals maps, minerals and waste matters including safeguarding areas and any minerals and waste allocation which are adopted in a development plan by the County council.

### **PPG17 – Planning Policy Guidance 17 – Planning for Open Space, Sport and recreation (July 2002)**

3.3.28 Planning Policy Guidance 17 (PPG17) was created to set out the policies needed to be taken into account by regional and local planning authorities. When creating regional and local planning guidance.

3.3.29 The document includes guidance on the use of open space and should be referred to when considering the restoration of minerals workings.

### **PPS23 Planning and pollution control**

3.3.30 Planning Policy Statement 23 (PPS23) is intended to complement the pollution control framework under the Pollution Prevention and Control Act 1999 and the PPC Regulations 2000. Waste management is however dealt with in PPG10 Planning and Waste Management as discussed above.

### **PPS 25: Development and Flood Risk (March 2010)**

3.3.31 Planning Policy Statement 25 and its supporting Practice Guide, published in December 2009, emphasise the active role LPAs should have in ensuring flood risk is considered during all stages of strategic land use planning.

3.3.32 PPS25 sets the following minimum requirements for the appraisal, management and reduction of flood risk:

- Identify land at risk from flooding and the degree of flood risk;
- Preparing Regional or Strategic Flood Risk Assessments (RFRA's / SFRAs) as appropriate, either as part of the SA of their plans or as a freestanding assessment;



- Frame policies for the location of development which avoid flood risk to people and property, where possible and manage any residual risk, taking into account climate change;
- Reduce flood risk to and from new development through location, layout and design, including sustainable drainage approaches;
- Use opportunities offered by new development to reduce flood risk;
- Only permit development in areas of flood risk when there are no suitable alternative sites elsewhere and the benefits outweigh the risks from flooding. In these cases, it must be demonstrated that the development will be safe. Work with the EA and other stakeholders to ensure that best use is made of their expertise and information in informing planning decisions; and,
- Ensuring spatial planning supports flood risk management and emergency planning.

3.3.33 To assist Waste and Minerals Planning Authorities (W/MPA) in their strategic land use planning, SFRAs should present sufficient information to enable them to apply the Sequential approach to the allocation of sites for waste management and where possible mineral extraction and processing. It is acknowledged that minerals have to be extracted and processed where the minerals are located but that the operational workings *'should not increase flood risk elsewhere and need to be designed, worked and restored accordingly'*.

3.3.34 The following national policy documents are directly relevant to minerals and waste planning.

## 3.4 Regional Policy

|   |                     |
|---|---------------------|
| <b>SFRA Position Statement<br/>Regional Spatial Strategy (RSS)</b>  | <b>October 2010</b> |
| <p>The RSS published by the Communities and Local Government (CLG) provided a broad development strategy for the region for a 15 to 20 year period. It also informed the preparation of Local Development Documents (LDD) and regional and sub-regional strategies.</p> <p>Following the election of a coalition government in May 2010, a Devolution and Localism Bill has been confirmed which intends to <i>'shift power from the central state back to the hands of individuals, communities and councils'</i>. This Bill includes legislation to scrap the RSS.</p> <p>While the Secretary for State for Communities and Local Government has confirmed that RSS will be revoked, at the time of writing there is no replacement for the RSS, therefore the RSS will be referred to as the current planning policy document for the purposes of this report.</p> |                     |

3.4.2 By letter of 6 July 2010 the Secretary of State for Communities and Local Government revoked the Regional Spatial Strategy for the South East - the South East Plan (SEP). The SEP was adopted in May 2009 and contained policies directly relating to flood risk and climate change as well as policies relating directly to minerals and waste development. Revocation of the SEP took place at the time this study was being finalised for publication and it was not considered appropriate or good value for money to simply delete the following paragraphs, which

summarise what were its relevant policies on flooding, minerals and waste development. Indeed, the Secretary of State has advised that data and information collated by Local Authorities, industry and other bodies who form the Regional Waste Technical Advisory Bodies (who advised on the SEP) will continue to assist in the preparation of new Local Development Frameworks, so regard may still be had to the content of the SEP in the preparation of the Minerals and Waste Development Framework.

## **NRM4 Sustainable Flood Management – Making Space for Water**

3.4.3 Flood risk management is of increased importance due to development in flood plains, changing patterns of rainfall, extreme weather, storms, rising sea levels and agricultural runoff accelerated by climate change. These factors will increase the probability and incidence of flooding of property and land. The RSS sought to avoid an increase in flood risk through the appropriate location and design of new development in line with the principles outlined in PPS25. Policy NRM4 set out these requirements in greater detail:

- *“The sequential approach to development in flood risk areas set out in PPS25 will be followed. Inappropriate development should not be allocated or permitted in flood zones 2 and 3 areas at risk of surface water flooding (critical drainage areas) or areas with a history of groundwater flooding, or where it would increase flood risk elsewhere, unless there is over-riding need and absence of suitable alternatives”*
- *“Local authorities, with advice from the Environment Agency, should undertake a Strategic Flood Risk Assessment (SFRA) to provide a comprehensive understanding of the flood risk and put in place a framework for applying the PPS25 sequential approach. This will facilitate allocating sites in a decreasing probability of flood risk. The SFRA would assess future climate change and identify appropriate types of development in accordance with the PPS25 sequential test and flood vulnerability of different land uses.”*
- *“Existing flood defences will be protected from development. Where development is permitted in appropriately defended floodplains it must be designed to be resilient to flooding (to minimise potential damage) and to allow for the future maintenance, realignment or management of the defences to be undertaken.”*
- *“In the preparation of local development documents and considering planning applications, local authorities in conjunction with the Environment Agency, should also:*
  - *(i). take account of River Basin Management Plans, Catchment Flood Management Plans, Shoreline Management Plans and Surface Water Management Plans in developing local development documents and other strategies. Where locationally specific flood risk and land management options such as flood storage, managed realignment and set back from coastal defences are identified, land should be safeguarded for these purposes and appropriate land use and land management practices should be encouraged*
  - *lii) consider the associated social and environmental costs and benefits to fisheries, biodiversity and the built and historic environment in assessment of new flood management schemes*
  - *(iii) require incorporation and management of Sustainable Drainage Systems (SuDS), other water retention and flood storage measures to minimise direct surface run-off, unless there are practical or environmental reasons for not doing so*

- *(iv) take account of increased surface water drainage on sewage effluent flows on fluvial flood risk.*

## **NRM1 – Sustainable Water Resources**

3.4.4 Policy NRM1 also required that “water supply and groundwater be maintained and enhanced through avoiding adverse effects of development on the water environment”. Local Authorities should:

- *Set out circumstances where sustainable drainage solutions should be incorporated into new development; and*
- *Encourage winter storage reservoirs and other sustainable land management practices to reduce summer abstraction, diffuse pollution and run-off, increase flood storage capacity and benefit wildlife and recreation.*

## **CC2 – Carbon Reduction**

3.4.5 Policy CC2 of the RSS set out cross cutting policies on resource use and sustainable design and carbon reduction. Policy highlights the need to reduce the consumption of resources and encourages:

- *Guiding strategic development to locations offering greater protection from impacts such as flooding, water shortages and storms.*
- *The use of sustainable drainage measures and high standards of water efficiency in new and existing building stock;*
- *Increasing flood storage capacity and developing sustainable new water resources;*
- *Ensuring that opportunities and options for sustainable flood management are actively promoted*

## **South East Plan - Minerals**

3.4.6 The general policy with respect to minerals is to ensure supply is sufficient to meet industry’s needs whilst taking full account for the objectives of sustainable development. The underlying aim is to move towards a more sustainable use of the mineral resource through a reduced reliance on primary aggregates and increased use of secondary and recycled aggregates. Policy M2 required Oxfordshire to source 0.9 mtpa (and where possible to exceed this target) of recycled and secondary aggregates by 2016. However, it recognised that significant amounts of primary minerals will still be required, and the Plan set out an apportionment for the amount of sand and gravel, crushed rock and secondary and recycled aggregate that each Minerals Planning Authority should provide. For Oxfordshire the amounts were as follows:

- *Sand and Gravel 1.82mtpa*
- *Crushed Rock 1.0mtpa*
- *Secondary and Recycled Aggregate – 0.9mtpa*

3.4.7 The department for Communities and Local Government (DGLG) had been consulting on revised national and regional guidelines for sand and gravel for the period 2005 – 2020, and this may have affected the provision to be made for land-won aggregate in the emerging Minerals and Waste Framework (MWFD). Monitoring for 2007 has indicated a modest decline in forecast national demand for aggregates between 2005 and 2020, with a more pronounced

decline in some regions – particularly in the south east. Consequently, a reduced regional guideline figure for the South East had been proposed by DCLG.

- 3.4.8 At the same time, the South East England Partnership Board had been carrying out a review of the sub-regional apportionment for land-won aggregates and this could well have resulted in an amendment to the sub-regional apportionments set out in SEP policy M3. The Secretary of State (19 March 2010) had recommended an increase in the amount of sand and gravel to be produced in Oxfordshire from 1.82mtpa to 2.1mtpa, and for crushed rock a reduction from 1.0 to 0.66 mtpa. However, by letter dated 16 July 2010, the Secretary of State announced that the review would proceed no further. It has been suggested that Local Authorities should still work to the revised apportionments proposed on 19 March, but it has also been suggested that Local Authorities could set different production targets if there is evidence to support this. This leaves a rather uncertain position and Oxfordshire is currently considering its position in the light of the Secretary of State’s recent announcement.

### South East Plan - Waste

- 3.4.9 Policies W3 and W4 required Waste Planning Authorities to adopt policies that are aimed at each area becoming self-sufficient in providing for its own waste needs i.e. to provide capacity to manage an amount of waste equivalent to that arising in its administrative area (plus a portion of London’s exported waste as set out in table 3-1 below).

**Table 3-1 SEP Policy W3 – London waste apportionment for Oxfordshire**

| 2006 -2015        |   | 2016-2025         |   |
|-------------------|---|-------------------|---|
| Apportionment (%) | Annual tonnages of waste to be managed (million tonnes) | Apportionment (%) | Annual tonnages of waste to be managed (million tonnes) |
| 18.7              | 2.26  | 17.2              | 1.26  |

*(Source p120of the South East Plan)*

- 3.4.10 The Plan set targets (policies W5 and W6) for diverting waste from landfill, including the proportions of waste that are progressively expected to be recycled and composted. The SEP envisaged that the volumes of waste to be managed within Oxfordshire for both municipal and solid waste (MSW) and commercial and industrial waste (C& I) would continue to grow, and policy W7 gave guideline figures for the actual amounts of waste that should be planned for. The totals for Oxfordshire are set out in table 3-2 below:

**Table 3-2 SEP Policy W7 – Waste to be managed in Oxfordshire**

| Waste Type | 2008-2010 | 2011-2015 | 2016-2020 | 2021-2025 |
|------------|-----------|-----------|-----------|-----------|
| MSW        | 319       | 347       | 377       | 406       |
| C& I       | 630       | 685       | 745       | 791       |

*(Source p125 the South East Plan. Note OCC has recently produced revised estimates)*

- 3.4.11 The SEP recognised that landfill space will continue to be required, and policy W13 set out the provision to be made across the region. To help keep this requirement to a minimum, WPAs were expected to 'husband' facilities that are already providing for the disposal of non-inert waste.
- 3.4.12 A strategy for the future location of waste management facilities was set out in policy W17. This gave priority to safeguarding and expanding sites already in waste use where suitably sited. New sites were to have good access to urban areas (a major source of waste arising) and transport connections, with sites located with compatible land uses – including brownfield land, vacant or derelict land and land adjoining sewage treatment facilities. Sites were also expected to be capable of meeting 'a range of locally based environmental and amenity criteria'.

### RBMPs Influencing Spatial Plans

- 3.4.13 The River Basin Management Plan has been approved by the Secretary of State for the Department for Environment, Food and Rural Affairs. It has been prepared by the EA in consultation with a wide range of organisations and outlines the pressures facing the water environment in the Thames basin, including Oxfordshire.
- 3.4.14 Appendix C of the RBMP outlines actions which are required to deliver the objectives of the plan and specifically section C.9 (page 115) includes details of the responsibilities of Local and Regional Government. These actions include measures such as maximising opportunities to contribute to an improved water environment (TH0017<sup>2</sup>), using information contained in the RBMP & CFMP to require the use of SUDS and flood storage techniques when making planning decisions (TH0125<sup>3</sup>), maximising potential for improvements to water quality the water environment in all appropriate development etc.
- 3.4.15 As well as being informed by various spatial and catchment wide plans and strategies, RBMPs produce strategic, regional policy information that is necessary to feed into the spatial planning process such as Local Development Frameworks. For example, where RBMPs have a direct affect on the use and development of land they will have to be material considerations in the preparation of statutory development plans for the areas they cover. It will also be necessary for planning authorities to consider WFD objectives at the detailed development control stage (not least to consider the requirements of Article 4(7) of the WFD in relation to new physical modifications).
- 3.4.16 To allow local authorities to incorporate WFD objectives into their various statutory development plans, the EA will provide local authorities with information such as CFMPs, CAMS and other catchment-wide guidance and strategies, to enable effective integration of the water management framework within statutory development plans. In order to address the fact that these plans have different planning cycles, and are at different stages in their development, RBMP policies that affect the development and use of land must be considered in the monitoring and review of statutory spatial plans.
- 3.4.17 In addition, some of the measures necessary to achieve WFD objectives will be delivered through land use planning mechanisms. For example spatial planners can make major contributions to WFD objectives by including appropriate planning conditions and planning obligations in relevant planning permissions for new developments, or by restricting some forms of development. Delivery of these measures is more likely to take place if they are included in

<sup>2</sup> TH0017 refers to the ID codes used in the EA RBFMP section C.9

<sup>3</sup> TH0125 refers to the ID codes used in the EA RBFMP section C.9

Local Development Frameworks / Plans by land use planners. As stated above, the Oxfordshire Minerals and Waste SFRA should inform the RBMPs and, as a result, the LDFs being prepared by the individual authorities should already include policies and recommendations relating to flood risk management and development within catchments. It should be noted that nothing has yet been adopted in Oxfordshire.

- 3.4.18 A copy of the Thames RBMP can be found on the Environment Agency's website at <http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/thames/Intro.aspx>.

### Thames Catchment Flood Management Plan (CFMP)

- 3.4.19 The approach that the EA would like to see taken to flood risk management in Oxfordshire is outlined in the Thames Region CFMP (December 2009). A CFMP is a high-level strategic planning document that provides an overview of the main sources of flood risk and how these can be managed in a sustainable framework for the next 50 to 100 years. The EA engages stakeholders within the catchment to produce policies in terms of sustainable flood management solutions whilst also considering local land use changes and effects of climate change.
- 3.4.20 The Thames CFMP covers the whole of the Environment Agency's Thames Region (not dissimilar to the South East planning region) which has very varied catchments. For this reason, the CFMP has been further divided into 43 policy units for each catchment. Oxfordshire falls into the 'Upper Thames' policy unit and the proposed approach to flood management within this area is included in full in Appendix H.
- 3.4.21 The Environment Agency's flood risk management approach in Oxfordshire includes the following aims:
- *Maintaining (and in some places enhancing) the capacity of the natural floodplain to retain water, combined with maintaining conveyance of watercourses in urban areas reduces the risk of flooding and has benefits for the natural environment;*
  - *To safeguard the natural floodplain from inappropriate development. The EA deem the floodplain to be their most important asset in terms of flood risk;*
  - *Managing the consequence of flooding through making buildings and communities more resilient and by taking effective action at times of flooding.*
- 3.4.22 The CFMP should also inform and support planning policies, statutory land use plans and implementation of the Water Framework Directive, so that future development in the catchment is sustainable in terms of flood risk. Awareness of the role of CFMPs among land-use planners is in its infancy as these plans, along with SFRAs, are a relatively new requirement.

## 3.5 Local Policy

### Oxfordshire Minerals and Waste Local Plan

- 3.5.1 The Oxfordshire Minerals and Waste Local Plan (OMWLP) was adopted in 1996 and was originally intended to cover the period to 2006. It supported the Oxfordshire Structure Plan which was approved in 1992 and covered the period to 2001. Subsequent alterations to the Structure Plan were approved to cover the period to 2016, but the Structure Plan was replaced

(except for three saved policies) by the SEP when adopted by the Secretary of State in May 2009.

- 3.5.2 OMWLP will eventually be replaced by the new Minerals and Waste Development Framework (MWDF), but pending adoption of this document the Council requested that the Secretary of State extend the lifetime of some of the policies in OMWLP beyond September 2007 (the date by which they would otherwise have ceased to effect). This request was accepted and has helped to avoid creating a gap in local planning policy for minerals and waste in Oxfordshire pending adoption of the MWDF.
- 3.5.3 Forty-six policies of OMWLP were saved under a direction by the Secretary of State, of which the following are of relevance to the SFRA study.

#### **OMWLP Minerals Policies**

- 3.5.4 OMWLP identified areas for sand and gravel extractions to meet the expected requirement over the period to 2006 plus a contingency allowance of 6.6 million tonnes. Of the areas identified for future working, most have been granted planning permission and work has taken place in these areas; approximately 1 million tonnes of the allocated sand and gravel resource remains without any form of planning permission and this is spread in small pockets of the areas identified for extraction at Sutton Wick, Cassington – Yarnton and in the Lower Windrush Valley.
- 3.5.5 There are two policies in the OMWLP of direct relevance to flooding issues, PE4 and PE7. PE4 states that proposals for mineral extraction and restoration (including waste disposal) will not be permitted where they would have an impact on groundwater levels in the surrounding area which would harm existing water abstraction, river flow, canal, lake or pond levels or important natural habitats. It adds that proposals must not put at risk the quality of groundwater.
- 3.5.6 PE7 requires that proposals for mineral extraction and restoration in the floodplain should not result in the raising of existing ground levels. Minerals extraction or restoration by landfill should not adversely affect groundwater levels or water quality, impede flood flows, reduce the capacity of flood storage or adversely affect existing flood defence structures. Developers and/or landowners are expected to undertake any hydrological surveys necessary to establish the implications of a proposal.

#### **OMWLP Waste Policies**

- 3.5.7 OMWLP allocates one site for waste management development. Land at Langford Lane, Kidlington is identified as suitable for a new waste recycling centre for household waste. The site is in the Oxford Green Belt, and to date no proposals to develop this site have come forward. However, policy W6 (which identifies the site for development) is one of those that have been 'saved' under the Secretary of State's recent direction. Other policies, in particular W3 and W4, guide the future location of waste recycling facilities generally.
- 3.5.8 Two of the Plan's policies make specific reference to flooding. W3 (d) states that waste development proposals for re-use/recycling will normally be permitted provided that the proposal will not pose an unacceptable risk to the water environment.
- 3.5.9 W7 (j) states that Proposals for waste sites must meet with the hydrological and geological requirements for safe disposal of the particular waste concerned.

## The emerging Oxfordshire Minerals and Waste Development Framework

- 3.5.10 In order to understand how the SFRA will inform the content of the MWDF it is helpful to set out the current position on the timetable for its preparation; this is known as the Local Development Scheme (LDS). In particular, the SFRA directly informs land allocation and the assessment of development proposals, so it is important that the document is able to form part of the evidence base for the MWDF at an early stage.
- 3.5.11 At present, it is expected that MWDF will comprise three main Development Plan Documents (DPD):
- The Minerals and Waste Core Strategy (the Core Strategy);
  - The Minerals Site Proposals and Policies Document (the Minerals Site Document);
  - The Waste Sites Proposals and Policies Document (the Waste Sites Document).
- 3.5.12 In February 2007 a Preferred Options Consultation Paper for the Core Strategy was published. Responses to the consultation, in particular from the Government's Regional Office, confirmed that fundamental changes would be required, and further consultation on the Document has yet to take place.
- 3.5.13 At the same time, an Issues and Options Consultation Paper for the Waste Sites Document took place. This included a significant number of possible sites for waste management purposes, and a summary of the responses that were received has been published. A Preferred Options Consultation Paper was expected to be published in the summer of 2008, but this was delayed pending further work being undertaken on the Core Strategy. One of the key issues for the Core Strategy is whether it will identify locations for strategic waste facilities or whether this will be undertaken through the Waste Sites DPD (as originally envisaged).
- 3.5.14 In April 2007 an Issues and Options Consultation Paper for the Minerals Site Document was published. This included a significant number of possible sites for future mineral extraction and secondary aggregate production, and a summary of responses has been published. Again a Preferred Options Consultation Paper was expected to be published in the summer of 2008, but this did not take place in view of the additional work required to progress the Core Strategy.
- 3.5.15 Technical work to build up the evidence base that will support the MWDF has taken place since the publication of these documents, and the Cherwell and West Oxfordshire SFRA is an example of this. However, no further public consultation has taken place on the DPDs. During this period, the County Council has also engaged consultants to undertake a Waste Needs Assessment and a detailed assessment of sites that might be suitable for accommodating a residual waste treatment facility capable of managing of up to 300,000 tpa. A scoping report for the Sustainability Appraisal and Strategic Environmental Assessments that will need to be undertaken has also been published.
- 3.5.16 Work is currently concentrating on the development of a revised strategy for minerals, and during 2010 OCC has been consulting with stakeholders on the options that should be appraised. Engagement with stakeholders on the development of spatial options for waste has been delayed to await the outcome of an appeal that is currently under consideration for the construction of a 300,000 tpa residual waste treatment plant at Ardley (in Cherwell District). The public inquiry hearing this appeal is being concluded as this SFRA is being finalised.



- 3.5.17 A revised timetable for further consultation on the Core Strategy is now emerging. A preferred strategy for mineral working is now being drawn up and public consultation will take place on this towards the end of 2010. For waste, the outcome of the Ardley residual waste proposal is key to the development of a strategy, and the aim is to carry out consultation on waste strategy options in the early part of 2011 (by which time it is hoped that the appeal will have been determined). After consultation on preferred strategies for both minerals and waste, OCC hope to publish a Minerals and Waste Core Strategy (Proposed Submission) Document towards the end of 2011, for representations to be made before submission to the Secretary of State for independent examination.
- 3.5.18 Formal consultation on the Mineral Site Document and the Waste Sites Document cannot take place until a strategy for site selection is in place through the Core Strategy.
- 3.5.19 Preparation of this SFRA is, however, timely as preferred strategic spatial options for neither minerals nor waste have been formulated, and the flooding implications of all of the possible site options can be taken into account at an early stage.

## 4 Level 1 Methodology

### 4.1 Data Collection

- 4.1.1 As outlined in Chapter 1, the objective of the Minerals and Waste Level 1 SFRA is to collect, collate and review the information available relating to flooding in the Study Area including a review of the Level 1 (&2 where available) SFRA reports completed by each District Council (Cherwell and West Oxfordshire SFRA, South Oxfordshire DC & Vale of White Horse DC SFRA & Didcot SFRA)
- 4.1.2 The information is then presented in a GIS and report format to enable Oxfordshire County Council to apply the PPS25 Sequential Approach to their potential mineral and waste development sites.
- 4.1.3 A comprehensive record of all the data collected through the production of the Level 1 SFRA is presented in the document register included in Appendix F.

### 4.2 Stakeholder Consultation

- 4.2.1 In the preparation of this Level 1 SFRA, data has been collected from existing SFRAs and stakeholder consultation.
- 4.2.2 The principal contacts and their associated details are presented in Appendix G.

#### Local Authorities

- 4.2.3 All five councils which make up Oxfordshire have completed an SFRA for their District within the last two years. There was little to be gained from re-gathering data (historic flood records, surface water flooding, groundwater flooding etc) which each council illustrated in their respective SFRA. Therefore, instead of re-gathering existing data, each District was contacted to confirm that the data presented in their SFRAs was still the most up to date information available.
- 4.2.4 The data which each District holds on flooding history varies greatly for example, while WODC has very detailed parish level flood reports, CDC only has preliminary flood risk information for key areas within their District.
- 4.2.5 SODC provided details of the number and location requests for sandbags during the summer 2007 flood event. They also provided some historic flooding records to be used in their local SFRA.
- 4.2.6 VOWH hold a database of flooding incidents in the District which records the source of flooding and has photos of the flood event where available. This database holds 628 recorded incidents and records back to 1999.
- 4.2.7 WODC holds a database of properties that claimed flood grant aid following the 2007 flood event. It should be noted that not all households claimed the flood grant due to concerns about potential blight on their property; however, it is a good indication of where significant flooding occurred at this time.

4.2.8 All of the data described above has been used in the individual Districts SFRA's. Since this time, there have been no further extreme flood events and the records of flooding obtained in 2007 remain the most significant wide scale flood event in the County. GIS layers illustrating the data described above have therefore been used in this SFRA in order to inform flood risk posed to potential minerals and waste sites.

### **Oxfordshire County Council**

4.2.9 Oxfordshire County Council provided GIS layers of all of the Minerals and Waste sites for consideration in the study.

4.2.10 Oxfordshire County Council Highways Department were contacted as part of the Cherwell and West Oxfordshire SFRA as they are the responsible authority for many of the Districts roads. The highways team are able to identify very detailed data such as specific gully pots or pipes that need replacing. Much of this data was too detailed and more appropriate for use at local level studies as such OCC highways team were not contacted again as part of this study.

### **Environment Agency**

4.2.11 The Environment Agency (EA) has discretionary powers under the Water Resources Act (1991) to manage flood risk from Main Rivers and, as a result hold the majority of flood risk data available for the study area. Oxfordshire falls within the Thames region of the EA.

4.2.12 The EA attended the project inception meeting to determine what information could be made available for the SFRA and to discuss how to best use the existing data contained in the District level SFRA's. Data that the EA provided can be summarised as:

- Catchment Flood Management Plan (CFMP) for the Thames Catchment;
- Strategic Flood Risk Mapping (SFRM) outlines and supporting data;
- Details and locations of historical flood events;
- LiDAR Digital Terrain Model and other surveys;
- Data relating to main rivers;
- Details and locations of flood defence assets and flood warning procedures.

4.2.13 The EA have provided the most up to date Flood Zone mapping for the study area which includes findings of the Cherwell and West Oxfordshire Level 1 SFRA and South Oxfordshire and Vale of White Horse Level 1 SFRA. Flood Zones included in this study also provide more up to date information than the mapping included in the Oxford City SFRA.

4.2.14 The EA have also assisted in the production of this SFRA by providing expert advice and comment.

### **Water Utilities**

4.2.15 Thames Water Ltd (TW), Anglian Water and Severn Trent Water are the service providers for the Study Area.

4.2.16 Each Water Utility Company holds a register of flood events that have affected properties internally, and a separate register of flood events that have led to external flooding of areas such as roads. This information is provided to the regulatory body OFWAT (Office of Water Services)

and is used to help define their capital programme. The register is also known as the DG5 register, and contains commercially sensitive information as well as information covered by the Data Protection Act (1998).

- 4.2.17 The level of detail provided in the DG5 register is to postcode boundaries and is currently the only available data from water utilities. This data has been used to inform site review tables and has been overlaid onto maps included in Appendix A to D.
- 4.2.18 Where available, sewer flooding information from several other sources has been collected as part of the VWHDC/SODC and CDC/EODC. This includes information from District Councils and also Parish Flood Defence Reports for West Oxfordshire and VOWH Parish Reports. This data has been used in the OCC SFRA (highlighted as red dots plans in Appendix A to D) to add greater detail to the Thames Water DG5 data.

### British Waterways

- 4.2.19 British Waterways are responsible for maintaining the inland navigable waterway network across the UK including the Oxford Canal which is located in the study area.
- 4.2.20 Canals are considered to be controlled water bodies so flood risk is deemed to be minimal unless overtopped in storm conditions. There is, however, a residual risk of structural failure. British Waterways have provided details of overtopping incidents from their waterway network in July 2007 which is included on plans included in Appendix A-D.
- 4.2.21 For potential development sites located adjacent to canals, the residual risk of flooding should be identified during a site specific FRA.

### Natural England

- 4.2.22 Natural England provided details of Sites of Special Scientific Interest (SSSI) including those designated for wetland interest e.g. seasonally flooded grassland or wet woodland as part of the CDC/WODC SFRA. This information for VWHDC/SODC has been obtained from the local councils.

### Highways Agency

- 4.2.23 The HA were contacted directly as part of each boroughs local SFRA. This data has been used to inform the OCC SFRA.

## 4.3 Data Presentation – GIS Layers and mapping

- 4.3.1 Using the data collected, GIS layers were used to create a series of maps to visually assist the Council in their site allocation decisions. Geographical data such as flood extents and watercourse routes have been presented as maps (Appendix A, B, C, D) and published through Geographical Information System (GIS) layers.
- 4.3.2 GIS is an effective management tool for the coordinated capture, storage and analysis of data of a geographical nature. GIS handles data in a hierarchical manner by storing spatial features within various layers, which are allied to an underlying database. GIS is an increasingly valuable resource for local planning authorities for informing planning decisions.

4.3.3 A summary of GIS layers generated for use in the production of the maps and figures presented within the Appendices of this Level 1 SFRA are outlined below:

**Table 4-1 Presented GIS Layers**

|                         | GIS Layer                                   | Details  | Presented in Figures |
|-------------------------|---|--|----------------------|
| Planning                | District                                    | County boundary and subsidiary Districts.  | All                  |
|                         | Parish2008                                  | Parish boundaries  | All                  |
|                         | RA_X_Crushed Rock                           | Crushed rock resource area boundaries (5)  | Appendix A           |
|                         | RA_X_Sand_Gravel                            | Sand and gravel resource area boundaries (18)  | Appendix B           |
|                         | RA_X_Soft_Sand                              | Soft sand resource area boundary (1)   | Appendix B           |
|                         | Mineral_Site_XXXX                           | Mineral site boundaries (78)   | Appendix C           |
|                         | Waste_Site_XXXX                             | Waste Site boundaries (85)   | Appendix D           |
| Watercourses & Assets   | CDC_WODC_MainRivers                         | Main river centrelines, designated by the Environment Agency in CDC and WODC   | All                  |
|                         | SODC_VWHDC_MainRivers                       | Main river centrelines, designated by the Environment Agency in SODC and VWHDC   | All                  |
|                         | Canals                                      | Canal network in OCC   | All                  |
|                         | Cherwell Defences 1                         | Flood defences in CDC  | All                  |
|                         | SODC_Defence1                               | Flood defences in SODC   | All                  |
|                         | SODC_Defence2                               | Flood defences in SODC   | All                  |
|                         | SODC_Defence3                               | Flood defences in SODC   | All                  |
|                         | VWHDC_Defence1                              | Flood defences in VWHDC  | All                  |
|                         | VWHDC_Defence2                              | Flood defences in VWHDC  | All                  |
|                         | VWHDC_Defence3                              | Flood defences in VWHDC  | All                  |
|                         | VWHDC_Defence4                              | Flood defences in VWHDC  | All                  |
|                         | SODC_FloodStorage_Area1                     | Areas identified for flood storage in SODC   | All                  |
|                         | SODC_FloodStorage_Area2                     | Areas identified for flood storage in SODC   | All                  |
|                         | SODC_FloodStorage_Area3                     | Areas identified for flood storage in SODC   | All                  |
|                         | VWHDC_FloodStorageArea1                     | Areas identified for flood storage in VWHDC  | All                  |
|                         | VWHDC_FloodStorageArea2                     | Areas identified for flood storage in VWHDC  | All                  |
| VWHDC_FloodStorageArea3 | Areas identified for flood storage in VWHDC | All  |                      |
| VWHDC_FloodStorageArea4 | Areas identified for flood storage in VWHDC | All  |                      |
| Flood Risk              | OCC_FZ_2                                    | Flood Zone 2; land with a probability of fluvial flooding between 1% - 0.1%.   | All                  |
|                         | OCC_FZ_3a                                   | Flood Zone 3a; land with a probability of fluvial flooding of more than 0.1%.  | All                  |
|                         | OCC_FZ_3a+CC_FINAL                          | Flood Zone 3a + climate change; land with a probability of fluvial flooding of more than 0.1% including allowances for climate change. | All                  |
|                         | OCC_FZ_3b                                   | Flood Zone 3b; land with a probability of fluvial flooding of 5% or greater.   | All                  |
|                         | OCC_Historic_Flood_Map                      | Outline of historic fluvial flooding events provided by the Environment Agency.  | All                  |
|                         | CDC_WODC_Sewer_Flooding_edit ed             | Incidents of sewer flooding reported in CDC and WODC   | All                  |
|                         | TW Flooding by postcode_region              | Incidents of sewer flooding reported in SODC and VWHDC   | All                  |
|                         | Flooded_Properties                          | Properties flooded during July 2007 across OCC. Dataset provided by the Environment Agency.  | All                  |
|                         | all-final                                   | Depth of surface water flooding during 1 in 100 year (1%) storm event, across SODC and VWHDC.  | All                  |

## 4.4 Flooding from Rivers

4.4.1 The predominant risk of flooding within the Oxfordshire County Boundary is from rivers i.e. fluvial flooding.

### Requirements

4.4.2 The EA provided a GIS layer with all watercourses designated as ‘main river’, the extents of which are defined by Defra. The Environment Agency has permissive powers for the management of flood risk arising from designated ‘main rivers’. It also has permissive powers to undertake maintenance and improvement works on main rivers. British Waterways also provided a GIS layer for the Oxford Canal which runs north to south through the Study Area.

4.4.3 As part of the Level 1 SFRA, PPS25 requires definition of the following fluvial Flood Zones across the Study Area:

**Table 4-2 PPS25 Flood Zones to be mapped as part of the SFRA**

| Flood Zone                            | Definition  | Probability of Flooding      |
|---------------------------------------|---|------------------------------|
| <b>Flood Zone 1</b>                   | At risk from flood event greater than the 1 in 1000 year event (less than 0.1% annual probability of flooding each year)  | <b>Low Probability</b>       |
| <b>Flood Zone 2</b>                   | At risk from flood event between the 1 in 100 and 1 in 1000 year event (between 1% and 0.1% annual probability of flooding each year)   | <b>Medium Probability</b>    |
| <b>Flood Zone 3a</b>                  | At risk from flood event less than or equal to the 1 in 100 year event (greater than 1% annual probability of flooding each year)   | <b>High Probability</b>      |
| <b>Flood Zone 3a + Climate Change</b> | At risk from a flood event less than or equal to the 1 in 100 year event plus an allowance of 20% increase in peak river flow due to climate change (greater than 1% annual probability of flooding each year including an additional 20% climate change allowance for increase in peak river flow).  | <b>High Probability</b>      |
| <b>Flood Zone 3b</b>                  | Land where water has to flow or be stored in times of flood, or land purposely designed to be flooded in an extreme flood event (0.1% annual probability). The 1 in 20 year annual probability floodplain is the starting point for consideration but local circumstances should be considered and an alternative probability can be agreed between the Local Planning Authority and the Environment Agency | <b>Functional Floodplain</b> |

4.4.4 The current Flood Zones have been prepared using the best available data from appropriate hydraulic models and following the precautionary principle as detailed throughout PPS25.

4.4.5 The extent of fluvial flooding from rivers and streams in the Study Area has been mapped in GIS using existing EA data. No additional hydraulic modelling has been undertaken as part of this study. Table 4-3 below identifies the sources of data used to map fluvial flood zones.

**Table 4-3 Data Sources for Fluvial Flood Zone Mapping**

| <b>Flood Zone</b>                        | <b>Data Source &amp; Modelling</b>  |
|--|---|
| Flood Zone 3b (2007)                     | <b>Cherwell &amp; West Oxfordshire SFRA</b><br>Detailed Modelling including the Lower Cherwell Study and Cherwell at Banbury. EA JFLOW Flood Zone Data.   |
|  | <b>Vale of White Horse &amp; South Oxfordshire SFRA</b><br>Detailed Modelling and EA JFLOW data. Flood Zones not labelled. Published September 2008 in the SFRA for Vale of White Horse and South Oxfordshire.  |
| Flood Zone 3a (2010)                     | <b>Cherwell &amp; West Oxfordshire SFRA</b><br>Detailed Modelling including the Lower Cherwell Study and Cherwell at Banbury. EA JFLOW Flood Zone Data.   |
|  | <b>Vale of White Horse &amp; South Oxfordshire SFRA</b><br>Detailed Modelling and EA JFLOW data. Flood Zones not labelled. Published August 2010 by the Environment Agency for inclusion in this study.   |
| Flood Zone 3a with Climate Change (2107) | <b>Cherwell &amp; West Oxfordshire SFRA</b><br>Detailed Modelling including the Lower Cherwell Study and Cherwell at Banbury. EA JFLOW Flood Zone Data.   |
|  | <b>Vale of White Horse &amp; South Oxfordshire SFRA</b><br>Detailed Modelling and EA JFLOW data. Flood Zones not labelled. Published September 2008 in the SFRA for Vale of White Horse and South Oxfordshire.  |
| Flood Zone 2 (2010)                      | <b>Cherwell &amp; West Oxfordshire SFRA</b><br>Detailed Modelling including the Lower Cherwell Study and Cherwell at Banbury. EA JFLOW Flood Zone Data. Published August 2010 by the Environment Agency for inclusion in this study.  |
|  | <b>Vale of White Horse &amp; South Oxfordshire SFRA</b><br>Detailed Modelling and EA JFLOW data. Flood Zones not labelled. Published September 2008 in the SFRA for Vale of White Horse and South Oxfordshire. Published August 2010 by the Environment Agency for inclusion in this study. |

## Functional Floodplain

- 4.4.6 Functional floodplains have the highest probability of flooding of all the Flood Zones defined within Table D.1 of PPS25 (see Table 4-2above). A functional floodplain is defined as an area of land where water has to flow or be stored at times of flood (Communities and Local Government, 2006). The functional floodplain has an annual probability of flooding of 5% (i.e. from a 1 in 20 year return period event).
- 4.4.7 The EA have provided modelled 1 in 20 year or 1 in 25 year flood outlines for a number of watercourses in the area including the Lower Windrush, sections of the River Cherwell, the River Thames and the River Ock. Where this is not available it was agreed that the whole of Flood Zone 3 should be assumed to be functional until such a time that more detailed information is available, such as the Level 2 SFRA, an EA Strategic Flood Risk Mapping (SFRM) study or a site-specific FRA, as recommended by PPS 25 guidance.

## Climate Change

- 4.4.8 To ensure sustainable development now and in the future, PPS25 requires that the effects of climate change should be taken into account in an SFRA and that flood outlines delineating climate change should be presented.
- 4.4.9 PPS25 suggests that when completing an SFRA, planning bodies will need to agree how to factor climate change and over what time frame. In agreement with the EA, with regard to this study, fluvial reaches where climate change has been modelled included a net increase of 20% over and above peak flows, which has been added to the 1 in 100 year flood event to account for climate change for the lifetime of development, i.e. over the next 100 years.
- 4.4.10 Where available, modelled outlines for Flood Zone 3a including the effects of climate change have been presented. In areas where climate change has not been modelled or mapped it has been agreed with the Councils and the EA that Flood Zone 2 should be used as a surrogate for Flood Zone 3 plus climate change until such time that more detailed information is available, such as a Level 2 SFRA, an EA Strategic Flood Risk Mapping (SFRM) study or a site-specific FRA.

## Mapping

- 4.4.11 Fluvial flooding GIS outlines have been included on mapping outputs for minerals and waste sites included in Appendix A, B, C and D.
- 4.4.12 Records of flooding collated by the Environment Agency during the July 2007 flood event have been included in the figures in Appendix A, B, C, and D. This data includes flooding records from both fluvial and drainage sources and is derived from records of flood grant claimants following the 2007 flood event. It should be noted that this dataset is not exhaustive, as not all residents of properties flooded will have claimed grant aid.



## SFRA Position Statement

October 2010

### Derivation of Flood Zones

Whilst every attempt has been made to use the most up-to-date, accurate and detailed modelled data, there were some instances where it was necessary to use proxy data where modelled data was not available.

### Limitations & Uncertainties

Using proxy data to define flood zones presents a series of issues and limitations and uncertainties. This is especially true when Flood Zone 3a is used as a proxy for Flood Zone 3b. In urban areas, watercourses often flow in deep and canalised channels and through culverts or tunnels. However, strategic scale modelled outlines assume a 'bank-full' state prior to flooding and therefore, large areas are shown to be flooded for Flood Zone 3 and Flood Zone 2 extents.

The level of confidence assigned to each Flood Zone is a result of the level of assumptions and limitations when deriving that Flood Zone. Until new modelling studies are complete, the County Council and the EA have agreed to use the best available data and to consult when new data is available during the continuing LDF progress.

## 4.5 Surface Water Flooding & Overland Flow

### Overview

- 4.5.1 Intense periods of rainfall over a short duration or periods of prolonged rainfall can lead to overland flow, as rainwater may be unable to infiltrate into the ground or enter drainage systems. This is exacerbated by highly impermeable urban development, local topography and low permeability soils/geology (such as clayey soils).
- 4.5.2 One of the main issues with surface water flooding is that relatively small changes to hard surface and surface gradients can cause flooding. As a result, development for minerals sites including the stockpiles and ancillary buildings could lead to more frequent surface water flooding which can cause disruption to the site and surrounding land. Additionally, the use of heavy machinery during the construction and operation phases could reduce the permeability of the site and thereby increase the potential for surface water runoff. The risk of surface water flooding to adjacent sites should be considered for individual sites as part of a site specific FRA due to localised pathways.

### Surface Water Flooding & Overland Flow Data

- 4.5.3 An assessment of surface water/overland flow should be undertaken as part of the Level 1 SFRA and assessed as part of site specific FRAs.

### Environment Agency Areas susceptible to Surface Water Flooding Maps

- 4.5.4 Following the summer 2007 flood events, the Environment Agency has undertaken broad scale surface water mapping based on the 1 in 200 year rainfall event with a 6.5 hour duration. This return period event was used as it was considered that this was most likely to produce flooding in most significant flow paths and storage areas. No allowance for climate change has been included at this time.
- 4.5.5 This dataset is known as 'Areas Susceptible to Surface Water Flooding' and has been produced using a simplified method that excludes urban sewerage and drainage systems, excludes buildings, and uses a single rainfall event. The mapping is primarily intended for use by Local Resilience Forums (LRFs) to inform emergency planning, but has recently been released for use in SFRAs to inform the most strategic levels of land use planning. It is not intended for use in allocating individual sites or determining individual planning applications. This mapping has the following limitations:
- The mapping does not show the interface between the surface water network, the sewer systems and the watercourses;
  - It does not show the susceptibility of individual properties to surface water flooding;
  - The mapping has significant limitations for use in flat catchments.
- 4.5.6 In the light of these limitations it is recommended that the mapping be used purely as a high level review of susceptibility to surface water flooding in the study area, and identification of those areas that may require further investigation.
- 4.5.7 Environment Agency 'Areas Susceptible to Surface Water Flooding' maps have been mapped for each district and are included in Appendix E.

### Additional Surface Water Flood Risk Information

- 4.5.8 In addition, historical records of surface water flooding have been supplied for the whole of Oxfordshire using the following sources:

#### *West Oxfordshire and Cherwell Districts*

- 4.5.9 In West Oxfordshire and Cherwell Districts, the location of historical surface water flooding incidents has been obtained from discussions with the council's drainage engineers and review of historical information. Where flooding has been recorded, these records are illustrated on mapping included in Appendix A - D using the following notation:

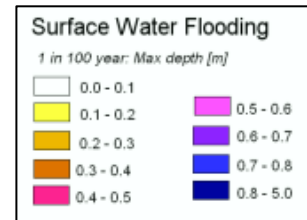
‘  July 2007 Flood Records’

#### *South Oxfordshire and Vale of White Horse Districts*

- 4.5.10 In South Oxfordshire and the Vale, historic flood records and Parish Reports post 2007 have been used to gather surface water flood risk information. Historic records of surface water flooding have been included within the text boxes on the individual site plans included in Appendix A - D using the following notation:

‘  July 2007 Flood Records’

- 4.5.11 In addition, as part of the South Oxfordshire and Vale SFRA JFLOW modelling has been used to show non-main river drainage paths and areas where surface water may pond following heavy rainfall events. This information has been overlaid onto maps (where it is available) to show where surface water flooding risk may be increased. Details of the modelled maximum surface water flood depth generated during the 1 in 100 year extreme rainfall event (South Oxfordshire and Vale only) is included in plans in Appendix A – D using the max depth key.



## Climate Change

- 4.5.12 The human influence in the UK on flooding remains uncertain. The Met Office report that climate models generally predict that the UK will become wetter in winter and drier in summer. However, while there are no clear trends towards an increase in summer extreme rainfall, climate models also suggest that proportionally more rain will fall as short duration heavy events as the climate changes in the future.
- 4.5.13 With this in mind PPS25, specifies that in order to account for climate change on rainfall predictions, 30% should be added to estimated rainfall volumes to account for climate change over the next 100 years.
- 4.5.14 As described in 4.5.5 as part of the South Oxfordshire and Vale SFRA, JFLOW modelling has been used to highlight the potential for surface water flooding. This modelling was only completed for the 1 in 100 year event and no modelling including an allowance for climate change is currently available.

## Mapping

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|--|--------------|
| <p><b>Flooding from the Land - Limitations &amp; Uncertainties</b></p> <p>Surface Water flooding from direct rainfall is frequently experienced, often very destructive and can be more significant than historic records suggest. Surface water flooding does not need a watercourse in close proximity to occur and is exacerbated by areas of hard standing such as tarmac.</p> <p>This source of flooding tends to suffer from a lack of historic records and almost always no predictive data is available based on modelling. Given the prediction for increased frequency and intensity of rainfall with climate change, surface water and pluvial flooding are likely to become more frequent and serious.</p> <p><b>Current Position – Flooding from the Land</b></p> <p>The Councils will continue to collate data on surface water flooding as and when it becomes available. A good example of this is the data collected through the parish Flood Defence Reports carried out by WODC. Updated information will be fed into subsequent updates of the SFRA and continue to inform the planning process.</p> <p>Where areas are identified as having a surface water flooding issue, Councils may be required to undertake a Surface Water Management Plan (SWMP). Under the Flood Risk Regulations, the Lead Local Flood Authorities must prepare a preliminary Flood Risk Assessment and preparation of a SWMP is likely to contribute towards this process.</p> |              |

## 4.6 Geology, Groundwater Flooding & Groundwater Vulnerability Mapping

### Overview

- 4.6.1 Groundwater flooding is described in PPS25 as occurring when water levels in the ground rise above surface elevation, which is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).
- 4.6.2 Minerals extractions frequently excavate below the natural water table, which during periods of heavy rainfall may rise. Mineral extractions often operate a pumped system and can therefore impact on groundwater flow. These issues would be most appropriately addressed in a site specific FRA at the planning application stage as are site specific to the geology and proposed site operations.

### Data Sources & Requirements

- 4.6.3 PPS25 states that an assessment of the risk of groundwater flooding needs to be considered; however, a quantified assessment of risk from groundwater flooding is difficult to undertake, especially on a strategic scale. This is due to lack of groundwater level records, the variability in geological conditions and the lack of predictive tools (such as modelling) that can be used to make assessments of groundwater flow and risk of groundwater flooding following rainfall events.
- 4.6.4 As part of the South Oxfordshire and Vale SFRA, the EA supplied locations of 38 groundwater flooding incidents since 2000; 29 were located in South Oxfordshire and 9 were located in the Vale. GIS has been used to illustrate groundwater flooding incidents in South Oxfordshire and the Vale on each minerals and waste assessment map included in Appendix C and D. In addition, data collected as part of the CDC/WODC SFRA has been used to highlight areas at risk of groundwater flooding in the north of the Study Area.
- 4.6.5 Data provided by the EA has been used to produce aquifer maps for the study area. These can be used to identify where water-bearing permeable rock or drift deposits from which groundwater can be extracted are located within the County. Each aquifer is designated in accordance with the Water Framework Directive which reflects the importance of groundwater as a drinking water resource as well as supporting various ecosystems.
- 4.6.6 Aquifer Designations have been mapped for the study area as outlined below including definitions in Table 4-4:
- **Superficial (Drift)** – permeable unconsolidated (loose) deposits e.g. sand and gravel
  - **Bedrock** – Solid permeable formations e.g. sandstone, chalk and limestone.

**Table 4-4 PPS25 Flood Zones to be mapped as part of the SFRA**

| Aquifer Designation      | Definition  |
|--------------------------|---|
| <b>Principal Aquifer</b> | These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most |

|                                   |  |
|-----------------------------------|--|
|                                   | cases, principal aquifers are aquifers previously designated as major aquifer.   |
| <b>Secondary A</b>                | <b>Secondary A</b> - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;   |
| <b>Secondary B</b>                | <b>Secondary B</b> - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.  |
| <b>Secondary Undifferentiated</b> | <b>Secondary Undifferentiated</b> - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type. |
| <b>Unproductive Strata</b>        | These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.  |

- 4.6.7 It should be noted that all uncoloured areas on the bedrock designation maps included in Appendix E are classified as un-productive strata. However, with regard to the superficial (drift) maps included in Appendix E, it is not possible to differentiate between areas of unproductive strata and areas where no drift is present. In order to do this, reference must be made to geological survey maps (bedrock and drift geology) also included in this Appendix.
- 4.6.8 The EA have also provided details of depth to groundwater and groundwater levels from their groundwater monitoring network. This data is illustrated as a series of groundwater contours included in Appendix E.
- 4.6.9 Further mapping of Groundwater Emergence Zones can be found in the Defra report '*Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS 23)*'.

### Climate Change

- 4.6.10 Little is currently known about how soil, subsurface waters and groundwater are responding to climate change. If climate change leads to longer dryer summers or heightened variability in precipitation, greater pressure will be placed on groundwater resources.
- 4.6.11 In addition, as urbanisation continues, impermeable areas often increase which reduce the recharge of groundwater systems.

## 4.7 Sewer Flooding

### Overview

- 4.7.1 Sewer flooding generally results in localised short term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding can also occur as a result of blockage, poor maintenance or structural failure.

- 4.7.2 Minerals sites are generally located in rural areas remote from settlements, and therefore sewer flooding is not thought to be a significant issue with regard to flood risk at proposed minerals sites. However, localised sewer flooding issues should be considered as part of a site specific FRA if sewer infrastructure is present in proximity to the site.

### Data Sources & Requirements

- 4.7.3 Areas at risk from sewer flooding have been determined through review of records from DG5 registers provided by TW. In order to fulfil statutory commitments set by OFWAT, water companies must maintain verifiable records of sewer flooding, which is achieved through their DG5 registers. Water companies are required to record flooding arising from public foul, combined or surface water sewers and identify where properties have suffered internal or external flooding.
- 4.7.4 The data provided by each water company is limited to postcodes, resulting in the coverage of relatively large areas by comparatively limited and isolated recorded flood events. The data also only covers records over the last ten years. It should be noted that the flood records provided could be misleading as they may not provide a complete and accurate record of flood events in the study area over the last 10 years as some minor flooding incidents may go unreported, particularly if no properties are affected by internal flooding.
- 4.7.5 Available data has been mapped showing the areas that have been most and least affected by sewer flooding over the last 10 years. For this study, data has been mapped as total sewer flooding incidents which include data for both foul and surface water flooding incidents.
- 4.7.6 As outlined previously, data provided by TW is limited and does not represent a comprehensive record of instances of sewer flooding as some events may not have been recorded. Specific recorded instances of sewer flooding (where provided by the councils) have been outlined on site specific plans included in Appendix A, B, C and D.

### Climate Change

- 4.7.7 Climate change is estimated to result in milder, wetter winters and increased summer rainfall intensity. This combination will increase the pressure on existing sewer systems effectively reducing their design standard, leading to more frequent flooding.

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#### **Flooding from Sewers - Limitations & Uncertainties**

Due to the significance of sewer flooding in urbanised areas, the flood risk data that utility companies hold on their sewer network is classified as critical to contribute to addressing all sources of flood risk within the SFRA. Sewer and drainage flooding has been identified using DG5 records and historic recorded instances. It must be noted that DG5 data only covers a limited period of time and should be considered a snapshot of flooding. In addition, the DG5 dataset is only provided on a five-digit postcode area, which can be large and make it difficult to determine where a sewer flooding problems may have occurred in the past.

#### **Current Position – Flooding from Sewers**

More detailed sewer flooding models, such as those produced by utility companies for certain areas, provide a much more detailed and useful appreciation of the risk posed. However much of this work is not yet publicly available due to commercially sensitive issues or the Data Protection Act.

Until more detailed and suitable data becomes available, the local authorities, the EA and the utility companies should continue to liaise to determine how sewer flooding data can best be used to inform strategic planning.

## 4.8 Flood Defences & Flood Warning

### Flood Defences

- 4.8.1 A 'formal' flood defence is infrastructure that is designed and used to protect an area against flooding and can include bunds/embankments, canalised channels, culverts and flood storage areas. An 'informal' flood defence is a structure that has often not been specifically built to retain floodwater and is not maintained for this specific purpose. Boundary walls and industrial buildings situated immediately adjacent to rivers often act as informal flood defences
- 4.8.2 Information on both formal and informal flood defences throughout the study area has been provided by the EA as a GIS layer of the National Flood and Coastal Defence Database (NFCDD), listing details of structures and flood defences. The NFCDD aims to provide the following information:
- The location, composition and condition of fluvial defences and watercourses referenced to identified risk areas,
  - The types of asset (i.e. property, infrastructure, environmental) at risk within identified risk areas and including those protected by fluvial defences,
  - The extent of floods related to different flooding scenarios (e.g. different return periods and different types of flood event such as overtopping or embankment failure).
- 4.8.3 The locations of all NFCDD flood defences in the study area are presented on plans included in Appendix C and D.
- 4.8.4 The EA Flood Zone Map defines the extent of flooding ignoring the presence of defences. The reason for this approach is to make an allowance for residual flood risk in the event of a failure or breach/blockage/overtopping of the flood defences. This conservative approach over time will reduce reliance on flood defences and raise the awareness of flood risk in defended areas to help ensure that it is managed appropriately as part of development proposals.
- 4.8.5 The impacts of both formal and informal defences on flooding should be considered as part of a site specific FRA.

### Flood Warnings

- 4.8.6 The Civil Contingencies Bill requires that the EA 'maintain arrangements to warn the public of emergencies'. As a Category 1 responder, the EA has a duty to maintain arrangements to warn, inform and advise the public in relation to particular emergencies.

- 4.8.7 The County Council also has a duty under the Civil Contingencies Act to warn and inform the public and that is done mainly through the Communications Unit.

### Data Sources & Requirements

- 4.8.8 The EA have provided details of areas benefiting from an EA flood warning system which should be used by emergency planners in conjunction with the Flood Zone maps and flood defence information to assist in developing emergency plans for areas at risk of flooding with the study area.
- 4.8.9 Reference should also be made to the EAs website ([www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)) for the most up to date flood warning information. The EA have recently 'gone live' with Phase 4 of the Flood Warnings Flood Risk Areas project which has added 33 new target areas, 7 flood watch areas and 26 flood warning areas including:
- The River Kennet and its tributaries – 4 flood watch areas; 14 flood warning areas
  - The River Pang and Sulham Brook and its tributaries – 1 flood watch area; 8 flood warning areas
  - The River Thames and its tributaries from Shiplake to Medmenham – 2 flood watch areas; 2 flood warning areas

### Mapping

- 4.8.10 Site Specific Assessment maps included in Appendix C and D include details of EA flood warning areas.

## 4.9 Climate Change & Future Flood Risk

- 4.9.1 PPS25 updates the approach to estimating the impacts of climate change on flooding by using newer scenarios predicted by the UKCIP02 (UK Climate Impacts Programme – Scenario 2). In addition to increasing the peak flow of larger watercourses (by up to 20%), PPS25 now also includes an increase in the peak rainfall intensity of up to 30%. This will seriously affect the modelling of smaller urban catchments, leading to rapid runoff to watercourses and surface water flooding, surcharging of gullies and drains and sewer flooding.
- 4.9.2 The Thames CFMP (Catchment Flood Management Plan) has considered flood risk for the next 50-100 years and has taken into account the flood risk drivers of climate change, urban development and changes in land use.
- 4.9.3 The SFRA brief has asked for an assessment of the implications of climate change for flood risk over a time period of 100 years.
- 4.9.4 In order to account for climate change where it is absent from EA Flood Zone data, an estimate of the impacts of climate change on the 100 year flood outlines is required. In order to achieve this, the following has been used as a proxy in the absence of modelled outlines:
- Flood Zone 3a (<= 1 in 100 year) + climate change ≈ Flood Zone 2
- 4.9.5 This is not to say that the 100 year flood outline (Flood Zone 3a) will necessarily increase to the 1000 year outline, (Flood Zone 2) but rather that one would expect the depth and extents of flooding to increase to somewhere between the 100 year and 1000 year outlines. This is a



conservative approach designed to help strategic planners identify where increased detail and resolution in the flood outlines is needed at either the Level 2 SFRA or Site Specific FRAs.

- 4.9.6 Sewer and surface water flooding are likely to become more frequent and widespread under urbanisation and climate change scenarios as the amount of impermeable surfaces and runoff increase, highlighting the importance of SuDS.
- 4.9.7 If climate change leads to longer dryer summers or heightened variability in precipitation, it is likely that greater pressure will be placed on groundwater resources. In addition, as urbanisation continues and the amount of impermeable surfaces increase, the rate of recharge of groundwater systems will be reduced

## 5 The PPS25 Sequential Test

### 5.1 The sequential approach to development

- 5.1.1 The sequential approach is ‘a simple decision-making tool designed to ensure that areas at little or no risk of flooding are developed in preference to areas at higher risk<sup>4</sup>.....The aim should be to keep all development out of medium and high flood risk areas (Flood Zones 2 and 3 and other areas affected by other sources of flooding) where possible. All opportunities to locate new water-incompatible developments in reasonably available areas of little or no flood risk should be explored, prior to any decision to locate them in areas of higher risk<sup>5</sup>”.
- 5.1.2 The overall aim is to steer all development, irrespective to its vulnerability to flooding, to Flood Zone 1 wherever possible, and then sequentially to Flood Zones 2 and 3 if appropriate. Additionally, within each Flood Zone development should be directed to the areas of least flood risk i.e. this approach reinforces the most effective risk management measure of all, that of avoidance.
- 5.1.3 PPS25 acknowledges that some areas will be at risk of flooding from flood sources other than fluvial systems. All sources of flooding must be considered when looking to locate new development. Other sources of flooding that require consideration when siting new development allocations include:
- Flooding from the Land - Surface Water;
  - Flooding from Groundwater;
  - Flooding from Sewers and Drains; and,
  - Flooding from Manmade or Artificial Sources.
- 5.1.4 To assist Waste and Minerals Planning Authorities (W/MPA) in their strategic land use planning, SFRAs should present sufficient information to enable them to apply a sequential approach to the allocation of sites for waste management and *where possible* mineral extraction and processing. This acknowledges that minerals can only be extracted where they are located and that some deposits (in particular sand and gravel) are normally found in the flood plain. However, the operational plant associated with such workings ‘*should not increase flood risk elsewhere and need to be designed, worked and restored accordingly*’.
- 5.1.5 So, although sand and gravel *workings* are identified as ‘water-compatible development’ (see table 5.1 below) sand and gravel *workings and processing* are classed as “less vulnerable development’, and steps should be taken to ensure that ancillary and supporting infrastructure and buildings are located in areas of least flood risk to reduce the risk of being adversely affected by flooding or increasing flood risk elsewhere. Exceptionally, essential sleeping accommodation for staff who may be required to service sand and gravel workings may still be classified as ‘water compatible development’ if subject to a specific flood warning and evacuation plan.

<sup>4</sup> PPS25 Practice Guide paragraph 4.4 p82

<sup>5</sup> PPS25 Practice Guide paragraph 4.5 p82

## 5.2 The Sequential Test

- 5.2.1 The Sequential Test is the process that LPA's should go through to demonstrate that the sequential approach to development (at all stages including both the forward planning and planning application stage) has been applied. At the forward planning stage this is particularly important to illustrate whether there are any reasonably available sites in areas with lower probabilities of flooding and that would be more appropriate to the type of development or land use proposed.
- 5.2.2 The Sequential Test should be applied at all stages of planning, including strategic option assessment, site allocation and in the determination of planning applications. The geographical area over which the Test should be applied may vary depending on the stage at which the Test is being applied. The EA provide guidance to the local authority on application of the Sequential Test, including defining the geographical area over which the Test should be applied. Within the defined area each site is compared with particular regard to the following:
- Flood Zone
  - Vulnerability Classification (see Table 5-1 below)
  - Development Site Area
  - Availability of 'reasonably available' alternative sites
- 5.2.3 Tables D.1, D.2 and D.3 of PPS25 identify types of development and the extent to which each may be appropriate for development within identified flood risk zones. Table 5-1 below enlarges on these and displays the vulnerability classification for the different forms of minerals and waste developments that can be reasonably envisaged and the Flood Zone(s) to which each is considered 'appropriate'. Building upon this, Table 5-2 below highlights where the Sequential and Exception Tests may need to be applied.
- 5.2.4 Any proposed development on a windfall site will by definition differ to a site allocated in the LPAs development plan that has been sequentially tested. Therefore, the Sequential Test will need to be applied at the planning application stage and should be subject to the same consideration of flood risk as other development sites.

**Table 5-1 Minerals and Waste Flood Vulnerability Classification**

| Development Type  | Vulnerability Classification | Flood Zone Compatibility |
|---|------------------------------|--------------------------|
| Landfill sites (hazardous, non-hazardous and inert waste – including waste used in quarry restoration)                                | More Vulnerable              | Flood Zone 1 and 2       |
| Waste management facilities handling hazardous waste  | More Vulnerable              | Flood Zone 1 and 2       |
| Minerals working and processing (except for sand and gravel working)  | Less Vulnerable              | Flood Zones 1, 2 and 3a  |
| Sand and Gravel Workings  | Water Compatible             | Flood Zone 1, 2, 3a, 3b  |
| Sand and Gravel processing sites (including grading and washing plant)  | Less Vulnerable              | Flood Zone 1, 2, and 3a  |
| Sewage Treatment Plants   | Less Vulnerable              | Flood Zones 1, 2 and 3a  |
| Waste recycling, composting and transfer uses (including recycling to produce recycled aggregate)                                     | Less Vulnerable              | Flood Zones 1, 2 and 3a  |
| Secondary aggregate re-cycling (considered as minerals processing)  | Less Vulnerable              | Flood Zones 1, 2 and 3a  |
| Waste treatment processes (including anaerobic digestion, mechanical biological treatment, incineration, gasification and pyrolysis). | Less Vulnerable              | Flood Zones 1, 2, and 3a |
| Concrete block manufacture (considered as minerals processing)  | Less Vulnerable              | Flood Zones 1, 2 and 3a  |
| Concrete batching plant (considered as minerals processing)   | Less Vulnerable              | Flood Zones 1, 2 and 3a  |

*(The above table is provided by building upon Table D.2. and Table D.3. PPS25)*

NB Waste management categories based on guidance given in Planning for Sustainable Waste Management Companion Guide to PPS10 – page 31.

**Table 5-2 PPS25 Flood Risk Vulnerability and Flood Zone Compatibility**  
(Provided by building upon Table D.2. and Table D.3. PPS25)

| M&W Development Type   | Use Category     | FLOOD ZONE |  |  |  |
|--|------------------|------------|--|--|--|
|  |                  | 1          | 2  | 3a   | 3b   |
| Landfill sites or sites used for waste management facilities for hazardous waste   | More Vulnerable  | ✓          | Use only appropriate if Sequential Test is passed<br>↓<br>✓                            | Use only appropriate if Sequential Test is passed<br>↓<br>Use only appropriate if the Exception Test is passed<br>↓<br>✓ | ✗<br>Use should not be permitted   |
| Waste management facilities (except landfill and hazardous waste), Minerals working and processing (except for sand and gravel workings) | Less Vulnerable  | ✓          | Use only appropriate if Sequential Test is passed<br>↓<br>✓                            | Use only appropriate if Sequential Test is passed<br>↓<br>✓  | ✗<br>Use should not be permitted   |
| Sand and gravel workings (that exclude processing operations)  | Water Compatible | ✓          | Sequential Test suggested as means of prioritising sites at allocation stage<br>↓<br>✓ | Sequential Test suggested as means of prioritising sites at allocation stage<br>↓<br>✓                                   | Sequential Test suggested as means of prioritising sites at allocation stage<br>↓<br>✓ |

✗: Use should not be permitted      ↓: If passed proceed      ✓: Appropriate use

Note: Even where development is found to be acceptable through the application of the Sequential and Exception Tests further flood resistance/resilience may be required in the design and construction of specific developments. The Sequential Test should be informed by a Level 1 SFRA and the Exception Test should be informed by both the Level 1 and Level 2 SFRA.

Sequential Test: Development should be steered first towards the lowest risk areas. Only where there are no reasonably available sites should development on suitable available sites in higher risk areas be considered taking into account flood risk vulnerability and applying the Exception Test where required.

Exception Test: Exceptionally, development whose benefits outweigh the risk from flooding may be acceptable. For this test to be passed, the development should demonstrably provide wider

*sustainable benefits to the community, should be on developable previously-developed land (unless there are no reasonably available sites on developable previously-developed land), and should be demonstrably safe without increasing flood risk elsewhere and where possible reducing flood risk overall.*

## 5.3 Using the SFRA Maps, Data and GIS Layers

5.3.1 Table 5-3 below highlights which GIS layers and SFRA data should be used in carrying out the Sequential Test. The table poses some example questions which provide some guidance in where to look within the SFRA for the information.

**Table 5-3: Sequential Test Key - A Guide to using the Minerals and Waste SFRA GIS Layers**

| Category  | GIS Layer   | Example Questions  |
|---|---|--|
| Development Vulnerability   | Not applicable refer to Table D2 in PPS25   | <b>Question 1</b> - Is the proposed development defined as 'more vulnerable' according to Table D2 in Planning Policy Statement 25?              |
|   |   | <b>Question 2</b> - Is the proposed development defined as 'less vulnerable' according to Table D2 in Planning Policy Statement 25?              |
|   |   | <b>Question 3</b> - Is the proposed development defined as 'water compatible development' according to Table D2 in Planning Policy Statement 25? |
| Food Zone Classification  | EA main river maps.   | <b>Question 4</b> - Is the site located near a watercourse?  |
|   | SFRA fluvial FZ2, FZ3a & FZ3b layers. Also examine historical floodplain and take into consideration climate change outlines. | <b>Question 5</b> – Through consultation of the EA's Flood Zone maps, is the development site located in Flood Zone 1?                           |
|   |   | <b>Question 6</b> - Through consultation of the EA's Flood Zone maps, is the development site located in Flood Zone 2?                           |
|   |   | <b>Question 7</b> - Through consultation of the EA's Flood Zone maps, is the development site located in Flood Zone 3a?                          |
|   |   | <b>Question 8</b> - Through consultation of the EA's Flood Zone maps, is the development site located in Flood Zone 3b?                          |
|   |   | <b>Question 9</b> - Can the development be located in Flood Zone 1?  |
|   |   | <b>Question 10</b> - Can the development be located in Flood Zone 2?   |
| <b>Question 11</b> - Can the development be located in Flood Zone 3a? |   |  |

| Category              | GIS Layer   | Example Questions   |
|-----------------------|---|---|
| Other Flood Sources   | SFRA fluvial FZ3 & FZ2 outlines plus climate change   | <b>Question 12</b> – Will the site be impacted by the effects of climate change over the next 100 years?                                |
|                       | Sewer Flood Layer & Historical Flood Outlines   | <b>Question 13</b> - Is the site in an area potentially at risk from sewer flooding?  |
|                       | EA Areas Susceptible to Surface Water Flood Risk Maps, Historical Flood Outlines, Parish Council data, groundwater vulnerability maps | <b>Question 14</b> - Is the site in an area potentially at risk from overland flow flooding?  |
|                       |   | <b>Question 15</b> - Is the site located in an area where groundwater is present?   |
|                       |   | <b>Question 16</b> – Is the site located in an area where groundwater is close to the ground surface?                                   |
| Flood Risk Management | Flood Defence Layer (NFCDD), Flood Warning Layer, Areas Benefiting from Flood Defences Layer, Parish Council data                     | <b>Question 17</b> - Does the site have a history of flooding from any other source?  |
|                       |   | <b>Question 18</b> - Does the site benefit from flood risk management measures?   |
|                       |   | <b>Question 19</b> - Can the development be relocated to an area benefiting from flood risk management measures or of lower flood risk? |

## 5.4 How to apply the Sequential Test where there are gaps in data

5.4.1 It should be noted that some watercourses in the study area do not have Flood Zones associated with them or do not have all Flood Zones defined. This is not to suggest these watercourses do not flood, moreover that modelled data is not currently available. Therefore, allocations adjacent to watercourses where Flood Zones have not been defined cannot be assessed against all aspects of the Sequential Test using the existing data.

5.4.2 To overcome gaps in existing data and to enable the Council to proceed with application of the Sequential test it is suggested that the following criteria be considered (*it should be noted that this is a recommendation of a potential approach and is not policy*):

- **For ‘ordinary’ watercourses where no Flood Zones have been defined:**
  - For application of the Sequential Test the site should be considered as lying within Flood Zone 3a until proven otherwise.
  - If a site is within 8m of a watercourse and promoted for development further investigation should be undertaken to determine the suitability of the site for the proposed development.
  - If following further investigation the site is found to lie within Flood Zone 3b the development may not be appropriate against the policies presented in PPS25;

- **For watercourses where Flood Zone 3b (functional floodplain) has not been defined:**
  - If a proposed development site is located in Flood Zone 3a, there is a possibility it may also fall within Flood Zone 3b. Further investigation should be undertaken to define Flood Zone 3b for the local water course(s).
  - According to the PPS25 Practice Guide Companion when applying the Sequential Test the site should be considered as lying within Flood Zone 3b until proven otherwise.
  - If following further investigation the site is found to lie within Flood Zone 3b the development may not be appropriate against the policies presented in PPS25;
- **For watercourses where the effect of climate change on Flood Zones has not been defined:**
  - For any development located in or adjacent to a Flood Zone boundary, there is a possibility that when considering the effects of climate change the site may be at greater flood risk. For example if a site is clearly identified to be in Flood Zone 2 when the effects of climate change are considered the site may be found to lie within Flood Zone 3.
  - For application of the Sequential Test sites located in Flood Zone 3 or at the boundary of Flood Zone 2 and 3, where the effects of climate change are not defined, the sites can be considered to lie within the higher risk Flood Zone however; the effects of climate change should be investigated further.
  - If following further investigation the site is found to lie within a different Flood Zone the Sequential Test should be re-applied to determine if the proposed development is appropriate.

5.4.3 It should be noted that adopting this approach requires the Council to accept an element of risk when reviewing and allocating their minerals and waste sites. For example, should the LPAs identify a site in Flood Zone 2 as acceptable for more vulnerable development, when considering the effects of climate change on Flood Zone definition the site may be found to be located in Flood Zone 3 and therefore require application of the Exception Test.

5.4.4 As stated above, when allocating sites near an ordinary watercourse (where no Flood Zones are mapped) it should be assumed that these sites are located in Flood Zone 3 until proven otherwise. It is suggested that the County consider the need for a more detailed Level 2 SFRA for such sites (i.e. within 8m of an ordinary watercourse) to ensure a sound and justified approach to the application of the Sequential Test at the Examination of Site Allocations stage of the planning process.

- **For sites spanning multiple flood zones:**
  - Many of the sites identified for possible minerals and waste development in Appendices C and D, particularly the sites for sand and gravel, are large scale and include land covered by different flood zone categorisations. The tables presented in the appendices confirm the proportion of each site covered by the various flood zones. When applying the Sequential Test at site allocation stage, these tables will allow a reasonable comparison to be made of the degree of flood risk at the various available sites.



## 6 The Exception Test & Level 2 SFRA

### 6.1 The Exception Test Process

6.1.1 The Exception Test process is detailed in paragraph D9 of PPS25 and should only be applied following application of the Sequential Test. There are three stringent conditions (parts), all of which must be fulfilled before the Exception Test can be passed. These conditions are as follows:

- a) It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk;
- b) The development must be on developable previously developed land or, if it is not on previously-developed land, that there are no reasonable alternative site on developable previously-developed land; and,
- c) A site specific FRA must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

### 6.2 When is the Exception Test Required?

6.2.1 As outlined in Table 5-2 above, the Exception Test is only required (in terms of minerals and waste development) for landfill and sites used for waste management of hazardous waste (i.e. more vulnerable development) located in Flood Zone 3a. The Exception Test will be required following application of the Sequential Test providing this shows that suitable alternative land at low risk of flooding is not available.

6.2.2 If the LPA wish to allocate an individual site which requires application of the Exception Test, the LPA should apply the exception test at the allocation stage and assess whether it is broadly feasible to deliver a safe development in line with Part C of the Exception Test. Only where it has been established that the site allocation would be delivered as a 'safe development' can the site be allocated. A further examination of the site using the Exception Test will still need to be undertaken at the detailed design stage of the planning application, using a site specific FRA (see section 12 of this report).

### 6.3 What is a Level 2 SFRA?

6.3.1 As outlined in 6.2.2, for forward planning purposes, where it has not been possible to allocate all proposed development and infrastructure in accordance with the Sequential Test using the Level 1 SFRA, it is necessary for the LPA to apply the Exception Test. In order to provide the required information for the Exception Test at the site allocation state, the SFRA scope should be increased to a Level 2 SFRA.

6.3.2 A Level 2 SFRA will assess the nature of the flooding in more detail to include hazard and depth mapping including the presence of flood defence measures. This will allow a sequential approach to development within the flood zone, as areas with lower hazard and depth can be highlighted and developed ahead of areas at higher risk with regard to hazard and depth of water.

- 6.3.3 The Level 2 SFRA should use the hazard and depth mapping to provide guidance at a strategic level on how developments can be made safer including recommendations on floor levels, the use of refuge areas, flood action plans etc.
- 6.3.4 PPS25 also outlines that a Level 2 SFRA should provide an outline of *'the requirements that would be necessary for a site specific FRA supporting a planning application for a particular application to pass part c of the Exception Test'*<sup>6</sup>
- 6.3.5 The difference between a Level 2 SFRA and a site specific FRA is the scale and scope of the study. A Level 2 SFRA covers a strategic site<sup>7</sup> (or several strategic sites) or an area that potentially encompasses many smaller sites or individual developments. A site specific FRA would be prepared for an individual, non strategic site.

## 6.4 Potential Areas where a Level 2 SFRA may be required.

- 6.4.1 Although specific waste uses for the various sites identified are not yet known, the general location of the various sites relative to each other and to flood risk areas suggests that the need for a level 2 study is unlikely to arise for waste sites allocations (unless a landfill site is proposed with part or all of its area in flood zone 3a). However, this should be kept under review, particularly if additional sites are proposed for consideration during the preparation of the Minerals and Waste Development Framework.
- 6.4.2 A large proportion of the area's sand and gravel deposits occur in the valley bottom of the Thames and its tributaries and many of the sites so far identified for possible development have areas that lie within Flood Zones 2 and 3. However, sand and gravel workings are classified as water compatible development, and other mineral working and processing sites as 'less vulnerable' development. It is therefore not expected that a Level 2 SFRA study will be required for minerals development, notwithstanding that some workings may still be located (or partly located) in the flood plain. Individual proposals submitted at the detailed planning stage should include a detailed site specific flood risk assessment as part of the planning application (see section 12).

<sup>6</sup> PPS25 Practice Guide December 2009 paragraph 3.65, p64

<sup>7</sup> Strategic sites are those that may be identified in a Core Strategy, because of their significance to the successful delivery of the overall strategy.

## 7 Potential Mineral Sites Assessment

- 7.1.1 To help identify where future sand and gravel working should take place in Oxfordshire, OCC is presently generating strategic options to identify those parts of the County from which future sand and gravel and crushed rock working should take place. These are illustrated in Appendix A and B. In addition to these resource areas, 78 potential mineral sites have also been identified as illustrated in Appendix C.
- 7.1.2 All 78 mineral sites, the 6 Crushed Rock Resource Areas and the 19 Sand and Gravel Resource Areas have been mapped as part of this Level 1 SFRA (Appendix A – Crushed Rock Resource, Appendix B – Sand and Gravel Resource, Appendix C - Minerals Sites).
- 7.1.3 An overview of each potential mineral site and resource area including its location, percentage area in each Flood Zone and records of flooding from all sources is included in overview tables included in Appendix A, B with individual site details included in Appendix C. Maps are ordered alphabetically by Site ID.
- 7.1.4 The MWDF should apply the sequential approach at both the strategic level and the site allocation stage of plan preparation. To assist the Council in applying the Sequential Test at the strategic level, Appendix A and B contain summary tables (as agreed with the EA on 01.07.2010) which outline the degree of flood risk generated by the various sites identified in each resource area. This details the proportion of the identified site areas that affect each flood zone, and the number of sites affected by each flood zone. These details will assist OCC in assessing whether the requirement for the mineral could first be met from areas of the County at little or no risk of flooding. The Council should discuss with EA reasons why areas at greater risk of flooding should be identified as preferred areas for extraction.
- 7.1.5 The detailed site assessment tables in Appendices A and B can be used by OCC in applying the sequential test at the site allocation stage. These details can assist in identifying those sites within a preferred area for extraction that are at least risk of flooding.
- 7.1.6 As previously mentioned (section 1.2.3 of this report) Scott Wilson prepared an earlier Level 1 SFRA for the Cherwell and West Oxfordshire District Council areas in April 2009. This assessed the level of flood risk for the possible mineral sites which had been nominated within those Districts at that time (6 in Cherwell and 24 in West Oxfordshire). These plans and supporting tables are now included in Appendix C of this report for completeness. The plans originally formed part of a separate report and their layout is slightly different to those completed for the additional sites assessed as part of this study. In some cases, alterations have been made to the original site boundaries as included in the Cherwell and West Oxfordshire SFRA. Where this has occurred, text has been highlighted in the original plans and new updated plans are included in Appendix C (this is relevant to sites SS-06, SG-20, SG-14, SG-15, SG58, SG-54, SG-08, SG-29 and SG-36).

## 7.2 Flooding from Rivers

- 7.2.1 The spatial strategy for minerals development will primarily be driven by geology, as minerals can only be worked where they naturally occur. This has implications when carrying out the sequential test in accordance with PPS25 (steering development to lowest flood risk) as reasonable alternative sites in areas of lower flood risk (in particular Flood Zone 1) may not

always be available. This is particularly the case with deposits of sand and gravel as many of the deposits are located within natural river floodplains which are often inundated during flood events.

- 7.2.2 Stockpiles and ancillary buildings can reduce the storage capacity of the floodplain and also alter the natural flow of the flood water by blocking flow paths and increasing flood risk to adjacent land. Typically in floodplain quarries, sand and gravel extracted in the spring and summer months are sold directly, resulting in smaller stockpiles. However, stockpiles are often increased in late summer and autumn to provide sales during the winter months when pumps are switched off and excavation is inhibited. This leads to a larger potential impact in the winter months.
- 7.2.3 In light of this, sand and gravel working (together with **essential** ancillary sleeping or residential accommodation for staff<sup>8</sup> (subject to a specific flood warning and evacuation plan) are confirmed as 'water compatible' development. Although acknowledging that guidance in PPS25 on flood risk and mineral working could be open to interpretation, the Environment Agency advise that the Sequential Test should still be applied to sand and gravel working, notwithstanding that this is classified as 'water compatible' development. Table 5.2 in this report (taken from PPS25) *suggests* that the Sequential Test is still applied to 'water compatible' development, and it is recommended that this is the approach adopted by OCC in formulating its minerals strategy.
- 7.2.4 Where processing plant are to form an integral part of a sand and gravel working, the Environment Agency takes the view that the development should **not** be classified as 'water compatible' development, and should be regarded as 'less vulnerable' development (and therefore not allowed in Flood Zone 3b - see table 5.2). This is particularly likely to apply where a new working is opened (as distinct from an extension to an existing pit). Therefore, where a possible sand and gravel site includes land in Flood Zone 3b, unless classified as an extension site, OCC are advised to treat the site with caution. At site allocation stage the Council will need to be satisfied that any stockpiles and non-essential ancillary buildings are able to be accommodated outside of Flood Zone 3b if the site is to be considered further. At the planning application stage a site specific FRA will need to demonstrate that the development will not reduce the storage capacity of the floodplain, obstruct flow paths or increase flood risk to adjacent ground. Compensation or other mitigation measures may be needed in order to achieve this. A sequential approach to development layout should be adopted as a means of achieving this.
- 7.2.5 Appendix C shows that the majority of mineral sites are located in Flood Zones 2 and 3. In the absence of the 1 in 20 year modelled Flood Zone 3b (functional floodplain) all sites located within Flood Zone 3a are automatically reclassified as being located within Flood Zones 3b.
- 7.2.6 Notwithstanding these possible concerns, mineral extraction in the floodplain may alternatively lead to an overall reduction in the level of flood risk by providing additional capacity during its operation phase for floodwater storage. This is discussed further in Section 9.

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<sup>8</sup> Table D.2 p26 Planning Policy Statement 25 March 2010

## 7.3 Flooding from Land (Pluvial/Surface Water Flooding and Overland Flow)

- 7.3.1 Intense periods of rainfall over a short duration or periods of prolonged rainfall can lead to overland flow as rainwater may be unable to infiltrate into the ground or enter drainage systems.
- 7.3.2 One of the main issues with pluvial flooding is that relatively small changes to hard surface and surface gradients can cause flooding. As a result, development for minerals sites including the stockpiles and ancillary buildings could lead to more frequent surface water flooding which can cause disruption to the site and surrounding land.
- 7.3.3 Any increases in surface water flooding will need to be managed in accordance with PPS25. Runoff from the site should not exceed current levels and this will need to be demonstrated in a site specific FRA.

## 7.4 Flooding from Groundwater

- 7.4.1 Groundwater flooding is described in PPS25 as occurring when water levels in the ground rise above surface elevation, which is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).
- 7.4.2 Minerals workings in most cases excavate below the natural water table, which during periods of heavy rainfall may rise. Mineral workings often operate a pumped system and can therefore interfere with groundwater flow. These issues should be addressed in a FRA at the planning application stage.
- 7.4.3 The restoration of mineral sites can lead to increase risks of groundwater flooding especially if a pumped system was previously used at the site. The restoration of minerals sites should clearly assess the risk of groundwater flooding in a FRA.

## 7.5 Flooding from Sewers

- 7.5.1 Sewer flooding generally results in localised short term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding can also occur as a result of blockage, poor maintenance or structural failure.
- 7.5.2 Thames Water is the statutory water undertaker for the section of the study area which includes all proposed minerals sites. Thames Water maintain a register of historical sewer flooding events (DG5 register), which has been provided as part of the SFRA study. Section 4.7 of this report discusses the available sewer flooding data in more detail with a position statement regarding limitation and uncertainties of the data.
- 7.5.3 Any incidents of sewer flooding highlighted by Thames Water and each council have been illustrated on the minerals overview table included in Appendix C.
- 7.5.4 Minerals sites are generally located in rural areas remote from settlements and scattered housing, therefore, sewer flooding is not thought to be a large issue with regard to flood risk at proposed minerals sites.

## 7.6 Flooding from Reservoirs, Canals and other Artificial Sources

- 7.6.1 The Oxford Canal has been included on minerals and waste site plans included in Appendix C and D. Reference should be made to these plans to assess the risk of flooding from the canal as part of a site specific FRA. Flood risk from the Oxford Canal should also be considered as part of the Sequential Test.

## 8 Potential Waste Sites Assessment

- 8.1.1 The Minerals and Waste Core Strategy is likely to identify areas where waste management facilities will be most appropriately located, but at present no options have been developed. It is possible that the Core Strategy may allocate one or more strategic waste sites. Other waste management facilities will be allocated in a subsequent Site Allocations DPD. Sites have been nominated for specific waste management uses, but other possible sites have been identified and no assessment has yet been undertaken as to their suitability for specific waste management facilities. The Sequential Test should be applied by OCC, in liaison with the EA, for each potential waste site.
- 8.1.2 An overview of each potential waste site including its location, percentage area in each Flood Zone and records of flooding from all sources is included in an overview table in Appendix D. Maps are ordered alphabetically by Site ID. These assessments should be sufficient for OCC to undertake the Sequential Test.
- 8.1.3 As mentioned in section 1.2.3 of this report, Scott Wilson prepared a SFRA for the Cherwell and West Oxfordshire District Council areas in April 2009 and this included sites that had been identified at the time as possible waste sites in each of the Districts (64 in Cherwell and 33 in West Oxfordshire). These plans and supporting tables have been included in Appendix D of this report for completeness. The plans originally formed part of a separate report and therefore, their layout is slightly different to those completed as part of this study. One change has been made to the plans since they were finalised in April 2009 as the outline of site 157 has been updated.

## 8.2 Waste Management and Flood Risk

- 8.2.1 Historically landfill was the most common method of waste management throughout the UK. However, in order to come into line with EU legislation and government targets ways must be found to reduce the current dependence on landfill and move towards more sustainable methods of managing waste. These methods include recycling, composting and energy recovery through various technologies such as anaerobic digestion, combustion or gasification.
- 8.2.2 The Waste Sites (Issues and Options) Consultation Paper (Feb 2007) identified a number of possible waste sites located across the Study Area. Further sites have been added following consultation and all of the possible waste sites so far identified are assessed in Appendix D. A number of non-hazardous and inert landfill sites in the study area are based on quarry areas. There is also a spread of existing waste management facilities (waste transfer stations, household waste recycling centres etc) across the area.
- 8.2.3 The waste sites that have been mapped include some possible waste sites that have been identified in addition to those nominated by operators and landowners. All sites known to be in active waste management have been included, together with a number of areas identified as being suitable for industrial processes in District Local Plans and land believed to be derelict or un-used.

- 8.2.4 PPS25 Table D.2 and Table 5-2 in this report classify landfill sites and sites used for waste management facilities for hazardous waste<sup>9</sup> as 'more vulnerable' development in terms of flood risk. More vulnerable developments may be considered acceptable in Flood Zone 2 subject to application of the Sequential Test and in Flood Zone 3a subject to application of the Exception Test. All other potential waste uses are classified as 'less vulnerable' in terms of flood risk, and are allowed in Flood Zones 1, 2 and 3a (subject to application of the Sequential Test).

## 8.3 Flooding from Rivers

- 8.3.1 The spread of waste sites across the study area means that flooding from all river catchments within the study area may be relevant.
- 8.3.2 The Overview Assessment Table included in Appendix D provides a review of the potential waste site allocations with regard to EA Flood Zones and other sources of flood risk.

## 8.4 Flooding from Land (Pluvial/Surface Water Flooding and Overland Flow)

- 8.4.1 Intense periods of rainfall over a short duration or periods of prolonged rainfall can lead to overland flow as rainwater may be unable to infiltrate into the ground or enter drainage systems.
- 8.4.2 One of the main issues with pluvial flooding is that relatively small changes to hard surface and surface gradients can cause flooding. Waste treatment plants may increase the percentage of impermeable surfaces increasing the risk of flooding from surface water. Flood risk is increased at low points in the catchment. Site specific FRAs will need to demonstrate how this increased risk is managed.
- 8.4.3 The EA's Areas Susceptible to Surface Water Flooding maps included in Appendix E should be used to inform strategic land use planning. It should be noted that this data is not intended for use in allocating individual sites and data limitations outlined in Section 4.5 should be adhered to.
- 8.4.4 Historic surface water flooding incidents provided by both Cherwell and west Oxfordshire District have been plotted on site specific assessment plans.
- 8.4.5 In South Oxfordshire and the Vale, JFLOW modelling has been used to highlight areas that may be more prone to surface water flooding.
- 8.4.6 This information is shown on plans included in Appendix D and shows that 27 of the 85 possible waste sites could be at risk from surface water flooding.

## 8.5 Flooding from Groundwater

- 8.5.1 Groundwater flooding is described in PPS25 as occurring when water levels in the ground rise above surface elevation, which is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).

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<sup>9</sup> See planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10 for definition. [www.communities.gov.uk/index.asp?id=1500757](http://www.communities.gov.uk/index.asp?id=1500757)



- 8.5.2 A number of waste sites in the study area are located in redundant mineral site excavations. The relation of groundwater and potential contamination needs to be investigated prior to approval of any landfill.

## 8.6 Flooding from Sewers

- 8.6.1 Sewer flooding generally results in localised short term flooding caused by intense rainfall events overloading the capacity of sewers. Flooding can also occur as a result of blockage, poor maintenance or structural failure.
- 8.6.2 Thames Water is the statutory water undertaker who maintain a register of historical sewer flooding events (DG5 register), which has been provided as part of the SFRA study. Section 4.7 of this report discusses the available sewer flooding data in more detail with a position statement regarding limitation and uncertainties of the data.
- 8.6.3 Any incidents of sewer flooding highlighted by Thames Water have been illustrated on the Waste Assessment Plans included in Appendix D.

## 8.7 Flooding from Reservoirs, Canals and other Artificial Sources

- 8.7.1 The Oxford Canal runs parallel to the River Cherwell and merges with it at two points within the District, sharing the same channel for 1.5km within the middle reach. A series of locks control water levels along the Oxford Canal with a series of overflow weirs ensuring any excess flows in the canals are diverted to the River Cherwell. During flood conditions the River Cherwell and the Oxford Canal are largely co-joined and therefore comments regarding the surcharging of the canal and the scope for flood protection and compensation are as for main rivers
- 8.7.2 Five possible waste sites have been identified as being located adjacent to the Oxford Canal or other artificial sources and are therefore at a greater risk of flooding from artificial sources. These include:
- Sites 98, 232 and 246 which are located near to the Oxford Canal
  - Sites 115A and 115B which have a storage reservoir to the south and west of the site.
- 8.7.3 In accordance with Table 5-2, if the LPA wish to allocate one or more of these sites for landfill or hazardous waste management, the Exception Test may be required to assess whether it is broadly feasible to deliver a safe development. Although this is unlikely to arise (98 is only 4.45ha and is adjacent to an urban area, 232 is 24ha but houses at sewage treatment works, 246 is located at the edge of the urban envelope and 115 is located in the River Thames floodplain), a Level 2 SFRA could be used to inform the Exception Test for any strategic allocation in this area. If the Level 2 SFRA demonstrates that safe development on the site is feasible, a more detailed site specific FRA will be required for the development to move forward to the planning application stage.
- 8.7.4 Residual risks to these sites (for example from breaching or overtopping) should be considered in a more detailed site specific FRA. The results of the site specific FRA should inform the Exception Test where required.

## 8.8 Strategic Waste Treatment

- 8.8.1 The Minerals and Waste Development Framework is likely to need to make allocations for a number of strategic waste facilities; this may include a sizeable waste treatment plant capable of treating up to 300,000 tonnes of residual waste per annum. The question therefore arises as to whether, for the purpose of this study, such a facility should be categorised as 'less vulnerable' development or whether it should be regarded as 'essential infrastructure' – to which a lower level of flood risk assessment would apply.
- 8.8.2 It is possible that future legislation or guidance may identify some waste facilities as nationally significant infrastructure. However, for the purposes of this report and in accordance with PPS25, it is considered that waste treatment (except hazardous waste facilities) should be classified as 'less vulnerable' development. See Table 5-1 above for vulnerability and Flood Zone compatibility.

## 9 Sequential Working and Restoration of Minerals Sites

### 9.1 Introduction

9.1.1 The restoration of mineral sites in the past has predominantly been achieved through infilling with waste material and capping with clays and soils to enable a return to agricultural use, or alternatively the creation of water bodies. There has since been a decline in the need for agricultural land; changes in the way in which waste disposal is taxed and regulated have also led to less inert material being available for use as fill. Conservation and amenity after uses have therefore become more common after uses for minerals sites. There are a number of potential restoration uses for minerals sites as discussed in more detail below.

### 9.2 Flood Storage

9.2.1 Research carried out by Symonds Group on behalf of DEFRA, the Mineral Industry Sustainable Technology and the Mineral Industry Research Organisation looked into the influence of aggregate quarrying in floodplains on flood risk. The results showed that sand and gravel extraction in a floodplain will create a void that can be used to provide potential storage during a flood event, generally reducing flow and water levels in the vicinity of the extraction. The EA support the principal of seeking opportunities to restore sites in such a way that they can be used for flood storage. However, long term benefits will only accrue where larger workings upstream of a vulnerable settlement are restored to an open water environment; it is also thought that any benefits are diminished where workings are more than 2km upstream of a settlement

9.2.2 This potential sequential working and restoration is likely to be most effective at a strategic (County) scale and is suggested in PPS25 Practice Guide.

9.2.3 Of the potential minerals sites assessed, 15 are greater than 100ha in size and 10 are greater than 200ha. The 10 largest sites have been reviewed for their potential for flood storage, with site SG43 showing the greatest potential of the 10.

- SG-08 Lower Road, Hanborough – this is upstream of Eynsham and could provide some local flood storage. However, the interactions of the rivers would need to be assessed further as flooding in the past has been caused by backing up from the River Thames which this storage area would not accommodate.
- SG-13 Land at Shillingford – This is upstream of Shillingford Hill and Wallingford and could provide up to 220ha of storage.
- SG-15 this potential site is located in a largely rural area and there is limited opportunity for provision of flood storage.
- SG-43 this site is located upstream of Abingdon and may provide an opportunity for a flood storage area to reduce flooding in this area.
- SG-44 this site is located in the meander of the Upper Thames upstream of Dorchester. There are a limited number of properties that would benefit from a flood storage area at this location and the site would be largely located in Flood Zone 3. There may be concern over the impact on the local flood regime that a site in this location could have.
- SG-45 – upstream of Long Wittenham. A flood storage area in this location may provide some protection to the residents of Long Wittenham. However, the village would then

start to become surrounded by water which may make safe access/egress to the local area an issue.

- SG-48 flood storage at this location may provide protection to Stadhampton and Chiselhampton. However, there are no recorded instances of flooding in this area & the development outline appears to largely lie outside Flood Zone 2 and 3, therefore the impact may be limited.
- SG-49 this site is located largely in Flood Zone 1 and there is limited potential for flood storage at this location.
- SG-54 this site located on the Upper Thames is largely surrounded by a rural landscape and the potential for flood storage is limited.

9.2.4 Options to create flood storage areas should be investigated on a site by site basis in consultation with the EA. In addition, any areas safeguarded for flood storage will require maintenance to ensure their efficient operation during a storm event. If the flood storage areas are not maintained, there could be potential for increased flood risk to areas downstream

## 9.3 Habitat Creation

9.3.1 Minerals sites can be restored to create a variety of habitats including wetlands, wetland grassland, ponds, backwaters, marshes and wet woodland.

9.3.2 There are a large number of water filled mineral extraction sites located in Oxfordshire that are valuable stopping off points for migrating wildfowl. They can also provide nesting sites and a good habitat for invertebrates. The following are examples of restored minerals sites that are now water filled and providing valuable habitats:<sup>10</sup>

- Balscote Quarry<sup>10</sup> – owned and managed as a nature reserve by Banbury Ornithological Society;
- Merton Borrow Pit<sup>10</sup> was dug during the construction of the M40 and is managed as a nature reserve for recreation;
- Shipton-on-Cherwell Quarry<sup>10</sup> – a disused limestone quarry with water filled pools at its base;
- Stratton Audley Quarries<sup>10</sup> – recently re-excavated limestone quarries;
- Yarnton Gravel Pits<sup>10</sup> (also known as Cassington Gravel Pits);
- Wolvercote Pit<sup>10</sup> – an old gravel pit owned by the EA;
- Lower Windrush Valley in West Oxfordshire;
- Dorchester Lakes, Dorchester Oxfordshire;
- Radley (Thrupp) Lake, Abingdon;
- Caversham Lakes, Caversham, Oxfordshire;
- Cassington Lakes, former gravel pit at Cassington Quarry, Worton, Witney;
- Sutton Courtney, old gravel workings, Abingdon, Oxfordshire.

9.3.3 When creating habitats attractive to many bird species, potential impacts such as hazard to aircraft should be considered. In addition long term management should be agreed to include

<sup>10</sup> Cherwell Biodiversity Action Plan 2005-2010

biodiversity action plans or site management plans. Finally monitoring is important to determine the success of restoration sites.

- 9.3.4 The Oxfordshire Conservation Target Areas Mapping Project Report, July 2006 aimed to map the most important areas for wildlife conservation where targeted conservation efforts will have the greatest benefit. Within each area different habitats are identified including floodplain, grazing marsh, reed beds, wet grassland etc. Sustainable flood risk management techniques should be applied with conservation targets in mind to provide habitats and flood storage areas. Further details on conservation target Areas can be found on OCC website, under Environment and Planning, Countryside, Ecology.

## 9.4 Water Supply

- 9.4.1 Minerals sites can be restored and used for winter water storage for agricultural spray irrigation or potable water supply. These uses may also create a greater opportunity for boating, walking, cycling, camping etc.
- 9.4.2 If the minerals site is to be used as a potable water supply, the potential adverse impact on local habitats through the use of herbicides and pesticides for weed control need to be fully understood.

## 9.5 Restoration to Agriculture

- 9.5.1 As already stated, the availability of fill material makes it increasingly likely that minerals sites will be restored for agricultural use at pre-existing ground levels. However, if an intended quarry is proposed to be restored in this way, it will need to be treated as a potential landfill site and assessed as 'more vulnerable' development for the purpose of flood risk.
- 9.5.2 Increasingly, any intention to restore a worked out quarry for agricultural purposes may involve the importation of a limited amount of fill and top soil material, and restoration at low level. In such circumstances it might be inappropriate to regard the proposal as involving the creation of a landfill site (Involving 'more vulnerable' development in terms of flood risk), but advice should be sought on this from the Environment Agency. It is important that the details of the restoration scheme are therefore made clear so that the flood risk implications of the whole development (not just the mineral extraction) are properly taken into account at the outset.

## 9.6 Recreation Use

- 9.6.1 Open recreational uses to which restored quarries might be put, including sports fields, amenity areas and water based recreational activity, are all classed as 'water compatible' development for the purpose of flood risk. Such uses are often the subject of later proposals (i.e. not put forward as part of a mineral extraction proposal) and are unlikely to prejudice the effective flood risk assessment of a proposed mineral development.

## 9.7 Advantages of minerals restoration

- 9.7.1 Apart from the obvious habitat and environmental benefits of minerals restoration, this process also offers social and potentially commercial incentives.
- 9.7.2 An example of a successful restoration project elsewhere in the country is the 'Funky Footprints' site near to Shepperton in Surrey. This former sand and gravel quarry now includes lakes, reed beds, woodland, pond dipping platforms and a bird watching hide. It was awarded the Quarry Products Association Restoration award in 2007 and is a good example of how minerals sites can be restored to supporting education and the environment at the same time.

## 10 Emergency Planning and Flood Risk

- 10.1.1 A key consideration to any new development is whether it is 'safe' and if adequate flood warning systems are in place to ensure that people are able to act upon flood warnings to ensure that they stay safe.
- 10.1.2 As the majority of potential mineral sites are located in areas at risk of flooding the need for emergency planning is even greater. New development proposals that may be at risk of flooding need to include details of safe access and egress routes to dry ground beyond the flooded area and may also require places of safe refuge if evacuation is not possible.
- 10.1.3 Flood evacuation plans should include:
- Details of how a flood warning is to be provided
  - What will be done to protect the development and its contents (deploying flood barriers across doors etc)
  - Ensure safe access to and from the site
- 10.1.4 Local Authorities are classified as Category 1 responders in the context of the Civil Contingencies Act 2004. As such their responsibilities include risk assessment, emergency planning and warning and informing the public. Emergency plans are in place in Oxfordshire County Council who would work closely with other Category 1 Responders, such as the Environment Agency or Emergency Services, to minimise the impact of flooding.

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The council should seek opportunities to:

- Ensure that all new developments that are located within Flood Warning Areas create a Flood Emergency and Evacuation Plan using information provided by site specific flood risk assessments in order that the risk to people and property is minimised in a flood event.
- Ensure that the SFRA is used to inform the local emergency plans with regards to access and egress routes, temporary shelter and accommodation and control and command locations.
- Through the planning process, ensure that future strategic or critical infrastructure is located in areas at least risk of flooding.

## 11 Sustainable Drainage Systems (SuDS)

11.1.1 An overview of SUDS and why they should be used is included below. Further detail on SUDS included in Appendix H.

### What are SuDS?

11.1.2 SuDS are typically softer engineering solutions inspired by natural drainage processes such as ponds and swales which manage water as close to its source as possible.

11.1.3 Wherever possible, SuDS techniques should seek to contribute to each of the three goals identified below, with the preferred system contributing significantly to each objective. SuDS solutions for specific sites should seek to:

- Reduce flood risk (to the site and neighbouring areas);
- Reduce pollution; and,
- Provide landscape and wildlife benefits.

11.1.4 These goals can be achieved by utilising a management plan incorporating a chain of techniques, (as outlined in Interim Code of Practice for Sustainable Drainage Systems 2004), where each component adds to the performance of the whole system:

- Prevention: good site design and upkeep to prevent runoff and pollution (e.g. limited paved areas, regular pavement sweeping);
- Source control: runoff control at/near to source (e.g. rainwater harvesting, green roofs, pervious pavements);
- Site control: water management from a multitude of catchments (e.g. route water from roofs, impermeable paved areas to one infiltration/holding site);
- Regional control: integrate runoff manage from a number of sites (e.g. into a detention pond).

### Why use SuDS?

11.1.5 Traditionally, built developments have utilised piped drainage systems to manage surface water and convey surface water run-off away from developed areas as quickly as possible. Typically these systems connect to the public sewer system for treatment and/or disposal to local watercourses. Whilst this approach rapidly transfers surface water from developed areas, the alteration of natural drainage processes can potentially impact on downstream areas by increasing flood risk and reducing water quality.

11.1.6 Due to the difficulties associated with upgrading sewer systems it is uncommon for sewer and drainage systems to keep pace with the rate of development/re-development and the increasingly stringent drainage discharge restrictions that are being placed upon them. As development continues and/or urban areas expand these systems can become inadequate to deal with the volumes of surface water that is generated, resulting in increased flood risk and/or pollution to watercourses. Allied to this are the implications of climate change and increasing rainfall intensities.



## 12 Site Specific Flood Risk Assessment Guidance

### 12.1 Introduction

- 12.1.1 Site specific FRAs are required for most proposed developments, with the level and detail being dependant on the level of flood risk at the site. Site Review Tables included in Appendix A, B, C and D should be used by planners to establish the scope and requirements of a FRA for different development types.
- 12.1.2 Site-specific flood risk assessments are required to assess the flood risk posed to and by proposed developments and to ensure that, where necessary, appropriate mitigation measures are included in the development proposals. FRAs are typically completed at the planning application stage as they use site proposals to assess existing and post development flood risk. However, a FRA can be completed at any stage of the development process if there are specific circumstances that warrant it. e.g. a site may require fluvial modelling results in order to inform the design of the site, in which case the modelling element of the FRA may be completed as the scheme progresses.
- 12.1.3 When preparing a site specific FRA, proposers are encouraged to seek pre-application advice at the earliest opportunity. The EA can provide guidance on what is required in each specific FRA in order to ensure the development is 'safe' and can advise on the uses of Sustainable Drainage Systems for a proposed development. EA guidance on flood risk requirements is located at their website at <http://www.environment-agency.gov.uk/research/planning/82584.aspx>.
- 12.1.4 Where a flood source other than fluvial is identified a site specific FRA should be completed to assess the full impacts of flooding to the site from all sources. i.e. a site may be located in Flood Zone 1 and be considered to pass the Sequential Test but still be at risk from surface water or groundwater flooding which should be fully investigated in a site specific FRA.
- 12.1.5 The effects of climate change may exacerbate future flood risk. Current predictions indicate that milder, wetter winters and hotter, drier summers will be experienced in the future and there will be a continued rise in sea levels. These changes will potentially lead to changes in the magnitude, frequency and intensity of flood events. Some areas currently defended from flooding may be at greater risk in the future due to the effects of climate change or as the defence condition deteriorates with age. Site specific FRAs will need to consider the impact that climate change will have on the site.
- 12.1.6 The location, layout and design of developments should be considered to enable the management of flood risk through proactive planning. This proactive planning approach must consider the risks to a development from local flood sources and the consequences a development may have on increasing flood risk to the surrounding areas. Early identification of flood risk constraints can ensure developments are sustainable whilst maximising development potential.
- 12.1.7 The guidance presented in the following Chapter has been based on:
- The recommendations presented in PPS25 and its Practice Guide Companion;
  - The information contained within this Level 1 SFRA report.

## 12.2 When is a Flood Risk Assessment Necessary?

- 12.2.1 When informing developers of the requirements of an FRA for a development site, consideration should be given to the position of the development relative to flood sources, the vulnerability of the proposed development and its scale. FRA requirements within each Flood Zone are outlined below.
- 12.2.2 EA guidance on flood risk requirements is located at their website at <http://www.environment-agency.gov.uk/research/planning/82584.aspx>. If a FRA is needed, it is suggested that the EA are contacted at the earliest opportunity to discuss the requirements of the FRA.
- 12.2.3 A flood risk Review Table is included in Appendix C and D which should be used by planners as a quick reference on Flood Risk Assessment requirements.

### Flood Zone 1

- 12.2.4 A FRA is required within Flood Zone 1 if the proposed development is vulnerable to any type of flood source or the site area is greater than 1.0ha. This is to ensure surface water generated by the site is managed in a sustainable manner and does not increase the burden on existing infrastructure and/or flood risk to neighbouring property. The scope of the FRA should be commensurate with the level of risk for the site. Minimum requirements for a FRA can be found at Appendix E of PPS25.
- 12.2.5 The PPS25 policy aim for Flood Zone 1 is 'developers and local authorities should seek opportunities to reduce the overall level of flood risk to the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques'.

### Flood Zone 2

- 12.2.6 All developments proposed within Flood Zone 2 require a FRA. The minimum requirements can be found at Annex E of PPS25. The land use appropriate for this Flood Zone, as classified by Table D2 of PPS25 are water compatible, less vulnerable, more vulnerable and essential infrastructure. Highly vulnerable types of land use are only appropriate in Flood Zone 2 if the Sequential and Exception Tests are passed.
- 12.2.7 With regard to Flood Zones 1 and 2, the aim of PPS25 is for developers to seek opportunities to reduce the overall level of flood risk to the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques.

### Flood Zone 3a

- 12.2.8 All developments proposed within Flood Zone 3a require a FRA. The minimum requirements can be found in Annex E of PPS25. The PPS25 policy aims for this zone are:
- Reduce the overall level of flood risk in the area through the outlay and form of the development and appropriate application of sustainable drainage techniques;
  - Relocate existing development to land in zones with a lower probability of flooding;
  - 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.

12.2.9 The water compatible and less vulnerable uses of land as classified by Table D2 of PPS25 are permitted in this zone. The highly vulnerable uses in Table D2 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 Sequential and Exception Tests are passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for use in times of flood.

### Flood Zone 3b

12.2.10 All developments proposed within Flood Zone 3b require a FRA. The minimum requirements can be found in Annex E of PPS25. The PPS25 policy aims for this zone are:

- Reduce the overall level of flood risk in the area through the outlay and form of the development and appropriate application of sustainable drainage techniques;
- Relocate existing development to land in zones with a lower probability of flooding.

12.2.11 The water compatible uses and essential infrastructure listed in Table D2 of PPS25 that are permitted in this zone should be designed and constructed to:

- Remain operational and safe for use in times of flood;
- Result in no net loss of floodplain storage;
- Not impede flood risk elsewhere.

12.2.12 At all stages, the LPA and, where necessary, the EA and statutory water undertaker should be consulted to ensure the FRA provides the necessary information to fulfil the requirements for planning applications.

## 12.3 What are the Requirements of a Flood Risk Assessment?

12.3.1 Annex E of PPS25 presents the minimum requirements for FRAs. These include:

- The consideration of the risk of flooding arising from the development in addition to the risk of flooding to the development;
- Identify and quantify the vulnerability of the development to flooding from different sources and identify potential flood risk reduction measures;
- Assessment of the remaining 'residual' risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development;
- The vulnerability of people that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification, including arrangements for safe access and egress;
- Consideration of the ability of water to soak into the ground, which could change with development, along with how the proposed layout of development may affect drainage systems;
- Fully account for current climate change scenarios and their effect on flood zoning and risk.

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**October 2010**

To achieve the aims of PPS25 with regard to Flood Risk Assessments, the Council should:

- Ensure the PPS25 Sequential Test is undertaken for all occasions and windfall sites promoted for development within their administrative areas;
- Have regard to the vulnerability classification of developments and local emergency planning issues when determining suitable locations for development;
- Have regard to the cumulative impact of development on flood risk;
- Determine decisions for windfall development through application of the Sequential Test. Where this is not practical the Council should balance the flood risk at an individual site, the type of development proposed, emergency planning and the contribution the development would make to the wider sustainability of the area before determining a decision;
- Consider flood risk as one of a number of policies that in tandem can provide mechanisms to deliver sustainable developments with multiple benefits;
- Engage with developers and local regulators throughout the development process to develop and instigate initiatives for the reduction of flood risk;
- Require flood risk assessments in accordance with PPS25 guidelines.

## Appendices

|                   |  |
|-------------------|--|
| <b>Appendix A</b> | Crushed Rock Resource Areas                    |
| <b>Appendix B</b> | Sand and Gravel Resource Areas                 |
| <b>Appendix C</b> | Detailed Mapping – Mineral Sites               |
| <b>Appendix D</b> | Detailed Mapping – Waste Sites                 |
| <b>Appendix E</b> | Surface Water & Groundwater Flood Risk Mapping |
| <b>Appendix F</b> | Data Record                                    |
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| <b>Appendix H</b> | GIS Layers                                     |
| <b>Appendix I</b> | SuDS Review                                    |
| <b>Appendix J</b> | How to Maintain and Update the SFRA            |
| <b>Appendix K</b> | Upper Thames Policy Unit CFMP                  |

Appendices A – E are provided in an additional supporting document at A3 size.

