Bournemouth, Dorset and Poole

Draft Mineral Sites Plan and Waste Plan

Level 1 - Strategic Flood Risk Assessment

December 2017

1. Introduction

Previous Strategic Flood Risk Assessment work

1.1. An initial Level 1 Strategic Flood Risk Assessment (SFRA) was carried out and published in December 2010. The 2010 SFRA was undertaken by Halcrow Group Limited on behalf of Dorset County Council to provide an evidence base on flood risk for Bournemouth, Dorset and Poole. The report assisted in the assessment of various options and proposals for minerals and waste development.

1.2. Minerals were the primary focus of the report because work was at the time progressing on the Minerals Strategy, but waste issues were also of relevance. The 2010 SFRA was prepared in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25) and then Environment Agency guidance.

1.3. The current update has been prepared in accordance with the latest Government development planning and flood risk guidance, including;

- Flood Risk and Coastal Change (first published 6 March 2014) (https://www.gov.uk/guidance/flood-risk-and-coastal-change#Strategic-Flood-Risk-Assessment-section) ;
- Local planning authorities: Strategic Flood Risk Assessment (DEFRA and Environment Agency – first published 1 July 2013);
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities (Environment Agency[1])

Minerals and Waste Planning

1.4. Bournemouth, Dorset and Poole Councils are minerals and waste planning authorities, with responsibilities for preparing and updating local planning policy for minerals and waste. Dorset County Council, on behalf of Bournemouth and Poole Councils are currently preparing the **Bournemouth, Dorset and Poole Mineral Sites Plan** and **Bournemouth, Dorset and Poole Waste Plan**.

1.5. Both plans are due for Publication in December 2017. The Mineral Sites Plan builds on the Mineral Strategy that was adopted in 2014 and includes site allocations to meet the need for mineral resources in the County. The Waste Plan is designed to replace the current Waste Local Plan, which was adopted in 2006, and will set out detailed development management policies and, where possible, site allocations to guide new waste development.

1.6. The Bournemouth, Dorset and Poole Mineral Strategy was adopted in 2014. Since then work has focused on the preparation of the Bournemouth, Dorset and Poole Mineral Sites Plan and the Waste Plan Review.

The Updated Strategic Flood Risk Assessment

1.7. This updated SFRA has been prepared by Dorset County Council (DCC) to reflect and contribute to the preparation of both Plans. It identifies existing minerals and waste sites, along with the sites proposed for allocation through the emerging minerals and waste plans.

1.8. The updated SFRA also makes use of the most up-to-date mapping and other datasets to assess the level of risk, at a strategic level, to sites proposed for allocation. It identifies the sites least likely to be affected by flooding, recognising that each site allocation will also be subject to a planning application which will include a detailed Flood Risk Assessment to assess in detail risks of all types of flooding. The detailed Flood Risk Assessment will also identify appropriate mitigation.

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[1] https://consult.environment-agency.gov.uk/engagement/bostonbarriertwao/results/appendix-15---adapting-to-climate-change-advice-to-fcerm-authorities--13-april-2016-.pdf

1.9. The SFRA is divided into the following sections:

Table 1 – Strategic Flood Risk Assessment Contents

SFRA Section	Content
2	Methodology and approach; mapping datasets available
3	Profile of and background information on the SFRA area;
4	Planning legislation and guidance; Water management and flood risk background and information
5	General information on flood risk and flood risk management
6	Sources of flooding and flood risk information – more specifically focussed on the local area.
7	Sustainable drainage information
8	Climate change information
9	Applying the information to assessing flood risk for proposed minerals and waste allocations
10	Flood Risk Assessments
11	Conclusions
Appendix A	Mineral Sites – Flooding Risk
Appendix B	Waste Sites – Flooding Risk

1.10. The information, SFRA maps show existing and proposed sites overlaid with the latest, readily available, flood risk data, is presented in hard copy on paper maps in Appendices A and B. It is also available online at: **https://explorer.geowessex.com/sfra**

1.11. Appendices A and B also include a site assessment spreadsheet indicating the level of flood risk to each site following a strategic assessment of risk. This information will allow the identification of development options that are appropriate to each site and to inform the need for application of the Sequential Test.

2. Dorset, Bournemouth and Poole Level 1 SFRA

2.1. As Lead Local Flood Authorities and Minerals and Waste Planning Authorities (MWPA), Dorset, Bournemouth and Poole require a SFRA to develop the evidence base for the Mineral Sites Plan and the Waste Plan and to inform the Sustainability Appraisal (incorporating the Strategic Environmental Assessment).

2.2. The aims and objectives of the SFRA are:

- To provide up-to-date information and guidance for Bournemouth, Dorset and Poole for the development and implementation of minerals and waste planning policy, taking into account the most recent flood risk information (including probable impacts of climate change) along with current national planning policy and legislation;
- To provide the basis for applying the flood risk Sequential Test and if necessary the Exception Test;
- To make recommendations on the suitability of proposed minerals and waste sites based on flood risk.
- To provide a reference document for all parties involved in planning for minerals and waste facilities for initial advice and guidance on flood risk.
- To provide a comprehensive set of maps, both in paper form and on GIS, presenting flood risk from a range of sources that forms part of the evidence base of the emerging minerals and waste plans.
- To identify the requirements for site-specific flood risk assessments and the application of Sustainable Drainage Systems.

2.3. Planning Practice Guidance identifies two levels of SFRA:

- Level 1 – flooding is not a significant issue and development pressures are relatively low. The assessment should be detailed enough to allow application of the Sequential Test
- Level 2 – land outside Flood Zones 2 and 3 cannot accommodate all development, thereby requiring the Exceptions Test. This level of assessment should consider the detailed nature of the flood characteristics within a Flood Zone and assessment of other sources of flooding.

2.4. This document fulfils the requirements of a Level 1 SFRA.

Level 1 SFRA Methodology

2.5. This Level 1 SFRA is a desk-based study, using readily available existing information and datasets to enable the minerals and waste planning authorities to apply the Sequential Test to the proposed site allocations under consideration for the Mineral Sites Plan and the Waste Plan, and to identify whether the Exception Test may be required. The main tasks in preparing the Level 1 SFRA are described below.

2.6. It provides general information on flood risk, with reference to sources of further information; information on planning, including minerals and waste planning; more specific information on flooding and flood risk in the areas covered by the SFRA, including climate change and SuDS and concludes with an assessment of flood risk and suitability for allocation for the sites proposed for allocation.

Gathering data and analysing it for suitability

2.7. Under Section 10 of the NPPF, the risk of flooding from all sources must be considered as part of a Level 1 SFRA, including flooding from rivers (fluvial), land (overland flow and surface water), groundwater, sewers and artificial sources. This Strategic Flood Risk Assessment focuses on flooding

from rivers, land and groundwater. Flooding from artificial sources and sewer flooding is also considered.

Providing Guidance

2.8. Sections of this report provide specific guidance for the minerals and waste planning authorities on policy considerations, the application of the Sequential Test, guidance on the preparation of site specific FRAs and guidance of the application of SuDS in the study area.

SRFA Future Proofing

2.9. As noted, this SFRA has been developed using the most up-to-date data and information available at the time of submission. The SFRA has been future proofed as far as possible, particularly as the mapping data is available via Geowessex Explorer, ensuring any updates in mapping/flooding data will be available. Any updates in any of the GIS mapping datasets will be applied automatically, therefore when the online mapping is used to assess any of the proposed allocations, or any other sites/areas, there is confidence that it will be up-to-date unlike a set of printed maps which will inevitable fall out of date.

2.10. It is intended to be a 'living document' with the online mapping being regularly updated, and the text should be updated also periodically, taking into account new flood risk information, and new planning guidance or legislation.

2.11. However, users of the document should always confirm with the minerals and waste planning authorities that the latest information is being used when decisions concerning development and flood risk are being made. The Planning Practice Guidance for Flood Risk and Costal Change (PPG-FRCC), as part of the National Planning Policy Framework (NPPF), is the current primary development and flood risk guidance information available at the time of writing and is referred to throughout this document.

SFRA Mapping

2.12. Alongside this report is a system of interactive GIS mapping which will enable updates to flood risk layers and minerals/waste data to be made quickly. This GIS mapping can be accessed at:

https://explorer.geowessex.com/sfra

2.13. The datasets used in compiling these maps are:

- *Risk of Flooding from Surface Water*
- *Historic Flood Map*
- *Risk of Flooding from River and Sea*
- *Main Rivers*
- *Detailed River Network*
- *Flood Defences*
- *Areas Benefitting from Flood Defences*
- *Flood Storage Areas*
- *Flood Zone 2*
- *Flood Zone 3*
- *Wessex Basin Groundwater Model – Depth to Groundwater*
- *Groundwater Flood Warning Maps 2015*

2.14. This mapping also includes permitted minerals/waste sites, and sites proposed for allocation in the Pre-Submission Draft Plans under preparation.

3. Profile of the Assessment Area

3.1. This section provides a profile of Bournemouth, Dorset and Poole and considers the characteristics of the river catchments and coastal areas and the associated flood risk issues.

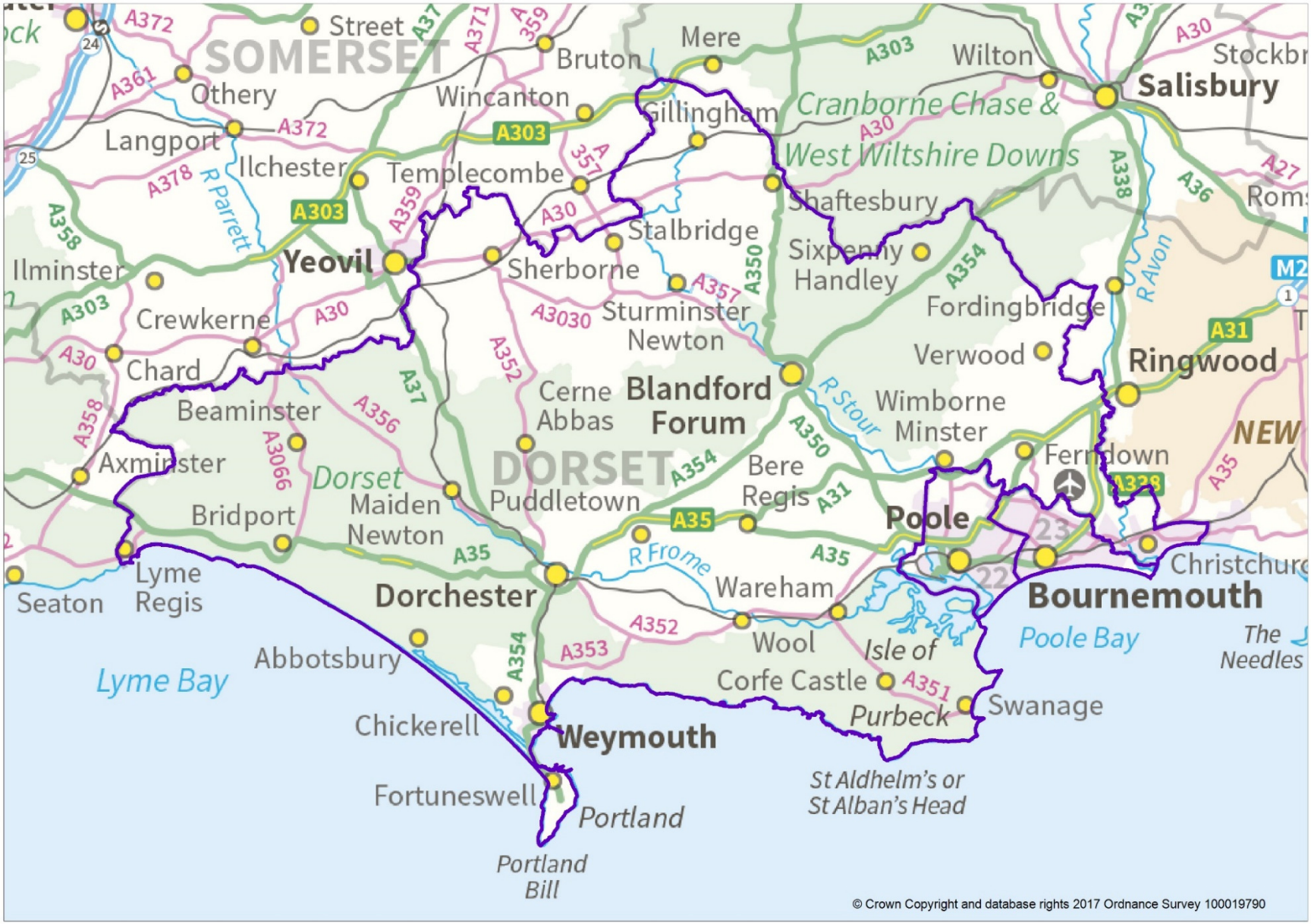
3.2. The County of Dorset together with the Borough of Poole and Bournemouth Borough Council covers an area of 2,764 square kilometres and have a combined population of 765,700 persons. The County currently comprises four District Councils (East Dorset, North Dorset, West Dorset and Purbeck) and two Borough Councils (Weymouth & Portland and Christchurch). Bournemouth and Poole Boroughs hold unitary status.

3.3. With the exception of the Bournemouth, Poole and Christchurch areas, the area is predominantly rural in character, with the majority of settlements being market towns. The main urban areas include the following towns, as illustrated in Figure 2.

- Dorchester - population 19,143*
- Weymouth - population 52,168 (2014 Mid-Year Estimate)
- Bridport population -14,697*
- Blandford population - 10,541*
- Sherborne population - 9,581*
- Gillingham population - 11,871*
- Wimborne population - 6,901*
- Wareham population - 5,490*
- Swanage population - 9,556*
- Portland population - 12,966 (2013 Mid-year estimates)
- Ferndown population - 17,981*
- Christchurch population - 47,987*

*2012 Mid-Year Estimates, unless otherwise noted

Figure 2: Bournemouth, Dorset and Poole



3.4. Bournemouth, Dorset and Poole have seen population growth in recent decades. Over the period 2005 to 2015 Dorset's population grew by over 17,000, growth of about 4% compared with 8% nationally. Below average rate of population growth is projected to continue over the next two decades.

3.5. The population across the County is expected to rise by approximately 17% over the period to 2029 with the Bournemouth, Poole and Christchurch area as a likely location for future growth, primarily within the existing urban areas.

3.6. Dorset's economy is dominated by Bournemouth, Poole, Ferndown and Wimborne in the south east of the county. Outside of these areas there is a network of towns that are principally focused on tourism and agricultural-based industries. This part of the region has a stable economy driven by the diverse mix of sectors and by the balance of service and manufacturing businesses.

3.7. Employment in Dorset (Dorset County Council area) is largely service sector based, much in line with Great Britain as a whole. Both Bournemouth and Weymouth and Portland have above average employment in the service sector. The largest employment sectors in the Bournemouth, Dorset and Poole sub-region are public administration, education and health; and business services. Purbeck and East Dorset have above the regional and national averages employed in the manufacturing sector. Weymouth & Portland and Purbeck have the highest percentages of employees working in both accommodation and food service activities, and in professional, scientific and technical activities (which falls under 'Business Services').

3.8. In terms of economic performance, Bournemouth and Poole have been growing at a rate just under the national average and above the regional figure (GVA, 2000 to 2013), while Dorset's growth has been substantially lower than both the regional and national figure. In 2015, Dorset's unemployment was lower than the national and regional levels. Unemployment is highest in the urban areas, such as Weymouth & Portland and Bournemouth.

3.9. The environment of Dorset is very important, comprising a number of features in a relatively small area:

- 1,406 km^2 of Areas of Outstanding Natural Beauty, covering 55% of its total land area
- 135 Sites of Special Scientific Interest, covering 18,730 hectares (approximately 7.5% of land area)
- 9 National Nature Reserves
- 34 Regionally Important Geological and Geomorphological Sites (with another 40 under consideration)
- 1,222 Sites of Nature Conservation Interest
- 91 km of heritage coast
- 114 km of the Jurassic Coast-World Heritage Sites

3.10. Dorset has a rich heritage of prehistoric sites, conservation areas, listed buildings, historic parks and gardens, many with mineral reserves and deposits within, or in close proximity to, their boundaries. Although Dorset only makes up 2% of the area of England, it contains 5% of the nationally protected monuments.

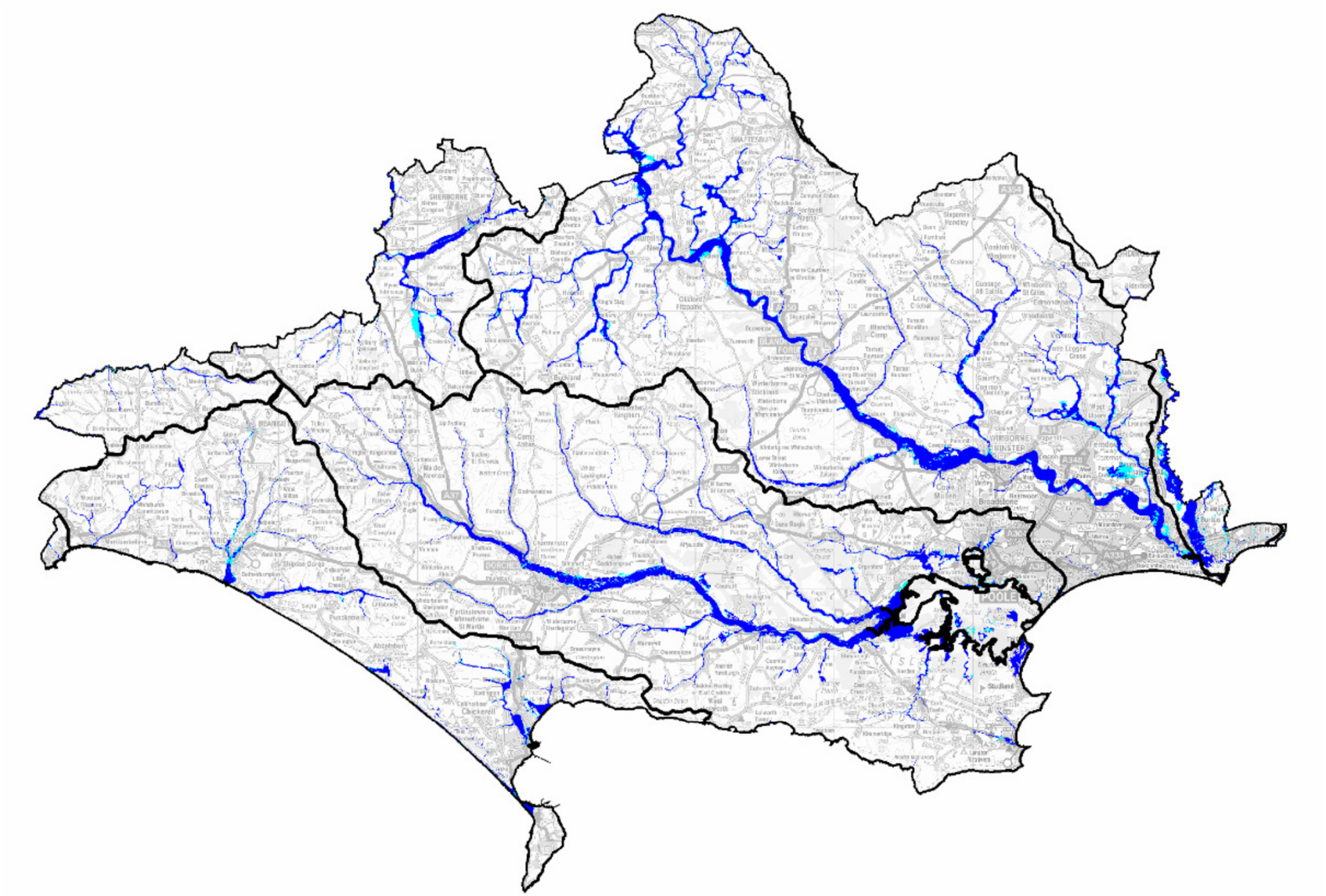
Main Rivers in Dorset

3.11. The main river catchments in Dorset are those of the River Frome & Piddle, River Parrett, River Stour and River Avon (referred to as Hampshire Avon that drains through the eastern side of Dorset). In addition, there are also a number of streams along the coastal fringe that run directly into the sea.

3.12. As many of the major settlements are located along these rivers and a small number are also within the zone of tidal influence, fluvial flood risk is a pertinent consideration in Dorset. An indication of the flood risk is shown in the Environment Agency Flood Zone maps reproduced in Figure 3. Rivers and their catchments do not correspond to administrative boundaries. It means that flows can be influenced to a great extent by factors occurring outside of Dorset County Council's jurisdiction, for example land use in other authorities. This therefore places limits on the measures any particular authority can take to reduce flood risk.

3.13. Measures to alleviate flooding such as storing flood water upstream in the catchment to reduce flows downstream is an example of how catchment considerations can affect planning considerations. The SFRA considers the Catchment Flood Management Plans (CFMPs) and Shoreline Management Plans (SMPs) relevant to Dorset in order to assess any cross-boundary issues (see section 3). The CFMPs apply to natural catchment boundaries not administrative boundaries and the SMPs extend beyond the Dorset shoreline, into Devon and Hampshire.

Figure 3: Main Rivers in Bournemouth, Dorset and Poole



Flood Risks in Bournemouth, Dorset and Poole

3.14. In Dorset most of the rivers and streams flow from their source in the hills in the north of the catchment and flow in a more or less southerly or south-easterly direction down into a lowland floodplain before flowing out into the English Channel. Watercourses are typically steep, narrow and unconstrained in the uplands, while further downstream they are slower moving and more heavily constrained by flood embankments.

3.15. The District and Borough Council SFRAs and Environment Agency CFMPs that cover Dorset identify that many areas flood regularly but without significant risk to life or property. In fact high water tables and frequent small scale flooding is an important feature of the low-lying areas, as it benefits the local ecology and agriculture.

3.16. The SFRAs and CFMPs identify that flooding from rivers is a problem in many of the urban areas: Bournemouth, Poole, Swanage, Wareham, Wool, Dorchester, Charminster, Lyme Regis, Bridport, Burton Bradstock, Beaminster, Nottington, Westham, Wincanton, Gillingham, Sturminster Newton, Wimborne Minster and Ferndown. Surface water flooding is also identified as a problem in the catchments, often caused by runoff from agricultural land and exacerbated when the capacity of drainage systems is insufficient or when blockages occur.

3.17. A combination of different approaches are used by the Environment Agency to manage flood risk. This includes a flood mapping programme that aims to improve the understanding of flood risks within the catchment and the flood warning service for the main areas at risk of flooding. There has also been considerable investment in river defences, particularly within residential areas, including flood embankments and walls.

Hydrology in Dorset

3.18. A brief description of the main river catchments follows (See Figure 3 above).

- **River Stour:** The Stour catchment is 1300km^2, the majority of which lies within Dorset. The River Stour is fed by many tributaries including the Rivers Crane, Allen, Tarrant, Winterbourne, Lydden, Cale, and Lodden, Caundle Brook, Shreen Water and the Moors. The River Stour passes through several towns including Gillingham, Blandford Forum, Wimborne Minster, West Parley, Bournemouth and Christchurch, each of which has been affected by flooding. Additionally there are several villages within the Stour catchment which have suffered varying degrees of flooding. Within Christchurch there are significant flooding issues relating to coastal inundation.
- **River Avon:** The Hampshire Avon catchment is 1750km^2, of which a small proportion is within Dorset. The River Avon flows through Salisbury, Downton and Christchurch. There are also a number of villages which lie on the floodplain of the River Avon. At Salisbury the Avon is joined by its main tributaries the Rivers Bourne, Nadder and Wylye. To the south of Salisbury the Avon is joined by the River Ebble. The lower Avon, south of Salisbury, is characterised by a complex network of artificially controlled channels, and is fed by a number of small tributaries. At Christchurch the Avon joins the River Stour before flowing into Christchurch Harbour.
- **River Frome / Piddle:** The catchment of the Frome and Piddle is about 900km^2, falling entirely within Dorset. Except for Poole at its downstream extreme it is a rural catchment, otherwise flowing only through Dorchester, Wareham and Swanage of note. At Poole it flows into Poole Harbour. The upper part of the catchment is underlain by chalk geology, which has an important local role in public water supply.
- **West Dorset rivers:** the principal rivers in West Dorset are the Char, Brit, Bride and Wey, and their combined catchments cover 370km^2. The principal settlements they flow through are Bridport and Weymouth. Although situated close together these rivers each have

individual characteristics with the Char and Brit responding rapidly to rainfall and the Bride and Wey being slower responding, chalk-fed watercourses.

- **River Parrett:** The Parrett catchment is approximately 1700km^2, flowing through Taunton Bridgwater and Yeovil in Somerset. Only its headwaters lie in Dorset in the vicinity of Sherborne.

Geology / Hydrogeology / Soils in Dorset

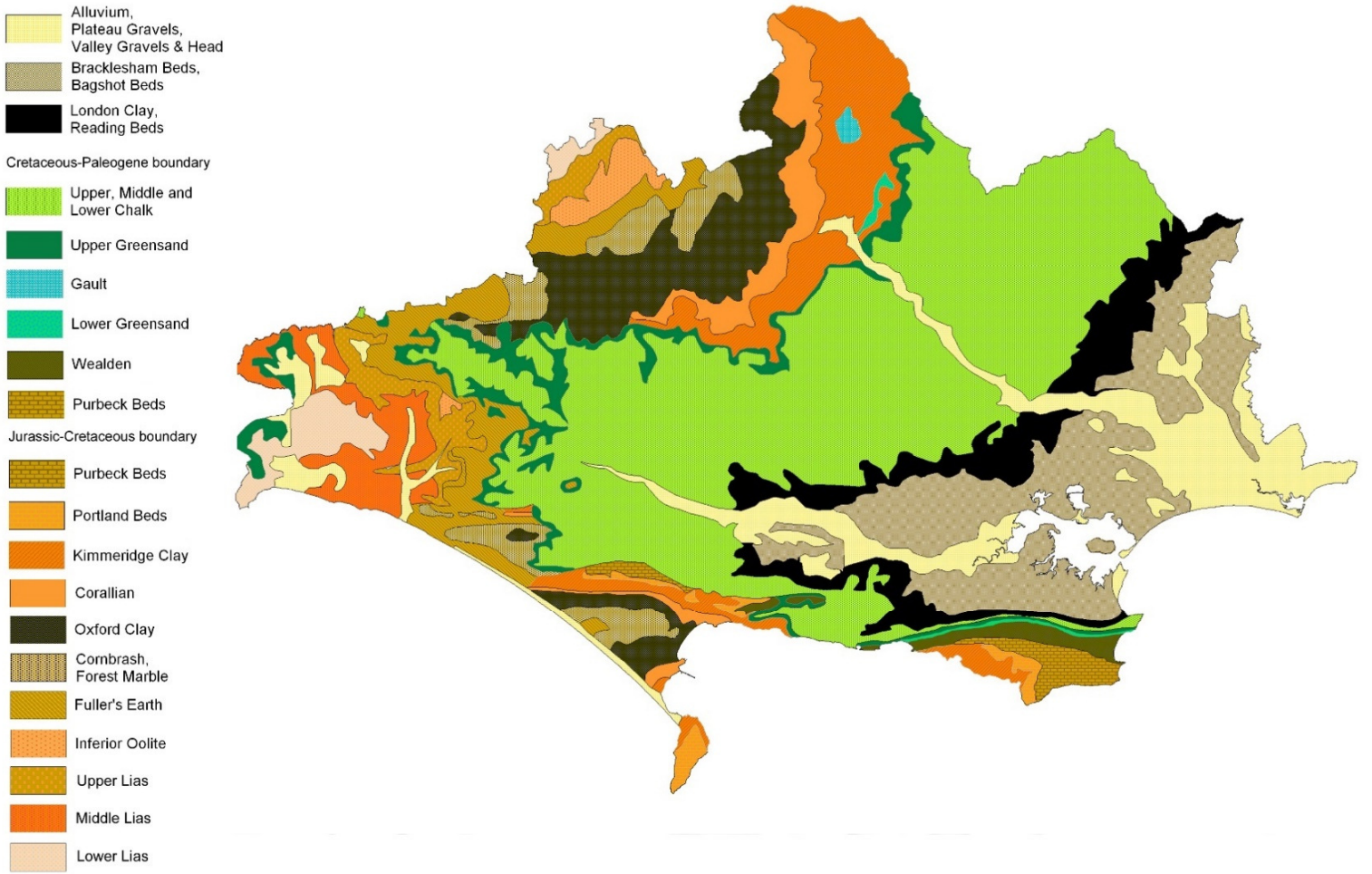
3.19. The geological and hydrogeological setting provides an indication of the potential for groundwater flooding and for an understanding of the role of infiltration drainage either within the overall natural water cycle, or as part of sustainable drainage systems (SuDS). The geology of the SFRA study area is shown on a number of the BGS 1:50,000 Scale Geological Map Sheets. Figure 4 illustrates the simplified geology of Dorset.

3.20. Soil type also provides a generic description of the drainage characteristics of soils. This will dictate, for example, the susceptibility of soils to water logging or the capacity of a soil to freely drain to allow infiltration to groundwater. Soil type may only be fully determined after suitable ground investigations, however some generalisations can be made. In upland areas the soil mainly consists of Brown Redzinas with some stagno-gleic paeleo-argyllic brown earth soils. The area around Poole is characterised by gley-podsols and further east by calcerous pelosols.

3.21. The Dorset coastline is part of the UNESCO (United Nations Educational, Scientific and Cultural Organisation) Dorset and East Devon World Heritage Site. The geology becomes progressively younger from west to east in the western part of the catchment, giving way to the chalk downland, which is by far the most prevalent bedrock in the county.

3.22. The extreme north and east of Dorset are underlain by impermeable clays, with the exception of Purbeck and Portland which are characterised by their distinctive eponymous Jurassic bedrocks. Geological strata in the assessment area range from recent drift deposits such as alluvium and plateau gravels to older Jurassic strata such as Great and Inferior Oolites.

Figure 4: Simplified Geology of Dorset



Mineral Sites

3.23. The following section provides a summary of the minerals resources and sites found in the County. Existing mineral operation sites are identified in Figure 5.

Sand and Gravel: Sand and gravel in Dorset is produced primarily from the Poole Formation sand (geologically considered a bedrock deposit) and river terrace or plateau sand and gravel (geologically considered a superficial deposit).

Poole Formation sand is considered to be the most important source of sand outcropping in the south east of Dorset. It forms hills and ridges in a broad zone stretching from Dorchester to Wareham and around the fringes of Poole and Verwood. Between these areas of higher land run the river valleys of the Frome, Piddle, Stour and Avon. Extensive spreads of river terrace sand and gravels are deposited along the flanks of these valleys. In the north-west, the valley of the River Axe contains deep gravel deposits, around 20m thick.

Marine-dredged sands and gravels, which are a potential source of aggregate, are extracted from the sea bed from licenced areas off the coast of Hampshire, the Isle of While and West Sussex. Marine dredged aggregates are landed at a wharf in the Port of Poole.

The Mineral Planning Authority is committed to maintaining a landbank of at least 7 years supply for sand and gravel, including both River Terrace and Poole Formation.

Crushed Rock: Limestone suitable for crushing for use as aggregate is found in both Purbeck and Portland. Swanworth quarry is the only aggregates quarry located within Purbeck. There are a number of quarries on Portland that have permission to extract stone for the purpose of crushing. The Mineral Planning Authority is committed to maintaining a landbank of at least 10 years for crushed rock.

Building Stone: The quarrying of Purbeck and Portland stone is a long established industry providing dimension stone for local building and for use in some major cities. Within Purbeck extraction is generally confined to an area of about $10m^2$ within the coastal zone south of Swanage and west to Worth Matravers. Stone is extracted both from surface quarrying and underground mining methods throughout Portland.

Other building stone outcrops in North and West Dorset and incudes Inferior Oolite, Corallian limestones and Forest Marble, as well as Lower Purbeck in the Dorchester Ridgeway area. Additionally, the sandstones of the Cretaceous and Paleogene periods have been used as a building stone in West, North and East Dorset.

There is no landbank for building stone, although some quarries have a limited output through their planning permission.

Ball Clay: The ball clays of Dorset are contained within a sequence of sediments referred to as the Poole Formation, which consists of interbedded sands, silts and clays deposited in the flood plain of a major river system some 40 - 50 million years ago. These deposits are now confined to a structure known as the Wareham Basin in Purbeck and covers an area of around $146m^2$. The Bournemouth, Dorset and Poole Minerals Strategy states that an adequate and steady supply of ball clay will be provided, up to 2.5 million tonnes over the life of the Strategy.

Clays: The "common" clays worked in Dorset, (as distinct from the ball clays), are used locally in the manufacture of bricks and tiles. The "common" clays are a relatively abundant resource being found predominantly in the south eastern portion of the County. In the past the clays have been worked both more intensively and extensively.

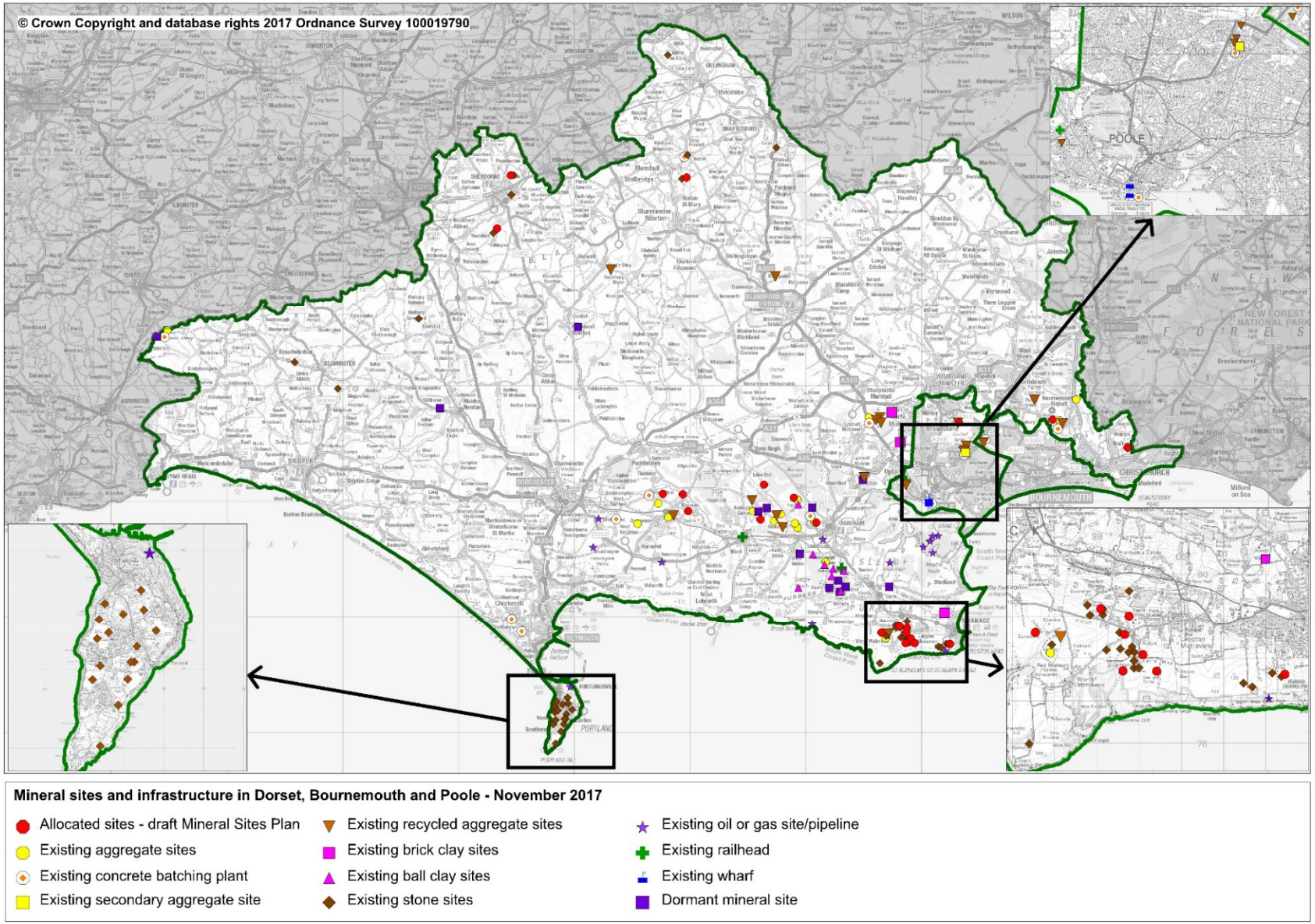
Only Cretaceous (Wealden) clays are currently exploited at Godlingston, just north of Swanage. Here Ibstock extract the clays from which handmade bricks are produced for a specialist market. The clays at this site are valued for their variable coloration from which a unique

product can be produced. Tertiary (Reading Formation and London Clay) were worked at Knoll Manor near Corfe Mullen until recently but operations have now ceased.

Chalk: Chalk is found widely throughout the County extending in a broad swathe from Ashmore and Cranborne in the north east, across the County in a south westerly direction towards Eggardon Hill. There is currently only one site with planning permission for extraction of chalk at Whitesheet hill, west of Maiden Newton.

Hydrocarbons: Oil and gas exploration and production in Dorset includes Kimmeridge (first commercial discovery in 1959), the significant oilfield at Wytch Farm (since 1973) that operates a total of 95 wells from 10 sites on the Isle of Purbeck and recent exploration east of Dorchester.

Figure 5: Locations of current mineral operations



Waste Sites

3.24. The following section provides a summary of waste management activities in the Plan and the need for new facilities as identified through the emerging Waste Plan. Existing waste sites are identified in Figure 6.

Recyclates: Recyclable materials are managed through the County's network of household recycling centres, waste management centres, transfer stations and small materials recovery facilities. A number of the existing facilities are in need of expansion/improvements and the emerging Waste Plan proposes to allocate new and improved sites, as appropriate.

There is also the need for new materials recovery centres to sort co-mingled Recyclates as this material is currently sent to a facility in North Wales. No allocations are proposed as there are already a number of permitted facilities. The Waste Plan includes a criteria based policy to determine applications for new materials recovery facilities.

Organic Waste: Organic waste includes green, wood and food waste. Green waste is collected at household recycling centres and composted through open windrow composting facilities. Wood waste is shredded or chipped so that it can be dealt with as biomass through a process of energy recovery. Currently shredded wood managed either through or exported. Food waste is separated from other waste and collected through kerbside collections. There is currently one operational anaerobic digestion (AD) facility in Dorset that manages food waste through a type of energy recovery. In addition, there are a number of on farm AD plants in the County which accept a small proportion of organic waste along with agricultural waste and energy crops.

There is a shortfall in capacity for green waste composting and the management of food waste. The Waste Plan proposes to manage this and facilitate a good spatial spread of facilities through one allocated site for green waste composting and a criteria based policy. .

Residual Waste: Non-hazardous residual waste arises from households and the commercial and industrial waste sector. This waste is managed through a combination of recovery and landfill facilities. Until recently there were two landfill sites in Dorset, however these have now been mothballed. A proportion of Dorset's residual waste is sent to landfill sites outside Dorset. There is currently only one treatment facility in Dorset.

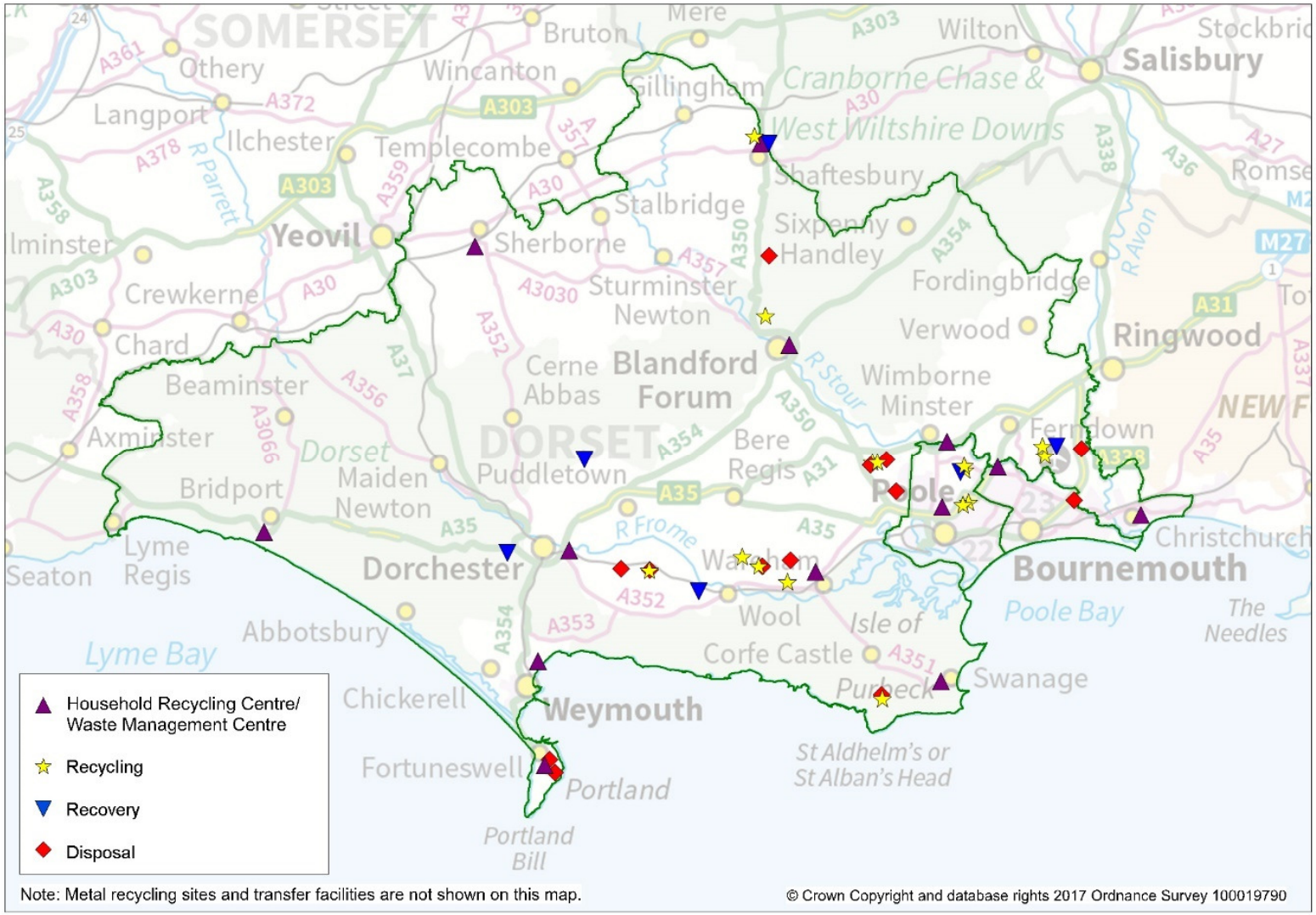
There is a significant shortfall in capacity for the management of residual waste. The Waste Plan addresses this through four site allocations for new treatment facilities and additional capacity at existing waste sites.

Inert Waste: There are two methods of managing inert waste. Some will be recycled and the remainder will be managed through inert landfill. There is a need for inert materials for the restoration of quarries which provides an opportunity for inert waste recovery as opposed to disposal.

There is a shortfall in capacity for the management of inert waste both through recycling and disposal. The Waste Plan proposes to manage this by aiming for a network of inert waste facilities across the Plan area. This will be achieved through a criteria based policy.

Specialist Waste Management – Hazardous & Radioactive Waste: Hazardous waste is managed on a regional or sub-regional basis at a range of specialist recycling, recovery/treatment or disposal facilities. There are two hazardous waste facilities in Dorset plus a number of transfer facilities. The largest volumes of radioactive waste in the county are generated from the decommissioning of Winfrith nuclear research facility and the Wytch Farm oilfield.

Figure 6: Existing waste facilities



4. The Planning Framework

Introduction

4.1. The main purpose of this section of the SFRA is to provide an overview of the planning framework , flood risk policy and flood risk responsibility. This section also provides an overview and context of Dorset County Council's responsibilities and duty in respect to managing local flood risk including but not exclusive to the delivery of the requirements of the Flood Risk Regulations (FRR) 2009 and the Flood and Water Management Act (FWMA) 2010.

4.2. There are a number of separate pieces of relevant legislation, national policy, statutory documents and flood risk assessments. Whilst the key pieces of legislation and policy are separate, they are closely related and their implementation should aim to provide a comprehensive and planned approach to asset record keeping and improving flood risk management within communities.

4.3. It is intended that the non-statutory Surface Water Management Plans and Strategic Flood Risk Assessments can provide much of the base data required to support the delivery of statutory flood risk management tasks as well supporting Local Authorities in developing capacity, effective working arrangements and informing Local Flood Risk Management Strategies (LFRMS) and Local Plans, which in turn help deliver flood risk management infrastructure and new development at a local level. This SFRA supports the development of the Mineral Sites Plan and Waste Plan and contributes to decision making on planning applications.

Flood Risk Regulations 2009 and Flood and Water Management Act 2010

4.4. The Flood Risk Regulations 2009 translate the current EU Floods Directive into UK law and place responsibility upon all Lead Local Flood Authorities (LLFAs) to manage localised flood risk. Under the Regulations, responsibility for flooding from rivers, sea and reservoirs lies with the Environment Agency. Responsibility for local and all other sources of flooding rests with the LLFAs. The LLFA is Dorset County Council.

4.5. As required by the Regulations, LLFAs were required to prepare a Preliminary Flood Risk Assessments (PFRA), with the aim of identifying significant Flood Risk Areas. PFRAs should cover the entire area for local flood risk (focusing on ordinary watercourses, surface water and groundwater flooding). They report on significant past and future flooding from all sources except Main Rivers and reservoirs. Three PFRA's were produced in 2011, covering the Plan area as required under the FRR. These are due to be updated on a six year cycle, and were reviewed in 2017.

4.6. Under the Regulations, the Environment Agency exercised an 'Exception' and did not prepare a PFRA for risk from rivers, reservoirs and the sea. Instead, a Flood Risk Management Plan (FRMP) was prepared and published. It summarises the flooding affecting the area and describes the measures to be taken to address the risk. The final **South West River Basin Flood Risk Management Plan** was issued in March 2016, covering the period 2015 to 2021[2].

[2] Environment Agency (March 2016) South West River Basin Flood Risk Management Plan 2015 - 2021

Flood & Water Management Act (FWMA) 2010

4.7. The Flood and Water Management Act (FWMA) was passed in April 2010[3]. It aims to create a simpler and more effective means of managing both flood risk and coastal erosion. It established Lead Local Flood Authorities (LLFAs), whose duties include:

- Developing, maintaining, applying and monitoring a Local Flood Risk Management Strategy (LFRMS), outlining how they will manage flood risk, identify areas vulnerable to flooding and target resources where they are most needed
- Flood Investigations – investigating and reporting on flooding incidents, where appropriate
- Register of Flood Risk Features – establish and maintain a register of structures/features which are likely to have a significant effect on flood risk
- Consenting – of works on ordinary watercourses

4.8. The FWMA creates clearer roles and responsibilities and instils a more risk-based approach. This includes a new lead role for Local Authorities, as Lead Local Flood Authorities, in managing local flood risk (from surface water, ground water and ordinary watercourses) and a strategic overview role of all flood risk for the Environment Agency.

4.9. The content and implications of the FWMA provide considerable opportunities for improved and integrated land use planning and flood risk management by Local Authorities and other key partners. The integration and synergy of strategies and plans at national, regional and local scales, is increasingly important to protect vulnerable communities and deliver sustainable re-generation and growth. Table 2 provides an overview of the key LLFA responsibilities under the FWMA.

Table 2: Lead Local Flood Authority responsibilities

FWMA Responsibility	Description of duties and powers	Dorset, Bournemouth and Poole LLFA Status
Local Strategy for Flood Risk Management	A LLFA has a duty to develop, maintain, apply and monitor a local strategy for flood risk management in its area. The local strategies will build on information such as national risk assessments and will use consistent risk based approaches across different Local Authority areas and catchments. The local strategy will not be secondary to the national strategy; rather it will have distinct objectives to manage local flood risks important to local communities.	Bournemouth – Adopted by cabinet Dec 2016 Dorset County Council Local Flood Risk Management Strategy Aug 2014 Borough of Poole Flood Risk Management Strategy Jan 2011
Duty to contribute to sustainable development	The LLFA has a duty to contribute towards the achievement of sustainable development.	Ongoing

[3] Flood and Water Management Act (2010): https://www.legislation.gov.uk/ukpga/2010/29/contents

FWMA Responsibility	Description of duties and powers	Dorset, Bournemouth and Poole LLFA Status
Duty to comply with national strategy	The LLFA has a duty to comply with national flood and costal risk management strategy principles and objectives in respect of its flood risk management functions.	Ongoing
Investigating Flood Incidents	The LLFA, on becoming aware of a flood in its area, has to the extent it considers necessary and appropriate to investigate and record details of 'significant' flood events within their area. This duty includes identifying the relevant risk management authorities and their functions and how they intend to exercise those functions in response to a flood. The responding risk management authority must publish the results of its investigation and notify any other relevant risk management authorities.	Ongoing
Asset Register	A LLFA has a duty to maintain a register of structures or features, which are considered to have an effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection and the Secretary of State will be able to make regulations about the content of the register and records.	Ongoing
Duty to co-operate	The LLFA must co-operate with other relevant authorities in the exercise of their flood and coastal erosion management functions.	Ongoing
Ordinary Watercourse Consents	has a duty to deal with enquiries and determine watercourse consents where the altering, removing or replacing of certain flood risk management structures or features on ordinary watercourses is required. It also has provisions or powers relating to the enforcement of unconsented works.	Ongoing
Works Powers	The Act provides a LLFA with powers to undertake works to manage flood risk from surface runoff, groundwater and on ordinary watercourses, consistent with the local flood risk management strategy for the area.	Ongoing
Designation Powers	The Act provides a LLFA with powers to designate structures and features that affect flooding or coastal erosion. The powers are intended to overcome the risk of a person damaging or removing a structure or feature that is on private land and which is relied on for flood or coastal erosion risk management. Once a feature is designated, the owner must seek consent to alter, remove, or replace it.	Ongoing

FWMA Responsibility	Description of duties and powers	Dorset, Bournemouth and Poole LLFA Status
Emergency Planning	A LLFA is required to play a lead role in emergency planning and recovery after a flood event.	Ongoing
Community Involvement	A LLFA should engage local communities in local flood risk management issues. This could include the training of community volunteers, the development of local flood action groups and the preparation of community flood plans, and general awareness raising around roles and responsibilities plans.	Ongoing
Planning Requirements for SuDS	Sustainable Drainage Systems (SuDS) are to become a planning requirement for major planning applications of 10 or more residential units or equivalent commercial development schemes with sustainable drainage. The LLFA is now a statutory planning consultee and it will be between the LPA and the LLFA to determine the acceptability of these proposed sustainable drainage schemes subject to exemptions and thresholds. Approval must be given before the developer can commence construction. Planning authorities should use planning conditions or obligations to make sure that arrangements are in place for ongoing maintenance of any SuDS over the lifetime of the development.	Ongoing

Dorset Local Flood Risk Management Strategy (2014)

4.10. Dorset County Council has developed, and maintains, a Local Flood Risk Management Strategy (LFRMS) for Dorset, used to coordinate flood risk management on a day-today basis. It also sets measures to manage local flood risk, and includes an action plan for implementation. It is to be updated regularly.

LLFAs, surface water and SuDS

4.11. From 6 April 2015, Government required changes to the planning process for major development, namely that in considering planning applications, local planning authorities should consult the LLFA. Dorset County Council therefore has to provide technical advice on surface water drainage strategies and designs proposed for new major developments.

4.12. There is more information on Sustainable Drainage Systems (SuDS) in Chapter 7 of this SFRA.

The National Flood and Coastal Erosion Risk Management Strategy for England (2011)

4.13. This Strategy provides the overarching framework for future action by all risk management authorities to address flooding and coastal erosion in England. It was prepared by the Environment Agency, with input from DEFRA.

4.14. It builds on existing approaches to flood and coastal risk management and promotes the use of a wide range of measure to manage risk. It is reviewed every six years, and due for re-issue in 2017, although to date it has not been issued. When issued, it may be necessary to update this SFRA.

Water Framework Directive & Water Environment Regulations

4.15. The purpose of the Water Framework Directive (WFD) is to deliver improvements across Europe in the management of water quality and water resources. The Water Environment Regulations (2003) transposed the WFD into law in England and Wales. The first management cycle of the WFD requires all inland and coastal waters to reach "good waterbody status" by 2015 through a catchment-based system of River Basin Management Plans (RBMPs), incorporating a programme of measures to improve the status of all natural water bodies. There is an exception for "heavily modified water bodies", that are required to achieve "good waterbody potential". The deadline for achieving good waterbody status can be extended to 2021 or 2027 if required, for technical or economic reasons.

4.16. The Environment Agency is responsible for monitoring and reporting on the objectives of the Water Framework Directive (WFD) on behalf of government. They work with government, Ofwat, local government, non-governmental organisations (NGOs) and a wide range of other stakeholders including local businesses, water companies, industry and farmers to manage water.

4.17. The Dorset area lies within the South West river basin district. The latest river basin management plan was published in December 2015. This document set out the:

- current state of the water environment
- pressures affecting the water environment
- environmental objectives for protecting and improving the waters
- programme of measures, actions needed to achieve the objectives
- progress since the 2009 plan

4.18. The main responsibility for Dorset is to work with the Environment Agency to develop links between river basin management planning and the development of Local Authority plans, policies and assessments.

4.19. The priority river basin management issues in the Dorset catchment are water quality (diffuse sources of nitrate, phosphorus and silt from rural areas), habitat degradation (e.g. physical modification of the channel) and water quality (e.g. low flows and surface water flooding).

National Strategy for Flood and Coastal Erosion Risk Management

4.20. In accordance with the Act, the Environment Agency has developed a National Strategy for Flood and Coastal Erosion Risk Management (FCERM) in England. This Strategy provides a framework for the work of all flood and coastal erosion risk management authorities.

4.21. The National FCERM Strategy sets out the long-term objectives for managing flood and coastal erosion risks and the measures proposed to achieve them. It sets the context for, and informs the production of local flood risk management strategies by LLFAs, which will in turn provide the framework to deliver local improvements needed to help communities manage local flood risk.

Surface Water Management Plans

4.22. In June 2007, widespread extreme flooding was experienced in the UK. The Government review of the 2007 flooding, chaired by Sir Michael Pitt recommended "Local Surface Water Management Plans (SWMPs) … coordinated by local authorities, should provide the basis for managing all local flood risk."

4.23. The Government's guidance document 'Surface Water Management Plan Technical Guidance' for SWMPs defines a SWMP as:

- *A framework through which key local partners with responsibility for surface water and drainage in their area, work together to understand the causes of surface water flooding and agree the most cost-effective way of managing surface water flood risk.*
- *A tool to facilitate sustainable surface water management decisions that are evidence*
- *A plan for the management of urban water quality through the removal of surface water from combined systems and the promotion of SuDS.*

4.24. In March 2015, Dorset County Council produced a guidance document explaining the information required to be provided for all major developments in terms of surface water management. Information includes a drainage catchment plan, an assessment of the characteristics of the site, surface waste management design details and a management and maintenance plan for the life of the development. Given that most future waste management proposals are likely to involve a site larger than 0.5 hectare, planning permission will required this information.

4.25. The **Dorset Surface Water Management Plan**[4] (Dorset County Council, 2012) outlined the preferred strategy for the management of surface water in Dorset. It contained findings from the preparation and risk assessment stages of the SWMP process. The actions identified within the SWMP were created in 2012. The timescale and priority of these actions will be reviewed in conjunction with assessment of flooding issues reported between 2012 and 2014 or may be considered as part of the detailed assessment of local flood risk in the highest priority locations where relevant.

4.26. Surface water flooding is referred to within the SWMP as flooding from high intensity rainfall where water is ponding or flowing over the ground surface before it enters a drainage network or watercourse. This also incorporates flooding from groundwater and / or ordinary watercourses. The SWMP identifies further actions to be considered in the form of an Action Plan.

4.27. Bournemouth Borough Council published a SWMP in November 2010. The assessment enabled the council to establish flood risk areas that could be resolved with the implementation of mitigation options such as improvements to surface water drainage, storage and capacity.

Catchment Flood Management Plans

4.28. Catchment Flood Management Plans (CFMPs) are a high-level strategic plan intended to provide an overview of flood risk across each river catchment. Developed by the Environment Agency, a Catchment Flood Management Plan (CFMP) is a key tool within spatial planning. As well as providing a broad overview of flood risk mainly from Main River and tidal sources, they develop complementary policies for long-term management of flood risk within the catchment that take account of the likely impacts of climate change and the effects of land use and land management whilst helping deliver multiple benefits and contributing towards sustainable development. This is critical when areas under development pressure coincide with high flood risk.

4.29. Chosen policies and actions highlight areas where development should be avoided when it is deemed inappropriate to reduce current and future flood risk. They also indicate where water

[4] https://www.dorsetforyou.gov.uk/article/424485/Surface-Water-Planning

should be allowed to flood or where current flood risk measures should be reduced. Development should therefore be focused towards the more 'sustainable' areas in terms of those locations at lower risk of flooding or where flood risk management is considered viable within the short and long-term plans. Therefore if development has been proposed in flood risk areas and the chosen policy is not to take further action to reduce flood risk, then developments will find it difficult to rely on Environment Agency led FRM infrastructure investment and there will be a great reliance on private (developer) funding to reduce risk. In this instance, development may not be viable.

4.30. The CFMPs are grouped by river basin district. There are four that cover the Dorset area, namely the Dorset Stour, the Frome and Piddle, the Hampshire Avon and the West Dorset Catchment Flood Management Plans. In addition, small parts of the East Dorset and Perrett CFMPs include parts of the County. Each catchment is divided into distinct sub-areas which have similar characteristics, sources of flooding and level of risk. Each area has been allocated one of six generic flood risk policies depending on level of flood risk, as follows.

- Policies 1 to 3 relate to areas of little to low or moderate risk where continued monitoring, reduced levels of monitoring or effective monitoring take place.
- Policy 4 relates to areas where flood risk is already being managed effectively but where further actions may be needed to keep pace with climate change.
- Policy 5 relates to areas where there is a case for further action to reduce flood risk – only Christchurch falls into this Policy area.
- Policy 6 relates to areas of low to moderate flood risk where action will be taken to store water or manage run-off to reduce flood risk and provide environmental benefits.

4.31. The Dorset Stour Catchment is divided into nine sub-areas. Policy 4 applies to Bournemouth and Christchurch as there are considered to be opportunities to reduce flooding in this area by increasing storage on the floodplain upstream.

4.32. The Frome and Piddle catchment is divided into nine sub areas. Policy 4 applies to Dorchester, Poole, Swanage and Wareham. Flood risk from river and surface water flooding in Dorchester is expected to increase in the long term due to climate change. Flooding in Poole would have a significant impact on the local economy and even the economy of the county. The preferred option for Poole to manage surface water flooding using techniques such as Sustainable Drainage Systems. Flood risk due to river and tidally influenced flooding and surface water in Swanage is expected to increase in the long term due to climate change. Flood risk from river and tidally influenced flooding in Wareham is expected to increase in the long term due to climate change.

4.33. The Hampshire and Avon catchment is divided into eight sub areas. Policy 4 applies to the Lower Avon and other areas outside of Dorset. The implementation of this policy will allow present actions to manage flood risk to be continued and expanded, and for future change in flood risk to be monitored such that appropriate further actions can be carried out. Any structural works may be concentrated in the higher risk urban areas, but an improved understanding of the flood mechanisms, resulting risks and climate change implications will also allow a better response from all parties concerned. Policy 5 relates to Christchurch highlighting that further action can be taken in this area to reduce flood risks.

4.34. The West Dorset catchment is divided into seven sub areas. Policy 4 applies to Bridport, Weymouth and Beaminster. Implementation of the policy would provide protection to properties in Bridport and reduce risk to critical infrastructure and caravan/holiday parks. In Weymouth there are significant opportunities to benefit the environment through the implementation of Policy 4. Implementation of Policy 4 in Beaminster would ensure that flood

risks to the 100 affected properties does not increase and there is opportunities to implement measures such as opening up culverts and influencing good land management.

4.35. The full range of Catchment Flood Management Plans can be seen here:

https://www.gov.uk/government/collections/catchment-flood-management-plans

River Basin Management Plans

4.36. River Basin Management Plans (RBMPs) are prepared under the Water Framework Directive (WFD) and assess the pressure facing the water environment in River Basin Districts. Bournemouth, Dorset and Poole fall within the South West River Basin District.

4.37. The RBMP describes how development and land-use planning need to consider a number of issues, including sustainable drainage systems, green and blue infrastructure, sewage treatment options (tertiary phosphate treatments), water efficiency measures, infrastructure and development locations and the reduction of nutrients from diffuse pollution. The RBMP provides a summary of measures to protect and improve the water environment in the river basin district.

Shoreline Management Plans

4.38. A Shoreline Management Plan (SMP)is a strategic document that sets out policies to assist decision-making on flooding form the sea and costal erosion risk management over the next 20, 50 and 100 years.

4.39. The original 1999 SMP1 has been reviewed and updated to produce SMP2, which was published in June 2011. The South Devon and Dorset Costal Advisory Group have produced three SMPs which cover the Dorset Coast.

1. Poole and Christchurch Bay Shoreline Management Plan
2. Durlson Heath to Rame Head Shoreline Management Plan
3. Lyme Bay and South Devon Shoreline Management Plan

4.40. Further information on Shoreline Management Plans can be seen here:

https://www.dorsetforyou.gov.uk/article/409401/Shoreline-Management-Plans

National and Local Flood Risk Management Strategies

4.41. The Flood Risk Management Act establishes how flood risk will be managed within the framework of National Strategies for England and Local Strategies for each LLFA area.

4.42. The National Strategy for England has been developed by the Environment Agency with the support and guidance of Defra. It sets out principles for how flood risk should be managed and provides strategic information about different types of flood risk and which organisations are responsible for their effective management. The Act requires risk management authorities (local authorities, internal drainage boards, sewerage companies and highways authorities) to work together and act consistently with the National Strategy in carrying out their flood and coastal erosion risk management functions effectively, efficiently and in collaboration with communities, business and infrastructure operators to deliver more effective flood risk management.

4.43. LLFAs have responsibility for developing a Local Flood Risk Management Strategy (LFRMS) for their area covering local sources of flooding. The local strategy produced must be consistent

with the National Strategy. The strategy should set out the framework for local flood risk management functions and activities and should raise awareness of local organisations with responsibilities for flood risk management in the area. The strategy should also facilitate partnership arrangements to ensure co-ordination between local organisations and an assessment of flood risk and plans and actions for managing risk, as set out under section 9 of the FWMA.

4.44. Dorset County Council have produced a LFRMS that was published in August 2014. The strategy sets out the vision 'working together to manage local flood risk in Dorset so communities are resilient and prepared for flooding'. The Strategy also includes 5 objectives and a series of measures and detailed actions to achieve each objective. The Strategy also highlights the priority locations for flood risk management which consists of the areas of the county at highest risk of flooding.

4.45. The priority locations where communities are considered to be at highest risk are; Christchurch, Gillingham, Portland, Swanage and Weymouth. Two further lists show wider communities where Flood Risk Management Activities should be prioritised. With regards to relevance to the Minerals and Waste Plans these include; Dorchester, Ferndown, Maiden Newton, Blandford Forum, Charminster, East Stoke, Shaftesbury, Wareham Wimborne

4.46. Further information on Flood Risk and Responsibilities can be seen here:

https://www.dorsetforyou.gov.uk/article/424484/Flood-Risk-and-Responsibilities

4.47. The Borough of Poole published their FRMS in January 2011. The aim of this study was to determine the flood risk management infrastructure requirements to provide protection from coastal flooding up to 2126. The study concludes by recommending areas where finding opportunities should be directed and details a series of further work to better understand flood risk. It can be seen here:

http://www.poole.gov.uk/planning-and-buildings/planning/ldp/flooding/

4.48. Bournemouth Borough Council's LFRMS was adopted in December 2015. It has a series of aims and objectives which include improved understanding of the causes of flooding, to identify practical solutions and assist the community to improve flood resilience. It can be seen here:

http://www.bournemouth.gov.uk/environment-and-sustainability/Documents/lfrms-nov-2015.pdf

Roles and Responsibilities

4.49. There is no single body responsible for managing local flood risks. In many cases, flooding may be caused by a number of different sources which are managed by different Flood Risk Management Authorities (RMA). The responsibilities for the FRMA under the Flood and Water Management Act and the Flood Risk Regulations are summarised below.

- **Dorset, Bournemouth and Poole LLFA**

  The management of local sources of flooding is conducted by three Lead Local Flood Authorities (LLFA). These include Dorset County Council, Bournemouth Borough Council and the Borough of Poole. Responsibilities are wide ranging but include; developing strategies for local flood risk management, providing strategic leadership to RMA's through partnership working, maintenance of a register of structures and features which have an effect on local flood risk and the power to designate structures or features that affect flooding.

- **District and Borough Councils**

  Christchurch Borough Council, East Dorset District Council; North Dorset District Council; Purbeck Borough Council, West Dorset District Council and Weymouth and Portland Borough Council have a series of roles and responsibilities. These include carrying out risk management functions, emergency response to flooding incidents and the duty to encourage appropriate sustainable development such as promoting sustainable drainage.

- **The Environment Agency (EA)**

  Taking a strategic overview for all forms of flooding, the EA has wide ranging responsibilities. These include responsibility for the development of the National Strategy for Flood and Costal Erosion Risk Management, granting consents for works on or near rivers and floodplains, power to designate structures and features that affect flooding, statutory consultee for planning authorities on relevant matters, emergency responder to flood incidents and the duty to contribute towards sustainable development.

- **Water Companies**

  Water authorities have to have regard to national and local strategies when carrying out their flood risk management functions. They have responsibility for the adoption of private sewers, for dealing with flooding from public sewers and adoption of new built sewers.

- **Highways Authorities**

  Bournemouth, Dorset and Poole and the Highways Agency have to regard to national and local strategies when carrying out their flood risk management functions. They have responsibility to maintain highways under the Highways Act 1980 and powers to protect the highway from flooding.

Key Stakeholders responsible for flood risk management

4.50. There are a whole host of stakeholders involved in the management of flood risk in the County. Often a range of stakeholders are involved in an incident of flooding. The key stakeholders responsible for the management of flood risk are summarised below.

Riparian owners and Landowners

Riparian landowners own land adjoining, above or with a watercourses running through it and have responsibility to maintain the bed and banks of the watercourse and ensure there is no obstruction, diversion or pollution of the watercourse.

Property owners and residents

It is the responsibility of the householder or business to look after their property including protecting it from flooding.

Private drainage asset owners

Private drainage assets may have a significant impact on local flood risk and it is the responsibility of the owner to regularly inspect and maintain their assets.

The Local Community

The community must be consulted on Local Strategies by the LLFA and have a key role to play in ensuring local strategies are delivered.

Partnership Working

4.51. To facilitate partnership working across organisations Dorset County Council chairs the Flood Risk Management Officer Group and Flood Risk Management Board. These groups include representatives from the Risk Management Authorities. The ability to share information flooding between RMA's is essential to ensure integrated and holistic solutions are proposed and developed to reduce or mitigate the risk from all sources of flooding.

Planning Legislation, National Planning Policy and Planning Guidance

4.52. The **Planning and Compulsory Purchase Act** (PCPA) sets out provisions with regard to regional functions, local development, development and development control whilst radically changing the raft of documents required in order for a Local Plan to be produced and adopted. Previous documents – regional planning guidance, county structure plans, district local plans and unitary development plans, old-style 'structure' plans, were replaced with Regional Spatial Strategies and Local Development Frameworks contained within a series of Development Plan Documents (DPD).

4.53. The **Localism Act** was given Royal Assent in November 2011 with the purpose of shifting power from Central Government back to Councils, communities and individuals. The Government proposed that Regional Spatial Strategies were to be abolished, providing the opportunity for councils to re-examine the local evidence base and establish their own local development requirements for employment, housing and other land used through the plan making process. Additionally the Act places a duty to cooperate on Local Authorities, including statutory bodies and other groups, in relation to planning of sustainable development. This duty to cooperate requires Local Authorities to:

> *"...engage constructively, actively and on an ongoing basis in any process by means of which development plan documents are prepared so far as relating to a strategic matter." (Provision 110)*

4.54. The Act, together with the Neighbourhood Planning (General) Regulations 2012, also provides new rights to allow Parish or Town Councils to deliver additional development through neighbourhood planning (Neighbourhood Plans). This means local people can help decide where new homes and businesses should go and what they should look like. Local Planning Authorities will be required to provide technical advice and support as neighbourhoods draw up their proposals. Neighbourhood Plans have a number of conditions and requirements, set out in legislation and the NPPF and Planning Practice Guidance.

4.55. **Local Plans**, including Minerals and Waste Plans, set the context for guiding decisions and development proposals and along with the NPPF, set out a strategic framework for the long-term use of land and buildings, thus providing a framework for local decision making and the reconciliation of competing development and conservation interests. The aim of a Local Plan is to ensure that land use changes proceed coherently, efficiently, and with maximum community benefit. Local Plans are subject to regular periods of intensive public consultation, public involvement, negotiation and approval.

4.56. A Local Plan is a statutory document forming the centre of the planning system, designed to promote and deliver sustainable development. Local Plans have to set out a clear vision, be kept up to date and to set out a framework for future development of the local area, addressing needs and opportunities in relation to housing, the economy, community facilities and infrastructure as well as safeguarding the environment and adapting to climate change and securing good design.

4.57. The NPPF requires that the evidence base for the Local Plan must clearly set out what is intended over the lifetime of the plan, where and when this will occur and how it will be

delivered. The NPPF States that Local Plans should be supported by a SFRA and should take account of advice provided by the Environment Agency and other flood risk management bodies. The SFRA should be used to ensure that when allocating land or determining planning applications, development is located in areas at lowest risk of flooding. Policies to manage, mitigate and design appropriately for flood risk should be written into the Local Plan, informed by both the SFRA and Sustainability Appraisal.

4.58. The Sustainability Appraisal (SA) is a key component of a Local Plan evidence base, ensuring that sustainability issues are addressed during the preparation of Local Plans. The SA is a technical document which has to meet the requirements of the Strategic Environmental Assessment Directive 2001/42/EC which assesses and reports on a plan's potential impact on the environment, economy, and society. The sustainability appraisal for the Mineral Sites Plan and the Waste Plan has also been informed by this SFRA. The SA carries out an assessment of the draft policies and proposals at various stages throughout the preparation of the Plans, and does this by testing the potential impacts, and consideration of alternatives are tested against the plan's objectives and policies. This ensures that the potential impacts from the plan on the aim of achieving sustainable development are considered, in terms of the impacts, and that adequate mitigation and monitoring mechanisms are implemented.

4.59. The **National Planning Policy Framework** (NPPF) was published in March 2012, and is based on core principles of sustainability. It replaced most of the previous planning policy sources. The NPPF is the national planning policy framework for Local Planning Authorities to help them prepare Local Plans and take development management decisions. Section 10 Paragraph 100 of the NPPF states that Local Plans:

> *"...should be supported by a Strategic Flood Risk Assessment and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as Lead Local Flood Authorities and Internal Drainage Boards.*
>
> *Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by applying the Sequential Test, if necessary applying the Exception Test, safeguarding land from development that is required for current and future flood management, using opportunities offered by new development to reduce the causes and impacts of flooding and where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long term, seeking opportunities to facilitate the relocation of development including housing to more sustainable locations"*

4.60. The NPPF consists of a framework within which councils and local people can produce local and neighbourhood plans that reflect the needs and priorities of their communities. The overall approach to flood risk is broadly summarised in NPPF Paragraph 103:

> *"When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific FRA following the Sequential Test, and if required the Exception Test, it can be demonstrated that:*
>
> - *Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location, and*

- *Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems."*

4.61. **National Planning Practice Guidance** (NPPG) was published in 2014 and sets out how the NPPF should be implemented. **NPPG: Flood Risk and Coastal Change** advises on how planning can address the risks associated with flooding and coastal change in plan preparation and determination of planning applications. It sets out Flood Zones, the appropriate land uses for each zone flood, risk assessment requirements, including the Sequential and Exception Tests and the policy aims for developers and planning authorities for each Flood Zone. It covers permitted development, site-specific flood risks, Neighbourhood Planning, Flood Resilience and Resistance and making development safe from flooding, and vulnerability.

4.62. The Flood Risk and Coastal Change document outlines how LPAs should use the SFRA, as follows:

- SFRAs should assess the flood risk from all sources within a specified potential site or area identified for development, both in the present day, and in the future. The impacts of climate change should be considered when assessing future flood risk;
- The impact on flood risk of future development and changes to land use should also be considered;
- The SFRA should provide the foundation from which to apply the Sequential and Exception Tests in the development allocation and development control process. Where decision-makers have been unable to allocate all proposed development and infrastructure in accordance with the Sequential Test, taking account of the flood vulnerability category of the intended use, it will be necessary to increase the scope of the SFRA (to a Level 2 SFRA) to provide the information necessary for application of the Exception Test;
- The SFRA should inform the sustainability appraisal of the Local Plan;
- The SFRA should outline requirements for site-specific FRAs, with specific requirements for particular locations;
- The SFRA should define the flood risk in relation to emergency planning's capacity to manage flooding;
- Opportunities to decrease the existing flood risk within the study areas should be explored, such as surface water management, provision of flood storage and managing conveyance of flood flows.

4.63. SFRAs should be prepared in consultation with the Environment Agency, emergency response and drainage authority functions of the LPA, and Lead Local Flood Authorities (LLFAs). Providing guidance on the application of the **Sequential** and **Exception Tests** is a key role of an Strategic Flood Risk Assessment. These tests are defined in the National Planning Practice Guidance , as follows:

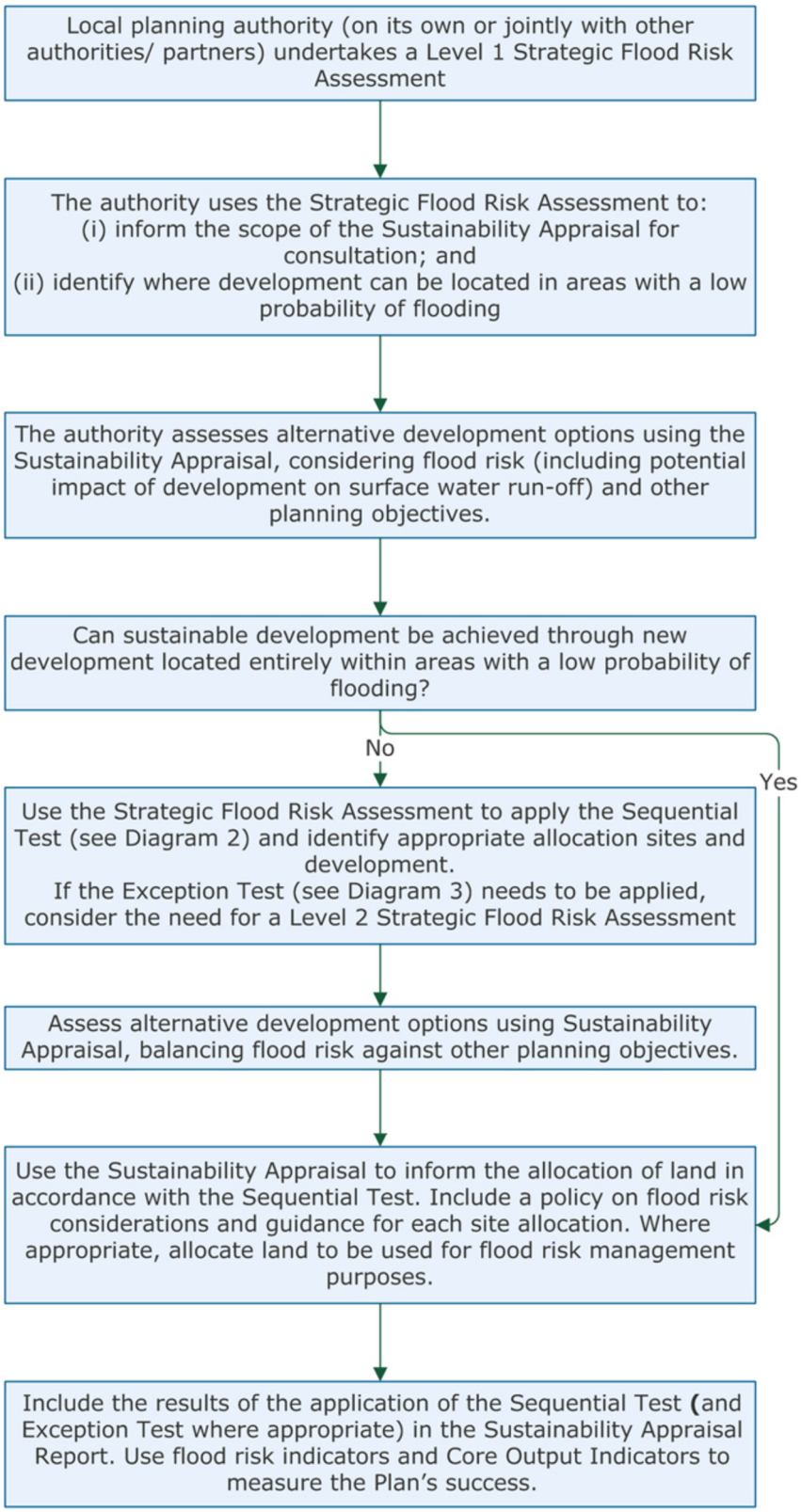
4.64. The **Sequential Test** ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. It must be performed when considering the placement of future development and for planning application proposals. The Sequential Test is used to direct all new development (through the site allocation process) to locations at the lowest probability of flooding. It states that development should not be permitted or allocated if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. (NPPG Paragraph: 020 Reference ID: 7-020-20140306)

4.65. The flood zones, as refined in the Strategic Flood Risk Assessment for the area, provide the basis for applying the Test. The aim is to steer new development to Flood Zone 1 (areas with a low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

4.66. The **Exception Test**, as set out in paragraph 102 of the Framework, is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. Essentially, the 2 parts to the Test require proposed development to show that it will provide wider sustainability benefits to the community that outweigh flood risk, and that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall. (NPPG Paragraph: 023 Reference ID: 7-023-20140306)

4.67. Figure 7 below indicates how the issue of flood risk should be taken into account when preparing local plans, including minerals and waste plans.

Figure 7: Taking Flood Risk into account in the preparation of a Local Plan



(From Planning Practice Guidance for Flood Risk and Coastal Change)

Minerals and Waste Planning

4.68. The Bournemouth, Dorset and Poole Minerals Strategy was adopted in 2014, setting out the overarching strategy for mineral development in Bournemouth, Dorset and Poole, including how much mineral was to be provided and where it would come from. It also included development management policies, intended to protect the environment during minerals development. These included Policies DM1 and DM3, covering the water environment, including flooding. The(relevant) text of these policies is set out below:

Policy DM1 - Key Criteria for Sustainable Minerals Development

Proposals for minerals development should support the delivery of social, economic and environmental benefits whilst any adverse impacts should be avoided or mitigated to an acceptable level.

In order to achieve this, all proposals for minerals development must demonstrate that all the following criteria have been addressed satisfactorily:

h. efficient use of water resources on the site;

i. avoidance or mitigation of, or compensation for, adverse impacts on the water environment and flood risk;

Policy DM3 - Managing the Impact on Surface Water and Ground Water Resources

Proposals for minerals development which would have an impact on water resources, including aquifers, will only be permitted where it can be demonstrated that the local water environment would be protected and where appropriate enhanced. Provision should be made to ensure the protection and maintenance of the:

a. quality;

b. direction and rate of flow; and

c. volume of flow of ground water, water courses and all other surface water.

Rivers, open watercourses, wetlands and ponds which have a significant ecological value, together with the land alongside these features, should be protected. Development should aim to prevent deterioration and where appropriate enhance the quality of aquatic ecosystems and associated wetlands.

Flood Risk Assessment (FRA) will be required for minerals development proposals in areas at risk of flooding or likely to contribute to flooding elsewhere, relative to the nature and scale of the development, and must take into account cumulative effects with other existing or proposed development. Where a risk of flooding is identified through FRA, proposals must include measures to ensure the avoidance and / or mitigation of that risk.

Development proposals will also be required to include provisions for the efficient use of water resources on site and the use of Sustainable Drainage Systems (SUDS).

4.69. The Minerals Strategy also included a series of site assessment criteria, intended to assess sites considered for future assessment. These included three criteria covering various aspects of the water environment (surface water, ground water and flooding). All assessment of sites for possible future development through the Mineral Sites Plan preparation process have had water environment issues considered.

4.70. The Bournemouth, Dorset and Poole Waste Plan under preparation is a complete review and updating of the 2006 Dorset Waste Plan, and includes a strategy for managing waste, allocation of sites to deliver the strategies and development management policies to protect amenity and the environment.

4.71. Policy 16 covers 'Natural Resources' including water resources and Policy 17 covers 'Flood Risk,' and are set out below. Again water/flooding issues have been taken into consideration during assessment of potential site allocations for the Waste Plan.

Policy 16 – Natural Resources

Proposals for waste management facilities will be permitted where all of the following criteria are met:

a. it can be demonstrated that the quality and quantity of water resources (including ground, surface, transitional and coastal waters) would not be adversely impacted and/or would be adequately mitigated;

b. ground conditions are shown to be suitable;

c. site soils would be adequately protected and/or improved; and

d. there would not be a loss of the best and most versatile agricultural land (Grades 1, 2 and 3a) unless the environmental, social and/or economic benefits of the proposal outweigh this loss and it can be demonstrated that the proposals has avoided the highest grades of land.

Policy 17 – Flood Risk

Proposals for new waste management facilities within Flood Zones 2 and 3 and of one hectare or greater within Flood Zone 1 must be accompanied by a Flood Risk Assessment (FRA). This must take into account cumulative effects with other existing or proposed developments.

Proposals for waste management facilities will be permitted where all of the following criteria are met:

a. they would not be at significant risk of flooding;

b. mitigation measures are provided, where a risk of flooding is identified, so that there would not be an increased risk of flooding on the site or elsewhere;

c. they are compatible with Catchment Flood Management Plans and/or Shoreline Management Plans and the integrity of functional floodplains is maintained;

d. appropriate measures are incorporated or provided to manage surface water run-off including, where appropriate, the use of sustainable drainage systems (SUDS); and

e. they would not have an unacceptable impact on the integrity of sea, tidal, or fluvial flood defences, or impede access for future maintenance and improvements of such defences.

Source: Chapter 12, Pre-Submission Draft Bournemouth, Dorset and Poole Waste Plan 2017

National Planning Policy for Waste

4.72. The National Planning Policy for Waste (NPPW) sets out detailed waste planning policies for waste planning authorities. Appendix B of the policy document describes locational criteria that waste planning authorities should consider when testing the suitability of sites and areas in the preparation of Local Plans and in determining planning applications.

4.73. This Level 1 SFRA Report seeks to provide initial information to support the consideration of criteria a) as follows:

'Protection of water quality and resources and flood risk management: Considerations will include the proximity of vulnerable surface and groundwater or aquifers. For landfill or land-raising, geological conditions and the behaviour of surface water and groundwater

should be assessed both for the site under consideration and the surrounding area. The suitability of locations subject to flooding, with consequent issues relating to the management of potential risk posed to water quality from waste contamination, will also need particular care'.

5. Flood Risk and Flood Risk Management Policy

Flood Risk

5.1. Flood risk is not static; it cannot be described simply as a fixed water level that will occur if a river overtops its banks or from a high spring tide that coincides with a storm surge. It is therefore important to consider the continuum of risk carefully. Risk varies depending on the severity of the event, the source of the water, the pathways of flooding (such as the condition of flood defences) and the vulnerability of receptors as mentioned above.

5.2. The consequences of flooding include fatalities, property damage, disruption to lives and businesses, with severe implications for people (e.g. financial loss, emotional distress, health problems). Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc.). Flood risk is then expressed in terms of the following relationship:

Flood risk = Probability of flooding x Consequences of flooding (Flood Hazard Magnitude x Receptor Presence x Receptor Vulnerability)

Actual Risk

5.3. This is the risk 'as is' taking into account any flood defences that are in place for extreme flood events (typically these provide a minimum Standard of Protection (SoP)). Hence, if a settlement lies behind a fluvial flood defence that provides a 1 in 100-year SoP then the actual risk of flooding from the river in a 1 in 100-year event is generally low.

5.4. Actual risk describes the primary, or prime, risk from a known and understood source managed to a known SoP. However, it is important to recognise that risk comes from many different sources and that the SoP provided will vary within a river catchment. Hence, the actual risk of flooding from the river may be low to a settlement behind the defence but moderate from surface water, which may pond behind the defence in low spots and is unable to discharge into the river during high water levels.

Residual Risk

5.5. Residual risk refers to the risks that remain after measures have been taken to alleviate flooding – e.g. flood defences. It is important that these risks are quantified to confirm that the consequences can be safely managed. Even when flood defences are in place, there is always a likelihood that these could be overtopped in an extreme event or that they could fail or breach. Defence failure can lead to rapid inundation of fast flowing and deep floodwaters, with significant consequences to people, property and the local environment behind the defence.

5.6. As noted in National Planning Policy Guidance[5], the developer must provide evidence to show that any proposed development would be safe and that any residual flood risk can be overcome to the satisfaction of the local planning authority, taking account of any advice from the Environment Agency. The developer's site-specific flood risk assessment should

[5] National Planning Policy Guidance - Paragraph: 038 Reference ID: 7-038-20140306

demonstrate that the site will be safe and that people will not be exposed to hazardous flooding from any source. The following should be covered by the flood risk assessment:

- the design of any flood defence infrastructure;
- access and egress;
- operation and maintenance;
- design of development to manage and reduce flood risk wherever possible;
- resident awareness;
- flood warning and evacuation procedures (see also advice on when flood warning and evacuation plans are needed); and
- any funding arrangements necessary for implementing the measures.

Flood Risk - Sources of Flooding

5.7. Flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land not normally covered by water and presents a risk when people and human or environmental assets are present in the area that floods. Assets at risk from flooding can include housing, transport and public service infrastructure, commercial and industrial enterprises, agricultural land and environmental and cultural heritage. Flooding can occur from many different and combined sources and in many different ways. Major sources of flooding include;

- **Fluvia**l (rivers) - inundation of floodplains from rivers and watercourses; inundation of areas outside the floodplain due to influence of bridges, embankments and other features that artificially raise water levels; overtopping or breaching of defences; blockages of culverts; blockages of flood channels/corridors.
- **Tidal** - sea; estuary; overtopping of defences; breaching of defences; other flows (e.g. fluvial surface water) that could pond due to tide locking; wave action.
- **Surface water** - surface water flooding covers two main sources including sheet run-off from adjacent land (pluvial) and surcharging of piped drainage systems (public sewers, highway drains, etc.)
- **Groundwater** - water table rising after prolonged rainfall to emerge above ground level remote from a watercourse; most likely to occur in low-lying areas underlain by permeable rock (aquifers); groundwater recovery after pumping for mining or industry has ceased.
- **Infrastructure failure** - reservoirs; canals; industrial processes; burst water mains; blocked sewers or failed pumping stations.

5.8. Different types and forms of flooding present a range of different risks and the flood hazards of speed of inundation, depth and duration of flooding can vary greatly. With climate change, the frequency, pattern and severity of flooding are expected to change and become more damaging.

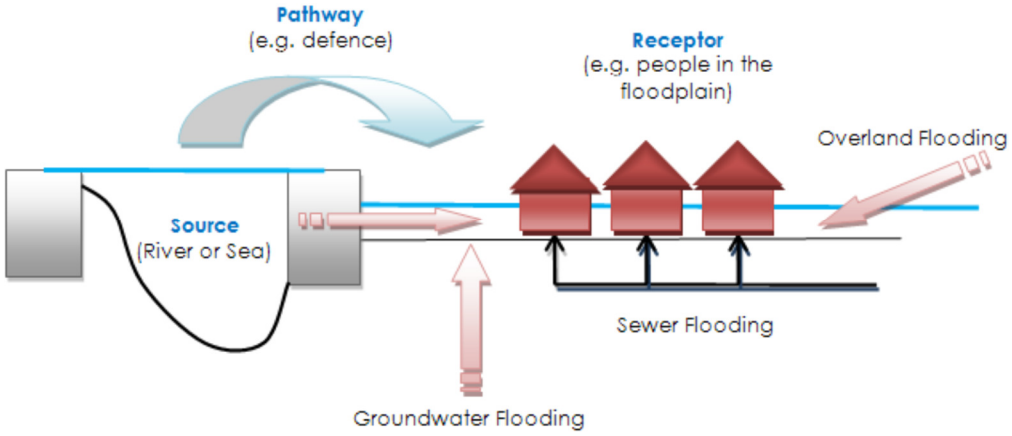
Likelihood and Consequence

5.9. Flood risk is a combination of the likelihood of flooding and the potential consequences arising. It is assessed using the source – pathway – receptor model as shown in Figure 8 below. This is a standard environmental risk model common to many hazards and should be

the starting point of any assessment of flood risk. However, it should be remembered that flooding could occur from many different sources and pathways, and not simply those shown in the illustration below.

5.10. The principal sources are rainfall or higher than normal sea levels, the most common pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets and the receptors can include people, their property and the environment. All three elements must be present for flood risk to arise. Mitigation measures have little or no effect on sources of flooding but they can block or impede pathways or remove receptors.

Figure 8: Source/Pathway/Receptor Model



5.11. The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. It is therefore important to define the components of flood risk in order to apply this guidance in a consistent manner.

Flood Risks in Bournemouth, Dorset and Poole

5.12. There is a long record of flood events in Dorset for the past 40 years. The 2007 and 2012 floods were some of the worst on record. Heavy prolonged rainfall over one weekend in July 2012 affected many parts of Dorset and East Devon as a large depression circulated slowly around South-West England. During this time a number of rain gauges registered over 100mm (four time the month's average). Between April and June more than double the average rainfall had been recorded and the rain therefore fell on already saturated ground. The intense torrential rain caused flash flooding to rapid response catchments to the west of Dorset. Subsequently, larger catchments were affected as flood waters passed through the systems on the Rivers Frome and Stour.

Flood Zones

5.13. Likelihood of flooding is expressed as the percentage probability based on the average frequency measured or extrapolated from records over a large number of years. A 1% probability indicates the flood level that is expected to be reached on average once in a hundred years, i.e. it has a 1% chance of occurring in any one year, not that it will occur once every hundred years. Table 3 describes the flood probabilities used to describe Flood Zones as defined in the NPPF Technical Guide and as applied in Appendices A and B of this SFRA.

5.14. Table 1 of NPPG Flood Risk and Coastal Change identifies the following Flood Zones. Flood risk vulnerability and flood zone compatibility is set out in Table 3 of the NPPG.

Table 3: Flood Probabilities used to describe Flood Zones

Flood Zone	Definition – annual probability of flooding
Zone 1 **Low Probability of Flooding**	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (<0.1%) in any year. All land uses are appropriate in this zone. Flood Risk Assessment required for development proposals on site 1ha or greater.
Zone 2 **Medium Probability of Flooding**	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%); or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year. Essential infrastructure, water compatible infrastructure, less vulnerable and more vulnerable land uses are appropriate in this zone. Highly vulnerable land uses acceptable provided they pass the Exception Test. All developments require Flood Risk Assessment
Zone 3a **High Probability of Flooding**	Land having a 1 in 100 or greater annual probability of river flooding (>1%); or Land having a 1 in 200 or greater annual probability of sea flooding (>0.5%) in any year. Developers and local authorities should seek to reduce the overall level of flood risk. Water compatible and less vulnerable land uses are permitted in this zone. Highly vulnerable land uses not permitted. More vulnerable and essential infrastructure only permitted if they pass the Exception Test. All developments require Flood Risk Assessment.
Zone 3b **The Functional Floodplain**	This zone comprises land where water has to flow or be stored in times of flood. This includes land that would flood with an annual probability of 1 in 20 (5%) or 1 in 25 (4%) or greater in any year, or is designed to flood in an extreme (0.1%) flood. Also referred to as functional floodplain. Only water compatible and essential infrastructure are permitted in this zone, and should be designed to remain operational in flood time, with no blocking of the water flow routes or loss of floodplain. They must be safe for users and not increase flood risk elsewhere. Essential infrastructure only if it passes the Exception Test. All developments require Flood Risk Assessment.

Surface Water Flood Risk Information

5.15. In 2016, the Environment Agency, working with LLFAs, produced the Risk of Flooding from Surface Water (RoFfSW) data set. It supersedes the previous Flood Map for Surface Water and Areas Susceptible to Surface Water Flooding maps. It is a national scale map and assesses

flooding scenarios as a result of rainfall, with chances of occurring in any given year. It is intended to provide a consistent standard of assessment for surface water flood risk across England and wales, to assist LLFAs, the Environment Agency and potential developers to focus their management of surface water flood risk. See Appendix A for more information.

5.16. The RoFfSW improves on previously available datasets, but should not be used to determine flood risk for individual properties – results are more appropriate for high level assessments, such as SFRAs. To properly understand risk of flooding for individual properties, a more detailed Flood Risk Assessment is required.

5.17. The RoFfSW mapping displays different levels of surface water flooding risk depending on the annual probability of the land in question being inundated by surface water, as shown in Table 4 below. The mapping is also available through the Dorset Explorer GIS mapping.

Table 4: Flood Probabilities used to describe Flood Zones

Risk	Definition
High	Probability of flooding greater than 1 in 30 (3.3%) each year
Medium	Probability of flooding between 1 in 100 (1%) and 1 in 30 (3.3%) each year
Low	Probability of flooding between 1 in 100 (1%) and 1 in 1000 (0.1%) each year

Groundwater flood risk information

5.18. This is often difficult to quantify as there is limited data available to be used to assign a probability to a flood event, and assess the risk. The risk of groundwater emergence is often assessed qualitatively based on soil conditions, topography and location of nearby water sources, to give an indications of susceptibility. Local borehole records and information on previous flood events can also be used to supplement this information and identify locations which are at risk.

5.19. For this SFRA, the datasets used are the Areas Susceptible to Groundwater Flooding, along with the Wessex Basin Groundwater Model Depth to Groundwater dataset.

Reservoir Flood Risk Information

5.20. The risk of reservoir flooding is usually considered to be low. While the consequences of such a flood would be significant (deep, fast-flowing water, with little warning of its arrival) the probability of a breach is very low due to the inspection and maintenance regime required under the Reservoirs Act 1975.

Sewer flood risk information

5.21. There is limited information with which to quantify sewer flood risk, especially as flooding can occur as a result of blockage or damage as well as through lack of capacity. Flood history data can be sued to identify locations where there has previously been sewer flooding (either fouls or surface water). This is a useful starting point in identifying areas where there may be a lack of sewer capacity or a recurring blockage issue, but it must be remembered that sewer flooding can occur anywhere there are sewers.

6. Sources of flooding

6.1. There are a number of different ways that flooding can occur in the County, and these are described below. The different types of flooding can occur on their own or together, and reflect the source of the floodwater and how it moves across the landscape. For example a storm may cause a river to rise and overtop flood defences and may, at the same time, exceed the capacity of a sewer system in an urban area.

Fluvial Flooding

6.2. River flooding can be characterised as a function of topography, geology and hydrology;

- Extent of flooding: related to flow and the shape of the river valley.
- Depth of flooding: related to the flood flows in the channel, the shape of the river valley and any structures that may cause water to back-up.
- Velocity of floodwater: controlled by the channel and floodplain slope, shape and roughness. Local variations in velocity occur where flow paths encounter natural or artificial features that either constrict or expand areas of flow.
- Flood depths and velocities: vary across the floodplain, with deeper, fast-flowing waters in the river channel and shallower, slower waters towards the outer edge.

6.3. Flood management and associated infrastructure has changed considerably over the last 100 years or more, and particularly since the 1960's. New flood defence schemes, pumping stations and flood warning systems have all contributed to a reduction in flood risk, particularly from more frequent events. Recent years have seen a number of large scale flood events throughout the UK including Easter 1998, autumn 2000, February 2002, New Year 2003, February 2004, summer 2007 and summer 2012.

6.4. Information about flooding is recorded by the Environment Agency on their FRIS (Flood Reconnaissance Information System) database, which was created in 2001. The Environment Agency has records of historical flood events which affected the study area in various years. Table 5 below indicates the main fluvial flooding events as described within the relevant CFMPs and SFRAs.

6.5. The following information on flood is taken from the existing SFRAs:

- Bridport: following significant flooding in 1979 a flood alleviation scheme was built.
- Dorchester: flooding experienced during 2000, when the Environment Agency issued a severe flood warning for the River Frome and the major incident plan was invoked here and also at West Bay.
- Dorchester: low lying parts of the Castle Park housing estate flooded in 1994, swamping the foul sewage system causing polluted flooding for several weeks. Less severe problems occurred again in 1995.
- In October 2000 to January 2001, Piddlentrenthide, Maiden Newton and Sydling St Nicholas were affected by flooding from all sources following heavy rainfall on saturated ground. Since this occurrence, the river channel of Sydling Water has been widened and straightened to increase the amount of water it can carry, protecting properties up to a 1% annual probability river flood. This event produced the highest rainfall ever recorded in the UK at Martinstown Dorset (approximately 180mm of rain fell in 21 hours). The flood level rose in parts of Weymouth to several feet, entered many properties and caused damage to Westham Bridge and other structures.

- Iford and Longham: 80 properties affected by river flooding in 2002
- Wincanton, Sturminster Newton and Blandford Forum: affected by past flooding.
- Piddletrenthide, Maiden Newton and Sydling St Nicholas: flooding in winter 2000/01.
- Weymouth: significant tidal flooding in 2005 and surface water flooding in 2004, and the area around Chiswell has a history of flood events.
- Christchurch: history of tidal flooding.

Table 5: Historical fluvial flood events

Flood event	Area affected
November 1824	Coastal flooding (Chesil Beach)
October 1908	Surface Water (Weymouth)
March 1914	Swanage
January 1923	Swanage
November 1935	Swanage
July 1955	UK record rainfall + tide locked outflow (Weymouth)
Dec 1955/Jan 1956	River Stour
January 1959	Rivers Avon and Stour
November/December 1959	River Stour
October 1960	River Parrett, River Stour
Summer 1966	Broadway and Nottington (heavy rainfall on a dry catchment)
November 1966	River Stour
July 1977	Weymouth
August 1977	Weymouth and Westham
March 1979	Swanage
May 1979	Weymouth and North of Portland, Nottington, Broadwey
December 1979	Rivers Avon, Stour, Allen and Brit
June 1980	Broadway and Nottington (heavy rainfall on a dry catchment)
June 1983	Weymouth
1989	River Stour

Flood event	Area affected
February 1990	River Stour, River Allen (Wimbourne Minster); Swanage
December 1993	River Jordan and Preston Brook
October 1994	Swanage
1995	River Avon
March 1996	Swanage
December 1999	River Wey (Broadwey); Swanage
October / December 2000	Avon and Stour Rivers Frome and Piddle
Autumn / winter 2000	River Parrett, Rivery Wey (Radipole Lake area flooding)
December 2000	River Allen (Wimbourne Minster)
December 2001	Hooke-Frome channel Maiden Newton
2002	River Avon
September 2002	Swanage
November 2002	River Stour (Middle Stour – Throop / Hamoon); Swanage
Jan 2003	Rivers Avon and Stour
Jan 2004	Swanage
May 2004	Surface Water (Littlesea Industrial Estate)
December 2005	River Stour (Sturminster Newton)

Source: Environment Agency (relevant CFMPs) and SFRAs (Local Authority)

Flooding from the sea

6.6. There is a significant risk from coastal flooding at several locations along the Dorset coastline. Information about flooding from coastal waters is recorded by the Environment Agency on their FRIS (Flood Reconnaissance Information System) database.

6.7. FRIS records indicate flooding from the sea to have been a contributory or principal factor in many of the largest flooding events, and under climate change scenarios the impact of this is expected to increase. Records show flooding from the sea has in the past affected coastal areas of Christchurch, but not Bournemouth. Coastal flooding within Christchurch has been caused by high tide levels in combination with high river levels, often exacerbated by heavy rain and strong winds.

6.8. West Bay has a long history of flooding, having been badly affected in 1978, 1974 and 1970 as well as on several other occasions prior to this. The flooding of 1974 was particularly severe after the sea breached East Beach. A major coastal defence and harbour improvement scheme was completed in 2005 to provide additional protection.

6.9. Lyme Regis has been affected by coastal flooding in the past. The town's land stabilisation and coastal protection scheme was designed to reduce the risks from coastal erosion and landslides, but should also help reduce the risk from coastal flooding to properties on the sea front.

6.10. Weymouth and Portland have been affected by significant tidal / coastal flooding at various times, most significantly in 1824 and most recently in December 2005, often affecting Chesil Beach and the settlement of Chiswell. The stretch of coastline on the Preston Brook at Overcombe is now protected by defence structures which are estimated to have a standard of protection of 1 in 25 years.

6.11. Tidal processes can have an influence on fluvial processes a considerable distance in-land, depending on the gradient of the river. For example, tidal processes are observable as far upstream as the A35 near Bridport on the River Brit. High tide levels, as well as posing a flood risk in their own right to settlements along the coast such as West Bay, can prevent or inhibit outflows from the mouth of rivers causing or exacerbating fluvial flooding, as has been known to cause some of the most serious flood events in Weymouth and the surrounding area.

The Functional Floodplain (Flood Zone 3b)

6.12. The NPPF and the Flood Risk and Coastal Change Planning Practice Guidance define functional floodplain as Flood Zone 3b, which is described as land where water has to flow or be stored in times of flood and includes water conveyance routes and designated flood storage areas.

6.13. The PPG-FRCC states that 'the identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters'. The outline is available on the SFRA Maps. The functional floodplain is usually defined by more frequent flood events, such as the 1 in 20 or 1 in 25 year flood outlines, but does not include currently developed land or areas that benefit from raised flood defences.

6.14. The following areas are generally not included in an area of functional floodplain:

- Land already benefiting from raised flood defences as identified in the Environment Agency's Areas Benefiting from Defences (ABD) GIS layer;
- Currently developed land where no flood alleviation function has been defined;
- Major transport infrastructure (e.g. roads and railways).

6.15. This Strategic Flood Risk Assessment is based on the current Environment Agency fluvial and surface water flooding data, to which a precautionary approach has been further applied. The Environment Agency data does not distinguish between Zones 3a and 3b. Therefore the Minerals and Waste Planning Authority have taken the view in this SFRA that, as the primary purpose of a Level 1 SFRA is to inform the Sequential Test and to provide a relatively high-level overview of flood risk, **the whole of Flood Zone 3 as depicted on Environment Agency mapping will be taken as and treated as the functional floodplain, Zone 3b**.

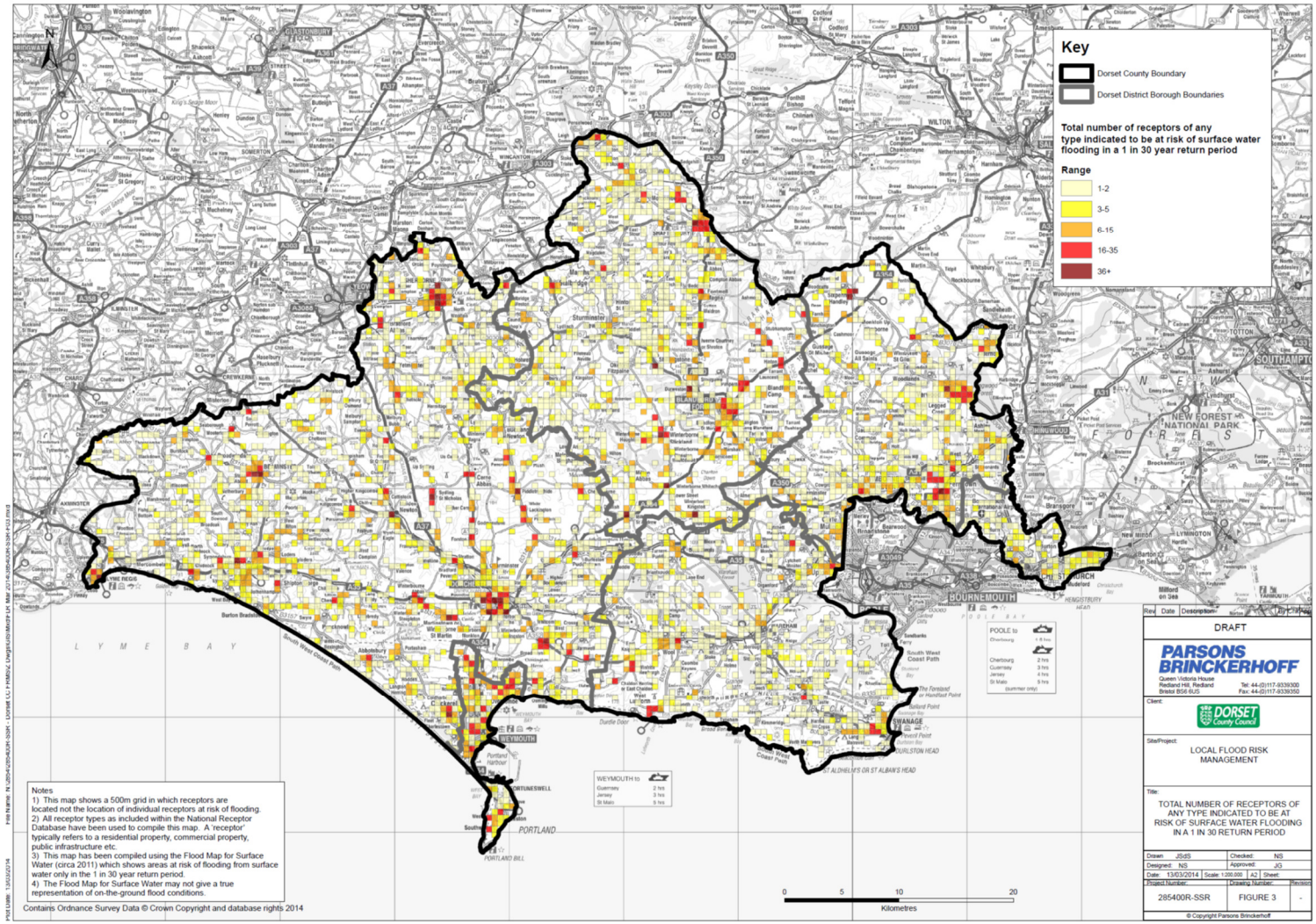
6.16. If in the future any part of the Bournemouth, Dorset and Poole area will be the subject of a Level 2 SFRA, or when at planning application a detailed Flood Risk Assessment is required, further advice and information will be sought from the Environment Agency, or specific modelling work will be carried out to provide information on where Zone 3b actually is.

Surface water (land drainage) flooding

6.17. Surface water refers to rainfall that has been intercepted by the ground or roofs but has not yet entered a natural watercourse system. Surface water flooding occurs when heavy rainfall exceeds the capacity of the local drainage network and water flows across the ground. This occurs either due to blockages in the drainage system or during very high intensity storms when water builds up before it can reach the surface water drainage system.

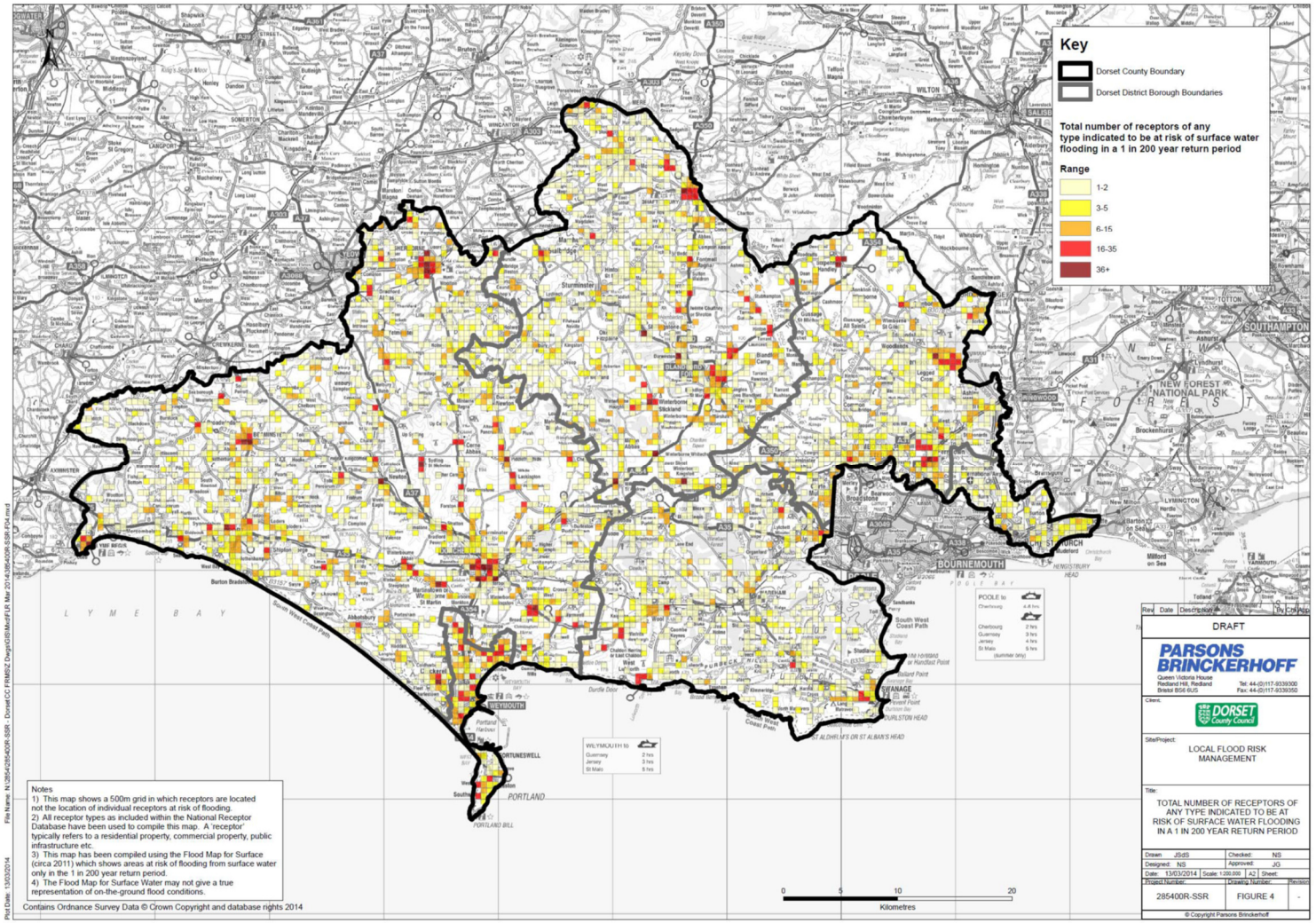
6.18. Figure 9 shows the main areas at risk of surface water flooding in Dorset in a 1 in a 30 year flood; this reflects expected impacts when drainage design standards for highways and culverts will be exceeded. Figure 10 shows the main areas at risk of surface water flooding in Dorset in a 1 in a 200 year flood.

Figure 9: Main areas at risk of surface water flooding in Dorset in a 1 in a 30 year flood[6]



[6] Taken from Dorset County Council's Local Flood Risk Management Strategy: Technical Report August 2014

Figure 10: Main areas at risk of surface water flooding in Dorset in a 1 in a 200 year flood[7]



[7] Taken from Dorset County Council's Local Flood Risk Management Strategy: Technical Report August 2014

6.19. Surface water flooding is a common problem across many parts of the UK and Dorset is no exception. This type of flooding is particularly common in urban areas, where surface water drainage is often unable to cope with intense rainfall events (in this case it is related to flooding from artificial drainage) and also associated with steep-sided catchments, where the rate at which rainfall is able to infiltrate into the ground is reduced due to the catchment slope and consequently runoff increases.

6.20. Urban areas are particularly prone to surface water flooding, due mainly to the high proportion of impermeable areas found within urban environments. In rural areas surface water flooding can be exacerbated by land management practices that result in increased runoff rates.

Table 6: Communities in Dorset with the greatest risk of surface water flooding

Rank for a 1 in 30 year flood	Community
1	Weymouth
2	Dorchester
3	Ferndown Town
4	Sherborne
5	Verwood
6	Beaminster
7	Sixpenny Handley
8	Shaftesbury
9	Lyme Regis
10	Gillingham
11	Winterborne Stickland
12	Swanage
13	Blandford Forum
14	Piddletrenthide
15	Chickerell
16	Christchurch
17	Portland
18	Wimborne St. Martin
19	Bridport
20	Broadmayne

6.21. Piddlehinton has close to 30 incidents of flooding attributed to surface water runoff, while Chickerell has just under 40 incidents. The remainder within the list above had between 10 and 20 incidents. It is important to note that these incidents do not necessarily relate to property flooding; some of them relate to incidents of road or undeveloped land flooding.

6.22. Sustainable drainage systems can play a significant role in the management of surface water. The intention of such systems in this context is to seek an overall reduction in surface water discharge from development sites. More information is provided in later in this chapter.

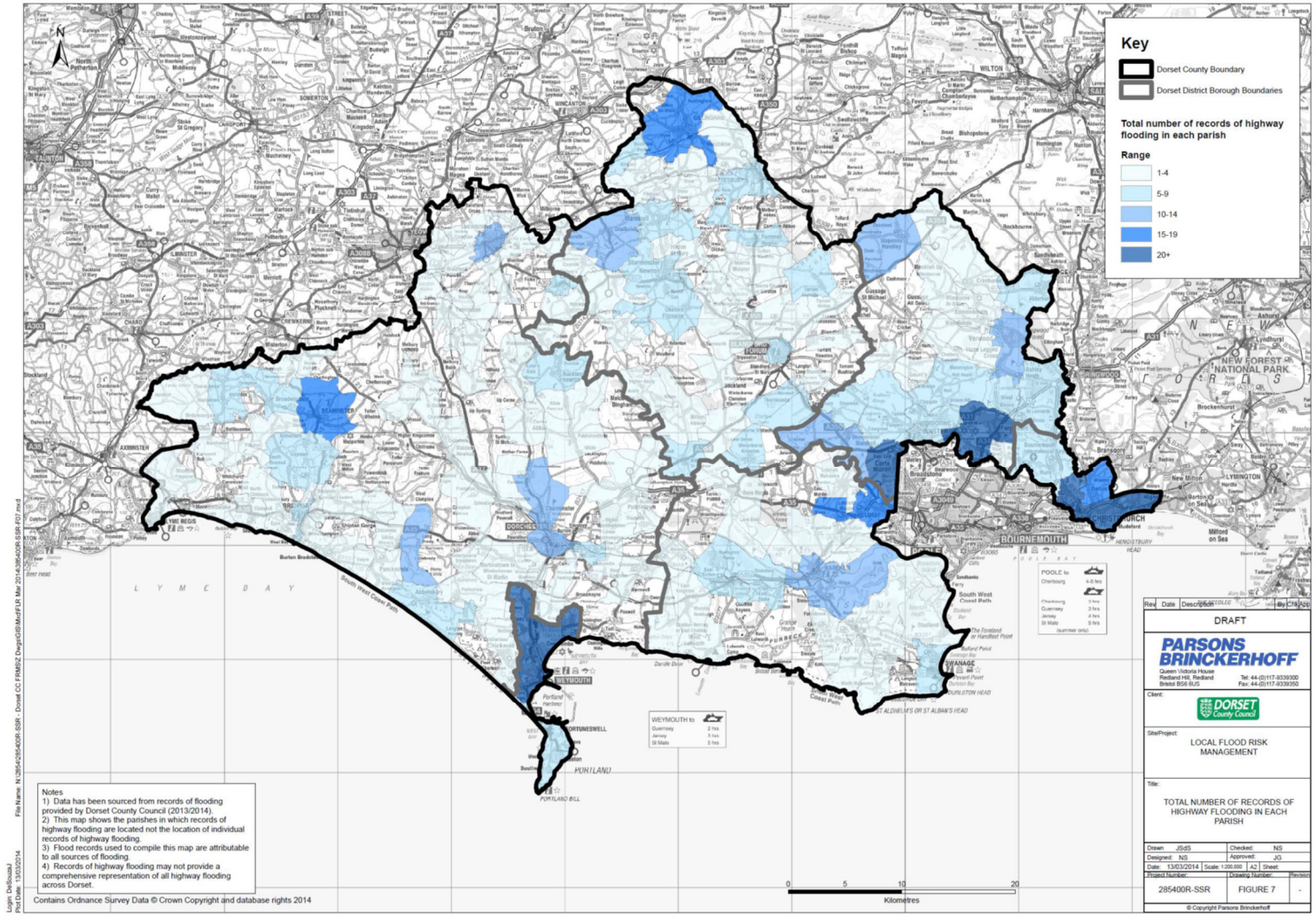
Highways flooding

6.23. Highways flooding can occur for a number of reasons. Intense rainfall can lead to highways drains becoming overwhelmed due to capacity, however it can also occur as a result of blocked gullies and culverts. A total of 764 records of highway flooding exist between October 2013 and February 2014. These records identify 497 different roads that experience flooding in 161 parishes in Dorset. Figure 6 presents the information on number of flood reports relating to highway flooding across all communities / parishes

6.24. Highways that were reported to have flooded three times between October 2013 and February 2014 are as follows:

- Purwell, Christchurch
- Mudeford, Christchurch
- Hinton Wood Avenue, Christchurch
- Stony Lane, Christchurch
- Bargates, Christchurch
- Ringwood Road, Verwood
- Broadmoor Road, Corfe Mullen
- Sandy Lane, St Leonards/St Ives
- High Street, Spetisbury
- Milton Road, Milborne St.Andrew
- Gillingham Road, Shaftesbury
- Dorhester Road, Lytchett Minster
- Litton Cheney Junction Baglake To Junction, Long Bredy
- West Stafford Bypass From Junction West, West Stafford
- Coombe, Sherborne

Figure 11: Number of records of highway flooding in each community[8]



[8] Taken from Dorset County Council's Local Flood Risk Management Strategy: Technical Report August 2014

Sewer flooding

6.25. Urban sewer flooding occurs when flows entering the sewer network are in excess of those leaving the network at the associated treatment works or outfall. These events manifest due to a number of possible causes such as:

- General incapacity of sewer network
- Pumping station failures or incapacity
- Ground water infiltration
- Excess surface water connectivity
- Blockages and pipe failure
- Overwhelming rainfall events

6.26. The problem has been exacerbated over the last decade, as a result of the EU Directive to reduce the number of consented overflows to watercourses and the increasing popularity of paving over grassed areas (increases rainfall-runoff into the sewerage network).

6.27. When sewer flooding occurs, the volume of flow entering the sewerage network is in excess of the volume of sewage that is able to be conveyed through the pipe under gravity. The pipes and associated manholes then surcharge and flooding may be witnessed at manholes or property connections depending on the gradient of the sewer systems and local topography.

6.28. Blockages and pipe failures such as collapsed sewers prevent the egress of flows, which will then build upstream of the problem before the pipes and associated manholes then overflow as noted above. Infiltration of groundwater into a sewerage system will reduce the capacity of the system and can thus cause surcharging during periods of increased flows. Infiltration may occur at poorly sealed joints and cracked or broken pipes to both the public sewer and private drainage systems. Areas with a high ground water level where pipes are continuously submerged are at most risk and result in a consistent base flow rather than periodic rainfall induced infiltration.

6.29. Pumping stations are utilised to transport flows to higher elevations, usually outside of local sub-catchments. Pumping stations comprise varying well-configurations that store incoming water from a catchment, pumps to overcome the required head and one or more rising mains to transport the flows. Problems can occur if there is a failure in any of the above and/or if either has insufficient storage capacity to deal with the incoming flows has.

6.30. Older networks often consist of combined sewers, where surface water and foul flows utilise the same pipework. During heavy rainfall events the excess surface water entering the system may overwhelm it causing foul flooding. Some surface water connectivity is expected in most systems and currently solutions are designed for 6.7% AEP rainfall events at a minimum with consideration made for 3.3% AEP rainfall events (AEP: annual exceedance probability)

6.31. In order to relieve foul flooding within an area, investigations are undertaken to determine the extent of the flooding, identify the causes and develop possible solutions. Where a flood alleviation scheme can be justified, engineering detailed design is then progressed to provide information for the Water Company and its contractors to implement the scheme.

6.32. The detailed investigations often require a complete urban catchment review to ensure that flooding associated with fluvial and highway drainage discharges are mitigated appropriately.

6.33. Bournemouth, Dorset and Poole fall within the South Wessex Area operated predominantly by Wessex Water, who are responsible for the performance and maintenance of the network, with

the exception of the area around Lyme Regis, which is operated by South West Water. The area is largely rural, with big urban centres in Bournemouth, Christchurch and Poole. There are comprises approximately 400 Sewage Treatment Works (STW), of which some 150 serve populations of less than 250. There are also an extensive number of Sewage Pumping Stations (SPS), of varying size which are required due to the undulating topography.

6.34. All water companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. More information on DG5 is available from www.ofwat.gov.uk This register includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the water company.

6.35. In addition to identifying the properties at risk, the DG5 register also classifies the flood risk into one of the following categories:

- Properties / areas at risk of flooding twice in ten years (Risk Status IA – see table below)
- Properties / areas at risk of flooding once in ten years (Risk Status IB – see table below

6.36. The recording of flood events by the authorities has often led to improvements intended to prevent reoccurrence, so historical flooding is not necessarily evidence of propensity for future flooding. Information on flooding caused by surface water runoff can also be obtained from local government, highway authorities and the Environment Agency.

6.37. The **DG5 sewer flooding register** currently lists the following areas containing properties at risk of flooding.

Street	Sub District	Town	Postcode	Risk Status
WOOD LANE		BOURNEMOUTH	BH119NG	IA
WOOD LANE		BOURNEMOUTH	BH119NG	IA
WILTSHIRE ROAD	BRANSGORE	CHRISTCHURCH	BH238BH	IA
CHARMINSTER ROAD		BOURNEMOUTH	BH8 8UE	IA
STUDLAND ROAD		BOURNEMOUTH	BH4 8JA	IB
PRIORY LANE		BRIDPORT	DT6 3RW	IB
GEORGE STREET	WEST BAY	BRIDPORT	DT6 4EY	IB
SPRINGDALE ROAD		BROADSTONE	BH189BT	IB
WEST LANE	BRANSGORE	CHRISTCHURCH	BH238EN	IB
WILTSHIRE ROAD	BRANSGORE	CHRISTCHURCH	BH238BH	IB
OAKE WOODS		GILLINGHAM	SP8 4QS	IB
SUNNYSIDE ROAD		POOLE	BH122LQ	IB

Street	Sub District	Town	Postcode	Risk Status
GOOD ROAD		POOLE	BH123HW	IB
CHRISTCHURCH ROAD		RINGWOOD	BH243AP	IB
GARDEN ROAD	BURLEY	RINGWOOD	BH244EA	IB
WATER MEADOW LANE	WOOL	WAREHAM	BH206HL	IB
CHICKERELL ROAD	CHICKERELL	WEYMOUTH	DT3 4DG	IB
MELSTOCK AVENUE		WEYMOUTH	DT3 6JX	IB
BOWLEAZE COVEWAY		WEYMOUTH	DT3 6PP	IB
	OSMINGTON	WEYMOUTH	DT3 6ES	IB
DALES DRIVE		WIMBORNE	BH212JS	IA
PILFORD HEATH ROAD		WIMBORNE	BH212NB	IB
BANKS ROAD		POOLE	BH137QL	IB
WOOD LANE		BOURNEMOUTH	BH119NG	IA

6.38. Wessex Water has undertaken extensive investigations to determine the cause of flood incidents recorded on their DG5 Flooding Register and where appropriate have built hydraulic models to replicate the performance of their networks. Wessex Water intend to implement solutions, where appropriate, to remove all properties in Bournemouth, Christchurch, East Dorset, North Dorset and Salisbury from their DG5 Register through an ongoing programme of flood alleviation works.

6.39. Changes in rainfall intensity as predicted by climate change modelling are not typically assessed or modelled by UK water companies, therefore there is no information available on the likely impact of climate change on artificial drainage systems. It is likely that, without either significant investment in the drainage system in urban areas or a reduction in the areas draining into artificial drainage systems, that risk of urban flooding from artificial drainage systems will increase with climate change. For this reason, any redevelopment in the urban area should be required to use the SuDS philosophy to reduce the discharge into existing drainage systems.

6.40. Local Planning Authorities should try to adopt a planning policy giving priority to sustainable drainage systems (SuDS) as required by the NPPF.

Groundwater Flooding

6.41. The occurrence of groundwater flooding as an identifiable phenomenon has really only been recognised in the fifteen years, primarily as a result of the extensive groundwater flooding in

the Chalk areas of Southern England (including significant parts of the study area) that occurred in the Winter of 2000/2001. Some locations in the study area were badly affected during this period (see below).

6.42. Groundwater flooding occurs when water levels in the ground rise above surface elevations but can cause harm in other ways, for example when it enters subsurface structures (such as basements etc). Defra research identifies seven types of groundwater flooding event, as follows:

(i) Rise of typically high groundwater levels to extreme levels in response to prolonged extreme rainfall.

(ii) Rising groundwater levels in response to reduced groundwater abstraction in an urban area (termed groundwater rebound) or a mining area (termed minewater rebound).

(iii) Subsidence of the ground surface below the current groundwater level.

(iv) Rise of groundwater level in aquifers in hydraulic continuity with high in-bank river levels or extreme tidal conditions.

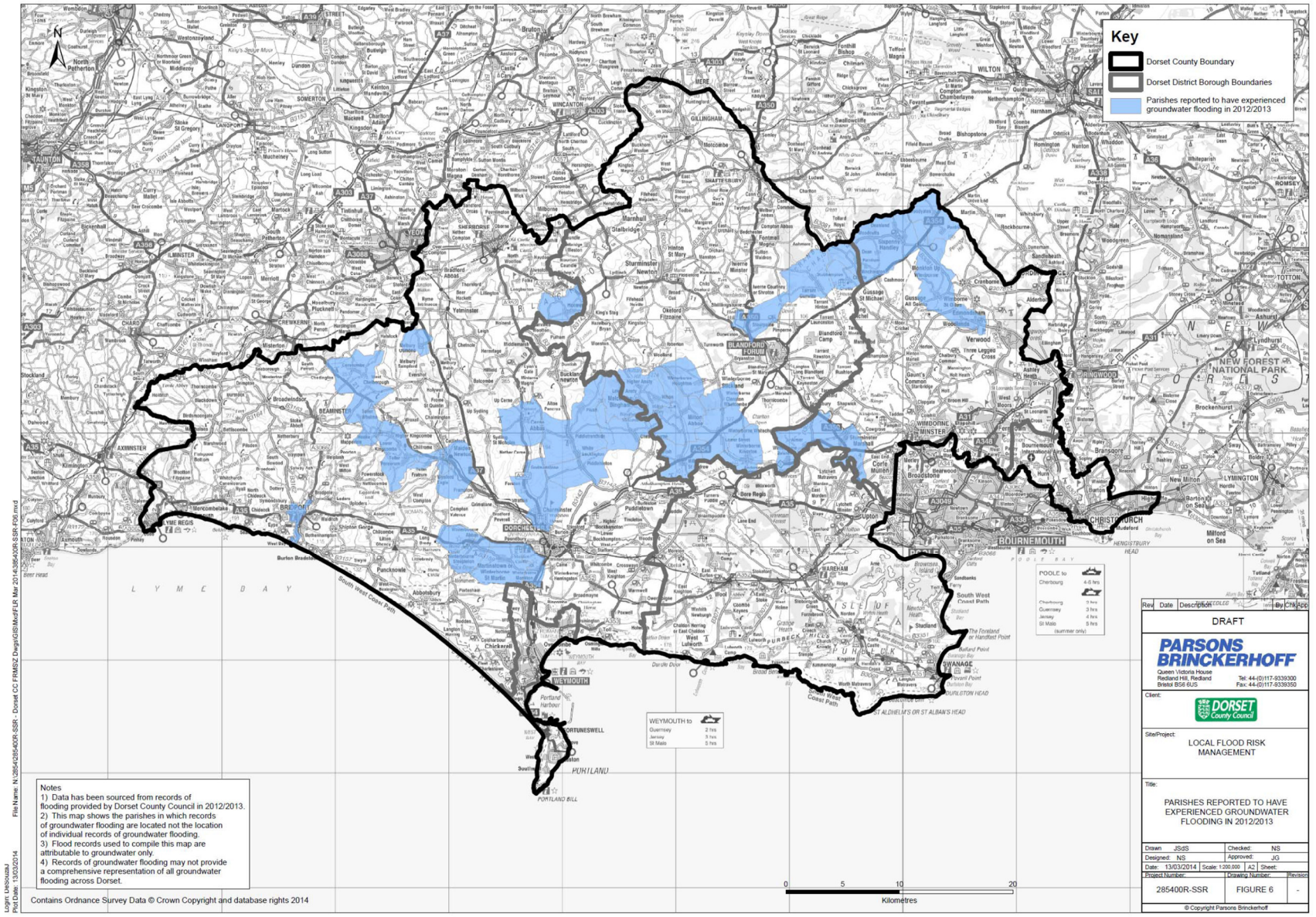
(v) Rise of groundwater levels due to leaking sewers, drains and water supply mains.

(vi) Faulty borehole headworks or casings causing upward leakage of groundwater through confining layers driven by artesian heads.

(vii) Increases in groundwater levels and changed flow paths due to artificial obstructions or pathways, and loss of natural storage and drainage paths.

6.43. Of these, (i), (iv) (v) and (vii) are the most likely to apply in the study area. Although type (vi) may be possible, it is likely to be localised and the responsibility for actions to address any such occurrence may, in most cases, be readily identified.

Figure 12: Parishes reported to have experienced groundwater flood in 2012/2013



6.44. The Defra research also identifies the following impacts observed as a direct result of excess groundwater:

- Flooding of basements of buildings below ground level
- Flooding of buried services or other assets below ground level
- Inundation of farmland, roads, commercial, residential and amenity areas
- Flooding of ground floors of buildings above ground level
- Overflowing (surcharging) of sewers and drains

6.45. Often, effects of groundwater flooding are indistinguishable from the effects of fluvial flooding, or are not obviously attributable to groundwater (e.g. surcharge of sewers). As a result the recording of groundwater flooding is often inconsistent. However, groundwater flooding from the chalk can be particularly onerous, as the flooding event may persist over a number of weeks (or even months) causing significant disruption to residents, commercial activities, transport networks and other infrastructure.

6.46. The Environment Agency retains records of flooding events on their FRIS (Flood Reconnaissance Information System) database. This database, created in 2001 following the flooding of the previous winter, records all flood events, regardless of their source. The record was populated with data back dated 30 years (from 2001) and it identifies groundwater events.

6.47. Although FRIS identifies, for example, the 'cause' of groundwater flooding, the source (aquifer) of the flooding is not identified – although this may generally be determined from mapped flooding locations and geological/hydrogeological mapping. A number of causes of groundwater flooding are identified:

- Spring water (including from high ground)
- High water table
- Water unable to drain due to blocked water courses/culverts
- Basement flooding
- Inundation of gardens
- Surcharging of sewers
- Back up of surface water drainage

6.48. Domestic and commercial properties, transport links and farmland have all been subjected to damage and disruption. The areas most impacted by groundwater flooding are within the North Dorset District, with a handful of events in East Dorset and no groundwater flooding recorded in Bournemouth or Christchurch. However given the difficulty sometimes found in distinguishing groundwater flooding from fluvial flooding, such events may have occurred (but not been recorded as such) in these areas.

6.49. The great majority of the groundwater flooding events was caused by flooding from the Chalk aquifer. Flooding from the Upper Greensand aquifer, likely to be associated with conditions in the overlying chalk, is also observed. A few flooding events were also noted in the Corallian (North Dorset District).

6.50. The current SFRA Level 1 for West Dorset identifies groundwater flooding problems in the Piddle and South Winterbourne catchments, typically experienced during the winter or early spring after above average rainfall. The following locations affected by groundwater flooding in the past are also identified:

Bridport*	Lower Burton*	Poyntington
Broadmayne	Lyme Regis	Puddletown*
Cerne Abbas	Martinstown*	Whitchurch Canonicorn
Charminster	Piddlehinton*	Winterbourne Abbas*
Godmanstone*	Piddletrenthide*	Winterbourne Steepleton*

* Locations marked have several records of groundwater flooding

6.51. The chalk areas of central and eastern parts of West Dorset are most at risk. The chalk typically absorbs rainfall through infiltration until saturation levels are reached, and at this point moderate additional rainfall can result in groundwater flooding. Hence, such flooding generally follows periods of prolonged high rainfall over a period of months or longer, rather than from individual heavy rainfall events.

6.52. To date, there is no formalised approach to the undertaking of a risk assessment for groundwater flooding. This relates to the large number of (often independent) variables that may contribute to a groundwater flood event. The current approach is to map all known incidences of groundwater flooding (although reports of groundwater flooding by "lay" observers may be unreliable) and to use these to develop an understanding of the susceptibility of an area to groundwater flooding.

6.53. The Environment Agency monitors groundwater levels using boreholes and the records of these are held on their WISKI database. Until further research is undertaken, the use of historical records will remain the only method for deriving an understanding of the risks of groundwater flooding.

Reservoirs and other artificial water retaining structures

6.54. It is necessary to consider the risk of overtopping or breach of reservoirs and canals. Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to show historic flooding from canals and raised reservoirs on plans. Occasionally major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

6.55. Reservoirs with an impounded volume in excess of 25,000 m^3 (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. Due to high standards of inspection and maintenance required by legislation, flood risk from registered reservoirs is normally moderately low.

6.56. All reservoirs pose some level of threat to the area and persons living near them. Under the Reservoirs Act 1975, reservoirs with a greater than 25,000m^3 capacity have been designated a category (A/B/C/D) which describes the danger posed in the event of a dam breach. The definitions of these categories are given below:

- Category A – a breach could endanger lives in a community
- Category B – a breach could endanger lives not in a community or result in extensive damage
- Category C – a breach would pose negligible risk to life and cause limited damage
- Category D – no loss of life can be foreseen as a result of a breach and very limited additional flood damage would be caused

6.57. The majority of reservoirs situated within the study area are small impounding reservoirs formed by earth embankment dams. The reservoirs within Bournemouth, Dorset and Poole are detailed below:

- Bournemouth: none
- Christchurch: 1 (service reservoir)
- East Dorset: 15
- North Dorset: 12
- West Dorset: 5

6.58. The following reservoirs are relevant for West Dorset based on details presented in the SFRA Level 2 report (there are no similar details in the other SFRAs):

- Beaminster Flood Retention Reservoir (43,500 m3 storage, non-impounding), Beaminster
- Cerne Abbas Flood Regulation (67,500 m3 storage, impounding), near Cerne Abbas
- Lucerne Lake (44,600 m3 storage, impounding), near Evershot
- Melbury Lake (27,720 m3 storage, impounding), near Evershot
- Sherborne Lake (475,000 m^3 storage, impounding), near Sherborne

6.59. The reservoirs at Beaminster and Cerne Abbas were built to help alleviate flooding, while the other three are artificial lakes. The only reservoir situated within Christchurch Borough is a service reservoir. The flood risks to service reservoirs are of a different nature to embankment dams. This is because the inflow is controlled and they are usually constructed of concrete (with or without an embankment surround), and as a result service reservoirs are intrinsically safer than embankment dams.

6.60. The Environment Agency designate their reservoirs according to the above categories. Category A and B reservoirs can be considered as posing danger to human life in the event of dam breach. It is likely that should any major development be proposed in the area downstream of these reservoirs that an extended scope SFRA (Level 2) will be required to determine the residual risk of overtopping or breach of the embankment and inform appropriate mitigation measures.

6.61. No other structures (e.g. canals) that might pose a flood risk are identified. Within Dorset there is a partially built section of the Salisbury & Southampton canal, but this is dry.

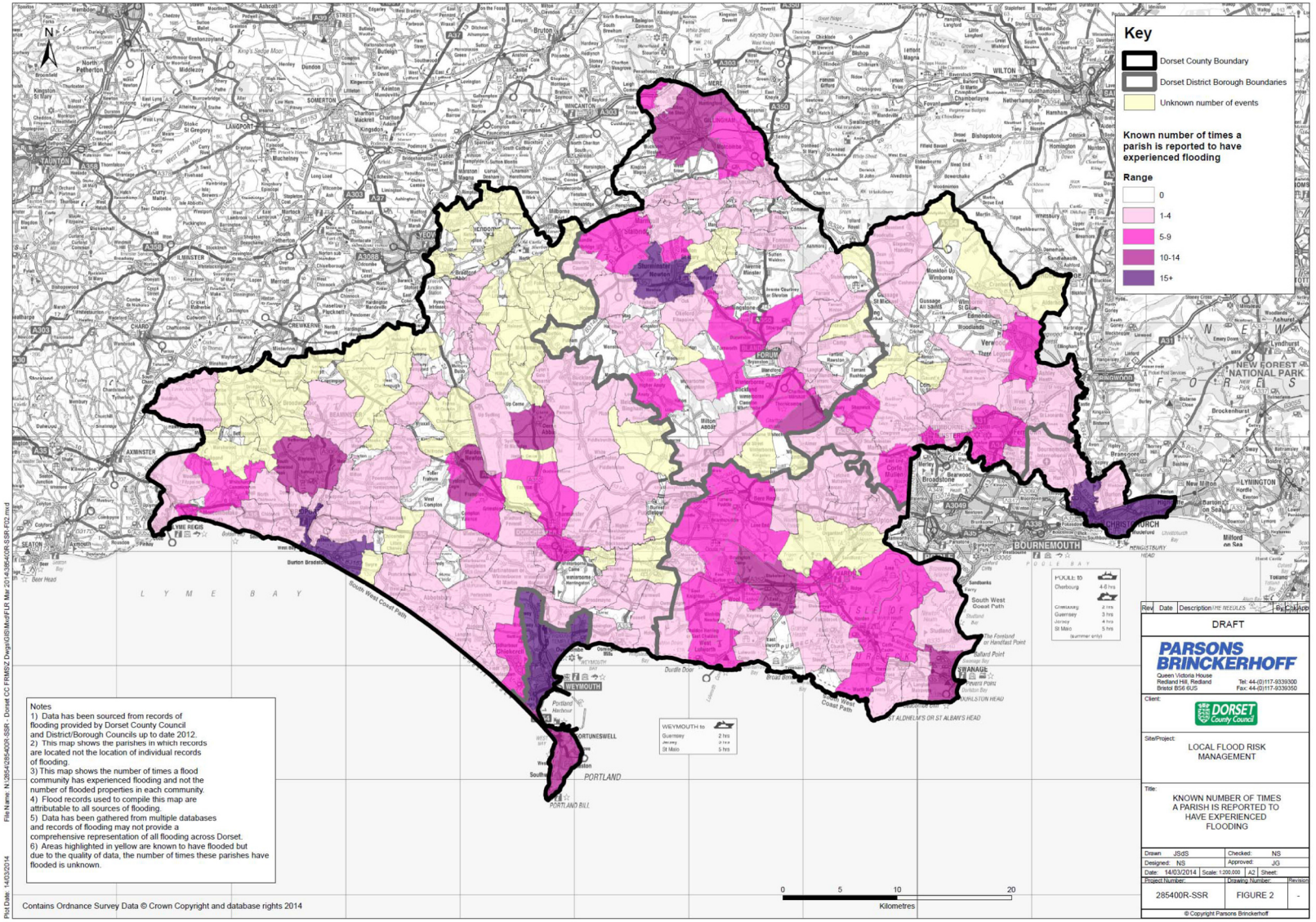
Frequency of flooding within a community.

6.62. Historic flood records can also provide useful evidence of flood risk. The information presented in Table 7 and Figure 13 below indicate the parishes where flooding is reported to have occurred most frequently.

Table 7: Communities and Parishes recorded as having experienced flooding on multiple occasions

Area	Number of Reported Flood Incidents
Weymouth	30
Christchurch	27
Bridport	18
Hammoon	18
Sturminster Newton	16
Burton Bradstock	15
Maiden Newton	14
Portland	13
Netherbury	12
Cerne Abbas	11
East Stoke	11
Swanage	11
Gillingham	10
Spetisbury	10
Arne	9
Frome Vauchurch	9
Shapwick	9
Winfrith Newburgh	9
Hinton St Mary	8
Wareham	8

Figure 13: Number of times a parish has reported flooding



7. Sustainable Drainage Systems (SuDS)

7.1. Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and consequently a potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure.

7.2. Managing surface water discharges from new development is therefore crucial in managing and reducing flood risk to new and existing development downstream. Carefully planned development can also play a role in reducing the amount of properties that are directly at risk from surface water flooding.

Role of the LLFA and Planning Authority in surface water management

7.3. From April 2015, local planning policies and decisions on planning applications should make provision for Sustainable Drainage Systems to manage run-off.

7.4. The NPPF reinforces how planning applications that fail to deliver SuDs above conventional drainage techniques could be rejected and sustainable drainage should form part integrated design secured by planning conditions. Maintenance options should identify who will be responsible for SuDS maintenance and funding.

Sustainable Drainage Systems

7.5. SuDS are designed to maximise the opportunities and benefits that can be secure from surface water management practices. The correct use of SuDS can counteract the negative impacts of development on the water cycle by promoting infiltrations and replenishing groundwater supplies. It is a requirement for all major new development proposals to ensure that SuDS for management of runoff are put in place. Advice on best practice is available from the Environment Agency and the Construction Industry Research and Information Association (CIRIA) – see the CIRIA SuDS Manual C753 (2015)[9].

7.6. When considering design criteria for SuDS; runoff destinations and effects on water quality should be investigated to consider the potential hazards arising from development and the sensitivity of the run off destination. The non- statutory technical standards for sustainable drainage systems[10] (2015) set out appropriate design criteria.

7.7. Future minerals and waste developments will require full consideration of sustainable drainage systems to control surface water runoff and improve amenity and wildlife interest. Ancillary buildings and hard-standing associated with minerals development can also lead to increases in surface run-off and therefore could contribute to flooding. Sustainable Drainage Systems that are capable of storing and controlling the discharge of water associated with these areas can also be incorporated into the design of proposals.

[9] https://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

[10] https://www.gov.uk/search?q=sustainable+drainage+systems

8. Climate Change

8.1. As well as looking at flood risk using past events the future risk of flooding needs to be assessed. This is especially relevant because of the need to consider the potentially significant effects arising from climate change.

8.2. Changes in climatic conditions can affect local flood risk in several ways; however, impacts will depend on local conditions and vulnerability. Wetter winters and more intense rainfall may increase river flooding in both rural and urban catchments. More intense rainfall causes greater surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so the county needs to be prepared for the risks arising from unexpected flash flooding.

8.3. Generally wetter winters would potentially increase levels of ground water but it is difficult to predict in detail as much depends on the nature of the rainfall. Once the ground is saturated or the intensity of rain exceeds the rate of infiltration, water runs off and is not available for groundwater recharge.

8.4. The county's existing drainage systems could be modified to manage water levels and could help in adapting locally to some impacts of future climate change. However changing intensity of weather patterns may mean that these assets may need to be managed differently.

Climate Change Guidance

8.5. The Environment Agency published updated climate change guidance on 19 February 2016[11], which support the NPPF and must be considered in all new developments and planning applications. It contains guidance on how climate change should be taken into account when considering development, specifically how allowances for climate change should be included with Flood Risk Assessments.

Peak River Flows

8.6. Climate change is expected to increase the frequency, extent, and impact of flooding, reflected in peak river flows. Wetter winters and more intense rainfall may increase fluvial flooding and surface water run-off and there may be increased storm intensity in the summer. Rising river levels may also increase flood risk.

Peak Rainfall Intensities

8.7. Climate change is predicted to result in wetter winters and increased summer storm intensity in the future. This increased rainfall intensity will affect land and urban drainage systems, resulting in surface water flooding, due to the increased volume of water entering the systems.

Groundwater

8.8. The effect of climate change on groundwater flooding problems, and watercourse where groundwater has an influence on winter flood flows, is more uncertain. Milder wetter winters may increase the frequency of groundwater flooding incidents in areas already susceptible, while warmer drier summers may counteract this effect by drawing down groundwater levels to a greater extent during summer months.

Climate change allowances

8.9. Making allowances for climate change will help to reduce the vulnerability of development, and provide resilience to future flooding. The 2016 climate change guidance includes climate change predictions of anticipated change for peak river flow and peak rainfall intensity. These

[11] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

allowances are based on climate change projections and differing scenarios of carbon dioxide emissions.

8.10. Due to uncertainties in predicting change, the guidance presents a range of possibilities to reflect potential variation in climate change impacts over three time periods.

Approach taken in this Strategic Flood Risk Assessment

8.11. Rather than seeking to apply the guidance very specifically at this higher-level, strategic stage, the minerals and waste planning authorities intend to adopt a precautionary approach for making allowance for future climate change, and for the purposes of this Level 1 Strategic Flood Risk Assessment will **assume that the current day fluvial Flood Zone 2 will be the extent of Flood Zone 3 (3a and 3b) in the future**.

8.12. This will give an indication of where future fluvial flooding could affect. This approach can only be an *estimate,* because by observation of the new climate change fluvial allowances for the south west the total potential change anticipated for the '2080s' (2070 to 2115) is up to 85% for the 'upper end' allowance category. This increase in river flow, as a sensitivity test, *may* result in flood outlines greater than existing Flood Zone 2.

8.13. Nevertheless, any future Level 2 SFRA and site specific FRA, depending on the nature and flood risk vulnerability of the proposal, will need to fully the climate change guidance referred to above and prepare climate change flood maps to include outlines, depths and resultant hazards based on the recently published climate change allowances. A detailed assessment of the future impact of climate change will need to be carried out at a later stage (later than the Level 1 SFRA) in the planning process.

8.14. It is expected that this will be addressed as part of the Flood Risk Assessment that would accompany any planning application for proposed minerals or waste development.

Summary of potential flood risk issues related to Waste and Minerals developments

8.15. The list below provides a summary of the main points for planners to bear in mind when considering the impact of waste and mineral sites on flood risk.

- The change to the topography of the land can alter overland flow patterns and alter the associated variations in flood risk
- Groundwater rebound following extraction can increase groundwater flow volumes (minerals only)
- Backfilling with impermeable materials can increase groundwater flow connectivity and increase flood risk (consider also for landfill/waste sites).
- Flood risk from sewers is likely to be a concern of minimal significance to both mineral and waste sites
- Increased surface water flood risk from an increase in impervious surface associated with waste or mineral development
- Effect of mineral extraction on channel morphology could lead to change in sediment regime and / or increase in flood risk
- Additional bridging of watercourses to provide access to infrastructure could lead to increased flood risk (due to potential flow restriction)
- Stockpiles and ancillary infrastructure/buildings could increase surface water run-off by increasing the area of hard standing and displace flood risk to surrounding land

- Stockpiles and ancillary infrastructure/buildings could lead to a decrease in floodplain storage
- Use of heavy machinery during construction and operation could reduce permeability and increase surface run-of, increase flood risk
- Mineral sites located within Flood Zone 3b can also be affected by the inundation of flood water during a flooding event. This could cause erosion of stockpiles and result in the deposit of sediment within a mineral void.
- Minerals extraction does however have the potential increase in flood storage and decrease in flood risk.

9. Development and Flood Risk

9.1. This section of the SFRA provides a strategic assessment of the suitability of the Mineral Sites Plan and Waste Plan site allocations, in terms of flood risk.

9.2. The information and guidance provided in this chapter has been used to inform the preparation of the Minerals Sites Plan and the Waste Plan. It has provided the basis from which to apply the Sequential Approach in the allocation of sites and through the development management process.

The Sequential Approach

9.3. The Planning Practice Guidance – Flood Risk and Costal Change (PPG–FRCC) provides the basis for the Sequential Approach. This guidance is appropriate to minerals and waste development and it is this approach, integrated into all stages of the development planning process, which provides the opportunities to reduce flood risk to people, property and the environment to acceptable levels through spatial planning and site design.

9.4. The approach is based around the flood risk management hierarchy, identifying appropriate action required to avoid, substitute, control and mitigate flood risk. It is important to assess the level of risk (at an appropriate scale) during the decision making process. Once this evidence has been provided and assessed, positive planning decisions can be made and effective flood risk management opportunities identified.

9.5. The overall aim of the Sequential Approach should be to steer new development to low risk Flood Zone 1 areas. Where there are no reasonable available sites in Flood Zone 1, the flood risk should consider vulnerability of land uses and reasonable available sites in Flood Zones 2 should be considered, applying the Exception Test if required.

9.6. Only where there are no reasonable available sites in Flood Zones 1 or 2 should the suitability of sites in higher risk Flood Zone 3 be considered. This should take into account the flood risk vulnerability of land uses and the likelihood of meeting the requirements of the exceptions test if required.

9.7. There are two different aims in carrying out the Sequential Approach depending on what stage of the planning system is being carried out i.e. Local Planning Authorities (LPAs) allocating land in Local Plans or determining planning applications for development. The SFRA does not remove the need for a site specific flood risk assessment at a development management stage.

9.8. The following sections are split between the two key users to provide a guided discussion on why and how the Sequential Approach should be applied, including the specific requirements for undertaking Sequential and Exception Testing.

Local Plan Sequential Test & Exceptional Test

9.9. The Minerals and Waste Planning Authority should seek to avoid inappropriate development in area at risk of flooding by directing development away from areas at highest risk of flood and ensuring that devolvement does not increase risk and where possible can help reduce risk from flooding to existing communities and development.

9.10. Before the minerals and waste sites being considered can be allocated for development, the minerals and waste planning authority must complete the Sequential Test to determine whether these sites are appropriate as strategic allocations given the associated flood risks. If sites being considered do not pass the Sequential Test they should not be allocated and alternative sites should be brought forward.

9.11. At a strategic level, the proposed site allocations must be assessed to seek to come to a view about flood risk posed to them, or flood risk they may pose to other areas/people. This will be carried out either as part of the preparation of the Bournemouth, Dorset and Poole Mineral Sites Plan and Waste Plans or identified in the Plan (as part of the site allocations) as being required at the planning application stage.

9.12. The following actions are relevant – at either the Plan allocation stage of the planning application stage:

- Using the Sequential Test to allocate sites in areas of least flood risk.
- Using the Sequential Approach within sites especially where more than one Flood Zone is contained by a site. Otherwise, an application should seek to mitigate flood risk to facilities or place them off site.
- A Flood Risk Assessment should be undertaken for all minerals and waste sites that fall within Flood Zone 2 and 3 to mitigate risk to the site and its users.
- A Flood Risk Assessment is required for all sites in Flood Zone 1 that are greater than 1ha in size.
- If floodplain storage is reduced (e.g. mineral stockpiles), compensatory storage should be provided
- Development should be avoided immediately downstream of impounded water bodies
- Opportunities should be investigated to increase floodplain storage capacity through mineral excavation as appropriate. This should be considered at the earliest planning stage.
- Safeguarding land from development that is required for current and future flood management.

9.13. Figure 14 below illustrates the application of the Sequential Test. Although it's a relatively simple process, it is challenging as a number of the criteria used are qualitative and based on experienced judgement. The process must be documented and evidence used to support decisions recorded.

9.14. The Sequential Test can be considered adequately demonstrated if both of the following criteria are met:

- The Sequential Test has already been carried out for the site (for the same development type) at the strategic level (development plan)
- The development vulnerability is appropriate to the Flood Zones

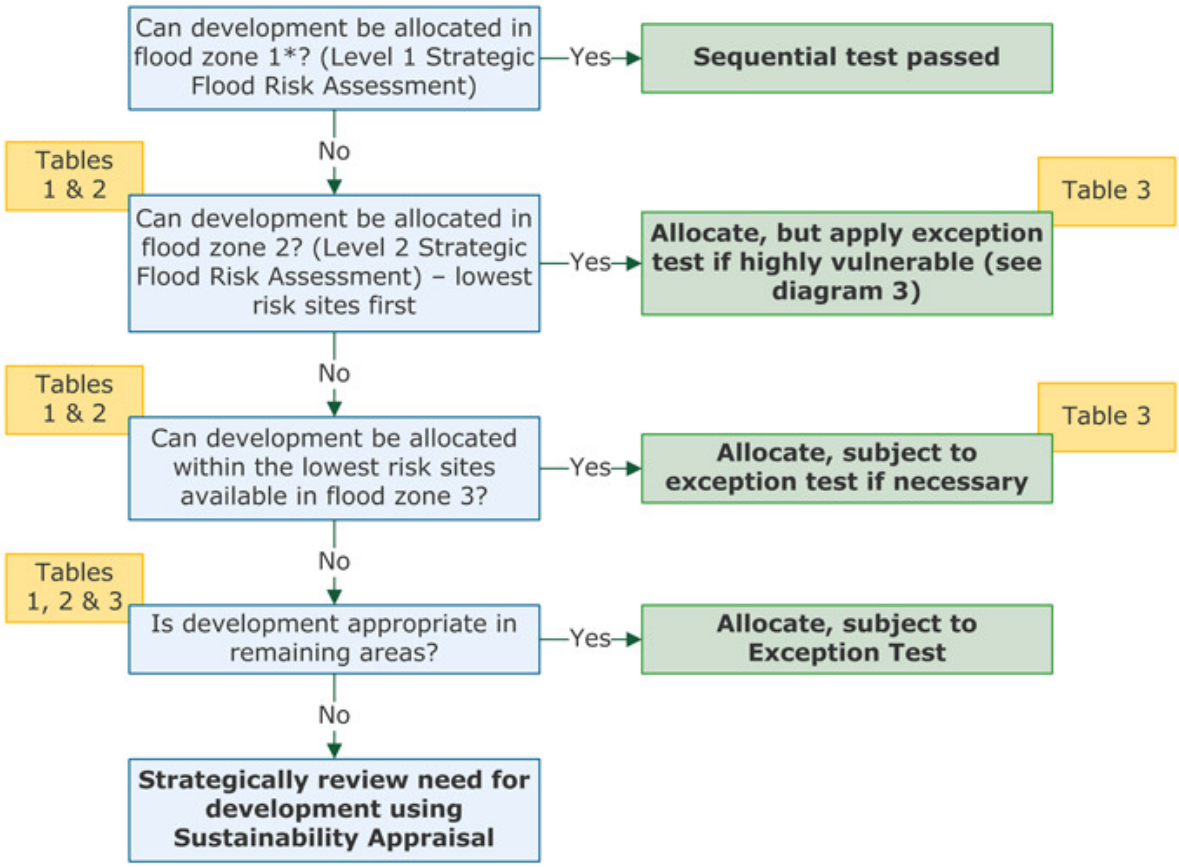
9.15. The SFRA provides the main evidence required. The process enables those sites that have passed the Sequential Test and therefore the Exception Test to be identified. For the Exception Text to be passed, NPPF Paragraph 102 states;

a. *It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk informed by a Strategic Flood Risk Assessment where one has been prepared; and*

b. *A site-specific Flood Risk Assessment (FRA) must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

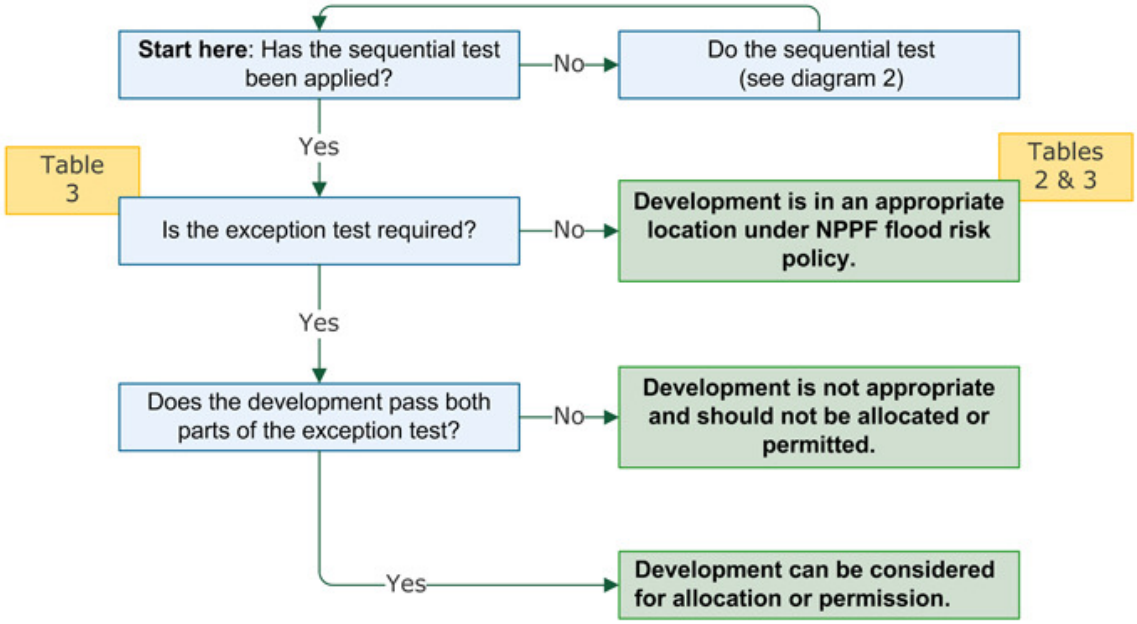
Both elements of the test will have to be passed for development to be allocated or permitted.

Figure 14: Application of the Sequential Test for Local Plan preparation



9.16. The Exception Test should be applied by decision-makers only after the Sequential Test has been applied and when more' vulnerable development' and 'essential infrastructure' cannot be located in Zones 1 or 2 and 'highly vulnerable' development cannot be located in Zone 1.

Figure 15: Application of the Exception Test for Local Plan preparation



9.17. Table 8 below shows the Flood Risk Vulnerability Classifications/Compatibility.

9.18. The table shows sand and gravel working to be water compatible development and therefore appropriate within all flood zones. Other types of minerals extraction are classified as less vulnerable and therefore appropriate in all zones except Zone 3b the functional flood plain.

9.19. Waste treatment (except landfill* and hazardous waste facilities) are classed as less vulnerable and therefore should not be permitted in Zone 3b. Landfill sites and hazardous waste facilities are classified as more vulnerable and Landfill* and sites used for waste management facilities for hazardous waste. Where proposals are located in Zone 3a should be subject to the Exception Test.

Table 8: Flood risk vulnerability and flood zone 'compatibility'

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Table 9: Flood Risk Vulnerability Classification – with definitions of infrastructure

Infrastructure Classification	Zone 1	Zone 2	Zone 3a	Zone 3b
Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.	**Development is appropriate**	**Development is appropriate**	**Exception Test required**	**Exception Test Required***
Highly vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').	**Development is appropriate**	**Exception Test required**	**Development should not be permitted**	**Development should not be permitted**

Infrastructure Classification	Zone 1	Zone 2	Zone 3a	Zone 3b
More vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.	**Development is appropriate**	**Development is appropriate**	**Exception Test required**	**Development should not be permitted**
Less vulnerable • Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.	**Development is appropriate**	**Development is appropriate**	**Development is appropriate**	**Development should not be permitted**

Infrastructure Classification	Zone 1	Zone 2	Zone 3a	Zone 3b
Water-compatible development • Flood control infrastructure • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence - defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan	**Development is appropriate**	**Development is appropriate**	**Development is appropriate**	**Development is appropriate**

9.20. The Exception Test is only appropriate for use when there are large areas in Flood Zone 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary for wider sustainable development reasons (the need to avoid social or economic blight and the need for essential civil infrastructure to remain operational during floods).

9.21. If the Sequential Test has failed the Exception Test should not be attempted. The purpose of the Exception Test is to provide a method of managing flood risk while still allowing necessary development to occur. The Exception Test may also be appropriate to use where restrictive national designations such as landscape, heritage and nature consideration designations, e.g. Areas of Outstanding Natural Beauty (AONB), Sites of Special Scientific Interest (SSSI) and World Heritage Sites (WHS), prevent the availability of unconstrained sites in lower risk areas.

9.22. Although actually passing the Exception Test will require the completion of a site-specific FRA, the minerals and waste planning authorities should be able to assess the likelihood of passing the test at the Plan making stage by using the information contained in this SFRA to answering the following questions:

1. Can development within higher risk areas be avoided through avoidance or substitution or by amending the site layout?
2. Is flood risk associated with possible development sites considered too high; and will this mean that the criteria for Exception Testing are unachievable?
3. Can risk be sustainably managed through appropriate development techniques (resilience and resistance) and incorporate sustainable drainage systems without compromising the viability of the development?
4. Can the site, and any residual risks to the site, be safely managed to ensure that its occupiers remain safe during times of flood if developed?

9.23. The flood risk information of SFRA Level 2 (prepared in more detail than SFRA Level 1) facilitates the application of the Exception Test. The Test is applied when there are an insufficient number of suitably available sites for development within zones of lower flood risk or due to possible increases in flood risk arising from climate change.

9.24. Where it is unlikely that the Exception Test can be passed due to few wider sustainability benefits, the risk of flooding being too great, or the viability of the site is compromised by the flood risk management work required, consideration should be given to avoiding the site all together.

9.25. Once the process has been completed the planning authority should be able to revisit and update the Plan with the allocation of development sites, as well as prepare flood risk policy including the requirement to prepare site-specific FRAs for all allocated sites that remain at risk of flooding.

10. Flood Risk Assessment requirements and flood risk management guidance

10.1. The SFRA provides a strategic assessment of flood risk for minerals and waste developments, including sites proposed for allocation for future minerals and waste uses. Prior to the actual development of any of these allocations, site-specific assessments will be required, to fully assess all potential forms of flood risk, and where appropriate to identify necessary mitigation.

10.2. The mapping provided through Geowessex GIS is a useful starting point. Where more recent or more detailed information has become available, this should be included in a site-specific Flood Risk Assessment. This will include an assessment of potential climate change impacts.

Site Specific Flood Risk Assessments

10.3. These are carried out by, or on behalf of, developers to assess the flood risk to and from any given site. They are normally carried out a planning application stage, and should indicate flood risks over the life of the site. **Paragraph 068** of the NPPG Flood Risk and Coastal Change Planning Practice Guidance sets out a checklist for developers, to assist with specific Flood Risk Assessments.

11. Minerals and Waste Plans - Flood Risk Assessment of Proposed Site Allocations

Using the SFRA

11.1. This SFRA presents background information on flooding and flood risk in Bournemouth, Dorset and Poole and is intended to be a source of reference for such matters.

11.2. In addition to being a reference source, the SFRA is intended to provide practical advice and information, at a strategic level, on flood risk and the likelihood of flooding, particularly in the context of minerals and waste planning.

11.3. All the mapping associated with this SFRA is available online, through the Dorset Geowessex Explorer. This was considered to be the most useful and effective way of presenting the information, allowing users to review the flood risk associated with existing or proposed sites or areas.

11.4. It can be accessed here: **https://explorer.geowessex.com/sfra**

11.5. The datasets used in compiling these maps are:

1. *Risk of Flooding from Surface Water*
2. *Historic Flood Map*
3. *Risk of Flooding from River and Sea*
4. *Main Rivers*
5. *Detailed River Network*
6. *Flood Defences*
7. *Areas Benefitting from Flood Defences*
8. *Flood Storage Areas*
9. *Flood Zone 2*
10. *Flood Zone 3*
11. *Wessex Basin Groundwater Model – Depth to Groundwater*
12. *Groundwater Flood Warning Maps 2015*

11.6. In addition to these flooding related datasets, mapping of current mineral and waste permissions and of the allocations proposed through the Mineral Sites Plan and Waste Plan is also available. Through this SFRA it is therefore possible to assess, at a strategic level, the flood risk associated with any existing mineral or waste site or any of the proposed allocations. It is also possible to assess the flood risk associated with a prospective unallocated minerals and waste site.

11.7. This strategic level assessment is intended to indicate whether or not the site is suitable for inclusion in the emerging Mineral Sites Plan or Waste Plan. At the planning application stage a far more detailed site-specific Flood Risk Assessment – as referred to in Chapter 10 above – will be required to more rigorously and accurately assess the flood risk associated with any particular site.

Identifying and assessing future minerals and waste site allocations

11.8. A series of calls for sites and site selection exercises have been undertaken during the stages of preparation on the Mineral Sites Plan and Waste Plan. This work resulted in a list of site options, all of which required assessment for suitability for inclusion in either Plan. Consideration of flood risk forms part of this assessment and the results of the assessment (for flood risk) are included in Appendix A for mineral site assessments and Appendix B, for waste sites.. This work forms part of the evidence base for the Bournemouth, Dorset and Poole Mineral Sites Plan and Waste Plan.

11.9. As noted in this SFRA a considerable amount of knowledge exists with respect to flood risk within the Plan area. Input from the Lead Local Flood Authority and from the Environment Agency has formed a significant part of the assessment process. The LLFA and the EA have considered the relevant sites and have provided comments and input during the process of Plan preparation.

Comments from the LLFA have been included in Appendices A and B, and contribute to final recommendations regarding each site. Comments from the Environment Agency are included on the site assessments prepared to support the site allocations .

Sites assessment and the Sequential Test

11.10. Sites nominated or identified for consideration for allocation have been assessed through application of the Sequential Test. Table 9 above sets out the appropriate locations for various types of minerals and waste facilities and processes, and these have been taken into account in carrying out the assessments. Also taken into consideration is the fact that, allowing for future climate change issues, land that is currently within Flood Zone 2 will be taken as being in Flood Zone 3. Land that is in Flood Zone 3a is taken as being Flood Zone 3b, meaning that essentially the whole of Flood Zones 2 and 3 are treated as being Flood Zone 3, and potentially could be the functional floodplain.

11.11. The results of the assessments are presented at the end of this report in **Appendix A** for minerals sites and **Appendix B** for waste sites. The full range of site nominations and identified potential sites, that have been subject to public consultation, have been assessed in this way. Each of these Appendices presents the data as a table, assessing the extent to which each site nomination/location coincides with Flood Risk Zones 2 and 3 for risk of flooding from river and sea, and with the three risk categories (low, medium and high) for risk of surface flooding.

11.12. The last column of these tables presents a brief commentary and a recommendation for each site, based on the results of the assessment, in terms of its suitability for the relevant proposed use and whether it is suitable for inclusion in the relevant Plan.

11.13. If the allocation of sites in areas at low risk of flooding is not possible or where there is a specific need for sites in areas at risk of flooding, then consideration should be given to the compatibility of vulnerability classifications and Flood Zones (PPG-FRCC) and whether or not the Exception Test will be required before finalising sites.

11.14. Mineral extraction is different to other types of development as minerals can only be extracted where they occur. This is particularly relevant to sand and gravel deposits, as these are generally flood plain deposits. There are implications when carrying out the Sequential Test, as reasonable alternatives are not always available. Sites proposed for sand and gravel extraction are considered water compatible development (see Table 9) and therefore appropriate within all flood zones.

11.15. The availability of land for the processing of sand and gravel or stockpiling processed material should be considered, as this operation is categorised as less vulnerable and should not be located in Flood Zone 3b. Appendix A recommends removing such uses as far as possible from Flood Zones 2 and 3.

11.16. It is important to note that each individual site will require further investigation, as local circumstances may dictate the outcome of the recommendation. Such local circumstances may include the following:

- Some sites may be able to be developed around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk
- Current land use. A number of sites included in the assessment are brownfield or existing waste facilities. The existing development should be taken into account and further

development may not lead to increased flood risk. However, the Environment Agency may have their own views on this in regard to health warnings as new-build properties in risk areas could be built with flood protection in mind

11.17. The decision making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas of high risk of flooding, if relevant.

Outcomes of the assessment – Minerals

11.18. Appendix A sets out the recommended approach - specifically regarding flood risk – for each of the assessed mineral sites. As noted, minerals are essentially a special case when it comes to site identification and allocation, as they can only be worked where they are found and the mineral type most commonly found in or near flood plains (sand and gravel) is water compatible (apart from the processing plant and storage of materials).

11.19. Only one site of those assessed was recommended as altogether unsuitable for allocation. Land at Sturminster Marshall was shown as being entirely within Zones 2/3 so there was no space for the processing plant. For the proposal to be acceptable, the material would have to be removed from the site and processed and sold elsewhere.

11.20. However, this site has separately been withdrawn from the site identification process, so its unsuitability in flood risk terms is irrelevant.

11.21. All the other sites assessed were found to be acceptable in flood risk terms, providing certain conditions were observed, e.g. ensuring the processing plant was not in Zone 3 and ideally not in Zones 2 or 3.

11.22. The sites proposed for allocation are coloured orange in Appendix A.

Outcomes of the assessment – Waste

11.23. Appendix B sets out the recommended approach – specifically regarding flood risk – for each of the assessed waste sites.

11.24. Consideration has been given to proposals in relation to the Flood Risk Vulnerability Classification. Landfill sites and sites used for the management of hazardous waste are classed as 'more vulnerable'. Sites for these facilities is only considered appropriate in Flood Zones 1 and 2. Development in Flood Zones 3a would require application of the Exception Test. Development in Zone 3b should not be permitted. The Pre-Submission Waste Plan does not include any site-specific allocations for landfill or facilities for the management of non-hazardous waste.

11.25. Other forms of waste treatment are classed as 'less vulnerable'. Development is considered appropriate in Zones 1, 2 and 3a. Development should not be permitted for this use in Flood Zone 3b. As explained earlier in this report, it has not been possible to split Flood Zones 3a and 3b. Therefore, it should be assumed that development should not be permitted in Flood Zones 3a and 3b.

11.26. A number of sites included in Appendix B are partially situated within Flood Zone 3. Most of these have been discounted for other reasons and have not been taken forward for allocation in the Waste Plan. Only three sites located partially within Flood Zone 3 are proposed for allocation in the Waste Plan. The boundaries of Inset 1 'Woolsbridge Industrial Estate' and Inset 3 'Brickfields' have been amended to exclude land within Flood Zone 3. Inset 7 'Eco Sustainable Solutions' includes less than 5% of the allocation within Flood Zone 3. This is an existing permitted waste facility, proposed for intensification. It is considered that given the size of the

site and proposed/existing uses it will be possible to avoid development of Flood Zone 3. Further consideration is likely to be necessary at the planning application stage. This issue has been drawn out in the 'Development Considerations' for the site included within the final Waste Plan.

11.27. All the other sites assessed were found to be generally acceptable in flood risk terms based on current evidence.

11.28. The approach taken with regards to the impact of climate change in this report is to assume that the current day fluvial Flood Zone 2 will be the extent of Flood Zone 3 (3a and 3b) in the future (see chapter 8). Of the sites assessed, several fall partially within FZ2, unsurprisingly these are the same sites as referred to above with the addition of Inset 5 'Loudsmill'. As a precaution, the boundaries of site allocations (Inset 1 and 3) have also been pulled back to avoid Flood Zone 2. In the case of Inset 7, the extent of Flood Zone 2 is less than 5% of the total site area. This is an existing waste facility and the WPA was keen that the allocation should be consistent with the permitted site. As above, it is likely that inappropriate development could be avoided given the size of the site. However, this may be an issue in the future and as such has been drawn out in the 'Development considerations'. The extend of Flood Zone 2 for Inset 5 is less than 10% of the site area and forms the northern edge of the site. It is considered that development could be avoided from within this area as it is likely to be used as part of the access road.

11.29. The sites proposed for allocation are coloured orange in Appendix A.

Surface Water Risk to Proposed Sites

11.30. For the sites at surface water flood risk the following actions can be considered;

- Possible withdrawal, redesign or relocation of the site, certainly for those sites at higher risk from the 1 in 30 year event and those with a large percentage of area at risk
- Preparation of a detailed site-specific Flood Risk Assessment incorporating surface water flood risk management
- Any Flood Risk Assessment may want to consider detailed surface water modelling, particularly for the larger sites
- For minerals and waste proposals FRAs should establish baseline hydrological conditions within and surrounding a site.
- FRAs should identify the potential impacts on groundwater and surface water from the proposed development on the surroundings of the site throughout the anticipated lifetime of the site (for minerals).
- Identify the likely impact that these potential changes to existing flow regimes may have on water resources, sensitive environments and existing or planned development within adjoining areas;
- minimise the potential impact upon the environment and adjoining areas through the use of appropriate mitigation techniques, including (for example) the application of SuDS;
- monitor groundwater and surface water conditions (i.e. water levels and water quality) throughout the lifetime of the operation;
- maximise the potential benefits to be gained post cessation from mineral extraction, for example the creation of parks, nature reserves or voids for landfill; and

- the operator should ensure that there is a dedicated emergency response plan in place during times of flood to ensure that public (worker) safety is not compromised.
- The size of development and the possibility of increased surface water flood risk caused by development on current greenfield land, and cumulative impacts of this within specific areas;
- Management and re-use of surface water on-site, assuming the site is large enough to facilitate this and achieve effective mitigation
- Larger sites could leave surface water flood prone areas as open greenspace
- Effective surface water management should ensure risks on and off site are controlled
- Any SuDS may offer opportunities to control runoff to Greenfield rates. Restrictions on surface water runoff from new development should be incorporated into the development planning stage. For brownfield sites, where current infrastructure may be staying in place, then runoff may look to be controlled to brownfield rates. National standards for sustainable drainage systems should be followed.

Development Management Sequential & Exception Test

11.31. This section of the SFRA has been developed to provide a useful tool to inform the development management process about the potential risk of flooding associated with future planning applications and the basis for requiring site specific FRAs where necessary.

11.32. According to the NPPF Paragraph 103:

"When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:

- *Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and*
- *Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems."*

11.33. Paragraph 11 of the NPPF re-affirms planning law that applications for planning permission "must be determined in accordance with the development plan unless material considerations indicate otherwise". Development proposals that are in line with Local Plan policies should be approved. Those that conflict should be refused unless material considerations indicate otherwise.

Demonstrating the Sequential Test for Planning Applications

11.34. Where the location of a proposed development has not been assessed through the Minerals Sites Plan or the Waste Plan, is a departure from the development plan (and?) where the site is located in Flood Zones 2 or 3 a sequential test will be carried out.

11.35. The purpose of a Sequential Test is to locate development in areas of lower flood risk. The planning officer in consultation with the Lead Local Flood Authority and Environment Agency will need to assess if there are more suitable and practical locations for the proposed development. The Sequential Test will look at the likelihood of flooding from all sources on the proposed location site and the effect of potentially increasing flood risk elsewhere.

11.36. If the development cannot be accommodated in an area of lower flood risk, the Exception Test will be carried out to allow the officer to determine if the development can be permitted. The

NPPF sets out two criteria that the development must meet before permission could be granted. These criteria are:

- the applicant must demonstrate that their development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment; and
- a site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime, taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, reduce flood risk overall.

Conclusions and recommendations

11.37. There is a clear requirement for sites to be allocated to maintain mineral supply and to provide a sustainable network of waste facilities to meet the needs of the county.

11.38. A considerable proportion of the County is at risk of flooding, including sites considered for allocation in the Mineral Sites Plan and Waste Plan. The flood risk arises from a number of sources including river flooding, coastal flooding, localised runoff, sewer and groundwater flooding.

11.39. A collation of potential sources of flood risk has been carried out in accordance with the NPPF, developed in close consultation with both the Lead Local Flood Authority and the Environment Agency. The County has been broken down into zones of high, medium and low probability of surface water ?? flooding in accordance with the NPPF, providing a basis for the application of the Sequential Test.

11.40. A planning solution to flood risk management should be sought wherever possible, steering vulnerable development away from areas affected by flooding in accordance with the Sequential Test.

11.41. Where other planning considerations must guide the allocation of sites and the Sequential Test cannot be satisfied, specific recommendations must be sought to assist the planning authority and site operator to meet the Exception Test. These should be reviewed in detail as part of the development management process.

11.42. Up to date policies are essential to ensure that the recommended development management conditions can be imposed consistently at the planning application stage. This is essential to achieve future sustainability within the County with respect to flood risk management to reduce the potential adverse impacts of minerals and waste activities on groundwater and surface water conditions.