West Dorset District Council

Strategic Flood Risk Assessment

Level 2 SFRA – Executive Summary

August 2010

Halcrow Group Limited

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	First Draft	14 April	R Gurung
1	A	Final Draft	2 June	T Styles
1	B	Final	2 August	PS Rayner

Contents

Executive Summary

A *Introduction*

West Dorset District Council (WDDC) commissioned Halcrow to prepare a Level 2 Strategic Flood Risk Assessment (SFRA) for the West Dorset District, in accordance with Planning Policy Statement 25: Development and Flood Risk (PPS25) and its accompanying practice guide.

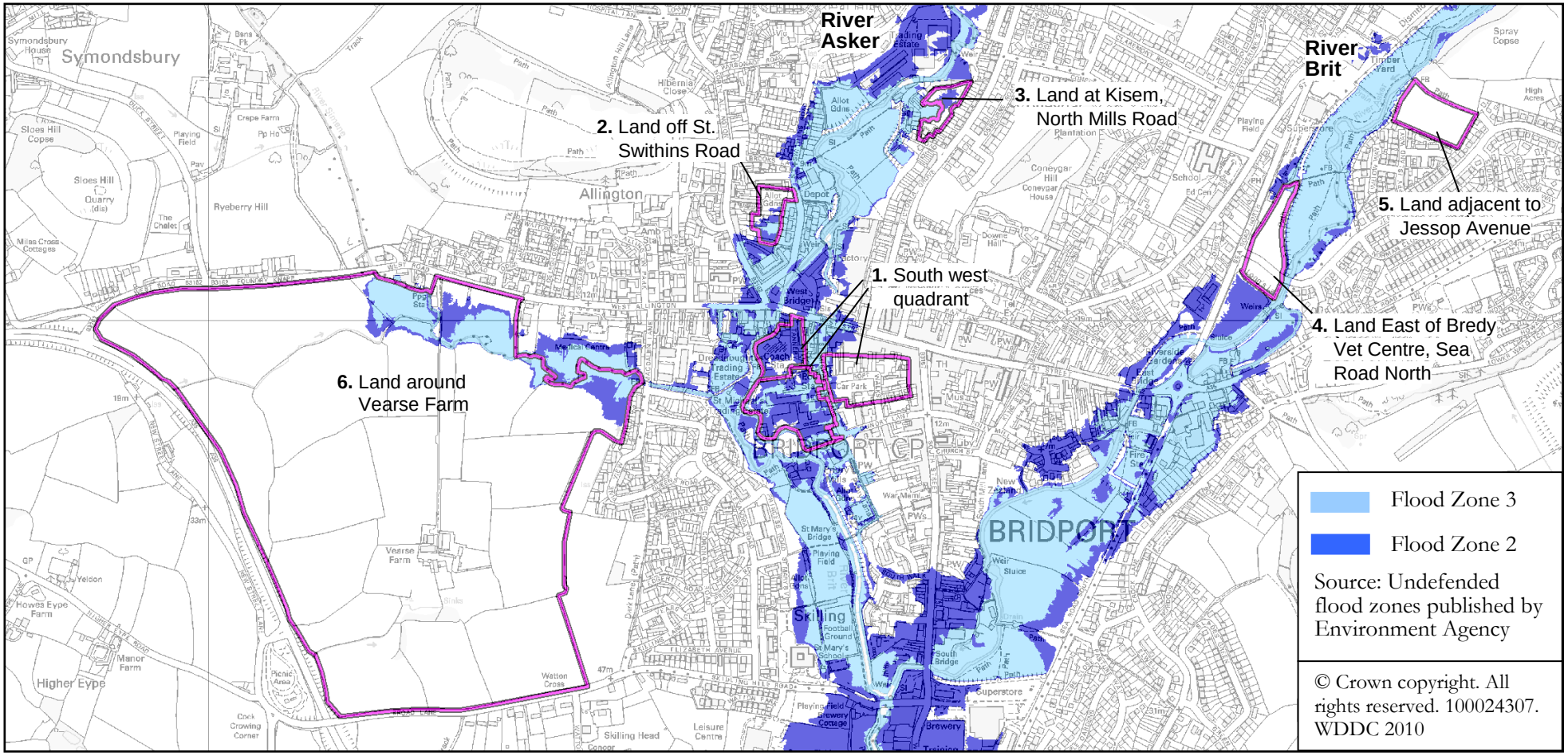
This Level 2 SFRA refines and builds on the Level 1 SFRA (2008), providing more detailed information on all forms of flood risk: fluvial (rivers), tidal, surface water, and groundwater, both now and in the future given the likely impacts of climate change. The information will inform the allocation of sites that may require the Exception Test if identified as a requirement by the Sequential Test as part of the preparation of the Local Development Framework (LDF).

This SFRA Level 2 report provides flood risk information in more detail than the SFRA Level 1 report. This approach is in line with PPS25 that states:

'*…Where decision-makers have been unable to allocate all proposed development and infrastructure in accordance with the Sequential Test* [based on SFRA Level 1, 2008]*, taking account of the flood vulnerability category of the intended use, it will be necessary to increase the scope of the SFRA* [by carrying out this SFRA Level 2, 2010] *to provide the information necessary for application of the Exception Test. This should additionally, consider the beneficial effects of flood risk management infrastructure* [includes flood defences] *in generally reducing the extent and severity of flooding when compared to the Flood Zones on the Flood Map. The increased scope of the SFRA will enable the production of mapping showing flood outlines for different probabilities, impact, speed of onset, depth and velocity variance of flooding taking account of the presence and likely performance of flood risk management infrastructure…*'.

The focus of the SFRA is on six areas in Bridport that are being considered for future development (identified by Level 1 SFRA); refer to figure below (next page). In other areas of the district it has been easier simply to avoid the Flood Zones in decisions about development, but this is more difficult at Bridport because of the extent of flood risk in and adjoining the built up area. This focus does not imply any particular planning status for the specific development sites located as areas for potential development or imply that identified sites within them will be granted planning permission for any use.

This SFRA Level 2 report also provides policy information and advice on flood risk management and site-specific Flood Risk Assessments, and considers the implications of the Weymouth & Portland SFRA.



Areas of search for potential development – Bridport

B Planning context

National planning policy relating to flooding is set out in PPS25, which recognises that although flooding cannot be wholly prevented its impacts can be avoided and reduced through good planning and management.

Flood risk is required to be taken into account at all stages in the planning process to avoid inappropriate development in areas of flood risk and to direct development away from areas of highest risk. PPS25 refers to this as the sequential approach.

Uses of SFRA

- SFRAs form part of evidence base for the LDF
- Inform the Sustainability Appraisal
- Inform decisions on land allocation / policies:
  - PPS25 Sequential Test of development sites
  - PPS25 Exception Test of development proposals
  - demonstrate if development will be safe
  - take into account future climate change
- Identify the level of detail required for site-specific Flood Risk Assessments
- Provide information to developers for use in Flood Risk Assessments
- Support the emergency planning capability
- Consider beneficial effects of flood defences

Where new development is necessary in flood risk areas, under exceptional circumstances, PPS25 aims to make development 'safe' through application of the Exception Test without increasing flood risk elsewhere and, where possible, reducing flood risk overall.

West Dorset District Council will use the Level 2 SFRA to inform application of the Sequential Approach as set out in PPS25, as some of the sites being considered for housing development in the Bridport area are within Flood Zones 2 and 3 (undefended).

The SFRA provides detailed flood risk information, identifying the lower risk areas within a Flood Zone, so that flood risk can be mitigated and developments made safe. Both undefended and defended conditions are taken into account, so that protection provided by existing flood defences can be considered.

The SFRA details flood related planning policy at national, regional and local levels. This highlights that flood risk must be taken into account at every hierarchical level within the planning process. A series of policy recommendations are made, and information contained in the SFRA provides evidence to help formulate robust policy in flood risk management.

The SFRA linkage to high level plans is also considered, including Catchment Flood Management Plans (CFMPs) and Shoreline Management Plan (SMP) that recommend the flood risk management policy for West Dorset.

The Pitt Review (2008) that reviewed the flooding of summer 2007 is also pertinent. It recommends Surface Water Management Plans (SWMPs) be prepared where surface water flood risk is high, as a framework to understand the flooding causes and agree the most cost effective way of managing the flood risks. Defra provide funding for SWMP studies, and Dorset County Council recently secured funding for one SWMP for Dorset, excluding Poole and Bournemouth, and will seek funding for other SWMPs including Bridport and Dorchester in the West Dorset area.

C The SFRA results

The SFRA Level 2 provides a set of tidal/fluvial flood maps for the Bridport area, which provide more detail than the SFRA Level 1 Flood Zone (undefended) maps for West Dorset. The SFRA Level 1 surface water flood maps based on records for West Dorset are also updated.

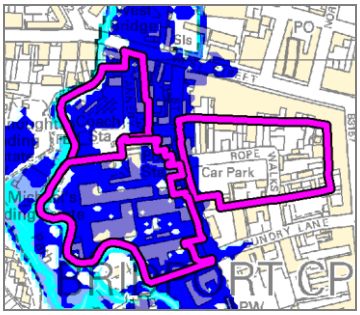
Modelling results provided as part of this SFRA Level 2, incorporating the effects of defences and breaches, provide a more detailed picture of flood risk at the very local scale for use within the Sequential and Exception Tests. The SFRA Level 2 evidence base includes peak flood extents, depths and flow velocities, flood hazard classifications and animations/maps to illustrate the rate of onset of flooding.

The emerging LDF for West Dorset is expected to run until 2026. To correspond with this planning horizon, the impact of climate change on the risk of tidal/fluvial flooding has been assessed to 2126 (100 years taken as the minimum design life of residential development). To obtain the future scenario, fluvial flows were increased by 20% in accordance with Defra guidance. Modelling confirmed that predicted sea level rise is not a threat to the areas of search for future development.

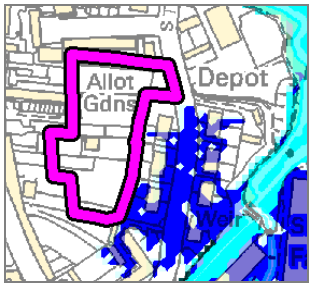
Additional flood risk information provided by the SFRA Level 2 may be required to carry out the Exception Test in accordance with Table D3 of PPS25. This information derives from detailed modelling to assess the effects of the defences through Bridport, and modelling 'worse-case scenario' breaches in the areas of search. This gives an indication of the residual risk to developments sited behind defences.

Example model results are given below to illustrate the SFRA products and work done.

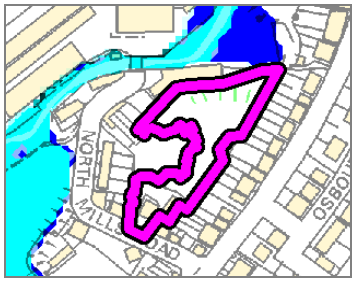
<u>Flood risk maps for defended scenario - examples</u>



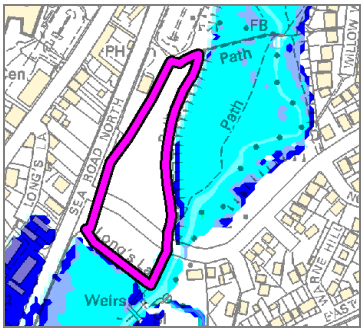
1. South West quadrant



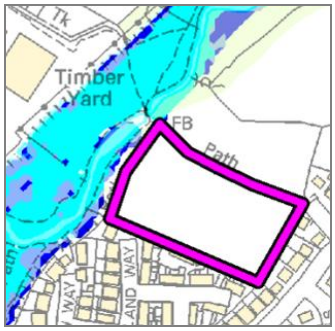
2. Land off Saint Swithins Rd



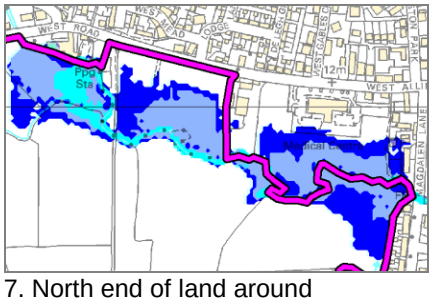
3. Land at Kissem, North Mills Rd



4. Land East of Bredy Vet Centre, Sea Road North



5. West Land adjacent to Jessop Avenue



7. North end of land around Vearse Farm

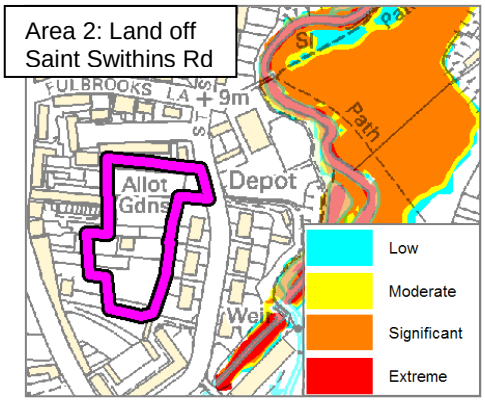
4% AEP (1 in 25 year), equivalent to Flood Zone 3b
1% AEP (1 in 100 year), equivalent to Flood Zone 3a
0.1% AEP (1 in 1000 year), equivalent to Flood Zone 2

Note: flooding from sources including sewers, surface water and groundwater can occur in any Flood Zone

Flood hazard maps - example

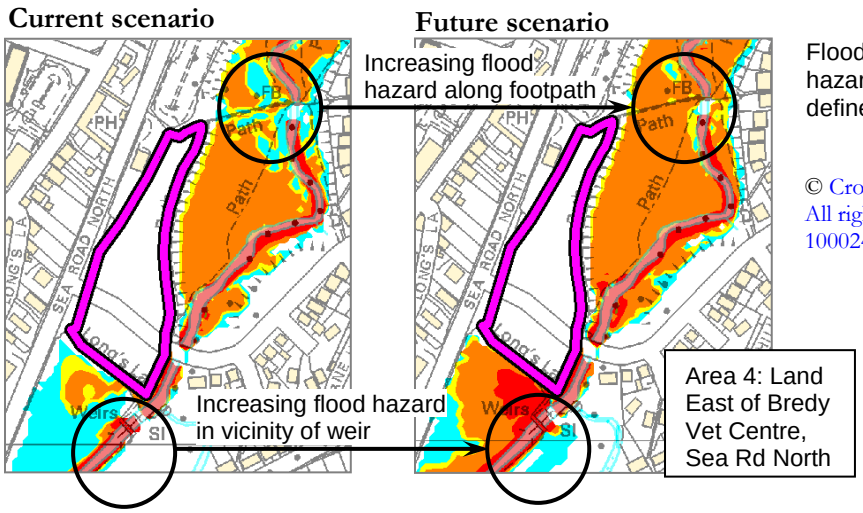
The SFRA flood hazard maps adopt the Defra flood risks to people classification (2006). Based on modelling results (flood depth/velocity) the degree of hazard is determined as

- low flood hazard
- moderate (danger for some, e.g. children)
- significant (danger for most people)
- extreme (hazard for all i.e. deep or fast flowing)



Climate change flood maps - example

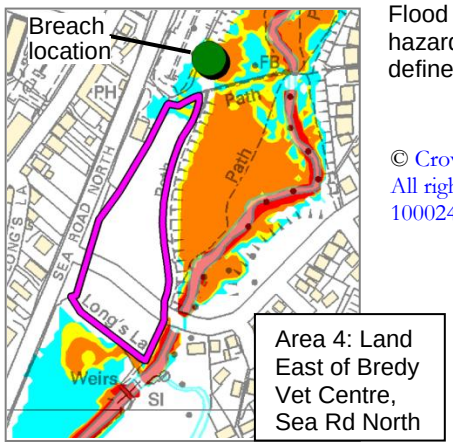
Within all six areas investigated, the impact of climate change is that generally the area at risk of flooding is increased. This impact on each of the Flood Zones has been assessed to 2126 by modelling (20% increase in fluvial flows). In the example below, the effects of climate change on future development are not predicted to impact the potential site.



Flood maps show flood hazard classification as defined above

Breach scenario flood maps - example

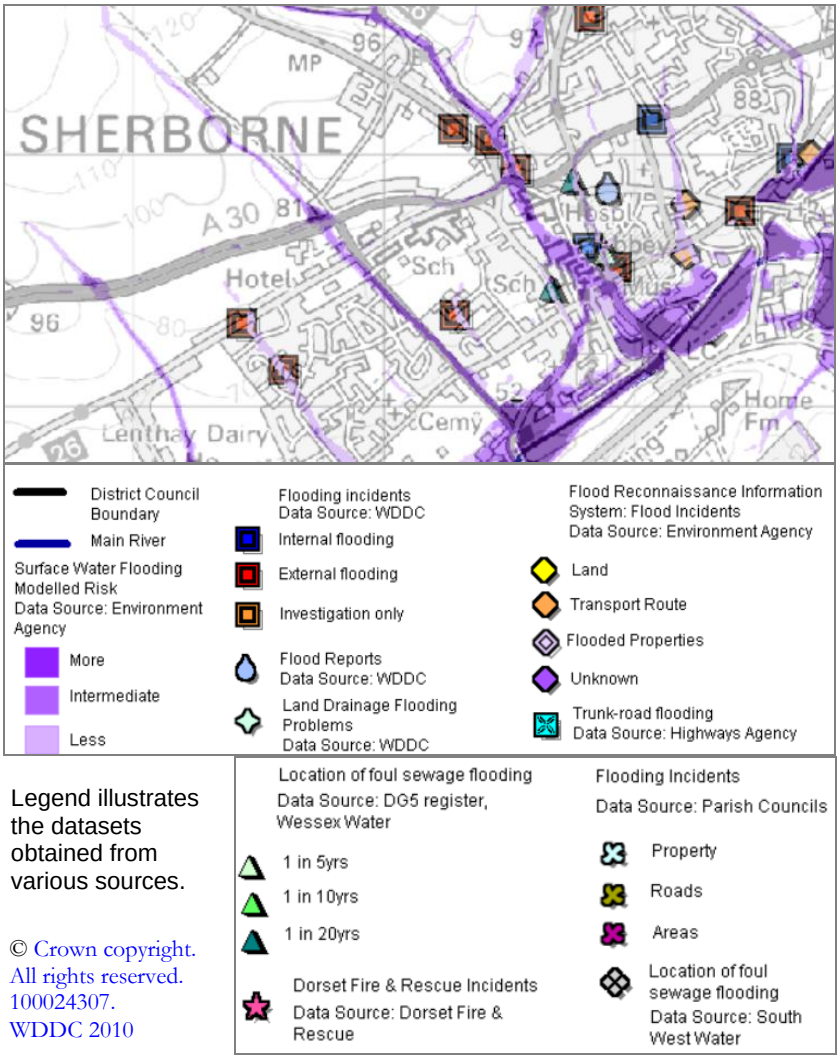
A number of breach scenarios were modelled to assess the flood risk should the defences fail through Bridport. The breach points were chosen to give the worst case scenario, i.e. should the breach occur at the worst possible place and time. Example results are illustrated below.



Flood map shows flood hazard classification as defined above

SFRA surface water flood risk maps – example

The surface water flood risk maps are based on records of past flooding rather than predictive modelling, except for broad-scale modelling by the Environment Agency (purple shading) that is indicative of surface water hotspots. Very rare events will not be represented by records, and this means the full extent of surface water flooding mechanisms may not be shown.



Legend illustrates the datasets obtained from various sources.

D Major implications

In line with PPS25, any development must be safe, without increasing flood risk elsewhere, and where possible reduce flood risk overall. This must be assessed over the lifetime of the development and therefore account for the impacts of climate change. Access and egress routes also need to take account of climate change. A failure or breach of flood defences is a scenario that must be considered. Flood mitigation measures may be appropriate.

PPS25 requires a risk based approach to planning referred to as the sequential approach. Flood Zones are the starting point to guide planning, together with the flood maps for other forms of flooding, e.g. surface water, groundwater.

Flood Zone (FZ)	Vulnerability of development				
	Essential infrastructure	**Water compatible**	**Highly vulnerable**	**More vulnerable**	**Less vulnerable**
FZ 1	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate
FZ 2	Sequential Test required	Sequential Test required	Exception Test required	Sequential Test required	Sequential Test required
FZ 3a	Exception Test required	Sequential Test required	**No**	Exception Test required	Sequential Test required
FZ 3b (functional floodplain)	Exception Test required	Sequential Test required	**No**	**No**	**No**

No = development should not be permitted

The benefits of the Sequential Test are:

- It aims to steer development to sites with little or no flood risk.
- Where no FZ1 sites are available: decision makers should identify reasonably available Zone 2 sites - applying the Exception Test, if necessary.
- Where no FZ1 or FZ2 sites are available: decision makers should identify reasonably available FZ3 sites - applying the Exception Test, if necessary.
- Within each Zone: direct development to sites with the lowest probability of flooding.
- Higher vulnerability uses: should be sited with the least flood risk.

For the Exception Test to be passed:

- Demonstrate the development provides sustainability benefits that outweigh flood risk
- Development should be on developable Previously Developed Land (PDL), if not, there should be no reasonably available developable PDL site
- Supporting Flood Risk Assessment required to demonstrate, inter alia, that development will be safe without increasing flood risk elsewhere

The LDF will require detailed policies to ensure development takes place in safe and suitable locations, while making the best use of the scarce developable land.

Flood risks for Bridport areas of potential development

The SFRA assesses the several areas of Bridport and West Bay protected from fluvial / tidal flooding by raised defences, and considers options for improvement consistent with CFMP policy. The SFRA also evaluates the fluvial / tidal flood risk implications for the six areas of potential development identified by WDDC. The key findings are summarised below.

In allocating sites for development the Council is required to adopt the climate change fluvial and tidal flood zone maps for the lifetime of the proposed development, in addition to any other sources of flooding (surface water, groundwater and sewer).

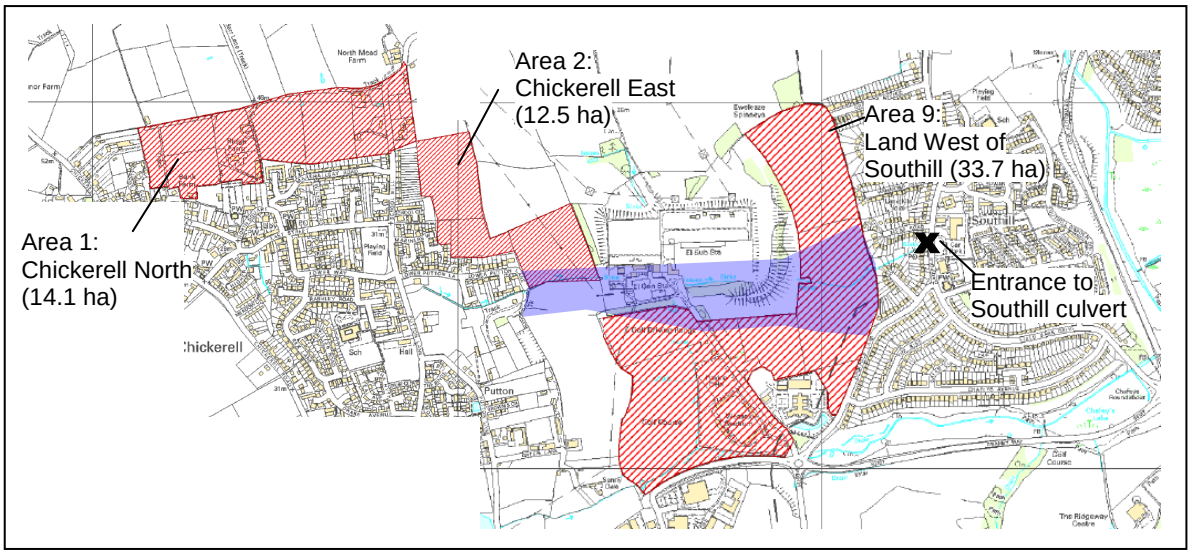
Bridport areas	Flood risks	Constraints on development potential
1. South west quadrant	For current and future scenarios a low risk of flooding, with majority of site in defended FZ2 (0.1% AEP) and no FZ3 (1% AEP). For breach scenario part of site at risk (1% AEP) and must factor this into any site development.	In FZ1 no restrictions on development other than managing surface water runoff. Restrictions apply in FZ2 subject to the Sequential Test and possibly the Exception Test. Development to accommodate breach areas (e.g. finished floor levels above flood levels).
2. Land off Saint Swithins Road	For current and future scenarios a low risk of flooding, with site wholly in FZ1 (<0.1% AEP). For breach scenario, southern part of site at risk (1% AEP) and must factor this into any site development.	In FZ1 no restrictions on development other than managing surface water runoff and development to accommodate breach areas as above.
3. Land at Kisem, North Mills Road	For current and future scenarios a low risk of flooding, with site wholly in FZ1 (<0.1% AEP). For breach scenario, minimal area at risk (1% AEP) and must factor this into any site development.	In FZ1 no restrictions on development other than managing surface water runoff and development to accommodate breach areas as above.
4. Land East of Bredy Vet Centre, Sea Road North	For current and future scenarios a low risk of flooding, with site wholly in defended FZ1 (<0.1% AEP).	In FZ1 no restrictions on development other than managing surface water runoff and development to accommodate breach areas as above.
5. Land adjacent to Jessop Avenue	In FZ1 - no restrictions on development other than managing surface water runoff. Breach scenario not tested as no flood defences along this river reach.	In FZ1 no restrictions on development other than managing surface water runoff.
6. Land around Vearse Farm	For current and future scenarios a low risk of flooding, with majority of site in FZ1 (<0.1% AEP), except along river corridor FZ3b Functional Floodplain, FZ3a (1% AEP) and FZ2 (0.1% AEP) along northern boundary.	In FZ1 no restrictions on development other than managing surface water runoff. For north end of site in FZ2, FZ3a and FZ3b, restrictions apply subject to the Sequential Test and possibly the Exception Test.

Weymouth & Portland

The SFRA reviews the Weymouth and Portland Borough Council SFRA Level 2 in relation to the Southill/Chickerell and Littlemoor areas to ensure that the assessments are sound in relation to the West Dorset LDF. The review also considers the associated feasibility study of Southill watercourse, including the modelling aspects, commissioned by Weymouth & Portland Council and WDDC (August 2009).

From the review it was concluded that the majority of the Southill/Chickerell and Littlemoor areas of search for potential development fall within Flood Zone 1, but parts of the areas adjacent to the watercourses will be Flood Zones 2 and 3 and this will dictate the types of development that are appropriate. A further modelling study to determine the Flood Zones for the Southill/Chickerell areas is therefore recommended in accordance with the Environment Agency requirements for strategic flood mapping.

An initial review of available topographic data (LiDAR aerial survey) has suggested the indicative outer limits of flood risk potential for the Chickerell and Southill sites due to the watercourse upstream of Southill culvert – see 'blue band' in figure below. It is recommended that the area for development be restricted to exclude this 'blue band' unless the developer provides a site-specific FRA that demonstrates by detailed modelling that the flood risk is less extensive. This modelling should build on the recent feasibility study modelling.



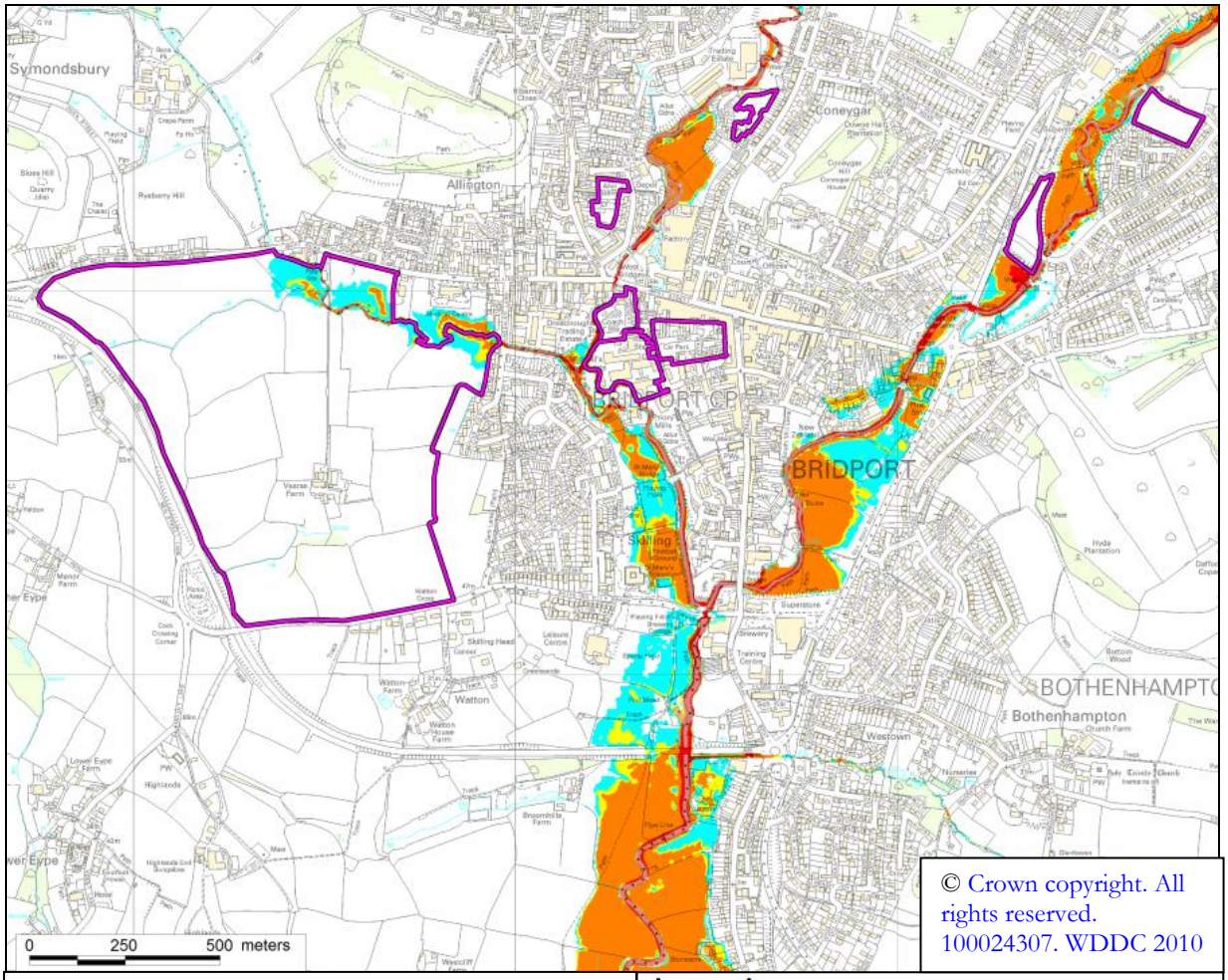
Indicative flood limits for Chickerell / Southill sites

Windfall sites

The Environment Agency has recommended that should the Strategic Housing Land Availability Assessment (SHLAA) demonstrate that it is necessary for the Bridport area to develop windfall sites within the future flood zones (with allowances made for climate change), that this be limited to those areas where the flood hazard rating is classified as "low" (caution – flood zone with shallow flowing water or deep standing water) based on defended 2126 flood hazard maps, and in most cases this will preclude sites where the flood depth is 0.25m or greater.

The figure below shows the defended 2126 flood hazard map for the Bridport area to identify the extent of the hazard rating of 0.75 and above where windfall sites are not recommended. This map is based on the future flood risk (assumes +20% increase in flows due to climate change and with no change in flood risk predicted in the Bridport area due to sea level rise).

In most cases it is considered unlikely that it will be practical to raise ground levels outside the windfall sites to provide dry access. Defra document FD2320 states that: *"…A safe access or exit route is a route that is safe for use by occupiers without the intervention of the emergency services or others. A route can only be completely safe in flood risk terms if it is dry at all times. However, this is not always practicable. Therefore, a more detailed analysis is sometimes required…".*



Flood hazards in Bridport – future scenario

(Any development must be safe and appropriate for the Flood Zone. Windfall sites are considered acceptable if the flood hazard rating is below 0.75, equivalent to low hazard in legend. Proposals for development in areas of moderate hazard should be considered on a case by case basis, taking into account the development types listed in the main report (Table 5.9.)

Legend

Degree of Flood Hazard

Low	*- Caution*
Moderate	*- Dangerous for some (i.e. children)*
Significant	*- Dangerous for most people*
Extreme	*- Dangerous for all*

E Concluding remarks

The SFRA Level 2 fulfils the study requirement to undertake a Level 2 Strategic Flood Risk Assessment (SFRA) to update and improve the Level 1 SFRA to be compliant with PPS25 and to provide an evidence base to assist in the assessment of the various options and proposals for development the Council is considering as part of the Local Development Framework.

The SFRA (Levels 1 and 2) provides an overview of flood risk within West Dorset and aims to provide general guidance to WDDC planners, developers and other interested people, including the general public, about locations where flood risk is an issue. Preparation of this SFRA has followed PPS25 and its associated Practice Guidance, with guidance provided at all stages by WDDC and the Environment Agency.

The SFRA forms part of the evidence base for the LDF and will be an integral part of the Sustainability Appraisal of relevant component documents of the LDF. It will be used by WDDC to inform decisions regarding land allocation and policies. The detailed information on flood risk for the Bridport area, included in this SFRA Level 2, confirms that development in the majority of the areas of search is viable as flood risk can be sustainably managed.

In Bridport the tidal / fluvial flood risk is limited for all the areas of search for potential development, though there are associated flood hazards and also other (e.g. surface water) flood risks. In view of this, promoting any of the areas of search will require a formal site-specific FRA, with the exception of one area – land adjacent to Jessop Avenue where no flood risks are identified. This FRA requirement also applies to windfall sites affected by flood risk.

This SFRA Level 2 includes policy recommendations for the planning system and advice for flood risk management such as SuDS and appropriate flood damage avoidance measures. It also includes advice for planners and developers for site specific FRAs, including the issues specific to Bridport.

The best information is to be used to guide the site selection process for future developments. For this reason the SFRA is a living document (reports and maps) to be updated by WDDC as new information becomes available. No additional SFRA study requirements are identified at this time.