



## **Elmsleigh Centre Flood Risk Assessment**



**April 2007**



**BLACK & VEATCH**

## THE ELMSLEIGH CENTRE, STAINES FLOOD RISK ASSESSMENT

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## 1. INTRODUCTION

- 1.1 Black & Veatch Ltd have been commissioned by Spelthorne Borough Council to prepare a flood risk assessment of the Elmsleigh Centre in Staines (OS grid reference TQ 036 715). The site is presently a shopping centre with a bus station and car park and is situated 100 metres to the west of the River Thames, enclosed by the A308 and the railway line. (Refer to Figure 1 Location Plan).
- 1.2 The River Thames flows from north east to south west past the site. Just upstream of the site lies the confluence of the River Colne which conveys flow from a catchment that extends as far north as Watford.
- 1.3 As part of this flood risk study information has been obtained from the Environment Agency on predicted flood levels and flood extents. It should be noted that this predicted data is constantly being reviewed by the Agency and as a result is subject to change. The information provided in this report is based on data provided in April 2005. Any subsequent review or application should include a verification of these predicted flood levels.

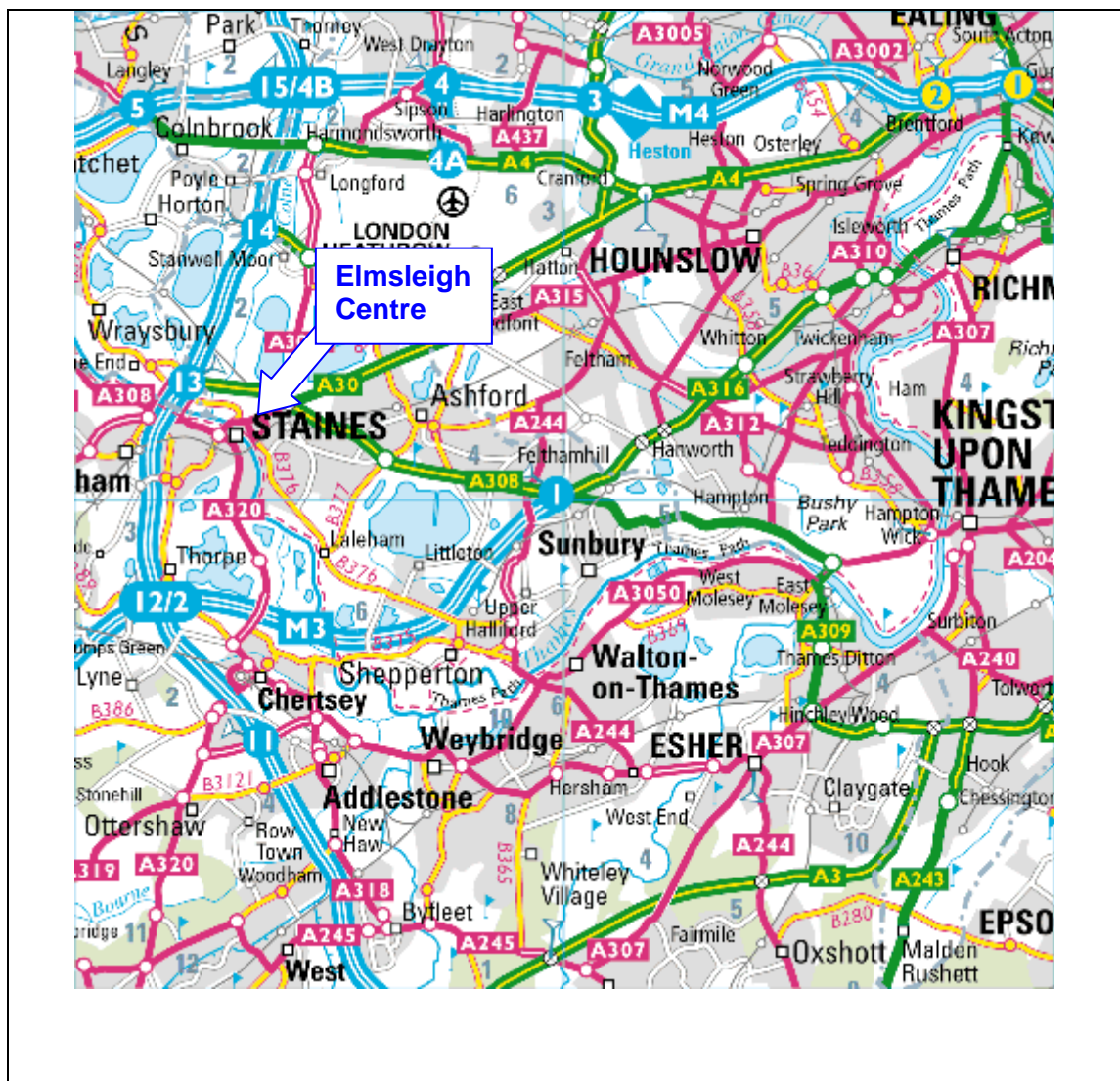


Figure 1 Location Plan of Site

- 1.4 Acceptance of this Flood Risk Assessment and the conditions that would be required from a future detailed application are included in Appendix A. Refer email dated 5<sup>th</sup> March and letter dated 20<sup>th</sup> March 2007 from the Environment Agency.

## 2. DEVELOPMENT PROPOSAL

- 2.1 The development proposal is still in its early stages and consequently there are no firm building outlines to present with this report. It is Spelthorne BC's intention to examine a number of opportunities for the site but they recognise the importance of ensuring the development meets the requirements of PPG 25 and as such want to be able to agree the flood risk strategy for the site in principle before embarking on finalising their proposals.
- 2.2 PPG25 is due to be replaced by PPS 25 in the summer of 2006 and a draft is currently undergoing a consultation phase. The draft has been developed to reflect the general direction set out in *Making Space for Water* (published by DEFRA in 2004) the evolving new strategy to shape flood risk management policy over the next 10-20 years. The new guideline is not expected to impact on the conclusions drawn into this study but will need to be referred to directly in future more detailed flood risk assessments of the site.
- 2.3 A figure titled 'Planning Brief Sites and its Sub-parts – Plan 2' in Appendix B shows the proposed development boundary. The principle of the development is to extend the existing Elmsleigh Centre building into an area known as the 'Western Extension Area' at the western end of the site and into the South Street Bus Station.
- 2.4 It is intended that the extension into the Western Extension Area would comprise a mixture of commercial and administrative buildings with penthouse style residential units. The size of the development footprint is estimated to be 9,950m<sup>2</sup>. This area is presently occupied by two large buildings, a club and a Masonic Hall and by various back yards and access points for the Elmsleigh Centre shops.
- 2.5 The extension at the Bus Station Area would comprise bringing a part of the Elmsleigh Centre frontage forward to occupy a rectangular footprint of approximately 1,750m<sup>2</sup>. The outline is yet to be defined but there are no existing buildings within this proposed site.



Plate 1: View towards bus station and Communication House



Plate 2: Escape route along Thames Street



Plate 3: Hall in Western extension area




Plate 4: Raised ramp to car park

### 3. FLOOD RISK INFORMATION

- 3.1 The Environment Agency have provided flood maps for the site based on the results of their mathematical hydraulic model of this part of the River Thames called the 'Lower Thames Flood Risk Model' (LTFRM). These maps are included in Appendix C. They indicate that considerable parts of Staines are at risk from flooding from a 1 in 100 year flood event (a 1% chance of happening each year). Indeed the proposed development site lies partly within the predicted 1 in 100 year flood envelope. The maps also show the extent of the 1947 flood level and the south west of the site is shown to have been partially flooded in that event, though this can still only be taken as indicative due to subsequent development of the River Thames corridor.
- 3.2 The River Thames is the main source of flood risk to the site with a quoted 1 in 100 year flood level of 15.59 mOD. Including a 20% allowance for climate change this figure rises to 15.92 mOD. (Refer Appendix A Environment Agency Correspondence).
- 3.3 The flooding pattern indicates that the River Thames overtops both left and right banks downstream of Staines Bridge. The Thames Street approach acts as a barrier to flood flow on the left bank in all flood events but those approaching the 1 in 100 yr event and above. This high ground partially protects the Elmsleigh site. Flooding on the right bank is more extensive where there is less restriction to floodplain flow.
- 3.4 The River Colne is also shown to flood parts of the central and eastern parts of Staines in a 1 in 100 year event, although the joint probability of the peak occurring at the same time as the River Thames peak would be rare. For instance, during the January 2003 event the peak flow in the River Colne occurred on 2<sup>nd</sup> January whilst the River Thames flow did not peak until the 6<sup>th</sup> January. In this event the peak flow in the River Colne was 24.4 m<sup>3</sup>/s but had dropped to 17.4m<sup>3</sup>/s by the time the River Thames peak occurred.



Figure 2 Environment Agency Indicative Flood Plain Map (Lower Thames Flood Risk Model)

 Extent of 1 in 100 yr flood plain

#### 4. **FLOOD LEVELS**

- 4.1 The site was levelled by Capital Surveys Ltd. on the 31<sup>st</sup> May 2005 using EA benchmarks and elevation levels to establish the datum. The site levels range from 14.57 mOD in the Western Extension Area to 17.00 mOD at the rear of the South Street car park to the east of the site. (*Refer Drg. 120297-1000-0001 in Appendix B Drawings*)
- 4.2 The Western Extension Area contains two large buildings and also a ramped access to the Elmsleigh Centre. Levels vary from 14.57m OD in the centre of the service area to 17.10mOD at the perimeter of this area adjacent to the High Street.
- 4.3 The proposed development in the South Street Bus Station is flat with levels ranging from 15.10mOD to 15.25mOD.
- 4.4 The flood levels for the site, as obtained from the Environment Agency's Lower Thames Flood Study Model (*Refer Appendix A*), are as follows:

**Table 4.1 Flood Levels (EA Node 21.061)**

Return Period (yrs)	Flood Level (mOD)
1 in 5	-
1 in 20	-
1 in 50	15.25
1 in 100	15.59
1 in 100 (+20%)	15.92

- 4.3 A comparison has been made between the flood levels quoted above and the ground contours using a ground model of the site. Areas below the 1 in 50 yr flood level are shown shaded as are the areas below the 1 in 100 yr flood level and the 1 in 100 yr (+20%) flood level. From this data it would appear that the development site would be partly flooded in a 1 in 50 year event and above. It is noticeable that in this event it would probably be as a result of floodwater backing up the drainage system as there is no direct connectivity with the 1 in 50 yr flood plain outside of the development area. (*Refer Drg. 120297-1000-0001 in Appendix B Drawings*).
- 4.4 A 1 in 100 yr flood would extend the area of flooding but not to the extent that the whole site is inundated. There is a significant area, presently occupied by the South Street Car Park which is indeed above the 1 in 100 yr (+20%) level and would not flood in even this extreme event.

#### 5. **SITE FLOOD ZONE CHARACTERISATION**

- 5.1 The site has been assessed as partially lying within a Zone 3a 'Developed Area' and partially in Zone 2 .
- 5.2 Zone 3 is defined in PPG 25 as 'an area where the annual probability of flooding is 1.0% (i.e. a 1 in 100 chance) or greater'. Zone 3a, is defined by Table 1 in PPG 25 is an area that may be suitable for commercial, residential and industrial development provided the appropriate minimum standard of flood defence (including suitable warning and evacuation procedures) can be maintained for the lifetime of the development .
- 5.3 Zone 2 is those areas which are at risk of flooding from a 1 in 1000 yr event or greater.

## 6. COMPENSATORY STORAGE

- 6.1 The high ground in the South Street Car Park provides an obvious opportunity for flood storage compensation. It is Spelthorne BC's intention that any future proposal will aim to provide more storage if at all possible and with an area of 12,400m<sup>2</sup> available this should provide ample opportunity to do so.
- 6.2 The Western Extension Area development contains building footprints equating to 1,330 m<sup>2</sup> in area. If the development were to proceed then the volume of these buildings would be offset against that required for the extended footprint.
- 6.3 An assessment has been carried out of the total available compensatory storage incorporating the high ground at South Street and the existing buildings in the Western Extension Area. This has been tabulated in bands of 0.2m depth in order to investigate the impact on storage for rising flood levels up to the 1 in 100yr event. (*Refer Table 6.1 below*).

**Table 6.1 Volumes presently occupied within floodplain**

Band depths (m)	Volume presently occupied (m <sup>3</sup> )		
	Car Park	Buildings in Western Extension Area	Totals
14.59 – 14.79	2,468	-	2,468
14.79 – 14.99	2,468	65	2,533
14.99 – 15.19	2,468	199	2,667
15.19 – 15.39	2,468	266	2,734
15.39 – 15.59	2,468	266	2,734
<b>Total volume</b>	<b>12,340</b>	<b>796</b>	<b>13,136</b>

- 6.6 An assessment has also been made using the ground model to calculate the volume that would be occupied by the extensions within the Western Extension Area and the Bus Station. These are listed in Table 6.2 and compared with the potential compensation volumes calculated above.

**Table 6.2 Comparison of volumes occupied by the proposals and available compensatory storage**

Band depths (m)	Volumes required by extensions (m <sup>3</sup> )			Available Compensatory Storage (m <sup>3</sup> )	Surplus Compensatory Storage (m <sup>3</sup> )
	W Ext. Area	Bus station	Total		
14.59 – 14.79	55	0	55	2,468	2,413
14.79 – 14.99	379	0	379	2,533	2,154
14.99 – 15.19	752	158	910	2,667	1,757
15.19 – 15.39	1,248	350	1,598	2,734	1,136
15.39 – 15.59	1,461	350	1,811	2,734	923
<b>Total volume</b>	<b>3,895</b>	<b>858</b>	<b>4,753</b>	<b>13,136</b>	<b>8,383</b>

- 6.8 From the figures in Table 6.2 it can be seen that the available volume of compensatory storage will not only provide adequate to deal with the potential volumes occupied by the proposed

extensions but does so through each band with considerable surplus. This demonstrates that the development site has the capacity to develop the areas under consideration without impacting on the overall flood storage of the area.

## **7. DRY ESCAPE**

- 7.1 It is intended that the new development introduces residential development within the site. It is therefore important that a dry escape route is identified that allows residents to evacuate the flood plain.
- 7.2 As explained previously the site lies partly in the indicative flood plain and much of Staines is inundated in a 1 in 100 yr event. However, the ground levels measured along Thames Street and Clarence Street to Staines Bridge indicate there is a line of high ground that can be used as a dry escape route.
- 7.3 Previous studies in the area by Black & Veatch have proven that a dry escape route exists from Staines Bridge along the Causeway to the M25. The route is shown on Drgs 120297-1000-0002 & 0003 and verification by the Environment Agency that this is a valid dry escape route is included in Appendix A.
- 7.4 Any future development will ensure there is dry direct access from the occupied parts of the development to Thames Street .
- 7.5 It is considered that such a dry escape meets the requirements of PPG 25.

## **8. FLOOD WARNING**

- 8.1 The site lies within the Flood Warning Area 'River Thames, Bell Weir Lock to Shepperton Lock'.
- 8.2 The Environment Agency operates an Automated Voice Messaging (AVM) system which is available to all residential and commercial properties located within the flood plain. This system will be incorporated into a Flood Management Plan for any future development and though there is unlikely to be any accommodation at ground level it will be used to ensure any cars parked at ground level are moved to higher ground safely.

## **9. OTHER ISSUES REQUIRED TO BE ADDRESSED BY PPG 25, APPENDIX F**

### **9.1 Existing Flood Defences**

- 9.1.1 There are no existing flood defences on the present site.

### **9.2 Speed of Water**

- 9.2.1 The site is situated down stream of the Staines Bridge but, due to the protection afforded by the high ground levels on Thames Street, is unlikely to sit within a fast moving part of the flood plain flow.

### 9.3 **Social, Economic and Environmental Impacts**

9.3.1 Spelthorne BC will consider the social, economic and environmental impacts at the time of any future planning application though considering the present use of the site; any impacts are unlikely to be significant. During the construction phase care will be taken to avoid unnecessary polluted run-off entering local drains and sewers.

### 9.4 **Assessment of hydraulics of Drains/Sewers During Floods**

9.4.1 This has not been addressed at this stage though it is likely that the foul drainage from the site will need to be in a sealed pumped system.

### 9.5 **Impact on fluvial morphology, long term stability and sustainability**

9.5.1 There are none.

### 9.6 **Residual Risk Assessment**

9.6.1 PPG 25 requires consideration of the long term effects of global warming and suggests in the Thames Valley area flows could increase by 20% for any given return period. The Environment Agency have provided a predicted level of 15.92mOD for this degree of increase and the additional extent of flooding that this represents is shown on Drg 120297-1000-0001. It is recommended that this level is combined with a sensible freeboard to set the threshold level of any new properties within the study area.

## 10. **CONCLUSION**

- The existing use of the site lies within the flood plain and is predicted to start being inundated above the 1 in 50 yr return period. The site is consequently classified as Zone 3a.
- The proposed development will not reduce flood plain storage and has the capacity to provide more.
- Dry access is available to a dry escape route along Clarence Street and then over Staines Bridge and along the Causeway. This access will be provided from the ground level which will be set above the 1 in 100 year level.
- A Flood Management Plan should be produced that makes use of existing flood warning measures to ensure safe removal of cars from any car park during a flood event.
- Any future more detailed applications for this site should make reference to the conditions included in the Environment Agency's letter dated 20<sup>th</sup> March and 5<sup>th</sup> March 2007 included in Appendix A

I K Simpson, April 2007

For Black & Veatch (ref 120297)

## **APPENDIX A: ENVIRONMENT AGENCY CORRESPONDENCE**

## APPENDIX B: DRAWINGS

## APPENDIX C: ENVIRONMENT AGENCY FLOOD MAP