



**PROPOSED EXTENSION TO
RESIDENTIAL DWELLING,
7 GREEN LINK WALK,
LONDON BOROUGH OF
RICHMOND UPON THAMES,
TW9 4AF**

FLOOD RISK ASSESSMENT

SEPTEMBER 2014

REPORT REF: 1333/RE/09-14/01

**Evans Rivers and Coastal Ltd
101 Knowsley Road
Norwich
Norfolk
NR3 4PT**

**T: 01603 611923
E: Enquiries@evansriversandcoastal.co.uk
W: www.evansriversandcoastal.co.uk**

CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by Michael Barclay Partnership LLP to carry out a flood risk assessment for a proposed extension to a residential dwelling at 7 Green Link Walk, London Borough of Richmond upon Thames, TW9 4AF.

QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY

Evans Rivers and Coastal Ltd operates a Quality Assurance, Environmental, and Health and Safety Policy.

This project comprises various stages including data collection; depth analysis; and reporting. Quality will be maintained throughout the project by producing specific methodologies for each work stage. Quality will also be maintained by providing specifications to third parties such as surveyors; initiating internal quality procedures including the validation of third party deliverables; creation of an audit trail to record any changes made; and document control using a database and correspondence log file system.

To adhere to the Environmental Policy, data will be obtained and issued in electronic format and alternatively by post. Paper use will also be minimised by communicating via email or telephone where possible. Documents and drawings will be transferred in electronic format where possible and all waste paper will be recycled. Meetings away from the office of Evans Rivers and Coastal Ltd will be minimised to prevent unnecessary travel, however for those meetings deemed essential, public transport will be used in preference to car journeys.

The project will follow the commitment and objectives outlined in the Health and Safety Policy operated by Evans Rivers and Coastal Ltd. All employees will be equipped with suitable personal protective equipment prior to any site visits and a risk assessment will be completed and checked before any site visit. Other factors which have been taken into consideration are the wider safety of the public whilst operating on site, and the importance of safety when working close to a water source and highway. Any designs resulting from this project and directly created by Evans Rivers and Coastal Ltd will also take into account safety measures within a "designers risk assessment".

Report carried out by:



.....
Rupert Evans, BSc (Hons), MSc, CEnv, C.WEM, MCIWEM, AIEMA

DISCLAIMER

This report has been written and produced for Michael Barclay Partnership LLP. No responsibility is accepted to other parties for all or any part of this report. Any other parties relying upon this report without the written authorisation of Evans Rivers and Coastal Ltd do so at their own risk.

COPYRIGHT

The contents of this document must not be copied or reproduced in whole or part without the written consent of Evans Rivers and Coastal Ltd or Michael Barclay Partnership LLP. The copyright in all designs, drawings, reports and other documents (including material in electronic

form) provided to the Client by Evans Rivers and Coastal Ltd shall remain vested in Evans Rivers and Coastal Ltd. The Client shall have licence to copy and use drawings, reports and other documents for the purposes for which they were provided.

© **Evans Rivers and Coastal Ltd**

CONTENTS

| | |
|---|--|
| CONTRACT | i |
| QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY | i |
| DISCLAIMER | i |
| COPYRIGHT | i |
| CONTENTS | iii |
| | |
| 1. INTRODUCTION | 1 |
| 1.1 Project scope | 1 |
| | |
| 2. DATA COLLECTION | 2 |
| | |
| 3. SITE CHARACTERISTICS | 3 |
| 3.1 Existing Site Characteristics and Location | 3 |
| 3.2 Site Proposals | 4 |
| | |
| 4. BASELINE INFORMATION | 5 |
| 4.1 Flood Zone Map | 5 |
| 4.2 Flood Defences | 6 |
| 4.3 Flood Warning and Emergency Planning | 6 |
| | |
| 5. FLOOD RISK FROM RIVER THAMES | 8 |
| | |
| 6. RIVER THAMES FLOOD RISK MITIGATION AND EVACUATION | 9 |
| 6.1 Reducing Exposure to the Hazard | 9 |
| 6.2 Differential Depth | 9 |
| 6.3 Water Entry Strategy | 9 |
| 6.4 Reducing Vulnerability to the Hazard | 11 |
| 6.5 Vulnerable Groups | 12 |
| 6.6 Safe Access/Egress | 13 |
| 6.7 Insurance | 14 |
| | |
| 7. OTHER SOURCES OF FLOODING | 15 |
| 7.1 Groundwater Flooding | 15 |
| 7.2 Surface Water Flooding and Sewer Flooding | 15 |
| 7.3 Reservoirs, Canals And Other Artificial Sources | 15 |
| | |
| 8. CONCLUSIONS | 16 |
| | |
| 9. BIBLIOGRAPHY | 17 |
| | |
| APPENDIX A | HOUSEHOLDER AND OTHER MINOR EXTENSIONS IN FLOOD ZONES 2 AND 3 |
| | |
| DRAWINGS | EXISTING GROUND FLOOR PLAN – 01A SEE PDF |
| | PROPOSED GROUND FLOOR PLAN – 02B SEE PDF |

1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by MR & MRS CHANDRA to carry out a flood risk assessment for a proposed extension to a residential dwelling at 7 Green Link Walk, London Borough of Richmond upon Thames, TW9 4AF.

1.1.2 It is understood that this Flood Risk Assessment will be submitted to the Planning Authority and Environment Agency (Agency, hereafter) as part of a planning application. Specifically, this assessment intends to:

- a) Consider the impacts of flooding from all sources, in accordance with NPPF and NPPF Technical Guidance;
- b) Review any literature and guidance specific to this area such as the SFRA;
- c) Adhere to the Agency's guidance document entitled "Householder and other minor extensions in Flood Zones 2 and 3";
- d) Assess the risks to people and property and propose mitigation measures accordingly;
- e) Review existing evacuation and warning procedures for the area;
- f) Report findings and recommendations.

1.1.3 This assessment is carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) and associated Technical Guidance, both dated March 2012. Other documents which have been consulted include:

- DEFRA/EA document entitled *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*, 2005;
- Communities and Local Government 2007. *Improving the Flood Performance of New Buildings*. HMSO.
- DEFRA/EA document entitled *The flood risks to people methodology (FD2321/TR1)*, 2006;
- EA *Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose*, 2008;

2. DATA COLLECTION

2.1 To assist with this report, the data collected included:

- Ordnance Survey 1:1250 map (Evans Rivers and Coastal Ltd OS licence number 100049458).
- 1:625,000 *Hydrogeological Map of England and Wales*, published in 1977 by the Institute of Geological Sciences (now the British Geological Survey).
- British Geological Survey Online Geology Viewer.
- London Borough of Richmond upon Thames Strategic Flood Risk Assessment dated 2010.

2.2 All third party data used in this study has been checked and verified prior to use in accordance with Evans Rivers and Coastal Ltd Quality Assurance procedures.

3. SITE CHARACTERISTICS

3.1 Existing Site Characteristics and Location

3.1.1 The site is located at number 7 Green Link Walk, London Borough of Richmond upon Thames. The location of the site is shown on Figure 1.

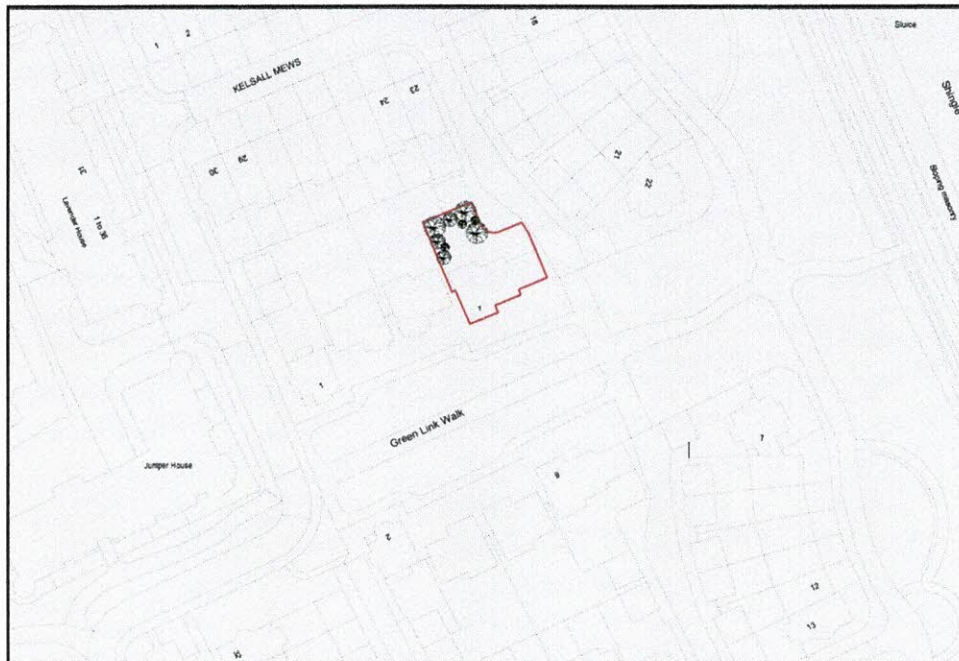


Figure 1: Site location plan (Source: Ordnance Survey, 2014)

3.1.2 The site currently comprises number 7 Green Link Walk, a three-storey residential detached house with a private garden to the front and rear. The site is surrounded by other residential dwellings and is accessed from Green Link Walk. General living areas and a garage occupy the ground floor with sleeping areas generally provided across upper floors. The existing site layout has been produced by Archic and can be seen on Drawing Number 1 and Figure 2.

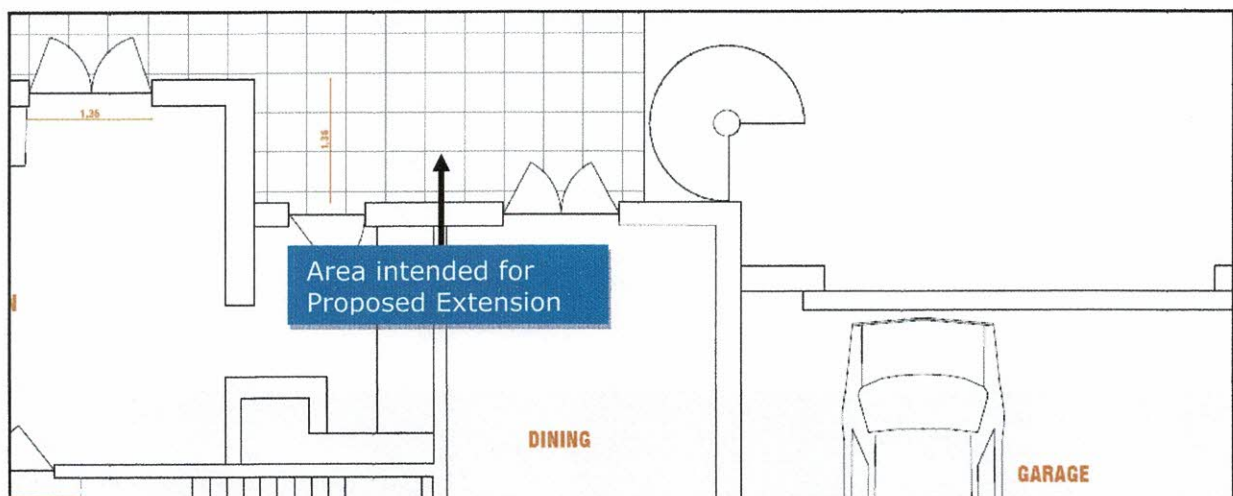


Figure 2: Area of existing site designated for proposed extension (Source: taken from Archic Drawing Number 1)

3.2 Site Proposals

- 3.2.1 It is the Client’s intention to refurbish/remodel some internal parts of the property and provide a small single-storey extension (of 5.49 sq m) to the rear of the property and over existing paving. The proposed extension will increase the dining area across the ground floor of the property. There will remain no sleeping accommodation across the ground floor.
- 3.2.2 The site proposals have been produced by Archic and can be seen on Drawing Number 6 and Figure 3.

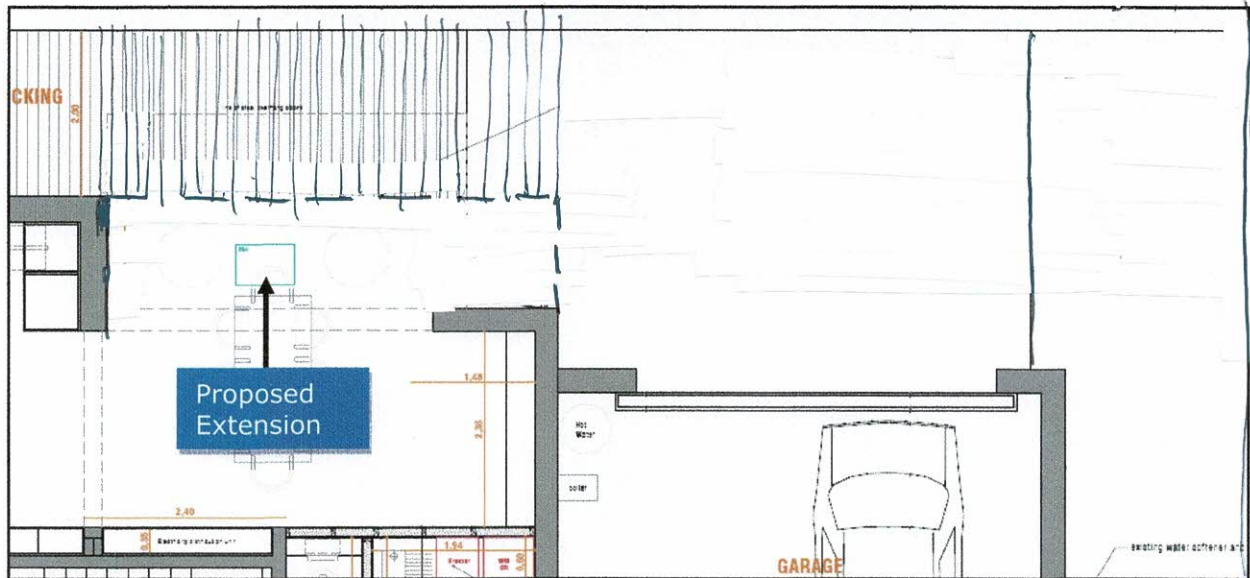


Figure 3: Area of site designated for proposed extension (Source: taken from Archic Drawing Number 6)

4. BASELINE INFORMATION

4.1 Flood Zone Map

4.1.1 The Environment Agency's Flood Zone Map (Figure 4) and SFRA Flood Map (Figure 5) shows that the site is located within the NPPF defined (defended) Flood Zone 3 associated with the River Thames. The extent of the flood zones do not take into account the presence of any formal flood defences, or other features which also act as informal flood defences.

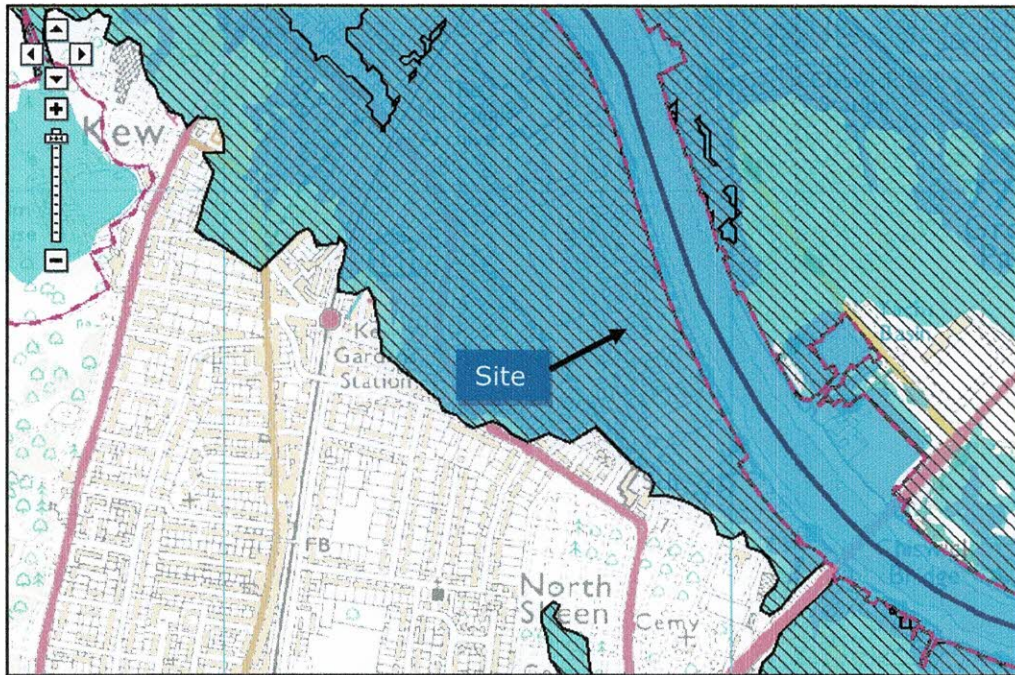


Figure 4: Environment Agency Flood Zone Map (Source: Environment Agency, 2014)

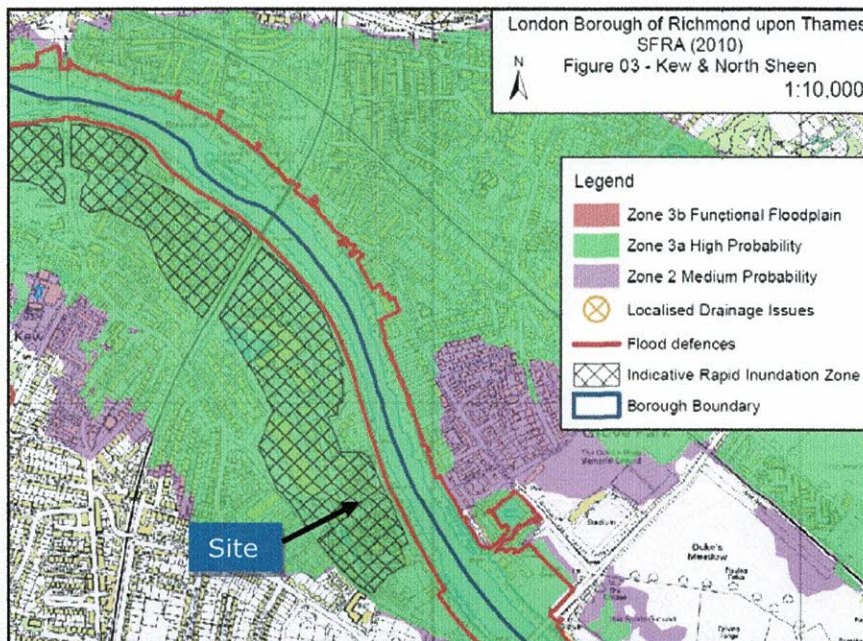


Figure 5: SFRA Flood Zone Map (Source: taken from Figure 3 of SFRA, 2010)

4.2 Flood Defences

- 4.2.1 The River Thames is defended by a combination of concrete tidal flood walls, which run parallel to the river at this location, and the Thames Barrier located along the Thames downstream of the site's location. The SFRA states that the defences as a whole offer a standard of protection 1 in 1000 years against a combine fluvial and tidal flooding event.

4.3 Flood Warning and Emergency Planning

- 4.3.1 The site is located within an Environment Agency flood warning area. The Environment Agency can issue each level of warning when necessary at least 12 hours prior to the next high tide or critical estimated peak surge tide (based on a model run which is reviewed every 6 hours). It is understood that flood warnings can be issued to the media and local authorities/emergency services approximately 24 hours in advance of a high category flood warning, however in the interest of public safety warnings are only issued to residents 12 hours prior to a higher category flood warning.
- 4.3.2 According to the Met Office document entitled *Together – make a difference with a coordinated response to emergency management* dated 2013, EMARC is one of the forecast production units at the Met Office. It provides specialist forecasts to the UK emergency services and other government departments, as well as to the international community and has continuous operational capability. This enables the Met Office to provide an immediate response to customers requiring meteorological information to deal with a variety of environmental incidents. These could range from chemical or radiological releases to biological hazards such as foot and mouth disease.
- 4.3.3 The National Severe Weather Warning Service provides severe weather alerts and warnings to the general public and emergency responders, giving up to four days advance notice of disruptive weather conditions. These are updated daily in the run up to the weather event and include maps showing the risk of disruption across the UK.
- 4.3.4 Flood Alerts, Flood Warnings and Severe Flood Warnings are issued to residents and businesses within flood risk areas by the Agency's *Floodline Warnings Direct* (FWD) service. This system is managed by the Environment Agency and dials out a message to the recipient when a particular category of flood warning is being advised. The message is conveyed by a constant ringing of the telephone or can alternatively be communicated to mobile phones and computers. The system functions at all times, issuing flood warnings and alerts in conjunction with announcements on radio and other media. Owners and occupiers of dwellings or businesses thought to be at risk can sign up to the scheme. **The owners are encouraged to confirm details with the Agency and to sign up for these warnings.**
- 4.3.5 The Extended Warning Direct (EWD) service also takes advantage of more recent developments in technology and allows contact to be made through mobile phones and PC's. Information concerning the category of flood warning is also sent to the emergency services and local authorities who may need to mobilise and implement evacuation procedures.
- 4.3.6 A new Flood Forecasting Centre (FFC) has been set up between the Agency and Met Office and is intended to improve the lead time and accuracy of flood warnings issued to emergency services and other important services to assist them with emergency planning decisions.
- 4.3.7 The FFC issues daily guidance on all forms of flood risk across England and Wales while the Scottish Flood Forecasting Service performs the same function across Scotland. The
-

FFC is now also responsible for issuing tidal alerts for the British coastline which helps the Environment Agency and the Scottish Environment Protection Agency assess the risk of coastal flooding and issue warnings when required.

4.3.8 The various flood warning codes can be seen on Figure 6.




| | |
|---|---|
|  FLOOD ALERT | Flooding is possible – Be prepared |
|  FLOOD WARNING | Flooding is expected – Immediate action required |
|  SEVERE FLOOD WARNING | Severe flooding – Danger to life |

Figure 6: Flood warning codes (Source: Environment Agency)

4.3.9 It is understood from the SFRA hereafter that the Local Authority are a Category 1 responder under the Civil Contingencies Act 2004. Should a Flood Warning be issued then evacuation procedures for the area are organised by the Emergency Planning Officer. In the event of an emergency such as major flooding a multi-agency group is responsible for all evacuation and co-ordination/assistance to emergency services. Evacuation of people is towards allocated Council operated rest centres which consist of centres generally located outside of the floodplain and comprise village halls or sports centres. These centres provide shelter, first aid and refreshment. Transportation to rest centres may be provided by the local authorities upon the instruction of the emergency response team and priority is given to the elderly and other vulnerable groups, however the council have a Duty of Care to all people within the flood risk area.

5. FLOOD RISK FROM RIVER THAMES

- 5.1 The SFRA states that the likelihood of rapid river rise in the Thames resulting in the rapid inundation of urban areas in the Borough is considered to be negligible.
- 5.2 When considering a catastrophic failure of the flood defences, the area behind the defences and including the site could be affected by floodwater during the event. Figure 5 shows that the site is also located within the *rapid inundation zone*. The SFRA states that this is a zone across which a sudden breach of the flood defences may pose an immediate risk to life.
- 5.3 Figure 7 shows that the flood hazard to people as calculated in the SFRA is medium should a failure of the defences occur. The breach modelling outlined in the SFRA indicates that the maximum flood levels throughout the inundated area are approximately 5m AOD. It is estimated from relevant OS maps that the site is currently set at approximately 4.6m AOD, therefore the flood depth at the site would be 0.4m under these circumstances.

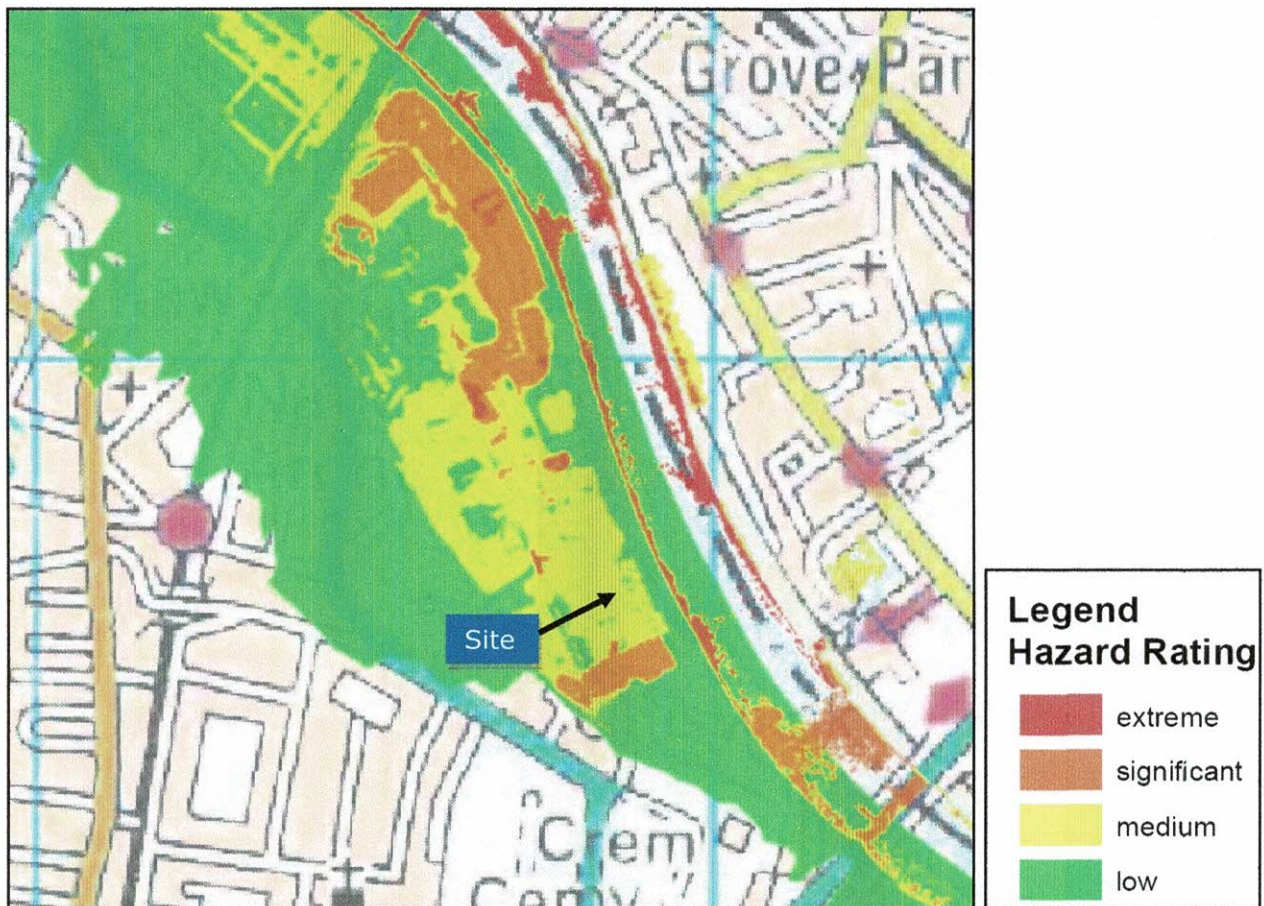


Figure 7: Flood hazard from a breach in the defences (Source: taken from Figure C-1 of the SFRA dated 2010)

6. RIVER THAMES FLOOD RISK MITIGATION AND EVACUATION

6.1 Reducing Exposure to the Hazard

- 6.1.1 In order to assess and reduce the exposure to the hazard and the vulnerability to the hazard after the site has been developed, the guidance outlined in the DCLG/DEFRA/EA document entitled *Flood Risk Assessment Guidance for New Development Phase 2; Flood Risks to People, Phase 2; Improving the Flood Performance of New Buildings* has been consulted.
- 6.1.2 The Agency's guidance document entitled "Householder and other minor extensions in Flood Zones 2 and 3" (Appendix A), states that when considering mitigation measures for proposed extensions which are less than 250 sq m, the applicant can either set the floor level of the extension to that of the existing adjacent dwelling, or the applicant can raise the floor level of the proposed extension to 300mm above the flood level.
- 6.1.3 It is considered more practical in this instance to set the floor level of the extension to the same level as the existing floor level of the dwelling. Mitigation measures in this Chapter have therefore been based on an internal flood depth of 0.4m as described in paragraph 5.3 of this report.

6.2 Differential Depth

- 6.2.1 Assuming that floodwater is restricted from entering the building somewhat by external doors, the differential depth (i.e. the depth difference between the inside of the building and outside of the building) could reach 0.4m.
- 6.2.2 The DEFRA/EA document entitled *Improving the Flood Performance of New Buildings*, dated 2007, suggests that where the depth of floodwater is higher than 0.5m above the floor level within a building, there will be damage to internal finishes.
- 6.2.3 It is also stated in the aforementioned DEFRA/EA document that there is some damage to buildings if the depth differential between the outside and inside water levels exceeds 0.6m. Severe damage can occur if this reaches 1m even if the buildings are flood proofed.
- 6.2.4 Despite the flood depth being below the critical differential depth threshold, it is considered that in order to adopt a worst-case scenario and to consider the uncertainties associated with the estimated ground level at the site, a *Water Entry Strategy* should be adopted rather than a *Water Exclusion Strategy* which would normally be implemented when the differential depth is below 0.6m.

6.3 Water Entry Strategy

- 6.3.1 In accordance with the ODPM guidance document *Preparing for Floods* and Figure 4.1 of the aforementioned DCLG/DEFRA/EA document, a *Water Entry Strategy* essentially permits the passage of floodwater through the building and prevents any displacement of floodwater during the event. A *Water Entry Strategy* in this case aims to allow floodwater to enter the extension and flood resilience techniques are incorporated to reduce the consequences of flooding. It is proposed that the following mitigation measures are established up to the predicted flood depth of 0.4m.

Floors

- 6.3.2 Ground supported floors will be preferable and a damp-proof membrane should be included within the floor construction and suitable floor finished such as ceramic or concrete based floor tiles are recommended.

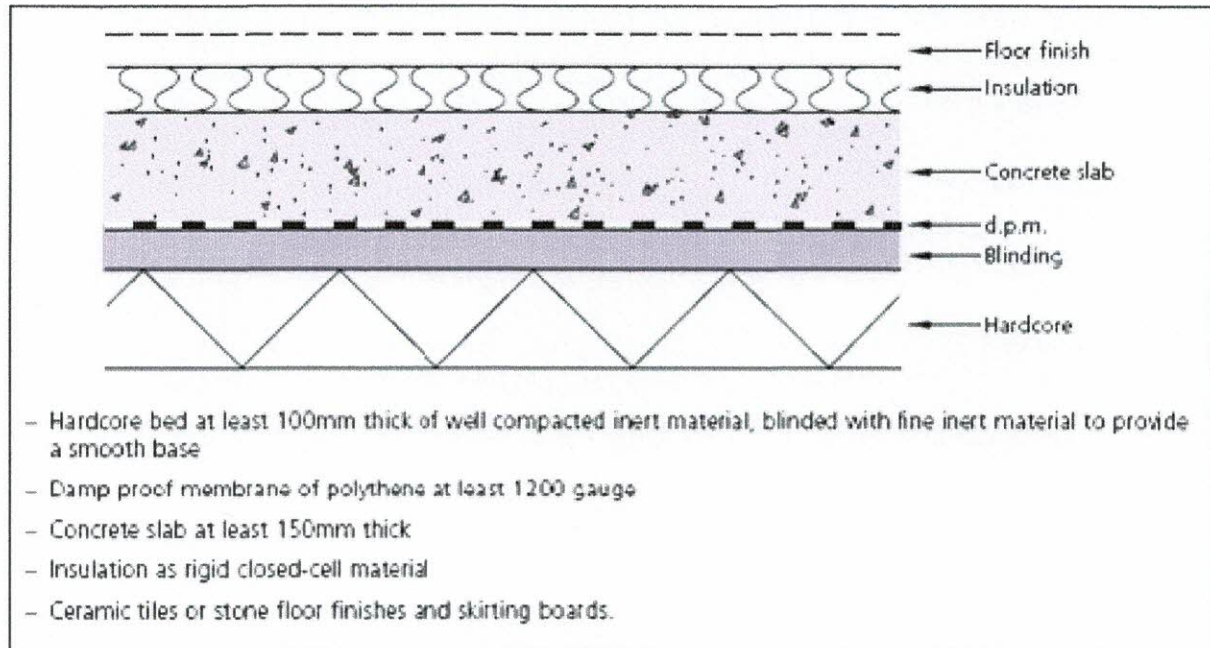


Figure 8: Ground-supported floor (Source: DCLG, 2007)

Walls

- 6.3.3 Suitable flood proofing measures will need to be incorporated within the walls up to the flood level. Concrete block walls dry quicker than other types such as Aircrete blocks.
- 6.3.4 Clear cavity walls (with no insulation) should be used as they also allow for quicker drying. Insulation can be fitted externally as it is easily replaced. If cavity insulation is preferred then rigid closed cell materials should be used as they have a low moisture take-up (Figure 9).
- 6.3.5 Internal cement renders should be avoided as they prevent effective drying. Standard gypsum plasterboard could be used as a sacrificial material and can be removed after the flood. Lime-based plaster and ceramic tiles are also known to offer some resilience.

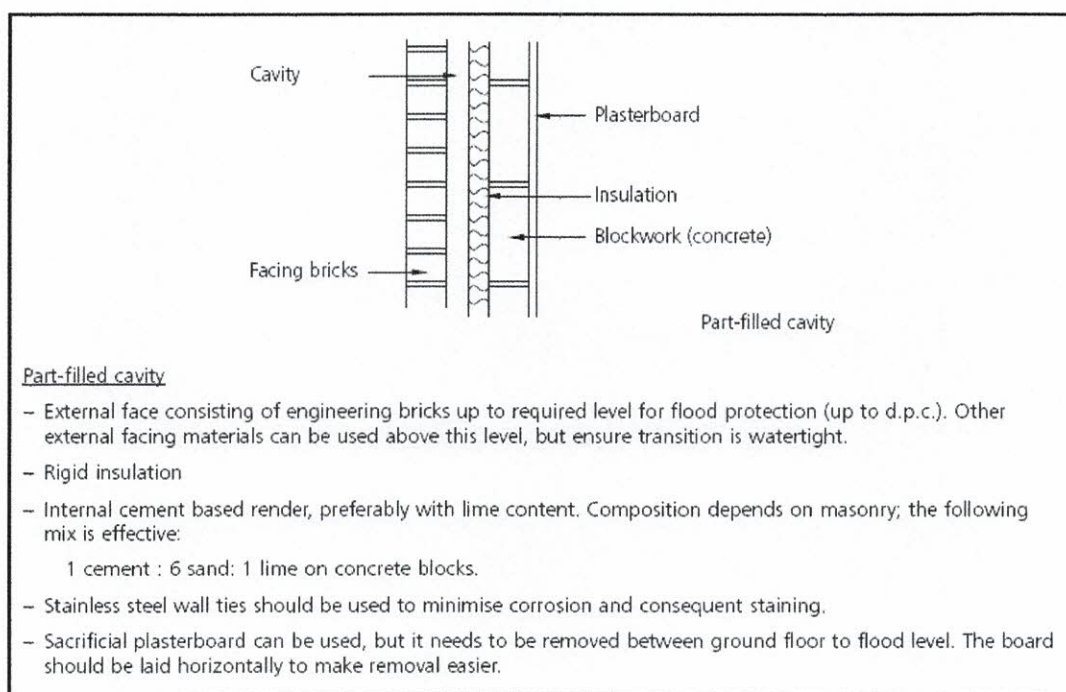


Figure 9: Cavity External Walls (DCLG, 2007)

Fittings

- 6.3.6 Durable fittings which are not affected by floodwater could be used internally (e.g. plastic or stainless steel units). Wood fittings should be avoided; however sacrificial fittings can be installed which can then be replaced easily after the flood. There should be gaps behind the fittings to promote drainage and drying.

Services

- 6.3.7 Electrical sockets should be raised above the flood level and the mains supply of electric should be turned off in the event of a flood. Wiring for communications should also be insulated to prevent damage.
- 6.3.8 It is recommended that after the event, a structural survey is carried out in order to assess any damage due to prolonged periods of flood water exposure. The CIRIA guidance document (C623) entitled *Standards for the repair of buildings following flooding* outlines the various approaches.

6.4 Reducing Vulnerability to the Hazard

- 6.4.1 Although people will remain safe across the upper floors of the dwelling, people at the site are unlikely to have detailed knowledge of the dynamics of the flood event and the storminess of the event could result in people panicking or becoming anxious.
- 6.4.2 The Agency aims to provide up to 12 hours notice before the issue of a *Flood Warning* for tidal events. It is likely that the flood levels will be monitored by the Agency and the corresponding level of flood warning issued depending on the rising flood level. It is understood that the police and other emergency services will assist in the evacuation to rest centres operated by the Council. It is not mandatory for occupants to use these centres and personal evacuation arrangements can be just as effective. The Fire Service will assist in any rescuing of people from the flooded area once this has occurred.

- 6.4.3 It is recommended that the occupants liaise with the Agency in order to register with the Agency's Flood Warnings Direct service and ensure that they are aware of the flood risk so that they have the option to escape/evacuate upon receipt of a *Flood Warning* or upon the instruction of the emergency services.
- 6.4.4 The occupants should develop a *Family Flood Plan*. Further guidance is offered in the Environment Agency's guidance document entitled *What to do before, during and after a flood*. The *Family Flood Plan* should consider, for example, information about vital medication needed and a *Flood Kit*.
- 6.4.5 A *Flood Kit* is a useful precautionary measure especially if evacuation from the site is prolonged. The kit should be stored in an accessible location to ensure that it is not affected by floodwater. The contents should also be checked every 6 months and items replaced if necessary.
- 6.4.6 It may be sensible to compile two *Flood Kit's* to suit each eventuality. For example, a smaller kit could be compiled which would allow the occupants to carry it during evacuation. A larger kit could also be compiled which included additional food and beverage items in case of ongoing safe refuge within the property. Both kits should contain the necessary items as suggested below.
1. Important documents
 2. Torch and batteries
 3. Mobile phone (fully charged)
 4. First-aid kit
 5. Wind-up radio
 6. Important telephone numbers
 7. Bottled water
 8. Non-perishable food provisions
 9. Rubber Gloves and wellington boots
 10. Medication or information relating to medication and its location
 11. Blankets, warm clothes
 12. Essential toiletries
 13. Camera to record any damage
 14. Emergency cash
- 6.4.7 Although there will be safe refuge across the site, it is not recommended that occupants remain within the building after the order for evacuation has been issued by the emergency services, unless the occupant is vulnerable (i.e. infirm) and the emergency services should be notified. If safe refuge is preferred, then the occupants should turn off the gas and electricity and non-return valves will ensure that there is no back flow of foul water (occupants should, however, refrain from flushing toilets or emptying sinks).

6.5 Vulnerable Groups

- 6.5.1 The occupants at the site may include vulnerable groups such as elderly people, those with sensory or physical disabilities, minority ethnic groups, or the infirm. Priority will need to be given to these people during the flood event.
- 6.5.2 Research suggests that older people may have life experiences which inhibit appropriate action on receipt of a flood warning and warnings may not be heeded due to this strong sense of independence.
- 6.5.3 Minority ethnic groups may not be aware of warnings because these warnings are not conveyed on radio channels customarily heard by them. Also a poor command of

English (verbally and written) may also inhibit their response to any flood warning and advice issued by the emergency services.

- 6.5.4 The infirm or disabled may also be vulnerable to flood risk. This may be in the form of anxiety or other ailments which are aggravated by flooding. Evacuation may also be a more extensive exercise for these groups than for other people at the site.
- 6.5.5 People with no prior experience of flooding tend to have a lack of awareness, preparedness and knowledge of flooding. These people often disbelieve that the flood water would reach their location and are not aware of how resilient their building is.
- 6.5.6 The research document entitled *Public Response to Flood Warning* published by the EA/DEFRA in 2007 suggests that warning messages issued face-to-face have been found to increase public response to hazard. Conversely, fear of looting can decrease the probability of response and therefore the necessary security measures will need to be implemented once evacuation has been ordered.

6.6 Safe Access/Egress

- 6.6.1 Safe refuge is available throughout the event, however, safe access and egress will not be achieved throughout the event.
- 6.6.2 By consulting Figure 7 and the OS map, people will need to travel 320m south west of the site in order to be outside of the floodplain (Figure 10). Figure 5 shows that the hazard to people will be *medium* for 205m and then *low* thereafter.

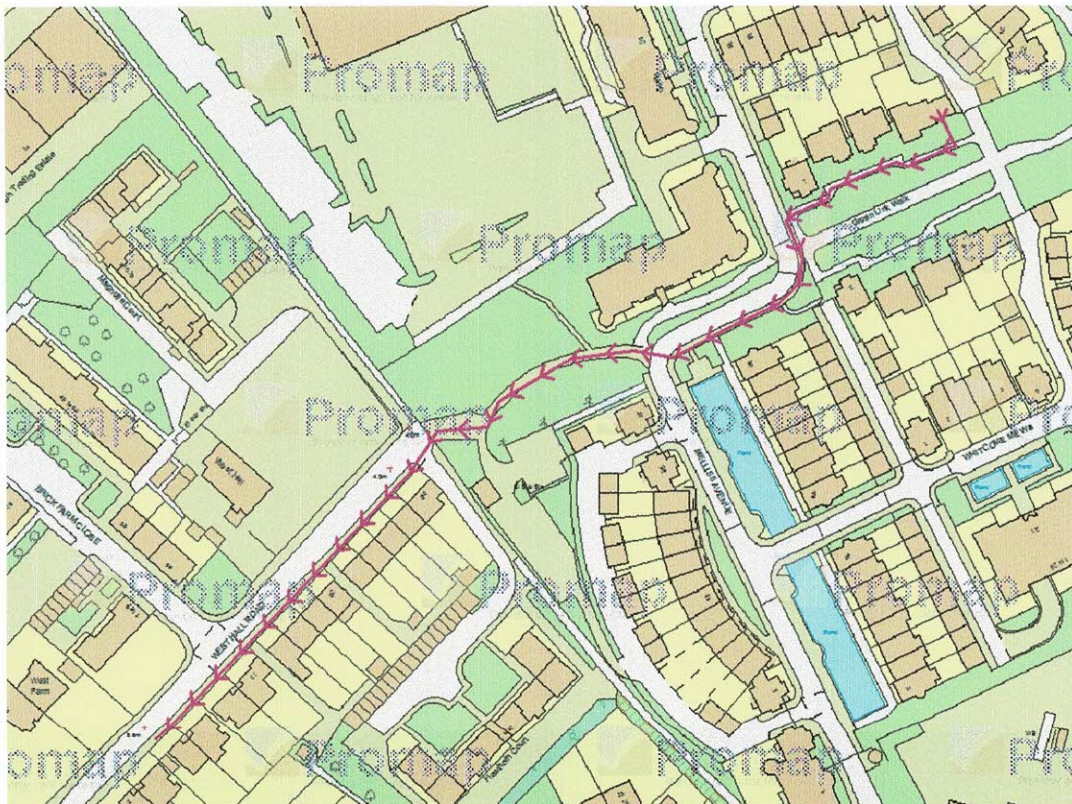


Figure 10: Preferred evacuation Route

6.7 Insurance

- 6.7.1 The Association of British Insurers (ABI) published a guidance document in 2012 entitled *Guidance on Insurance and Planning in Flood Risk Areas for Local Planning Authorities in England*.
- 6.7.2 The ABI guidance sets out the requirements of the insurance industry when considering flood risk and insurability of the property. The guidance suggests that properties should be protected for flood events up to the 1 in 100 year event in order to access insurance at a competitive price.
- 6.7.3 The guidance also states that insurers would of course prefer to cover properties which are not at risk of flooding, however, for those properties which are at risk of flooding insurers would prefer that the properties are raised above the flood level, over resistance measures which prevent floodwater from entering the building, or resilience measures which allows floodwater to enter the building.
- 6.7.4 It is not practical to raise the ground floor level above the flood level, however, flood resilience measures have been proposed and there will be a good chance of the property being insured at a competitive rate.

7. OTHER SOURCES OF FLOODING

7.1 Groundwater Flooding

- 7.1.1 To assist with determining the soil and geology at the site, the various soil and hydrogeological data listed in Section 2 has been referred to. It can be seen from the various soil and hydrogeological data listed in Section 2 that the soils beneath the site comprise Alluvium overlying London Clay.
- 7.1.2 The SFRA shows on Figure D that there have not been any recorded incidents of groundwater flooding at the site. Therefore, it is likely that the less permeable soils will have a buffering effect on infiltrating surface water resulting in a low potential for any perched groundwater to rise and breach the ground surface.
- 7.1.3 It is therefore considered that there is a low risk of groundwater flooding at the site.

7.2 Surface Water Flooding and Sewer Flooding

- 7.2.1 Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewer thus causing it to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding. Surface water flooding can also occur as a result of overland flow across poorly drained rural areas.
- 7.2.2 The SFRA shows on Figure G that there is a very low risk of surface water flooding to the site. The Environment Agency Surface Water Flooding Map indicates that there is a very low surface water flood risk across the site.
- 7.2.3 Figure 3 of the SFRA shows that there are no identified local drainage issues at the site or within the immediate vicinity.

7.3 Reservoirs, Canals And Other Artificial Sources

- 7.3.1 The failure of man-made infrastructure such as flood defences and other structures can result in unexpected flooding. Flooding from artificial sources such as reservoirs, canals and lakes can also occur suddenly and without warning, leading to high depths and velocities of flood water which pose a safety risk to people and property.
- 7.3.2 The Environment Agency's "Risk of flooding from reservoirs" map suggests that the site is at risk from the Queen Mary Reservoir and Queen Elizabeth II Reservoir. However, as the information associated with the maps suggest, it is considered that reservoir flooding is extremely unlikely to happen and such features are regularly inspected by qualified engineers under the Reservoir Act 1975.
- 7.3.3 If flooding from such sources was to occur, the development will be protected as a result of the *Water Entry Strategy* and flood warning/evacuation measures outlined in this report.

8. CONCLUSIONS

- The site is located within the NPPF Flood Zone 3a from a flood event within the River Thames. It has been estimated that the flood depth across the site under breach conditions will reach 0.4m. In accordance with the EA's standing advice, the floor level of the proposed extension will be set the same as the adjacent floor level of the dwelling. Mitigation measures will be incorporated to a level of 0.4m above the floor level. A *Water Entry Strategy* should be adopted to mitigate the flood risk at the site.
- A warning and evacuation strategy has been developed within this assessment. It is proposed that the occupants register with the Agency's *Flood Warnings Direct* and prepare a *Family Flood Plan*. It is recommended that the occupants take advice from the emergency services and evacuate the site before the receipt of a *Flood Warning*.
- Safe access/egress cannot be achieved during the peak of the event, however, it is recommended that the occupants evacuate the site before a breach of the defences and during the early warning stages if possible. Safe refuge during all events is available at all times.
- It is considered that there is a low risk of groundwater flooding at the site and a very low surface water/sewer flooding risk. The site is at risk from other sources such as reservoirs. The proposed *Water Entry Strategy* will mitigate these risks to acceptable levels.

9. BIBLIOGRAPHY

- i. Association of British Insurers 2012. *Guidance on Insurance and Planning in Flood Risk Areas for Local Planning Authorities in England.*
- ii. CIRIA 2005. *Standards for the repair of buildings following flooding, Report 623.* CIRIA.
- iii. CIRIA 2000. *Groundwater Control – design and practice, Report 515.* CIRIA.
- iv. Cobby, D., et al. 2009. *Groundwater flood risk management: advances towards meeting the requirements of the EU Floods Directive.* Journal of Flood Risk Management.
- v. Communities and Local Government 2012. *National Planning Policy Framework.*
- vi. Communities and Local Government 2012a. *Technical Guidance to the National Planning Policy Framework.*
- vii. Communities and Local Government 2007. *Improving the Flood Performance of New Buildings.* HMSO.
- viii. DEFRA/EA 2007. *Public Response to Flood Warning, Flood and Coastal Defence R&D Programme, R&D Technical Report SC020116.* Environment Agency.
- ix. DEFRA/EA 2006. *Flood Risks to People, Phase 2, R&D Technical Report FD2321/TR1, Flood and Coastal Defence R&D Programme.* Water Research Council.
- x. DEFRA/EA 2006a. *Flood Risks to People, Phase 2, R&D Technical Report FD2321/TR2, Flood and Coastal Defence R&D Programme.* Water Research Council.
- xi. DEFRA/EA 2005. *Framework and guidance for assessing and managing flood risk for new development, Phase 2, Flood and Coastal Defence R&D Programme, R&D Technical Report FD2320/TR2.* Water Research Council.
- xii. DEFRA/EA 2005a. *Flood Warning for Vulnerable Groups: A review of the literature, Flood and Coastal Defence R&D Programme.* Environment Agency.
- xiii. DEFRA/Jacobs 2006. *Groundwater flooding records collation, monitoring and risk assessment (ref HA5).*
- xiv. DEFRA/Jacobs 2004. *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS), Final Report, Volumes 1 and 2.*
- xv. Environment Agency 2008. *Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1.*
- xvi. Geological Society of London 2006. *Groundwater and Climate Change.* Geoscientist magazine, Volume 16, No 3.

- xvii. Institute of Geological Sciences 1977. *Hydrogeological Map of England and Wales*, 1:625,000. NERC.
- xviii. London Borough of Richmond upon Thames 2010. *London Borough of Richmond upon Thames Strategic Flood Risk Assessment*.
- xix. NERC 2009. *Flood Estimation Handbook* [CD-ROM], Version 3. Institute of Hydrology.
- xx. NERC 1975. *Flood Studies Report (FSR)*. Institute of Hydrology.
- xxi. ODPM 2003. *Preparing for Floods*. London: ODPM.

**APPENDIX A - HOUSEHOLDER AND OTHER MINOR
EXTENSIONS IN FLOOD ZONES 2 AND 3**

Route to this page -->Matrix-->Matrix>Cell D3

Restart

Print Form

Householder and other minor extensions in Flood Zones 2 and 3

This guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250 sq. metres. It should NOT be applied if an additional dwelling is being created, e.g. a self contained annex. In this instance consult the Environment Agency.

We recommend that:

Planning Authorities:

- 1) Refer the applicant to the standing advice pages on the Environment Agency website or provide them with a copy of this page for them to include as part of the planning application submission.
- 2) Check the planning application to ensure that one or other of the mitigation measures from the table below has been incorporated.

Applicants:

Complete the table below and include it with the planning application submission. The table, together with the supporting evidence, will form the Flood Risk Assessment (FRA) and will act as an assurance to the Local Planning Authority (LPA) that flood risk issues have been adequately addressed.

| Applicant to choose one or other of the flood mitigation measures below | Applicant to provide the LPA with the supporting information detailed below as part of their FRA | Applicant to indicate their choice in the box below. Enter 'yes' or 'no' |
|--|--|--|
| Either ; Floor levels within the proposed development will be set no lower than existing levels AND, flood proofing of the proposed development has been incorporated where appropriate. | Details of any flood proofing / resilience and resistance techniques, to be included in accordance with ' <i>Improving the flood performance of new buildings</i> ' CLG (2007) | Yes |
| Or; Floor levels within the extension will be set 300mm above the known or modelled 1 in 100 annual probability river flood (1%) or 1 in 200 annual probability sea flood (0.5%) in any year. This flood level is the extent of the Flood Zones | This must be demonstrated by a plan that shows finished floor levels relative to the known or modelled flood level. All levels should be stated in relation to Ordnance Datum ¹ | No |

Subterranean/basement extensions

Due to the risk of rapid inundation by floodwater basements should be avoided in areas at risk of flooding. The LPA may hold additional guidance for basement extensions.

Self-contained basement dwellings are 'highly vulnerable' development and should not be permitted in Flood Zone 3. We are opposed to these developments.

Continued...

¹ Ordnance Datum or the abbreviation 'OD' is the mean level of the sea at Newlyn in Cornwall from which heights above sea level are taken. The contour lines on Ordnance Survey maps measure heights above OD for example, though these are not accurate enough for a flood risk assessment..

Cumulative impact of minor extensions and the removal of Permitted Development rights.

There is potential for cumulative impact of minor extensions to have a significant effect on flood risk. Where local knowledge (Strategic Flood Risk Assessment held by the LPA/information provided by the parish council) suggests this is the case the guidance contained in FRA guidance note 2 should be applied. FRA guidance note 2 can also be applied where permitted development rights have been removed for flood risk reasons. The Environment Agency does not usually comment on minor development in this category.

Permeable paving and changes to permitted development rights for householders

On the 1st October 2008 the General Permitted Development Order (GPDO) in England was amended by the Government (Statutory Instrument 2008 No. 2362).

One of the changes introduced by the GPDO amendment is the removal of permitted development rights for householders wishing to install hard surfacing in front gardens which exceeds 5sq. metres (i.e. 1m x 5 m) without making provision to ensure permeability. This means that use of traditional materials, such as impermeable concrete, where there is no facility in place to ensure permeability, requires an application for planning permission.

In order to help and advise householders of the options for achieving permeability and meeting the condition for permitted development status the Department for Communities and Local Government (CLG) has produced guidance on permeable paving which can be found on the following link <http://www.communities.gov.uk/publications/planningandbuilding/pavingfrontgardens>

The Environment Agency supports the GPDO amendment as it is in line with the recommendations of the Pitt Report regarding the need to better tackle the impact of surface water flooding. However, Local Planning Authorities should determine these applications in accordance with the CLG guidance **without** consulting the Environment Agency.

End of comment

