



Thames Hotel

Thames Hotel, Maidenhead

Flood Risk Assessment

131826-R1(0) - FRA

RECEIVED  
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PLANNING

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**RSK**



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The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

## 3 SITE DESCRIPTION

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### 3.1 Site Location

Figure 1 shows the site location, the proposed site for development is situated approximately 1km to the north-east of Maidenhead centre and within 20m of the River Thames fronted by Ray Mead Road. The Windsor and Eton Flood Alleviation Scheme (MWEFAS) is located approximately 450m the east.

The site is bounded by:

- North – Property known as “The Boathouse” part residential and light industry at ground level.
- East – A4094 Ray Mead Road with River Thames immediately to the east.
- South – Ray Park Road with residential properties to the south.
- West – Hotel car park immediately adjoining car park area for residential flats.

The site is flat, and contains a large three to four storey hotel, the main part of which was erected between 1884 and 1886. It has since had a number of extensions added to it, including a large two storey addition to its western flank (along Ray Park Road), and a number of single storey additions to the rear. The site is a hotel, car park and grounds currently occupying 1,880m<sup>2</sup>. The hotel itself occupies 563m<sup>2</sup>.

The hotel is brick-built, with a tiled-roof of varying heights over. It has five small dormer windows at third floor level fronting Ray Park Road, as well as a single large pitched roof element to three- and four-storey level.

There is a further two-storey (with pitched-roof over, including a pitched glass insertion forming its roof pitch) element west of this, which is in appearance a mix of mock-Tudor and more modern concrete archways. In construction, this part is essentially separate to but adjoining the main building, and sits lower than it both internally and externally.

There is a terrace along the Ray Mead Road frontage set around 1 metre above pavement level, facing the Thames River.

There is a single-storey flat-roofed extension to the rear of the building which houses a beer store, and which lies within 0.5m of the site's boundary with the adjacent flats. There are also two single-storey, pitched roof extensions to the rear of the building, of different heights, set back some 2.8m from the site's northern boundary. The rear of the building also has an old metal external fire escape staircase from ground to first floor level, and several large exhaust outlets.

There is a close-boarded fence to around 2m in height along the site's northern boundary, immediately abutted and topped by a lleylandi hedge, on the neighbouring property.

There is very little in the way of soft landscaping in and around the site. The proposed development is to be located over existing hardstanding areas.



### 3.4.1 Flood Zones

The EA Indicative flood map of the area, **Figure 3** shows the extent of the flood envelop and indicates the area of benefit associated with the completed MWEFAS. Based on the EA Flood Maps the site is shown to be located within FZ3a and is outside the area of benefit associated the MWEFAS

The EA and SFRA flood mappings are based on broad scale modelling of the River Thames and aerial survey data. Detailed hydraulic modelling has been carried out by the EA as part of the Lower Thames Remodelling Study, which was completed December 2007.

The modelled flood level data has been utilised in conjunction with the detailed topographical survey of the site to determine the extent of flood zones on site.

### 3.4.2 Historic Flood Events

The SFRA shows the site as having experienced surface water and fluvial flooding.

The EA have confirmed that flooding of the site occurred during the man River Thames flood event of 1947 (considered to be a 1 in 60 year event) as well as in 1974 and 1990. However, the EA have no records of internal flooding of the buildings.

Site advice confirms that some internal flooding of the basement areas has occurred due to groundwater seepage through the basement walls. No direct flooding has occurred due to fluvial events.

### 3.4.3 Existing Flood Defences

The Maidenhead, Windsor and Eton Flood Alleviation Scheme (MWEFAS) reduces the risk of flooding in the area. However, the EA mapping confirms that the site is not currently located within the Area Benefiting from Defences (ABD).

### 3.4.4 Detailed Hydraulic Modelling

The EA modelled flood level data has been provided from the Lower Thames Reach 1 (Hurley to Cookham) and Reach 2 (Cookham to Windsor) which was remodelled in December 2007 and includes the Jubilee River, which forms part of the MWEFAS. The re-modelled flood level data provided by the EA as part of the Product 4 Flood Data Enquiry are provided within **Appendix C**.

## 3.5 Site Hydrogeology

According to the Environment Agency groundwater mapping, the hydrogeology of the site consists of a Principal Chalk Aquifer overlain by a Secondary A Aquifer consisting of the superficial Alluvial deposits. Due to the large-scale mapping, the aquifer outlines can only be approximate.

The Site is not located within a Groundwater Source Protection Zone. According to the EA mapping, the site lies within a Groundwater Vulnerability Zone classified as 'Major



## 4 DEVELOPMENT PROPOSALS

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It is proposed to demolish and rebuild existing extensions to the Thames Hotel in Ray Mead Road, Maidenhead. Primarily there is a large two storey element, with a pitched-roof lantern light, which forms an incongruous extension to the western flank of the building, fronting Ray Park Road. This would be demolished, and replaced with a slightly larger extension, which would match and closely replicate the appearance of the existing building. The overall footprint of the building would increase by just 8.7m<sup>2</sup>.

The development would be carried out to enable the complete refurbishment of the Thames Hotel. Currently, the hotel has a number of very small bedrooms, and no disabled access. It is proposed to increase the size of the smallest rooms, and to provide lift access to all floors, while improving the external appearance of the building. No additional rooms are to be created.

As part of the refurbishment, it is proposed to relocate the main entrance to the Hotel. The hotel is currently entered from Ray Park Road, near its junction with Ray Mead Road. It is proposed to create a new entrance from the hotel car park at the western end of the building.



## 5.2 Relevant Studies

### 5.2.1 Strategic Flood Risk Assessment (SFRA)

Title: Windsor and Maidenhead Borough Council, Level 1 Strategic Flood Risk Assessment, April 2009 <sup>(Ref. 6)</sup>

The principle aim of the SFRA was to map all forms of flood risk in order to provide an evidence base to locate new development. It also aims to provide appropriate policies for the management of flood risk, and identify the level of detail required for site-specific FRAs. The SFRA contains maps detailing flood sources and risks. The specific details for the area surrounding the site are given below.

For this site the Royal Borough of Windsor & Maidenhead Strategic Flood Risk Assessment (SFRA) identifies that localised flooding issues affect properties and infrastructure within the Borough. They include groundwater flooding, surcharging of the underground sewer system, the blockage of culverts and gullies and surface water flooding.

The SFRA map shows that the entire site is located within FZ3a and is also located within a historic flood event.

The Borough has also been affected by River Thames no less than nine times within the past 100 years with the most recent event in 2003. Substantial investment has been made in recent years to alleviate the risk of flooding, including the Maidenhead, Windsor & Eton Flood Alleviation Scheme. The Borough is also threatened by other watercourses but the proposed site is most likely affected by River Thames.

One of the approaches (to be adopted by this development) is that redevelopment and refurbishment of existing buildings in the floodplain is carried out to achieve resilience and/or resistance, which is also one of the proactive approach suggested in the SFRA.

### 5.2.2 Details of Previous Site-Specific FRA

An FRA was produced by RSK Group Ltd <sup>(Ref. 1)</sup> based on PPS25 in 2009 for the same proposed scheme that is the subject of a planning application for the renewal of the extant consent.

### 5.2.3 Drainage

#### Private Drainage and Public Sewers

The existing surface water from the scheme is directed to the surrounding public sewer network. It is achieved by gravity around the buildings and through the car park area, which includes the car parking drainage.



Table 6.1: Modelled Flood Levels for the Lower Thames Reach 1 and 2

Node Label	Flood Levels (mAOD)				
	5-year	20-year	100-year	100-year + CC	1000-year
063TH01_MH_26.060U	22.53	23.04	23.89	24.41	-

These levels and the predicted flood extent in relation to the existing hotel are shown on in section on **Figure 5** and in plan on **Figure 6**.

As can be seen the 1 in 100 year event is predicted to surround the hotel but the ground floor level (at around 24.28m AOD) is above the flood level by some 390mm. It should be noted that the Conference / function room located to the west of the main building is at a lower elevation (23.40m AOD) and could be subject to flooding during extreme events.

The predicted effects of climate change indicate that flood levels could rise by around 480mm over the next 50 years. If this were the case flood levels could exceed the current ground floor level by around 130mm.

### 6.3 Flooding from the Sea (Tidal Flood Risk)

The River Thames is tidally influenced up to Teddington Lock, and therefore, given the location of the site is approximately 15km upstream of the tidal limit along the River Thames, the risk of tidal flooding at this site is **low**.

### 6.4 Flooding from the Land (Surface Water Flood Risk)

The SFRA provides very little detail on localised sewer flooding issues within the study area. However, review of the topographical survey indicates that in the event of overloading of public sewer system overland flows will follow the topography and run in a southerly direction along Ray Mead Road and west along Ray Park Road. Based on existing finished floor levels and external levels around the perimeter of the building, any sewer flooding within the site drainage system will tend to flow away from the building.

Therefore the risk of surface water flooding is considered to be **low**

### 6.5 Flooding from Groundwater

Based on the underlying geology of the site it is likely that shallow ground water is present within the Secondary A Aquifer, which is in continuity with the River Thames located immediately to the east of the site.





## 7 PLANNING CONTEXT

### 7.1 Application of Planning Policy

NPPF includes (Section 10) measures specifically dealing with development planning and flood risk using a sequential characterisation of risk based on planning zones and the EA Flood Map. The main study requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

Within NPPF Technical Guidance on flood risk (reproduced as **Appendix D**) each flood zone has a list of appropriate land uses dependent on vulnerability to flooding.

### 7.2 Land Use Vulnerability

From the NPPF Technical Guidance, a “less vulnerable” land use could be appropriate to Flood Zone 3a (High Probability of flooding at higher than 1 in 100 annual probability) with the “more vulnerable” use only permitted if the exception test is passed. For a “more vulnerable” class, development on this site could be appropriate within Flood Zone 2 (Medium Probability of flooding at less than 1 in 100 but higher than 1 in 1,000 annual probability).

In applying the sequential test, reference is made to the following table (reproduced from Table 3 contained within NPPF);

**Table 7.1: Flood Risk Vulnerability and Flood Zone ‘Compatibility’**

Flood Risk Vulnerability Classification (Table D2)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (Table D1)	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to **Appendix D**, Table 2, this residential development can be classed as ‘more vulnerable’



## 8 FLOOD MITIGATION MEASURES

### 8.1 Flood Displacement

The current modelled flood levels indicate that the main building remains outside the flood limits with the proposed floor level of 24.28m AOD some 390mm above the predicted 1 in 100yr flood level.

It can be seen that the redevelopment of the western part of the site and the raising of the former conference / function room to maintain a constant floor level throughout the hotel brings this section of the building above the flood levels.

This raising of the internal ground floor level by 880mm together with the infilling of around 8.7m<sup>2</sup> of access corridor will result in the potential loss of around 144m<sup>2</sup> of flooded floor space representing around 97m<sup>3</sup> of flood storage. However, it should be noted that only 8.7m<sup>2</sup> of this area is currently outside the existing building footprint and potentially available for flood storage.

The remainder is contained within the building and constrained by doors, furniture, fixtures and fitting and cannot be reasonably considered as active flood storage.

Thus, the potential loss of flood storage resulting from this development is in the order of 6m<sup>3</sup>. Therefore, given that the garden areas remain unchanged in extent and level, whilst the car parking areas and main building footprint remain unaltered, the impact on third part flood risk of the displacing 6m<sup>3</sup> is considered negligible.

### 8.2 Finished Floor Levels

The Environment Agency typically advises three minimum freeboard levels with respect to the flood design levels for proposed residential elements in new developments, relating to the 1 in 100-year flood level, as set out in **Table 8.1**.

**Table 8.1: Advisory Minimum Finished Levels for Proposed New Development**

Residential Element of Development	EA's Flood-Related Criterion
Ground Floors	Flood Level + 300mm freeboard
Dry External Access/Egress	Flood Level + 300mm freeboard
Car Parking	200mm maximum depth of flooding

The existing ground floor finished levels as shown on the topographical survey as 24.28m AOD which is approximately 390mm above the current 1 in 100 (1% annual probability event) fluvial flood level of 23.89m AOD. The predicted climate change flood level of 24.412m AOD will extend over much of the ground floor with a depth of water in the region of 132mm. This depth of water will exceed skirting levels and potentially reach the level of existing electrical and telephone connection points.



## 8.4 Flood Response Plan

The site is located within Flood Zone 3a and is subject to shallow flooding within the curtilage of the site and therefore it is considered prudent to consider the implementation of a flood response plan.

Forecasting of flooding on the River Thames is well developed through 24 hour monitored telemetry and flood forecasting models allowing around 36 hours notice of an impending storm surge.

A flood evacuation plan should be developed for future residents, who should also be informed of the EA's regional Flood Warning system (Floodline Warning Direct) to provide adequate forewarning in the event of a predicted flood in the neighbourhood in order to decrease the risk to a 'safe' level.

The EA charter is to provide a minimum 2 hours advance warning, which would provide sufficient time for ground floor occupants to be evacuated to an area of safe refuge within the upper floors of the proposed development.

As with fire escape procedures, all staff as well as all potential occupiers of the hotel rooms should be made aware of flood warning information and contacts, including the provision of EA website and Flood line information. At present there is no provision for safe dry access during extreme flood events. The hotel will be required to register with the Environment Agency flood warning system. It is recommended that a safety protocol be introduced such that once warnings have been issued; residents of the hotel are advised of escape procedures, which should include early evacuation to safe areas. In the case of the Thames Hotel the nearest dry areas would be immediately east of the A4 bridge across the Thames some 400m south-east of the site.

## 8.5 Surface water management

The existing surface water from the scheme is directed to the surrounding public sewer network. It is achieved by gravity around the buildings and through the car park area, which includes the car parking drainage. The proposed refurbishment will not change the drainage regime or increase impermeable areas as the whole building structure is surrounded by hardstanding areas.

It should be noted that the proposed National SuDS Standards <sup>(Ref. 10)</sup> (B7) makes it clear that off-site impacts should not increase flood risk elsewhere but considers previously developed land. The Standards state:

*"Where the site is on previously developed land and neither Approach 1 nor 2 is reasonably practicable then:*

- a) *An approach as close to Approach 1 (i.e. The peak flow rates must not be greater than the equivalent greenfield runoff rates for these events. The critical duration rainfall event must be used to calculate the required storage volume for the 1 in 100 year rainfall event.) as is reasonably practicable must be used;*

## 9 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and key recommendations have been formatted from this FRA.

**Table 9.1: Flood Risk Assessment Summary**

<b>Development description and location</b>	<b>1.</b>
What type of development is proposed and where will it be located? <ul style="list-style-type: none"> <li>Redevelopment of the Thames Hotel in Ray mead Road, Maidenhead, Berkshire</li> </ul>	1a
What is its vulnerability classification? <ul style="list-style-type: none"> <li>Hotel development are classified as 'More vulnerable'</li> </ul>	1b
Is the proposed development consistent with the Local Development Documents? <ul style="list-style-type: none"> <li>The proposals are considered Minor Development as defined within footnote 10 of the NPPF Technical Guide: Extension less than 250 sq.m</li> </ul>	1c
Provide evidence that the Sequential Test or Exception Test has been applied in the selection of this site for this type of development? <ul style="list-style-type: none"> <li>Paragraph 104 of the NPPF states that minor developments are not subject to the Sequential Test and Exception Test, however, a FRA is required to demonstrate that the site will be safe in flood risk terms over the lifetime of the development</li> </ul>	1d
<b>Definition of the flood hazard</b>	<b>2.</b>
What source of flooding could affect the site? <ul style="list-style-type: none"> <li>Direct flooding from the adjacent River Thames, groundwater seepage into the basement and lift pits</li> </ul>	2a
Describe how flooding could occur? <ul style="list-style-type: none"> <li>Out of bank flooding during extreme flood events and possible increase in groundwater level due to increase river flow during intense rainfall event</li> </ul>	2b
What are the existing surface water drainage arrangements for the site? <ul style="list-style-type: none"> <li>The existing surface water from the site is directed to the surrounding public sewer network. It is achieved by gravity around the building and through the car park area, which includes the car parking drainage.</li> </ul>	2c
<b>Probability</b>	<b>3.</b>
Which flood zone is the site within? <ul style="list-style-type: none"> <li>Flood Zone 3a</li> </ul>	3a



How will run-off from the completed development be prevented from causing an impact elsewhere? <ul style="list-style-type: none"><li>• Redevelopment will not increase surface water flow enough to impact surrounding areas. Surface water will use the existing drainage network</li></ul>	7b
<b>Residual risks</b>	<b>8.</b>
What flood related risks will remain after the implementation of measures to protect the site from flooding? <ul style="list-style-type: none"><li>• Fluvial flooding as a result of overtopping of the River Thames banks during extreme events and groundwater flooding of basement levels</li></ul>	8a

In summary, this document updates a previous assessment of the Thames Hotel site in accordance with the requirements of the NPPF and confirms that redevelopment should be possible with careful consideration of the proximity of the River Thames and the flooding issues. The refurbishment will enable the inclusion of water resistant materials and design that will improve the building structure.

The raising of the floor level within the conference room will improve mobility around the hotel as well as protect that area from flooding.

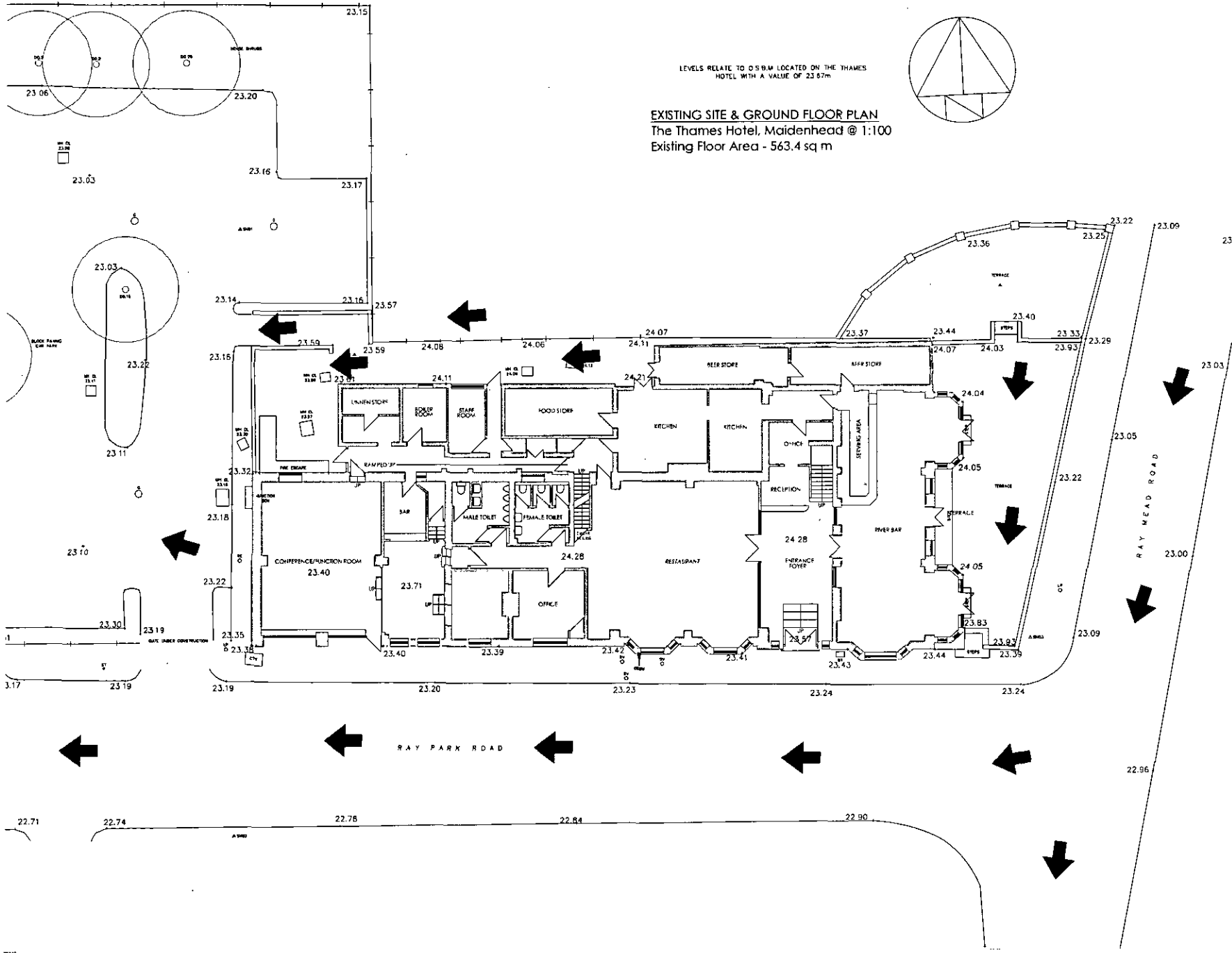
The proposals balance the flood storage volumes and should not impede flood flows. However, there are a few key recommendations, these are:

- a) Design of the new dwellings in accordance with "Preparing for Floods" a DEFRA publication, CIRIA guidance C624 "Development and flood risk" and CLG "Improving the flood performance of new buildings";
- b) Inclusion of the site as part of an area wide flood risk alert and that the occupiers are made aware of this; and
- c) Renovation of the basement areas and introduction of a lift pit need to be constructed in accordance with best practice for areas with high groundwater levels.



## FIGURES

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LEVELS RELATE TO O'S B.M. LOCATED ON THE THAMES HOTEL WITH A VALUE OF 23.67m

**EXISTING SITE & GROUND FLOOR PLAN**  
 The Thames Hotel, Maidenhead @ 1:100  
 Existing Floor Area - 563.4 sq m

**LEGEND**

← Flood flow path

**Figure 2**

P2	14.07.06	Updated		KYC	CP	CP
Rev.	Date	Amendment	Drawn	Chk'd	App'd	

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 LAND & DEVELOPMENT ENGINEERING LTD

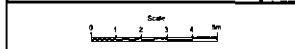
18 Parkway Road, Maidenhead, SL7 1JF, UK  
 Tel: +44 (0)1628 557777  
 Fax: +44 (0)1628 557766  
 E-mail: sales@rskgroup.com  
 Website: www.rskgroup.com

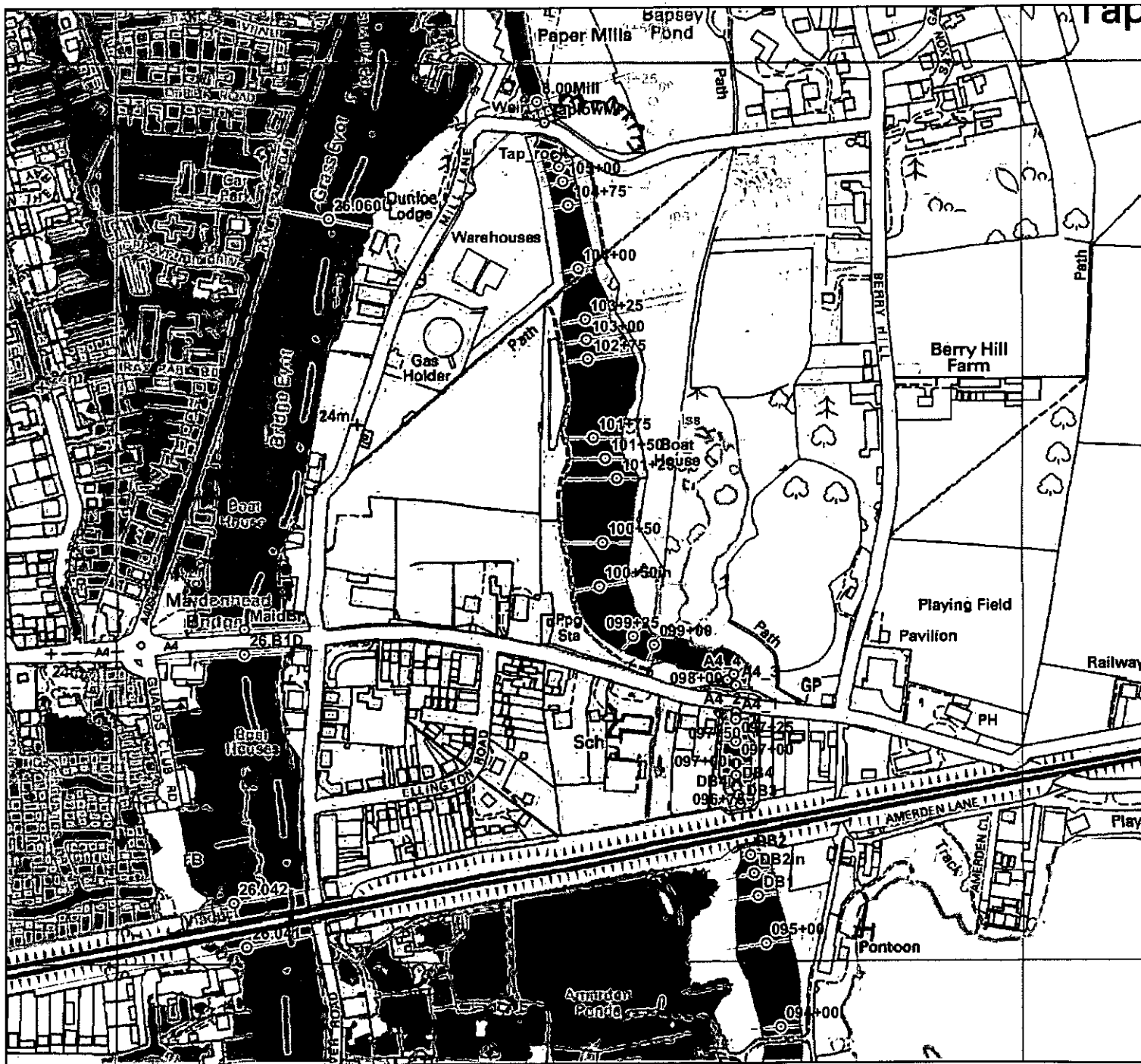
Client: **THE THAMES HOTEL**

Project Title: **THE THAMES HOTEL  
 RAY MEAD ROAD  
 MAIDENHEAD**

Drawing Title: **EXISTING SITE SURVEY  
 WITH EXISTING  
 FLOOD FLOW ROUTE**

Drawn: KYC	Date: 14.07.06	Checked: CP	Date: 14.07.06	Approved:	Date:
Scale: 1:100	Unit Size: A1	Orientation: m	Orientation: m		
Project No: 130349	Drawing Title: SITE SURVEY.dwg				
Drawing No: LDE 1000			Sheet: P2		





Environment Agency  
 South East Thames Area  
 Frimley Business Park  
 Frimley  
 GU16 7SQ

### Flood Model Data Request

This document is a GeoPDF. Select layers to interact with the document. Use the object tool to query features. Refer to the attachments for information about the data, standard notice and how to use this document.

Map created: January 2009

Scale 1:6,000



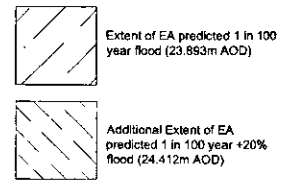
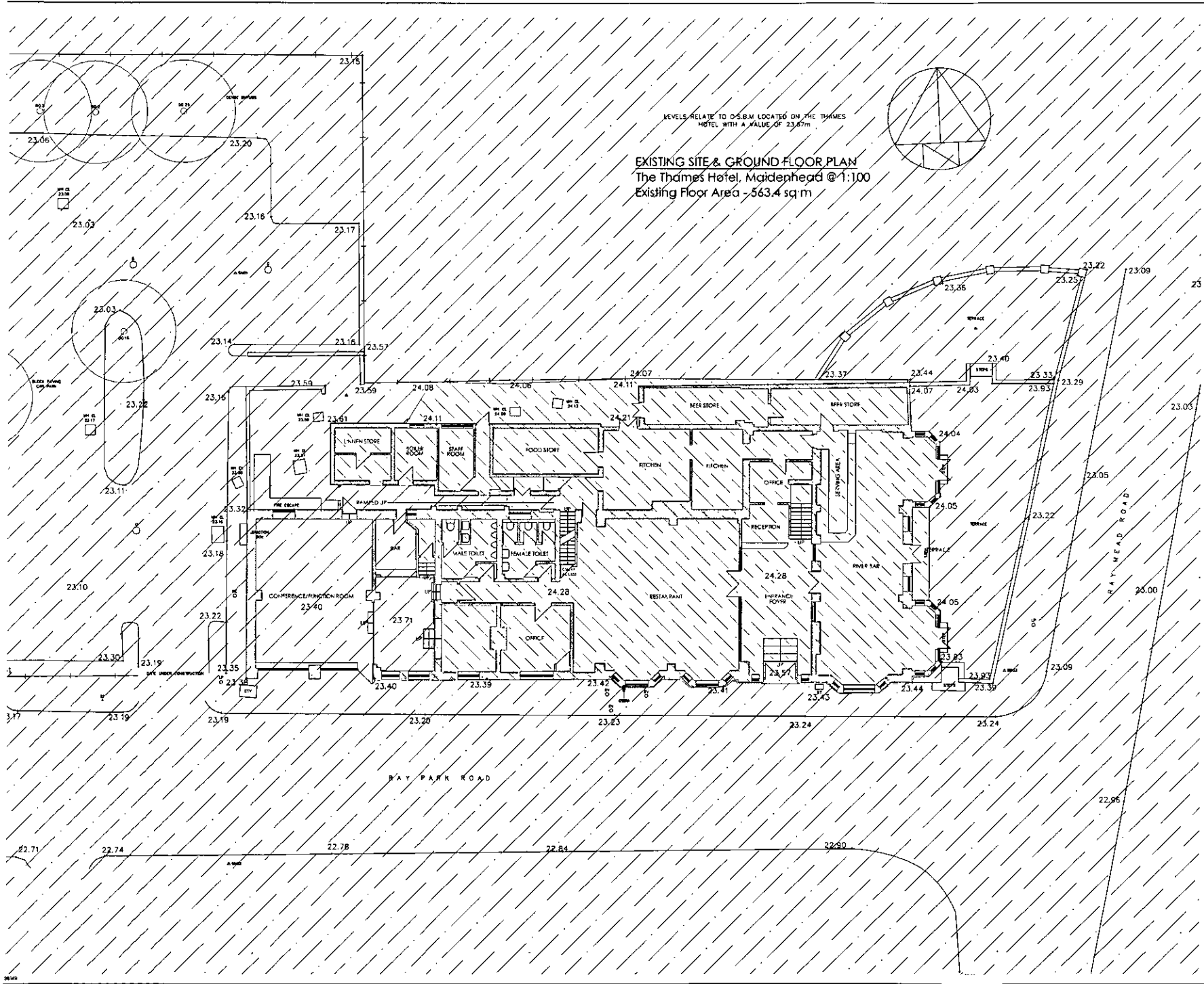


Figure 6

Rev	Date	Description	Drawn	Check	Appd
P2	14.07.09	Updated		KYC	CP

LAND & DEVELOPMENT ENGINEERING LTD <small>11 Fingertons Road, Maidenhead, Berkshire, SL6 1JH, UK          Tel: +44 (0)1628 577000 Fax: +44 (0)1628 577001          Email: info@rskgroup.co.uk Website: www.rskgroup.co.uk</small>	

Client	THE THAMES HOTEL
Project Title	THE THAMES HOTEL RAY MEAD ROAD MAIDENHEAD
Drawing Title	EXISTING SITE SURVEY SHOWING EXTENTS OF PREDICTED FLOODING

Drawn	Date	Checked	Date	Approved	Date
KYC	14.07.09	CP	14.07.09		
Scale	1:100	Drawn By	A1	Orientation	m
Project No.	130349	Drawing File	SITE SURVEY.dwg		
Drawing No.	LDE 1002	Rev	P2		

Scale	0 1 2 3 4 5m
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*RSK GROUP*  
*SERVICE CONSTRAINTS*

1. This report and the Drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Thames Hotel (the "client") in accordance with the terms of a contract between RSK and the "client" dated August 2012. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable Civil Engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.



## APPENDIX B

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### NPPF Technical Guidance Note

#### Site-specific Flood Risk Assessments (FRAs)

As set out in the National Planning Policy Framework, local planning authorities should only consider development in flood risk areas appropriate where informed by a site-specific flood risk assessment. This should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account. Those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the flood risk assessment.

#### **BS 8533-2011 Assessing and managing flood risk in development Code of practice, Nov 2011**

##### Assessing the risk of flooding

###### 4.1 General

A detailed, development-based flooding investigation should be undertaken to determine:

- a) the likelihood and consequence of flooding in and around the development, from all sources,
- b) how the development might alter the existing flooding regime, potentially increasing the risk of flooding elsewhere; and
- c) the design measures needed to manage the risk of flooding in and around the development.

*NOTE: a detailed, development-based flooding investigation to be prepared and submitted to the planning authority as part of the planning application. By producing the flood investigation at such an early stage, it can be used to influence the conceptual layout and design of the development and reduce (or avoid) the risk of flooding.*

###### 4.2 Site information

Before undertaking a detailed assessment of the risk of flooding, information about the site and surroundings should be obtained, including:

- a) details of existing infrastructure (e.g. reservoirs, canals, culverts, flood risk management infrastructure and/or drainage infrastructure);
- b) details of existing raised flood risk management infrastructure (e.g. the level of protection afforded by them and their condition);
- c) evidence of historical flooding;
- d) topographic mapping including local features (e.g. boundary walls and hedges);
- e) information on site ground conditions.

##### Assessing the risk of flooding to the development site and beyond

The risk of flooding associated with a proposed development should be assessed as the combination of the likelihood of flooding and its consequence. The following factors should be assessed:



## APPENDIX C

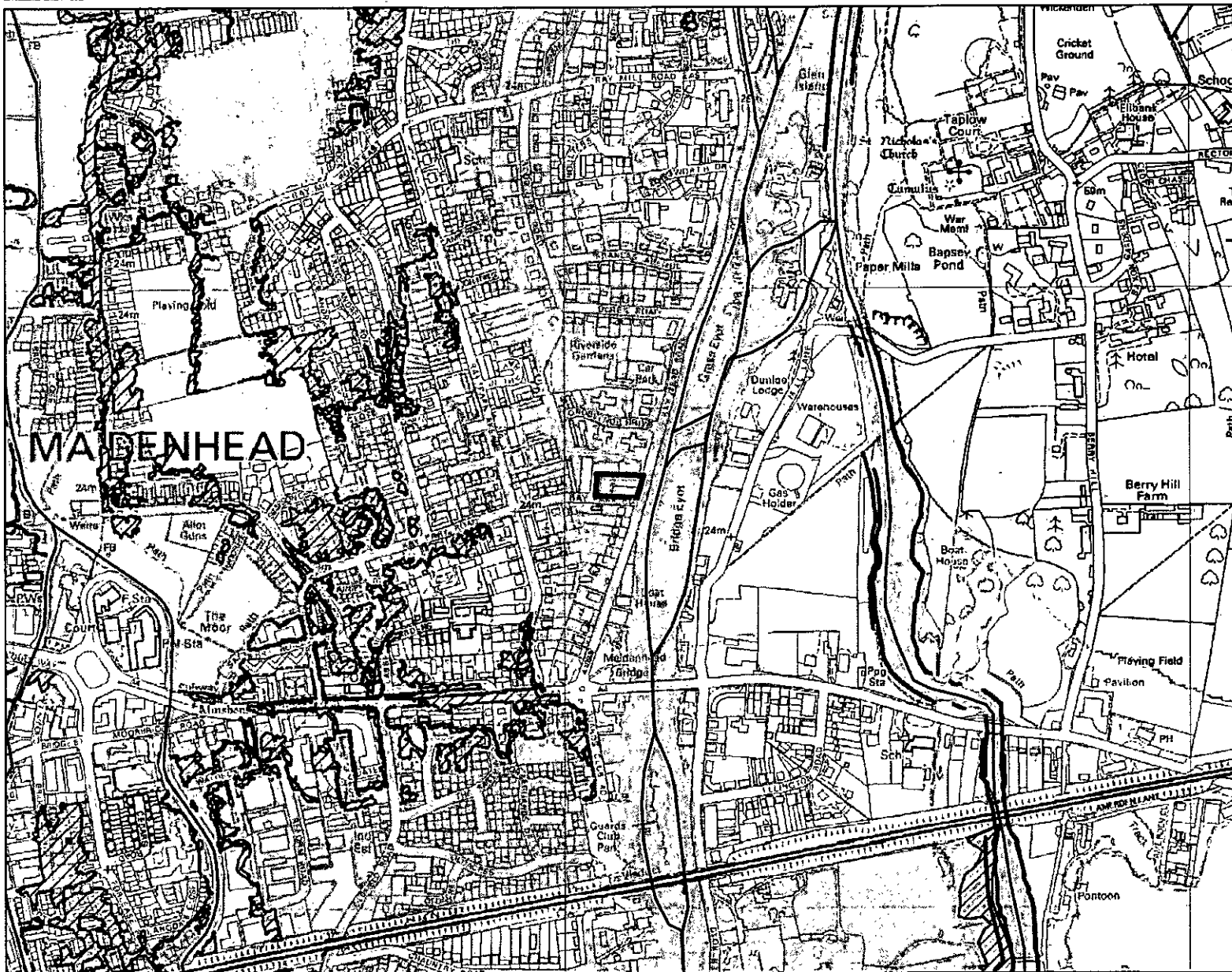
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### Environment Agency Correspondence

Thames Hotel  
Thames Hotel, Maidenhead  
Flood Risk Assessment  
131826-R1(0)-FRA

# Flood Map centred on Ray Mead Road, Maidenhead

Created 22/08/2012 - REF: BE\_0074\_01



Environment Agency

Kilometres

0 0.15 0.3



### Legend

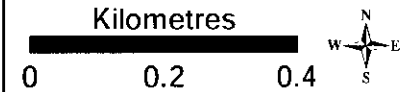
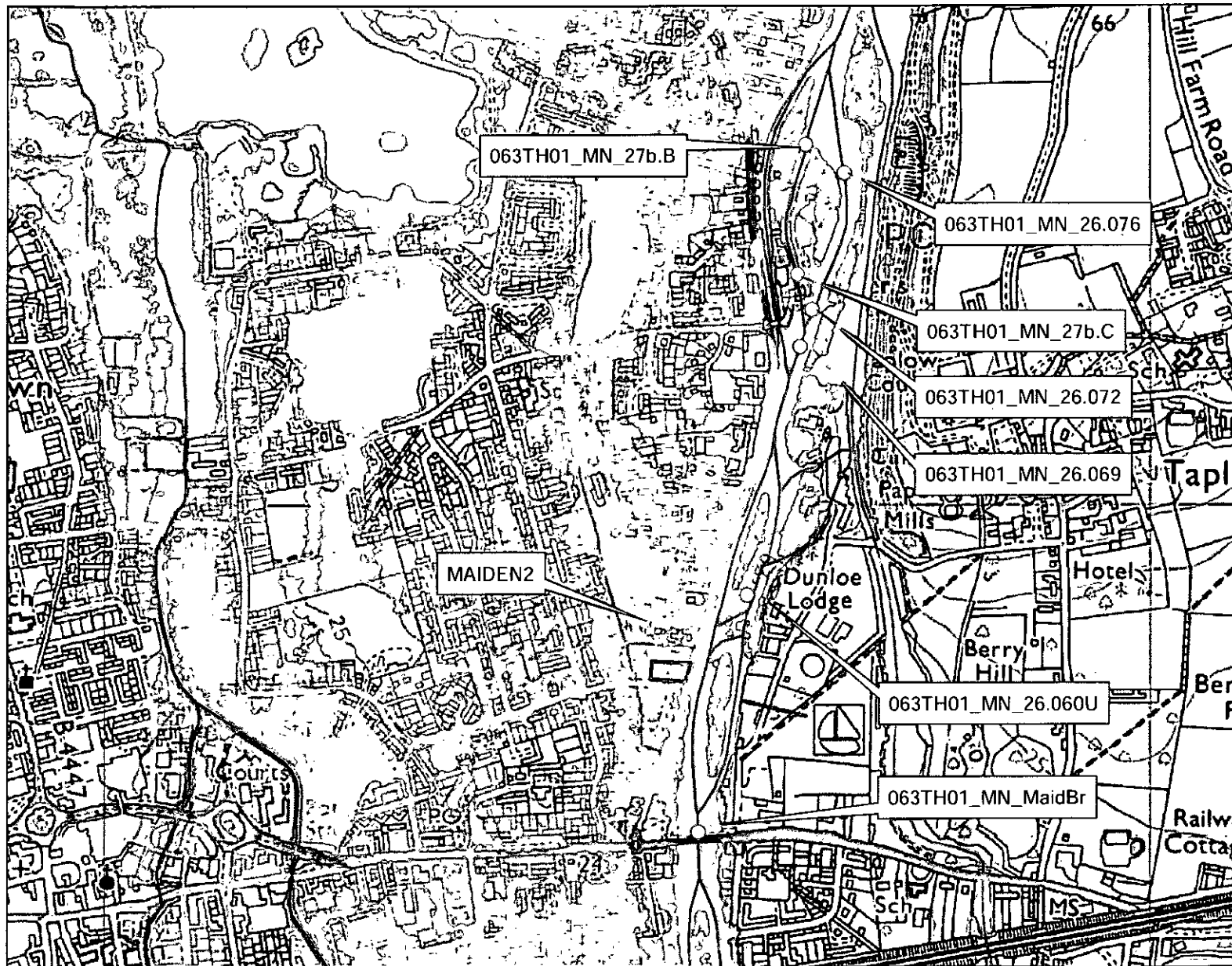
- Site
- Main River
- Flood defences
- Areas benefiting from flood defences
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)
- Flood Map - flood storage areas

Flooding from rivers or sea without defences (Flood Zone 3) shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

The Extent of an extreme flood (Flood Zone 2) shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Detailed FRA Map centred on Ray Mead Road, Maidenhead  
 Created 28/08/2012 - REF: BE\_0074\_01



Legend

- Nodes
- Site
- Main River
- 20% AEP flood extent
- 5% AEP flood extent
- 1% AEP flood extent
- 1%CC AEP flood extent

AEP = Annual Exceedance Probability  
 The probability of a flood of a particular magnitude, or greater, occurring in any given year

1%CC = 1% Climate Change extent  
 This is the 1% AEP event with an allowance for climate change (+20% on river flows)

## Modelled flood levels for reservoir units

The modelled flood levels for the reservoir unit closest to your site is provided below:

Reservoir label	Model	Centre-point Easting	Centre-point Northing	flood levels (mAOD)				
				20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
MAIDEN2	Lower Thames Reach 1 & 2 - ISIS model 2007	490021	181976	21.00	23.05	23.89	24.40	

This flood model has represented some parts of the floodplain with reservoir units.  
 The flood water levels have been calculated for these areas directly.  
 Therefore, for a site located within a reservoir unit, in-channel water levels are not relevant and are not supplied.

## Historic flood data

BE\_0074\_01

Our records show that the area of your site has been affected by flooding.  
Information on the floods that have affected your site is provided in the table below:

Flood Event Code	Flood Event Name	Start Date	End Date	Source of Flooding	Cause of Flooding
EA0620030101570	06JanuaryNewYear2003	23/12/2002	12/01/2003	main river	channel capacity exceeded (no raised defences)
EA0620001200425	06DecemberWinter2000	01/01/2000	12/12/2000	main river	channel capacity exceeded (no raised defences)
EA0619900200262g	06FebruaryWinter1990	01/01/1990	12/12/1990	main river	channel capacity exceeded (no raised defences)
EA0619741100274	06NovemberAutumn1974	01/01/1974	12/12/1974	main river	channel capacity exceeded (no raised defences)
EA0619470300431b	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)

Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.





Within the NPPF Technical Guidance, each flood zone has a list of appropriate land uses dependent on vulnerability to flooding. The flood zones are described in Table 1: Flood Zones reproduced below. (Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences).

**NPPF Technical Guidance Table 1: Flood Zones**

<b>Zone 1 - Low Probability</b>
<b>Definition</b>
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)
<b>Appropriate uses</b>
All uses of land are appropriate in this zone
<b>FRA requirements</b>
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention.
<b>Policy aims</b>
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques. Sustainable drainage systems cover the whole range of sustainable approaches to surface drainage management. They are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible.
<b>Zone 2 - Medium Probability</b>
<b>Definition</b>
This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
<b>Appropriate uses</b>
Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in Table 2, are appropriate in this zone. The highly vulnerable uses are <i>only</i> appropriate in this zone if the Exception Test is passed.
<b>FRA requirements</b>
All development proposals in this zone should be accompanied by a FRA.
<b>Policy aims</b>



In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems; and
- relocate existing development to land with a lower probability of flooding.

The vulnerability classes are related to the sensitivity of the development to flooding and also consider the risk to people, property and services. The vulnerability classification Table 2 from NPPF Technical Guidance is reproduced below.

**NPPF Technical Guidance Table 2: Flood Risk Vulnerability Classification**

Vulnerability classes	Description
Essential Infrastructure	<ul style="list-style-type: none"> <li>• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk,</li> <li>• 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.</li> <li>• Wind turbines</li> </ul>
Highly Vulnerable	<ul style="list-style-type: none"> <li>• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required being operational during flooding.</li> <li>• Emergency dispersal points.</li> <li>• Basement dwellings.</li> <li>• Caravans, mobile homes and park homes intended for permanent residential use.</li> <li>• Installations requiring hazardous substances consent.<sup>1</sup> (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"<sup>2</sup>)</li> </ul>
More Vulnerable	<ul style="list-style-type: none"> <li>• Hospitals.</li> <li>• Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.</li> <li>• Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.</li> <li>• Non-residential uses for health services, nurseries and educational establishments.</li> <li>• Landfill and sites used for waste management facilities for hazardous waste.<sup>3</sup></li> <li>• Sites used for holiday or short-let caravans and camping, <b>subject to a specific warning and evacuation plan.</b></li> </ul>