

FRESH CONSULTING AND SUPPORT LIMITED

FLOOD RISK ASSESMENT

214 Whitby Road, Ruislip, Middlesex, HA4 9DY



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Introduction.

Context.

This FRA report has been completed in accordance with guidance presented in Planning policy Statement 25 (PPS25) 1 and supplementary Practice Guide 2, and has been prepared by a Technical Engineer of FRESH who has studied flood risk and drainage infrastructure matters.

The site falls within the Lead Local Flood Authority Hillingdon London Borough jurisdiction in terms of the planning consultation process on flood risk and surface water management.

This FRA draws upon recent dialogue and correspondence with Development Control and Planning Liaison staff at the Environment Agency (EA).

Site Location and Features.

The site is located approximately 880m (Geodesic) east of the centre of Ruislip Manor, near Ruislip. The northern boundary of the site is with Whitby Road and the southern boundary abuts common land encompassing Yeading Brook a tributary of the River Crane. Refer to Site Location Plan in Appendix A.



Figure 1 Aerial Photo of site.

Hydrological Features.

The site is located adjacent to the Yeading Brook a tributary of the River Crane, the existing site is drained by a private surface water sewer network, and runoff tends to shed off to the Yeading Brook.

Geology and Hydrogeology.

The published geological map for the area indicates that the proposed development is underlain by Clay, Silt and Sand. Sedimentary Bedrock, comprising of organic rich clay and silt, which is underlain by Palaeogene Period Group.

Development Proposals.

We wish to develop the site in order to provide a storage solution for our current business activities. Refer to development proposals Ref: PP-04574156 in Appendix B.

Flood Zone Classification.

Based upon the Flood Zone Maps (refer to Appendix C) published by the EA, the entire site is shown to lie within Flood Zone 2 - 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.

Sources of Information.

Flood Zone Map.

Information regarding the current flood risk at the application site and local flood defences has been obtained from the EA website and confirmed through direct contact with staff at the EA's office. Refer to Appendix C.

Historic Flooding.

As part of this assessment, flooding history in the vicinity of the site was discussed with the EA. The EA has confirmed that they do not hold any records of historic flooding at or within close proximity of the site. Refer to Appendix C.

Based upon a search of the Hydro chronology database compiled by the University of Dundee, together with a brief search using recognised Internet search engines, there would appear to be no history of flooding at the development site itself.

Topographical Data.

Topographical Survey data has been provided by London Topographic Maps. The site elevation is 42.3672mAOD (refer to Appendix D). The surrounding area is predominantly flat with no significant topographic changes.

Geological Data.

Geological data was derived from a review of the British Geological Survey Generalised digital geological map data based on BGS's published poster maps of the UK (North and South). Bedrock related themes created by generalisation of 1:50 000 data to make the 2007 fifth edition Bedrock Geology map.

Superficial related themes digitised from 1977 first edition Quaternary map (North and South). Solid and Drift geology, 2004 (refer to Appendix E).

Flood Risk Assessment.

Flood Risk Assessment Methodology & Objectives.

It is recognised that developments that are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. Current guidance on development and flood risk identifies several key aims for a development to ensure that it is sustainable in flood risk terms. These aims are as follows:

- The development should not be at a significant risk of flooding and should not be susceptible to damage due to flooding;

- The development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, are threatened;
- Normal operation of the development should not be susceptible to disruption as a result of flooding;
- Safe access to and from the development should be possible during flood events;
- The development should not increase flood risk elsewhere;
- The development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- The development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- Future users of the development should be made aware of any flood risk issues relating to the development;
- The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues;
- The development should not lead to degradation of the environment;
- And the development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change.

This Flood Risk Assessment is undertaken with due consideration of these sustainability aims, and has been prepared to inform the proposed scheme.

Project Scope.

In order to achieve the aims outlined above, a staged approach has been adopted in undertaking this Flood Risk Assessment, in accordance with current best-practice guidance. A screening study has initially been undertaken to identify whether there are any potential sources of flooding at the site which may warrant further consideration. Any potential flooding issues identified in the screening study have subsequently been considered in a scoping study. The aim of the scoping study is to review all available information and provide a qualitative assessment of the flood risk to the site and the impact of the site on flood risk elsewhere.

The report has been undertaken with due regard to the EA's National Standing Advice on Development and Flood Risk.

Screening Study.

All potential sources of flooding must be considered for any proposed development. A summary of the potential sources of flooding and a review of the potential risk posed by each source at the application site is presented in Table 1.

Table 1: Potential Risk Posed by Flooding Sources	
Potential Source	Potential Flood Risk at Application Site
Fluvial flooding	No
Tidal Flooding	No
Flooding from high groundwater	Yes (minor)
Overland flow flooding	Yes (minor)
Flooding from artificial drainage systems	No
Flooding due to infrastructure failure	Yes

Fluvial flooding.

Based upon the EA's Flood Zone Maps (refer to Appendix C) the entire site is located within Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%). The Yeading brook has scope to carry fluvial flood water away from the application site onto the River Crane. The EA advise they have no history of flooding at the application site (refer to Appendix F).

Tidal flooding.

The application site is not within an area effected by Tidal Flooding.

Flooding from high ground water.

The site and surrounding area is relatively flat, therefore overland flow from offsite areas is not deemed to pose a significant flood risk to the site.

Flooding from artificial drainage systems.

Thames Water have confirmed that they do not hold any records of public sewer flooding for the site.

Flood due to infrastructure failure.

Flood risk to the site may increase due to a blockage to the free flow of Yeading Brook, this could increase the risk of both flooding from high level ground water and overland flow flooding.

Proposed Mitigation Measures.

Finished floor levels.

Floor levels for the proposed application will be constructed to accommodate a sump drain and necessary dirty water pumping equipment. This will deliver any ingress of surface water to the existing surface water drainage system.

Critical Infrastructure.

Critical infrastructure (that must remain operational at all times) including the electrical plant and switch gear, and control equipment is proposed to be set at a minimum elevation of 44.8672m AOD (i.e. at 1st floor level within the building envelope).

Vulnerable Infrastructure.

In order to minimise the disruption to the operation of the site and limit the damage of key equipment that would require a significant lead time to replace plant is proposed to be situated at or above 44.8672 AOD (i.e. at 1st floor level within the building envelope). where practical considerations allow.

Less vulnerable Infrastructure.

Other less vulnerable operational plant within the proposed application will be elevated on storage racks or plinths at or above 42.8672m AOD.

Flood warning system and evacuation plan.

The site is at low risk of flooding, however, the aim will be to ensure that the site users and workers will have sufficient warning and notice prior to any flood event. A further objective would be to allow sufficient time for a planned shutdown of parts of the facility prior to the onset of flooding. The proposed mitigation put forward is as follows.

- It is proposed that Commun-IT sign up to the Environment Agency Flood Warnings Direct Service. This will help to act as an early warning system. These proposals are in line with the Defra / Environment Agency document entitled "Flood Warning Dissemination Technologies".
- In addition, a Flood Evacuation Plan should be drawn up for the proposed development site. This is likely to focus on providing a warning when flood levels are expected to rise above the proposed site elevation of circa 42.3672m AOD

Safe Refuge.

In the unlikely event that advance flood warnings are not heeded, or a breach (failure) of the proposed development defences were to occur, safe refuge would be afforded to site users within the facilities, with internal access being provided to welfare facilities on an upper level situated at or above 44.8672 AOD (i.e. at 1st floor level within the building envelope).

Safe route of access \ egress.

The access / egress route from proposed development involves exiting the structure from the north into the existing building and out onto Whitby Road. See the evacuation plan (refer to Appendix G).

Flood Resilience.

Flood resilience should be built into the development by implementing suitable flood proofing methods to a level of at least 42.8672m AOD (i.e. approximately 500mm above finished floor level / formation level, and significantly higher than predicted 'post breach' inland water levels. Service ducts in or below the base slab should be sealed to prevent the ingress of floodwater.

Maintaining site operations.

Continuous site operations should be maintainable as a result of implementation of proposed elevated control equipment, and flood resilience. Provision will be made within the emergency evacuation plan for controlled shutdown of the facility.

Site Drainage – Application of Sustainable Drainage System.

Current guidance promotes sustainable water management through the use of Sustainable Drainage Systems (SuDS). A hierarchy of techniques is identified below:

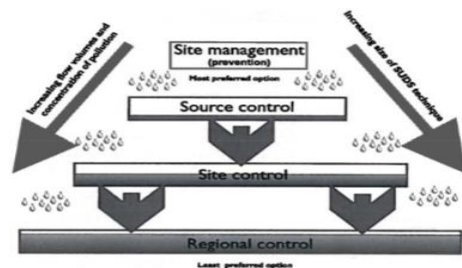


Figure 6
SuDS Management Train (from CIRIA Report C697)

1. Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution (e.g. minimise areas of hard standing).
2. Source Control – control of runoff at or very near its source (such as the use of rainwater harvesting).
3. Site Control – management of water from several sub-catchments (including routing water from roofs and car parks to one/several large soakaways for the whole site).
4. Regional Control – management of runoff from several sites, typically in a retention pond or wetland

It is generally accepted that the implementation of SuDS as opposed to conventional drainage systems, provides several benefits by:

- Reducing peak flows to watercourses or sewers and potentially reducing the risk of flooding downstream;
- Reducing the volumes and frequency of water flowing directly to watercourses or sewers from developed sites;
- Improving water quality over conventional surface water sewers by removing pollutants from diffuse pollutant sources;

- Reducing potable water demand through rainwater harvesting;
- Improving amenity through the provision of public open spaces and wildlife habitat;
- Replicating natural drainage patterns, including the recharge of groundwater so that base flows are maintained.

Proposed SuDS Design Statement.

During the evolution of the proposals, the scheme design has fully investigated the viability and usage of alternative forms of SuDS. A hierarchy for SuDS, reflecting the degree of sustainability offered by the various SuDS application is shown in Table 4 below.

Table 4: SuDS Sustainability Hierarchy

SUDS technique	Flood Reduction	Water Quality Improvement	Landscape & Wildlife Benefit
Living roofs	✓	✓	✓
Basins and ponds	✓	✓	✓
Filter strips and swales	✓	✓	✓
Infiltration devices	✓	✓	✓
Permeable surfaces and filter drains	✓	✓	
Rainwater Harvesting	✓		
Tanked systems	✓		

In order to provide a degree of 'post development' benefit, the following SuDS measures are proposed to be incorporated within the development scheme:

- The plan incorporates a living roof with managed drainage and moisture monitoring systems.
- The development will also implement surplus roof water harvesting for use within the proposed development.

Summary and Conclusion.

Based upon the EA's Flood Zone Maps (refer to Appendix C) the entire site is located within Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%).

The site is deemed to meet Sequential Test criteria due to a lack of alternative sites at lower risk of flooding.

The primary risk of flooding associated with the site is over land flow flooding, associated with out-of-bank flows from the local Yeading Brook, risks which may be exacerbated by a blockage to the free course of the brook.

It is proposed to manage the risk by elevating the critical and vulnerable infrastructure within the proposed structure wherever practical to do so, by providing safe refuge via an evacuation plan, and by implementation of robust flood warning measures linked to the Environment Agency Flood Warnings Direct Service.

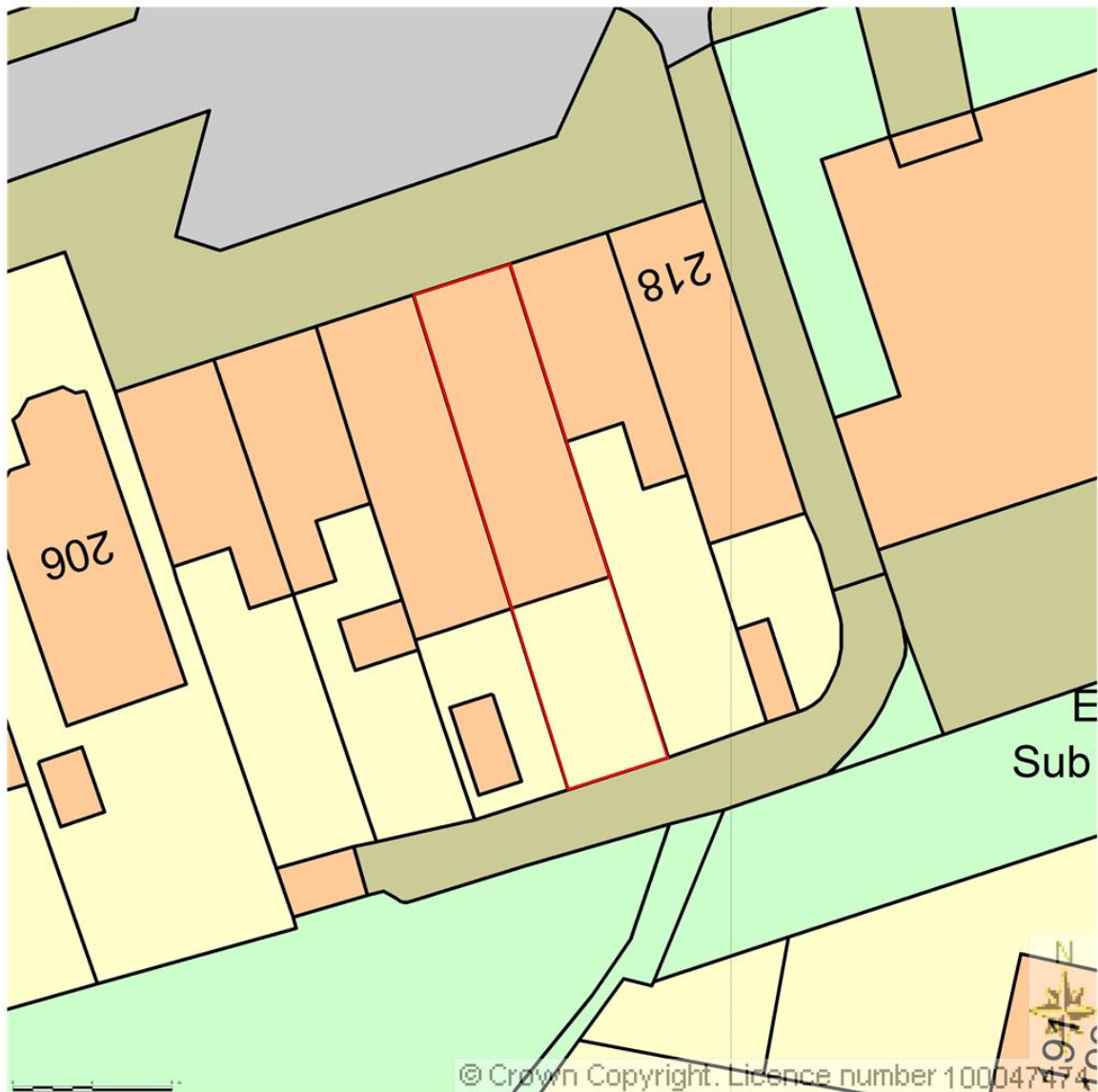
SuDS will be provided in the form of a living roof and rainwater harvesting facilities.

This Flood Risk Assessment, accompanying the planning submission, demonstrates that the ability to reduce the risk of flooding may be satisfied with the implementation of reasonable, deliverable flood management and mitigation measures.

Appendix A.

Site Plan

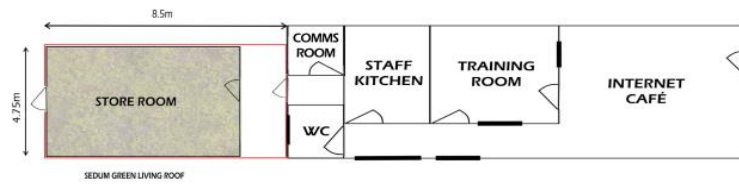
BLOCK/SITE PLAN
AREA 55m x 55m A3
SCALE 1:200
CENTRE COORDINATES: 511291, 186628



Supplied by Streetwise Maps Ltd
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Appendix B.

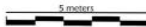
Development Proposal.



PROPOSED FLOOR PLAN VIEW



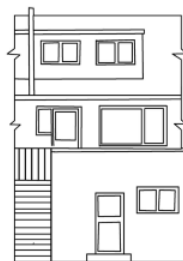
CURRENT FLOOR PLAN VIEW



PROPOSED REAR STORAGE EXTENSION 214 WHITBY ROAD
DRAWING ISSUE V02 PAGE: A3 SCALE 1:100

PLANNING DRAWING REF:10004 & 10005
DRAWN BY SHOW/ARD

DATE: 23.11.2015
SHEET: 4 OF 5



CURRENT SOUTH ELEVATION



PROPOSED SOUTH ELEVATION



PROPOSED REAR STORAGE EXTENSION 214 WHITBY ROAD
DRAWING ISSUE V02 PAGE: A3 SCALE 1:100

PLANNING DRAWING REF:10006
DRAWN BY SHOW/ARD

DATE: 23.11.2015
SHEET: 3 OF 5

Appendix C.

Flood Zone Maps.



Appendix D.

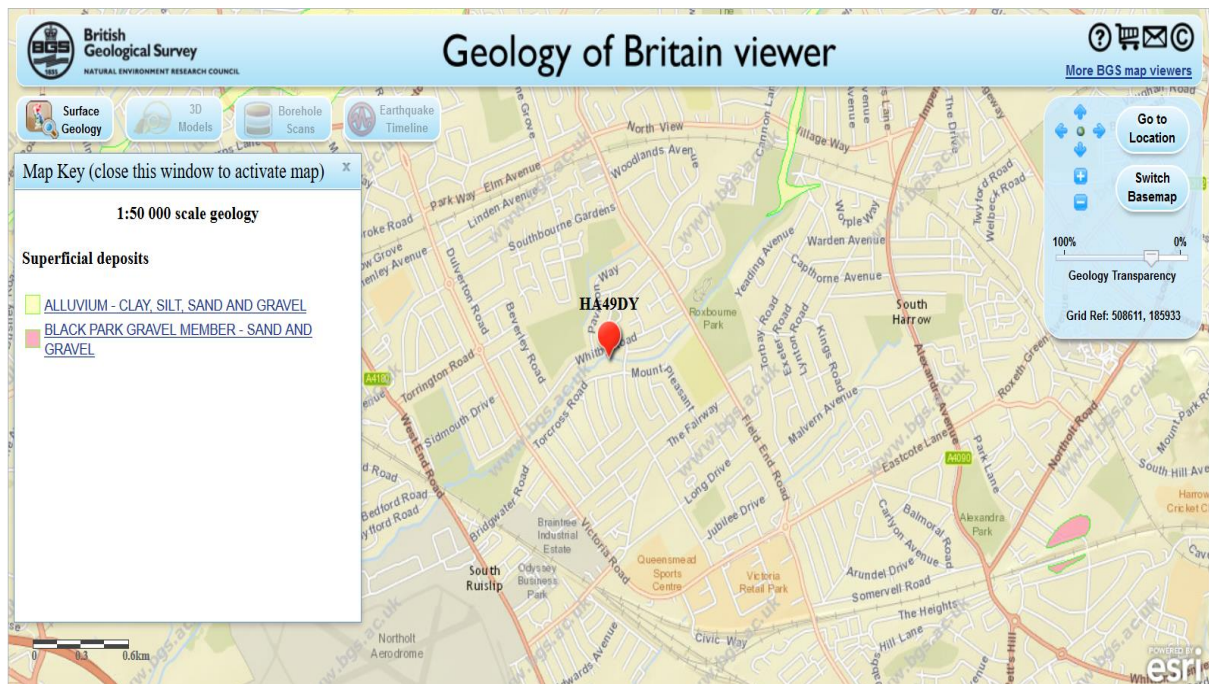
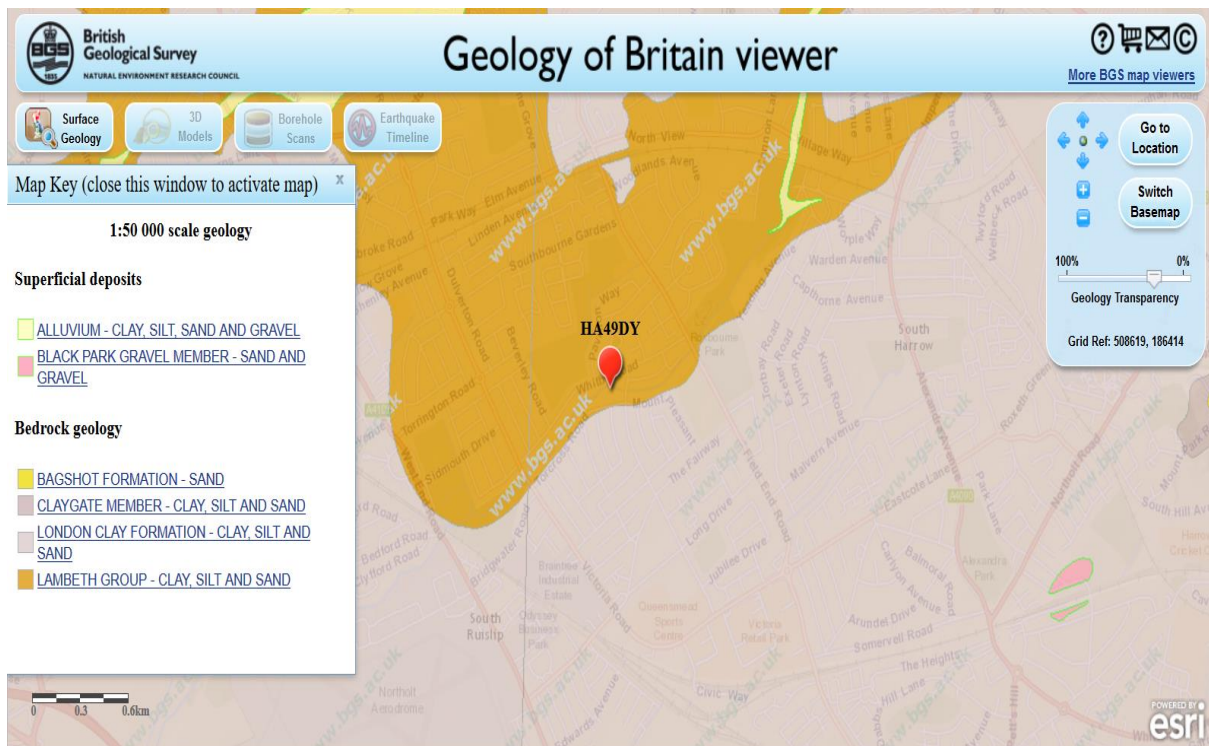
Topographic Maps.



246 ft	237 ft	228 ft	219 ft	210 ft	202 ft	194 ft	186 ft	179 ft	171 ft	164 ft	158 ft	151 ft	145 ft	140 ft	134 ft	130 ft	125 ft	121 ft	118 ft	115 ft	112 ft
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Appendix E.

Geological Maps.



Appendix F.

EA Flood Reports.

Our Reference: HN/L2607/MS

Dear Mr Howard,

Enquiry regarding 214 Whitby Road, Ruislip HA4 9DY

Thank you for your enquiry which was received on 1 February 2016

We have no record of this site having been affected by flooding from rivers or the sea in the past

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive: <http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=HN/L>

Yours sincerely

Michael Soltysiak
Customers and Engagement Officer

Environment Agency, Hertfordshire and North London
(01707 632505 * HNLEnquiries@environment-agency.gov.uk)

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Dear Mr Howard,

Thank you for registering with the Environment Agency's Floodline Warnings Direct service. From now on you will receive flood warnings direct to you at any time of the day or night.

Your customer reference number is: 49188510

Your password is: *****

Please keep these details safe as they will be required if you wish to change your Floodline Warnings Direct registration.

It is important that you notify us if you move property or your contact details change. This way we can keep our records up to date and make sure that you receive flood warnings in the event of a flood.

Registering for flood warnings is only the first step in preparing for flooding. Please call our Floodline service on 0345 988 1188 or visit our website www.gov.uk/flood for further information and advice on how to help protect yourself and your property from flooding.

Appendix G.

Evacuation Plan.

Flood Evacuation Plan

1 Locations at risk of flooding		A		Flood Warnings	
Area No.	Location at Risk	Trigger Level		Actions	
1	Rear Storage Shed	Flood Alert		Call the Environment Agency's Flood line (0845 988 1188)	
1 Actions taken before flood		B		Source of flooding	
Area No.	Location at Risk	Source of Flooding		Direction of Flooding	
1	Rear Storage Shed	Yeading Brook		North toward Whitby Road	
2 Actions taken during a flood		A		Local Flood Actions	
Area No.	Location	Trigger	Local Action	Equipment	Time Needed
1	Rear Storage Shed	Flood Warning	Check Flood Protection	Drain Key & Torch	10 Minutes
2 Actions taken during a flood		B		Flood Action Personal	
Name		Role	Contact Number	Mobile	
Casey Farquharson		Flood Coordinator	0203 667 1499	07857 299 210	
Shaka Clarke		Health & Safety	0203 667 1499	07575 815 101	
Simon Howard		Site Manager	0203 667 1499	07510 741 636	
2 Actions taken during a flood		C		Important Numbers	
Organisation		Telephone (office hours)	Telephone (out of hours)	Fax	
Flood Line		0345 988 1188	0345 988 1188		
EnvironmentalAgency		0800 80 70 60	0800 80 70 60		
Hillingdon Borough		01895 556666			
2 Actions taken during a flood		D		Available resources	
Organisation	Resource	Number	Location	Notes	
On Site Storage Facilities	Sandbags Plastic Sheets	0203 667 1499	Rear Storage Shed	All Personnel Are Key Holders	
2 Actions taken during a flood		E		Steps to be Actioned	
Action	Responsibility	Time Needed		Notes	
Shutdown Electricity to Storage Shed (except for sump pumps)	Site Manager Or Flood Coordinator	10 Minutes		Isolators located at the front of the premises	
Check Storage Shed is clear	Health & Safety Officer or Flood Coordinator	10 Minutes		Personnel Assemble at Fire Assembly Point Whitby Road	
Call necessary Authorities	Flood Coordinator or Site Manager	10 Minutes		Contact numbers above	