elliottwood

Emmbrook Secondary School Expansion

Flood Risk Assessment

engineering a better **society**

		Remarks:	For Information				
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Contents

Appendices

One

Terms of Reference

1.1 Introduction

Elliott Wood has been commissioned to produce a site-specific Flood Risk Assessment (FRA) for the proposed Sixth Form Block at Emmbrook School for Wokingham Borough Council.

This report is intended to review all potential sources of flooding to the proposed building, evaluate the sensitivity of the site to flooding and consider any impact to the surrounding area that the development may cause.

The following documents have been reviewed during preparation of this FRA;

- National Planning Policy Framework (NPPF)
- Planning Practice Guidance (PPG)
- Wokingham Borough Council SFRA 2023

Two

Existing Site

2.1 Site Location

Emmbrook School is in Emmbrook, north of Wokingham town centre, and is approximately 2.70 ha in area with the main access from Emmbrook Road to the north. A residential development can be found adjacent to the north and west boundaries with the Emm Brook flowing in a north direction along the eastern boundary.

The school buildings are located across the majority of the site particularly to the north, with playing fields to the south. There are access roads, footways and parking located within the north-eastern part of the site.

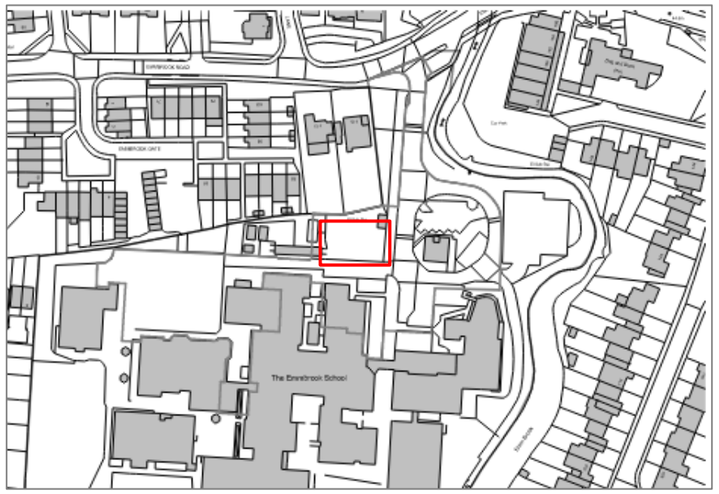

Figure 1: Site Location OS Grid Reference 479856, 169829 (Development site boundary shown in red)

2.2 Existing Development

The existing development currently consists of Emmbrook School which is made up of several buildings, pedestrian walkways, vehicular access roads, parking areas and landscaping amenities. The land use currently consists of existing hardstanding land which is utilised as a car park.
Figure 2 below describes the existing ground floor layout for Emmbrook School.

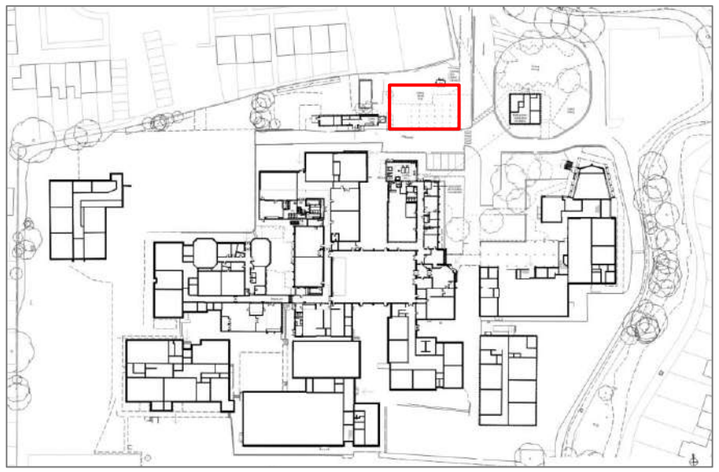

Figure 2: Existing Ground Floor Layout

2.3 Existing Site Topography

A topographical survey has been undertaken at the site and this has been included in Appendix A. The topographical survey indicates that levels within the proposed development area range from 43.70mAOD in the northwest and 43.50mAOD in the southeast.

2.4 Existing Hydrology

The Emm Brook flows from south to north along the eastern boundary of the school site. According to the EA, it is a Main River and tributary of the River Loddon which is a tributary of the River Thames. The topographical survey indicates that the channel is approximately 0.60 to 0.90m deep along the school boundary.

2.5 Underlying Geology

A site investigation was undertaken in June 2022 and the final report was issued in September 2022. Figure 3 below shows the site investigation locations.

Figure 3: Ground investigation trial pits and boreholes.

The site is generally underlain with made ground and a layer of gravelly alluvium, then London clay at depth. The trial pits indicate shallow existing foundations founded on the clay or deep in the made ground layer close to the clay. Figure 4 summarises the below ground stratum.

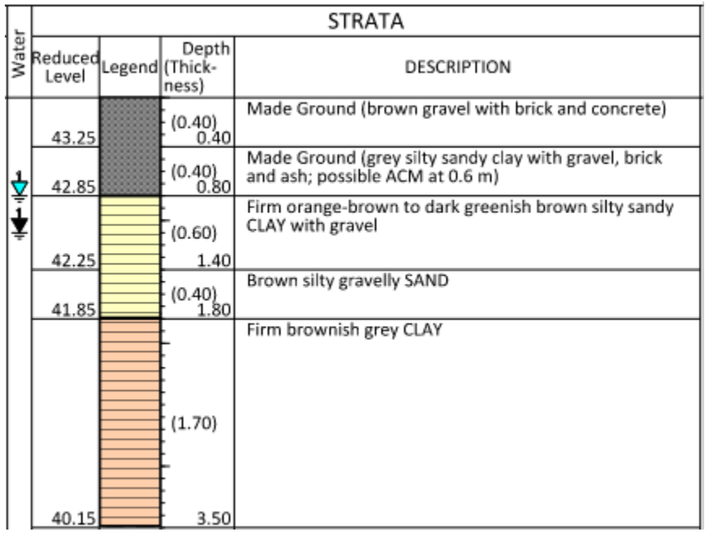

Figure 4: Summary of assumed ground stratum beneath the site

Groundwater was found typically at 700mm below ground level. A high-water table is expected due to the proximity to the river and high flood risk.

According to the British Geological Society data, the site is situated on London Clay formation and is overlain Alluvium. Further information can be found on the following website link: https://mapapps.bgs.ac.uk/geologyofbritain/home.html.

Three

Proposed Development

The proposed expansion at Emmbrook School includes the construction of new Sixth Form Centre as shown below in Figure 5.

Figure 5: Sixth Form Centre

The following tables highlight the existing and proposed area breakdown for the site and the comparison to existing (land use of area used for proposed building):

Table 1 – Proposed Sixth Form Block

	Existing (m2)	Proposed (m2)
Buildings	-	300
Hard standing	300	-
Total	**300**	**300**

The proposed development will result in an increase of building footprint of approximately 300m^2 and therefore result in a loss of flood storage without mitigation measures.

Four

Planning and Flood Risk Management Policy

It is important to assess the flood risk posed to the development of this site from all sources of flooding, in accordance with National Planning Policy Framework (NPPF) requirements.

The flood risk sources being considered as part of this FRA are as follows:

- Rivers and Sea
- Groundwater
- Overland Flow
- Infrastructure Failure / Sewer Flooding
- Flooding from Artificial Waterbodies

Five

Flood Risk

5.1 Tidal / Fluvial Flooding

According to the Environment Agency Flood Risk Information, Emmbrook School is located both in flood zone 1 and 3a. The proposed works, which include a new sixth form centre, is located within flood zone 3a. The EA Product 4 can be found in **Appendix D**.

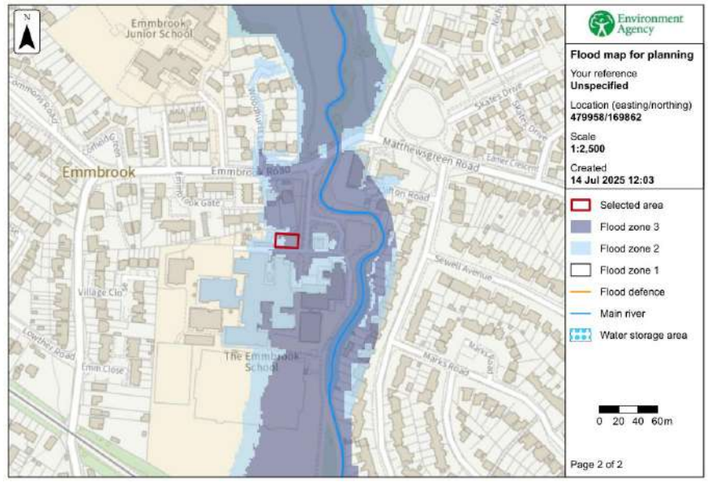

Figure 6: Extract of flood map for planning showing site (in red) is located within Flood Zone 3a

The Product 4 which was obtained from the environment agency, also provides the expected flood levels across the site for the 20%, 5%, 1% and 1% + 20% and 0.1% Climate Change Annual Exceedance Probabilities. These can be found in Table 2.

Annual Exceedance Probabilities	Max Flood Level m AOD
20% AEP (1 in 5)	43.56
5% AEP (1in 20)	43.81
1% AEP (1 in 100)	43.94
1% AEP + 20% CC	44.00
0.1% (1 in 1000)	0.00

Table 2: Modelled Flood Levels (Product 4 Data)

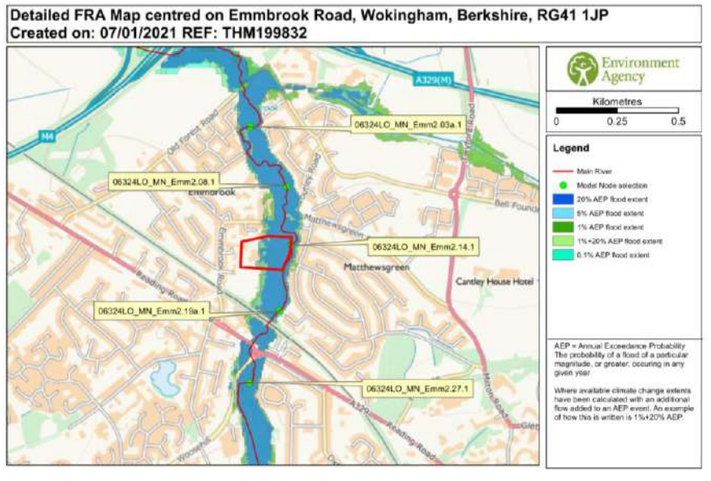

Figure 7: Product 4 Flood Extents

According to the Environment Agency Hydrology data, since the site is considered a commercial development, located in flood zone 3 and is classed as more vulnerable, the central allowance for the '2050's' model should be used, which is 4%.

Since the Product 4 data provided a flood zone extent for the 1 in 100 + 20%, it is not necessary to determine the flood level for the 4% extent.

5.2 Historic Flooding

EA Product 4 data has provided a Historic Flood Map which can be found below as Figure 8. As shown, the site was subject to flooding during the event which took place in 2007. This event was due to the channel capacity being exceeded since there are no formal flood defences.

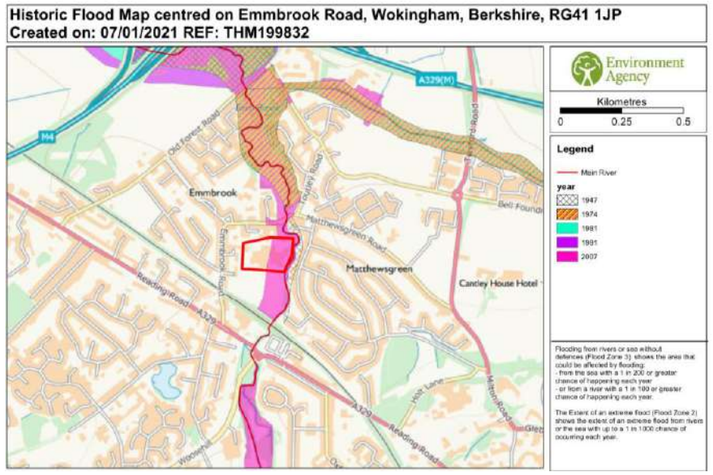

Figure 8: Historic flood event (2007)

5.3 Ground Water Flooding

Groundwater flooding occurs when water levels in the ground rise above surface levels. It is most likely to occur in areas underlain by permeable ground, called aquifers.

While there are three reported historic groundwater flood events within the RG41 postcode, that the school is within, these were all located at least 1.7km to the west of the site.

There is limited risk of groundwater flooding associated with alluvium superficial geology overlying the London Clay Formation bedrock.

The ground floor level of the building is to be set considerably higher than the exiting ground level and there is no proposed basement with the new sixth form centre. It is therefore considered that flood risk from groundwater is considered to be at a low level for the site.

5.4 Surface Water Flooding

Surface water flooding may occur during intense or prolonged rainfall events where there is insufficient capacity within the existing drainage infrastructure which leads to over land flows. Figure 9 below is an extract from the Environment Agency Flood Risk from Surface Water maps. This shows the school is at low, medium and high risk from surface water flooding. However, the location of the new Sixth Form Centre is located within a low risk area.

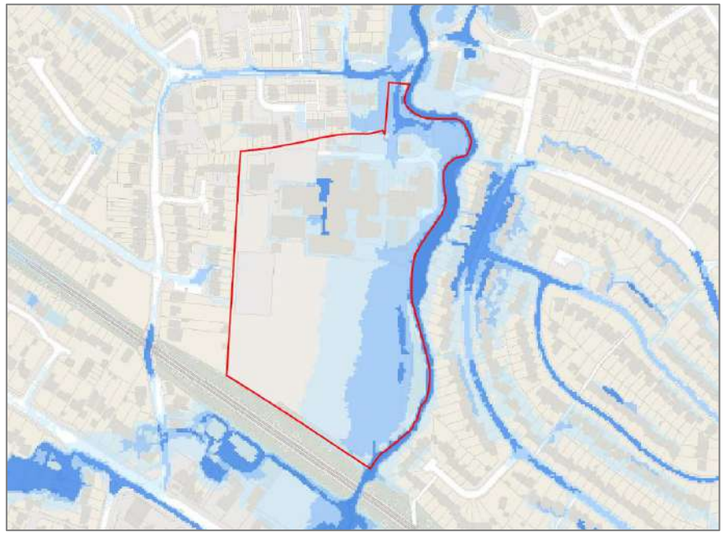

Figure 9: Flood Risk from Surface Water

The topography of the site shows levels fall from west to east i.e. to the watercourse. As mentioned, the proposed Sixth Form Centre is to be located within the 'low' risk area, however the building is to be constructed higher than the ground floor, with purpose built flood voids, and will therefore not be subject to surface water flooding.

Given the above, it is considered that the site has sufficient mitigation measures making surface water flood risk at an acceptable level.

5.5 Sewer Flooding

Sewer flooding is usually localised and short lived, it can be caused by intense rainfall events overloading the capacity of the sewer, blockages, poor maintenance or structural failure of sewers.

In 2007 and 2008, the school was affected by sewer flooding associated with two large Thames Water foul sewers that pass south to north through the centre of the site between the western and eastern school building complex.

Since then, the School flood defence system has been designed to ensure that all manholes associated with these sewers are outside of the defened area. The Schools private foul pipes which link to these are now also fitted with non-return valves.

It is important to note that due to the urbanised nature of Wokingham Borough, it is inevitable that localised flood events will occur from problems arising from the limited capacity of a largely ageing sewewrage system and increasing pressures due to climate change.

5.6 Flood Defences

As mentioned, the Product 4 data states there are no flood defences along the Emm Brook which benefit the school. However, there is a site wide flood defence present at the school, which is protecting the buildings. The defence consists of flood walls with demountable flood boards and in some locations a waterproof wall treatment with a height of 0.6m above ground levels.

The crest level equates to 44.25mAOD for the defence surrounding the main school, and 44.35mAOD for the separate defence around the reception building.

During a previous site visit, it was noted that there was a gap in the defence wall, thus rendering the defence incomplete. Emmbrook School will prioritise completing the gap in the Flood Defence.

There are currently no flood defences serving the area to which the new sixth form centre will be located.

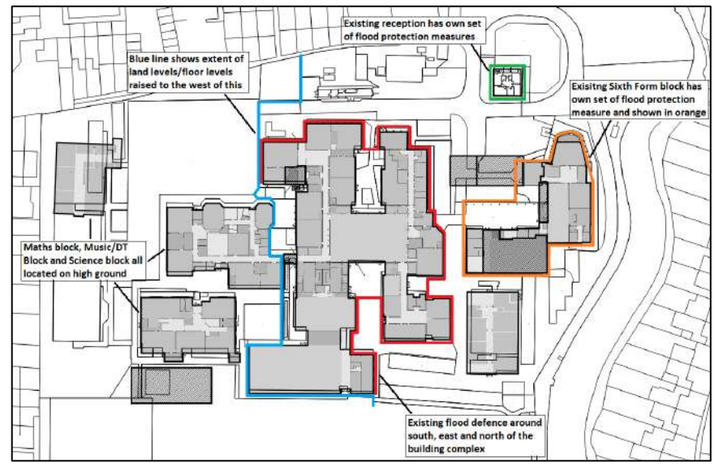

Figure 10: Existing Flood Defences

5.7 Flooding from Artificial Water Bodies

Reservoirs are artifically created lakes that are usually formed by building a dam across a river. If one of the dams failed then water could escape from the reservoir, resulting in land or property being flooded.

The EA reservoir flood risk mapping shows that the eastern half of the school field is subject tot flooding, as well as the school buildings found to the east

of the site. The risk comes from the unlikely case of the impoundment failure of the Queens Mere Reservoir, which would pose flood depths of between 0.3m and 2.0m.

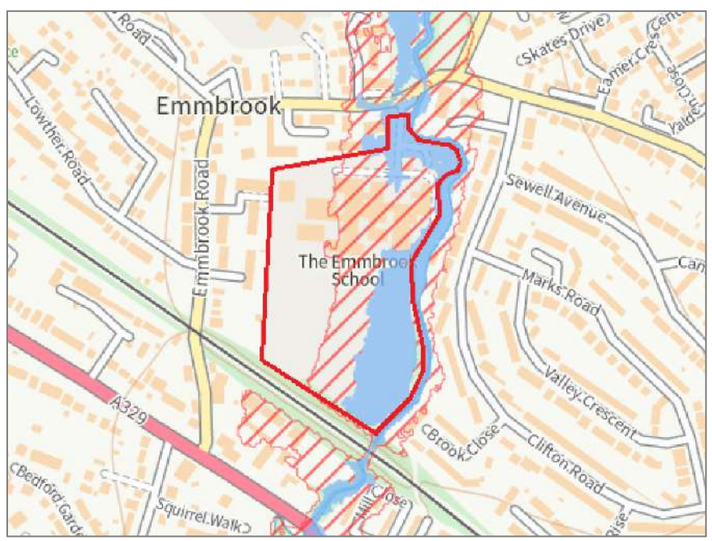

Figure 11: Flood risk from reservoirs to the site. (GOV.UK Flood Maps)

The reality of a flood occurring due to a reservoir failure is extremely low. Reservoirs must be properly maintained and, in this case, will be regulated under the Reservoirs Act 1975. This legislation is enforced by the Environment Agency which requires reservoirs to be routinely inspected and maintained to an appropriate standard.

Six

Sequential and Exception Test

6.1 Flood Risk Vulnerability Classification

When considering the flood risk vulnerability, the proposed development consists of more vulnerable uses reviewed in line with Table 2 Flood Vulnerability classification on the UK.gov website.

6.2 Flood Risk Vulnerability and Flood Zone 'Compatibility'

Following a desktop study, the existing site is located within Flood Zone 3a and flood zone 1, with the proposed Sixth Form Centre located within flood zone 3a. As such the proposal is deemed to be a permitted development in line with Figure 12 below subject to an exception test.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Figure 12: Flood risk vulnerability and flood zone compatibility (taken from Flood Risk and Coastal Change NPPG, October 2019)

6.3 Sequential and Exception Test

6.3.1 Sequential Test

The aim of the sequential test is to steer new development to areas with the lowest risk of flooding.

The sequential test is concerned specifically with the availability of sites that can accommodate buildings of this scale, including parking and amenity space.

It is noted that Wokingham Borough Council have considered detailed school requirements for the future which includes the proposals set out in this report. Therefore, the proposed works must be located on the existing Emmbrook School site and therefore it is impractical to consider other sites within the borough in lower flood risk areas.

In terms of locating either of the proposed Sixth Form Centre in flood zone 1 to the west, it was deemed practical and necessary to locate both where they are proposed due to the following reasons:

- The area available in flood zone 1 is the only area of hard standing on the site that is remote from the main vehicle routes and parking where outside play can be supervised.
- The hard standing area is an essential resource that is used daily by the PE department.
- Any construction in this area would have a significant impact on the day to day running of the school.
- Construction of a multi-storey building in this area would have a significant impact on neighbouring properties.

Previously, a Flood Risk Assessment was undertaken for the proposed replacement teaching block for Emmbrook School dated 23rd April 2014. The proposals included works within flood zone 3, again, which was deemed necessary for the benefit of the school as advised by Wokingham Borough Council.

6.3.2 Exception Test

The exception test as laid out in Paragraph 164 of the NPPF is defined as follows:

The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

a) *The development would provide wider sustainability benefits to the community that outweigh the flood risk; and;*
b) *The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*

Since the site is an existing brownfield site and a community school, the improvement of facilities at Emmbrook School will only benefit the local community. The school is also listed as a priority by Wokingham Borough for investment in terms of improving facilities to support educational needs. It is therefore considered

Seven

Mitigation Measures

7.1 Flood Storage Compensation

The positions of the sixth form block are located within flood zone 3 and therefore a flood storage compensation analysis has been undertaken.

The proposed building has an increase in floor area of approximately 300m^2, therefore compensation will be required for the loss of flood storage on site.

To mitigate this, for the proposed Sixth Form block, it is considered feasible to construct flood voids beneath the building to allow the area beneath to flood. This is similar to the approach used on the drama building. The void under the building will be accessible by flood water by secure floodable openings located along the southern and eastern edges of the building. These openings shall be in the order of 0.5m high by 0.6m wide with at least 1 opening per 5.0m length of wall.

The underside of the ground floor slab will be raised approximately 50mm higher from the 1% + 20% CC AEP extent of 44.00mAOD, with the FFL to be set a minimum of 300mm above said flood extent to approximately 44.30mAOD.

As mentioned, there is approximately 300m^2 in increase of building floor area, however since the proposed Sixth Form Centre is too be constructed with flood voids, the overall increase in floor area falls to approximately 7m^2.

To mitigate the decrease in flood storage volume on site, due to proposed substructure works, it is proposed to lower the ground level beneath the proposed sixth form block to 43.500m.

A supplementary document has been produced, referenced 2220077-EWP-ZZ-XX-TN-C-0001-FVMP-P2, which includes the proposed flood void details and maintenance strategy.

Eight

Flood Warning and Evacuation

8.1 Flood Warning

The school is in a Flood Warning area. Flood Warnings provide more specific advance notice of flooding to locations at risk than Flood Alerts which are more general. The school has been registered with the flood alert system, meaning the school will receive flood alert via, phone, email and text. This will allow the users of the building to safely evacuate the flood area well in advance of severe flooding if they choose to do so.

The Environment Agency endeavours to provide a minimum flood warning of 2 hours via the Flood-Line service. The Environment Agency operated Flood-Line service is based on flood forecast and warnings and is in operation 24-hours per day. It relies on the measurement of rainfall, river levels, predictive models, rainfall radar date and information from the Met Office.

Emmbrook School should be registered via the following site address: https://www.fws.environment-agency.gov.uk/app/olr/register

8.2 Evacuation Plan

While it is understood that the school has a flood evacuation plan which has been verbally agreed by senior staff, this is currently classed as informal and therefore won't be presented in this report.

Instead, since the area at risk of flooding covers most of the east side of the site and the existing vehicular and access road is located within flood zone 3, the proposed route away from the site will begin at the pedestrian only access point heading towards Emm Brook gate. From there, staff and students will head north onto Emmbrook Road before following that road west to high higher ground and refuge.

The construction of the Sixth Form Centre, the FFL will be set ideally at 300mm above the 1% + 20% CC AEP flood extent of 44.00mAOD according to the Product 4 data.

Consideration shall be given to the development of a detailed evacuation plan in conjunction with the building owner / operator.

Nine

Surface Water Drainage Strategy

Refer to separate surface water drainage strategy report produced by Elliott Wood reference '2220077-EWP-ZZ-XX-RP-C-0002'.

Foul Water Drainage Strategy

As part of the below-ground drainage proposals, a new separate foul water network will be installed to serve the new sixth form block. The Finished Floor Level (FFL) of the building will be raised at least 300 mm above the 1-in-100-year flood extent plus 20% allowance for climate change (AEP). This design ensures that the building will remain free from flooding, even in the event of foul water network surcharge.

Ten

Conclusion

The Environment Agency Product 4 data shows that the proposed site is located within Flood Zones 3a and is a "more vulnerable" in line with the PPG.

The exception and sequential tests have been carried out which show there are no alternative suitable sites, that the benefits of the development outweigh the flood risk and the development is safe for the duration of its design life.

Flood risk from groundwater, surface water, infrastructure/ sewer and artificial water bodies is deemed to be acceptable on site.

Flood mitigation methods have been put in place which include the use of flood voids, raising the FFL of buildings.

Since the proposals will see an increase in building footprint, flood compensation is proposed through the uses mentioned above.

It is recommended that the occupier/proprietor of the development registers with the GOV.UK flood warning and alert system service.

In the event of a flood event, all staff and students will follow the flood evacuation route set out in this report. As flash flooding is highly unlikely residents will have sufficient time to evacuate prior to a flood event. Consideration should be given to the production of a flood evacuation plan in conjunction with the building owner / operator.

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Appendices

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A Topographical Survey

Station	Eastings	Northings	Height
1	Road Nail	479904.387	169857.299	44.855
2	Road Nail	479892.105	169834.202	43.951
3	Road Nail	479811.105	169824.202	43.951
4	Road Nail	479857.481	169794.933	45.077
5	Road Nail	479855.407	169766.671	45.257
6	Road Nail	479888.272	169791.106	44.425
7	Road Nail	479889.442	169791.106	44.425
8	Wood Peg	479889.442	169750.248	44.659
9	Road Nail	479910.478	169778.042	43.958
10	Road Nail	479941.124	169778.042	43.958
11	Road Nail	479942.124	169754.000	43.705
12	Road Nail	479941.475	169789.177	43.735
13	Road Nail	479970.756	169750.136	43.624
14	Road Nail	479971.073	169790.156	43.726
15	Road Nail	480018.935	169789.477	42.885
16	Road Nail	480018.935	169789.477	42.885
17	Road Nail	479971.044	169822.457	43.549
18	Road Nail	479970.044	169814.574	43.549
19	Road Nail	479993.524	169814.574	43.105
20	Wood Peg	480002.900	169740.066	42.970
21	Road Nail	479947.139	169856.257	43.928
22	Road Nail	479975.480	169882.334	43.427
23	Road Nail	479975.480	169882.334	43.427
24	Road Nail	479938.497	169819.604	43.705
25	Road Nail	479920.119	169863.567	43.764
26	Road Nail	479878.572	169819.604	43.705
27	Road Nail	479878.572	169863.567	43.764
28	Wood Peg	480003.944	169882.154	43.450
29	Road Nail	480038.675	169883.357	43.422
30	Wood Peg	480034.404	169849.121	43.453
31	Wood Peg	480032.564	169798.966	42.885
32	Wood Peg	480032.564	169798.966	42.885
33	Wood Peg	480018.117	169778.861	42.771

UNDERGROUND SERVICES

1) Although every effort has been made to trace underground services using radiodetection no guarantee can be given that all have been found. Due to their non-conductivity certain types of gas and water pipes have not been possible to trace. Service trial holes must be dug prior to excavation.

2) This survey has been carried out in accordance with the RICS specification for tracing underground utilities at scales of 1:500 and larger

3) In the absence of evidence to the contrary the routes of confirmed manhole connections are assumed to be direct and straight.

4) Information obtained from records has been shown as (R) and should be treated with caution and further investigation is advised.

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142-144 HILLVIEW AVENUE, HORNCHURCH, ESSEX. RM11 2DL
TEL 01708 438408 FAX 01708 438403 email: london@laserurveys.com

DATUM NOTES

CO-ORDINATES USED ARE BASED ON O/S NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000 ABOUT STATION 13

LEVELS ARE RELATED TO --- ORDNANCE NATIONAL GRID
BENCH MARK USED IS LOCATED AT :---

STATION 13
ROAD NAIL, SE CORNER OF SITE, IN TARMAC

VALUE GIVEN AS 43.624m

NG REF

SURVEY CONTROL STATIONS SHOWN

ABBREVIATIONS (where applicable)

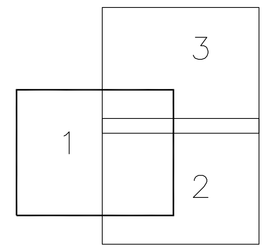
AV	Air Valve	MH	Manhole Cover
BK	Brick	MK	Marker
BL	Bollard	MS	Milestone
BS	Bus Stop	MT	Meter
BT	British Telecom	MY	Mercury
C/B	Close Boarded	OH	Overhead
CL	Cover Level	PAV	Paving
CLK	Chainlink	PB	Post Box
CO	Column	PC	Pipe
Conc	Concrete	PM	Parking Meter
CP	Catch Pit	P/R	Post and Rail
CPS	Concrete Paving Slabs	PT	Post
CTV	Cable Television	P/W	Post and Wire
CW	Combined Water	RE	Rodding Eye
DC	Drainage Channel	RET	Retaining
DP	Drain Pipe	RM	Rising Gas Main
EP	Electricity Pole	RS	Road Sign
ER	Earthing Rod	RSJ	Rolled Steel Joist
FB	Flower Bed	SC	Stop Cock
FDP	Foul Down Pipe	SDP	Storm Down Pipe
FE	Fire Extg	SK	Soakaway
FH	Fire Hydrant	SPT	Septic Tank
FL	Floor Level	ST	Stay
FP	Flag Pole	SV	Stop Valve
FW	Foul Water	SVC	Security Video Camera
GP	Gate Post	SW	Storm Water
GV	Gas Valve	TCB	Telephone Call Box
GY/G	Gully	THL	Threshold Level
HT	Height	TL	Traffic Light
IC	Inspection Cover	TLPB	Traffic Light Push Button
IL	Invert Level	TK	Tank
IN	Interceptor	TP	Telegraph Pole
I/R	Iron Railings	UG	Underground
JB	Junction Box	UTF	Unable to trace Further
KO	Kerb Outlet	UTR	Unable To Raise
LB	Litter Bin	VP	Vent Pipe
LP	Lamp Post	WL	Water Level
LT	Light	WM	Water Meter
A	Approximate Diameter	WO	Wash Out
AC	Air Conditioning Unit		
NRV	Non-Return Valve		
P/D	Pit Depth		
W/L	Water Level		
S/L	Silt Level		
UTT	Unable to trace		

NOTES

- Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- Tree species (where shown) should be treated with caution and expert identification is advised.
- Although this is a digital survey the accuracy and amount of detail plotted is dependant upon the scale of publication unless otherwise specified. Care should be exercised when working to larger scales.
- Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
- Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- Kerb levels have been taken in the bottom of the channel.

FOUL DRAINAGE
STORM DRAINAGE
UNIDENTIFIED DRAINAGE

SHEET LAYOUT
NOT TO SCALE



THE EMBROOK SCHOOL
EMBROOK ROAD
WOKINGHAM
RG41 1JP

TOPOGRAPHICAL SURVEY
DRAINAGE SURVEY

SURVEYED FOR	ARCHIBALD SHAW LIMITED 1 LITTLE LONDON CHICHESTER WEST SUSSEX PO19 1PP
SURVEYOR	VINCENZO ANNESE
DATE	MARCH 2007

NO	DATE	REVISION
1	MAY 08	DRAINAGE SURVEY ADDED TO TOPOGRAPHICAL SURVEY

DRAWING NO	T 5962/1	REV	1
DRAWING TITLE	TOPOGRAPHICAL		
SCALE	1 : 200		
SEE ALSO DWG NOS			
SHEET	1 of 3		
REF NO	T 5962		

UNDERGROUND SERVICES

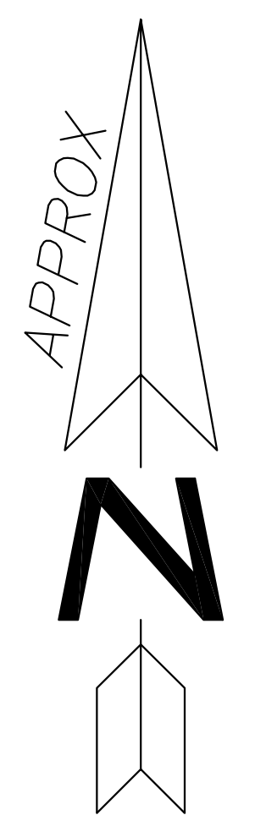
1) Although every effort has been made to trace underground services using radiodetection no guarantee can be given that all have been found. Due to their non-conductivity certain types of gas and water pipes have not been possible to trace. Service trial holes must be dug prior to excavation.

2) This survey has been carried out in accordance with the RICS specification for tracing underground utilities at scales of 1:500 and larger

3) In the absence of evidence to the contrary the routes of confirmed manhole connections are assumed to be direct and straight.

4) Information obtained from records has been shown as (R) and should be treated with caution and further investigation is advised.

Station		Eastings	Northings	Height
1	Road Nail	479904.367	169857.299	44.955
2	Road Nail	479859.386	169827.707	45.021
3	Road Nail	479911.105	169824.255	43.787
4	Road Nail	479857.481	169794.923	45.077
5	Road Nail	479855.407	169766.871	45.257
6	Road Nail	479898.272	169791.106	44.425
7	Road Nail	479852.829	169733.303	45.715
8	Wood Peg	479889.442	169750.246	44.659
9	Road Nail	479910.476	169776.042	43.958
10	Wood Peg	479826.121	169774.551	47086
11	Road Nail	479942.124	169754.089	43.799
12	Road Nail	479941.475	169789.177	43.735
13	Road Nail	479970.759	169759.136	43.624
14	Road Nail	479971.073	169790.156	43.726
15	Road Nail	479995.310	169756.569	43.485
16	Road Nail	480018.935	169789.477	43.595
17	Road Nail	479971.044	169822.457	43.549
18	Road Nail	479972.206	169849.329	43.454
19	Road Nail	479993.644	169714.316	43.640
20	Wood Peg	480002.900	169740.066	42.970
21	Road Nail	479947.139	169856.257	43.628
22	Road Nail	479975.480	169882.334	43.427
23	Road Nail	480017.607	169852.961	43.629
24	Road Nail	479938.497	169819.604	43.705
25	Road Nail	479920.119	169863.567	43.764
26	Road Nail	480027.340	169817.306	43.539
27	Road Nail	479978.572	169929.624	43.499
28	Wood Peg	480003.944	169890.154	43.450
29	Road Nail	480038.675	169883.257	43.222
30	Wood Peg	480034.404	169849.121	43.453
31	Wood Peg	480034.990	169820.966	42.860
32	Wood Peg	480032.564	169796.566	42.861
33	Wood Peg	480018.117	169778.861	42.771



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LAND AND BUILDING SURVEYS, UNDERGROUND SERVICES LOCATION, CCTV DRAINAGE SURVEYS.

Established 1975. Member of The Survey Association.

BROCKAMIN HOUSE, LEIGH, WORCESTER. WR6 5JU.
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142–144 HILLVIEW AVENUE, HORNCHURCH, ESSEX. RM11 2DL
TEL 01708 438408 FAX 01708 438405 email: london@lasersurveys.com

DATUM NOTES

CO–ORDINATES USED ARE BASED ON O/S NATIONAL GRID, OBTAINED USING THE ACTIVE GPS NETWORK AND ADJUSTED TO A LOCAL GRID WITH A SCALE FACTOR OF 1.0000 ABOUT STATION 13

LEVELS ARE RELATED TO :– ORDNANCE NATIONAL GRID
BENCH MARK USED IS LOCATED AT :–
STATION 13
ROAD NAIL, SE CORNER OF SITE, IN TARMAC

VALUE GIVEN AS 43.624m

NG REF

SURVEY CONTROL STATIONS SHOWN △

ABBREVIATIONS (where applicable)

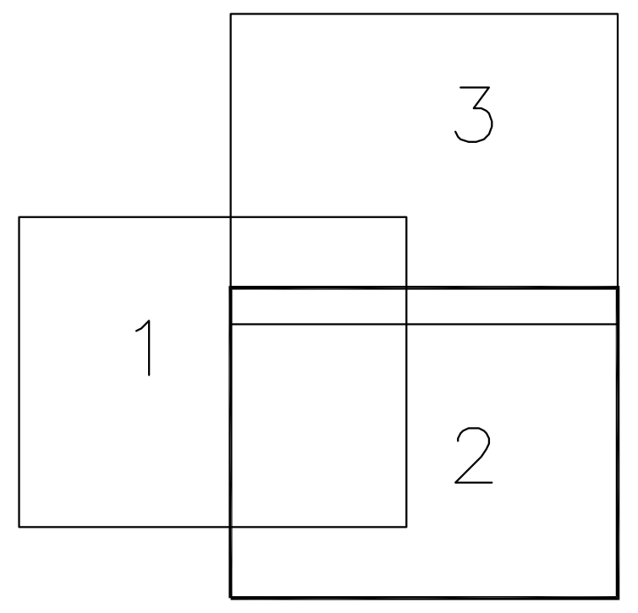
AV	Air Valve	MH	Manhole Cover
BK	Brick	MK	Marker
BL	Bollard	MS	Milestone
BS	Bus Stop	MT	Meter
BT	British Telecom	MY	Mercury
C/B	Close Boarded	OH	Overhead
CL	Cover Level	PAV	Paving
CLK	Chainlink	PB	Post Box
CO	Column	PE	Pipe
Conc	Concrete	PM	Parking Meter
CP	Catch Pit	P/R	Post and Rail
CPS	Concrete Paving Slabs	PT	Post
CTV	Cable Television	P/W	Post and Wire
CW	Combined Water	RE	Rodding Eye
DC	Drainage Channel	RET	Retaining
DP	Drain Pipe	RM	Rising Gas Main
EP	Electricity Pole	RS	Road Sign
ER	Earthing Rod	RSJ	Rolled Steel Joist
FB	Flower Bed	SC	Stop Cock
FDP	Foul Down Pipe	SDP	Storm Down Pipe
FE	Fence	SK	Soakaway
FH	Fire Hydrant	SPT	Septic Tank
FL	Floor Level	ST	Silt Trap
FP	Flag Pole	SV	Stop Valve
FW	Foul Water	SVC	Security Video Camera
GP	Gate Post	SW	Storm Water
GV	Gas Valve	TCB	Telephone Call Box
GY,G	Gully	THL	Threshold Level
HT	Height	TL	Traffic Light
IC	Inspection Cover	TLPB	Traffic Light Push Button
IL	Invert Level	TK	Tank
IN	Interceptor	TP	Telegraph Pole
I/R	Iron Railings	UG	Underground
JB	Junction Box	UTF	Unable to trace Further
KO	Kerb Outlet	UTR	Unable To Raise
LB	Litter Bin	VP	Vent Pipe
LP	Lamp Post	WL	Water Level
LT	Light	WM	Water Meter
A	Approximate Diameter	WO	Wash Out
AC	Air Conditioning Unit		
NRV	Non–Return Valve		
P/D	Pit Depth		
W/L	Water Level		
S/L	Silt Level		
UTT	Unable to trace		

NOTES

- * Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- * Tree species (where shown) should be treated with caution and expert identification is advised.
- * Although this is a digital survey the accuracy and amount of detail shown is only commensurate with the graphical scale of mapping as specified. Care should be exercised when working to larger scales.
- * Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed ownership.
- * Whilst every effort has been made to achieve accuracy on this plan, CRUCIAL clearance dimensions, levels and invert levels should be checked prior to design and construction.
- * Kerb levels have been taken in the bottom of the channel.

🟥 — · · —	FOUL DRAINAGE
🟦 — – – – —	STORM DRAINAGE
🟩 — – – – —	UNIDENTIFIED DRAINAGE

SHEET LAYOUT
NOT TO SCALE



THE EMBROOK SCHOOL
EMBROOK ROAD
WOKINGHAM
RG41 1JP

TOPOGRAPHICAL SURVEY
DRAINAGE SURVEY

SURVEYED FOR
ARCHIBALD SHAW LIMITED
1 LITTLE LONDON
CHICHESTER
WEST SUSSEX
PO19 1PP

SURVEYOR VINCENZO ANNESE
DATE MARCH 2007

NO	DATE	REVISION
1	MAY 08	DRAINAGE SURVEY ADDED TO TOPOGRAPHICAL SURVEY

DRAWING NO	T 5962/2	REV	1
DRAWING TITLE	TOPOGRAPHICAL		
SCALE	1 : 200		
SEE ALSO DWG NOS			
SHEET	2 of 3		
REF NO	T 5962		

UNDERGROUND SERVICES

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APPROX N

LASER SURVEYS

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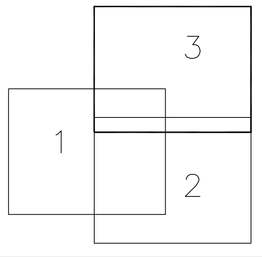

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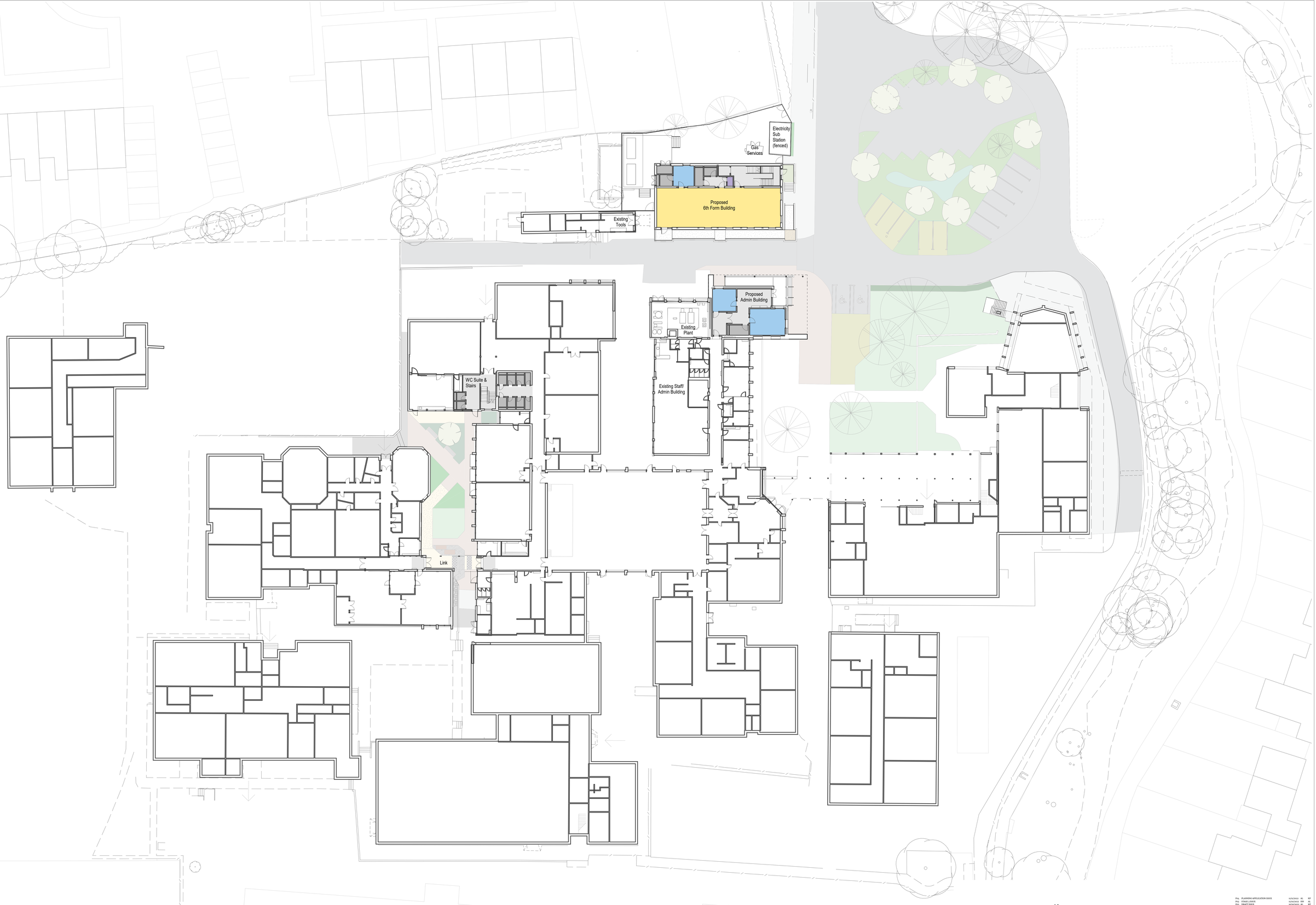
DRAWING NO	T 5962/3	REV 1
DRAWING TITLE	TOPOGRAPHICAL	
SCALE	1 : 200	
SEE ALSO DWG NOS		
SHEET	3 of 3	
REF NO	T 5962	

B Proposed Site Layout



CDM
CONSTRUCTION PHASE HAZARD IDENTIFICATION
In accordance with the Construction (Design & Management) Regulations 2015.

This hazard sign is a notification to other designers and contractors of foreseeably exceptional risks resulting from the design activities carried out by HLM Architects Ltd., which have not been adequately addressed or cannot be identified by a competent person as defined in the 'Construction (Design and Management) Regulations 2015' – Regulation 9 & 10 and Industry Guidance for Designers (Section 4) published by the CITB (2015)

DRAWING REVIEWED pink or no	YES
EXCEPTIONAL RISKS / RISK CONTROL MEASURES none or see warning triangle	see warning triangle

N

Project
The Emmbrook School

Client
WOKINGHAM BOROUGH COUNCIL

Title
GROUND FLOOR GA PROPOSED

Scale @ A0: 1 : 200@A0
Drawn: AL
Date: 11/11/2022
Checked: KP

Rev	Description	Date	By	Chk
P04	PLANNING APPLICATION ISSUE	01/12/2022	AL	KP
P03	STAGE 3 ISSUE	01/12/2022	KW	AL
P02	DRAFT ISSUE	01/12/2022	AL	KP
P01	DRAFT ISSUE	09/11/2022	AL	KP

Revisions
Suitability
S4 STAGE APPROVAL

Drawing No.
EMM-HLM-ZZ-00-DR-A-00101
Revision
P04

Notes Check all dimensions on site. Do not scale from this drawing. Report any discrepancies and omissions to HLM Architects. This Drawing is CopyrightED

1:500 50 M
1:200 20 M

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www.hlmarchitects.com
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F. +44 (0) 20 7921 4850
london@hlmarchitects.com

C Product 4 Data

Product 4 (Detailed Flood Risk) for Emmbrook Road, Wokingham, Berkshire, RG41 1JP
Our Ref: WT 14606

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This is:

i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions", and

ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;
Flood Zone 2 and Flood Zone 3;
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);
Model extents showing *defended* scenarios;
FRA site boundary (where a suitable GIS layer is supplied);
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)
Flood Map areas benefiting from defences (where available/relevant);
Flood Map flood storage areas (where available/relevant);
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;
Statutory (Sealed) Main River (where available within map extents);

A table showing:

i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.

ii) Flood defence locations unique identifiers and attributes; (supplied seperately)

iii) Historic flood events outlines unique identifiers and attributes; and

iv) Local flood history data (where available/relevant).

Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please read the enclosed guidance which sets out our requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at

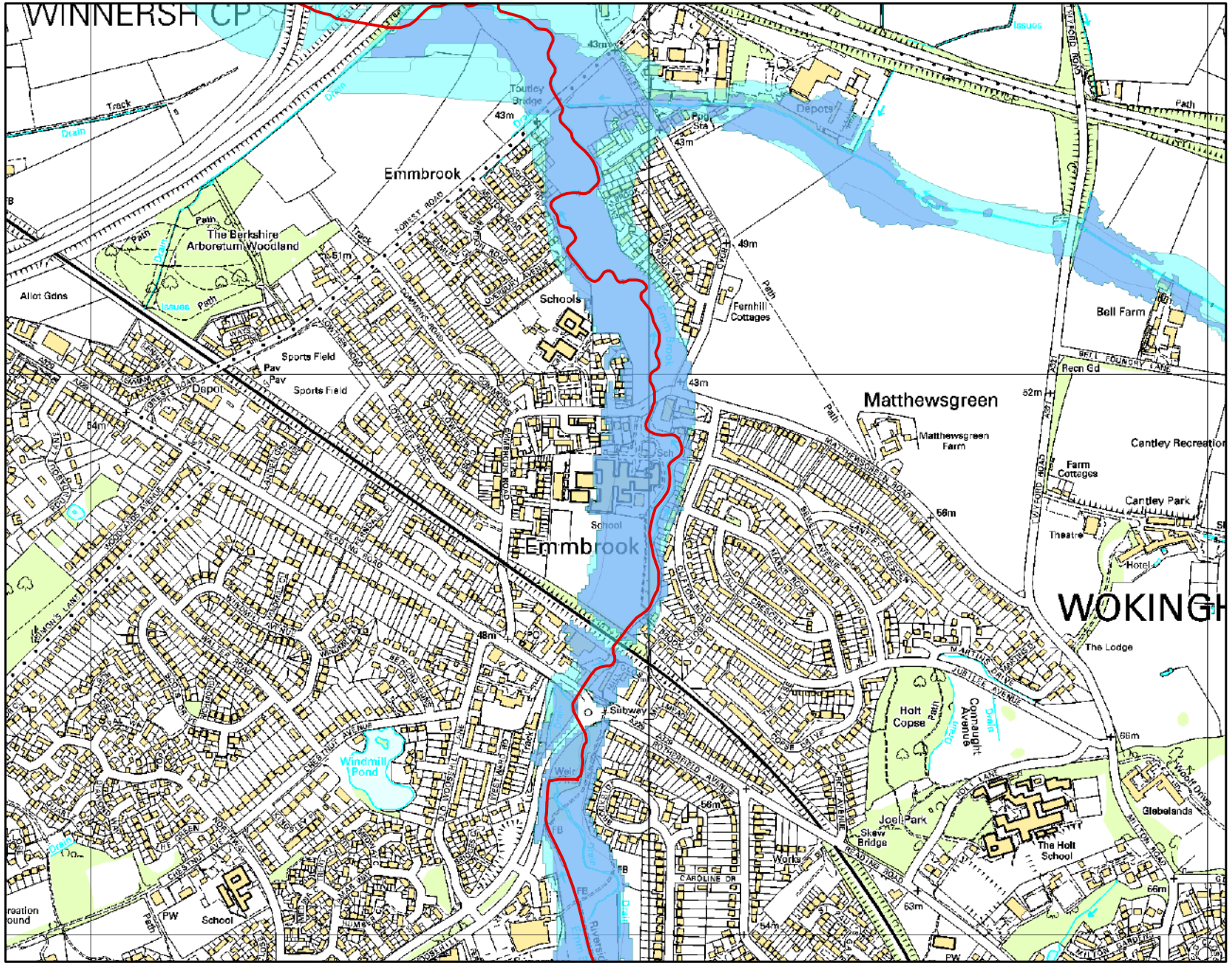
http://www.environment-agency.gov.uk/research/planning/82584.aspx

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at

http://www.environment-agency.gov.uk/research/planning/33580.aspx

Red Kite House, Howbery Park, Wallingford, Oxon OX10 8BD
Customer services line: 08708 506 506
Email: WTenquiries@environment-agency.gov.uk

Flood Map for Planning Centred on Emmbrook Road, Wokingham, Berkshire, RG41 1JP
Created 24/03/2014 - REF: WT14606



Environment Agency

Kilometres

0 0.1 0.2

Legend

- 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.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Defence information

WT 14606

Defence Location:	No defences on Main River
Description:	This location is not currently protected by any formal defences and we do not currently have any flood alleviation works planned for the area. However we continue to maintain certain watercourses and the schedule of these can be found on our internet pages.

Model information

WT 14606

Model: Loddon (Lower Tribs) 2007

Description: The information provided is taken from the Lower Loddon Detailed Flood Risk Mapping study which was completed in January 2007. This model is a 1D-2D model using ESTRY-TUFLOW. The study consisted of five model areas:
Emm Brook (Wokingham)
Emm Brook (Upstream)
Ashridge Stream
Waterloo Road Stream
Barkham Brook

There was no water level data available to verify these models, so we do not know the model accuracy.

Model design runs:
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 100 / 1% AEP; and 1 in 100+20% / 1% AEP with climate change

Mapped outputs:
1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 100 / 1% AEP; and 1 in 100+20% / 1% AEP with climate change

Model accuracy:
Levels ± 250mm

Detailed FRA Centred on Emmbrook Road, Wokingham, Berkshire, RG41 1JP
Created 24/03/2014 - REF: WT14606

Environment Agency

Kilometres

0 0.050.1

Legend

- Nodes
- 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, occuring 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)

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled in-channel flood flows and levels

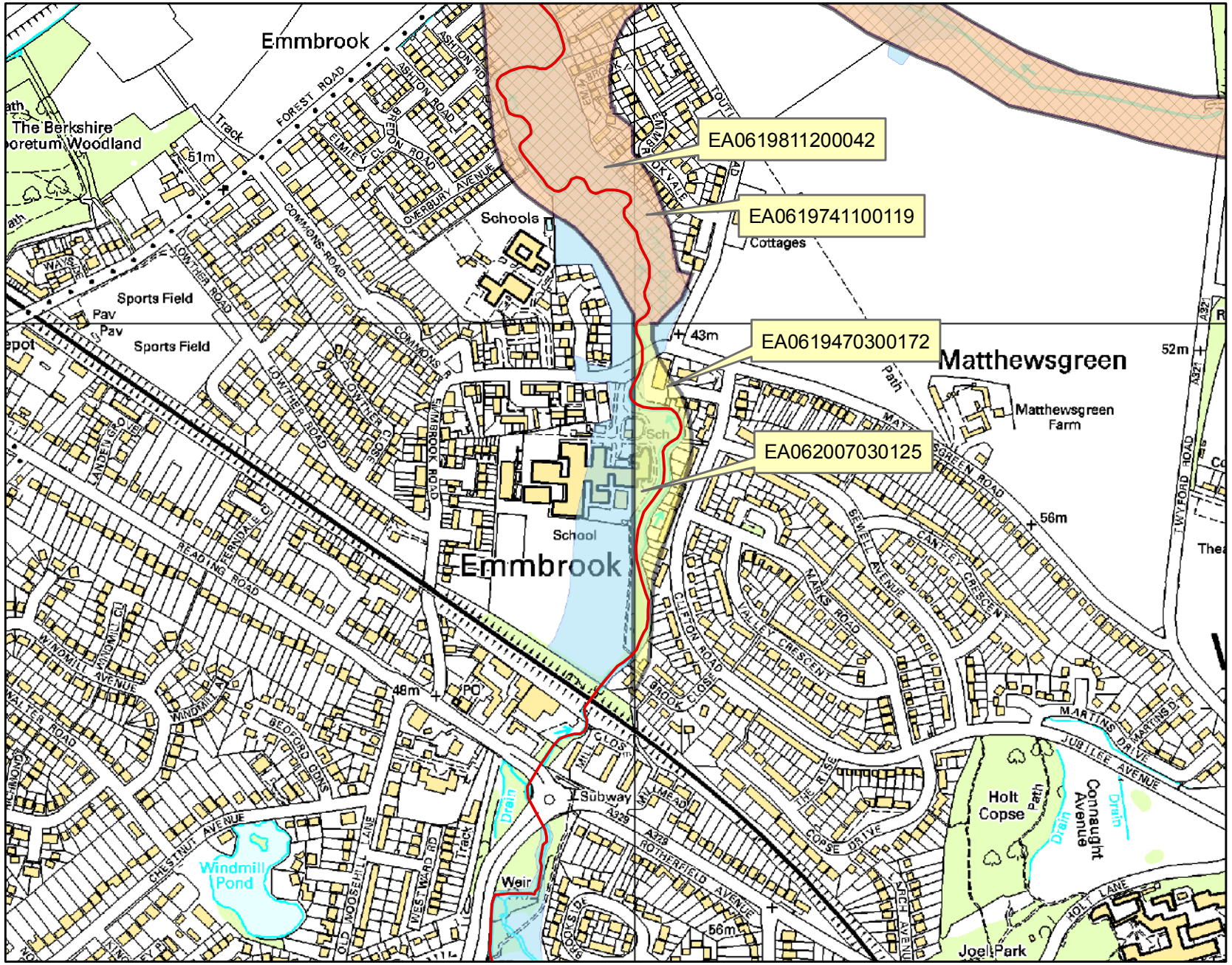
WT 14606

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

				Flood Levels (mAOD)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06324LO_MN_Emm2.02.1	Loddon (Lower Tribs) 2007	479881	170324	42.38	42.55	42.75	42.84	0.00
06324LO_MN_Emm2.04.1	Loddon (Lower Tribs) 2007	479863	170255	42.65	42.82	42.99	43.08	0.00
06324LO_MN_Emm2.08.1	Loddon (Lower Tribs) 2007	480017	170081	42.93	43.06	43.22	43.30	0.00
06324LO_MN_Emm2.12a.1	Loddon (Lower Tribs) 2007	480008	169944	43.16	43.32	43.52	43.67	0.00
06324LO_MN_Emm2.14.1	Loddon (Lower Tribs) 2007	480036	169843	43.56	43.81	43.94	44.00	0.00
06324LO_MN_Emm2.16.1	Loddon (Lower Tribs) 2007	480002	169702	43.63	43.87	44.02	44.10	0.00
06324LO_MN_Emm2.19a.1	Loddon (Lower Tribs) 2007	479989	169573	43.95	44.12	44.31	44.40	0.00
06324LO_MN_Emm2.22.1	Loddon (Lower Tribs) 2007	479882	169443	45.10	45.16	45.25	45.30	0.00
06324LO_MN_Emm2.26R1.1	Loddon (Lower Tribs) 2007	479885	169361	45.15	45.26	45.44	45.57	0.00

				Flood Flows (m3/s)				
Node label	Model	Easting	Northing	20% AEP	5% AEP	1% AEP	1% AEP with climate change allowance (+20% on river flows)	0.1% AEP
06324LO_MN_Emm2.02.1	Loddon (Lower Tribs) 2007	479881	170324	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.04.1	Loddon (Lower Tribs) 2007	479863	170255	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.08.1	Loddon (Lower Tribs) 2007	480017	170081	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.12a.1	Loddon (Lower Tribs) 2007	480008	169944	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.14.1	Loddon (Lower Tribs) 2007	480036	169843	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.16.1	Loddon (Lower Tribs) 2007	480002	169702	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.19a.1	Loddon (Lower Tribs) 2007	479989	169573	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.22.1	Loddon (Lower Tribs) 2007	479882	169443	0.00	0.00	0.00	0.00	0.00
06324LO_MN_Emm2.26R1.1	Loddon (Lower Tribs) 2007	479885	169361	0.00	0.00	0.00	0.00	0.00

Historic Flood Map Centred on Emmbrook Road, Wokingham, Berkshire, RG41 1JP
Created 24/03/2014 - REF: WT14606



Environment Agency

Kilometres

0 0.050.1

Legend

Main River

Historic Flood Outlines

- 1947
- 1974
- 1981
- 2007

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.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Historic flood data

WT 14606

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
EA0619470300172	06MarchSpring1947	01/01/1947	12/12/1947	main river	channel capacity exceeded (no raised defences)
EA0619741100119	06NovemberAutumn1974	01/01/1974	12/12/1974	main river	channel capacity exceeded (no raised defences)
EA0619811200042	06DecemberWinter1981	01/01/1981	12/12/1981	main river	channel capacity exceeded (no raised defences)
EA062007030125	Thames SE area July 2007	20/07/2007	21/07/2007	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.

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