

CHERRY TREES
LAKE LANE
BARNHAM
BOGNOR REGIS
WEST SUSSEX
PO22 0AD

FLOOD RISK ASSESSMENT

DEMOLITION OF EXISTING GARAGE & CONSTRUCTION OF 1 NO.
DETACHED DWELLING.

FEBRUARY 2020

REVISION A

Consulting Civil Engineers

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1. INTRODUCTION

Baker & Associates Ltd have been appointed by Rabgrange Developments Ltd to produce a Flood Risk Assessment (FRA) for the demolition of an existing garage & construction of one detached dwelling, on land at Cherry Trees, Lake Lane, Barnham, Bognor Regis, West Sussex.

This Flood Risk Assessment is to be submitted as part of the planning application for the development of the site.

This Flood Risk Assessment has been prepared in accordance with Communities & Local Government, National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG) and the Department for Environment, Food and Rural Affairs (DEFRA).

2. SITE DESCRIPTION

2.1 SITE LOCATION AND SURROUNDING AREA

The site is located in Barnham, 6.1 km to the north-east of Bognor Regis town centre and 10.0 km east of Chichester city centre, off of Lake Lane. See figures 2.1.1 to 2.1.3.

The existing 460sqm site consists of a semi-detached dwelling, Cherry Trees, with a 17m² garage. It is proposed that the existing garage is demolished, and the site split to create a developable area of 267m² adjacent to Cherry Trees.



FIGURE 2.1.1 SITE LOCATION



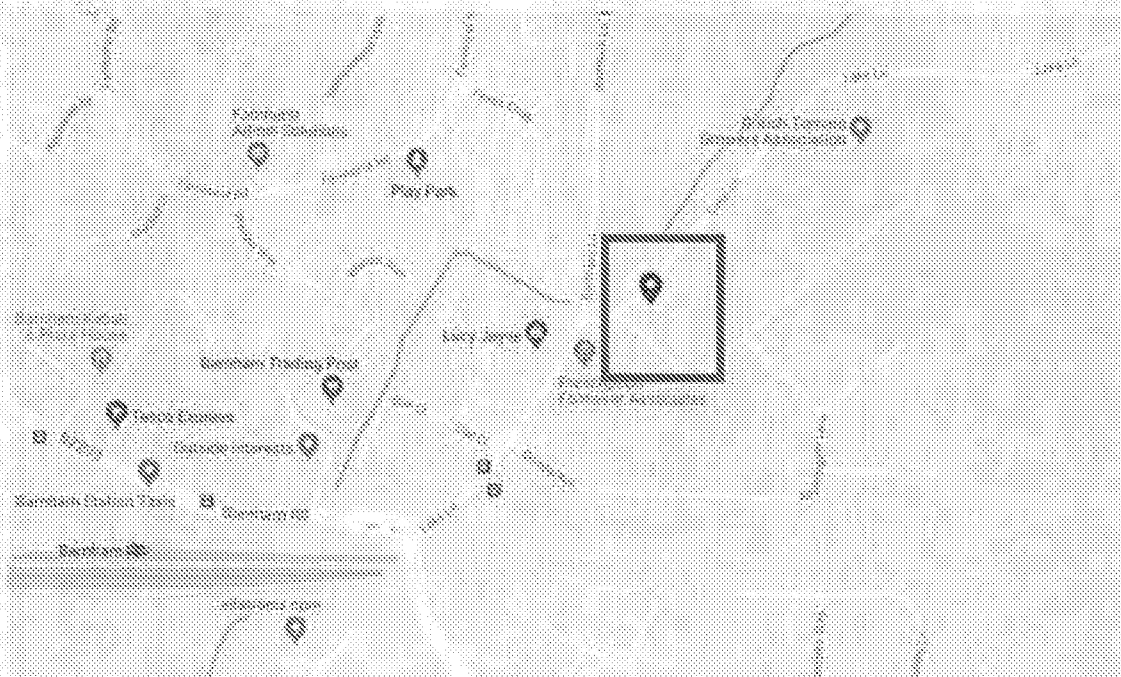


FIGURE 2.1.2 SITE LOCATION



FIGURE 2.1.3 AERIAL IMAGE OF SITE LOCATION





2.2 GEOLOGY

British Geological Survey maps indicate that the substrata beneath the site is London Clay Formation with superficial raised beach deposits consisting of sand and gravel.

The historic borehole record also shows that ground water was recorded at being struck within the sand sub-strata at a depth of 1.7m.

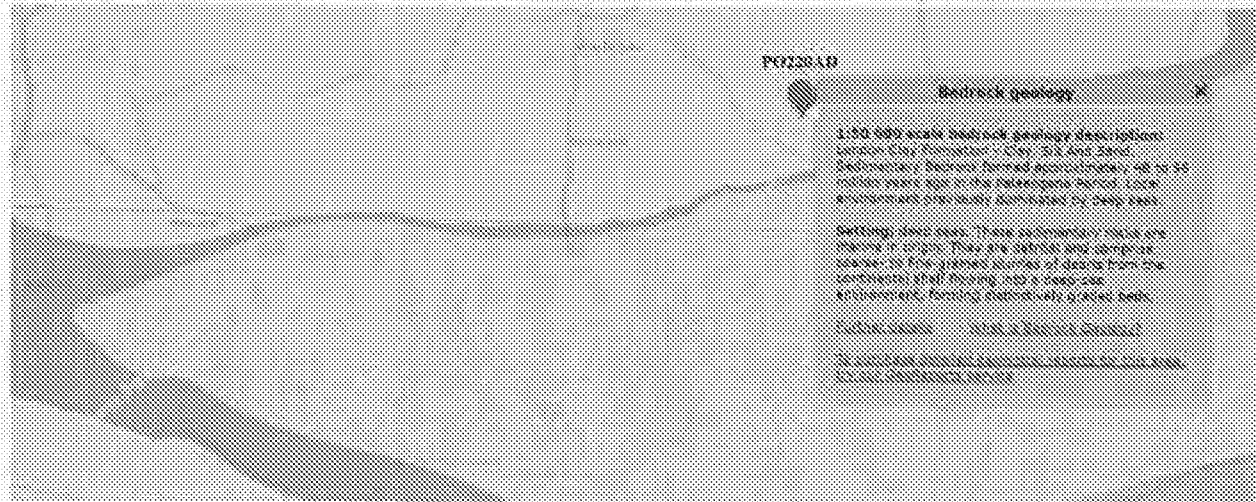


FIGURE 2.2.1 BRITISH GEOLOGICAL SURVEY MAP
(WWW.BGS.CO.UK)

A soakaway test was undertaken 700mm below ground level, the test pit was filled 3 times and took an average of 85 minutes to empty 75%-25%. An infiltration rate has been calculated below.

Soakaway Calculations	
Field Test	
Depth of Pit	0.30 m
Width of Pit	0.30 m
Length of Pit	0.30 m
Depth of Pit Soaked	0.30 m
ap50	0.27 m ²
Vp75-25	0.0135 m ³
t75-25	85.0 min
water used	0.0270 m ³
f	9.804E-06 m/sec.

FIGURE 2.2.2 INFILTRATION RATE CALCULATION





2.3 TOPOGRAPHY

The existing finished floor level of Cherry Trees is 5.90mAOD, with a level in the rear garden at 5.72mAOD (Southern boundary). The level at the front of the site, at the north east corner of Cherry Trees, is 5.42mAOD falling to 5.11mAOD at the top of the existing driveway. The level along Lake Lane in front of Cherry Trees is approximately 4.69mAOD.

Refer to Appendix A for existing site levels.

3. POTENTIAL SOURCES OF EXTERNAL FLOODING

3.1. TIDAL

The site is located 5.0km north of the English Channel and is therefore not at risk of tidal flooding.

3.2. FLUVIAL (RIVERS)

The EA produces floodplain maps for the UK, which show the areas at risk of fluvial and tidal flooding. The magnitudes of the flooding events considered are defined in terms of their return period. Generally, when determining the impact of any development within the floodplain of a fluvial reach, the design standard against which the EA will consider the feasibility of any scheme is typically the 1% AEP (1 in 100 year return period flood) for sites within the floodplain, or the effects of a 1 in 100 year storm if outside the floodplain.

The EA flood zone maps identify undefended floodplain, giving the horizontal extent of low (Zone 1), medium (Zone 2) and high risk flood zones (Zones 3a and 3b) depending on the severity of the flood event.

The site is shown to be within Flood Zone 2 up to the rear elevation of Cherry Trees.

Lake Lane is partially within Flood Zone 2 and Flood Zone 1.

A Flood Risk Assessment carried out in 2015 for the redevelopment of 4 Lake Lane Barnham (Application ref BN/23/15/PL), contained flood levels from the 2009 JFLOW model, which gives a 1:100 year flood level of 4.97mAOD and a 1:1000 year flood level of 5.27mAOD at a node 80m north east of the site along Lake Lane.



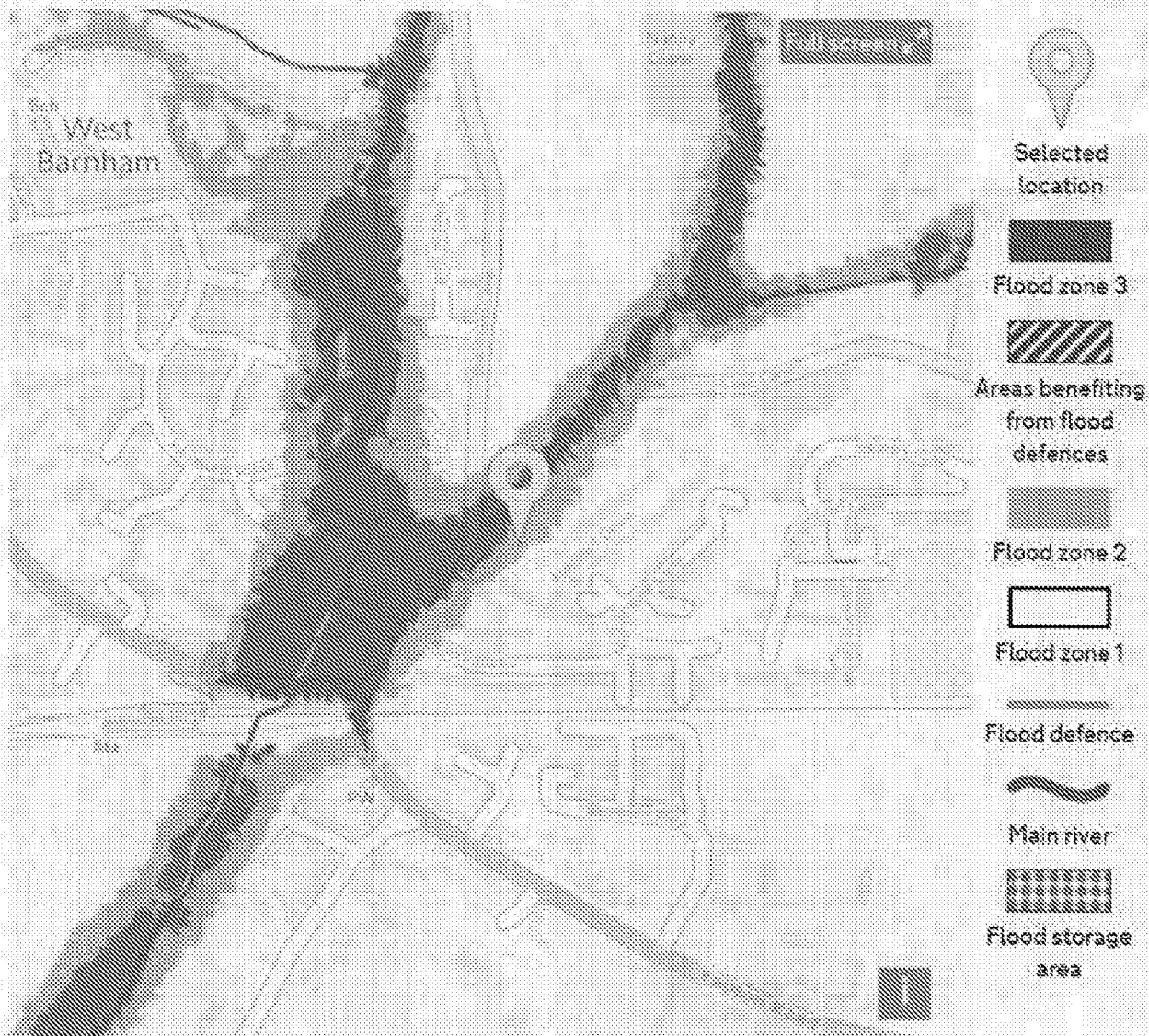


FIGURE 3.2.1 ENVIRONMENT AGENCY FLUVIAL FLOOD RISK MAP
(flood-map-for-planning.service.gov.uk)

3.3. PLUVIAL (SURFACE WATER)

The Environment Agency also produce maps which highlight the risk of flooding from surface water flows illustrating when the capacity of existing surface water drainage networks and channels are exceeded in extreme rainfall events.

The Environment Agency's risk of flooding from surface water map (below) shows that the site is not at risk from pluvial flooding and that there is a low risk of pluvial flooding, below 300mm depth, along section of Lake Lane.



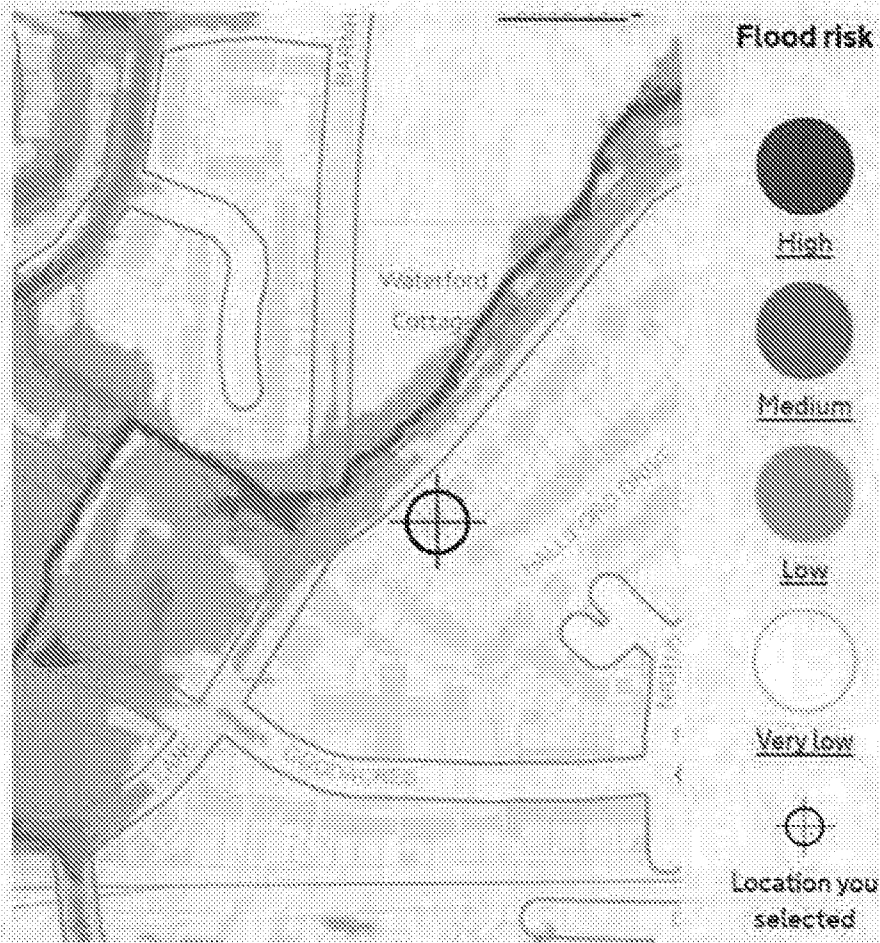


FIGURE 3.3 ENVIRONMENT AGENCY PLUVIAL FLOOD RISK MAP
(flood-map-for-planning.service.gov.uk)

3.4. FOUL/SURFACE WATER SEWERS

There is a foul water sewer and surface water drain located within Lake Lane (figure 3.4.1). There have been no historic reported incidents of flooding from this source and the proposed dwelling will be elevated by approximately 1.2m above Lake Lane and therefore the risk of flooding is deemed as low.



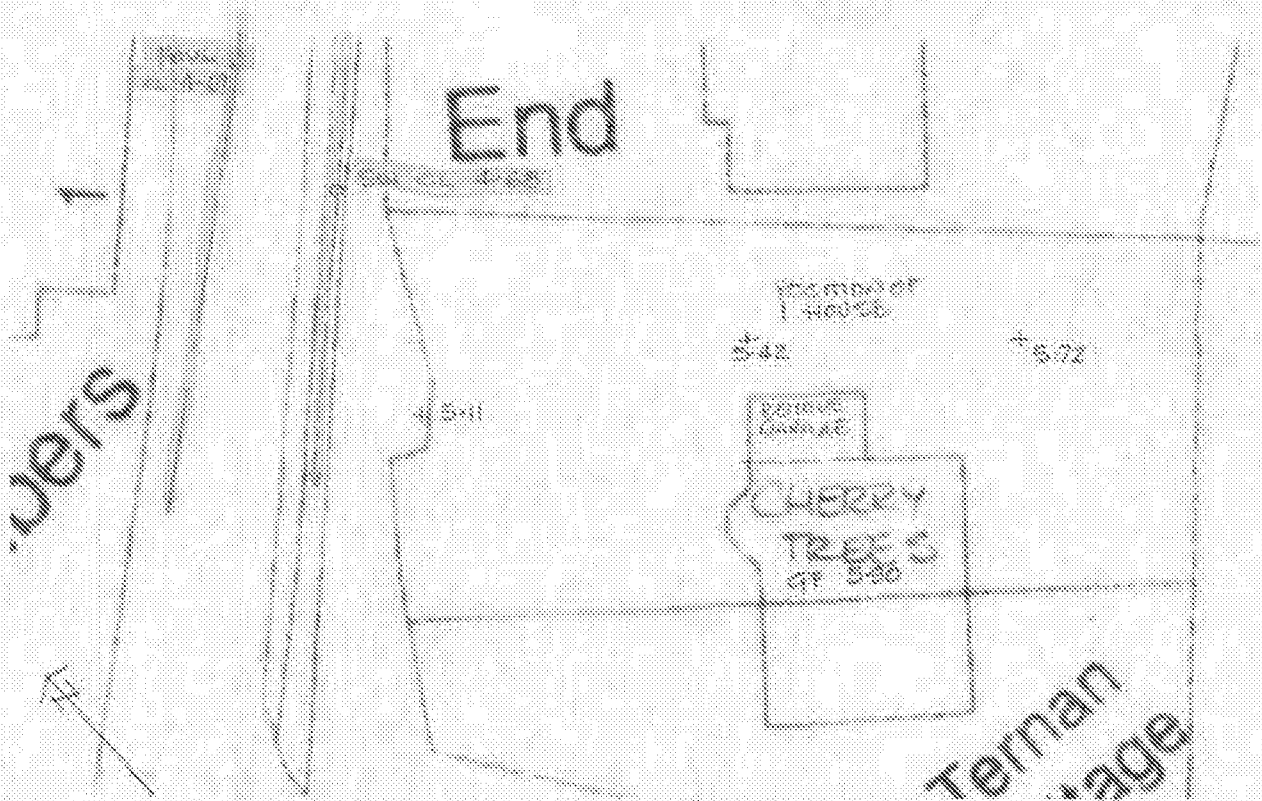


FIGURE 3.4.1 SKETCH OF PUBLIC DRAINAGE SYSTEMS

3.5. GROUND WATER

There have been no reports of groundwater flooding taking place within the catchment of the site. A historic borehole confirmed that groundwater was present within the sand sub-strata layer beneath the clay. The depth of the sand-substrata layer at the site location is unknown, however the clay cap upon the sand substrata would prevent groundwater reaching the surface and therefore this risk is deemed as low.

3.6. RESERVOIRS/CANALS AND OTHER ARTIFICIAL SOURCES

There are no Reservoirs, Canals or Artificial sources surrounding the site and therefore the site is not at risk of flooding from these sources.





4. STRATEGIC FLOOD RISK ASSESSMENT

A Level 1 & 2 Strategic Flood Risk Assessment (SFRA) was carried out in January 2016 by JBA, the SFRA was produced for Arun District Council.

The purpose of the SFRA was to assess and map flood risk from groundwater, surface water, sewer and river sources taking into account climate change predications.

The SFRA confirmed historic flood events in Barnham in 1993 where inadequate culvert capacity contributed to the flooding experienced and in 2012 where 8 properties along Lake Lane were affected by flooding from the Barnham Rife.

5. DEVELOPMENT PROPOSALS

The existing 460sqm site consists of a semi-detached dwelling, Cherry Trees, with a 17m² garage. It is proposed that the existing garage is demolished, and the site split to create a developable area of 267m² adjacent to Cherry Trees.

It is proposed to construct 1 residential detached, dwelling with a footprint of 56m² with associated driveway and parking (Appendix A).

5.1 EXISTING SITE DRAINAGE

It is believed that the existing surface water from Cherry Trees discharges to the surface water drain at the front of the site or to the foul sewer as combined.

Foul Water drainage is anticipated to discharge to the foul water sewer within Lake Lane.

5.2 SUDS HIERARCHY OF SYSTEMS AND JUSTIFICATION OF USAGE

We have reviewed and taken into consideration the Environment Agency SuDS Hierarchy for SuDS systems which are noted below in order of preference:

1. Living Roofs
2. Basins and Ponds
3. Filter Strips and Swales
4. Infiltration Devices
5. Permeable Surfaces and Filter Drains
6. Tanked Systems

Below is the response to these systems identifying the most suitable system for the





scheme and why the more favourable are unsuitable.

1. Living and green roofs impose a large load on the roof structure and require relatively flat roofs to insure water retention. The proposed buildings will be constructed using pitched lightweight roofs. This deems green roofs as being unfeasible for this project.
2. Attenuation basins will be unfeasible due to the compact nature of the site.
3. Impermeable Filter strips and swales are feasible.
4. Infiltration devices are feasible.
5. Permeable surfaces as a tanked system with discharge to a drain or sewer are feasible, permeable surfaces as an infiltrating system are feasible.
6. A surface water storage tank system with restricted discharge connection to a surface water drain is feasible.

5.2 PROPOSED SITE SURFACE WATER DRAINAGE STRATEGY

An infiltration test undertake on site confirmed that a shallow soakaway is a feasible option to dispose of surface water runoff.

Surface water run-off will be discharged to a soakaway designed to cater for the 1:100 year (1% AEP) storm plus 40% allowance for climate change (Appendix B).

Site levels will be designed such that any flows caused by storms above the designed return period of 1:100+40% are managed in exceedance routes falling away from the building.

5.3 PROPOSED SITE FOUL WATER DRAINAGE STRATEGY

The foul water drainage for the site will be discharged to the existing foul water drainage for Cherry Trees which is anticipated to have a connection to the foul water sewer within Lake Lane.

5.4 FUTURE MAINTENANCE OF SYSTEM

A maintenance document for the system will be provided for the owners of the dwellings detailing the maintenance requirements of the on-site drainage system (Appendix C).





6. FLOOD RISK MANAGEMENT MEASURES

The proposed dwelling falls within Flood Zone 2 and the site entrance joins Lake Lane which is within Flood Zone 3, therefore mitigation measures are to be put into place to reduce the risk to persons living/staying at the dwelling and to the dwelling itself.

6.1 FINISHED FLOOR LEVELS

The finished floor level of the proposed dwelling will be set at 5.90mAOD, 630mm above the 2009 1:1000 year storm return period flood level and 930mm above the 1:100 storm return period flood level.

6.2 FLOOD RESILIENT CONSTRUCTION

The finished floor level of the proposed dwelling will be above the 1:1000 year storm return period, however it is recommended that Flood resilient construction methods and materials for floors and walls up to finished floor level are incorporated with the design and construction of the dwelling as well as Anti-flood air bricks or vent covers.

The architect, structural engineer and builder of the dwellings should review and incorporate the recommendations outlined in Communities and Local Government, Improving the Flood Performance of New Buildings, Floor Resilient Constructions.

6.3 FLOOD WARNING SYSTEM & ACCESS & EGRESS

A Flood Management Plan (FMP) has been prepared to summarise the information related to potential flooding in the Burnham area and to Lake Lane.

The document outlines the potential flood risk that may impact on the development and provides guidance to ensure residual risks are communicated to the occupiers of the development.

It is advised that the FMP is provided to all occupants of the proposed dwellings to ensure that they are aware of the risk of flooding and that the appropriate response to the flood risk can be actioned, if required. The FMP is included within Appendix D.





7. SUMMARY AND CONCLUSIONS

The proposed new dwelling is shown to be within Flood Zone 2 with the entrance to the site along Lake Lane within Flood Zone 1 & 2.

The finished floor level of the proposed dwelling will be set at 5.90mAOD, 630mm above the 2009 1:1000 year storm return period flood level and 930mm above the 1:100 storm return period flood level.

The dwelling will incorporate flood resilient construction methods up to finished floor level.

The owner/occupiers of the dwellings will be connected to the Environment Agency's floodline and a Flood Water Management plan has been prepared advising on the risk and procedures to undertake during a flood event.

Surface water drainage will be dealt with by discharging runoff to soakaway designed to cater for the 1% AEP (1:100 year) storm with 40% additional storage to allow for climate change.

The drainage system has been designed in accordance Communities & Local Government, National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and the Department for Environment, Food and Rural Affairs (DEFRA)

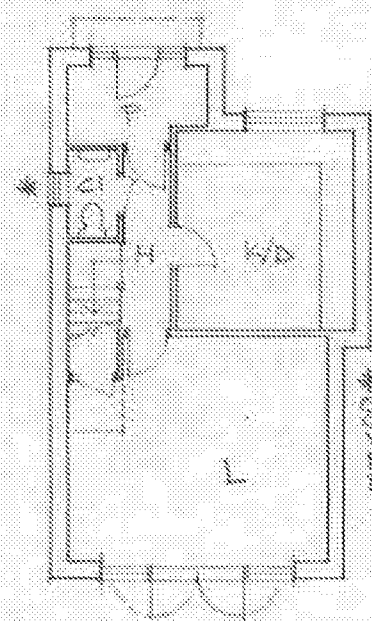
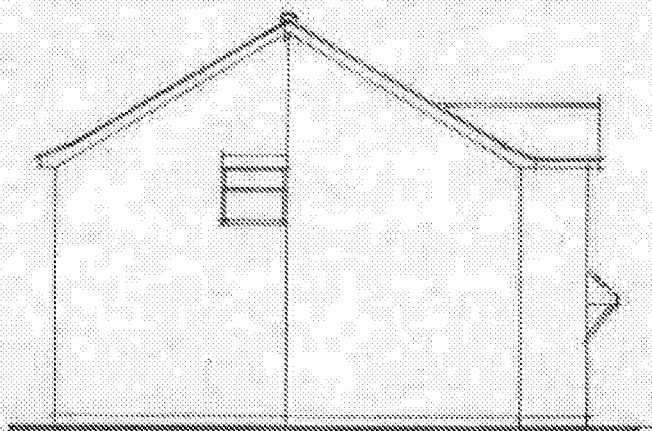
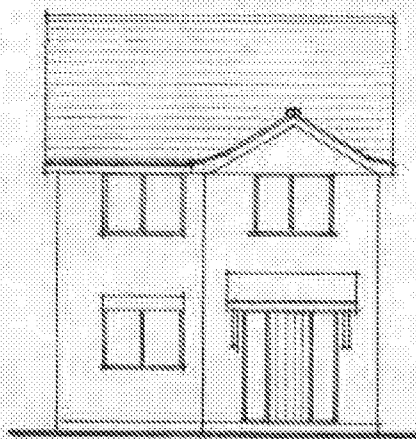
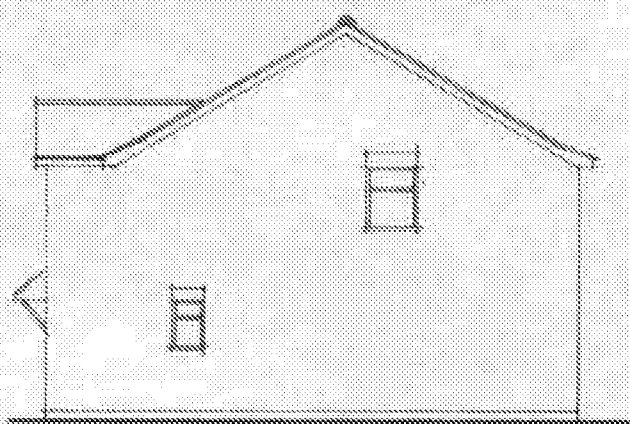
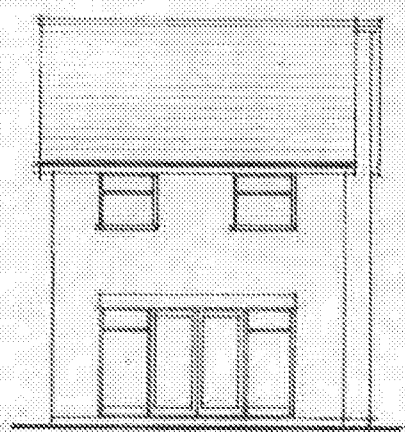
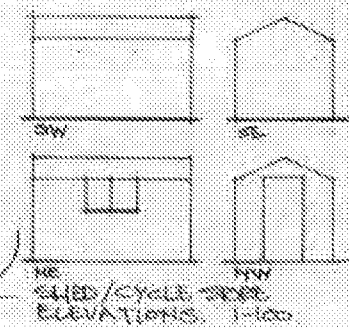
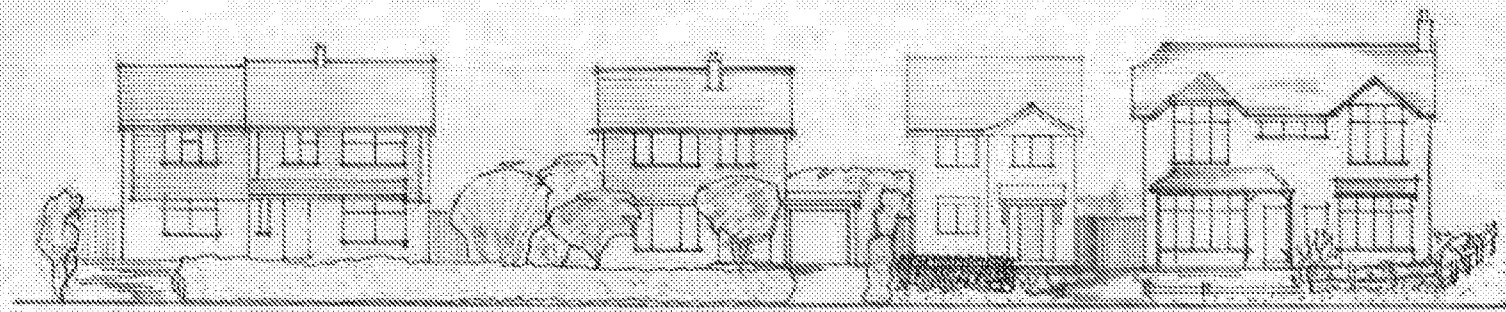
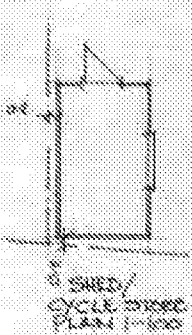




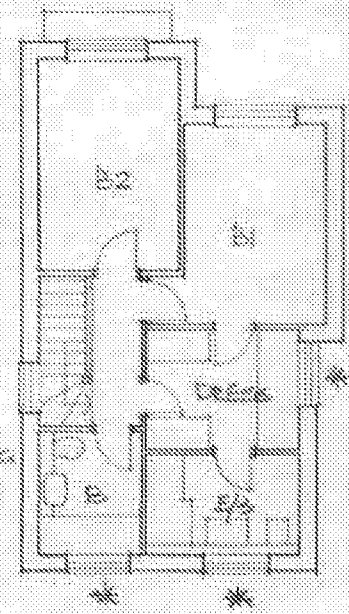
APPENDIX A - EXISTING SITE LEVELS & DEVELOPMENT PROPOSAL



STREETLEY | DEEP END | PROPOSED HOUSE SITE | CHERRY TREES | TURNER COTTAGE | HALLIBROOK DRIVE



* RECURSE
GLAZED
WINDOW -
NON-OPENING
BELOW 0.7M
ABOVE F.L.



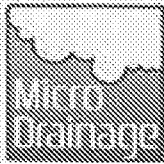
PROPOSED HOUSE
ADJACENT TO
CHERRY TREES
LAKE LANE
BARNHART.

PLANS
ELEVATIONS
STREET SCENE
JULY 2019
DRAWING 2A
SIGNED AS SHOWN (AS)



APPENDIX B - DRAINAGE STRATEGY



Baker & Associates Ltd		Page 1
Wessex House Upper Market Street Eastleigh Hampshire SO50 5PD	Land adjacent to Cherry Trees	
Date 17/02/2020	Designed by S Baker	
File Task.SBCX	Checked by	
Micro Drainage	Source Control 2017.1.2	

Summary of Results for 100 year Return Period (+40%)

Half Basin Time : 431 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.141	0.141	0.1	1.6	O K
30 min Summer	0.187	0.187	0.1	2.1	O K
60 min Summer	0.233	0.233	0.1	2.7	O K
120 min Summer	0.274	0.274	0.1	3.1	O K
180 min Summer	0.292	0.292	0.1	3.3	O K
240 min Summer	0.298	0.298	0.1	3.4	O K
360 min Summer	0.300	0.300	0.1	3.4	O K
480 min Summer	0.298	0.298	0.1	3.4	O K
600 min Summer	0.285	0.285	0.1	3.4	O K
720 min Summer	0.290	0.290	0.1	3.3	O K
960 min Summer	0.280	0.280	0.1	3.2	O K
1440 min Summer	0.257	0.257	0.1	2.9	O K
2160 min Summer	0.223	0.223	0.1	2.5	O K
2880 min Summer	0.192	0.192	0.1	2.2	O K
4320 min Summer	0.140	0.140	0.1	1.6	O K
5760 min Summer	0.102	0.102	0.1	1.2	O K
7200 min Summer	0.074	0.074	0.1	0.8	O K
8640 min Summer	0.056	0.056	0.1	0.6	O K
10080 min Summer	0.048	0.048	0.1	0.6	O K
15 min Winter	0.158	0.158	0.1	1.8	O K
30 min Winter	0.210	0.210	0.1	2.4	O K
60 min Winter	0.263	0.263	0.1	3.0	O K
120 min Winter	0.311	0.311	0.1	3.5	O K
180 min Winter	0.332	0.332	0.1	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.074	0.0	19
30 min Summer	84.745	0.0	33
60 min Summer	54.368	0.0	62
120 min Summer	33.674	0.0	122
180 min Summer	25.065	0.0	182
240 min Summer	20.180	0.0	240
360 min Summer	14.839	0.0	328
480 min Summer	11.923	0.0	386
600 min Summer	10.064	0.0	450
720 min Summer	8.741	0.0	514
960 min Summer	7.003	0.0	654
1440 min Summer	3.114	0.0	924
2160 min Summer	3.727	0.0	1324
2880 min Summer	2.973	0.0	1728
4320 min Summer	2.159	0.0	2464
5760 min Summer	1.718	0.0	3168
7200 min Summer	1.438	0.0	3824
8640 min Summer	1.245	0.0	4496
10080 min Summer	1.102	0.0	5144
15 min Winter	126.074	0.0	18
30 min Winter	84.745	0.0	33
60 min Winter	54.368	0.0	62
120 min Winter	33.674	0.0	120
180 min Winter	25.065	0.0	178

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Wessex House Uper Market Street Eastleigh Hampshire SO50 5FD	Land adjacent to Cherry Trees	
Date 17/02/2020	Designed by S Baker	
File Tank.SRCX	Checked by	
Micro Drainage	Source Control 2017.1.2	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	0.341	0.341	0.1	3.9	O X
360 min Winter	0.347	0.347	0.1	4.9	O X
480 min Winter	0.343	0.343	0.1	3.9	O X
600 min Winter	0.339	0.338	0.1	3.9	O X
720 min Winter	0.332	0.332	0.1	3.8	O X
960 min Winter	0.317	0.317	0.1	3.6	O X
1440 min Winter	0.283	0.283	0.1	3.2	O X
2160 min Winter	0.232	0.232	0.1	2.6	O X
2880 min Winter	0.186	0.186	0.1	2.1	O X
4320 min Winter	0.113	0.113	0.1	1.3	O X
5760 min Winter	0.065	0.065	0.1	0.7	O X
7200 min Winter	0.047	0.047	0.1	0.5	O X
8640 min Winter	0.041	0.041	0.1	0.5	O X
10080 min Winter	0.036	0.036	0.0	0.4	O X

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	25.189	0.0	234
360 min Winter	14.839	0.0	344
480 min Winter	11.923	0.0	444
600 min Winter	10.054	0.0	476
720 min Winter	8.741	0.0	552
960 min Winter	7.002	0.0	704
1440 min Winter	3.114	0.0	1088
2160 min Winter	3.727	0.0	1428
2880 min Winter	2.973	0.0	1848
4320 min Winter	2.159	0.0	2552
5760 min Winter	1.716	0.0	3176
7200 min Winter	1.438	0.0	3744
8640 min Winter	1.245	0.0	4488
10080 min Winter	1.102	0.0	5144

Baker & Associates Ltd		Page 3
Wesses House Uper Market Street Eastleigh Hampshire SO50 5PD	Land adjacent to: Cherry Trees	
Date 17/02/2020	Designed by S Baker	
File Tank.SBCK	Checked by	
Micro Drainage		Source Control 2017.1.2

Rainfall Details

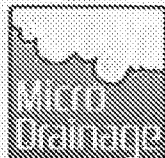
Rainfall Model	F3R	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region England and Wales		Cv (Winter)	0.840
M3-60 (mm)	19.200	Shortest Storm (mins)	15
Rain S	0.350	Longest Storm (mins)	18000
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.067

Time (mins)	Area
From:	To: (ha)

0	4 0.067
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Wessex House Upper Market Street Eastleigh Hampshire SO80 9PD	Land adjacent to Cherry Trees	
Date 17/02/2020	Designed by S Baker	
File Tank.SRCX	Checked by	
Micro Drainage	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 0.400

Trench Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.03528	Trench Width (m)	3.0
Infiltration Coefficient Side (m/hr)	0.03528	Trench Length (m)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.95	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000



CHERRY TREES
LAKE LANE
BARNHAM
BOGNOR REGIS
WEST SUSSEX
PO22 0AD

DRAINAGE SYSTEM
MAINTENANCE REQUIREMENTS.

February 2020

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1. INTRODUCTION

2. COMPONENTS OF THE SYSTEM

3. MAINTENANCE SCHEDULES

3.1 Pipes, foul and surface water system. Clay or Plastic

3.2 Inspection Chambers, manholes, channel drains & Gullies

3.3 Soakaway





1 INTRODUCTION

The purpose of this document is to set out the maintenance requirements for the private drainage system at Land adjacent Cherry Trees, Barnham.

The foul drainage system has been designed such that foul water flows from the dwellings drain into an adopted foul water sewer system within the Highway

The surface water drainage system has been designed such that surface water flows falling on roofs and hard paved surfaces drain into an attenuation tank, designed to cater for the 1:100 +40% storm return period prior to discharging to a surface water drain at a restricted rate.

The implications of not meeting the requirements set out within this document is the potential for flooding of dwellings and open areas on the site.

2 COMPONENTS OF THE SYSTEM

The following components form part of the drainage system and need to be maintained as indicated within this document.

- Pipes, foul and surface water system. Clay or Plastic
- Inspection Chambers, manholes, channel drain & road gullies
- Attenuation Tank

3 MAINTENANCE SCHEDULES

The below sets out the requirements for maintenance of the drainage system.

The maintenance requirements are based on durations and the occurrence of severe storms. However should water be found ponding on any hard surface around channel drains, road gullies, or foul drains become blocked then this visual identifier will trigger the requirements for investigation and maintenance.

A severe storm is defined as any aspect of weather that poses risk to life, property or requires the intervention of authorities. Severe weather warnings will be issued by the Met Office.

3.1 PIPES, FOUL AND SURFACE WATER SYSTEM. CLAY OR PLASTIC

To be checked annually by CCTV survey and debris removed by high pressure jetting. A list of defects should be compiled with high, medium and low risk of failure. High risk defects should be fixed immediately, medium risk should be fixed within 6 months and low risk to be monitored annually.





3.2 INSPECTION CHAMBERS, MANHOLES, CHANNEL DRAINS AND ROAD GULLIES

To be checked annually and after a severe storm by visual survey and debris removed. A list of defects should be compiled and with high, medium and low risk of failure. High risk defects should be fixed immediately, medium risk should be fixed within 6 months and low risk to be monitored annually.

3.3 SOAKAWAY

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually





CHERRY TREES
LAKE LANE
BARNHAM
BOGNOR REGIS
WEST SUSSEX
PO22 0AD

FLOOD MANAGEMENT PLAN

February 2020

REVISION -

Consulting Civil Engineers

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1. INTRODUCTION

This Flood Management Plan (FMP) has been prepared to summarise the information related to potential flooding in the Barnham area and to the 1 number detached dwelling proposed to be constructed at land adjacent to Cherry Trees, Lake Lane, Barnham

This document outlines the potential flood risk that may impact on the development and provides guidance to ensure residual risks are communicated to the occupiers of the dwellings.

It is advised that this FMP is provided to all occupants of the dwellings to ensure that they are aware of the risk of flooding and that the appropriate response to the flood risk can be actioned, if required.

2. BACKGROUND

2.1 THE SITE

The site is located in Barnham, 6.1 km to the north-east of Bognor Regis town centre and 10.0 km east of Chichester city centre, off of Lake Lane. See figures 2.1.1 to 2.1.3.

The existing 460sqm site consists of a semi-detached dwelling, Cherry Trees, with a 17m² garage.

The finished floor level of Cherry Trees is 5.90mAOD, with a level in the rear garden at 5.72mAOD (Southern boundary). The level at the front of the site, at the north east corner of Cherry Trees, is 5.42mAOD falling to 5.11mAOD at the top of the existing driveway. The level along Lake Lane in front of Cherry Trees is approximately 4.69mAOD.

It is proposed that the existing garage is demolished, and the site split to create a developable area of 267m² adjacent to Cherry Trees.

It is proposed to construct 1 residential detached, dwelling with a footprint of 53m² with associated driveway and parking

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FIGURE 2.1 SITE LOCATION

2.2 SUMMARY OF FLOOD RISK ASSESSMENT

A site-specific Flood Risk Assessment was completed in August 2019 and submitted as part of the planning application process. The key information highlighted in the FRA is summarised below:

2.2.1 Summary & Conclusions

The proposed new dwelling is shown to be within Flood Zone 2 with the entrance to the site along Lake Lane within Flood Zone 1 & 2.

The finished floor level of the proposed dwelling will be set at 5.90mAOD, 630mm above the 2009 1:1000 year storm return period flood level and 930mm above the 1:100 storm return period flood level.





The dwelling will be incorporate flood resilient construction methods up to finished floor level.

The owner/occupiers of the dwellings will be connected to the Environment Agency's floodline and a Flood Water Management plan has been prepared advising on the risk and procedures to undertake during a flood event.

Surface water drainage will be dealt with by discharging runoff to an attenuation tank designed to cater for the 1% AEP (1:100 year) storm with 40% additional storage to allow for climate change with a restricted discharge rate of 0.5l/s to a surface water drain.

The drainage system has been designed in accordance with Communities & Local Government, National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and the Department for Environment, Food and Rural Affairs (DEFRA)

2.2.2 Fluvial and Tidal Flood Risk

The site is located 5.0km north of the English Channel and is therefore not at risk of tidal flooding.

The site is shown to be within Flood Zone 2 up to the rear elevation of Cherry Trees.

Lake Lane is partially within Flood Zone 2 and Flood Zone 1.

A Flood Risk Assessment carried out in 2015 for the redevelopment of 4 Lake Lane Barnham (Application ref BN/23/15/PL), contained flood levels from the 2009 JFLOW model, which gives a 1:100 year flood level of 4.97mAOD and a 1:1000 year flood level of 5.27mAOD at a node 80m north east of the site along Lake Lane.



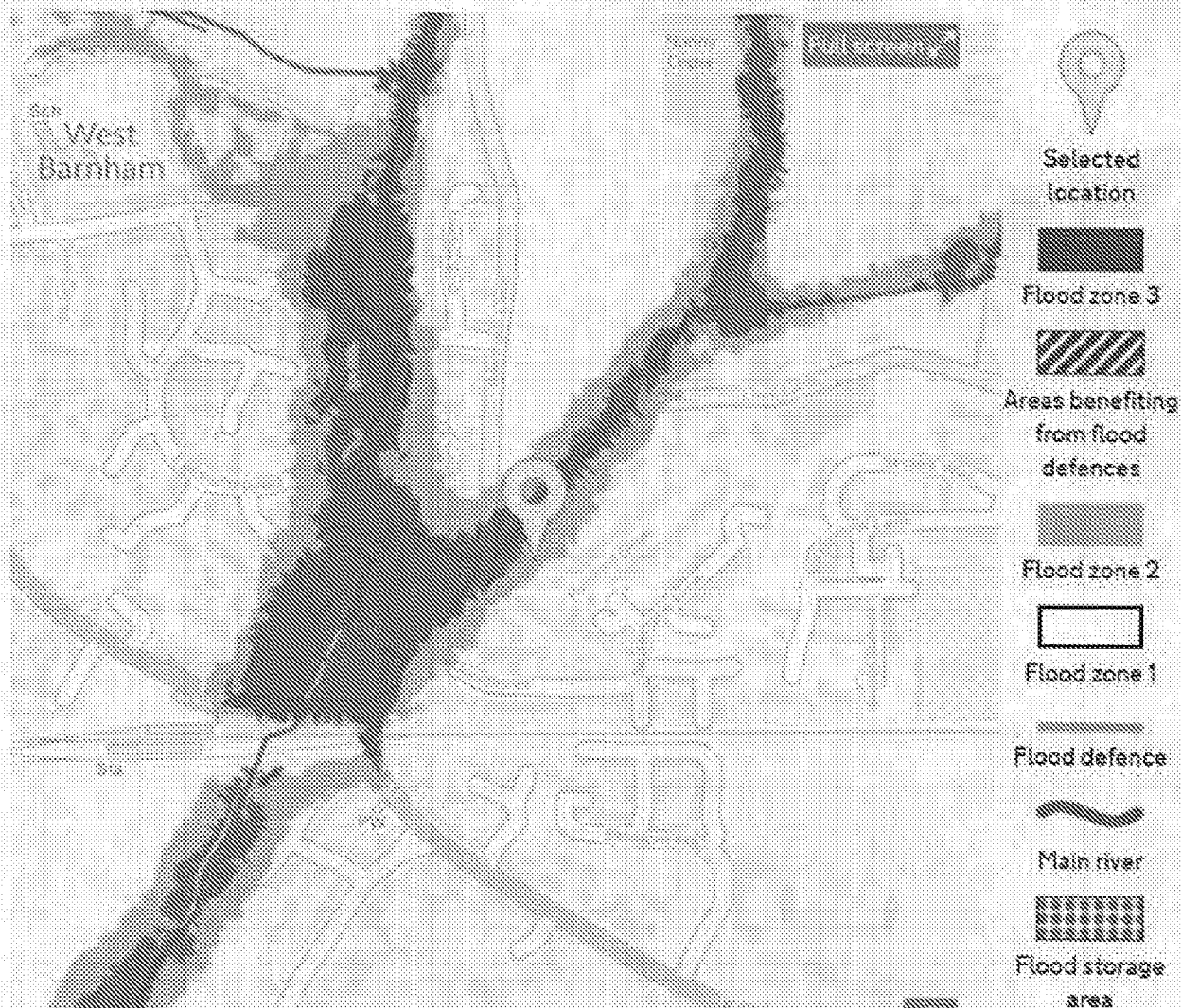


FIGURE 2.2.2.1 ENVIRONMENT AGENCY FLUVIAL FLOOD RISK MAP
(flood-map-for-planning.service.gov.uk)

2.3 SUMMARY OF FLOOD LEVELS

A Flood Risk Assessment carried out in 2015 for the redevelopment of 4 Lake Lane Barnham (Application ref BN/23/15/PL), contained flood levels from the 2009 JFLOW model, which gives a 1:100 year flood level of 4.97mAOD and a 1:1000 year flood level of 5.27mAOD at a node 80m north east of the site along Lake Lane.

The finished floor level of the proposed dwelling will be set at 5.90mAOD, 630mm above the 2009 1:1000 year storm return period flood level and 930mm above the 1:100 storm return period flood level.





3. ROLES AND RESPONSIBILITIES FOR THE MANAGEMENT OF FLOOD RISK

3.1 FLOOD MANAGEMENT PLAN PRINCIPAL PERSON

One occupier within the proposed development should be appointed the development key member. In the event of a flood warning or flooding within Barnham & the surrounding area, the development key member is to be alerted immediately as their role is the Principal Person of the Flood Event Procedure. The other members of the development are to assist the FMP Principal Person in applying the Flood Event Procedure, particularly in communicating with both the emergency services and other residents affected by the flood, as required.

3.2 DUTIES OF FLOOD MANAGEMENT PLAN PRINCIPAL PERSON

The Flood Management Plan Principal Person shall have the following duties:

- Ensure that regular communication is made with the key services (refer to section 3.3) to ensure that when any warning signals are received, they are disseminated to all residents within the development.
- In the event that they receive a flood warning or an observed flood locally, the person initiates the flood event procedures (refer to section 4).

3.3 INTERACTION WITH EMERGENCY SERVICES AND OTHER STAKEHOLDERS AND THEIR RESPONSIBILITIES

In the event of a flood warning, severe flood warning or flood event there would be a mobilisation of the emergency services, Southern Water and the Environment Agency as well as the Resilience & Emergency Team at West Sussex County Council. In case of emergency the vital emergency contacts are listed in Table 1.

It is recommended that this list is printed by the FMP Principal Person and disseminated to all dwellings within the development to ensure each household has key emergency contacts, if required.





Agency	Contact Details	Responsibilities
Environment Agency (Flood Warnings)	[REDACTED]	• Issuing flood warnings; • Recording details of floods; • Monitoring the situation and advising the emergency services; • Advising and assisting on pollution and waste disposal.
Hampshire Police Service	[REDACTED]	• Co-ordinating the different emergency services; and • Taking a lead in the implementation of the flood event procedures.
Fire Brigade	[REDACTED]	• Rescue; • Responding quickly to incidents; and • Assisting the populace wherever a need is identified using Fire Service equipment.
Ambulance Service	[REDACTED]	• Communication with other emergency services to provide mass healthcare (if needed); and • To ensure they have a plan for the illnesses and health implications of a flood.
Southern Water	[REDACTED]	• Clearing blocked sewers after the event; • Protection of property from flooding in the mains/sewers; and • Clearing up of and assistance in dealing with flood water (storm and foul).
Resilience & Emergency team (WSCC)	[REDACTED]	• Sharing information between different agencies and services; • Planning for civil and business continuity in the event of a flood; and • Getting the roads cleared after a flood.
Utility Providers	[REDACTED]	• Ensure the key utilities (gas, electricity etc.) are still running in the aftermath of a flood; • Ensure in the event of a flood any key infrastructure is still properly operational; and • Ensure that any damaged wiring etc. is repaired quickly.

Table 1 Key Flood Event Emergency Contacts and Responsibilities





4. FLOOD EVENT PROCEDURE

4.1 FLOOD WARNING NOTIFICATION

As part of the FMP Principal Person role, they should ensure that all dwelling owners and occupiers are signed up to the Environment Agency Flood Warning Scheme. The dwelling owners and occupiers should sign up to the Flood Warning Scheme (<https://fwd.environment-agency.gov.uk/app/olr/register>) so that they are aware of the possible onset of flooding and can prepare for parts of Barnham & the surrounding area flooding. This is a free service which allows flood warnings to be received by phone, text or email.

Further update information can also be found during a flood event at the following locations:

Call the Environment Agency Floodline on 0345 9881188

Web site: <https://www.gov.uk/check-if-youre-at-risk-of-flooding>

When the situation is serious, flood warnings will also be broadcast on local television and radio news.

There are 4 Flood Warnings that will be issued by The Environment Agency, refer to Table 2.

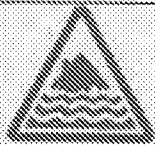
	Status
	Severe Flood Warning: Severe flooding. Danger to life.
	Flood Warning: Flooding is expected. Immediate action required.
	Flood Alert: Flooding is possible. Be prepared
	Warning no longer in force: Flood warning and flood alerts that have been removed in the last 24 hours

Table 2 Environment Agency Flood Warnings





4.2 FLOOD WARNING ACTION

Where appropriate, the FMP Principal Person should coordinate the actions to ensure that each dwelling occupant is prepared for the flood warning.

The actions that should be undertaken by persons living/staying at the dwellings for each level of flood warning are:

Flood Alert

Ensure that you are prepared for parts of Barnham & the surrounding area flooding and the areas surrounding the site being unpassable. Stock up on food, bottled water and medication. Ensure that batteries for torches are charged and torches and candles are to hand.

Prepare a flood kit to be used in the event that the property needs to be evacuated which should contain a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons.

Flood Warning

If there are ill or vulnerable persons living/staying at the property they should be moved to another safe location outside of the flood zone (Flood Zone areas are shaded light or dark blue within Figure 4.3). No essential journeys should be attempted due to the risk of the roads and surrounding areas becoming flooded.

Severe Flood Warning

The FFL of the building is set above the flood zone the and the building is designed to and constructed to be flood resilient, however It is advised to evacuate all persons at the property to an area outside of the flood zone immediately (Flood Zone areas are shaded light or dark blue within Figure 4.3).

Warning no longer in force

Check that roads are passible before returning to the property. If the property has been flooded internally, do not enter until the flood waters have subsided and it is safe to do so.





4.3 ACCESS & EGRESS

Lake Lane and land around the dwelling is at risk of flooding, during an evacuation vehicles should ingress and egress from and to the site via the safest possible route and then travel to an area outside of the Flood Zone, Flood Zone areas are shaded light or dark blue within Figure 4.3.

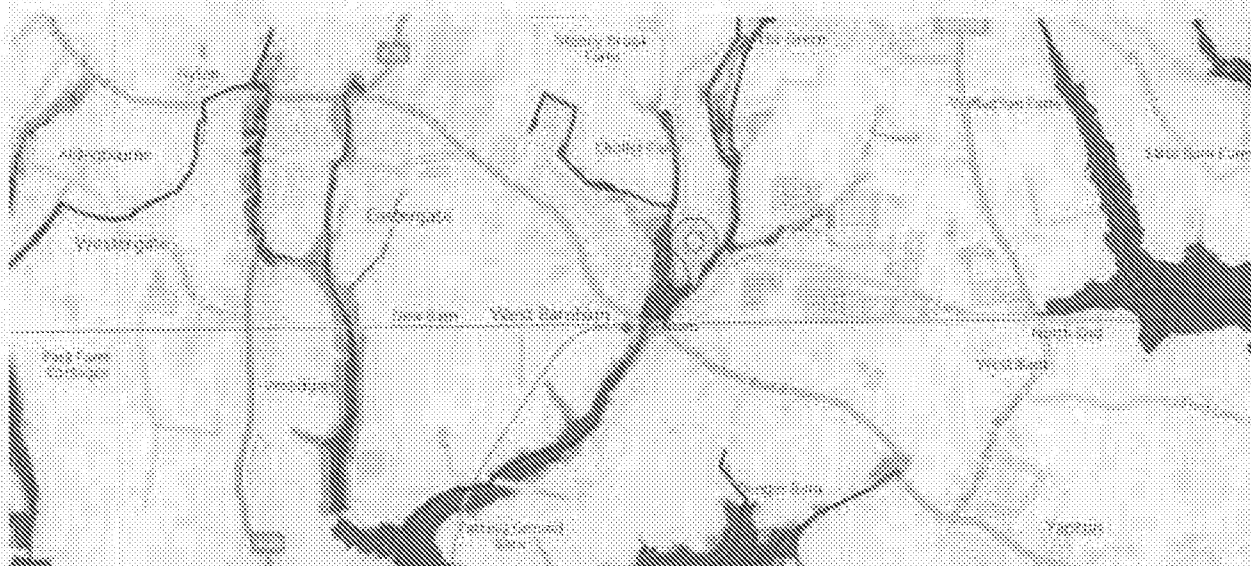


FIGURE 4.3 WIDER FLOOD ZONE

Roads within the Flood Zone should only be used by vehicles until such time as there is a risk of:

- The presence of water stopping the engine functioning;
- The vehicle floating; or
- The vehicle becoming difficult to control.

Cars will stop and/or float in water as shallow as 0.5m, whilst some emergency vehicles may survive in water of 1m. A fire engine remains controllable in depths of 0.5m up to a flow velocity of 5 m/sec, due to high-level air intakes/exhausts.

The risk to persons whilst staying in the property is low, by leaving the property during a Severe Flood Warning the risk increase to medium to high and persons living/staying at the property should contact emergency services if there are ill or vulnerable persons that need evacuating or if anyone requires medical attention. If persons become trapped in the building, contact the emergency services.





Extreme care must be taken whilst accessing and egressing the site during a flood event and the following should be considered:

- Should journeys be undertaken on foot or by vehicle?
- Journeys at night should be avoided where possible
- Lone journeys should be avoided where possible.
- The depth and speed of water should be visually assessed using fixed features.
- Social media and local news should be monitored to gain an understanding of flooding in the area and whether routes are passible

If in doubt, contact the emergency services direct or via the FMP principal person to arrange for emergency assistance during a flood event.

5. REVIEW OF THE PLAN

5.1 ANNUAL REVIEW

This Flood Management Plan is a live document. This means it must be reviewed yearly by the FMP Principal Person.

This review should involve the following steps:

- Check the emergency contacts (refer to section 3.3) are up to date and that any other details are updated.
- Confer with the Environment Agency that the flood risk on the proposed development has not changed.
- Ensure registration to receive Floodline direct flood warnings has been renewed by any new occupants within the development (this should be completed when occupiers of the development change throughout the year).
- Re-familiarise any necessary residents with this Flood Management Plan.
- Review that the evacuation procedures are still correct.
- Review this plan once a flooding incident has taken place.

The outcomes of any review must be recorded in the plan and an updated copy distributed to all residents and the Emergency planning officer of WSCC, as required.

This document should also be reviewed upon construction of the dwelling prior to occupation.

