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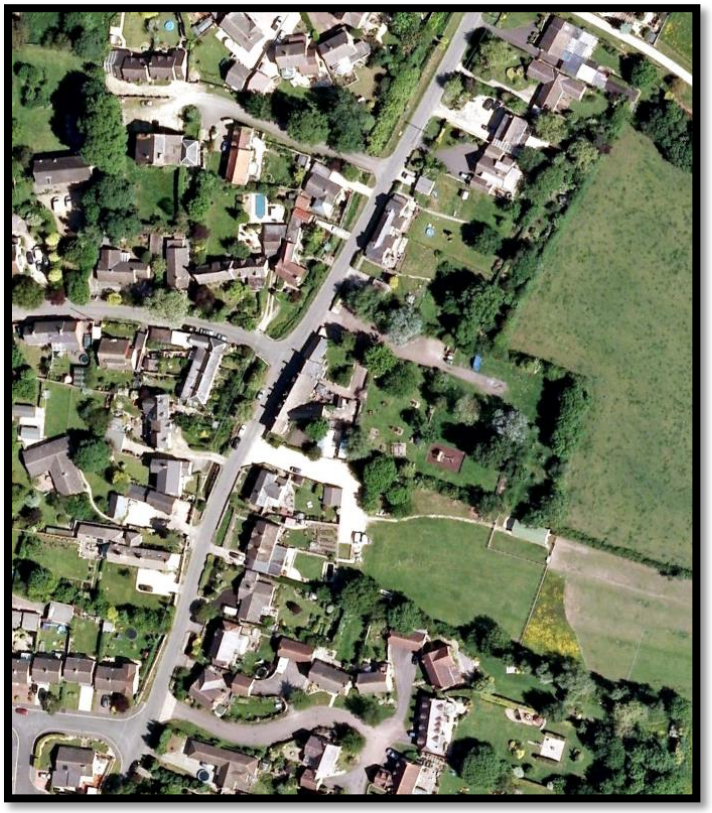

Flood Risk Assessment & Drainage Strategy

Site reference

The Red Lion
Wendlebury
Bicester,
Oxon
OX25 2PW

Client

The Red Lion

Report Ref – **14-1570.07.01**

Revision	Compiled by	Checked by	Approved by	Issue date
-	R J White BSc Hons Design Engineer	D. JEFFERY I.Eng FIHE	T. S. TROTMAN M.Eng (Hons) C.Eng CWEM MCIWEM FIHE	Aug 2014

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1.0 Summary & Recommendations

This FRA is to support the proposed development of the existing pub and grounds and finds the following –

SOURCE OF FLOODING	RISK
Fluvial Flooding	**Low** – *The EA flood maps and levels for the development site show the majority of the site (98%+) is Flood Zone 1 which is defined in NPPF as comprising land at low risk of flooding. There is a small area immediately adjacent to the road that is flood zone 2. There are no habitable dwellings proposed in this area*
Overland Flow to the Site	**Low** – *To the west is the Wendlebury Road and associated un-named watercourse, both of which are lower than the site . To the north and south are residential developments which by its nature will not generate 'sheet' overland flows. To the east is are Alchester Stables, whilst these are slightly higher than the site, any flows generated are anticipated to be low and will be arrested by the permeable paving before reaching any dwellings.*
Rising Groundwater	**Low** – *A ground investigation has not been undertaken for this site, however, a bore hole taken at 15 Wendlebury Road indicated no ground water seepage over a 24 hour test period.*
The Local Sewerage Network	**Low** – *The sewerage network is owned and maintained by Thames Water. The risk of flooding by surcharging is considered low.* *Locally the surface water appears to drain to the un-named watercourse opposite, as this is lower than the site it is not considered a risk.*
Reservoirs, Canals And Other Artificial Sources	**Low** – *No artificial sources that present a risk to the site.*

1) *Nature Of Development*

The proposed development (Appendix A) consists of proposed extensions to the existing public house building, and new accommodation building within the existing gardens.

2) *Proposed surface water drainage*

The implementation of suitable SUDS sustainable drainage techniques and mitigation measures, will address any potential risks associated with surface water runoff generated from the development. These will be controlled and managed to a safe and suitable level to ensure downstream areas are not affected by flooding. Roof runoff and private hardstanding will be discharged into cellular soakaways or permeable paving. Drainage designed to accommodate the peak storm event for a 1 in 30 year storm.

The property owners should be issued with a maintenance manual that details the type and frequency of maintenance required for the sustainable techniques utilised .

3) *Hardstanding drainage*

The car park/hardstanding area will be constructed using permeable paving sized to accommodate the highway authority design requirements of a 1 in 30 year storm.

4) Proposed foul drainage

Foul drainage from the site will discharge via the existing connection from the public house.

5) Floor levels

The development site levels and floor levels are to be set 300mm above the 2001 flood level of 62.706mAOD. At a minimum of 63.006mAOD

6) Exceedance

In the event of design storm exceedance the levels are designed to direct flows to the proposed highway and into the un-names watercourse to the west of the development site.

2.0 Level Of FRA Required

FRA LEVEL	Description of Report Content
Level 1 Screening study	The level 1 FRA is intended to identify any flooding or surface water management issues related to the development site that may require further investigation, the study should be based on readily available existing information including: • SFRA • Environment Agency Flood Maps • Standing advice The level of the FRA will determine the need for a Level 2 or 3 FRA
Level 2 Screening study	Where the level 1 FRA indicates that the site may lie in an area of risk of flooding or may increase flood risk elsewhere due to runoff, a Level 2 FRA should be carried out. This report will confirm sources of flooding which may affect the site and should include the following: • Appraisal of the flood risk posed to the site, the potential impact of the development on flood risk on and off the site. • An appraisal of the scope of possible measures to reduce the flood risk to acceptable levels. This level may identify that sufficient quantitive information is already available to complete a FRA appropriate to the scale and nature of the development.
Level 3 Detailed study	Undertaken if the level 2 FRA concludes that further quantitive analysis is required in order to assess flood risk issues related to the development site. This level to include: • Quantitive appraisal of the flood risk to the development • Quantitive appraisal of the potential impact of development on the site under investigation on flood risk on and off the site. • Quantitive demonstration of the effectiveness of any proposed mitigation measures.

3.0 Introduction

3.1 Commission

The Red Lion have commissioned Infrastruct CS Ltd to prepare a Flood Risk Assessment (FRA) to support the proposed extensions to the existing building, and new accommodation building.

3.2 Guidance

This flood risk assessment has been compiled in accordance with the recommendations of the National Planning Policy Framework (NPPF).

3.3 Aims and Objectives

The purpose of this flood risk assessment is to assess the potential for flood risk caused as a result of, and to the proposed development. It will identify the flood risk zone, potential sources of flood risk, consider the proposed drainage and will be used to support the proposed planning application.

4.0 Site Details

4.1 Location

The development site is situated on arable land situated in the centre of the Oxfordshire village of Wendlebury. The site accessed is from the Barrets Row/Wendlebury Road.

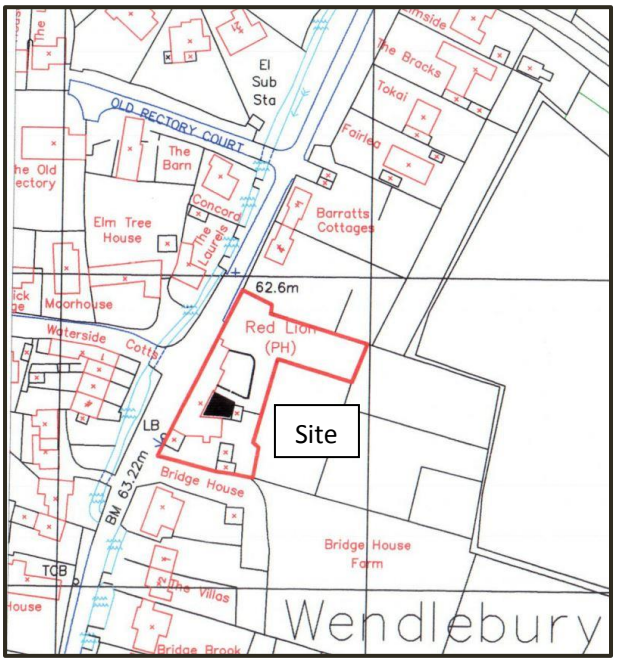


Fig 4.1 – Site Location Plan – reproduced under licence WL 1005534

4.2 Proposed development

The proposed development (Appendix A) is for the proposed extensions to the existing building, and new accommodation building.

4.3 Grid reference

The approximate ordnance survey national grid reference for the site is 456164E,219672N.

4.4 Topography and site description

A topographic survey (Appendix B) was undertaken in August 2014. The site is an existing pub and associated car park.

The development site is accessed off the Barrets Row/Wendlebury Road to the east of the development site.

The topography of the site is relatively flat with an overall fall of **2.83**m from the east to the west giving an approximate gradient of 1 in 20. To the west is an un-names *un-named watercourse*. To the east is the farm land and to the north and south are residential properties and associated gardens.

4.5 Existing Surface Water Drainage description

There appears to be no formal drainage for the existing development, with roof drainage discharging directly to the road and parking before discharging into the un-named water course fronting the properties.

5.6 Local rivers and water courses

Immediately to the west and at a lower level is an un-named water course. The difference in levels between the pub floor level and the river bed is just over 1.0m

5.7 Existing Foul Drainage description

The proposed extensions to the existing building, and new accommodation building are to utilise the existing foul water connections.

5.8 Vulnerability classification

The vulnerability classification is 'more vulnerable'. See Section 6.10 for vulnerability descriptions.

5.0 Flood Risk Policy

5.1 Environment Agency Flood Map - Fluvial Flooding

The Environment Agency Flood Zone maps and product 4 flood level information (appendix D) show the majority of the site (approx 98%) to be flood zone 1. There is a small area adjacent to the entrance that is flood zone 2 .

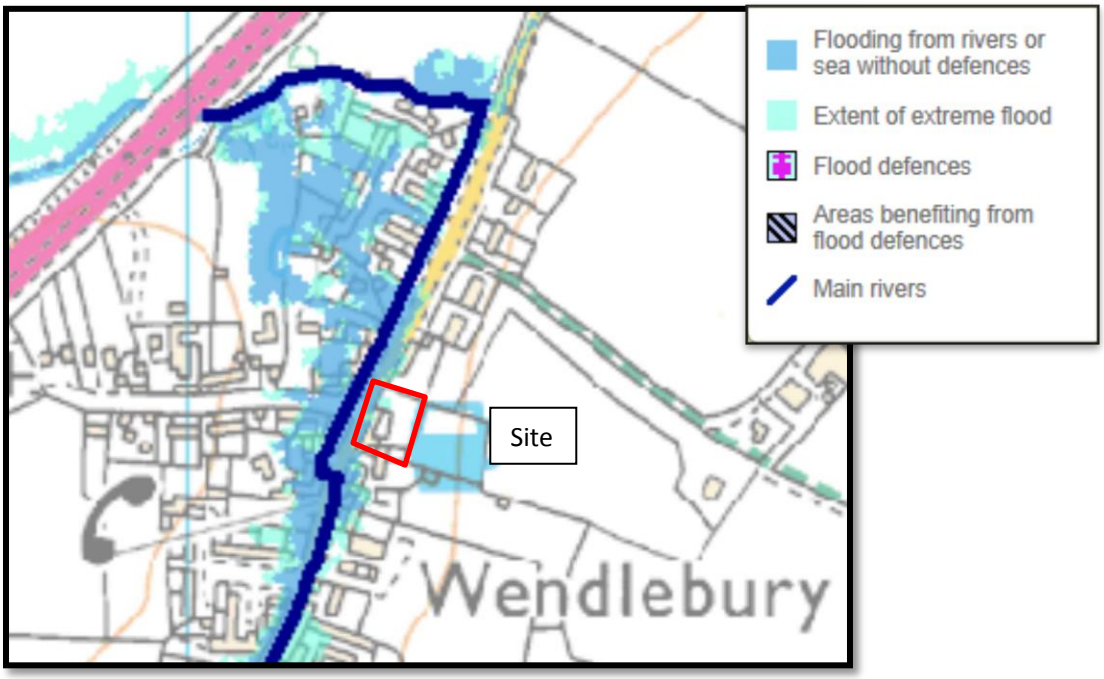


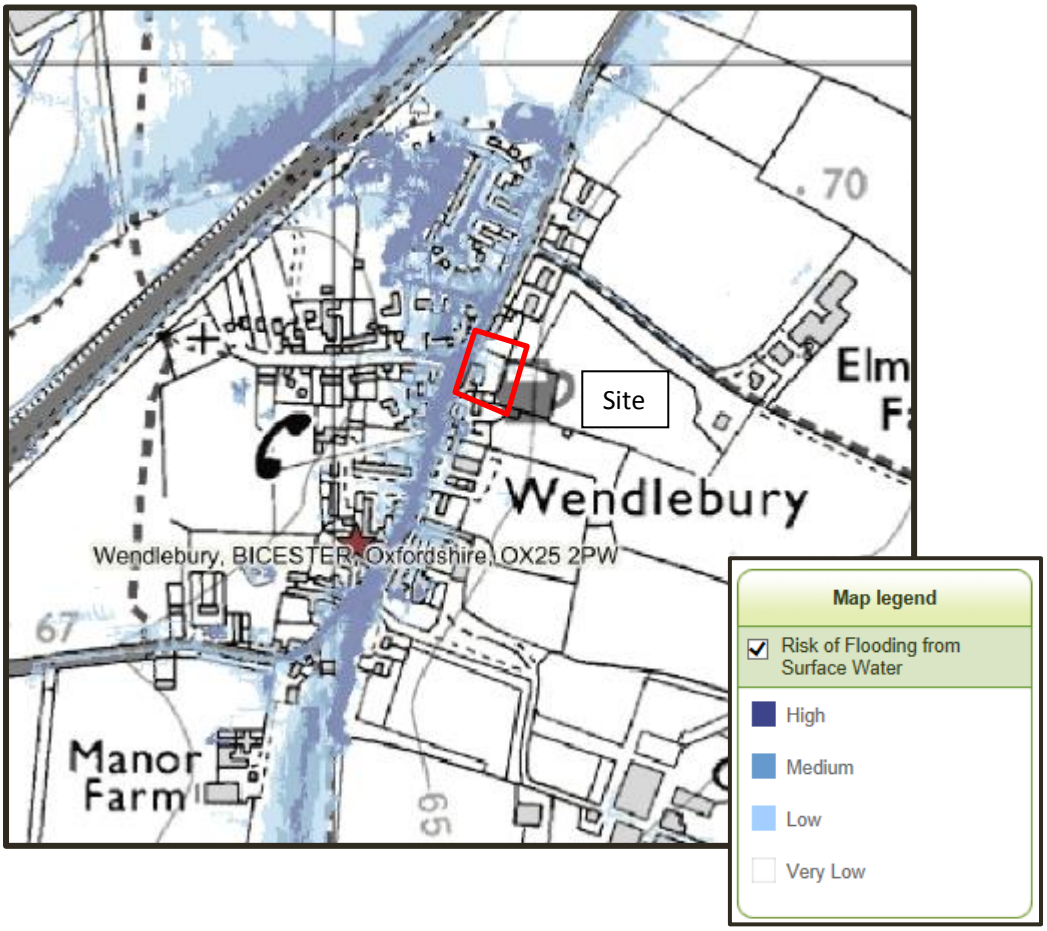
Fig 5.1 Environment Agency Flood Zone Map

5.2 Environment Agency Flood Map – Flood levels

Product 4 flood level information was requested from the Environment Agency. However this has not been modelled by them and accurate flood level information is not available. The Environment Agency has provided plans showing the 2008 flood event, Basic flood map and a Risk of surface water flooding map (appendix D) and inspection of the records when compared to the topographic survey gives and approximate flood level of 63.00mAOD. A review of the flood maps indicates roughly 95% of the site to be above the 1 in 100 year plus climate change allowance flood level of 63.00mAOD. No habitable development is shown in the flood zone 2 area. It should be noted that a minor part of the area shown for the kitchen extension is below the 63.00m level, however this is not linked to the fluvial flood map.

5.3 Environment Agency Flood Map – Surface water flooding

The Environment Agency surface water flooding map reproduced below shows localised flooding associated with the un-named watercourse and some localized flooding in Barrets Row/Wendlebury Road. There is some limited low level flooding in the entrance to the site which is an existing issue, which unfortunately cannot be remedied, due to the levels of the adjacent road.



5.5 National Planning Policy Framework -NPPF

The National Planning Policy Framework Development and Flood Risk however the accompanying practice guide gives guidance for development with respect to flooding. A sequential approach is adopted in order to encourage development away from areas that may or are susceptible to flooding. In doing so it categorises flood zones in the context of their probability of flooding.

5.6 Flood zone definition

National Planning Policy Framework Definition of Flood Zones

Flood zone	Fluvial	Tidal	Probability of flooding
1	< 1 in 1000 year (<0.1 %)	<1 in 1000 year (<0.1 %)	Low probability
2	Between < 1 in 1000 year (<0.1 %) and 1 in 100 year 1%	Between <1 in 1000 year (<0.1 %) and 1 in 200 year 0.5%	Medium Probability
3a	> 1 in 100 year 1% (>1.0%)	> 1 in 200 year (>0.5%)	High probability
3b	Either > 1 in 20 (5%) or as agreed between the EA and the LPA	Either > 1 in 20 (5%) or as agreed between the EA and the LPA	Functional flood plain

5.7 Other Flooding Mechanisms

In addition to the potential for assessing flooding from fluvial and tidal sources NPPF also requires that consideration is given to other mechanisms for flooding -

- Flooding from land – intense rainfall, often in short duration, that is unable to soak into the ground or enter drainage systems, can run rapidly off land and result in local flooding.
- Flooding from groundwater – occurs when water levels in the ground rise above the surface elevations.
- Flooding from sewers – In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and waste water sewers known as combined sewers. Flooding can result causing surcharging when the sewer is overwhelmed by heavy rainfall
- Flooding from reservoirs, canals and other artificial sources – Non-natural or artificial sources of flooding can result from sources such as reservoirs, canals lakes etc., where water is held above natural ground levels.

5.8 National Planning Policy Framework: Flood zones definition (table 1 of NPPF)

(Note: These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defenses)

Zone 1 - Low Probability
Definition
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
Appropriate uses
All uses of land are appropriate in this zone.
FRA requirements
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention. See Annex E for minimum requirements.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques
Zone 2 - Medium Probability
Definition
This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Appropriate uses
Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses of land and essential infrastructure in (Table 2 NPPF) are appropriate in this zone. Subject to the Sequential Test being applied, the highly vulnerable uses in Table 2 are only appropriate in this zone if the Exception Test is passed.
FRA requirements
All development proposals in this zone should be accompanied by a FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage techniques.
Zone 3a - High Probability
Definition
This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Appropriate uses
The water-compatible and less vulnerable uses of land in (Table.2 NPPF)are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in time of flood.
FRA requirements
All development proposals in this zone should be accompanied by a FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to: reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and relocate existing development to land with a lower probability of flooding.

Zone 3b - The Functional Floodplain
Definition
This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.
Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in Table D.2 that has to be there should be permitted in this zone. It should be designed and constructed to: – remain operational and safe for users in times of flood; – result in no net loss of floodplain storage; – not impede water flows; and – not increase flood risk elsewhere. Essential infrastructure in this zone should pass the Exception Test.
FRA requirements
All development proposals in this zone should be accompanied by a FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to: reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques; and relocate existing development to land with a lower probability of flooding.

5.9 NPPF - Flood Risk Compatibility Classification

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes)which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly Vulnerable

- Police stations, Ambulance stations and Fire stations and Command Centre's and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

More Vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, **subject to a specific warning and evacuation plan**.

Less Vulnerable

- Police, ambulance and fire stations which are ***not*** required to be operational during flooding.

- Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do **not** need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel workings.
- Docks, marinas and wharves.
- Navigation facilities.
- MOD defense installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, **subject to a specific warning and evacuation plan.**

5.10 Flood Risk Vulnerability And Flood Zone Compatibility Table

Vulnerability classification flood zone	Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
1	√	√	√	√	√
2	√	√	Exception test required	√	√
3a	Exception test required	√	x	Exception test required	√
3b	Exception test required	√	x	x	x

√ Development is appropriate x development is not appropriate

5.11 Strategic Flood Risk Assessment

Reference has been made to the Warwickshire Strategic Flood Risk Assessment undertaken by URS Infrastructure & Environment UK Ltd (Sept 2013). The FRA does not show the site to be at risk. However it does note that for sites in wendlebury

"There is generally limited scope for acceptable flood compensation schemes in the village. Located on low lying impervious ground, there may be limited land drainage and a presumption against the use of soak aways unless there is justification through robust design."

6.0 Flood Risk To The Development

6.1 Flooding From Fluvial Sources

The EA flood maps and levels for the development site show the majority of the site (95%+) is Flood Zone 1 which is defined in NPPF as comprising land at low risk of flooding. There is a small area to the entrance which is flood zone 2. There is also a small area shown to be below the estimated 1 in 100 year level adjacent to the new kitchens.

It is therefore the consideration of this FRA that the site is not at risk from fluvial flooding.

6.2 Flooding From Overland Flow To The Site

To the west is the Wendlebury Road and associated un-named watercourse, both of which are lower than the site . To the north and south are residential developments which by its nature will not generate 'sheet' overland flows. To the east is are Alchester Stables, whilst these are slightly higher than the site, any flows generated are anticipated to be low and will be arrested by the permeable paving before reaching any dwellings.

It is therefore the consideration of this FRA that the site has at low risk of flooding from overland flows.

6.3 Flooding From Rising Groundwater

A ground investigation has not been undertaken for this site, however, a bore hole taken locally, at 15 Wendlebury Road, indicated no ground water seepage over a 24 hour test period. (See appendix C). Other anecdotal evidence indicates a ground water level of approximately 2.5m below ground level.

It is therefore the consideration of this FRA that the site has a low risk of flooding from rising groundwater levels.

6.4 Flooding From The Local Sewerage Network

The sewerage network is owned and maintained by Thames Water. The risk of flooding by surcharging is considered low.

Locally the surface water appears to drain to the un-named watercourse *opposite, as this is lower than the site it is not considered a risk.*

It is therefore the consideration of this FRA that the site has a low risk of flooding by surcharging of the local sewer network.

6.5 Flooding From Reservoirs, Canals and Other Artificial Sources

Review of location plans for the development site show there to be no signs of manmade water sources within the immediate vicinity that would present a potential source of flooding.

It is therefore the consideration of this FRA that the site has a low risk of flooding by reservoirs, canals or other artificial sources.

7.0 Recommendations and Conclusion

In line with the recommendations of the National Planning Policy Framework, the development site lies within land classified as flood zone 2 and 3, which is considered appropriate for a development subject to the requirements of the exception test being passed. This report has assessed all the possible means of flooding to and from the development site and demonstrated that all of the requirements of the exception test can be met.

As such this report concludes that the site is suitable for development in line with the current architectural proposals.

7.1 Finished Flood Levels

The finished floor levels for the proposed extension must be set to ensure the property is located above the 1 in 100yr flood level to reduce the likelihood of flood water damaging the property. The Whilst the was no product 4 information available, The EA did provide some flood maps for the area and a previous development locally provided flood levels for the 2001 flood (Appendix E). The latter provides a flood level of 62.706m and in line with EA recommendations the minimum flood level should be set 300mm above this. **As such a minimum finished floor level for the development site should be 63.006mAOD.**

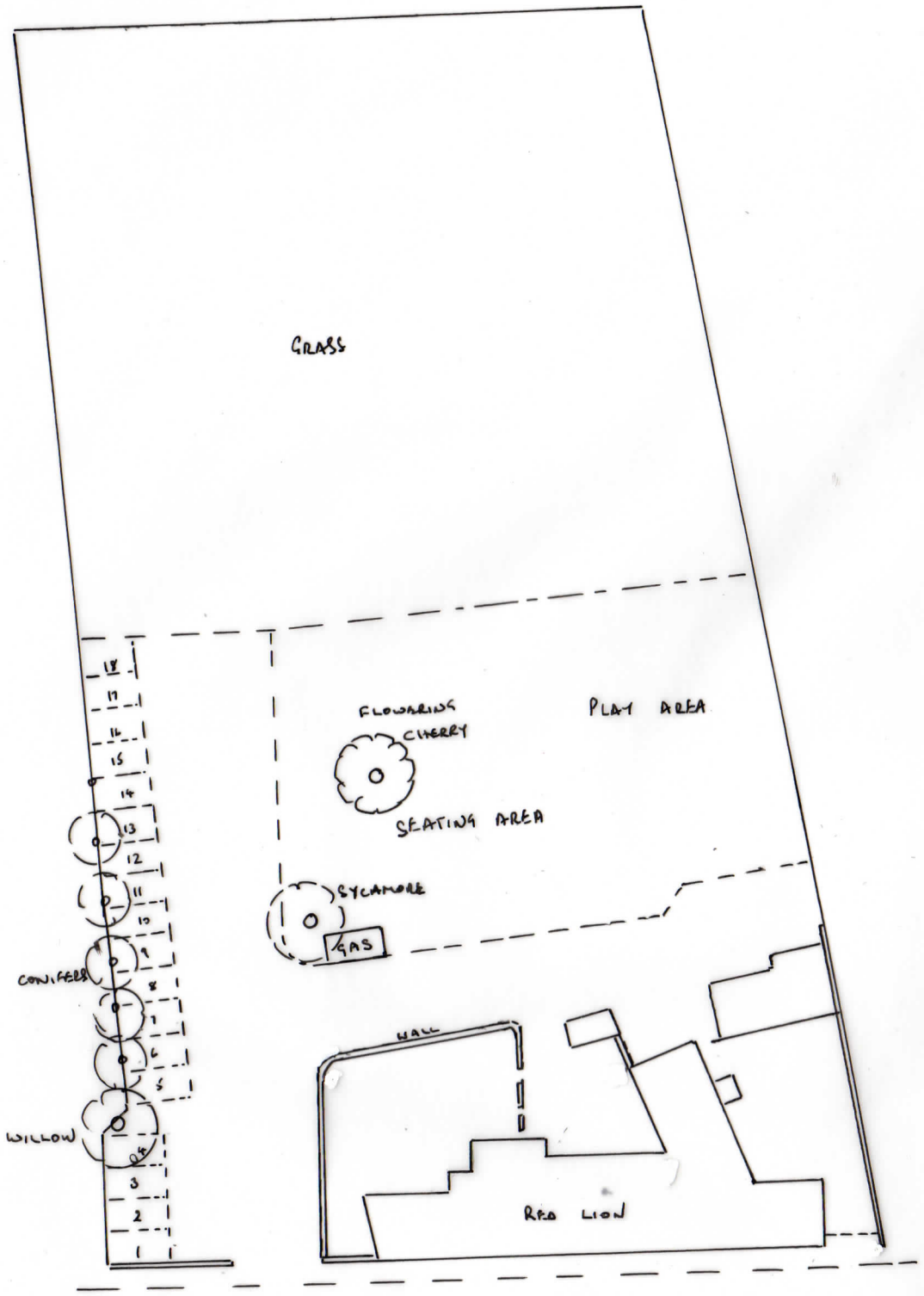
7.2 Flood Resistant measures

As part of the works associated with the new dwellings it is the recommendation of the report that consideration should be given to flood resistant measures. These are mechanisms which can be implemented by the occupier to provide additional defenses against flood water ingress. Systems such as flood barriers to external door openings can prove an effective measure but must be used in conjunction with suitable ground floor construction techniques to prevent water entering the dwelling from the under floor void. As these works are associated with the construction of the residential dwelling it would be advisable to site sockets and fuse boxes away from floor level. More information and recommendations can be gained from the CIRIA document 'Improving the flood performance of new buildings'.

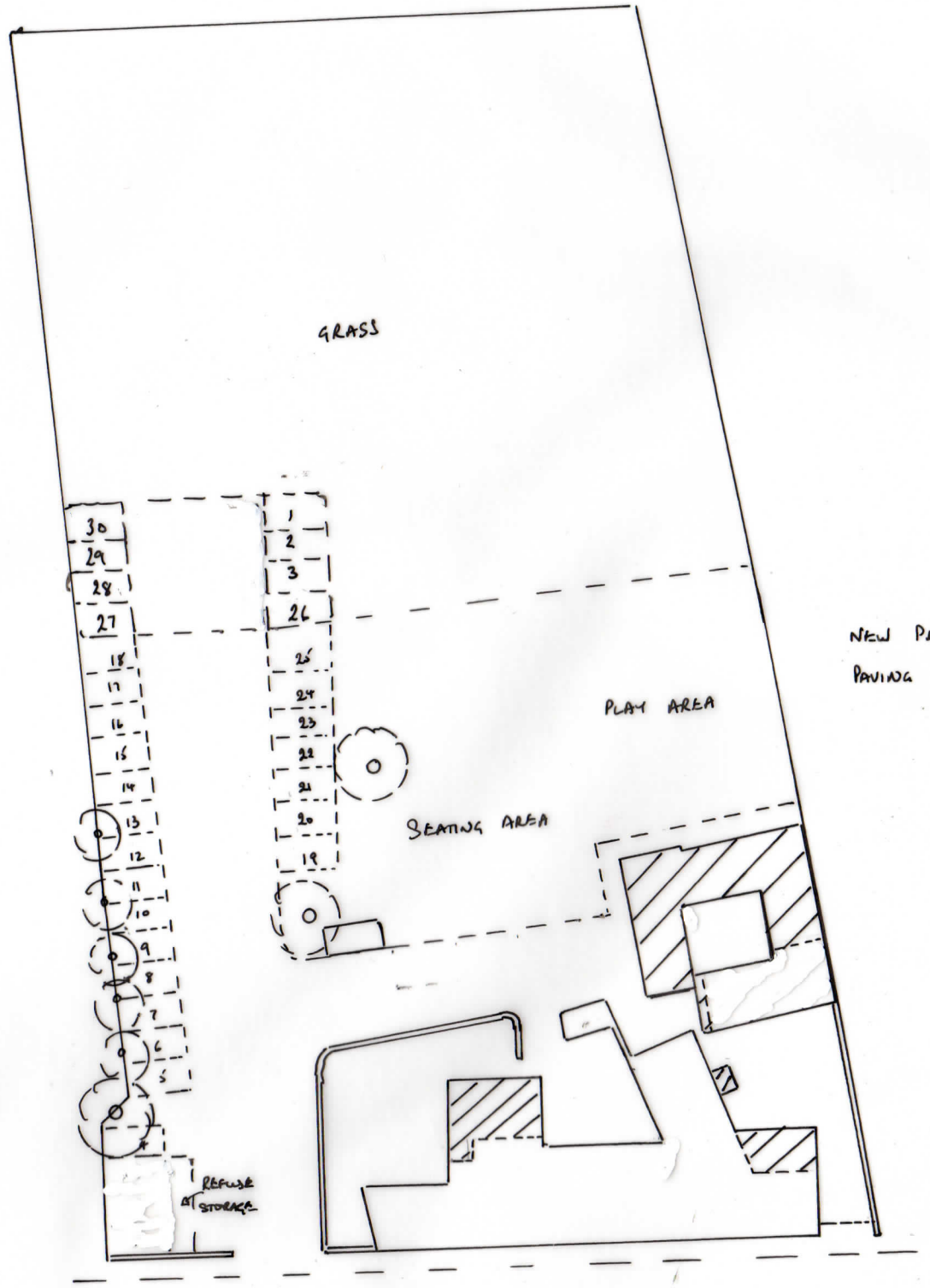
References & Bibliography

- National Planning Policy Framework (this replaces Planning Policy Statement 25: Development and Flood Risk Practice Guide).
- Code For Sustainable Homes - Department of Communities and Local Government. Revised February 2012.
- Environment Agency indicative flood maps http;//maps.environment- agency gov.uk
- Environment Agency indicative ground water source protection zone maps http;//maps.environment- agency gov.uk
- Environment Agency indicative Aquifer designation maps http;//maps.environment- agency gov.uk
- CIRIA 2007, The Sustainable drainage Systems (SUDS) Manual C697
- Sewers for adoption 6th Edition and interim guidance prior to the introduction of sewers for adoption 7th edition WRC
- Strategic Flood Risk Assessment for Oxfordshire Preliminary Flood Risk Assessment (PFRA).

Appendix A – Proposed development



EXT



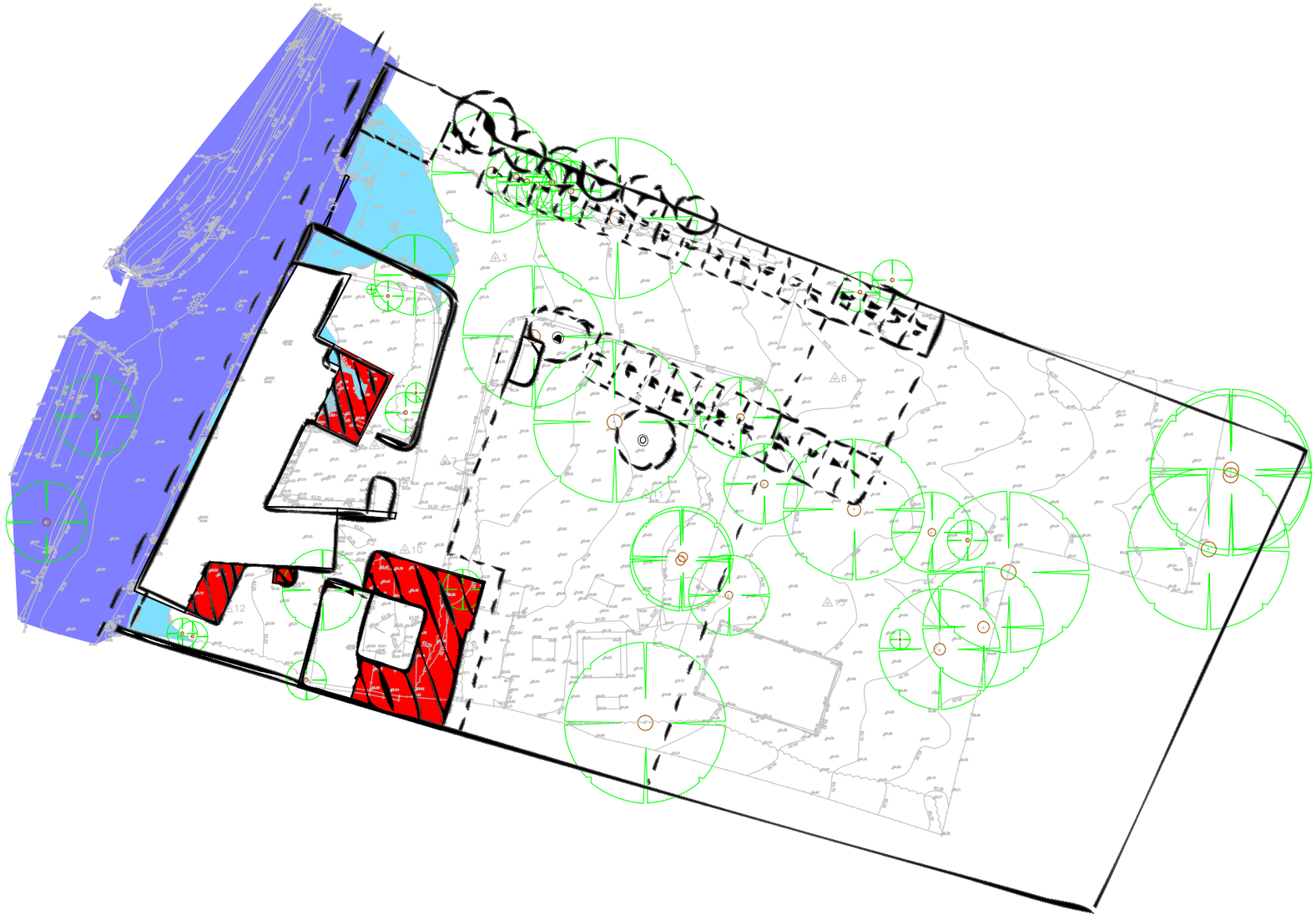
NEW PARKING AREA POROUS PAVING

PROP

0 5 10 15 20

1:500

PARKING	Scale	1:500	
THE RED LION, MAIN STREET			
WENDLEBURY	Date	June	2014
Beverley Bates,	Ref:	9/41/14	
Iverley Lodge, Main Road,	Check all measurements on		
Kilsby, Rugby. 01788822486	site before commencing works		



N

W E

S

Key

	2001 Flood Level - 62.706
	EA Flood Level - 63.000 Flood level interpreted from EA Flood Maps
	Proposed Extension

0m 12.5m 25m

scale bar @ 1:500

TITLE

Extent of Flood Plain
The Red Lion
Wendlebury
Bicester

DRAWING NUMBER

14-1570-01 Rev P01

CLIENT

THE RED LION

NOTES

1. All dimensions and levels are in metres unless otherwise noted
2. This drawing is to be read in conjunction with the relevant Architect's/Engineer's drawings, specifications and CDM documentation
3. This drawings has been produced electronically and may have been photo reduced or enlarged when copied. Work to figured dimensions only (DO NOT SCALE). All dimensions to be checked on site. Any errors or omissions to be reported to the engineer immediately.
4. This drawing contains coloured lines / information that may not be clear if reproduced in black and white.

Rev	Drawn	Check	Comments	Date
P01	RJW	RJW		29/08/14

DATE 29/08/2014

DESIGNED BY RJW

SCALE 1:500 @ A3

STATUS **FOR INFORMATION**

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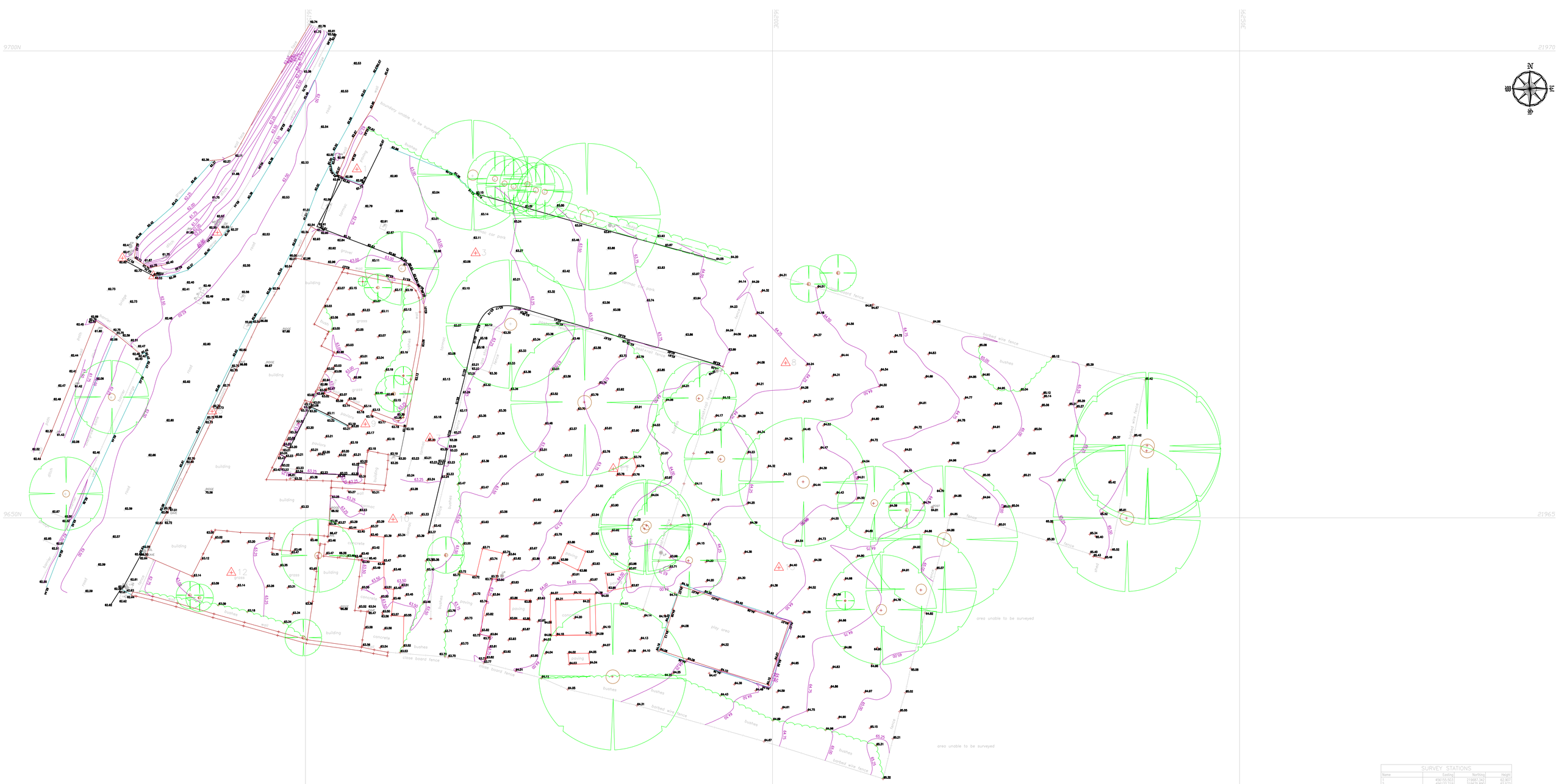
Appendix B – Topographic Survey



SURVEY STATIONS

Name	Easting	Northing	Height
1	456156.563	219687.742	62.267
2	456133.719	219679.890	62.371
3	456168.213	219678.354	63.134
4	456140.570	219680.556	62.482
5	456140.008	219661.416	62.679
6	456130.406	219677.811	62.566
7	456163.317	219658.519	63.220
8	456201.404	219666.591	64.182
9	456156.406	219660.039	63.202
10	456159.375	219649.829	63.341
11	456180.953	219655.252	63.771
12	456200.683	219644.672	64.430
13	456142.058	219644.137	63.125

Shyres Rural Ltd.
RICS
CHARTERED SURVEYORS
MAPPING CONSULTANTS

Shyres Rural Ltd Registered in England and Wales No. 6635142
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JOB TITLE:

RED LION WENDLEBURY

survey to OS grid and datum using gps

CLIENT:

DATA SHOWN ON THIS PLAN PREPARED TO CLIENT SPECIFICATIONS

DATE: 29/08/14	DRAWING NUMBER: SRL.109.14	REVISION
SCALE: 1:200		
DRAWN BY: taff		

survey data correct at date of survey only.

symbols representing tree spread and trunk dimensions are indicative only

all service detail must be considered approximate and its full location must be verified by details obtained from the relevant provider and/or authority

digital copies of this plan can only be considered accurate if supplied directly by Shyres Rural Ltd.

do not scale from plots

Appendix C – Borehole Logs from No 15 RECTORY CLOSE WENDLEBURY

TRIAL PIT ONE

Depth -m		Strata Description
		MADE GROUND
Ground level - 0.34		Soft, brown, occasionally yellow sandy, silty, occasionally gravelly, calcareous CLAY with included clasts of yellow/red chert and sub-angular, creamy oolitic limestone up to 1 cm in diameter. Occasional traces of black carbonaceous material. Traces of red brick and white plastic.
0.34	- 0.61	Soft, brown sandy, rarely gravelly, calcareous CLAY with included fragments of glass and oolitic limestone up to 2 cm in diameter. Occasional traces of black carbonaceous material.
0.61	- 0.78	Soft to firm, yellow/brown, creamy yellow sandy, gravelly, calcareous CLAY with included fragments of creamy white limestone up to 4 cm in diameter and subrounded flints up to 1 cm in diameter. Occasional included bone fragments, red brick and metal nails and hinges.

Date .	TRIAL PIT LOG	Report No.
August, 1986	TYRONE	S.748

TRIAL PIT ONE

0.78	- 0.86	Soft, black/brown, carbonaceous CLAY with included fragments of bituminous coal and creamy/white limestone, occasional inclusions of red brick, nails and broken white tile.
		OXFORD CLAY
0.86	- 1.15	Soft to firm, orange brown yellow, sandy, calcareous CLAY with included fragments of angular creamy brown limestone up to 2 cm in diameter. Occasional traces of black carbonaceous material and flints.

Remarks.

1. Trial pit excavated by hand on 18.08.1986.

2. Trial pit dimensions 0.60 x 1.35 x 1.15m deep.

3. No groundwater seepage evident after standing open for twenty four hours.

4. In situ shear strength values - kN/m²

Depth -m	Values			Average
0.86	26	34	36	32
0.97	24	28	30	27
1.15	30	20	26	25

Date. August, 1986	TRIAL PIT LOG	Report No. S.748

TYRONE

Appendix D – Environment Agency flood data

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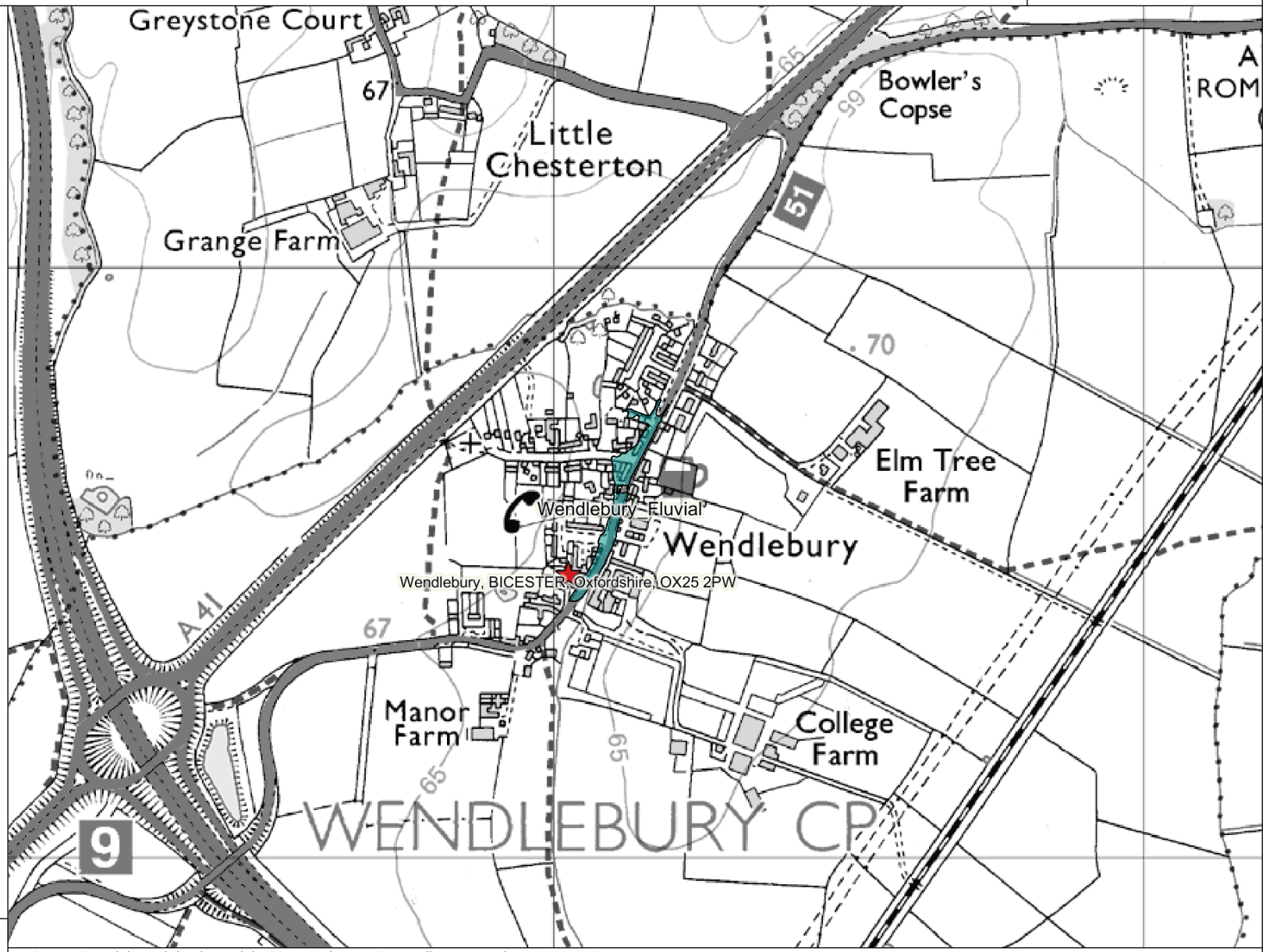
WT17105 Wendlebury 2008 Flood Event

Environment Agency

Legend

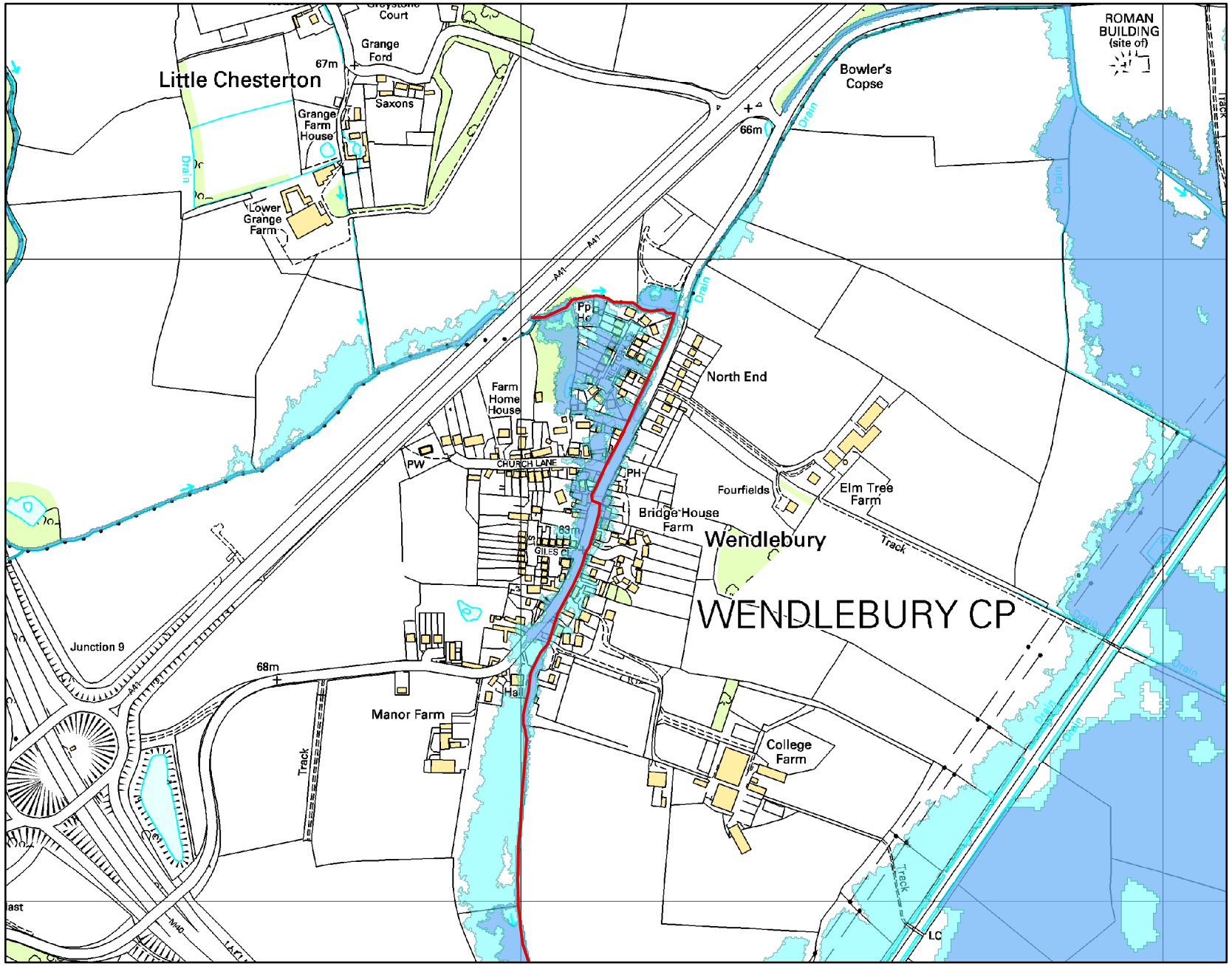
Flood Event Outlines



0 95 190 285 m.

N W E S

Basic Map centred on Red Lion Pub, Wendlebury
Created 08/08/2014 - REF: WT17105



Environment Agency

Kilometres

0 0.1 0.2

N W E S

Legend

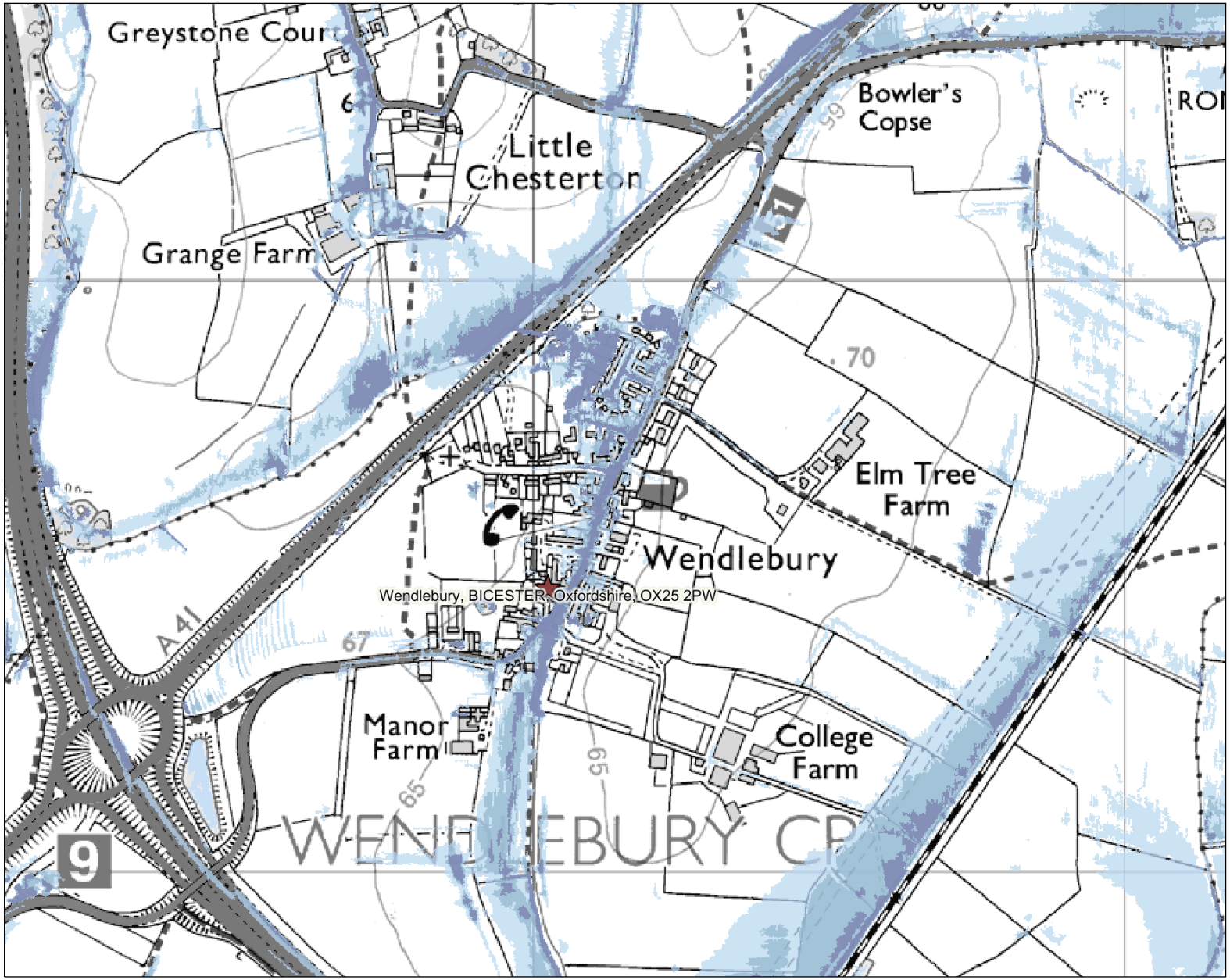
- Main River
- Flooding from rivers or sea (FZ3)
- Extent of extreme flood (FZ2)

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

Risk of flooding from Surface Water



Environment Agency

Scale 1:10,001

N W E S

Likelihood of flooding from Surface Water

- High
- Medium
- Low
- Very Low

Likelihood of flooding from Surface Water

High:	Greater than or equal to 1 in 30 (3.3%) chance in any given year
Medium:	Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
Low:	Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
Very Low:	Less than 1 in 1,000 (0.1%) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Appendix E – Historic Flood Levels DWH

Survey January / February 2001

Report June 2001

APPENDIX B FROM PETER BRETT ASSOCIATES — WENDLEBURY BROOK FLOOD STUDY 2001

height above sea level for various properties in WENDLEBURY which may be at risk to flooding
The ods

RECTORY CLOSE

HOUSE NO.	LEVEL/m
6	63.808
7	63.798
8	64.025
9	63.768
10	63.714
11	63.753
12	63.755
13	63.734
14	63.647
15	63.766
16	63.650
17	63.592
18	63.548
19	63.551
20	63.668
21	63.501
22	63.594
23	63.521
24	63.524

OLD RECTORY COURT

HOUSE NAME	LEVEL/m
The Barn	62.969
Sycamore House	63.414
The Larks	63.312

CHURCH LANE

HOUSE NAME	LEVEL/m
Waterside Cottages 1	62.769
" " 2	62.702
" " 3	62.772
" " 4	62.731
The Laurels	62.806

ALONG THE HIGH STREET

HOUSE NAME	LEVEL/m
Brookside	62.963
Red Lion Pub	62.706
Willow Cottage	63.004
Dalhana	62.906
(The Villas)-1 Bridge End	62.934
The Villas - 2	62.890
Adjoining Dalhana	62.665
Rose Cottage	63.740
Garage Block	63.003

Appendix F – Photos

Frontage of Pub – Including bridge/ un-named watercourse opposite

Rain Water Down Pipe discharging to road

un-named watercourse plus existing car park entrance