Weetwood

Development • Planning • Environment

BROAD OAK FARM, ROSSETT

FLOOD CONSEQUENCES ASSESSMENT

Final Report v1.0

November 2017

Weetwood Services Ltd
Park House
Broncoed Business Park
Ffordd Byrnwr Gwair
Mold
CH7 1FQ

t: 01352 700045
e: info@weetwood.net
w: www.weetwood.net

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Client:	Cornish Hall Barns Ltd
Date of Issue:	2 November 2017

Prepared by:	Jamie Eden BEng (Hons) *Technical Engineer*
Checked and Approved by:	Adam Edgerley BSc (Hons) *Associate Director*

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Contents

Page
Signature Sheet i
Contents ii
List of Figures & Appendices iii

1 INTRODUCTION 1
1.1 Purpose of Report 1
1.2 Structure of the Report 1

2 PLANNING POLICY AND GUIDANCE 2
2.1 Technical Advice Note 15; Development and Flood Risk 2
2.2 Local Planning Policy and Guidance 2
2.3 Consents 3
2.4 Relevant Documents 3

3 SITE DETAILS AND PROPOSED DEVELOPMENT 4
3.1 Site Location 4
3.2 Existing and Proposed Development 4
3.3 Waterbodies in the Vicinity of the Site 4
3.4 Ground Conditions 5
3.5 Site Levels 5
3.6 Access and Egress 6

4 REVIEW OF FLOOD RISK 7
4.1 Flood Zone Designation 7
4.2 Justification Test 8
4.3 Historical Records of Flooding 8
4.4 Fluvial Flood Risk – unnamed watercourse 8
4.5 Flood Risk from Reservoirs, Canals and Other Artificial Sources 10
4.6 Flood Risk from Groundwater 11
4.7 Flood Risk from Surface Water 12

5 FLOOD RISK MITIGATION MEASURES 14
5.1 Flood Mitigation 14
5.2 Flood Plan 14
5.3 Ordinary Watercourse Consent 14

6 SUMMARY 15

7 RECOMMENDATIONS 16

List of Figures

Figure 1: Site Location 4
Figure 2: Digital Elevation Model 5
Figure 3: Development Advice Map 7
Figure 4: Natural Resources Wales Flood Map 8
Figure 5: Unnamed Watercourse Cross-Sections 9
Figure 6: Unnamed Watercourse Flow Routes 10
Figure 7: Risk of Flooding from Reservoirs Map 11
Figure 8: Groundwater Flooding Hazard Map 12
Figure 9: Natural Resources Wales Risk of Flooding from Surface Water 13
Figure 10: Natural Resources Wales Flood Warning Areas 14

List of Appendices

Appendix A: Development Proposals

1 INTRODUCTION

1.1 PURPOSE OF REPORT

Weetwood Services Ltd ('Weetwood') has been instructed by Cornish Hall Barns Ltd to undertake a Flood Consequences Assessment (FCA) for the proposed redevelopment at Broad Oak Farm, Rossett.

This FCA has been prepared in accordance with the requirements of Technical Advice Note 15 (TAN15): Development and Flood Risk.

1.2 STRUCTURE OF THE REPORT

The report is structured as follows:

Section 1 Introduction and report structure

Section 2 Presents national and local flood risk and drainage planning policy

Section 3 Provides background information relating to the development site, the development proposals, ground conditions and existing site access arrangements

Section 4 Assesses the potential sources of flooding to the development site

Section 5 Presents flood risk mitigation measures based on the findings of the assessment

Section 6 Presents a summary of key findings

Section 7 Presents the recommendations

2 PLANNING POLICY AND GUIDANCE

2.1 TECHNICAL ADVICE NOTE 15; DEVELOPMENT AND FLOOD RISK

The general approach of TAN15 is to set out a precautionary framework to guide planning decisions in areas at high risk of flooding. The overarching aim of the framework is, in order of preference, to:

- Direct new development away from those areas which are at a high risk of flooding.
- Where development has to be considered in high risk areas (i.e. Zone C) only those development which can be justified should be located in such areas.

2.1.1 Justification Test

In accordance with Paragraph 6 of TAN15 for the Justification Test to be passed it must be demonstrated that:

i Its location in Zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; **or**,

ii Its location in Zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;

and,

iii It concurs with the aims of Planning Policy Wales (PPW) and meets the definition of previously developed land (PPW Fig 2.1); and,

iv The potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in sections 5 and 7 and appendix 1 found to be acceptable.

2.2 LOCAL PLANNING POLICY AND GUIDANCE

Policy EC12 Development and Flood Risk of the Wrexham Unitary Development Plan (UDP) 1996 - 2011 states:

'Development (including the raising of land) within defined flood plains will only be permitted if it:-

a) would not be subject to an unacceptable risk of flooding on-site; and/or
b) does not result in an unacceptable risk of flooding on or off-site; and/or
c) does not adversely affect flood management or maintenance schemes

5.15 Development proposals within areas of flood risk are not only at risk of flooding, but may also exacerbate existing or create new flooding problems on other land or property through reductions in floodplain storage capacity or by impeding flood flows. Flood alleviation measures can only reduce the risk of flooding and can never eliminate the risk. For these reasons, development within land at an unacceptable risk of flooding will not be permitted. Where detailed information in respect of flood risk is not available, developers will be required to carry out detailed technical investigations to evaluate the extent of the flood risk and ensure that no unacceptable development, including the raising of land, occurs within the flood risk area identified.

5.16 In exceptional circumstances, where the Council considers a development essential for the economic viability of the area, and it has been confirmed that there are no other sites capable of providing the necessary stimulus, the development will still only be permitted where the developer can conclusively demonstrate that appropriate and environmentally sympathetic flood protection and mitigation measures can be implemented. The Council will require developers to carry out and provide details of hydraulic investigations to properly determine the implications of the proposed development. Developers should be aware that the responsibility for, and costs of, carrying out of any investigation/mitigation works rests with themselves. Development will not be permitted to commence until any mitigation works required have been implemented to the satisfaction of the Council, and a formal agreement regarding the future maintenance of any flood protection/mitigation structures is in place'

2.3 CONSENTS

An Environmental Permit for Flood Risk Activities may be required from Natural Resources Wales (NRW) for work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

Further information can be found by visiting the following website:
https://naturalresources.wales/apply-for-a-permit/flood-risk-activities/flood-risk-activity-permits-information/?lang=en

If the location of your activity is on any watercourse that lies within an Internal Drainage District (IDD) you will need to apply to Natural Resources Wales for a Flood Risk Activity Permit.

Ordinary Watercourse Consent may be required from the lead local flood authority for work to an ordinary watercourse..

Undertaking activities controlled by local Byelaws (made under the Water Resources Act 1991) also requires the relevant consent.

2.4 RELEVANT DOCUMENTS

The FCA has been informed by the following documents:

- Wrexham UDP, Wrexham CBC, February 2005

3 SITE DETAILS AND PROPOSED DEVELOPMENT

3.1 SITE LOCATION

The site is located north-east of Cobblers Lane at Ordnance Survey National Grid Reference SJ 367 584, as shown in **Figure 1**. The site is approximately 1.27 hectares (ha) in area.

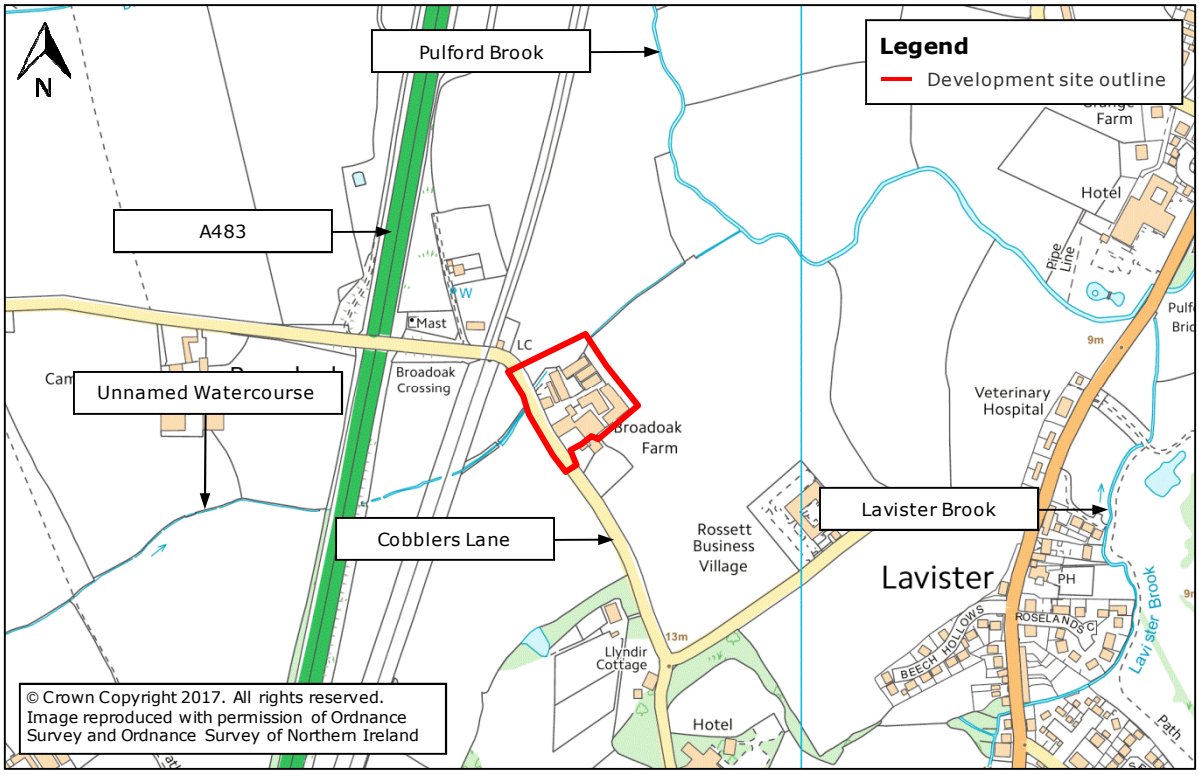

Figure 1: Site Location

3.2 EXISTING AND PROPOSED DEVELOPMENT

The site currently comprises existing agricultural buildings with associated hardstanding and landscaping.

The proposals are for the conversion of agricultural barns into 13 residential dwellings (**Appendix A**). It should be noted that several buildings in the northern portion of the site will be retained.

TAN15 classifies residential development as *'highly vulnerable'* land use[1].

3.3 WATERBODIES IN THE VICINITY OF THE SITE

An unnamed watercourse runs through the northern portion of the site via a culvert and flows in a north-westerly direction. The unnamed watercourse discharges into Pulford Brook which is located approximately 240 m to the north-east of the site.

[1] TAN15, Figure 2

Lavister Brook is located approximately 580 m west of the site. Lavister Brook flows in a northerly direction before discharging into Pulford Brook.

Pulford Brook and Lavister Brook are classified as 'main rivers'.

The unnamed watercourse is classified as an 'ordinary watercourse'.

3.4 GROUND CONDITIONS

According to the British Geographical Survey bedrock geology at the site is *'Kinnerton Sandstone Formation - Sandstone'* whilst superficial deposits are likely to be *'River Terrace Deposits (undifferentiated) – Sand and Gravel'*.

According to the Soilscapes maps produced by the National Soils Research Institute[2], soil conditions at the site and within the surrounding area are described as *'freely draining loamy soils'*.

BGS borehole records[3] located approximately 220 m east of the site and 390 m north of the site showed ground conditions to consist of an initial layer of silty sand and clay at depths to around 3 m followed by a layer of stiff clay. Ground water was encountered at 8.6 m and 6.9 m below ground level respectively for each borehole.

3.5 SITE LEVELS

LiDAR data has been utilised to develop a digital elevation model as illustrated in **Figure 2**.

Site levels are generally shown to be in the region of 11.90 to 12.95 metres Above Ordnance Datum (m AOD) with the highest point of the site at its centre.

Figure 2: Digital Elevation Model

[2] Soilscapes www.landis.org.uk/soilscapes/
[3] www.bgs.ac.uk/data/boreholescans/home.html, Ref: SJ35NE65, SJ35NE22

3.6 ACCESS AND EGRESS

Access and egress to the site is provided via Cobblers lane which is located along the north-western boundary of the site. Levels along Cobblers Lane are in the region of 12.0 m AOD to the south and 18.0 m AOD to the north-west where it passes over the A483.

4 REVIEW OF FLOOD RISK

4.1 FLOOD ZONE DESIGNATION

Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. TAN15 defines flood zones as follows[4]:

- **Zone A.** Considered to be at little or no risk of fluvial or tidal/coastal flooding.
- **Zone B**. Areas know to have been flooded in the past evidenced by sedimentary deposits.
- **Zone C.** Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal). Zone C is subdivided into the following two zones:
  - **Zone C1.** Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.
  - **Zone C2.** Areas of the floodplain without significant flood defence infrastructure.

The Flood Zones are currently shown on the Development Advice Map and do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

4.1.1 Development Advice Map

According to the latest Development Advice Map the majority of the site is located within Zone A (**Figure 3**). A small strip of land adjacent to the unnamed watercourse within the northern portion of the site is located in Zone B.

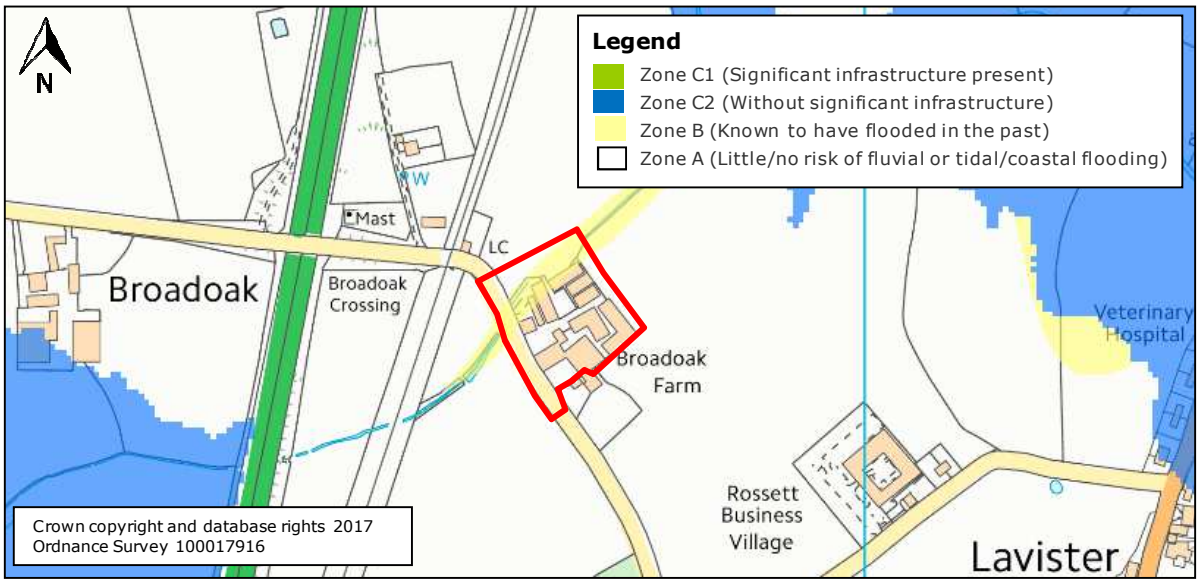

Figure 3: Development Advice Map
(Source: NRW website)

4.1.2 Natural Resources Wales Flood Risk Map

According to the NRW Flood Risk Map the site is located outside the 1 in 1,000 annual probability flood outline.

[4] TAN15, Figure 1

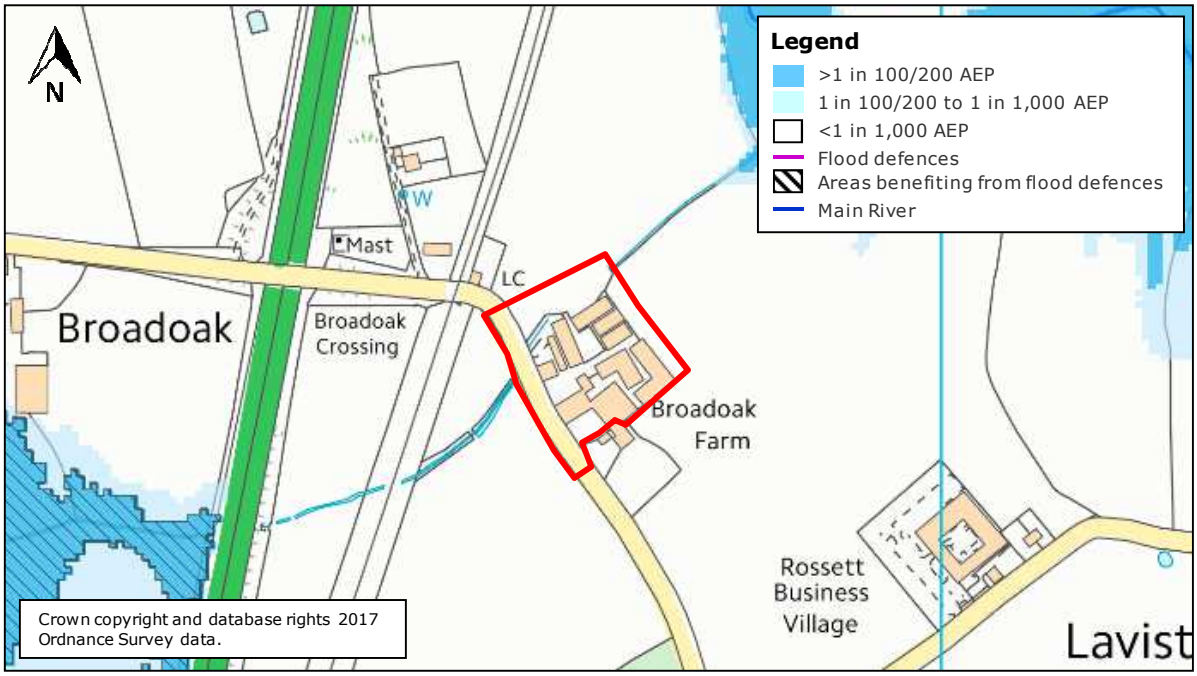

Figure 4: Natural Resources Wales Flood Map
(Source: NRW website)

4.2 JUSTIFICATION TEST

The site is not located within Zone C and therefore the Justification Test need not be addressed.

4.3 HISTORICAL RECORDS OF FLOODING

NRW historical flood records show a small portion of the land adjacent to the site to have flooded previously, which corresponds with the Zone B extent as outlined in **Figure 3**.

4.4 FLUVIAL FLOOD RISK – UNNAMED WATERCOURSE

According to the Flood Estimation Handbook (FEH) Web Service, the unnamed watercourse has a catchment area of 1.49 km² upstream of the site.

NRW has confirmed that it does not hold any modelled data for the unnamed watercourse. However, for such small watercourses it is usually possible to utilise the NRW Risk of Flooding from Surface Water map as a proxy to quantify likely flood risk (refer to **Section 4.7**). This indicates that the site is outside of the 1 in 1,000 annual probability surface water flood extent.

It is noteworthy that flows within the unnamed watercourse adjacent to the site will be constrained by the upstream structures (i.e. culverts) associated with the railway and the A483. The upstream structures should also reduce the likelihood of a culvert blockage within the immediate vicinity of the site.

In terms of residual concern relating to a blockage of the structures associated with the unnamed watercourse, LiDAR data shows the site to be raised up above surrounding ground levels, with lower land being situated to the north and north-east (**Figure 5**). As such, overtopping of the banks of the unnamed watercourse within the vicinity of the site would be expected to flow around the site and ultimately to the north-east down the floodplain, as shown in **Figure 6.**

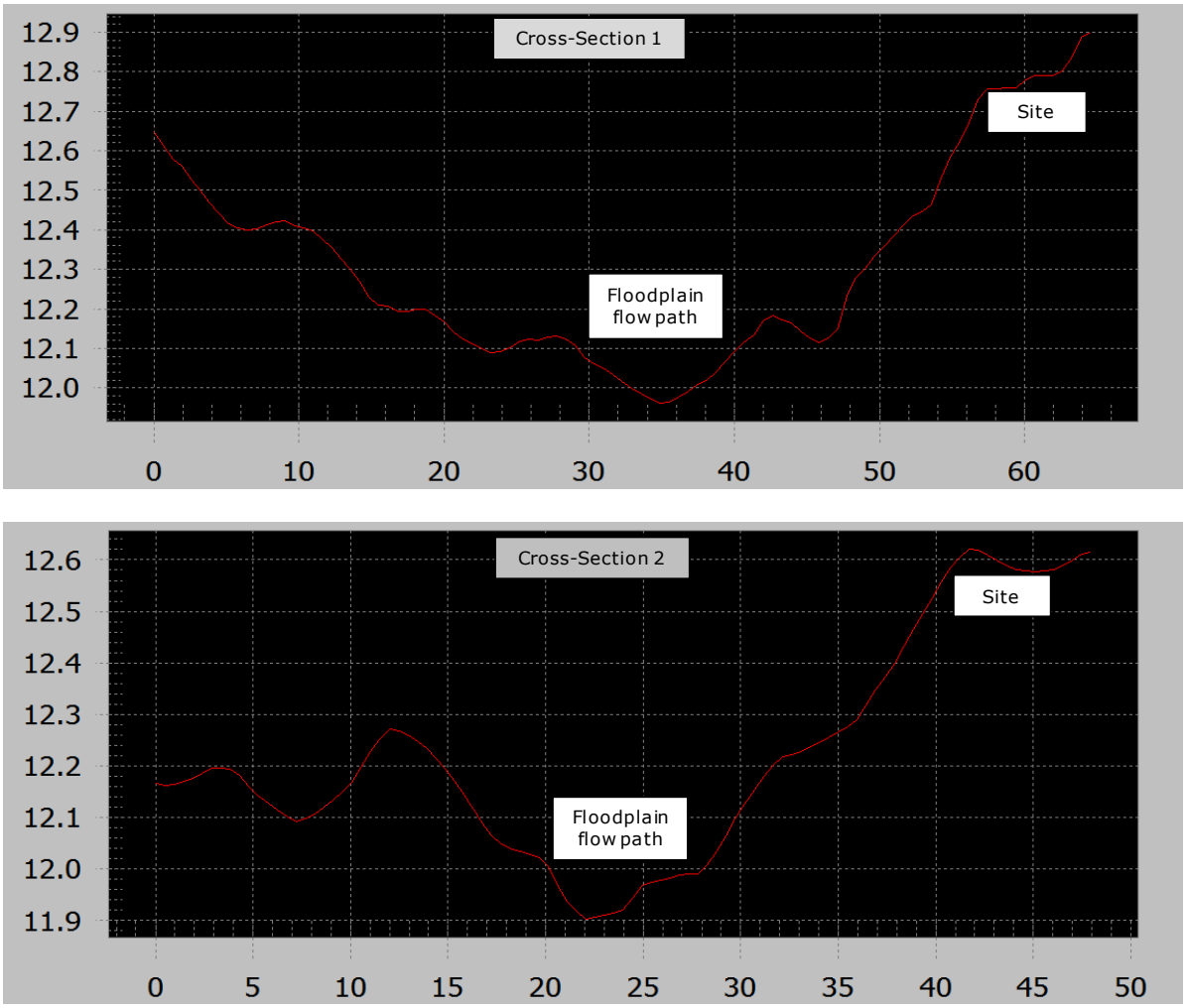

Figure 5: Unnamed Watercourse Cross-Sections

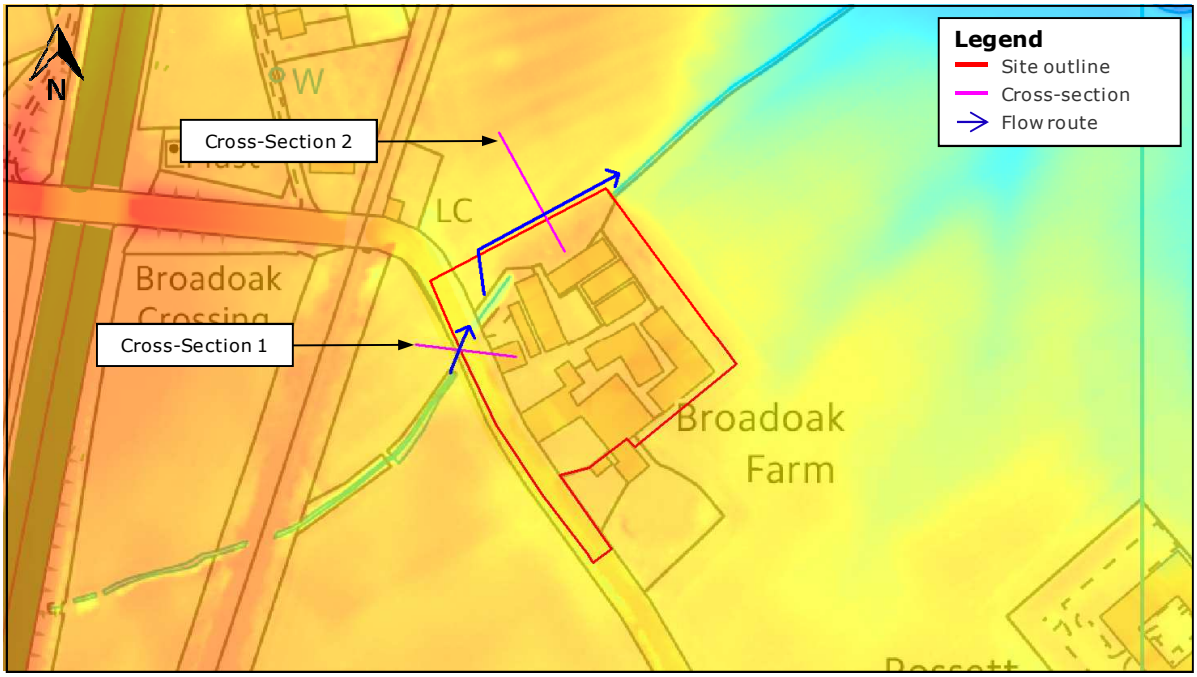

Figure 6: Unnamed Watercourse Flow Routes

Given the above, the unnamed watercourse is not expected to pose a significant flood risk to the site; however, any residual flood risk to the site from this source will be mitigated though the implementation of the measures proposed in **Section 5** of this report.

4.5 FLOOD RISK FROM RESERVOIRS, CANALS AND OTHER ARTIFICIAL SOURCES

Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.

There are no canals located within the immediate vicinity of the site.

The NRW Risk of Flooding from Reservoirs map (**Figure 7**) indicates the site is not at risk from reservoir flooding.

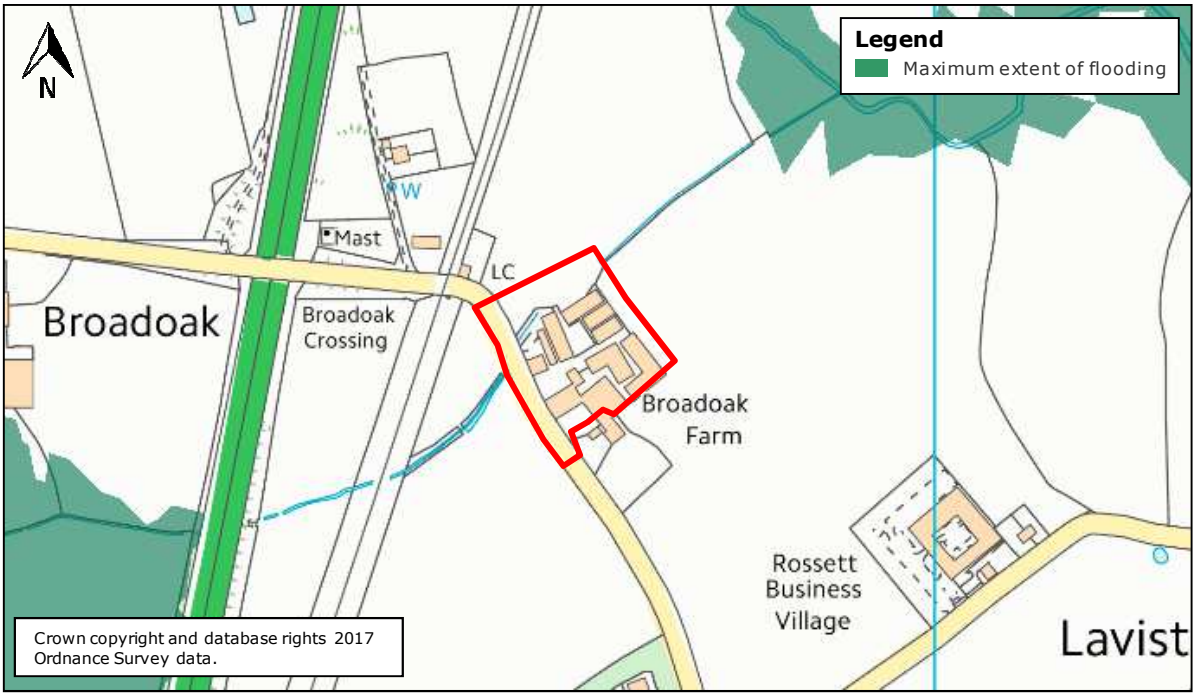

Figure 7: Risk of Flooding from Reservoirs Map
(Source: NRW website)

4.6 FLOOD RISK FROM GROUNDWATER

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels. It is most common in low-lying areas overlain by permeable soils and permeable geology, or in areas with a naturally high water table.

According to the BGS Groundwater Flooding Hazard map (**Figure 8**) the susceptibility to groundwater flooding is moderate to significant.

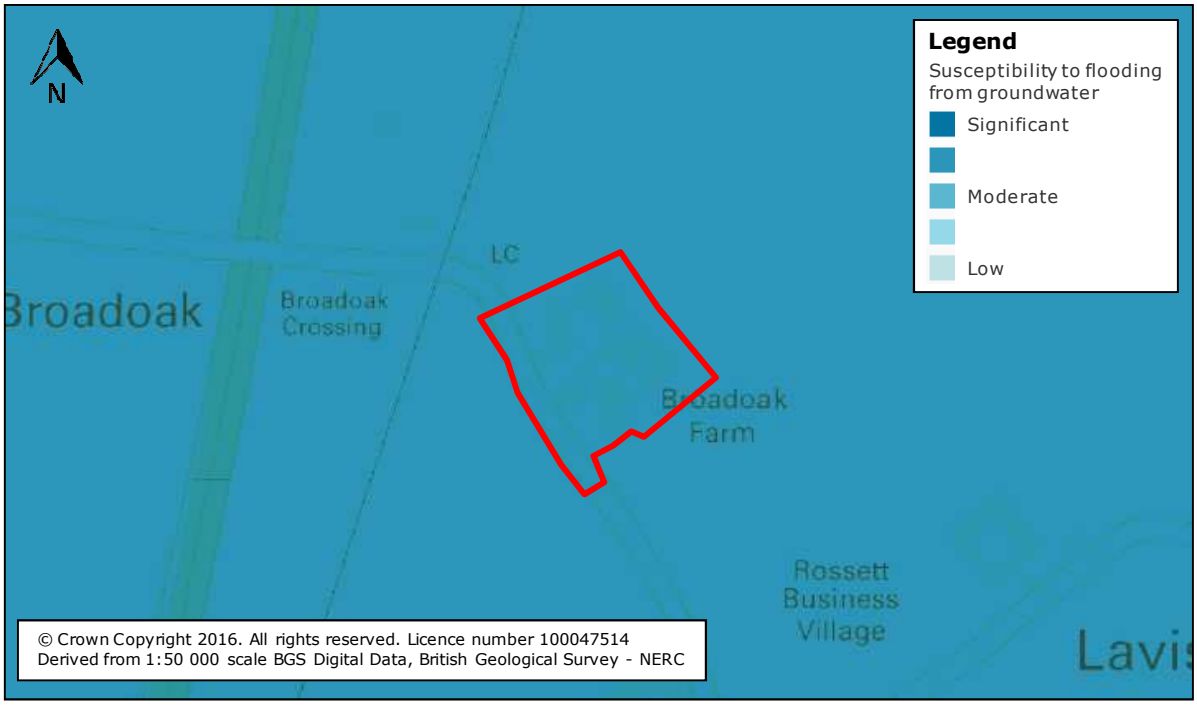

Figure 8: Groundwater Flooding Hazard Map
(Source: Findmaps)

As detailed in **Section 3.4** ground conditions at the site and within the surrounding area are described as *'freely draining loamy soils'*. There may therefore be the propensity for groundwater flooding in the locality; however, given the presence of the adjacent watercourse which should convey flows away from the site and given that the site is significantly raised up above adjacent ground levels, flood risk to the site itself is considered to be low.

Based on the above, the risk of groundwater flooding is assessed to be low. The residual risk of flooding from this source will be mitigated through the implementation of the measures proposed in **Section 5** of this report.

4.7 FLOOD RISK FROM SURFACE WATER

Surface water flooding comprises pluvial flooding and flooding from sewers and highway drains and gullies.

4.7.1 Risk of Pluvial Flooding

Pluvial flooding results from rainfall-generated overland flow, before the runoff enters any watercourse or sewer, or where the sewerage/drainage systems and watercourses are overwhelmed and therefore unable to accept surface water.

Pluvial flooding is usually associated with high intensity rainfall events but may also occur with lower intensity rainfall where the ground is saturated, developed or otherwise has low permeability resulting in overland flow and ponding within depressions in the topography.

As detailed in **Section 3.4** ground conditions at the site and within the surrounding area are described as *'freely draining loamy soils'*. The propensity for surface water flooding may therefore be considered low.

The NRW Risk of Flooding from Surface Water map (**Figure 9**) indicates the site is at 'very low' risk from surface water flooding. The small area of 'low' risk flooding is confined to within the channel of the unnamed watercourse.

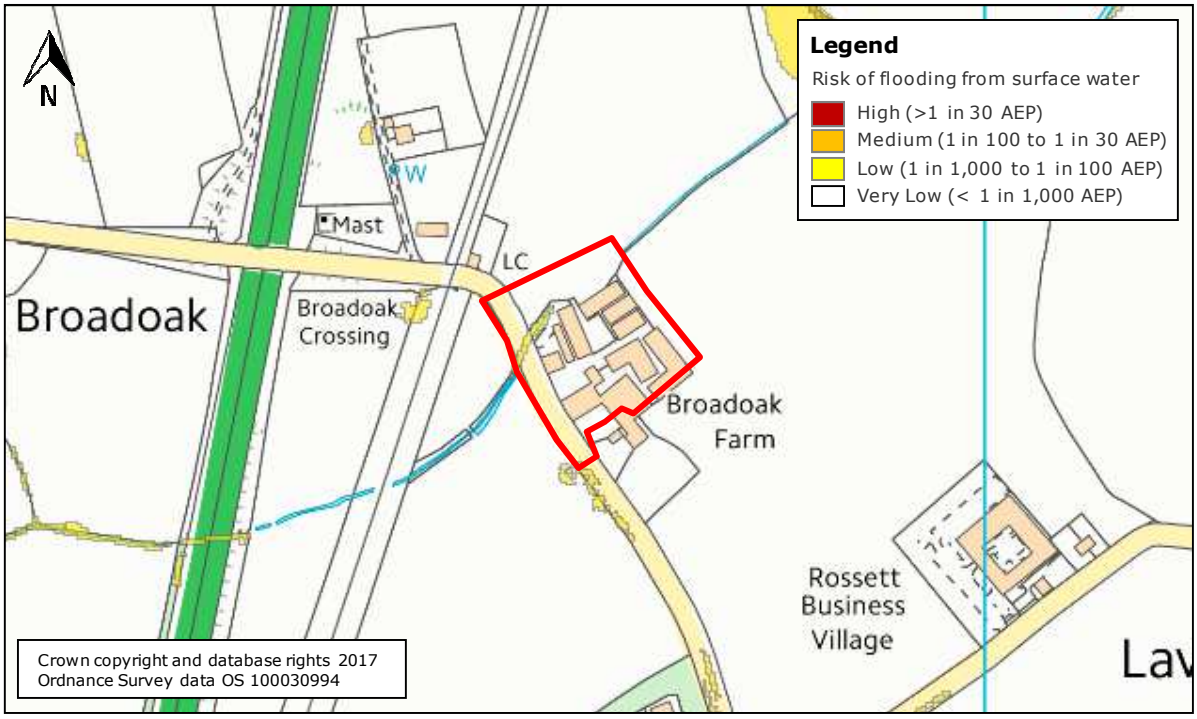

Figure 9: Natural Resources Wales Risk of Flooding from Surface Water
(Source: NRW website)

The risk of pluvial flooding at the site is assessed to be very low. Residual flood risk from this source will be addressed through the mitigation measures as detailed in **Section 5** and the surface water drainage strategy[5].

[5] Weetwood Surface Water Drainage Strategy v1.0 report, dated 2 November 2017

5 FLOOD RISK MITIGATION MEASURES

5.1 FLOOD MITIGATION

Any residual risk of flooding from the unnamed watercourse and groundwater flooding will be mitigated though the implementation of the measures proposed within the following section of this report.

5.1.1 Finished Floor Levels

Finished floor levels should be set at a minimum of 0.30 m above adjacent ground levels following reprofiling of the site.

This should enable any potential overland flows to be conveyed safely across the site without affecting property in accordance with the approach promoted by government policy[6].

5.2 FLOOD PLAN

According to the NRW Flood Warning Areas map[7] (**Figure 10**), the site and access and egress routes are not located within an area covered by flood warnings.

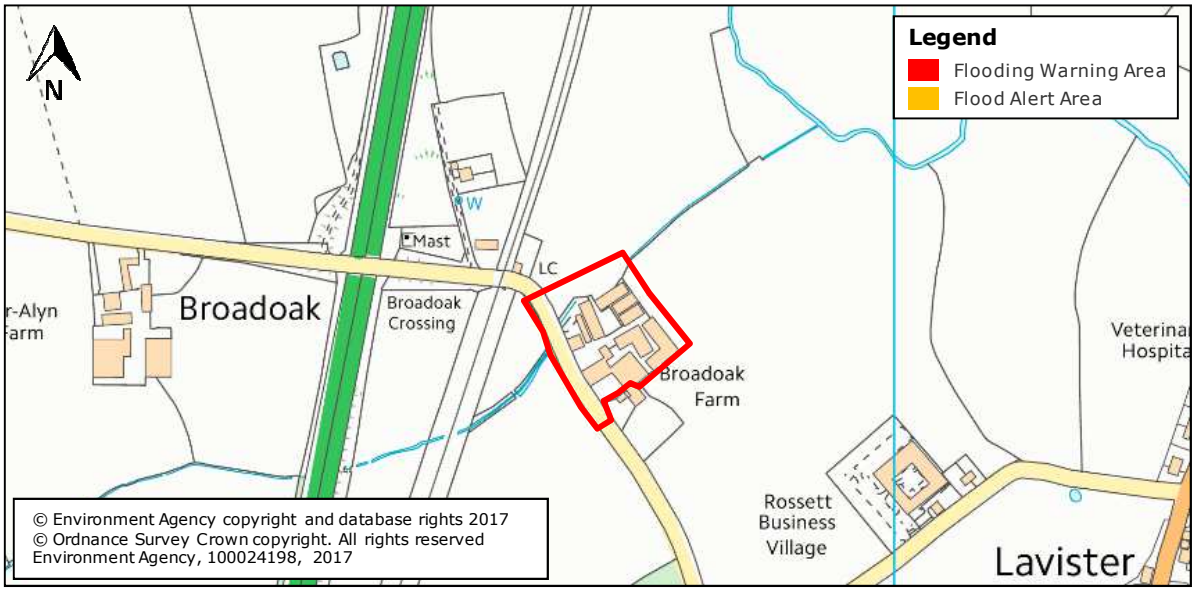

Figure 10: Natural Resources Wales Flood Warning Areas
(Source: NRW website)

5.3 ORDINARY WATERCOURSE CONSENT

The development proposals are not considered to encroach within the easement of the ordinary watercourse given that the northern part of the site is to remain unchanged. Should this not be the case the Ordinary Watercourse Consent will be required from the appropriate body.

[6] Making Space for Water, Taking forward a new Government strategy for flood and coastal erosion risk management in England, March 2005, Dept for Environment, Food and Rural Affairs

[7] Currently provided on the Environment Agency website

6 SUMMARY

This FCA has been prepared on behalf of Cornish Hall Barns Ltd and relates to the proposed redevelopment of land at Broad Oak Farm in Rossett

According to the NRW Flood Risk Map the proposed development site is located outside the 1 in 1,000 annual probability flood outline and is therefore defined by TAN15 as being situated within Zone A. However, the site is shown to be partially located within Zone B, having possibly experienced historic flooding.

The site is not located within Zone C and therefore the Justification Test need not be addressed.

Flood risk from all sources is considered to be low.

Finished floor levels should be set at a minimum of 0.30 m above adjacent ground levels following reprofiling of the site.

The site and access and egress routes are not located within an area covered by flood warnings.

The development proposals are not considered to encroach within the easement of the ordinary watercourse given that the northern part of the site is to remain unchanged.

7 RECOMMENDATIONS

This FCA has demonstrated that the proposed development may be completed without conflicting with the requirements of TAN15 subject to the following:

- Finished floor levels to be set 0.30 m above adjacent ground levels

APPENDIX A:	Development Proposals

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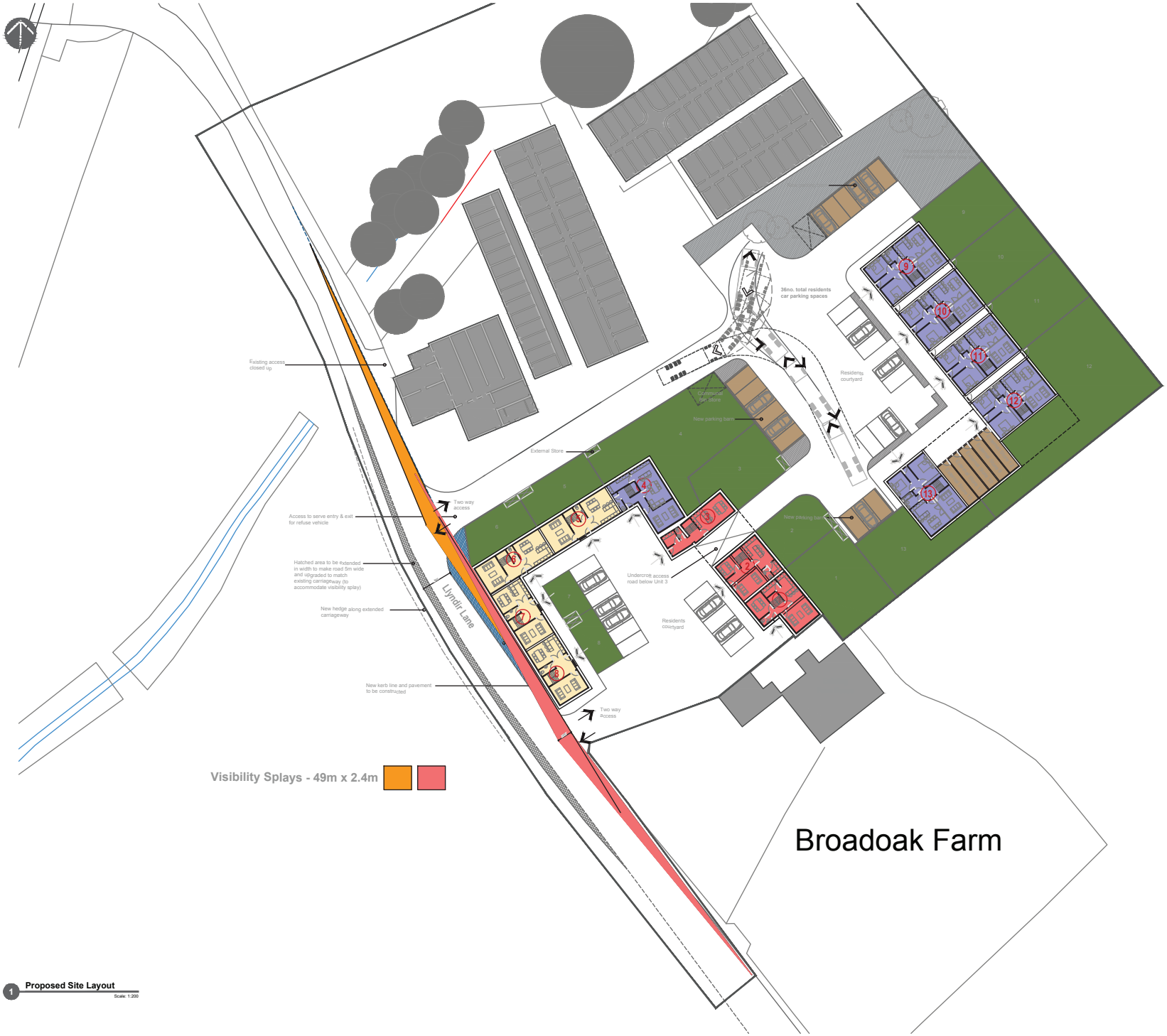
Health & Safety Notes

1. Contractor must ensure that all work on site is carried out in a safe & satisfactory manner, in accordance with Health & Safety At Work Act 1974, COSHH Regulations 2002 & requirements of C.D.M



Accommodation Schedule

Unit 1 (1,485sqft)	Part 2/3 storey	4no. bed	138sqm
Unit 2 (1,582sqft)	Part 2/3 storey	4no. bed	147sqm
Unit 3 (1,582sqft)	Part 2/3 storey	4no. bed	147sqm
Unit 4 (1,292sqft)	2 storey	3no. bed	120sqm
Unit 5 (1,130sqft)	2 storey	2no. bed	105sqm
Unit 6 (1,098sqft)	2 storey	2no. bed	102sqm
Unit 7 (990sqft)	2 storey	2no. bed	92sqm
Unit 8 (990sqft)	2 storey	2no. bed	92sqm
Unit 9 (1,152sqft)	Part 1/2 storey	3no. bed	107sqm
Unit 10 (1,152sqft)	Part 1/2 storey	3no. bed	107sqm
Unit 11 (1,152sqft)	Part 1/2 storey	3no. bed	107sqm
Unit 12 (1,152sqft)	Part 1/2 storey	3no. bed	107sqm
Unit 13 (1,152sqft)	Part 1/2 storey	3no. bed	107sqm

1 **Proposed Site Layout**
Scale: 1:200

0 2 4 6 10m

Rev	Description	Date
P3	Power name replaced with Landscaping. External access added to unit 7 plots	30.10.2017
P2	Visibility splay indicated and red line boundary amended to suit	04.10.2017
P1	First Issue	04.06.2015

Client
Mr S Trowbridge

Project
Broad Oak Farm
Rossett

Drawing Title
Proposed Site Layout

Drawn by	Checked by	Date
AO	GE	30.05.2017

Status	Scale @ A0
PLANNING	1:200

Job no	Dwg no	Rev
c3707	L04	P3

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