

**FLOOD CONSEQUENCE ASSESSMENT
for
Proposed Residential Properties
at
Packsaddle Bank, Wrexham Road, Wrexham, LL14 4EH**

7 August 2014

REVISION A: 23 February 2015

Client:

**Flood Consequence Assessment for Proposed Residential Properties at
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Document Verification

Project Title	FLOOD CONSEQUENCE ASSESSMENT for Proposed Residential Properties at Packsaddle Bank, Wrexham Road, Wrexham, LL14 4EH
Project Number	1230
Document Number	1230 FCA

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Revision Record

Revision Number	Date	Description	Prepared
A	23 FEBRUARY 2015	ADDITIONAL INFORMATION (ITEM 13 AND 14) ADDED	A.K.

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1.0 Executive Summary

The proposed site is for a residential development and part of the site is located within the dark blue (formerly zone C) 1 in 100 year flood zone. The remainder of the site rises steeply and is outside any flood zone. The purpose of this report is to justify the proposed development with respect to flooding issues.

The survey plus site observations, partly dictated by a step up to the 117m contour, indicate that about 15% of the site is within the dark blue flooding zone. However the NRW flood map, based on a aerial photograph, suggests about 45% of the site is within the flood zone. Site evidence refutes this.

A non-main river, Pentrebychan Brook, runs adjacent to the western boundary of the site.

There is a bridge underpass / culvert on Wrexham Road immediately outside the site. There is a weir close to the bank on the opposite side of Wrexham Road.

Traditionally a culvert blockage modelling exercise would be required for detailed design, but in this instance it is considered unnecessary because of the substantial difference between bed level and the site.

The access / egress route is technically within the flood plain, but can be expected to avoid a build-up of water because of the level difference, and levels falling away from the site.

Detailed design will involve discharge to the river at an agreed green-field run-off, with a flow control. The site is to be designed for 100 year plus 30% climate change

2.0 Introduction

Appendix 1: Location Plans

- 2.1 Kane Design has been instructed to prepare a Flood Consequence Assessment for a proposed residential development at the existing dwelling known as Packsaddle Bank, located on B5605 Wrexham Road, Wrexham, LL14 4EH.
- 2.2 The Flood Consequence Assessment is to be produced in accordance with Technical Advice Note TAN 15 by the Welsh Assembly Government and the requirement of National Resources Wales (formerly the Environment Agency Wales).
- 2.3 The copyright of this report is owned by Kane Design. Consequently this report may not be amended or adapted without the approval of Kane Design. Complete copies of this report may, however, be made and distributed by our client in dealing with matters directly related to its commission.

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3.0 Existing Site Description**Appendix 2: Site Survey**

- 3.1 The site occupies 0.6Ha / 1.5 Acres and has several areas that are dense conifers/ heavily wooded. A single large dwelling occupies an area of approximately 226m² towards the front of the site. Around the dwelling are landscaped gardens and tarmac access areas. Levels on the southern boundary with Wrexham Road are approximately 113m, rising to 118.78m at the dwelling. The rear northern portion of the site is generally at 121m.
- 3.2 There is an access drive on the western boundary, with levels ranging from 114.0m on Wrexham Road, to 120.0m at the rear.
The site is approximately 92m by 65m.
Access to the proposed site awaits confirmation.

4.0 Technical Requirements.

TAN 15 supplies definitions for flood zones as stated below, and based on the flood risk mapping of Natural Resources Wales. The percentages relate to the probability of flooding within a given year.

Uncoloured: No or minimal risk of flooding from fluvial or tidal / coastal.

Dark blue: Areas that are potentially affected by flooding. These areas are defined as:

1: 200 probability (0.5%) of sea flooding

1: 100 probability (1.0%) of river (fluvial) flooding

Light blue: Extreme flooding.

This is based on historical geological estimations, and specifies the areas with a 1:1000 (0. 1% chance of flooding.

The above can be taken as equivalent to:

Uncoloured = Zone 1 England, and Zone A Environment Agency Wales (no longer used)

Light blue = Zone 2 England, and Zone B Environment Agency Wales (no longer used)

Dark blue = Zone 3 England, and Zone C Environment Agency Wales (no longer used)

In addition:

Purple line: Flood defence

Hatched area: Areas benefiting from flood defences.

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5.0 Site Specific Flood Details

Appendix 3: Environment Agency Flood Maps

The site straddles all three zones.

Approximately 55% of the site is uncoloured / no-risk.

The lower 45% of the site is dark blue / 100 year flood zone.

There is a sliver of light blue / 1000 year at the interface of the two.

However, see item 13 relating to site observations, disputing these mappings.

The potential flood is due to Pentrebychan Brook, which has a flood plain opposite the site, and is culverted (Packsaddle Bridge) under Wrexham Road where it then runs east, adjacent to Wrexham Road.

6.0 Tan 15 Section 6: Site Justification.

Wrexham County Borough Council are currently revising their settlement plan. Proposed developments can now be considered in previously excluded areas.

There are existing residential dwellings opposite and on Smith Lane, and in and the village of Pentre Bychan nearby. Further along the Wrexham road are the wards Rhosllanerchrugog and Ponciau.

This particular site offers good development opportunity, has excellent transport facilities via Wrexham Road, and is beside several large office blocks, including Dee Valley Water. The proposal is to replace the existing large dwelling and build eleven new residential dwellings above the flood plain line.

7.0 Tan 15 Section 9: Summary of Policy Requirements and Acceptable Criteria

Development in the uncoloured zone need not be considered.

Development in the dark blue zone should satisfy the following

[If there is development within this zone However, it is the intention to prove that all of the residential area to be developed is within the uncoloured zone.]:

Acceptable consequences for use

Occupiers aware of floor risk

Escape routes

Effective flood warning provided

Flood emergency plans and procedures in place

Flood resistant design

No increase in flooding elsewhere.

Agreement for any flood defences secured.

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It is likely that any residential development in the flood zone will comprise of gardens only, but there could be sheds, garages. Most of the existing path to the south and the existing access to Wrexham Road are located within the Flood zone.

8.0 Sources of Flooding and Flood Risk

Sources of flooding can be categorised as:

Fluvial: This is the only source being considered within this report.

Tidal / Sea: Not applicable

Pluvial: This is localised flooding, generated from overland flows from built up areas.

It can occur with high intensity rainfalls, or melting snow, and can flow through a site or be collected in topography depression areas.

The only obvious construction that could generate this is the Dee Valley Water Depot / offices to the rear / west of the site. This is approximately 121m AOD.

The writer is assuming that Dee Valley Water has an adequately drained premises and access road, and any overflow will fall to their low access points, on the far north, past our proposed development.

Groundwater: National Resources Wales maps indicate that this area is not a risk from groundwater.

Sewer Flooding: Again, the Dee Valley Water Depot is the only external source and assumptions are as above. Proposed in-site surface water drainage from the proposed development is likely to drain to Pentrebychan Brook, with a limited discharge / flow control. The steep levels dictate that any exceedence overflow will be towards the road.

Artificial: [canal, reservoir] Not applicable

The following tables are taken from Tan 15 Appendix 1:

Flood- free threshold

TYPE OF DEVELOPMENT	FLOOD THRESHOLD (years)	
	Fluvial	Tidal
Residential	1%	0.5%
Commercial	1%	0.5%
Industrial	1%	0.5%
Emergency Services	0.1%	0.1%
General Infrastructure	1%	0.5%

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Tolerable Flood Conditions

TYPE	MAX. DEPTH FLOOD (mm)	MAX. RATE OF RISING WATER (mm/hr)	MAX. SPEED OF INUNDATION OF FLOOD (hrs)	MAX. VELOCITY OF FLOOD WATER (m/s)
Habitable rooms	600	0.1	4	0.15 / 0.3
Commercial	600	0.3	2	0.15 / 0.3
Industrial	1000	0.3	2	0.3 / 0.45
Emergency Services	450/600	0.1	4	0.15 / 0.3
General Infrastructure	600	0.1	2	0.3

9.0 Pentrebychan Brook:**9.1 River and surrounding area**

Pentrebychan Brook (river) is falling west to east, with the large field on the opposite side of Wrexham Road to the development, indicated as a flood zone. The flood map also shows potential flooding upstream beside the proposed development site.

Levels in the field opposite are 113m.

Levels at the river at the west of the site rise to 116m

Site levels begin at 113m, grading to 117m, then step up to 120 / 121m.

There is a weir indicated in the field opposite.

9.2 Culvert / Bridge Underpass details**Appendix 4: Culvert Photos**

A survey of the culvert (bridge underpass?) at the bridge is not available yet, but approximate measurement taken on 7th August 2014 give:

Downside (field): 2.2m wide, 1.7m depth, 180mm water depth.

Upside: (Site) 2.1m wide 1.6m depth.

Taking the road as about 113m, this would compute a river bed of about 111.4m

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9.3 Standard Modelling Requirements.

The source of any flooding would appear to be any surcharge or blockage of the culvert on the site side.

Detailed modelling would require culvert blockage analysis, in accordance with National Resources Wales Flood Risk Management Guidelines: 'Blockage and Breach Scenarios' (in production).

This requires the culvert to be analysed for the effects of 30%, 67%, and 100% blockage for new developments.

9.4 Comments on Modelling Requirements.

The writer considers that with respect to this site detailed modelling is not required. The higher area of the site is approximately 5.6m above the river bed. Any surcharging due to blockages will overflow into the road and lower fields, and lower car park west of the site. The probability of flooding reaching the higher area of the site can be dismissed.

It is probable that a Flood Consequence Assessment for this area is available for the Dee Valley Site.

10.0 Access and Egress / Escape and Evacuation Routes:

Part of the main road outside the site, and site entrance, is within the 100 year flood plain. However, the majority of the site will not flood and is a safe zone.

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11.0 Other Flood Acceptability Criteria:

11.1 General

The site is to be designed so that there is no increase in surface water run-off or volume, or increase in flooding elsewhere. This should be attainable as the current site is already partly hard-surfaced / landscaped. In fact, substantial betterment can be offered. The site is to be designed for 100 year plus a 30% allowance climate change. The climate change is derived from Tan 15 Appendix 2.

11.2 Applicable to any development that might take place within the dark blue flood zone only.

- Environment Agency to approve finished floor levels
- Occupiers aware of floor risk
- Flood warning system to be supplied. The 'Flood Warning Direct' service already covers this area.
- Flood resistant construction to be used.

12.0 Further Considerations / Outstanding Information / Limitations.

- National Resources Wales approval of the report and confirmation of permissible floor levels
- Accurate confirmation / agreement from National Resources Wales for the position of the interface between the non-coloured / dark blue zones.
- Detailed survey of the culvert / bridge underpass, and river bed levels adjacent to the site may be required.
- All level information outside the supplied survey drawing is approximate.

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13.0 Additional Information following N.R.A Site Visit.

13.1 Observations:

A site visit by Ryan Knowles (National Resources Wales) took place on 30 January 2015 and site observations / survey figures are listed below:

- Wrexham Road levels outside the site range from 112.38m to 113.55m.
- Wrexham road falls in a West-East direction, towards Wrexham.
- Levels at the river bank to the west of the site are around 114.78m.
- Levels for the first 13m of the site range from 113m to 116.23m, before a step up to 117m at the existing property.
- The river bed is 1.7m depth beneath road level.
- The office car park to the west is below road level, by about 1m
- The fields / floods plain to the south fall away from the site.

The latter three items are approximate, pending additional survey information.

The lowest proposed finished floor levels are 117.00m

13.2: Conclusions from observations

Full scale flood modelling, including backwater, blockages, and weir modelling, have not been carried out, but within the scope of this report it can be assumed that the flooding will not reach the 117.00m build level.

The proposed levels average 4m above the surrounding area, and 5.6m above the river bed.

There are three flood path flows, all falling away from the site, and about 4m lower.

To the west: office car park

To the south: fields / flood plain

To Wrexham: Along Wrexham Road.

The following additional appendices are included;

Site Plan with finished floor levels

Site Plan: large scale extract

Photos: Office block car park to west

Fields to south

Site entrance

13.3: Comparisons between site observations and the NRA Flood map.

The NRA map can be considered as incorrect.

It indicates the dark blue flood plain extending to the rear of the existing property. This coincides with a existing landscaped area at 118.9m, some 7.5m above the road and surrounding falling levels.

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14.0 Conclusion

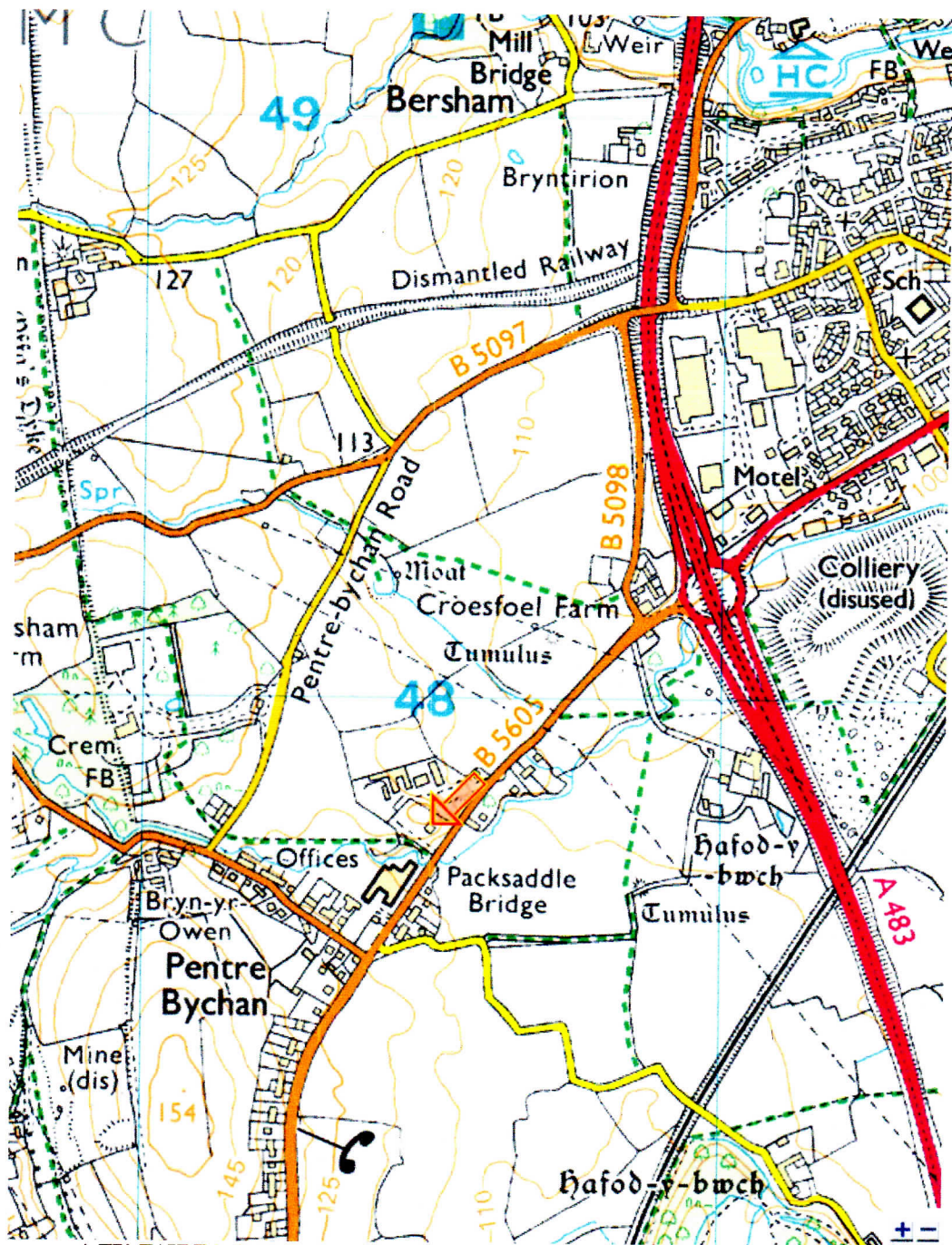
- The proposed development will be at 117.0m or higher, and outside the flood zone as defined by the survey / site observations. Flooding cannot be considered an issue, with this build level.
- The NRW aerial photograph shows a larger flood zone but is incorrect.
- External flood flow path levels fall away from the site via three routes.

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Appendix 1

LOCATION PLANS







Depot

Holly Lodge

Pentre-bychan Bridge

Packsaddle Bridge

Bryn-yr-Owen

Pentre ychan

SMITHY LANE

WREXHAM ROAD

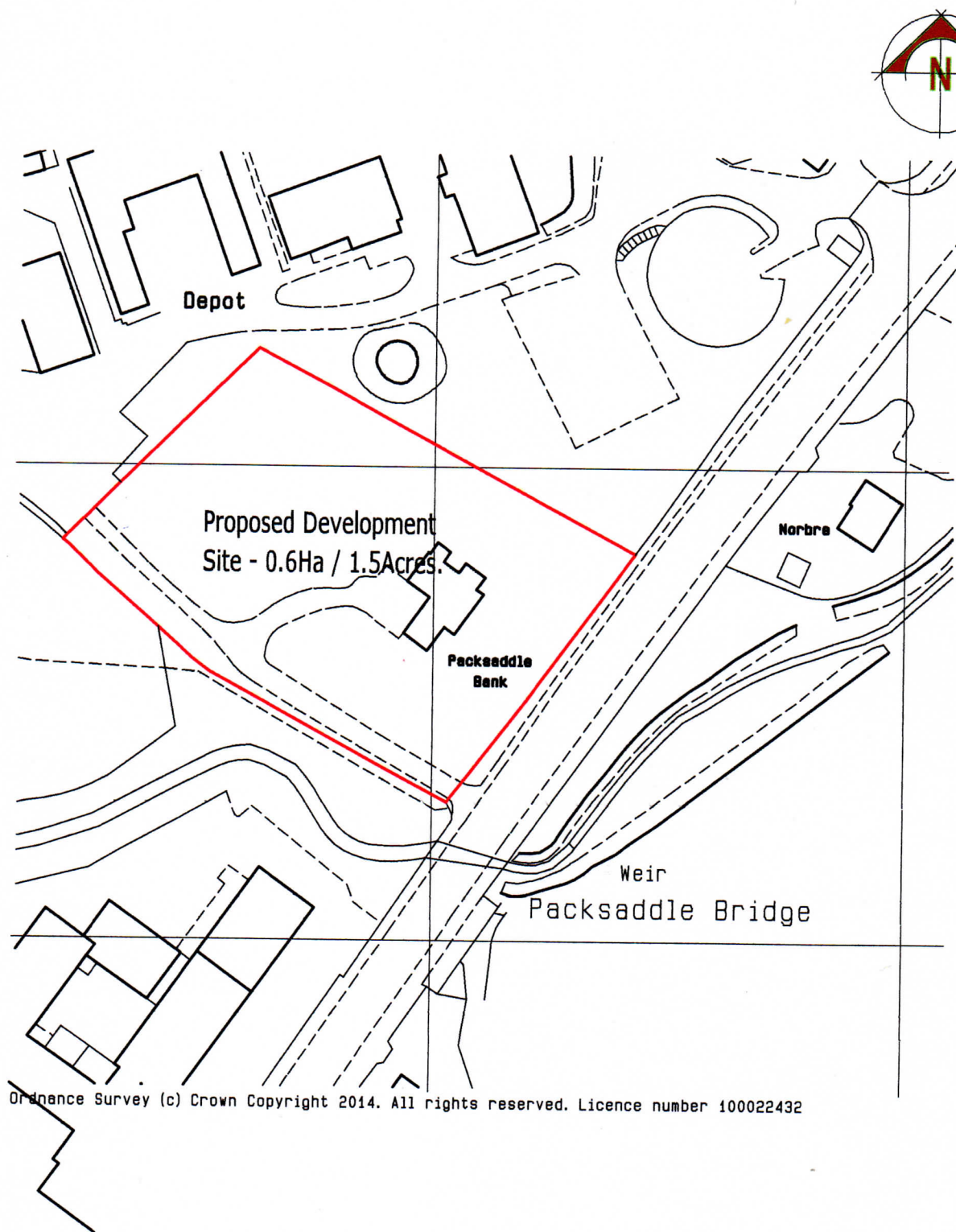


BS605

BS428

26

11



PROPOSED RESIDENTIAL DEVELOPMENT -
 Land at PACKSADDLE BANK,
 WREXHAM ROAD,
 PENTRE BYCHAN,
 WREXHAM,
 LL14 4DS.

LOCATION PLAN. Scale 1:1250 @ A4.
 Dwg No. 10095.01.dsj.

D.S. Jones & Co.

Architectural & Planning Consultants.
 The Cottage, 11, Salisbury Road,
 Wrexham, LL13 7AS.
 Telephone : 01978 469662 / 07880 874522.



Rhostyllen, Wrexham LL14 4EH, UK

Google earth

Image © 2014 Getmapping plc
© 2014 Google

Google earth

feet
meters

100 400





500

1000

feet
meters

Google earth

Site



Google earth

miles
km



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Appendix 2

SITE SURVEY





PROPOSED 117m
CONTOUR (APPROX.)

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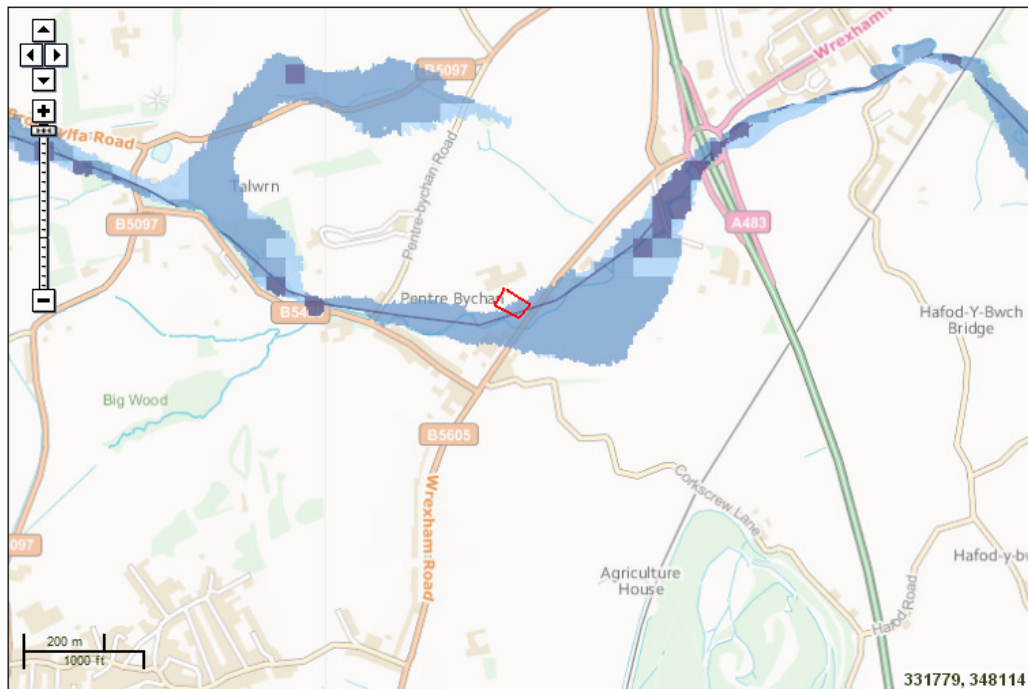
Appendix 3

ENVIRONMENT AGENCY FLOOD MAP



Map of LL14 4DS at scale 1:10,000

[Data search](#)



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRW) will take over the responsibilities of the Environment Agency in Wales.
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Extract EA Flood Map –

Packsaddle Bank, Wrexham Road, Pentre Bychan, Wrexham, LL14 4DS.

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Appendix 4

CULVERT PHOTOS



First page:

Top: Culvert site side

Bottom: Culvert opposite side

Second page:

Top: Culvert bed, site side

Bottom: Culvert bed, opposite side





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Appendix 5

SITE PHOTOS



First page:

Top: Culvert site side

Bottom: Culvert site side from road

Along river

Second page:

Top left: Road towards Wrexham

Top right Top left: Into existing site access

Bottom left: Out of existing site access

Bottom right: Road away from Wrexham





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Appendix 6

ARCHITECT LAYOUT and ENLARGED EXTRACT





SOFT LANDSCAPING.

Garden areas to be grassed front and rear with good quality turf with tree planting as indicated.

Tree planting is to be carried out as indicated. Trees to comprise selected standard stock, nursery cultivated specimens planted as indicated at an initial height of approximately 3000mm with a 100mm - 120mm girth. Tree species to be a selection of Rowan / Mountain Ash (*Corus aucuparis*) - M4, Silver Birch (*Betula pendula*) - S8, and Wild Cherry (*Prunus avium*) - WC as indicated.

Trees are to be adequately staked to provide protection after planting. Landscaping proposals are to be completed during the first planting season following completion of development.

Extent of adoptable roadway throughout the site is to be surfaced in tarmacadam to County Council Adoption standards and details are to be supplied. Kerbs to demarcate adoptable road are to be concrete and to approval. 1.8m wide pedestrian footway to be surfaced in tarmacadam to adoptable standards. Driveway serving individual dwelling to be surfaced with tarmacadam with 1/4% red stone chippings to top wearing course in order to differentiate between private and adoptable surfaces.

Pathways to perimeters of dwellings to be finished with concrete paving slabs laid with a gravelled chipped immediately adjacent to the dwellings.

Screen fence between private rear gardens to comprise 1.8m high timber close boarded fence panels supported ogilmer rails and posts which are to be set in concrete bases all to details supplied.

Project. PROPOSED DEMOLITION OF EXISTING DWELLING AND RESIDENTIAL DEVELOPMENT at: PACKSADDLE BANK, WREXHAM ROAD, PENTREBYCHAN, WREXHAM, LL14 4DS.		Client.
Mrs. L.P. CROSSLAND		
Title. PROPOSED ILLUSTRATIVE SITE LAYOUT PLAN.		
Drawing No. 10095.03.dsj		
Date.	August 2014.	Scale.
		1:200@A1.
D.S. Jones & Co. Architectural & Planning Consultants. The Cottage, 11, Salisbury Road, Wrexham, LL13 7AS. Tel : 01978 469662 / 07880 874522. E : djonesandco@live.co.uk		

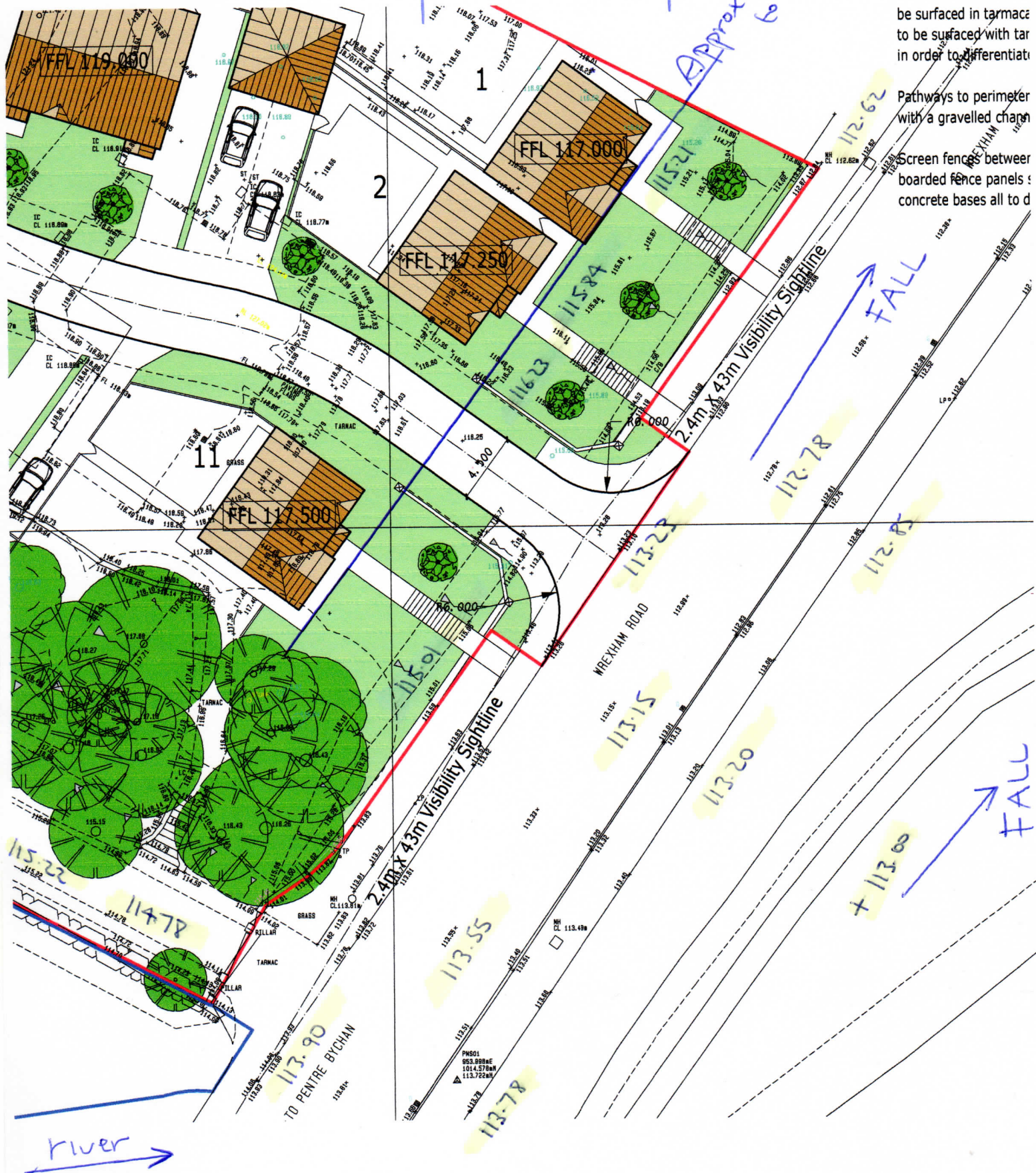
Proposed
Finished
Floor Levels
117.00m
or
Higher

Approx. Step to 17.00m Contour.

to be surfaced with tar
in order to differentiate

~~Pathways to perimeter
with a gravelled chaps~~

Screen fences between
boarded fence panels &
concrete bases all to d



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Appendix 7

ADDITIONAL PHOTOGRAPHS





Google earth

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Google earth

feet
meters



20

7





feet
meters

20
6

Google earth



Google earth

feet
meters

10

5

Google earth