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Report No: 5792/R1

WHITEACRE LANE,
WISWELL

FLOOD RISK ASSESSMENT

AUGUST 2014

Prepared By: **John E Lees B.Sc., C.Eng., M.I.C.E., M.C.I.W.E.M.**

Client:

Redrow Homes
Redrow House
14 Eaton Avenue
Matrix Office Park
Buckshaw Village
Chorley
PR7 7NA

PROJECT QUALITY CONTROL DATA SHEET

Site Name:	Whiteacre Lane, Wiswell
Report Title:	Flood Risk Assessment
Report Number:	5792/R1

Revision	Date	Status
-	August 2014	For Approval

Client Contact: Phil Harkness

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Redrow House
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Lees Roxburgh Limited Drg. No. 5792/ 01-04

1.0 INTRODUCTION

1.1 Lees Roxburgh have been instructed by Redrow Homes to carry out a Flood Risk Assessment (FRA) for a proposed residential scheme comprising 25No. dwellings on land off Whiteacre Lane, Wiswell.

1.2 This FRA has been prepared in support of an outline application.

1.3 The site lies within an area designated on EA Flood mapping as Flood Risk Zone 1.

1.4 *The National Planning Policy Framework (NPPF)* and the accompanying *Planning Practice Guidance* set out the requirements for addressing flood risk with respect to potential development sites.

At over 1 hectare in area, the site is required to be the subject of an FRA.

1.5 In accordance with the NPPF, developers are required to provide an assessment which addresses the following;

- The potential for the proposed development to be affected by flooding either from the development proposal or external sources.
- The potential for the proposed development to increase the flood risk elsewhere.
- That mitigation measures introduced to deal with any risks identified can be successfully managed.
- That the site can be developed and occupied safely.

The NPPF indicates that an assessment of flood risk should be proportionate to the risk and appropriate to the scale, nature and location of the development. This report reflects the requirements of the NPPF in this regard.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Location

2.1.1 The site is centred on National Grid references SD374070, 437820 and is approximately 1.46 hectare in area. **(Appendix 1)**.

2.1.2 The site is situated at the south eastern outskirts of Barrow, some 4km to the south of Clitheroe.

2.2 Surrounding Land Use and Access

2.2.1 The site is bounded by the A59 in cutting to the east, by Whiteacre Lane to the north, by Green Park Court to the west and by open fields to the south.

Open fields continue beyond the A59 to Wiswell some 0.5 km to the south east.

2.2.2 To the north are two reservoirs separated by the A59, the largest of which lies to the east of the A59.

Beyond this reservoir and served off the A59 is a retail park.

An open field separates the smaller reservoir from the rear of properties fronting onto Whiteacre Lane to the opposite side of the site.

2.2.3 Whalley Industrial Park is situated about 0.35km to the south west of the site.

2.2.4 Whiteacre Lane is bridged over the A59 and links Barrow with Wiswell.

2.3 Site Description

2.3.1 The site comprises two open fields separated by a fence line with a mature hedge and three trees.

Along the internal boundary is a dry shallow grassed ditch. This ditch was grassed with little evidence of any flows.

The ditch turns south and deepens along the west boundary leaving the site from the south west corner and continues generally in a westerly direction.

2.3.2 External boundaries are formed by a post and rail fence to the A59, with fencing continuing around the remaining boundaries reinforced by mature hedges, bushes and occasional trees.

2.4 Topography

2.4.1 Levels fall from the east boundary at the top of the cutting with the A59 to the west.

2.4.2 Reference should be made to the topographical survey (**Appendix 2**) but the topography can be summarised as;

- North east corner… 92.8m AOD
- South east corner… 91.8m AOD
- North west corner… 86.7m AOD
- South west corner… 86.2m AOD
- Level in ditch south west corner… 85.2m AOD

Thus levels fall at an average of about 1 in 20 from west to east.

2.4.3 As noted, the A59 runs in cutting visually estimated at about 8m below the eastern boundary of the site.

2.5 Existing Drainage

2.5.1 Reference to OS mapping (**Appendix 1B**) identifies numerous watercourses and drains in the area.

2.5.2 As noted, there are two reservoirs to the north.

The largest reservoir is fed by a number of ditch systems and overflows as Barrow Brook under the A59 and continues westerly through Barrow.

The second smaller reservoir is fed by Barrow Brook with an overflow back into Barrow Brook at its south western corner.

2.5.3 The site however lies in a separate sub-catchment to that of Barrow Brook.

As noted, a shallow dry ditch cuts across the site becoming deeper and better defined before leaving the site and continuing westerly and then south westerly alongside Whalley Industrial Park.

Site inspection did not identify any source of incoming flows and recorded that within the site the ditch was shallow, poorly defined and dry, but becoming deeper and better defined at the south west corner of the site.

2.5.4 Site inspection confirmed a manhole cover and gullies in Whiteacre Lane consistent with the presence of a highway drainage system.

2.6 Development Proposals

2.6.1 The development proposals comprise 25 No. of dwellings (**Appendix 6**).

3.0 FLOOD RISK

3.1 Environment Agency Flood Map

3.1.1 Reference to the Environment Agency Flood Map **(Figure. 1)** indicates that the existing site is situated within a Flood Zone 1 Area of flood risk. This is land defined within the NPPF as land assessed as having a less than 1 in 1000 annual probability of flooding (<0.1% in any year). All uses of land are appropriate in this zone.

Figure 1: Environment Agency Flood Mapping

3.2 Sequential and Exception Tests

3.2.1 The proposed development is situated within a Flood Zone 1 Risk Area. On this basis, the Sequential and Exception Tests as set out in NPPF are not applicable.

3.3 Sources of Flood Risk

3.3.1 **River/Local Water Bodies and Watercourse Systems**

3.3.1.1 There are two large reservoirs linked with Barrow Brook 200m and 250m to the north of the site at the closest.

Ground levels alongside Barrow Brook fall from downstream of where it passes under the A59 to around 81m AOD, over 5m below the lowest site level and within a separate catchment.

These water bodies therefore do not present a source of risk to the development.

3.3.1.2 There are a number of watercourse systems to the east which are cut off by the A59 bypass.

3.3.1.3 The site lies in a separate sub-catchment to that of Barrow Brook.

As noted, a shallow dry ditch cuts across the site becoming deeper and better defined before leaving the site.

Reference to 1970 to 1973 mapping identifies this ditch system as being fed from the east. However, the construction of the A59 bypass, first recorded on 1975 mapping has clearly cut off the source of flows to this ditch system.

Site inspection did not identify any source of incoming flows and recorded that within the site the ditch was shallow, poorly defined and dry, but becoming deeper and better defined at the south west corner of the site.

It is concluded that the only source of potential flows into this ditch system is greenfield run off generated by the site and therefore this system will become redundant, can be abandoned and does not present a source of flood risk to the development.

3.3.1.4 There are no other water bodies or water systems in the area which present a source of risk to the development.

3.3.2 Existing Sewers and Drainage

3.3.2.1 Copies of United Utilities public sewer records have been obtained and identify the presence of adopted drainage infrastructure in the area of the site. These records have been incorporated in **Appendix 4.**

3.3.2.2 Reference to the public sewer records indicates the following;

- 150mm dia combined system in Whiteacre Lane the head of which is at MH 8902 about 135m from the north west corner of the site.

  The depth of MH 8902 is not recorded.

3.3.3 Land Drainage and Groundwater

3.3.3.1 The site is sloping and appears well drained.

Reference to geological mapping identifies that the site is underlain by clay and unsuitable for soakaways.

3.3.3.2 With the A59 immediately to the east the site effectively lies at the top of the catchment.

No evidence of any land drainage or groundwater issues was noted during the site inspection.

3.3.3.3 On this basis, no land drainage or groundwater issues are anticipated which cannot readily be dealt with at construction stage.

3.3.4 **Comment**

3.3.4.1 On the basis of the assessment of the potential sources of flood risk described above, it is concluded that the risk associated with the following only needs to be addressed by this FRA;

- Development Drainage Proposals

4.0 SURFACE WATER RUNOFF

4.1 Requirements for Surface Water Drainage of the Site

4.1.1 The NPPF recommends that surface water generated by the development site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development.

4.1.2 Proposals should ensure that volumes and peak flow rates of surface water leaving the developed site are no greater than those prior to development, reducing surface water run off where possible and taking climate change into consideration.

4.2 Site Area

4.2.1 The area proposed for development comprises 1.46 ha.

4.3 Existing Site Run Off

4.3.1 The existing site is greenfield.

4.3.2 Existing greenfield run off rates have been calculated based on the EA recommended ICP SUDS Mean Annual Flood method (**Appendix 5**) and these are as follows;

- Q_1… 8.9 litres/sec
- Q_{30}… 17.3 litres/sec
- Q_{100} … 21.2 litres/sec

4.4 Surface Water Run Off from the Developed Site

4.4.1 The development plan is incorporated in **Appendix 6**

4.4.2 Uncontrolled flows from the development will significantly exceed greenfield run off rates. For the purposes of this FRA, it is considered that development run off rates limited to the greenfield run off rates identified in 4.3.2. would be appropriate.

4.5 Comment

4.5.1 Betts Associates Geoenvironmental Desk Study Report Ref. 14RED076/DS of June 2014 identifies from geological mapping that the site is immediately underlain by Drift Deposits of Clay Diamictom.

On this basis, it is anticipated that ground conditions will not be suitable for a ground percolation based drainage solution. Should site investigation works identify the potential for some soakaway provision, this will be assessed at a more detailed design stage.

Meanwhile, a positive surface water outfall from the site is required.

4.5.2 Levels within the proposed development area fall towards the ditch system at the south west boundary.

On this basis, the proposed outfall point for gravity surface water drainage from the development is to this system, hence mimicking the existing greenfield run off.

4.5.3 It is therefore proposed to connect the development surface water drainage system into this system, thus capturing and controlling surface water discharge from the development.

5.0 FLOOD MITIGATION MEASURES

5.1 The site is situated within an area of Flood Risk Zone 1.

It has been concluded that the ditch system within the site is redundant and can be abandoned.

No mitigation measures are therefore required with regard to the risk of flooding from external sources.

5.2 It is proposed that flows from the development will be connected into the existing ditch system at the south west boundary and limited to the greenfield runoff rates identified in 4.3.2. This will be achieved by the incorporation of a complex control arrangement to ensure that flows are contained within the system so as not to exceed the greenfield runoff rates for the equivalent storm event.

The new on site piped system will be designed to accommodate flows up to the 1 in 30 year event and will be proposed for adoption by United Utilities under a Section 104 Agreement.

Flows in excess of this up to those generated by a 1 in 100 year plus climate change event will be contained on site within an open space area with appropriate setting of levels.

5.3 Uncontrolled land drainage will be significantly reduced by the development proposals with residual land drainage, if any, to be directed safely through the development.

5.4 Generally, development levels will be set in accordance with good design practice and will therefore also mitigate against any risk of associated flooding of properties, although any such risk is deemed very low.

5.5 On this basis, no further mitigation measures are warranted.

5.6 The drainage strategy for the development has been prepared accordingly and is incorporated in **Appendix 6**.

6.0 CONCLUSIONS

6.1 The site lies within an area of Zone 1 flood risk.

On this basis the Sequential and Exception Tests will not apply.

It has been concluded that the ditch system within the site is redundant and can be abandoned.

No mitigation measures are therefore required with regard to the risk of flooding from external sources.

6.2 A desk study has identified that ground conditions are likely to be unsuitable for an infiltration based drainage solution although this will be reviewed at a more detailed stage.

Meanwhile, a positive surface water connection from the development to the existing watercourse system is proposed thus mimicking existing arrangements.

6.3 The development surface water run off rates will be limited to greenfield values.

The onsite system will provide attenuation up to the 1 in 30 year event and it is proposed the system will be adopted by United Utilities under a S104 Agreement.

The private element of the system will be designed to current Building Regulation standards and will be maintained by the houseowners.

6.4 Uncontrolled land drainage will be significantly reduced by the development proposals with residual land drainage, if any, to be directed safely through the development.

6.5 In conclusion, this FRA has demonstrated that development of the site can be delivered in accordance with the principles and requirements set out in the NPPF and is therefore appropriate.

APPENDIX 1

SITE LOCATION PLANS

APPENDIX 1A

1:2,500

LeaHough
CHARTERED SURVEYORS
Survey Valuation Design Planning Sales

Blakewater House
Phoenix Business Park
Blakewater Road
Blackburn
Lancashire
BB1 5RW
Tel: 01254 260196

8 Eaton Avenue
Matrix Office Park
Buckshaw Village
Preston
Lancashire
PR7 7NA
Tel: 01772 458866

Email: info@leahough.co.uk
Web: www.leahough.co.uk

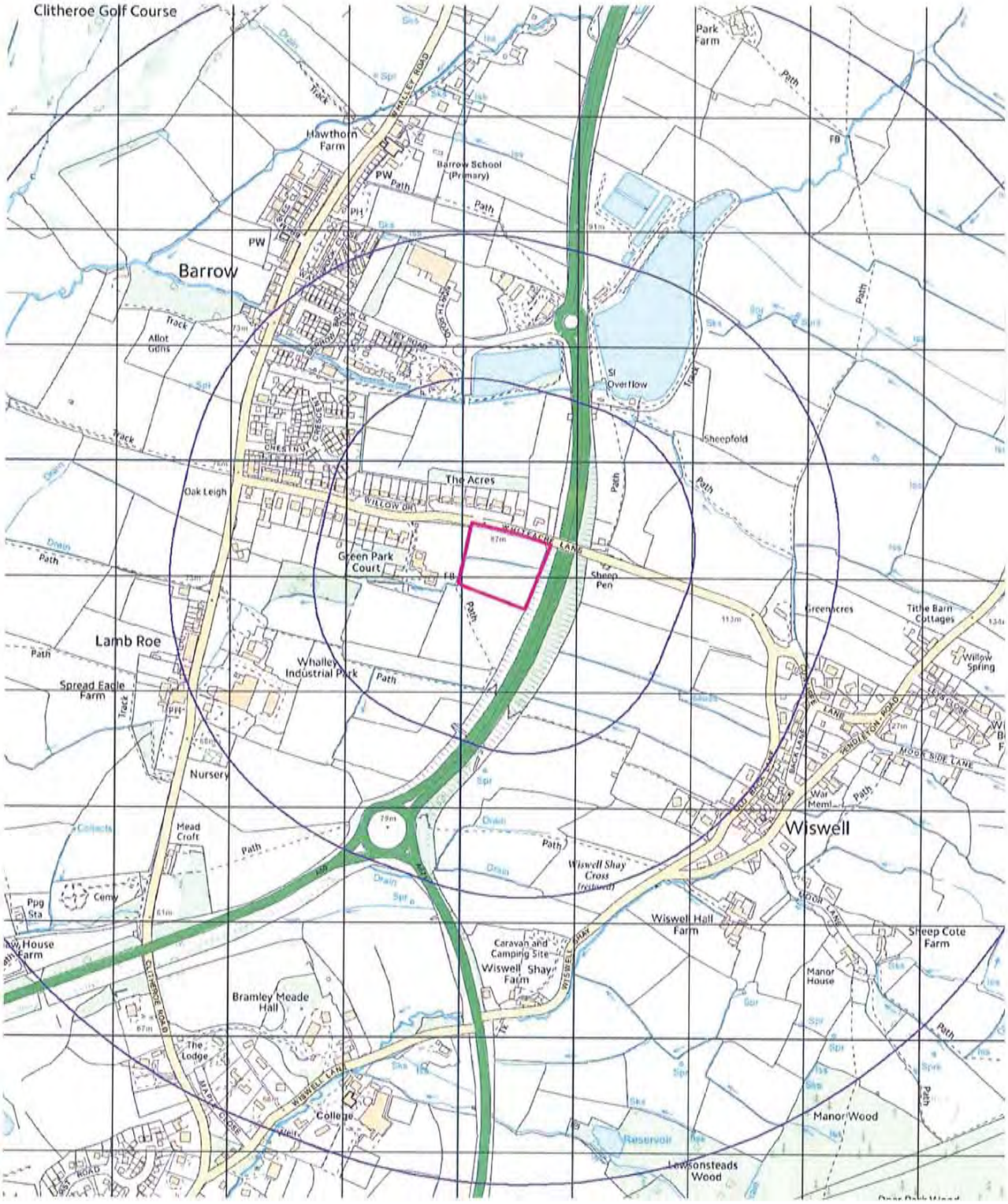
RICS

DRAWING NUMBER:	REV	DRAWN BY		SCALE:	PAPER SIZE:	DATE:
BS.11-028/04	-	GM		1:2500	A4	March 2013

PLAN REFERRED TO:
Land off Whiteacre Lane, Barrow, Nr Clitheroe, BB7 9BJ.

APPENDIX 1B

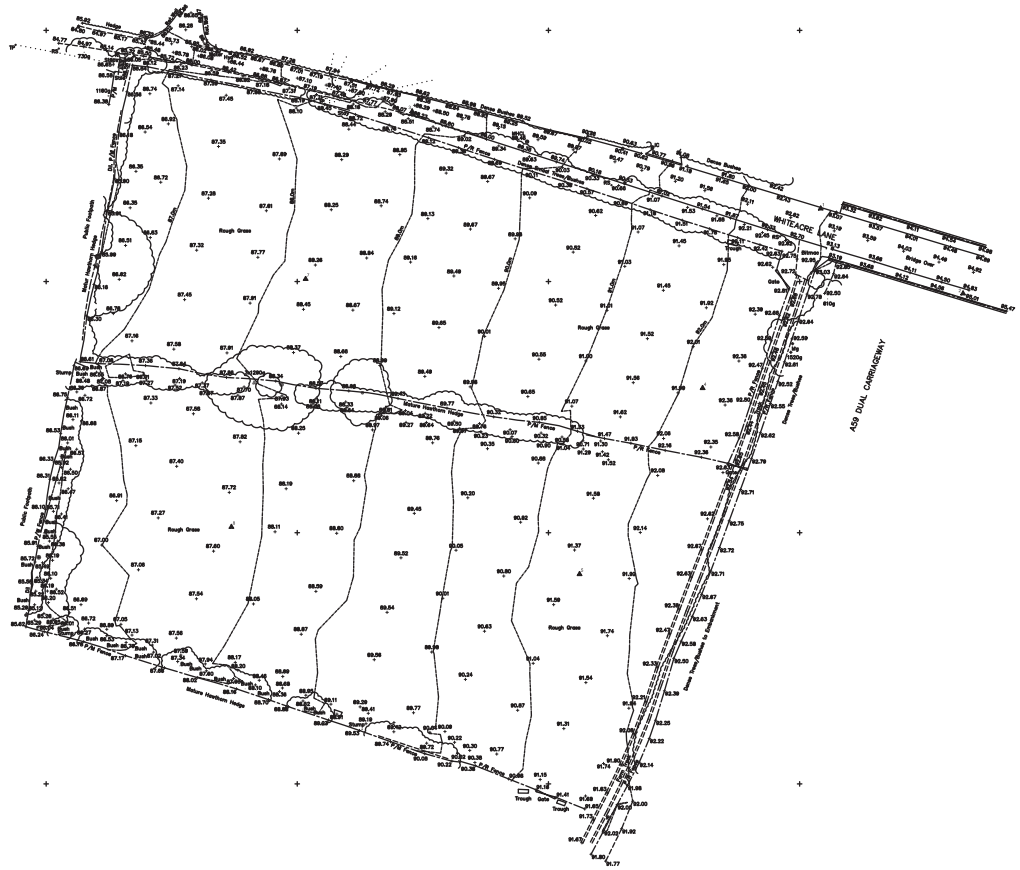
1:10,000



SITE LOCATION PLAN 1:10,000	WHITEACRE LANE, WISWELL, CLITHEROE	LR

APPENDIX 2

TOPOGRAPHICAL SURVEY
Survey & Design Ltd Drg. No. SDL 2096/1



Legend (Topographical)

STATION COORDINATES			
STN	EASTING	NORTHING	LEVEL
1	374154.195	437864.511	92.907
2	374182.537	437847.611	94.882
3	374072.866	437883.842	88.237
4	374130.684	437828.773	92.336
5	374106.185	437791.739	91.650
6	374032.054	437896.444	86.121
7	374051.659	437850.486	88.466
8	374036.888	437801.133	87.969

SURVEY GRID AND LEVELS ARE DEFINED UTILISING THE LEICA SMARTNET GNSS NETWORK.
ONLY MANHOLES FOUND DURING THE SITE SURVEY ARE INDICATED ON THIS PLAN. FURTHER INVESTIGATION MAY BE REQUIRED TO DETERMINE THE FULL EXTENT OF THE SITE DRAINAGE.

ISSUE	REVISION	DATE

Project
WHITEACRE LANE,
WISWELL,
CLITHEROE.

Drawing title
SITE SURVEY.

Scales 1:500 Date 03.06.14.

Drawing number SDL 2096/1. Rev. – Drawn by BJ

CLIENT
REDROW HOMES (LANCASHIRE) LTD.
REDROW HOUSE, 14 EATON AVENUE,
MATRIX OFFICE PARK, BUCKSHAW VILLAGE,
CHORLEY, LANCASHIRE. PR7 7NA.
TEL: 01772 643700.

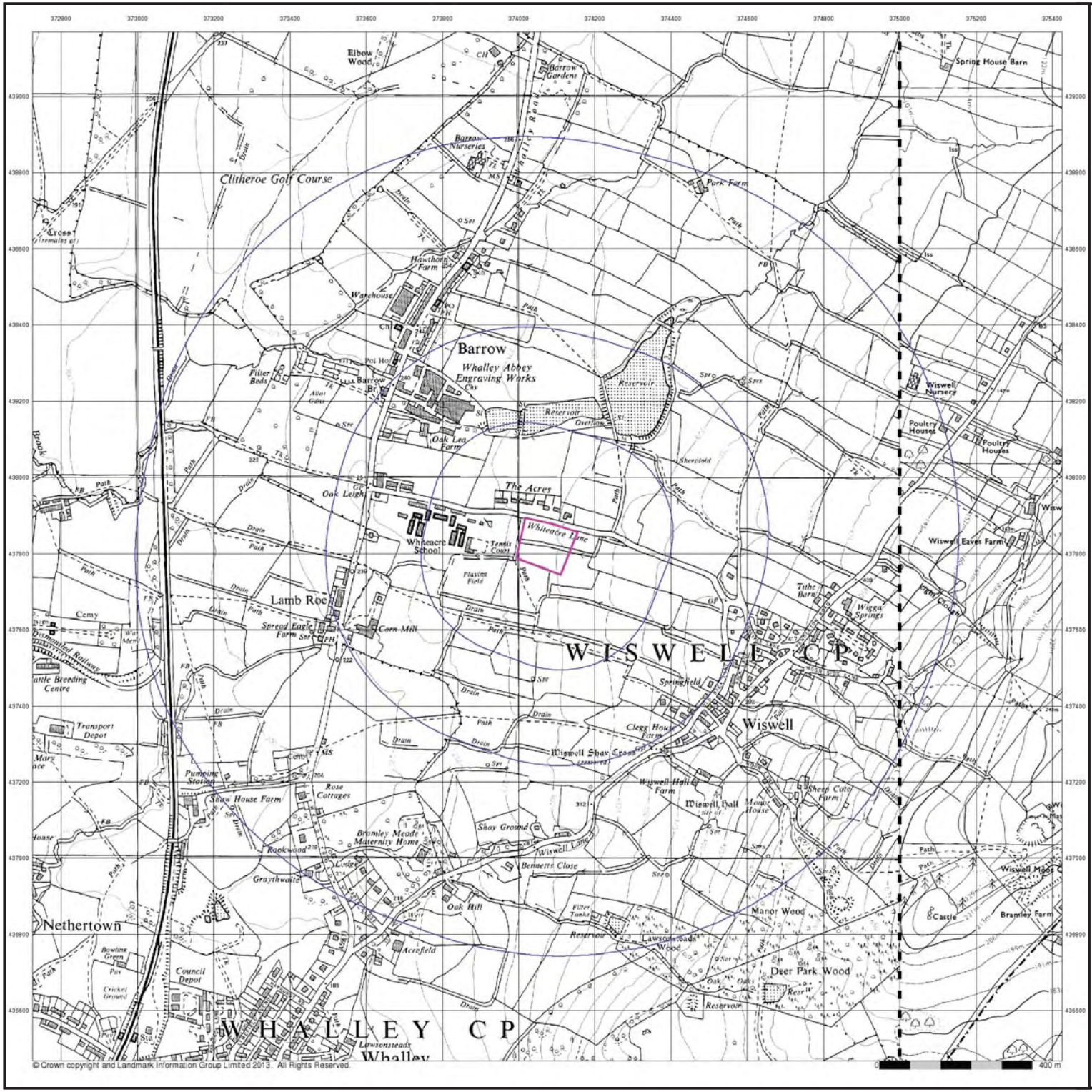
Survey & Design Limited
28 RAILWAY ROAD, LEIGH, LANCS, WN7 4AU
Tel: 01942 673136, Fax: 01942 607054
Email: bryn@surveyanddesign.co.uk
LAND SURVEYING ◦ DESIGN CONSULTANTS
CIVIL ◦ ARCHITECTURAL ◦ PLANNING

APPENDIX 3

HISTORICAL MAPPING

APPENDIX 3A

1970 to 1973



Envirocheck®

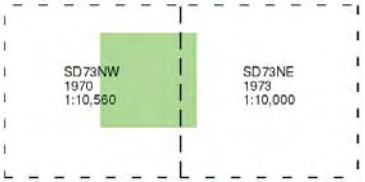
Ordnance Survey Plan

Published 1970 - 1973

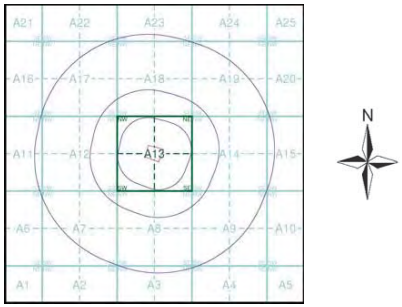
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	56791483_1_1
Customer Ref:	14RED076
National Grid Reference:	374070, 437820
Slice:	A
Site Area (Ha):	1.56
Search Buffer (m):	1000

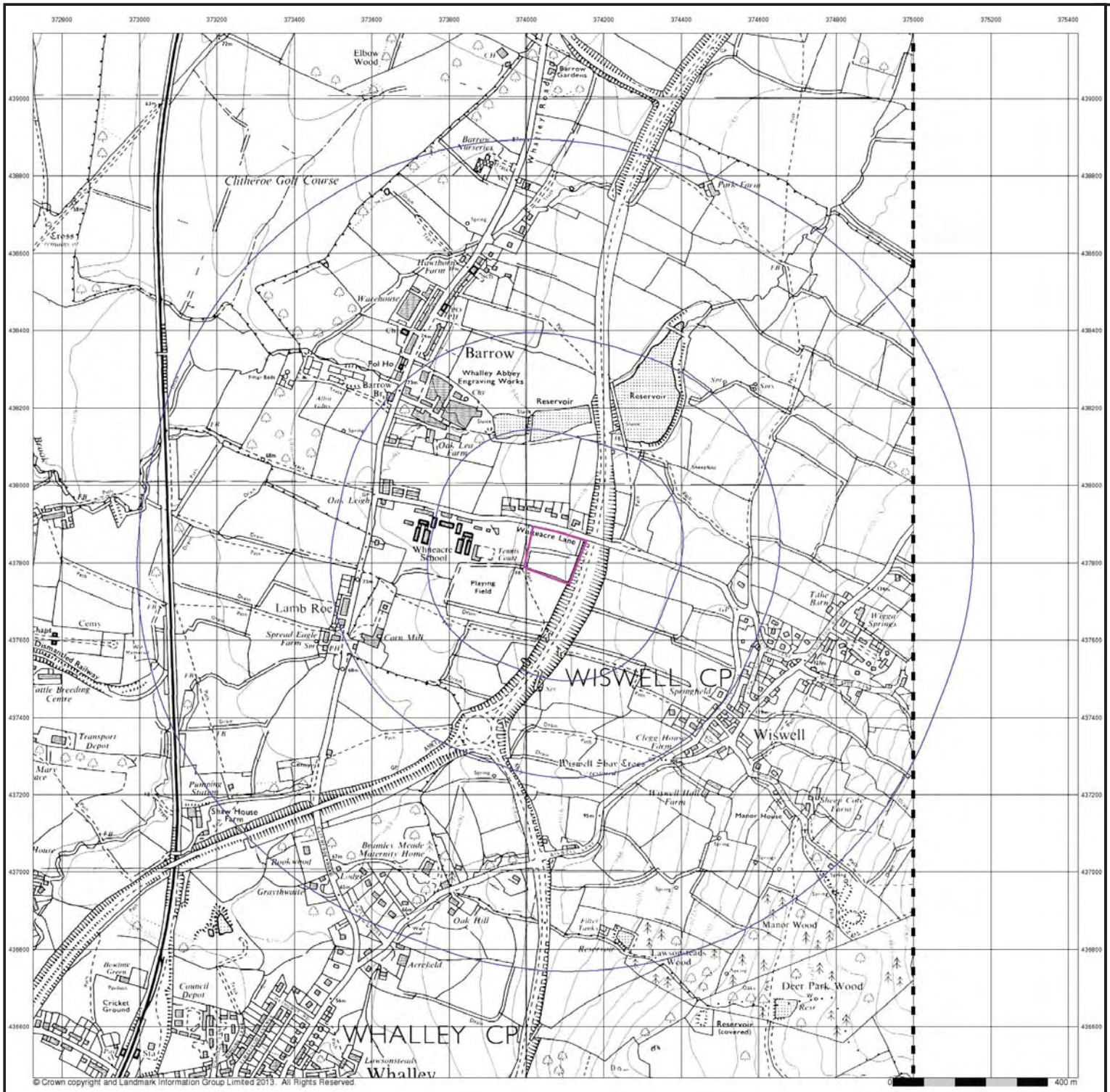
Site Details

Whiteacre Lane, Barrow, CLITHEROE, Lancashire, BB7 9BH

Landmark Information Group
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

APPENDIX 3B

1975



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Ordnance Survey Plan

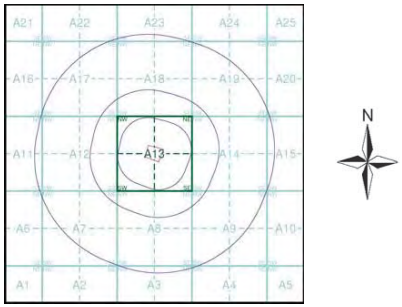
Published 1975

Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

Historical Map - Slice A



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Whiteacre Lane, Barrow, CLITHEROE, Lancashire, BB7 9BH

Landmark® Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

APPENDIX 4

UNITED UTILITIES PUBLIC SEWER RECORDS

United Utilites Water PLC
Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP
DX 715568 Warrington
Telephone 0870 751 0101
Fax Number 0870 7510102
Property.searches@uuplc.co.uk

Your Ref: 5792 5 1
Our Ref: 14/ 1025354
Date: 04/06/2014

Lees Roxburgh Limited
The Genesis Centre
Science Park South
Birchwood
Warrington
WA3 7BH

FAO:

Dear Sirs

Location: WHITEACRE LANE WISWELL BARROW BB7 9BJ

I acknowledge with thanks your request dated 03/06/14 for information on the location of our services.

Please find enclosed plans showing the approximate position of our apparatus known to be in the vicinity of this site.
I attach General Condition Information sheets, which details contact numbers for additional services (i.e. new supplies, connections, diversions) which we are unable to deal with at this office. In addition you should ensure they are made available to anyone carrying out any works which may affect our apparatus.

I trust the above meets with you requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please telephone us on 0870 7510101.

Yours Faithfully,

S McManus.

Sue McManus
Operations Manager
Property Searches

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUW apparatus) of United Utilities Water PLC ("UUW").

TERMS AND CONDITIONS:

1. This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.

2. This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.

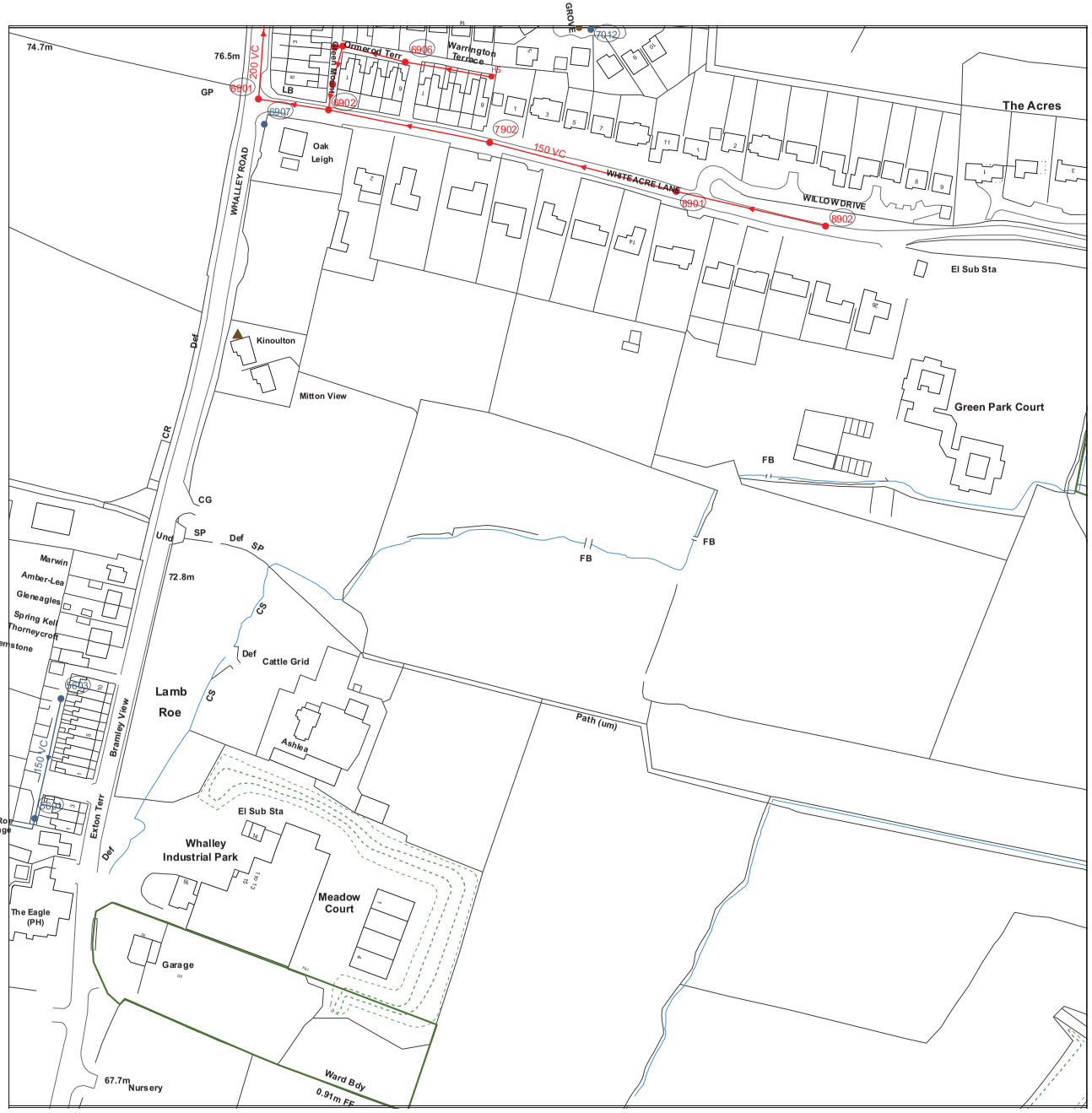
3. In particular, the position and depth of any UUW apparatus shown on the Map are approximate only. UUW strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUW apparatus. The exact location, positions and depths should be obtained by excavation trial holes.

4. The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.

5. The position and depth of UUW apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.

6. This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUW apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.

7. No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUW apparatus by reason of the actual position and/or depths of UUW apparatus being different from those shown on the Map and any information supplied with it.



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5601	69.47	SW	68.42	150		CI	VC	44.79	0
5603		SW	0	150		CI	VC	59.97	56
6901	76.47	CO	74.91	200		CI	VC	10.86	0
6902	76.91	CO	75.26	200		CI	VC	32.79	0
6903		CO	0	150		CI	VC	12.27	7
6904	77.23	CO	75.94	150		CI	VC	18.32	0
6905	77.18	CO	76.13	150		CI	VC	3.94	5
6906	77.69	CO	76.76	150		CI	VC	30.02	0
6907		SW							
7901	78.65	CO	77.42	150		CI	VC	16.16	1
7902	80.8	CO	79.28	150		CI	VC	16.37	1
8902		CO	0	150		CI	VC	71.03	30
7012		SW	0	225		CI	VC	18.94	10
7901		CO	0	150		CI	VC	40.37	50
6801		FO							

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
Oil Interceptor
Penstock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
Dropshaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

Foul Surface Combined Overflow

Screen Chamber
Discharge Point
Outfall

Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available.
The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded.
United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.

OS Sheet No: SD7337NE

Scale: 1: 1250 Date: 04/06/14

15 Nodes

Sheet 1 of 1

Printed By: Donna Camblin

OS Sheet No: SD7337NE

Scale: 1: 1250 Date: 04/06/14

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SEWER RECORDS

Retno Cover Func Invert Size.x Size.y Shape Matl Length Grad Retno Cover Func Invert Size.x Size.y Shape Matl Length Grad

OS Sheet No: SD7437NW

Scale: 1: 1250 Date: 04/06/14

Printed By: Donna Camblin

WASTE WATER SYMBOLOGY

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

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OS Sheet No: SD7437NW
Scale: 1: 1250 Date: 04/06/14
0 Nodes
Sheet 1 of 1

United Utilities
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SEWER RECORDS

APPENDIX 5

EXISTING RUN OFF RATES
ICP SUDs Mean Annual Flood Method

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.450
Area (ha)	1.460	Urban	0.000
SAAR (mm)	1042	Region Number	Region 10

Results l/s

QBAR Rural	10.2
QBAR Urban	10.2
Q1 year	8.9
Q1 year	8.9
Q30 years	17.3
Q100 years	21.2

APPENDIX 6

SURFACE WATER DRAINAGE STRATEGY
Lees Roxburgh Limited Drg.No.5792/01-04

Notes

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE CONSTRUCTION (DESIGN and MANAGEMENT) REGULATIONS 2007.

SURFACE WATER

ATTENUATION

STORAGE BASED ON GREENFIELD RUNOFF RATES AS FOLLOWS:

1in1 Yr 9L/S
1in30 Yr 17L/S
1in100 Yr 21L/S

STORAGE TO BE LOCATED WITHIN PIPE NETWORK UP TO AND INCLUDING THE 1:30 YEAR EVENT.

ADDITIONAL VOLUMES FOR EVENTS UP TO THE 1:100 YEAR + CC EVENT TO BE CONTAINED IN THE OPEN SPACE AREA.

NOTES

ALL SUBJECT TO DETAILED DESIGN

Drainage Key:

- EXISTING SEWER
- PROPOSED ADOPTABLE FOUL SEWER
- PROPOSED ADOPTABLE SURFACE SEWER
- SITE BOUNDARY
- EXISITNG DITCH
- G — ROAD GULLY
- GG — DOUBLE ROAD GULLY
- SURFACE WATER DRAGOUT
- FOUL DRAGOUT
- PROPOSED EASEMENT

Rev	REVISION	By	Date

REDROW HOMES LIMITED
REDROW HOUSE, 14 EATON AVE
MATRIX OFFICE PARK, CHORLEY
LANCASHIRE. PR7 7NA

WHITEACRE LANE
WISWELL, CLITHEROE

SURFACE WATER DRAINAGE STRATEGY

LEES ROXBURGH Consulting Engineers
THE GENESIS CENTRE, SCIENCE PARK SOUTH,
BIRCHWOOD, WARRINGTON, CHESHIRE, WA3 7BH.
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Job No.	Drawing No.	Revision
5792	01-04	-

Scale 1250@A1 Date JUNE 2014

Drawn By	Designed By	Checked By
CB	CB	JEL

DRAWING FILE LOCATION:-