

T19006/18/01

DRAINAGE STRATEGY

**AT
CLITHEROE ROAD, BARROW
(PHASE 3)**



**FOR
REILLY DEVELOPMENT**



ISO 9001
ISO 14001
OHSAS 18001

Certificate Number 14272

REPORT VERIFICATION

| | |
|--------------|----------------------------------|
| Site Address | Clitheroe Road, Barrow (Phase 3) |
|--------------|----------------------------------|

| | |
|--------------------|---|
| Document Reference | T19006/18/01 Drainage Strategy |
| Version | 01 |
| Date released | 22 November 2018 |
| Originator | Dimitrios Pantelakis BEng(Hons) MSc |
| Checked | Matthew Johnson BEng(Hons) |
| Verified | Kieron Hounslow BEng(Hons) CEng MIStructE |

| Issue no | Date | Status | Report version | Issued by |
|----------|----------|--------|----------------|-----------|
| 01 | 22-11-18 | Final | 01 | KDH |
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1.0 BRIEF

1.1 Client Brief

Reilly Developments have appointed Thomas Consulting Ltd to undertake an assessment of existing and proposed drainage arrangements for the proposed residential development at Clitheroe Road, Barrow (Phase 3).

1.2 Limitations

The opinions expressed within this review make use of sourced documentation currently available and information provided by the client. Thomas Consulting have not undertaken any special investigations, including opening up of covered areas or quantitative assessments.

The report utilises current guidance and therefore may require revision to incorporate any future changes in guidance or legislation.



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2.0 LOCATION

2.1 Site Location

The site is located off Clitheroe Road, Barrow, Lancashire. The approximate Ordnance Survey (OS) grid reference for the site is 373700, 437850 and the location of the site is shown on Figure 1.

The area of the site is approximately 0.83 ha.



Figure 1: Site Location Plan

2.2 Site Description

The site is comprised of open fields, located immediately to the east of Clitheroe Road between the villages of Barrow and Whalley, south of Clitheroe in the Ribble Valley, Lancashire.

An examination of the topographical survey indicates that site levels range from approximately 74.7m to 78.9m AOD falling from northeast to southwest. A copy of the topographical survey is contained in Appendix A.



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2.3 Notable Features

The site comprises of land surrounded by residential property on the north and eastern boundaries. Phase 2 forms part of the southern boundary with access road and residential property, while Clitheroe road is located at the western boundary with open land and some trees.

3.0 SITE PROPOSALS

3.1 Proposed Development

A layout has been provided by the client for review.

The site proposals comprise the construction of a new residential development of 9 houses with associated infrastructure.

Site Access will be taken off Clitheroe Road through the Phase 2 development, which lies to the southwest of the site.

A copy of the current site proposals are contained in Appendix A.



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4.0 SURFACE WATER MANAGEMENT PLAN

4.1 Overview

As a statutory consultee of the planning process, Lancashire County Council has sought clarification on the management of surface water run-off from the development and measures to ensure that the risk of flooding is not increased.

This drainage strategy report aims to examine the current site and its context in terms of any existing drainage regimes.

On the basis of this information and paying due regard to any Environmental / Topographical constraints associated with the site, examination of available options for the satisfactory disposal of foul and surface water flows will be investigated.

Based on these investigations a preferred Surface Water Management Plan is to be developed for later detailed design development.



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5.0 EXISTING SITE DRAINAGE ARRANGEMENTS

5.1 Drainage Overview

Copies of the United Utilities sewer records have been obtained for review. Copies of the sewer records are contained in Appendix B.

Detail of any private drainage systems within or adjacent to the site have not been provided for review.

No CCTV sewer survey information has been provided for review.

5.2 Foul Drainage

A review of the existing United Utilities records shows there to be 150mm diameter foul sewer, which is approximately 190m to the south of the site.

This sewer is indicated as being subject to a Section 104 agreement. It is understood that this sewer was constructed by Reilly Developments as part of an earlier development to the south of the site.

5.3 Surface Water Drainage

A review of the existing United Utilities records shows there to be no surface water sewers in the vicinity of the site.

No private surface water drainage has been identified within the site boundary or provided for review.

5.4 Surface Water Management Plan

The basis of this strategy will be to identify a robust and workable drainage solution that can be delivered for the site that is fully compliant with current Planning Policy, Building Regulations and design guidance.



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6.0 FLOOD RISK

6.1 Historic Flooding

Lancashire County Council has reported that the general area of the site experienced flooding over the Christmas period of December 2015. It has been confirmed by the developer that the site was not subject to flooding during this period.

From local knowledge it is understood that the area around Catlow Terrace, in Barrow, was flooded from the effect of Barrow Brook overflowing.

6.3 Culverted Watercourse

Beyond the proposed Phase 3 development and approximately 50m to the south of Phase 1, the open watercourse becomes culverted. From correspondence with the client, the watercourse is approximately 440mm diameter (nominal 450mm). It is also understood that water flows during the Christmas period of 2015 were contained within the banks of the watercourse. No further investigation has been undertaken for this watercourse / culvert.

Flows from the Phase 3 development have been restricted to 5 l/s to minimise the flood risk to the area.

6.4 Existing Flood Risk

The Environment Agency flood risk map for Planning indicates that the site and its surroundings are located within Flood Zone 1 map (low risk) which comprises land as having less than a 1 in 1000-year annual probability of fluvial or tidal flooding – see Figure 2 below.

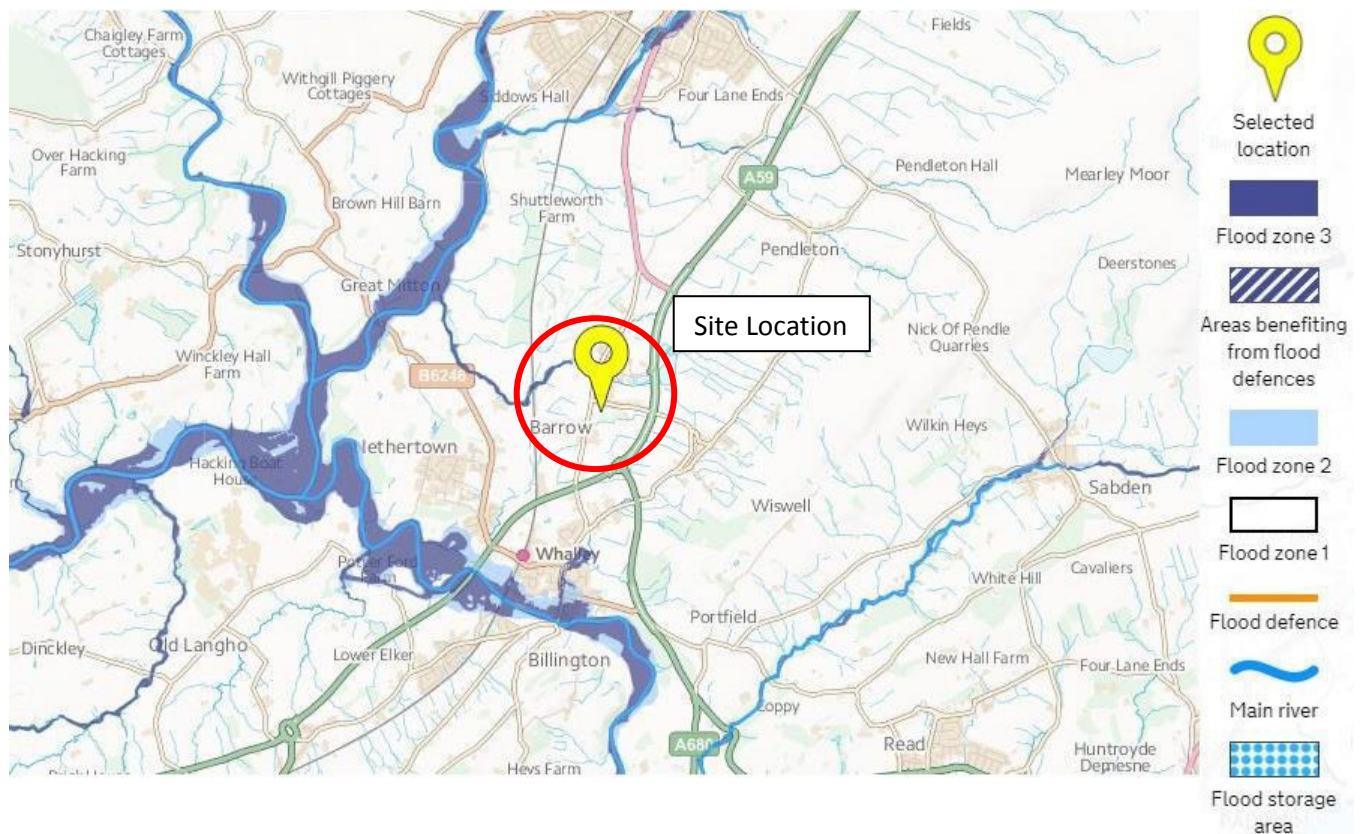


Figure 2 Environment Agency Flood Risk Planning extract



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A check on the Environment Agency’s fluvial (rivers & sea) flood risk mapping indicates that the site is not within an area identified as being at risk.

On the Environment Agency’s pluvial flood risk map (surface water) – see Figure 3 below - is identified as very low risk for surface water flooding.

There is a small area of medium/high risk surface water flooding shown along the south boundary of Phase 3, this is due to a localised low area which will be within the proposed access road. The levels of this area will be changed, and the surface water run-off managed within the proposed drainage system.

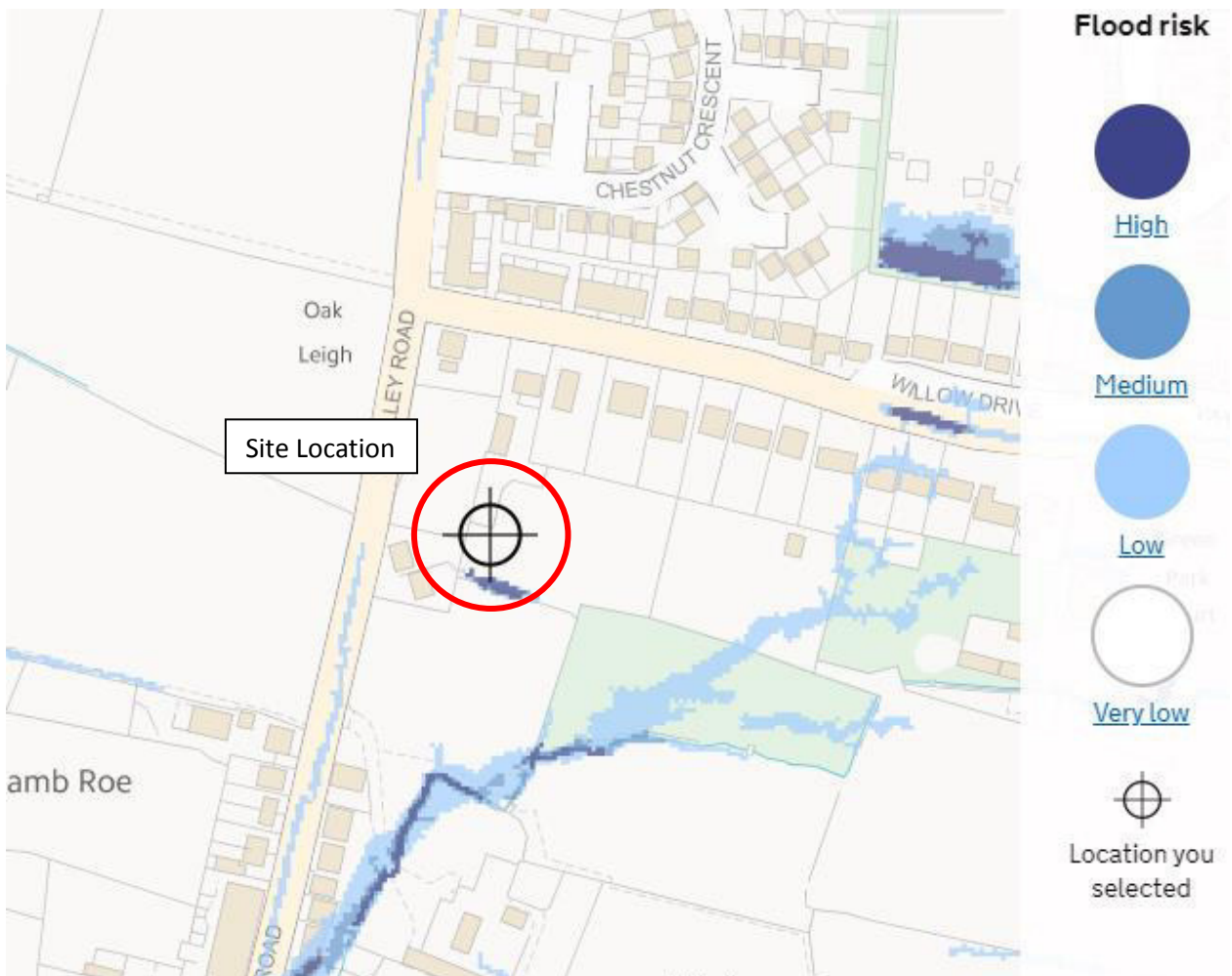


Figure 3 Environment Agency Flood Risk Pluvial Flooding extract



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7.0 PROPOSED DRAINAGE ARRANGEMENTS

7.1 Foul Water Drainage

The proposal for the redevelopment of the site is comprised of 9 residential dwellings together with gardens, driveways, car parking areas and an internal access road.

United Utilities currently utilise the guidance provided by Sewers for Adoption (6th Edition) which indicates that for gravity sewers serving residential developments the design flow is 4000 litres/unit dwelling/24hrs which equates to 0.046 l/unit dwelling/sec, which equates to an average design flow rate of 0.417 l/s.

United Utilities has confirmed that foul drainage can be connected to the existing 150mm diameter foul sewer (MH 5602) located on Clitheroe Road approximately 190m south of the site.

A connection to this sewer is to be provided via the foul drainage system provided for the Phase 2 development. Additional capacity has been provided within this system to receive the additional flows from Phase 3.

A preliminary design has been undertaken for the foul sewer. A copy of the proposal is contained in Appendix C.

7.2 Proposed Surface Water Drainage Arrangements

A review of the existing United Utilities records shows there to be no surface water sewers in the vicinity of the site.

The current site area is 0.83ha of which 100% constitutes as green field. The development proposal is comprised of 53% (0.44ha) of landscaped permeable area and 47% (0.39ha) of impermeable surfaces. Hence, the development proposals for the site will result in a significant increase in impermeable area and therefore an increase in the peak surface water run-off rates and volume from the site.

The National Planning Policy Framework requires sites to be developed so as not to increase the potential for flooding from surface water run-off. Surface water run-off should be no greater post – development when compared to the pre- development scenario. Consequently surface water run-off should be limited to green field run-off rates.

Building Regulations requires consideration to be given to the following hierarchy for the disposal of surface water run-off as follows

- i. Infiltration to ground via soakway
- ii. Discharge to river / watercourse
- iii. To surface water sewer.

An examination of the available BGS data would indicate that the site is unlikely to prove suitable for the installation of infiltration type drainage solutions such as soakaways or other infiltration systems.

7.3 Green-Field Run-Off

An estimate of the mean annual greenfield runoff rate (Q_{bar}) can be arrived at through estimation methods contained within IH 124. For site areas below 50 Hectares, it is recommended to calculate the value for 50 hectares and pro-rata this down to the actual site area.



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Utilising XP Solutions Source Control application, the Qbar value for a site of 50 Ha is 295.4 l/s see figure 4 below. Pro-rata for a 0.83Ha site this equates to 4.9 l/s.

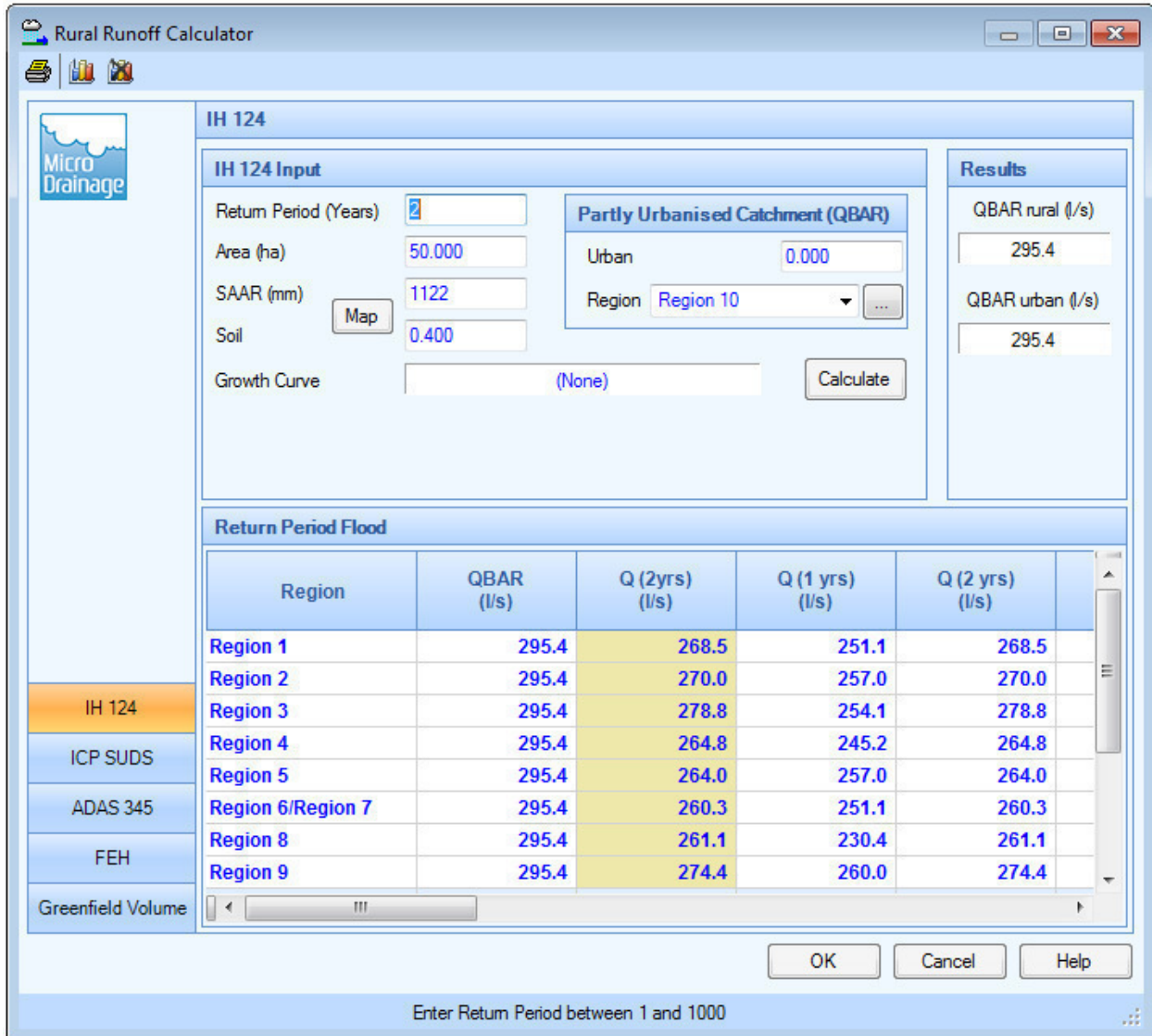


Fig 4: XP Solutions’ Source Control Green-Field Run-Off Estimate

Surface water run-off from the site, should be discharged to a river or watercourse at 5l/s or Qbar, whichever is the greater. Surface water run-off from the site is to be discharged at a rate of 5.0l/s pending agreement with the lead local flood officer.

A connection of the surface water into the watercourse to the south of phase 2 development is proposed. The connection from Phase 3 site to the discharge will be via a separate surface water system.

With surface water discharge rates being restricted, attenuation will need to be provided to cater for storms with return periods up to and including the 1 in 100 year plus 40% climate change.

Sewers for Adoption – 6th Edition requires below ground attenuation be provided to cater for storms with return periods up to the 1 in 30 year event.



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For rainfall events in excess of the 1 in 30 year event, NPPF requires surface water to be contained within the site for storms with return periods up to the 1 in 100 year event plus 30% climate change. This additional attenuation may be provided above ground subject to the flood risk not being increased off the site. Where this is not practicable, due to site constraints, consideration should be given to increasing the below ground attenuation accordingly.

7.4 Surface Water Attenuation Volume

An estimation of the 1 in 100 year + 40% CC, has been calculated using XP Solutions' Source Control "Quick Storage Estimate". Results for the attenuation volumes are indicated below:

The screenshot shows the 'Quick Storage Estimate' window with the following variables and values:

| Variable | Value |
|-----------------------------------|-------------------|
| FSR Rainfall | England and Wales |
| Return Period (years) | 100 |
| Region | England and Wales |
| M5-60 (mm) | 20.000 |
| Ratio R | 0.300 |
| Cv (Summer) | 0.750 |
| Cv (Winter) | 0.840 |
| Impermeable Area (ha) | 0.390 |
| Maximum Allowable Discharge (l/s) | 5.0 |
| Infiltration Coefficient (m/hr) | 0.00000 |
| Safety Factor | 2.0 |
| Climate Change (%) | 40 |

Buttons: Analyse, OK, Cancel, Help

Footer: Enter Maximum Allowable Discharge between 0.0 and 999999.0

Figure 5: Quick Storage Estimate Variables



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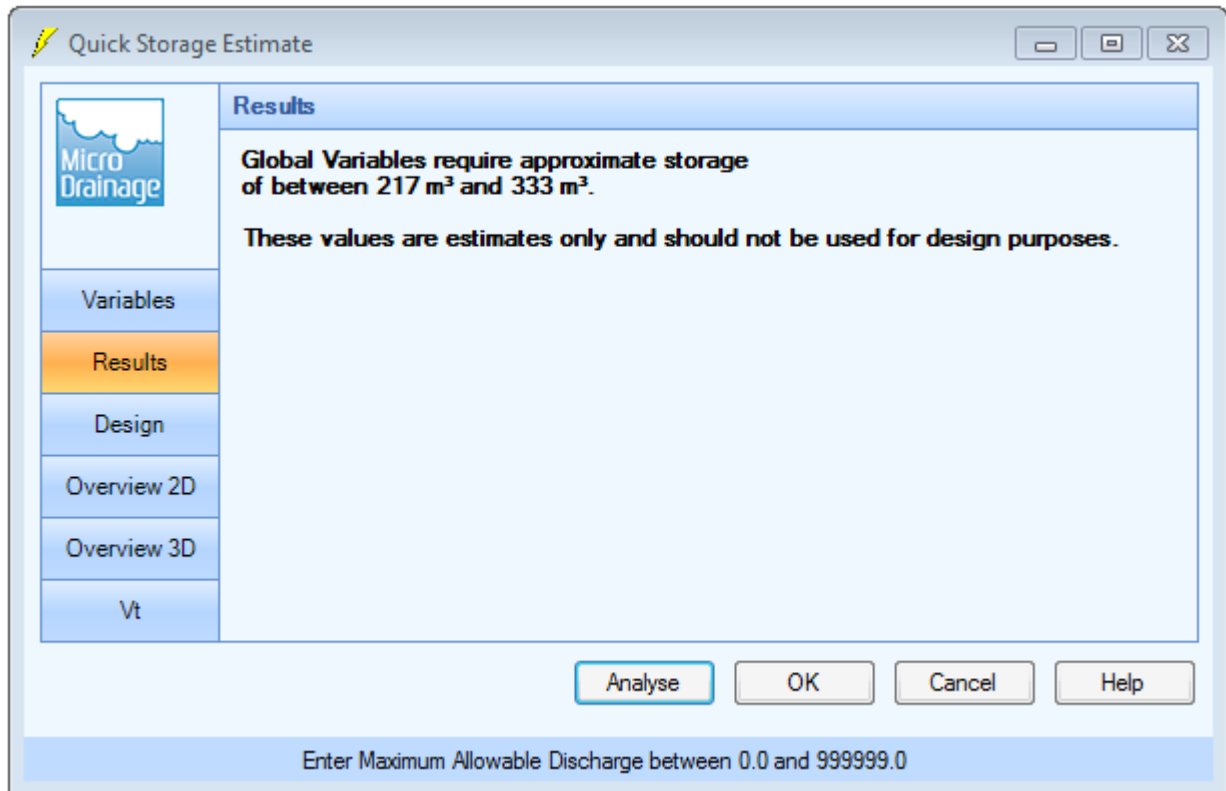


Figure 6: Quick Storage Estimate Attenuation Volumes

The volume of surface water attenuation required should be considered as in the region of 275m³, until detailed designs are undertaken.

An area in the west of the site has been set aside for the potential location for a tank for surface water attenuation. Levels in this area are in the region of 74.8 to 75.5.

A sketch layout for the surface water drainage proposals is contained in Appendix C.



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8.0 RESIDUAL FLOOD RISK

8.1 Development Proposals

The development proposals are not currently located within areas identified by the Environment Agency as being at risk of flooding for planning purposes.

Based on being able to satisfactorily deal with surface water flows from the site it is considered that the development proposals do not affect upon the current flood risk areas or increase flood risk off site.

This report does not constitute a formal flood risk assessment.



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9.0 CONCLUSIONS

9.1 Foul Water Drainage

United Utilities has confirmed that foul drainage can be discharged to the existing Section 104 sewer at manhole MH 5602 via the proposed foul drainage system to be installed as part of the Phase 2 works.

Connections will be subject to approval with United Utilities at detailed design stage.

9.2 Surface Water Drainage

Surface water is to be attenuated and discharged to the water course currently located along the south boundary of Phase 2. The discharge is to pass through phase 2 in a new drainage run and will not increase the flow from Phase 1 and 2.

By restricting discharge rates to 5 l/s for flows up to an including the 100-year return period plus an allowance of 40% for climate change event, the development proposals do not represent an increase in flood risk.

The principles set out in this report should form the basis for the detailed design for the management of surface water run-off from the scheme.

Subject to the above, the development proposals should be considered satisfactory in respect of flood risk.

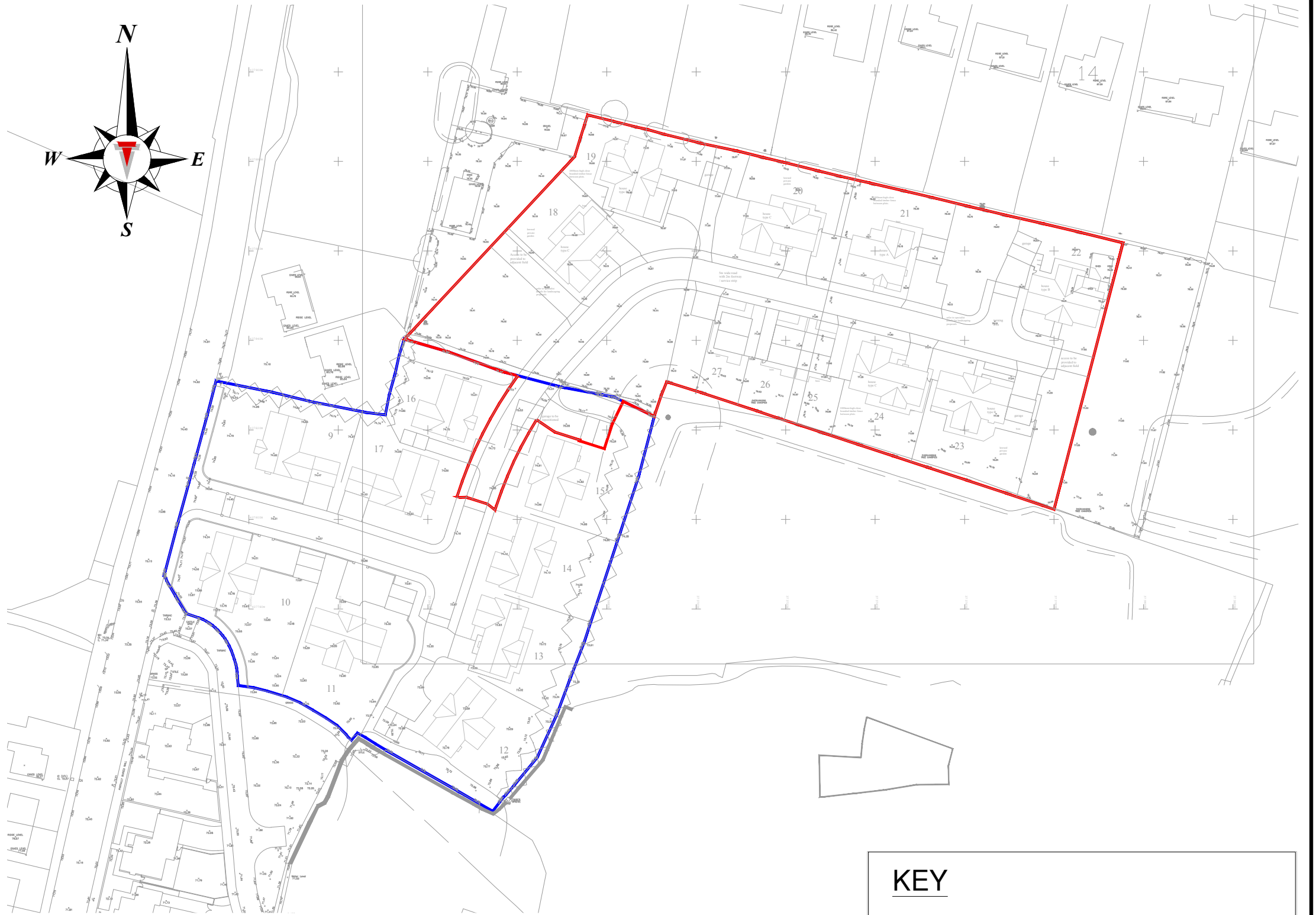


APPENDIX A

Existing and Proposed Layouts

GENERAL NOTES:

1. Before construction commences, the setting out Engineer shall ensure that all setting out information is mutually compatible with all the drawings and documents provided by the designers. Where information is apparently contradictory or ambiguous, the design Engineer and/or the Architect is to be informed immediately. Thomas Consulting will accept no liability for setting out errors where work is constructed to incorrect information.
2. All drawings and documents are to be read in conjunction with one another, are mutually compatible and shall be read as such. All documents shall be checked to ensure that they are compatible by the contractor before construction commences. In the event of apparent ambiguity or contradiction the engineer and/or architect shall be notified immediately. Thomas Consulting accept no liability in the event of not being so notified and where construction work has commenced.
3. In accordance with CDM regulations 2015 this drawing has been prepared with due attention to identifying any unusual design hazards that may exist. Unusual design hazards are hazards that a reasonably competent contractor, experienced in this type of work may not be expected to identify. In dealing with unusual design hazards we have adopted the "ERIC" principle and where possible eliminated (E) the hazard at design stage, if it has not been possible to eliminate the hazard we have endeavoured to reduce (R) it. Where it has not been possible to eliminate these hazards, the hazard is noted on the drawing with appropriate information (I) in order that the hazard can be controlled (C) during construction. It is the contractor's responsibility to fully acquaint themselves with all construction drawings before commencing construction and if in doubt about any matter to ask for clarification from the designer.
4. All drawings issued electronically for this scheme are provided for the sole purpose of assisting the design, procurement or construction of the structures for which Thomas Consulting have been appointed as Design Engineers/Consultants. They may not be used for any other purpose, nor may they be amended, copied, redistributed or issued to third parties without the written agreement of Thomas Consulting. All drawings remain under copyright to, and the intellectual property of, Thomas Consulting. Upon completion of the project, all drawings are to be deleted from your computer systems and all other electronic copies destroyed. Where electronic copies of final drawings are to be issued, these will be provided in a digital only format by Thomas Consulting (no other copies may be retained). By opening and using this drawing, it is assumed that you agree to abide by these Terms and Conditions.
5. Unless expressly agreed with a director of Thomas Consulting Ltd, for the purposes of the CDM regulations 2015 Thomas Consulting are not the Principal Designer. The client has been advised that they are required to appoint a Principal Designer. For further information see <http://www.hse.gov.uk/>.



| IN ADDITION TO THE HAZARDS/RISKS ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, PLEASE NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS: | |
|--|-----------------------|
| ITEM | HAZARD IDENTIFICATION |
| 1 | HAZARD DESCRIPTION... |

Site Address: Clitheroe Rd,
Clitheroe,
BB7 9AL,
Grid Reference: X 373700 Y 437850
(SD 73700 37850)

| KEY | |
|-----|-----------------------|
| | Phase 2 Site Boundary |
| | Phase 3 Site Boundary |

| | |
|-----------|----------------------------------|
| A3 | DO NOT SCALE THIS DRAWING |
| NOTES | |

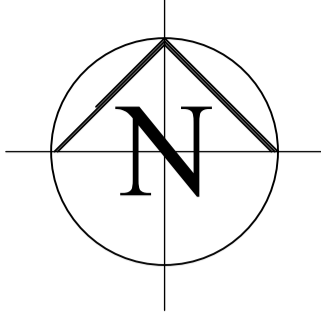
| REVISIONS | | | | |
|-----------|------|-------------|----------|------------|
| REV | DATE | DESCRIPTION | DRAWN BY | CHECKED BY |
| | | | | |

Thomas Consulting
CIVIL, STRUCTURAL, GEOTECHNICAL AND
CONTAMINATION ENGINEERS

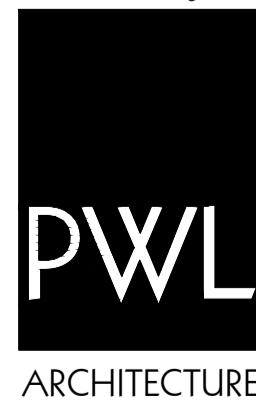
32 EATON AVENUE, MATRIX PARK,
BUCKSHAW VILLAGE, CHORLEY, PR7 7NA.

Tel: 01772 299040
Fax: 01772 457860

| | | | | |
|--------------------------------------|--|--|-------------------|-------------------|
| CLIENT: Reilly Developments Ltd | PROJECT: Clitheroe Road, Barrow (Phase 3) | DRAWING TITLE: Location Plan | | |
| DATE CREATED: 22.11.2018 | DRAWING SCALE: 1:1000 | DRAWN BY: DP | CHECKED BY: MJ | QC CATEGORY: - |
| DRAWING STATUS: PRELIMINARY ISSUE | | DRAWING REF: TC / T19006 / 18 / 001 | | REV: - |



Rev C: Site Plan updated 3-10-18
 Rev B: Site Plan updated 3-10-18
 Rev A: Parking revised 1-8-18



31 Chapel Brow Leyland Preston PR25 3NH
 Tel 01772 467404 E-Mail info@pwlarchitecture.com

Title
Proposed Site Layout

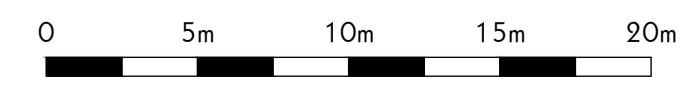
Project
Proposed Development at Clitheroe Road, Barrow Phase 3

Scale
1:250@A1

Date
May 2018

Drawn
CTA

Drwg No
1218-PL03C



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Thomas Consulting



APPENDIX B
Sewer Records

Thomas Consulting

**32 Eaton Avenue
Matrix Park, Buckshaw Village
Chorley
PR7 7NA**

FAO: John Moxham

Dear Sirs

Location: KINOULTON WHALLEY ROAD BARROW CLITHEROE BB7 9BN

I acknowledge with thanks your request dated 22/11/16 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.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read our access statement before you start work to check how it will affect our network.

<http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your 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 0370 7510101.

Yours Faithfully,



Amanda Simmonds
Property Searches Manager

United Utilities Water Limited

Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP
DX 715568 Warrington
Telephone 0370 751 0101

Property.searches@uuplc.co.uk

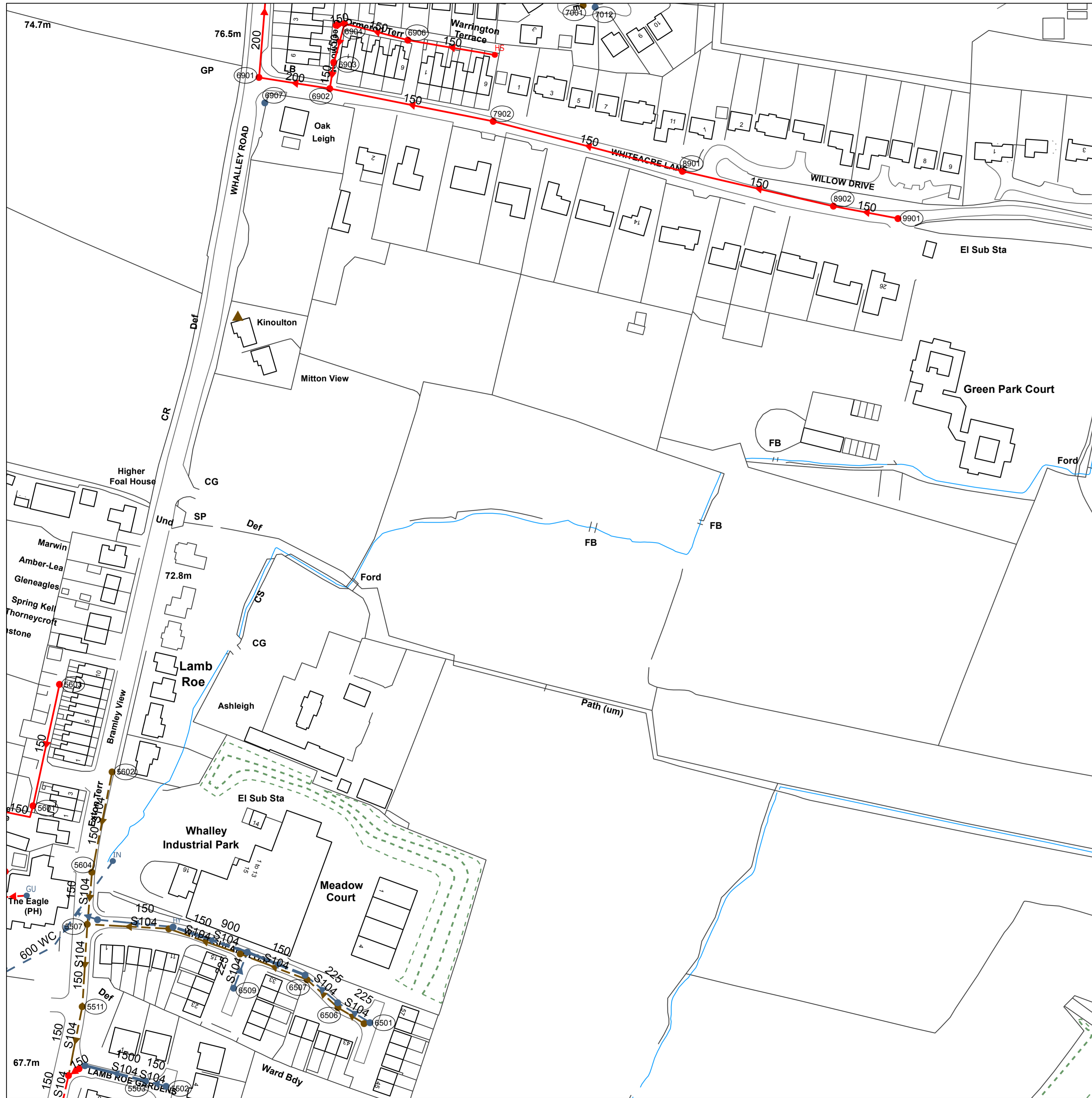
Your Ref: P5977
Our Ref: 16/ 1251258
Date: 23/11/2016

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) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

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 UUWL apparatus shown on the Map are approximate only and given in accordance with the best information available. The nature of the relevant system and/or its actual position may be different from that shown on the plan and UUWL is not liable for any damage caused by incorrect information provided save as stated in section 199 of the Water Industry Act 1991. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL 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 UUWL 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 UUWL 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 UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
8. If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
9. This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



| Reho | Cover | Func | Invert | Size | Size y | Shape | Mat | Length | Grad |
|------|-------|------|--------|------|--------|-------|-------|--------|------|
| 5502 | 68.8 | SW | | | | | | | |
| 5503 | 68.63 | SW | | | | | | | |
| 5504 | 67.75 | SW | | | | | | | |
| 5505 | 67.71 | CO | | | | | | | |
| 5506 | 67.7 | CO | | | | | | | |
| 5507 | 68.53 | FO | | | | | | | |
| 5508 | 70.78 | SW | | | | | | | |
| 5509 | 68.97 | SW | | | | | | | |
| 5510 | 70.73 | FO | | | | | | | |
| 5511 | 69.3 | FO | 66.25 | 150 | CI | VC | 32.25 | 23 | |
| 5601 | 69.47 | CO | 68.42 | 150 | CI | VC | 44.79 | 35 | |
| 5602 | 69.84 | FO | 68 | 150 | CI | VC | 47 | | |
| 5603 | 68.88 | FO | 0 | 150 | CI | VC | 56.97 | 149 | |
| 5604 | 68.88 | FO | 66.66 | 150 | CI | VC | 23.88 | | |
| 5601 | 73.45 | SW | 71.88 | 225 | CI | VC | 17.37 | 51 | |
| 5602 | 73.04 | SW | | | | | | | |
| 5603 | 72.53 | SW | | | | | | | |
| 5604 | 71.8 | SW | | | | | | | |
| 5605 | 73.35 | FO | 71.6 | 150 | CI | VC | 14 | 50 | |
| 5606 | 73.06 | FO | 70.94 | 150 | CI | VC | 32.82 | 90 | |
| 5607 | 72.58 | FO | | | | | | | |
| 5608 | 71.74 | FO | 70.13 | 225 | CI | VC | 17.57 | 80 | |
| 5609 | 71.94 | SW | | | | | | | |
| 5601 | 76.47 | CO | | | | | | | |
| 5602 | 76.91 | CO | | | | | | | |
| 5603 | 0 | 150 | CI | VC | 12.27 | | | | |
| 5604 | 77.23 | CO | 75.94 | 150 | CI | VC | 18.32 | | |
| 5605 | 77.18 | CO | | | | | | | |
| 5606 | 77.69 | CO | | | | | | | |
| 5607 | 77.69 | SW | | | | | | | |
| 7902 | 78.65 | CO | | | | | | | |
| 8901 | 89.6 | CO | | | | | | | |
| 8902 | 0 | 150 | CI | VC | 30.11 | | | | |
| 9901 | 0 | 225 | CI | VC | 18.34 | | | | |
| 5501 | 0 | 150 | CI | VC | 40.37 | | | | |
| 7901 | 0 | 150 | CI | VC | 40.37 | | | | |
| 5512 | 0 | 150 | CI | VC | 40.37 | | | | |
| 5501 | 0 | 150 | CI | VC | 40.37 | | | | |
| 5605 | 0 | 800 | CI | UN | 76.85 | | | | |

WASTE WATER SYMBOLOGY

| | | | | |
|--|--|--|--|--|
| | | | | |
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ABANDONED PIPE

- MainSewer
- Rising Main
- Highway Drain
- Sludge Main

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

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

SEWER MATERIAL

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

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.
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APPENDIX C

Proposed Drainage Layouts

GENERAL NOTES:

- Before construction commences, the setting out Engineer shall ensure that all setting out information is mutually compatible with all the drawings and documents provided by the designers. Where information is apparently contradictory or ambiguous, the design Engineer and/or the Architect is to be informed immediately. Thomas Consulting will accept no liability for setting out errors where work is constructed to incorrect information.
- All drawings and documents are to be read in conjunction with one another, are mutually compatible and shall be read as such. All documents shall be checked to ensure that they are compatible by the contractor before construction commences. In the event of apparent ambiguity or contradiction the engineer and/or architect shall be notified immediately. Thomas Consulting accept no liability in the event of not being so notified and where construction work has commenced.
- In accordance with CDM regulations 2015 this drawing has been prepared with due attention to identifying any unusual design hazards that may exist. Unusual design hazards are hazards that a reasonably competent contractor, experienced in this type of work may not be expected to identify. In dealing with unusual design hazards we have adopted the 'ERIC' principle and where possible eliminated (E) the hazard at design stage, if it has not been possible to eliminate the hazard we have endeavoured to reduce (R) it. Where it has not been possible to eliminate these hazards, the hazard is noted on the drawing with appropriate information (I) in order that the hazard can be controlled (C) during construction. It is the contractor's responsibility to fully acquaint themselves with all construction drawings before commencing construction and if in doubt about any matter to ask for clarification from the designer.
- All drawings issued electronically for this scheme are provided for the sole purpose of assisting the design, procurement or construction of the structures for which Thomas Consulting have been appointed as Design Engineers/Consultants. They may not be used for any other purpose, nor may they be amended, copied, redistributed or issued to third parties without the written agreement of Thomas Consulting. All drawings remain under copyright to, and the intellectual property of, Thomas Consulting. Upon completion of the project, all drawings are to be deleted from your computer systems and all other electronic copies destroyed. Where electronic copies of final drawings are to be issued, these will be provided in a digital only format by Thomas Consulting (no other copies may be retained). By opening and using this drawing, it is assumed that you agree to abide by these Terms and Conditions.
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IN ADDITION TO THE HAZARDS/RISKS ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, PLEASE NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS:

| ITEM | HAZARD IDENTIFICATION |
|------|-----------------------|
| 1 | HAZARD DESCRIPTION... |

REVISIONS

| REV | DATE | DESCRIPTION | DRAWN BY | CHECKED BY |
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DRAWING STATUS: PRELIMINARY ISSUE

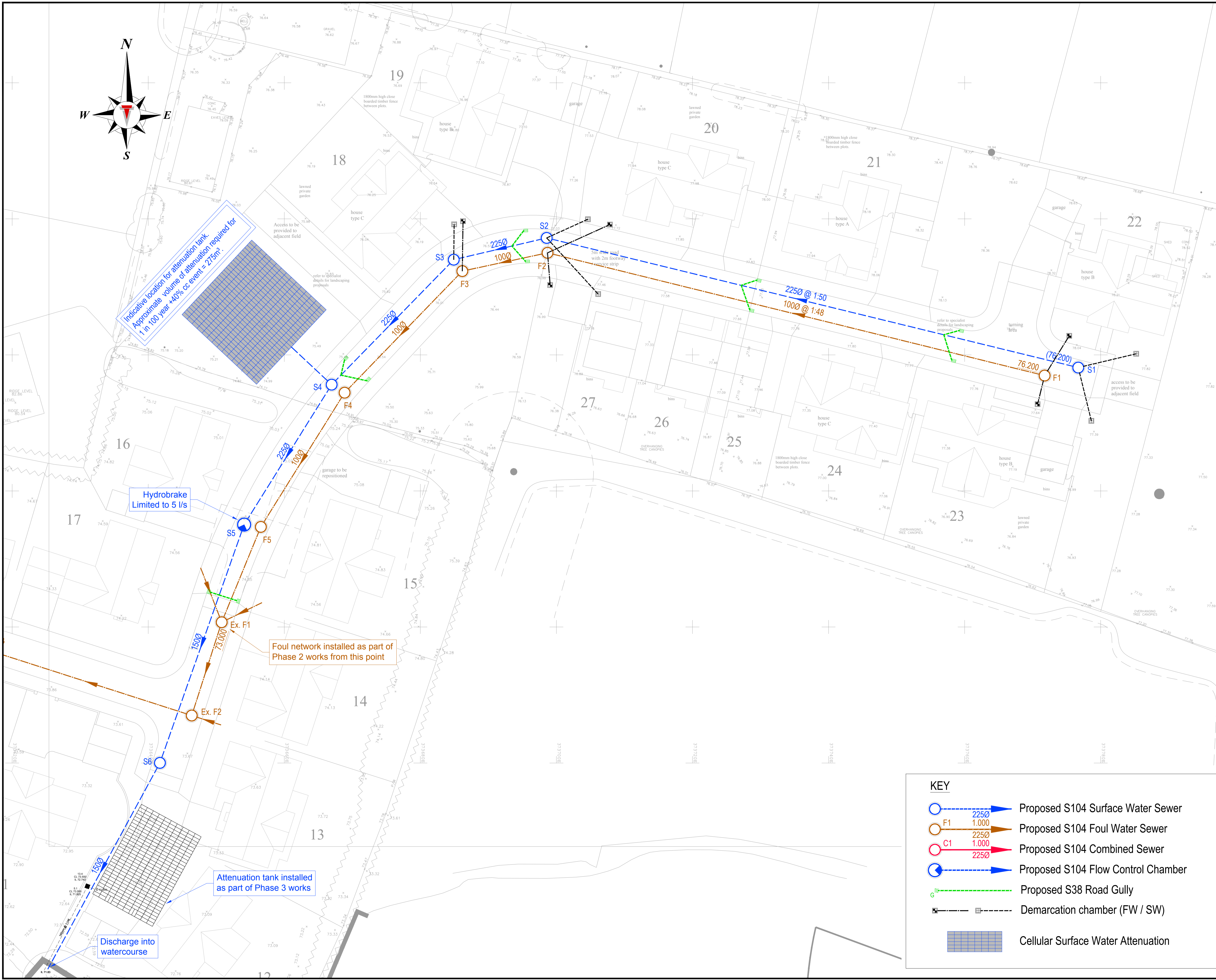
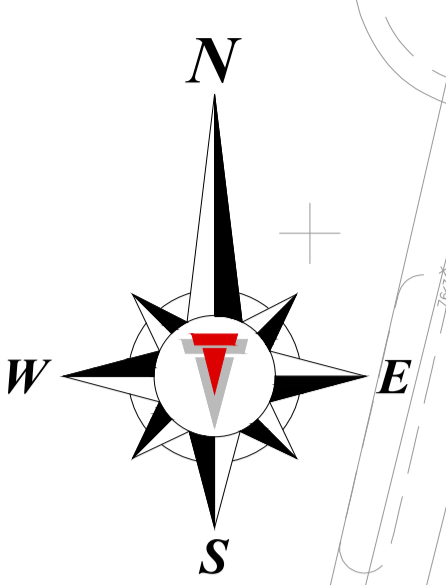
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 Offices in Chorley, Lancaster, Shrewsbury & Workington

CLIENT: Reilly Developments Ltd

PROJECT: Clitheroe Road, Barrow (Phase 3)

DRAWING TITLE: Indicative Drainage Layout

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| DATE CREATED: 22.11.2018 | DRAWING SCALE: 1:250 | DRAWN BY: DP | CHECKED BY: MJ | QC CATEGORY: - |
| DRAWING REF: TC / T19006 / 18 / 002 | REV: - | | | |



KEY

- 225Ø Proposed S104 Surface Water Sewer
- F1 1.000 Proposed S104 Foul Water Sewer
- C1 1.000 Proposed S104 Combined Sewer
- 225Ø Proposed S104 Flow Control Chamber
- G Proposed S38 Road Gully
- Demarcation chamber (FW / SW)
- Cellular Surface Water Attenuation

Indicative location for attenuation tank.
 Approximate volume of attenuation required for 1 in 100 year +40% cc event = 225m³.

Hydrobrake Limited to 5 l/s

Foul network installed as part of Phase 2 works from this point

Attenuation tank installed as part of Phase 3 works

Discharge into watercourse