

Land adjacent to Rhosddu Industrial Estate, Wrexham

Flood Consequences Assessment and Drainage Strategy

March 2015



DOCUMENT VERIFICATION RECORD

**CLIENT:**

D S Holmes Builders Ltd.

SCHEME:

Flood Consequences Assessment and Drainage Strategy for a development at land adjacent to Rhosddu Industrial Estate, Wrexham, LL11 4RL. The purpose of this report is to support the Planning Application.

INSTRUCTION:

The instruction to carry out this Flood Consequences Assessment was received from Mr Haydn Jones of D S Holmes Builders Ltd.

REPORT FORMAT:

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

ISSUE HISTORY:

Issue Date	Comment
10/03/2015	First issue

DOCUMENT REVIEW & APPROVAL

Prepared by Angharad Llewelyn BSc (Hons) MSc

Reviewed by Jordan Jones BSc (Hons)

Approved by Aled Williams BSc (Hons)

Waterco Document Reference Number.....w1762-150310-FCA and Drainage Strategy

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Supporting Documents:

Welsh Government Technical Advice Note (TAN) 15: Development and Flood Risk (2004)
Wrexham County Borough Council Preliminary Flood Risk Assessment (June 2011)

Abbreviations

AEP	<i>Annual Exceedance Probability</i>
CCA	<i>Climate Change Allowance</i>
DCWW	<i>Dwr Cymru Welsh Water</i>
EA	<i>Environment Agency</i>
FCA	<i>Flood Consequences Assessment</i>
LiDAR	<i>Light Detection and Ranging</i>
m AOD	<i>metres Above Ordnance Datum</i>
NRW	<i>Natural Resources Wales</i>
PFRA	<i>Preliminary Flood Risk Assessment</i>
SuDS	<i>Sustainable Drainage Systems</i>
TAN15	<i>Welsh Government Technical Advice Note 15: Development & Flood Risk</i>
WCBC	<i>Wrexham County Borough Council</i>

1 Introduction

- 1.1 Waterco Consultants have been instructed to prepare a Flood Consequences Assessment (FCA) and Drainage Strategy report in respect of a proposed residential development at land adjacent to Rhosddu Industrial Estate, Wrexham, LL11 4RL (grid reference: 332877E 352772N). A location plan, aerial image and photographs of the site are included in Appendix A.
- 1.2 The site covers an area of approximately 1.911ha and is bordered by residential properties to the north, the B5425 (Main Road) to the east, Rhosddu Industrial Estate and residential properties to the south and agricultural land to the west. The existing site comprises of agricultural land.
- 1.3 The proposed development is for 50 dwellings with associated access road, parking and amenity areas. Site levels range from a high of 90.60m AOD in the north to a low of 86m AOD in the west. A Topographical Survey and an Indicative Site Plan are included in Appendix B.

2 Flood Zone Category and TAN15 Review

- 2.1 The Welsh Government Development Advice Map included in Appendix C shows that the site is located within Flood Zone A – an area considered to be at little or no risk of fluvial or tidal flooding, with a less than 1 in 1000 (0.1%) annual probability of occurrence.
- 2.2 The EA Flood Map (Appendix C) shows that the site is located within Flood Zone 1 – an area considered to have the lowest probability of fluvial flooding with a less than 0.1% annual probability of occurrence.
- 2.3 The proposed residential development is considered ‘highly vulnerable’ development in accordance with Figure 2 of the Welsh Government's Technical Advice Note 15 - Development and Flood Risk (TAN15).
- 2.4 TAN 15 states that highly vulnerable development can be located in Flood Zone A subject to demonstrating that development will not increase flood risk elsewhere.

3 Scope of Site Specific Flood Consequences Assessment

- 3.1 The potential sources of flooding considered in the following sections are: Fluvial - from rivers and streams; Tidal; Pluvial – from rainfall on the surface; Rising Groundwater; Overwhelmed Sewers and Drainage Systems; Reservoirs, Canals, Lakes and Artificial sources.
- 3.2 An Envirocheck Flood Screening Report (Appendix D) has been obtained to inform the assessment. Historical research has also been undertaken and the Wrexham County Borough Council PFRA (June 2011) has been reviewed for site specific information.

4 Potential Sources of Flooding and Probability

Fluvial & Tidal

- 4.1 The site is located in the River Dee catchment. The nearest major watercourse is the River Alyn which is located approximately 560m north-east of the site. The River Alyn flows north-east in this location to its confluence with the River Dee, approximately 7.6km north-east of the site. There are no other major watercourses in the immediate vicinity of the site.
- 4.2 As shown on the Envirocheck 'Detailed River Network Map' (Appendix D) there is a land drain located at the southern boundary of the site. This land drain is classified as an offline drainage feature and drains into a pond approximately 125m south-west of the site. The pond drains via infiltration and has no formal discharge to the wider river network. The land drain is shown in photograph 2 in Appendix A. The pond is shown in photograph 3.
- 4.3 The PFRA contains no records of fluvial flooding at or near to the site. The site is situated at a minimum of 86m AOD and is approximately 41m above the River Alyn. Any potential flooding of this watercourse would therefore not affect the site. The site is located in Flood Zone 1 on the EA flood map and is therefore considered to be at low risk of fluvial flooding.
- 4.4 The site is situated at a low of 86m AOD and is significantly above sea level. Therefore there is no risk of tidal flooding.

Pluvial flooding

- 4.5 This is defined as local flooding in areas not normally associated with natural or manmade watercourses, which result from rainfall-generated overland flow before the run-off enters any watercourse or sewer. It is usually associated with high intensity rainfall events, but can also

occur with lower intensity rainfall or melting snow, where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Pluvial flooding is unpredictable to the extent that the localised heavy rainfall can occur anywhere without any warning. However, flow paths and depths can be determined by consideration of contours and relative levels.

- 4.6 The Envirocheck report (Appendix D) shows that the majority of the site is not at risk from pluvial flooding during all events up to and including the 1 in 100 year event. A small extent of the site near to the western boundary is shown at risk during the 1 in 75 and 1 in 100 year events. Approximately 30% of the site is shown at risk during the extreme 1 in 1000 year event. The flood extent is constrained to the lower, western extent of the site.
- 4.7 The EA 'Surface Water Flood' map included in Appendix C shows that the majority of the site is at very low risk of surface water flooding. A minimal extent of the site in the location of the dismantled railway to the north is shown at low to medium risk. As shown on the Topographical Survey (Appendix B), the dismantled railway is at a topographical low point.
- 4.8 Any potential surface water flooding arising at the site would be directed south-west, away from the site, following the local topography. It can therefore be concluded that the risk of pluvial flooding is low for the majority of the site.

Groundwater flooding

- 4.9 Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.
- 4.10 The Envirocheck report shows that the majority of the site is within an area with limited potential for groundwater flooding to occur. The western extent of the site is within an area with potential for groundwater flooding of property situated below ground level.
- 4.11 The PFRA states that 'there were no records of past groundwater flooding within Wrexham County Borough Council (WCBC)' due to the topography and geology of the area. It can therefore be concluded that the risk of groundwater flooding is low.

Sewer flooding

- 4.12 Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged or is of inadequate capacity. This is mostly applicable to combined and surface water sewers.

- 4.13 The Dwr Cymru Welsh Water (DCWW) sewer plan (Appendix E) shows that there are no public sewers crossing through the site. There is a 225mm public foul sewer located in Main Road to the south-east of the site.
- 4.14 The PFRA states that 'there were no records of properties affected by sewer flooding with significant consequences' in WCBC. There are no public combined or surface water sewers in the area and the risk of sewer flooding is therefore considered to be low.

Artificial sources of flooding

- 4.15 The site is not shown to be at risk of flooding from reservoirs as shown on the EA 'Flooding from Reservoirs' map (included in Appendix C). There are no canals within the vicinity of the site. Therefore the probability of flooding from artificial sources can be considered to be low.

Summary of Potential Flood Sources

- 4.16 It can be concluded that the site is at low risk from all sources. Minimal extents of the site within topographical low points have been identified at low to medium risk of surface water flooding.

5 Flood Resistant Design / Consideration of Layout

- 5.1 Taking a precautionary approach, finished floor levels of the properties located on the lower, western extent of the site (plots 17 – 34) should be set 300mm above surrounding ground levels. Finished floor levels of all other properties should be set 150mm above surrounding ground levels in accordance with Building Regulations. This will protect properties from any potential shallow depth surface water flooding.

6 Surface Water – No Adverse Impact

- 6.1 The existing site is 100% permeable, and consists of agricultural land. It is therefore assumed that there is currently no positive drainage and surface water is either infiltrating into the ground or draining to land drains and to a pond located to the south-west of the site.
- 6.2 The proposed development will increase the impermeable area by approximately 26% through the introduction of buildings and roads.

- 6.3 A comparison of the pre and post-development runoff rates and volumes is provided below. The calculations are included in Appendix E. A 30% allowance for climate change has been included in the post-development calculations.

Table 1 – Comparison of pre- and post-development runoff rates

Event	Pre-development (l/s)	Post Development (l/s)	Change (l/s)
1-1yr	3.22	45.92	+ 42.70
1-30yr	6.94	113.48	+ 106.54
1-100yr	8.55	142.37	+ 133.82

Table 2 – Comparison of pre- and post-development runoff volumes

Event	Pre-development (m³)	Post-development (m³)	Change (m³)
1-100 yr	389.10	768.33	+ 379.23

- 6.4 As shown in Tables 1 and 2 above, the proposed development will increase the surface water runoff rates and volumes. In order to ensure this increase will not have an impact elsewhere, runoff should be dealt with using appropriate Sustainable Drainage Systems (SuDS).
- 6.5 In accordance with Building Regulations Part H, the following hierarchy of surface water disposal options have been considered and are discussed further below:
- 1) Soakaway
 - 2) Watercourse
 - 3) Sewer

Soakaway

- 6.6 The Cranfield University 'Soilscapes' map indicates that the site is underlain by 'freely draining loamy soils'. Therefore the use of soakaways may be a feasible option. However a site walkover found areas of waterlogged ground. Therefore, it is recommended that infiltration tests are carried out in accordance with the BRE 365 specification to determine the feasibility of soakaways.
- 6.7 In accordance with Building Regulations, soakaways should be located at least 5m away from buildings and adopted roads.

-
- 6.8 Infiltration testing may find that parts of the site are more suitable for infiltration than others. In this instance an option may be to form a pond or large communal soakaway in an area with suitable infiltration characteristics.

Watercourse

- 6.9 Where infiltration is not feasible, the next consideration is discharge to watercourse. As outlined in Section 4, the nearest major watercourse is the River Alyn which is located approximately 570m north-east of the site. A connection to the River Alyn would require crossing third party residential land and is not considered a practical option.
- 6.10 There is a land drain located at the southern site boundary. This land drain does not join the wider river network and is not considered suitable for surface water disposal. Therefore a connection to watercourse does not appear to be a feasible option for the site.

Sewer

- 6.11 The final option for surface water disposal is a connection to the public sewer. As shown on the DCWW sewer plan (Appendix E) there are no public surface water or combined sewers located within the immediate vicinity of the site.
- 6.12 A developer enquiry was submitted to DCWW on 26th January 2015 to establish if a surface water connection to the public sewer system is acceptable in principle. A response was received on 13th February 2015 and is included in Appendix E. DCWW state that 'foul only discharge from the proposed development can be accommodated within the public sewerage system'. DCWW further state that 'in relation to the surface water flows from the proposed development, these will have to be disposed of separately by other means, such as using soakaways or discharging directly to a watercourse in liaison with the Land Drainage Authority and / or EA'.
- 6.13 Therefore a surface water connection to the public sewerage network is not permitted.

Preferred Option

- 6.14 At this stage it appears that infiltration drainage either in the form of soakaways or a pond is the only feasible method of surface water drainage. Infiltration tests should be undertaken in accordance with the BRE 365 specification to confirm the suitability of the site for infiltration drainage. The use of rainwater harvesting should be considered to reduce runoff volumes.

Surface Water Storage

- 6.15 Drainage systems such as soakaways or ponds should be designed to accommodate runoff during storm events up to and including the 1% Annual Exceedance Probability (AEP) + Climate Change Allowance (CCA) event. An estimated storage volume could be established once infiltration testing has been undertaken.

7 Foul Drainage

- 7.1 Part H of the Building Regulations sets out the preferred methods for the disposal of foul water, in the order of priority: public sewer, septic tank, cesspool.
- 7.2 As stated in the DCWW correspondence (Appendix E) 'the foul only discharge from the proposed development can be accommodated within the public sewerage system'. The connection point should be established with DCWW. A suitable connection point appears to be manhole SJ32529701 in Main Road to the east of the site. A pumping station may be required to establish a connection to the foul sewer in Main Road.
- 7.3 In accordance with Sewers for Adoption 7th edition, a 15m easement will be required from the wet well of a pumping station. Storage will also be required in the event of a pumping station failure. In accordance with Sewers for Adoption 7th edition, 150 litres of storage is required per dwelling (7,500 litres in total).

8 Other Considerations

- 8.1 All sewers should be designed in accordance with the Sewers for Adoption 7th edition. Sewers will be adopted by DCWW who will be responsible for their maintenance.

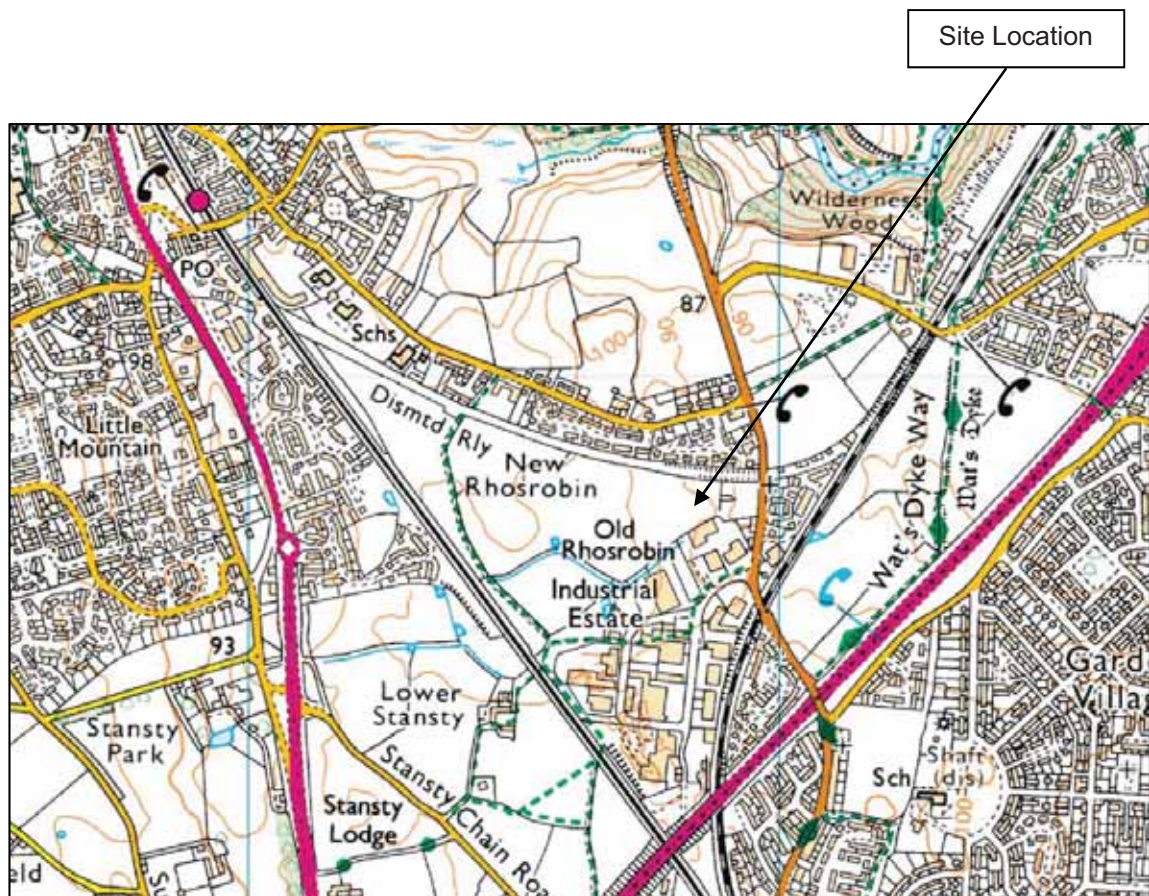
9 Summary and Conclusions

- 9.1 The site is located within Flood Zone A on the Welsh Government Development Advice Map and Flood Zone 1 on the EA Flood Map. The proposed residential development is classified as 'highly vulnerable' development in accordance with TAN15.
- 9.2 The proposed development is for 50 dwellings with associated access road, parking and amenity areas.
- 9.3 All potential sources of flooding have been considered as part of this report including fluvial, tidal, pluvial, sewer, groundwater and artificial. Surface water flooding at the lower, western extent of the site and in the location of the dismantled railway is considered to be the principal source of flood risk. However, flooding is only estimated during extreme storm events i.e. the 0.1% AEP event and there are no records of historical flooding at or near to the site.
- 9.4 Mitigation measures such as raising floor levels will minimise the risk of surface water flooding.
- 9.5 The development will increase the impermeable area of the site by approximately 26%. This results in an increase in surface water runoff rates and volumes. In order to ensure the increase in surface water runoff rates and volumes will not have an impact elsewhere, SuDS will be incorporated.
- 9.6 Soakaways should be used where feasible (subject to infiltration tests). An alternative is to discharge surface water into a pond. Any proposed ponds will drain by infiltration. Discharge to watercourse is not practical and discharge to the public sewer system is not permitted. Rainwater harvesting should be used to reduce runoff volumes.
- 9.7 Foul flows will be permitted to discharge into the public foul sewer network. A pumping station will likely be required to establish a connection.

10 Recommendations

- 10.1 Taking a precautionary approach, finished floor levels of the properties located on the lower, western extent of the site (plots 17 – 34) should be set 300mm above surrounding ground levels. Finished floor levels of all other properties should be set 150mm above surrounding ground levels in accordance with Building Regulations.
- 10.2 Infiltration tests should be carried out in accordance with the BRE 365 specification to determine the feasibility of soakaways.
- 10.3 All sewers will need to be designed in accordance with Sewers for Adoption 7th edition.
- 10.4 In accordance with Sewers for Adoption 7th edition, a 15m easement will be required from the wet well of a pumping station. Storage will also be required in the event of a foul pumping station failure. 150 litres of storage is required per dwelling (7,500 litres in total).
- 10.5 This Flood Consequences Assessment and Drainage Strategy should be submitted to the Local Planning Authority in support of the planning application.

Appendix A – Location Plan, Aerial Image & Photographs



Location Plan

(Source: Street Map)

Site Location



Aerial Photograph

(Source: Google Maps)

See Topographic Survey in Appendix B for photograph references



Photograph 1



Photograph 2

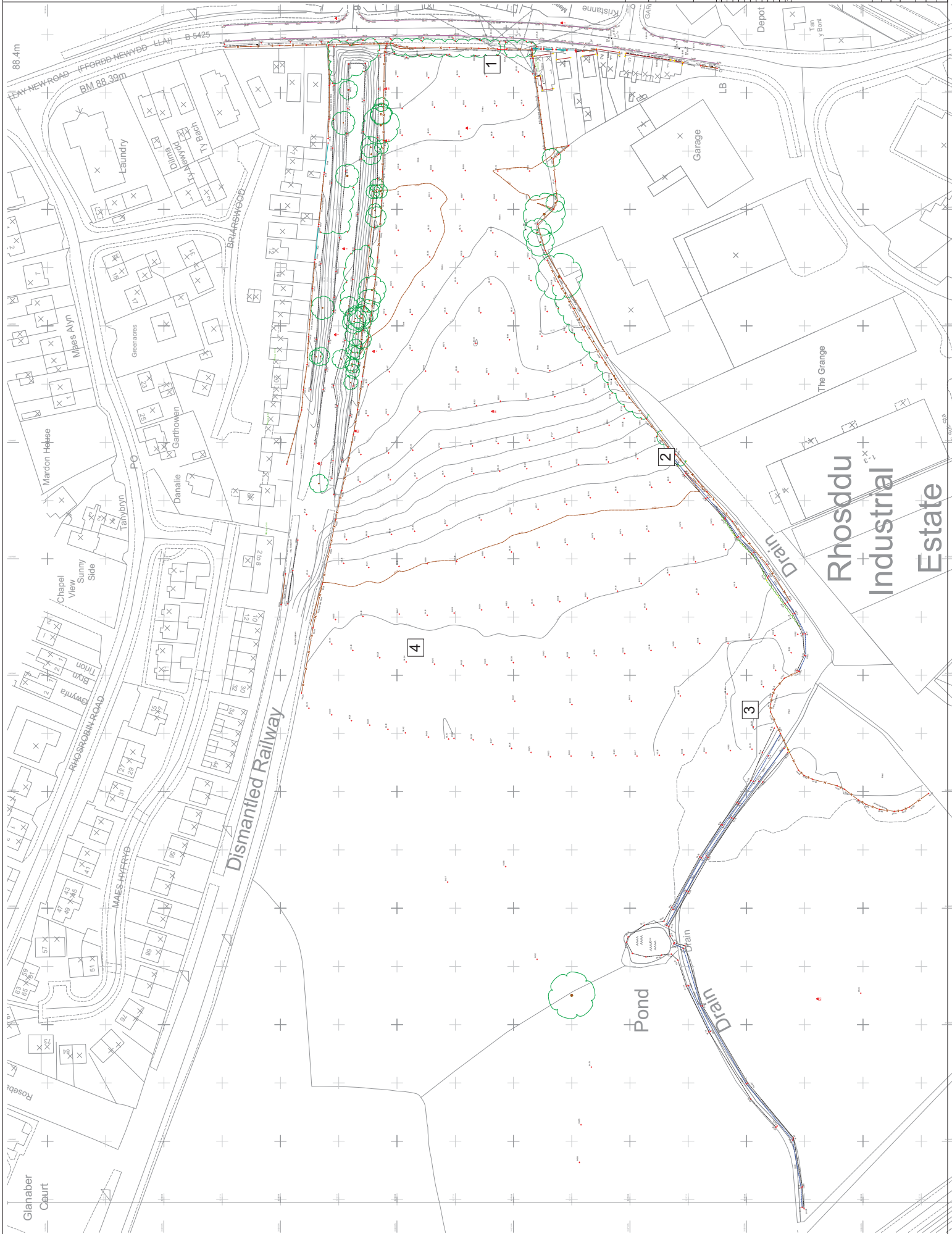


Photograph 3



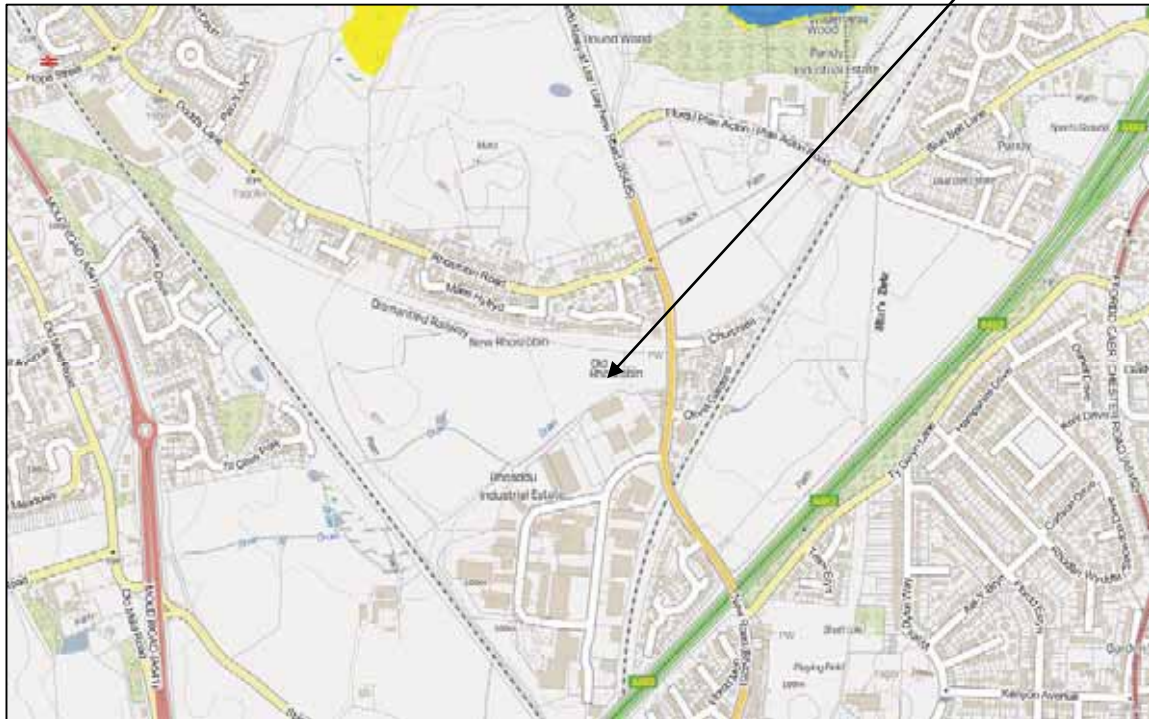
Photograph 4

Appendix B – Topographical Survey and Indicative Site Plan



Appendix C – Flood Maps

Site Location

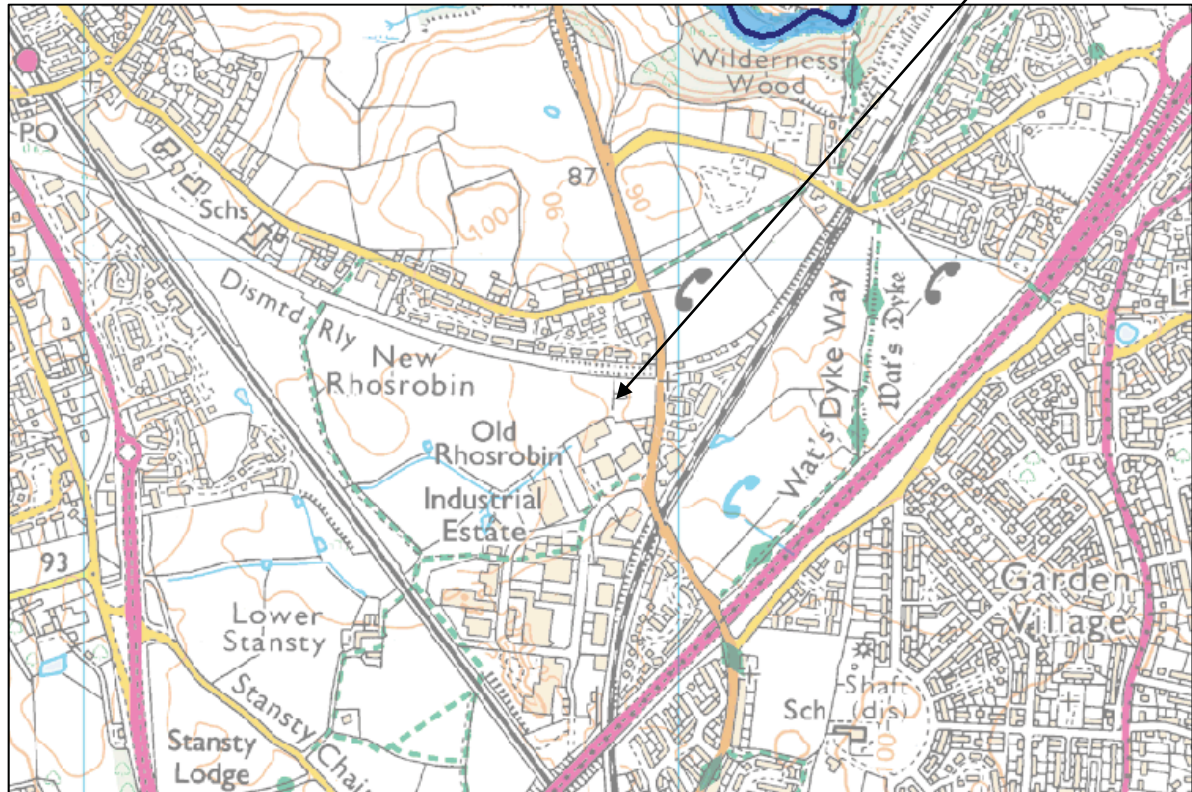


■	Zone C1: Served by significant infrastructure, including flood defences
■	Zone C2: Without significant flood defence infrastructure
■	Zone B: Areas known to have been flooded in the past
■	Zone A: Considered to be at little or no risk of fluvial or coastal/tidal flooding

Zones C1 and C2 based on Environment Agency's Extreme Flood Outline $\geq 0.1\%$ (River, Tidal or Coastal)

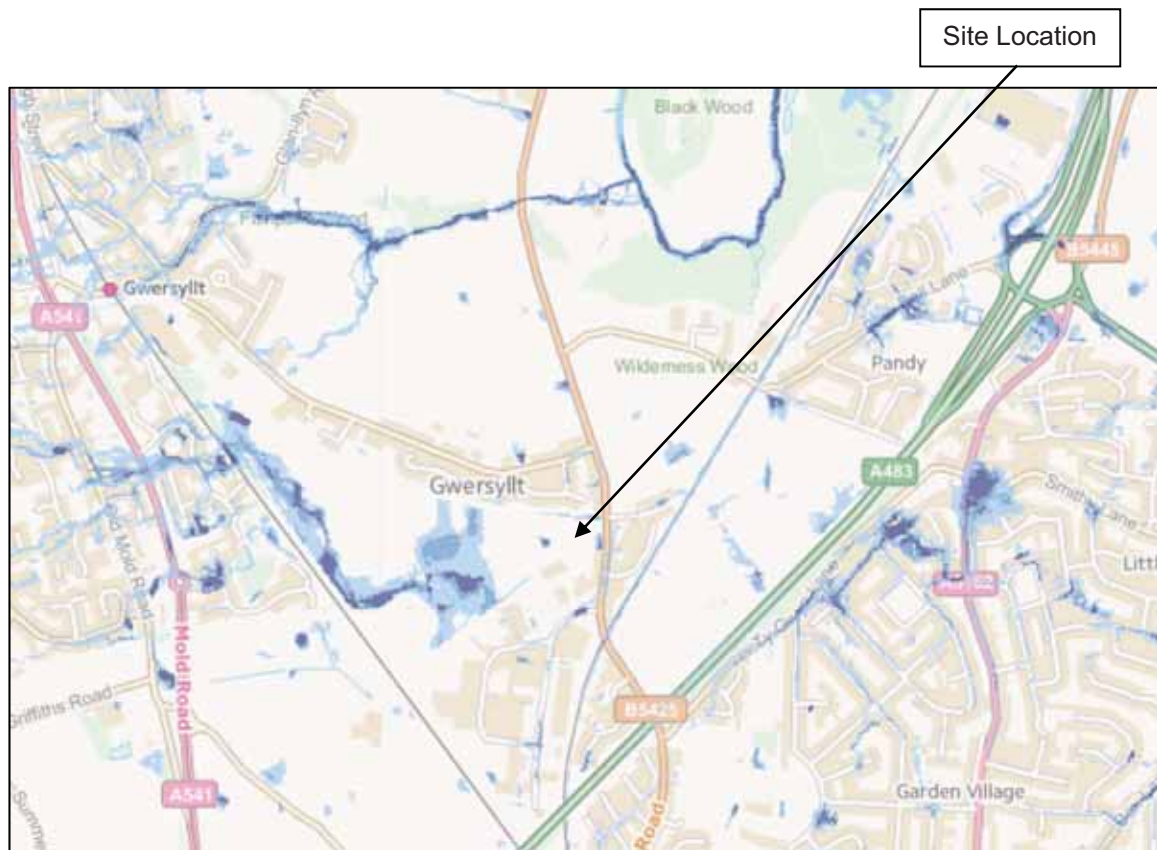
Welsh Government TAN15 Development Advice Map
(March 2015)

Site Location



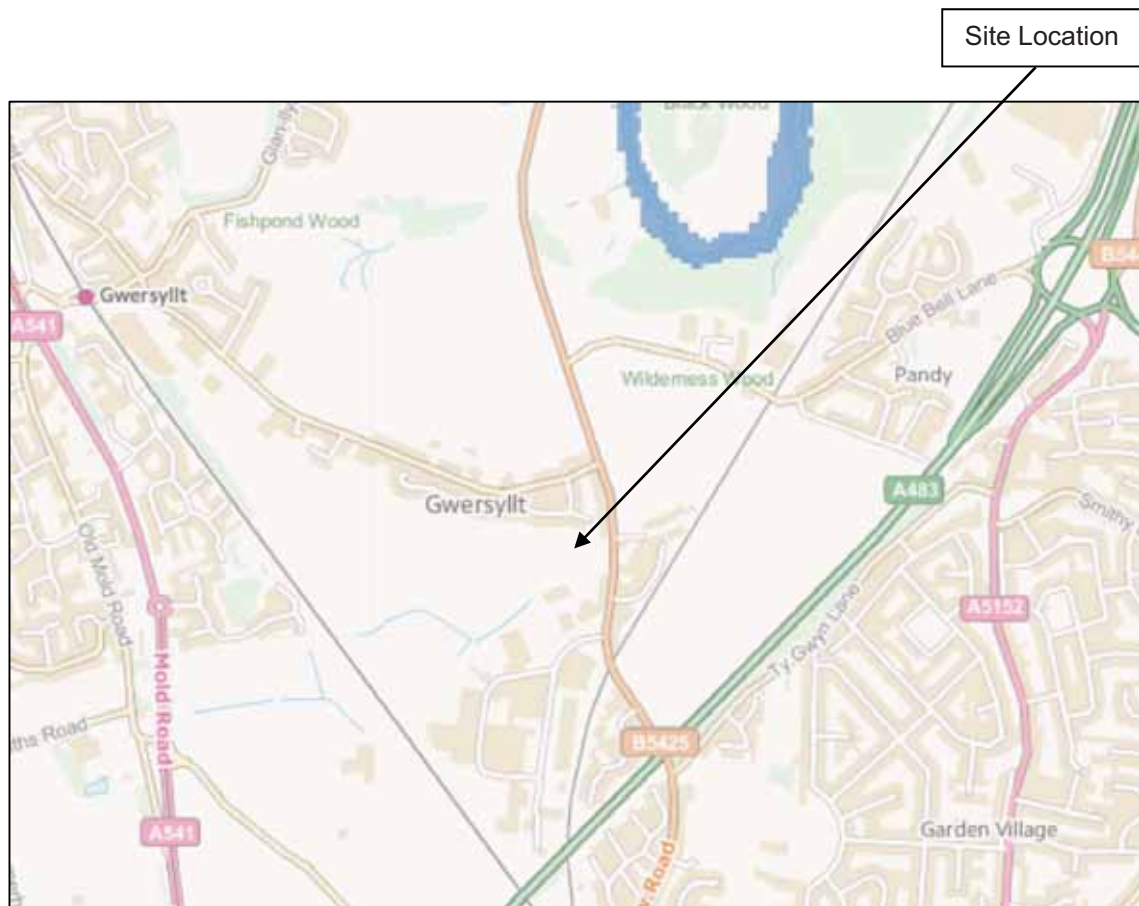
EA Flood Map
(March 2015)



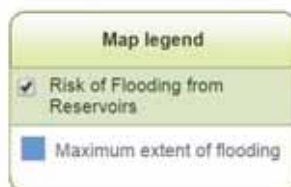


EA Flooding from Surface Water Flood Map
(March 2015)





EA Flooding from Reservoirs Flood Map
(March 2015)



Appendix D – Envirocheck Flood Report

EANRW Flood Data Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

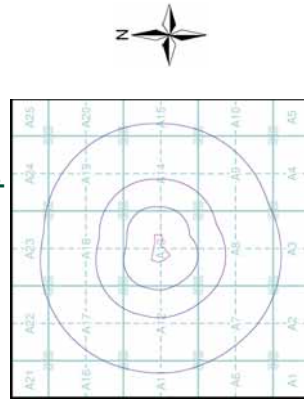
Flood Data

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

EANRW Flood Data Map - Slice A

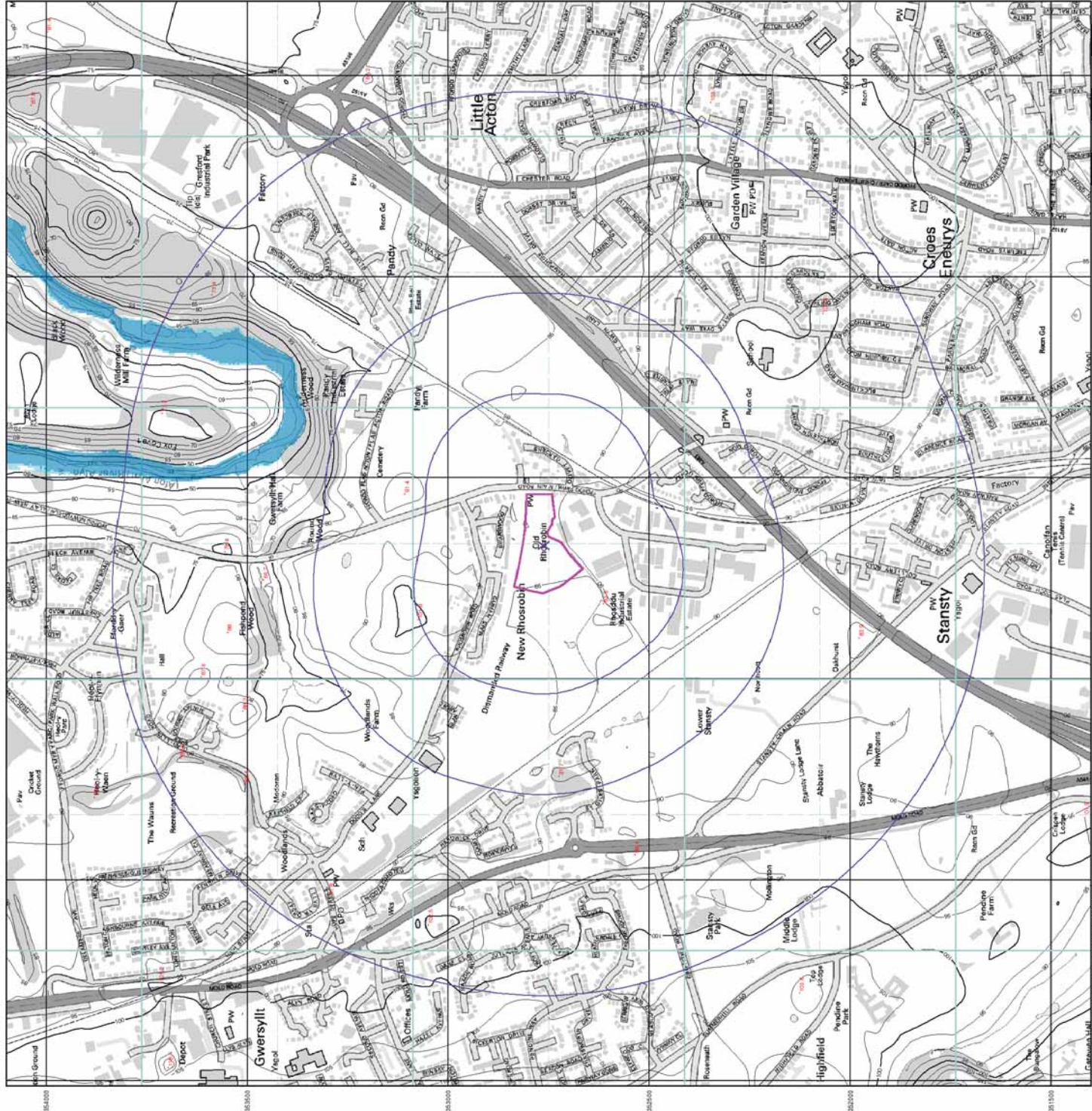


Order Details

Order Number: 64007979_1_1
 Customer Ref: w1762-150130
 National Grid Reference: 332830, 352760
 Slice: A
 Site Area (Ha): 2.35
 Search Buffer (m): 1000

Site Details

1. Rhosddu Industrial Estate, Old Rhosrobin, Rhosrobin, WREXHAM, Cwtyd, LL11 4YL



RMS 75 year Return Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

RMS 75 year Return Flood Data

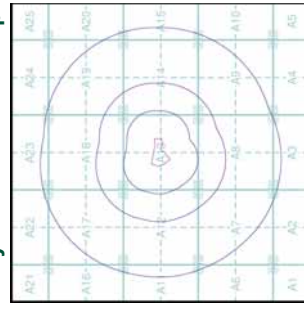
Flood Type
 Pluvial & Minor River Flood (flood depth in m)



Contours (height in meters)

Standard Contour
 Master Contour
 Spot Height

RMS 75 year Return Flood Map - Slice A



Order Details

Order Number: 64007979_1_1
 Customer Ref: w1762-150130
 National Grid Reference: 332830, 352760
 Slice: A
 Site Area (Ha): 2.35
 Search Buffer (m): 1000

Site Details

1. Rhosddu Industrial Estate, Old Rhosrobin, Wrexham, Cwmd, LL11 4YL



General

- Specified Site
 Specified Buffer(s)
 Bearing Reference Point

RMS 100 year Return Flood Data

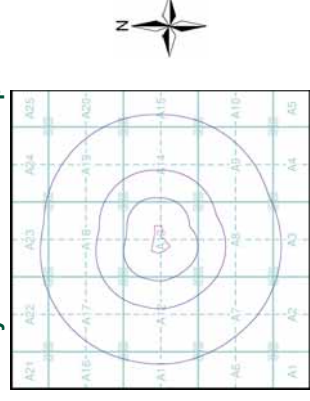
- | | Flood Depth (mm) | Defended Flood | Undefended Flood | Flood Type | Pluvial & Minor River Flood (flood depth rule) |
|----|------------------|----------------|------------------|------------|--|
| 1 | 100 | | | | |
| 2 | 100 | | | | |
| 3 | 100 | | | | |
| 4 | 100 | | | | |
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| 90 | 100 | | | | |
| 91 | 100 | | | | |
| 92 | 100 | | | | |

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Contours (height in meters)

-

RMS 100 year Return Flood Map - Slice A



Order Details

Order Number: 64007979_1_1
Customer Ref: w1762-150130
National Grid Reference: 332830, 352760
Slice: A
Site Area (Ha): 2.35
Search Buffer (m): 1000

Site Details

1, Rhosddu Industrial Estate, Old Rhosrobin, Rhosrobin,
WREXHAM, Clwyd, LL11 4YL

General

 Specified Buffer(s)

 Bearing Reference Point

RMS 1000 year Return Flood Data

Flood Type	Flood Depth (mm)	Defended Flood	Undefended Flood	Pluvial & Minor River Flood (flood depth rule)

Number of Countries	Number of Years
0 - 200	0 - 200
201 - 500	201 - 500
501 - 2000	501 - 2000
2001 +	2001 +

Contours(height in meters)

Standard Contour

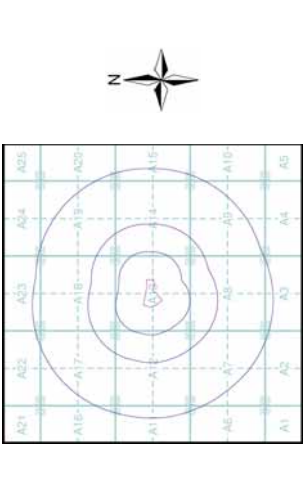
Master Contour

MLW Mean Low Water

MHW Mean High Water

Spot Height 167.8

RMS 1000 year Return Flood Map - Slice A

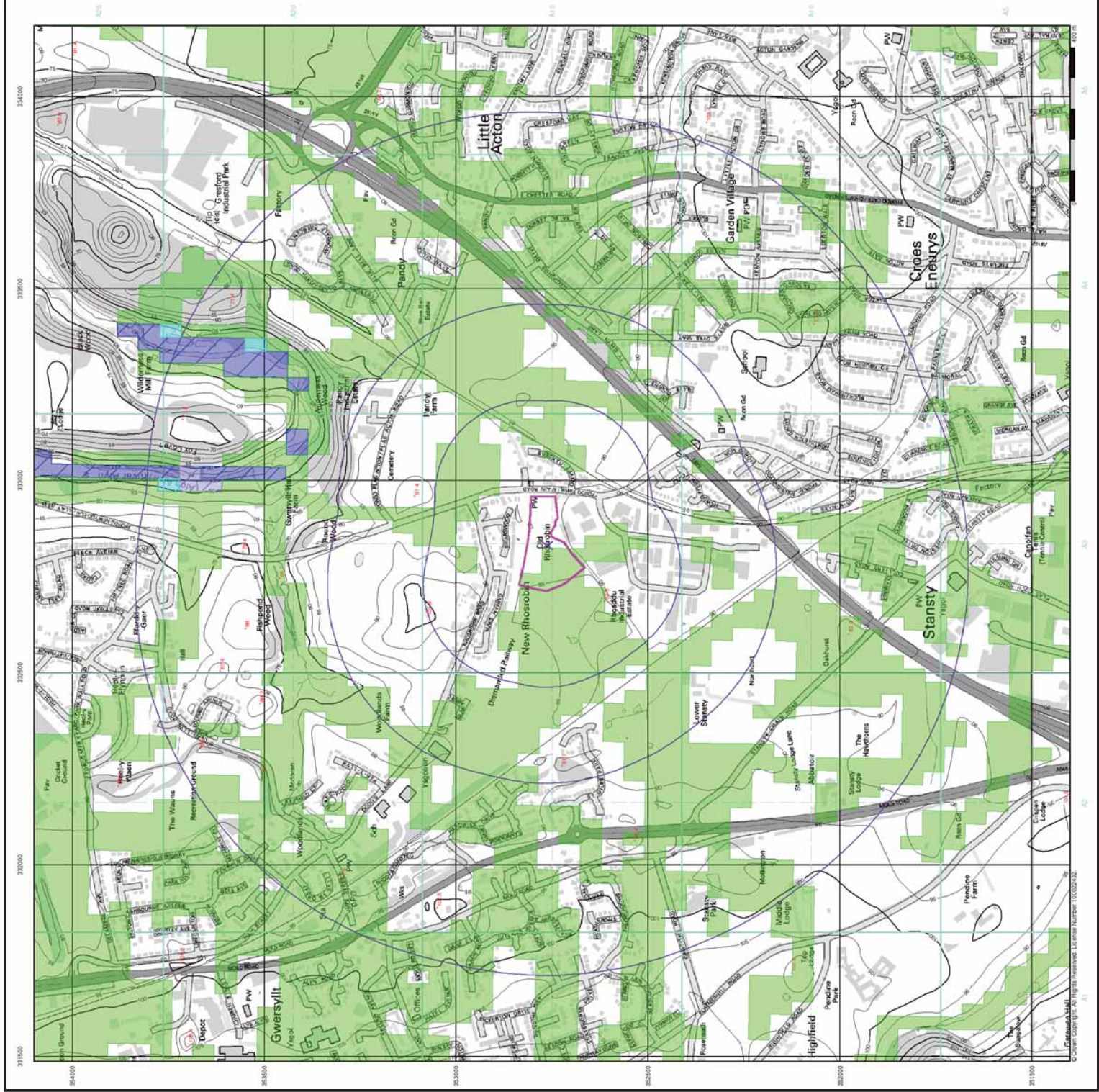


Order Details

Order Number: 64007979_1_1
Customer Ref: w1762-150130
National Grid Reference: 332830, 352760
Slice: A
Site Area (Ha): 2.35
Search Buffer (m): 1000

Site Details

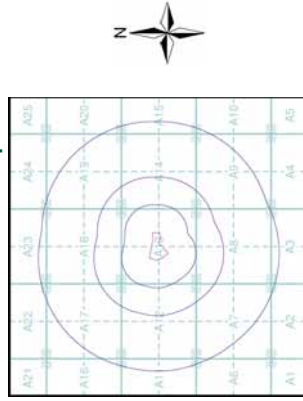
1, Rhosddu Industrial Estate, Old Rhosrobin, Rhosrobin,
WREXHAM, Clwyd, LL11 4YL



Detailed River Network Map (1:10,000)

- General**
- Specified Site
 - Specified Buffer(s)
 - Bearing Reference Point
 - Map ID
- Detailed River Network Data**
- Primary River
 - Secondary River
 - Tertiary River
 - Canal
 - Canal Tunnel
 - Undefined River
 - Lake/Reservoir
 - Extended Culvert (greater than 50m)
 - Underground River (inferred)
 - Underground River (local knowledge)
 - Downstream of High Water Mark
 - Downstream of Seward Extension
 - Not assigned River feature
- Contours (height in meters)**
- Source
 - Junction
 - Sink
 - Non-interactive Node
 - Offline Drainage Feature
 - Standard Contour
 - Master Contour
 - Spot Height
 - Mean Low Water
 - Mean High Water
- Contours (height in meters)**
- Not assigned River feature
 - Pseudo Node (general)
 - Pseudo Node (High Water Mark)
 - Pseudo Node (OS MasterMap polygon boundary)

Detailed River Network Map - Slice A

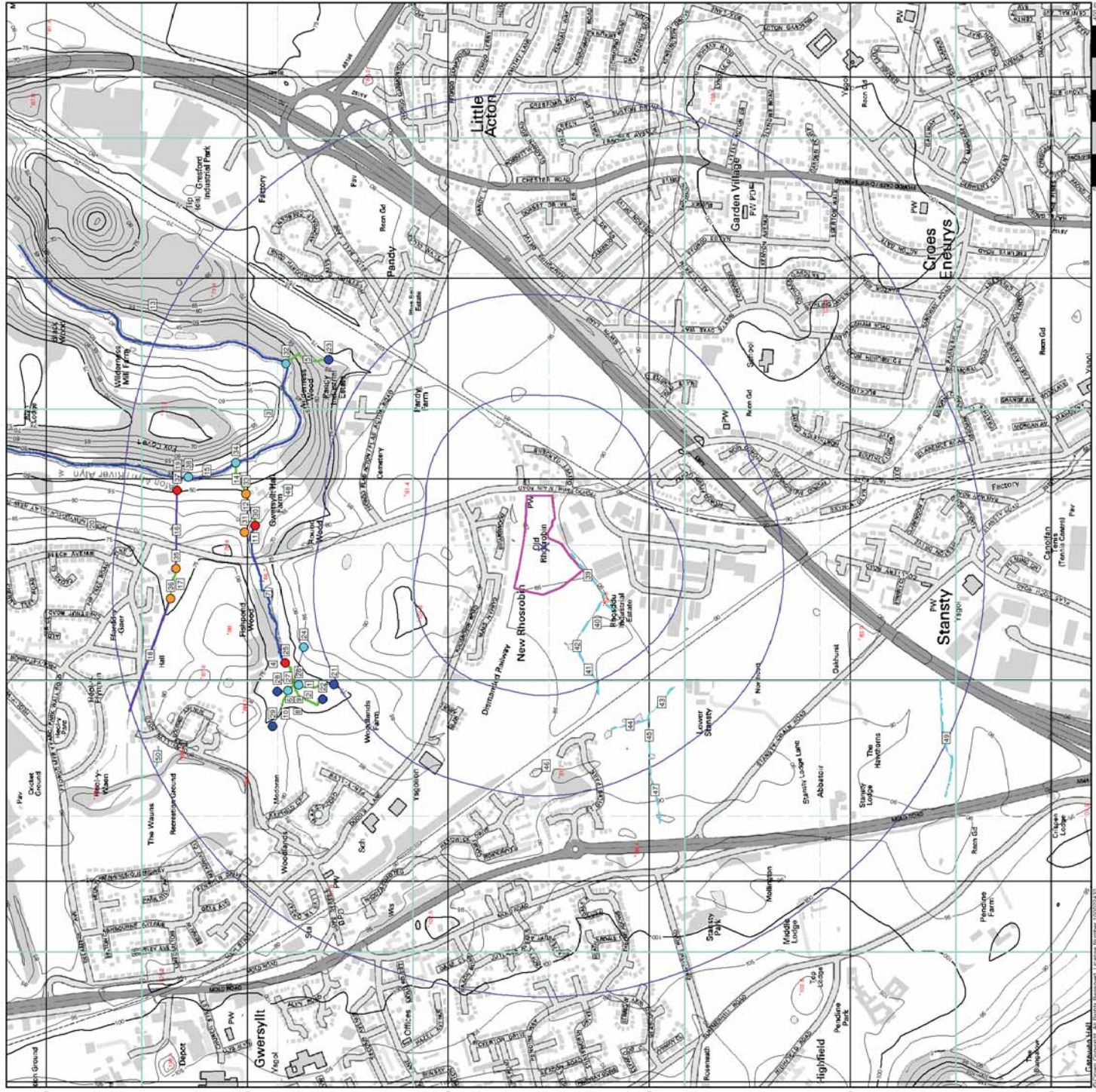


Order Details

Order Number: 64007979_1_1
 Customer Ref: w1762-150130
 National Grid Reference: 332830, 352760
 Slice: A
 Site Area (Ha): 2.35
 Search Buffer (m): 1000

Site Details

1. Rhosddu Industrial Estate, Old Rhosrobin, Rhosrobin, WREXHAM, Cwmd, LL11 4YL



EANRW Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

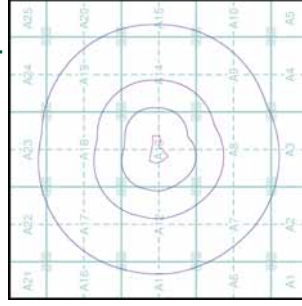
Historic Flood Events Data

- Channel Capacity Exceeded (no raised defences)
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/Breach of Defence
- Other
- Overtopping of Defences
- Unknown

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height
- Historical Flood Liabilities
- Mean Low Water
- Mean High Water

EANRW Historic Flood Map - Slice A



Order Details

Order Number: 64007979_1_1
 Customer Ref: w1762-150130
 National Grid Reference: 332830, 352760
 Slice: A
 Site Area (Ha): 2.35
 Search Buffer (m): 1000

Site Details

1. Rhosddu Industrial Estate, Old Rhosrobin, Rhosrobin, WREXHAM, Cwtyd, LL11 4YL



BGS Flood Data (1:50,000)

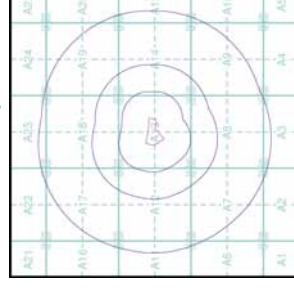
General

- Specified Site
- Specified Buffer(s)
- Map ID
- Bearing Reference Point

BGS Geological Indicators of Flooding

- Coastal
- Inland
- Bodies of Water

BGS Flood Data Map - Slice A



Order Details

Order Number: 64007979 1.1
Customer Ref: w1762-150130
National Grid Reference: 332830, 352760
Slice: A
Site Area (Ha): 2.35
Search Buffer (m): 1000

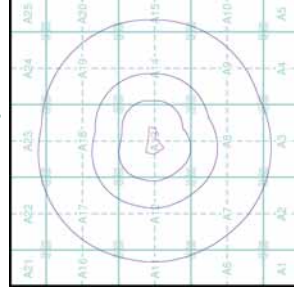
Site Details

1, Rhosdu Industrial Estate, Old Rhosrobin, Rhosrobin, WREXHAM,
Cwyl, LL11 4YL

BGS Flood Data (1:50,000)

- General**
- Specified Site
 - Specified Buffer(s)
 - Map ID
 - Bearing Reference Point
- BGS Groundwater Flooding Susceptibility**
- Potential for Groundwater Flooding to Occur at Surface
 - Potential for Groundwater Flooding of Property Situated Below Ground Level
 - Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



Order Details

Order Number: 64007979 1.1
Customer Ref: w1762-150130
National Grid Reference: 332830, 352760
Slice: A
Site Area (Ha): 2.35
Search Buffer (m): 1000

Site Details

1, Rhosdu Industrial Estate, Old Rhosrobin, Rhosrobin, WREXHAM,
Cwyl, LL11 4YL

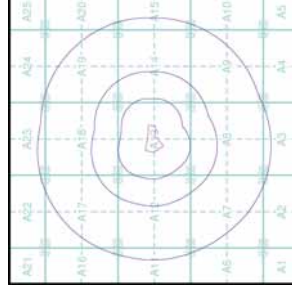
EANRW RoFRS Data (1:50,000)

General
Specified Site  Specified Buffer(s)  Bearing Reference Point 
Slice  Map ID 

Risk of Flooding from Rivers and Sea (RoFRS)

High Risk 
Medium Risk 
Low Risk 
Very Low Risk 

EANRW RoFRS Data Map - Slice A



Order Details

Order Number: 64007979 1.1
Customer Ref: w1762-150130
National Grid Reference: 332830, 352760
Slice: A
Site Area (Ha): 2.35
Search Buffer (m): 1000

Site Details

1, Rhosdu Industrial Estate, Old Rhosrobin, Rhosrobin, WREXHAM,
Clwyd, LL11 4YL

Envirocheck[®] Report:

Flood Screening Report Datasheet

Order Details:

Order Number:

64007979_1_1

Customer Reference:

w1762-150130

National Grid Reference:

332830, 352760

Slice:

A

Site Area (Ha):

2.35

Search Buffer (m):

1000

Site Details:

1, Rhosddu Industrial Estate
Old Rhosrobin, Rhosrobin
WREXHAM
Clwyd
LL11 4YL

Client Details:

Miss A Llewelyn
Waterco Ltd
Eden Court
Lon Parcwr
Industria
Ruthin
Clwyd
LL15 1NJ

Report Section and Details	Page Number
Summary	-
The Summary section provides an overview of the data contained within the report, detailing the number of data set features or the existence of a data set in relation to the buffer(s) selected. For ease of reference, the report is broken down into seven sections of data.	
EA / NRW / CEH Flood Data	-
This section details data from the Environment Agency/Natural Resources Wales and the Centre for Ecology and Hydrology. The EA/NRW data is reported to a distance of 250m from the edge of the site polygon and details both Zone 2 (extreme) and Zone 3 flood extents, as well as flood defences, flood water storage areas and areas benefiting from flood defences. The CEH data is reported to a distance of 250m from the edge of the site polygon and covers flood data for Scotland, divided into levels based on the frequency and magnitude of a predicted 100 year term. All data sets within this section are plotted and feature on the EA / NRW / CEH Flood Data (1:10,000) map. For added value, OS Contour data is also plotted, detailing contours, spot heights and land water boundaries.	
RMS Flood Data	1
This section contains the Risk Management Solutions flood data. The data is based upon the likelihood of a flood occurrence for 3 flood return periods; these being 75 years, 100 years and 1000 years. Each return period is depicted on a separate 1:10,000 scale map and reports features to a distance of 250m from the edge of the site polygon. Each return period can detail both defended and/or undefended flood features, with each feature also reporting an associated flood depth. In addition pluvial flood features are also detailed where applicable, but tidal flooding is not included. For added value, OS Contour data is also plotted, detailing contours, spot heights and land water boundaries.	
BGS Flood Data	2
This section contains two BGS data sets; namely Geological Indicators of Flooding and Groundwater Flooding Susceptibility, both of which report features out to a possible 1000m, with coverage in England, Wales and Scotland. Each data set is plotted on a separate BGS Flood Data (1:50,000) map.	
EA/NRW Detailed River Network Data	7
This section details 3 sources of data that depict and detail the river network of England and Wales, captured primarily from the water features theme of Ordnance Survey's OS MasterMap Topography Layer. The DRN Lines data set details all the types of rivers, drains and streams which can be found in England and Wales. The DRN Nodes data set details the river, drain and stream node intersections which divide the detailed river network data. All nodes are defined as being one of the following: A source, sink, junction, or pseudo node, interactions or not assigned. The DRN Offline Drainage dataset details water features from OS MasterMap that do not connect into the river network and are generally limited in length. All data sets within this section are plotted and feature on the EA/NRW Detailed River Network (1:10,000) map. For added value, OS Contour data is also plotted, detailing contours, spot heights and land water boundaries.	
EA/NRW Historic Flood Events Data	-

This section details Historic Flood data sourced from the Environment Agency/Natural Resources Wales and from data held by Landmark. The EA/NRW Historic Flood Events data is reported to a distance of 1000m from the edge of the site polygon and details recorded historic flood events from 1703 to October 2008. The data also contains information on the source and cause of the flood, and how the flood outline was established.

Also included in this section is Landmark's Historical Flood Liabilities data set, which identifies areas that are liable to flood based on systematic analysis of historical mapping dating back to the mid 19th century.

Both data sets within this section are plotted and feature on the EA/NRW Historical Flood (1:10,000) map. For added value, OS Contour data is also plotted, detailing contours, spot heights and land water boundaries.

EA/NRW RoFRS Data

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This section details the Risk of Flooding from Rivers and Sea (RoFRS) data sourced from the Environment Agency/Natural Resources Wales and is reported to a distance of 1000m from the edge of the site polygon. The RoFRS data provides an indication of areas of land at risk of flooding from rivers and the sea. These areas of land, called impacted cells, are represented as 50 metre squares, or smaller areas where a square is intersected by a river or coastline.

The average height information of the impacted cell, modelled river and sea levels and information about over 200,000 flood defences are used as inputs to a computer flood model run by the Environment Agency/Natural Resources Wales. The model compares the probability that the flood defences will overtop or breach and the distance of the impact cell from the river or the sea for 40 scenarios for probabilities of between 100% to 0.1%.

The results are then consolidated to calculate a single probability category for each impacted cell. These results have been validated by local staff using their local knowledge and expertise. RoFRS is a national flood risk assessment and does not contain information about property thresholds. Due to variations in the input data and the performance of the computer flood model at particular locations, the resulting category of an impacted cell should only be used at a specific study scale. In certain areas it would only be appropriate to compare risks between towns and counties whereas in other areas they would be more suitable for understanding risk at a street level. The level of suitability for a particular cell is indicated by the cell's suitability scale.

The data within this section is plotted and feature on the EA/NRW RoFRS Data (1:50,000) map. This dataset is not available in Scotland.

Flood Insurance Risk Data

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This section contains flood risk data from Crawford and Company. This dataset is not plotted on any of the associated Flood maps.

Crawford & Co have generated an Insurance Claims rating for Flood Risk. The risk is determined by comparing the number of flood insurance claims made to the number of properties in the postcode sector. The data will also include flood claims from domestic accidents or blocked drains, as well as flooding from river or tidal events. Flood insurance claim ratings are reported for the site only.

Data Currency

15

Data Suppliers

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Useful Contacts

17

Report Version v49.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
EA / NRW / CEH Flood Data					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
RMS Flood Data					
RMS 75 year Flood Return	pg 1	1	7	n/a	n/a
RMS 100 year Flood Return	pg 1	1	7	n/a	n/a
RMS 1000 year Flood Return	pg 1	1	1	n/a	n/a
BGS Flood Data					
BGS Geological Indicators of Flooding	pg 2				4
BGS Groundwater Flooding Susceptibility	pg 2	5	9	16	73
EA/NRW Detailed River Network Data					
Detailed River Network Lines	pg 7				20
Detailed River Network Nodes	pg 10				18
Detailed River Network Offline Drainage	pg 11		4	5	3
EA/NRW Historic Flood Events Data					
Historic Flood Events					
Historical Flood Liabilities					
EA/NRW RoFRS Data					
RoFRS - Risk of Flooding from Rivers and Sea	pg 12				26
Flood Insurance Risk Data					
Postcode Sector Flood Insurance Claim Ratings	pg 14	1	n/a	n/a	n/a

Report Version v49.0

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NW (W)	0	2	332757 352764
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13SE (E)	71	2	333025 352719
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	101	2	333059 352760
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NW (N)	115	2	332793 352945
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	134	2	333092 352774
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (NE)	170	2	333061 352941
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	170	2	333127 352829
	RMS 75 year Flood Return Flood Type/Depth: 75 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	217	2	333161 352884
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NW (W)	0	2	332757 352764
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13SE (E)	71	2	333025 352719
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	101	2	333059 352760
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NW (N)	115	2	332793 352945
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	134	2	333092 352774
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	170	2	333127 352829
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (NE)	170	2	333061 352941
	RMS 100 year Flood Return Flood Type/Depth: 100 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NE (E)	217	2	333161 352884
	RMS 1000 year Flood Return Flood Type/Depth: 1000 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NW (W)	0	2	332824 352763
	RMS 1000 year Flood Return Flood Type/Depth: 1000 year pluvial flood, depth is not applicable Flood Hazard: Pluvial & Minor River Flood Risk	A13NW (N)	115	2	332827 352944

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Geological Indicators of Flooding Flooding Type: Inland Flooding Flood Potential: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment. Code:	A17SE (NW)	513	3	332476 353281
	BGS Geological Indicators of Flooding Flooding Type: Inland Flooding Flood Potential: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment. Code:	A18SE (NE)	570	3	333106 353355
	BGS Geological Indicators of Flooding Flooding Type: Inland Flooding Flood Potential: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment. Code:	A17NE (NW)	872	3	332193 353523
	BGS Geological Indicators of Flooding Flooding Type: Inland Flooding Flood Potential: Higher flood potential from rivers: the first areas to experience the effects of inland flooding in a river catchment. Code:	A17NE (NW)	966	3	332335 353717
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (SW)	0	3	332832 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (NW)	0	3	332750 352800
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (E)	0	3	332850 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (W)	0	3	332800 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (W)	0	3	332750 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (SW)	28	3	332750 352650
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (NW)	33	3	332700 352850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SW (W)	64	3	332650 352750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (SW)	137	3	332700 352550
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (NW)	144	3	332600 352900
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (W)	212	3	332500 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (NW)	213	3	332550 352950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (W)	215	3	332500 352800
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (NW)	243	3	332550 353000
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (W)	332	3	332400 352650
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (S)	367	3	332750 352300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A12NE (W)	372	3	332350 352850

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (SW)	386	3	332450 352450
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (NW)	390	3	332500 353150
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SW (NW)	407	3	332550 353200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SE (W)	417	3	332300 352700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17SE (NW)	421	3	332450 353150
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A17SE (NW)	422	3	332400 353100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (NW)	452	3	332550 353250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (S)	466	3	332800 352200
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NW (S)	467	3	332832 352200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A12SE (W)	476	3	332250 352650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SW (NW)	483	3	332600 353300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A7NE (SW)	488	3	332450 352300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (NW)	499	3	332550 353300
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SW (N)	516	3	332700 353350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NW (S)	517	3	332832 352150
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (N)	522	3	332650 353350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NE (S)	522	3	332850 352150
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A19SW (NE)	532	3	333250 353250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17SE (NW)	547	3	332250 353100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A18SE (NE)	563	3	333100 353350
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (N)	566	3	332750 353400
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SW (N)	566	3	332800 353400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NW (S)	566	3	332800 352100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (S)	567	3	332832 352100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17SE (NW)	570	3	332400 353300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17SE (NW)	586	3	332450 353350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A7NE (SW)	597	3	332400 352200
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A17SE (NW)	600	3	332350 353300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SW (S)	616	3	332832 352050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	616	3	332700 353450
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A18NW (N)	616	3	332800 353450
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8SW (S)	616	3	332750 352050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A19SW (NE)	627	3	333400 353250
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SE (S)	629	3	332900 352050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	641	3	332550 353450
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A19SW (NE)	663	3	333250 353400
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NW (N)	666	3	332750 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NW (N)	666	3	332800 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SW (S)	670	3	332700 352000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	670	3	332832 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17NE (NW)	676	3	332450 353450
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NW (N)	678	3	332600 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	689	3	332550 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8SE (S)	703	3	333000 352000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SW (W)	712	3	332000 352750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7SE (SW)	720	3	332400 352050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A17NE (NW)	722	3	332450 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SW (S)	726	3	332650 351950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NE (N)	726	3	332850 353550
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	738	3	332550 353550
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17NE (NW)	742	3	332400 353500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (NW)	751	3	332500 353550
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NE (N)	758	3	333100 353550
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12NW (W)	760	3	332000 353050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8SE (S)	768	3	333050 351950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NW (N)	769	3	332832 353600
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NW (N)	776	3	332600 353600
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7SE (SW)	807	3	332400 351950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12NW (W)	812	3	331900 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SW (W)	815	3	331900 352700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	826	3	332600 353650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8SE (S)	833	3	333100 351900
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SW (S)	834	3	332600 351850
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A14NE (E)	841	3	333800 352800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17NE (NW)	862	3	332450 353650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18NW (N)	866	3	332800 353700

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SE (S)	879	3	333100 351850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NE (N)	883	3	332900 353700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	884	3	332550 353700
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A19NW (NE)	892	3	333450 353550
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8SE (S)	899	3	333150 351850
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A7SE (SW)	900	3	332300 351900
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A11NE (W)	912	3	331800 352763
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NW (SW)	917	3	332050 352100
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A11SE (W)	919	3	331800 352650
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NW (SW)	931	3	331900 352300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NE (N)	932	3	332900 353750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18NW (N)	933	3	332550 353750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A19NW (NE)	935	3	333450 353600
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A9SW (S)	965	3	333200 351800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A11NE (W)	966	3	331750 352850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A19NW (NE)	977	3	333450 353650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A23SE (N)	981	3	332900 353800
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A9SW (SE)	986	3	333250 351800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A23SE (N)	990	3	332950 353800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A23SW (N)	992	3	332500 353800

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A17SE (NW)	530	4	332489 353307
2	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A17SE (NW)	552	4	332452 353312
3	Detailed River Network Lines River Type: Primary River River Name: River Alyn (Afon Alun) Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: ALYN Name: Water Course: 1959 Reference:	A18SE (NE)	592	4	333122 353375
4	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18SW (NW)	592	4	332530 353392
5	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A19SW (NE)	597	4	333296 353297
6	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A17SE (NW)	599	4	332493 353385

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
7	Detailed River Network Lines River Type: Primary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NW (N)	599	4	332643 353427
8	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A17SE (NW)	601	4	332488 353385
9	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A17SE (NW)	620	4	332473 353399
10	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A17SE (NW)	620	4	332473 353399
11	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NE (N)	661	4	332889 353477
12	Detailed River Network Lines River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NE (N)	674	4	332907 353486

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	Detailed River Network Lines River Type: Primary River River Name: River Alyn Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: ALYN Name: Water Course: 1959 Reference:	A19SW (NE)	682	4	333286 353404
14	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NE (N)	699	4	332962 353503
15	Detailed River Network Lines River Type: Primary River River Name: River Alyn (Afon Alyn) Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: ALYN Name: Water Course: 1959 Reference:	A18NE (N)	728	4	333040 353528
16	Detailed River Network Lines River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NE (N)	844	4	332845 353676
17	Detailed River Network Lines River Type: Tertiary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NW (N)	844	4	332777 353677
18	Detailed River Network Lines River Type: Extended Culvert (greater than 50m) River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Below Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NW (N)	858	4	332702 353691

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
19	Detailed River Network Lines River Type: Secondary River River Name: Not Supplied Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Other Rivers Management Status: Water Course: Not Supplied Name: Water Course: Not Supplied Reference:	A18NE (N)	868	4	332975 353673
20	Detailed River Network Lines River Type: Primary River River Name: (Afon Alun) Hydrographic Area: D010 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: ALYN Name: Water Course: 1959 Reference:	A18NE (N)	871	4	333004 353674
21	Detailed River Network Nodes River Node Type: Source Hydrographic Area: D010	A17SE (NW)	530	4	332489 353307
22	Detailed River Network Nodes River Node Type: Source Hydrographic Area: D010	A17SE (NW)	552	4	332452 353312
23	Detailed River Network Nodes River Node Type: Source Hydrographic Area: D010	A19SW (NE)	597	4	333296 353297
24	Detailed River Network Nodes River Node Type: Junction Hydrographic Area: D010	A17SE (NW)	599	4	332493 353385
25	Detailed River Network Nodes River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D010	A18SW (NW)	600	4	332543 353405
26	Detailed River Network Nodes River Node Type: Junction Hydrographic Area: D010	A17SE (NW)	601	4	332488 353385
27	Detailed River Network Nodes River Node Type: Junction Hydrographic Area: D010	A17SE (NW)	620	4	332473 353399
28	Detailed River Network Nodes River Node Type: Source Hydrographic Area: D010	A17SE (NW)	632	4	332470 353411
29	Detailed River Network Nodes River Node Type: Source Hydrographic Area: D010	A17SE (NW)	648	4	332438 353414
30	Detailed River Network Nodes River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D010	A18NE (N)	664	4	332884 353480
31	Detailed River Network Nodes River Node Type: Pseudo (general) Hydrographic Area: D010	A18NE (N)	674	4	332907 353486
32	Detailed River Network Nodes River Node Type: Junction Hydrographic Area: D010	A19SW (NE)	682	4	333286 353404
33	Detailed River Network Nodes River Node Type: Pseudo (general) Hydrographic Area: D010	A18NE (N)	699	4	332962 353503
34	Detailed River Network Nodes River Node Type: Junction Hydrographic Area: D010	A18NE (N)	728	4	333040 353528

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
35	Detailed River Network Nodes River Node Type: Pseudo (general) Hydrographic Area: D010	A18NW (N)	844	4	332777 353677
36	Detailed River Network Nodes River Node Type: Pseudo (general) Hydrographic Area: D010	A18NW (N)	858	4	332702 353691
37	Detailed River Network Nodes River Node Type: Pseudo (OS MasterMap polygon boundary) Hydrographic Area: D010	A18NE (N)	870	4	332971 353674
38	Detailed River Network Nodes River Node Type: Junction Hydrographic Area: D010	A18NE (N)	871	4	333004 353674
39	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A13SW (S)	5	4	332814 352694
40	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A13SW (SW)	88	4	332697 352619
41	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A13SW (W)	151	4	332585 352679
42	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A13SW (W)	151	4	332585 352679
43	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A12SE (SW)	368	4	332478 352445
44	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A12SE (W)	374	4	332378 352594
45	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A12SE (SW)	393	4	332404 352502
46	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A12SE (W)	422	4	332291 352749
47	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A12SE (SW)	479	4	332305 352499
48	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A18SE (N)	580	4	332962 353384
49	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A8SW (S)	931	4	332500 351776
50	Detailed River Network Offline Drainage River Type: Tertiary River Hydrographic Area: D010	A17NE (NW)	971	4	332332 353721

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18SE (NE)	575	1	333110 353360
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18SE (NE)	581	1	333095 353370
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18SE (N)	605	1	333070 353400
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18SE (NE)	612	1	333100 353400
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18SE (N)	621	1	333045 353420
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A19SW (NE)	640	1	333250 353375
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A19SW (NE)	644	1	333204 353400
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A19SW (NE)	646	1	333200 353404
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A19SW (NE)	663	1	333250 353400
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A19SW (NE)	681	1	333300 353394
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A19SW (NE)	686	1	333300 353400
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18NE (N)	692	1	333070 353488
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18NE (N)	695	1	333065 353492
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: County to Town Suitability Scale: Natural Resources Wales Source:	A18NE (N)	697	1	333010 353500

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	705	1	333060 353503
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	712	1	333060 353510
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A19NW (NE)	718	1	333275 353450
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	722	1	333055 353520
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: High - Greater than or equal to 1 in 30 (3.3%) chance in any given year Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A19NW (NE)	730	1	333300 353450
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	740	1	333045 353540
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A19NW (NE)	747	1	333280 353479
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	750	1	333040 353550
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	768	1	333030 353570
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A18NE (N)	796	1	332995 353600
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A19NW (NE)	802	1	333350 353505
	Risk of Flooding from Rivers and Sea (RoFRS) Flood Risk: Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) Assessment: chance in any given year Suitability Scale: County to Town Source: Natural Resources Wales	A23SE (N)	974	1	333050 353775

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Postcode Sector Flood Insurance Claim Ratings Insurance Rating: Low Flood Insurance Claim Rating Postcode Sector: LL11 4	A13NW (SW)	0	5	332832 352763

EA / NRW / CEH Flood Data	Version	Update Cycle
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office Natural Resources Wales	October 2014 October 2014	Quarterly Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office Natural Resources Wales	October 2014 October 2014	Quarterly Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	October 2014	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	October 2014	Quarterly
Flood Defences Environment Agency - Head Office	October 2014	Quarterly
RMS Flood Data	Version	Update Cycle
RMS 75 year Flood Return Risk Management Solutions - Dee Catchment	December 2008	As notified
RMS 100 year Flood Return Risk Management Solutions - Dee Catchment	December 2008	As notified
RMS 1000 year Flood Return Risk Management Solutions - Dee Catchment	December 2008	As notified
BGS Flood Data	Version	Update Cycle
BGS Geological Indicators of Flooding British Geological Survey - National Geoscience Information Service	October 2013	Annually
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	Annually
EA/NRW Detailed River Network Data	Version	Update Cycle
Detailed River Network Lines Environment Agency - Head Office	March 2012	Annually
Detailed River Network Nodes Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage Environment Agency - Head Office	March 2012	Annually
EA/NRW Historic Flood Events Data	Version	Update Cycle
Historic Flood Events Environment Agency - Head Office	October 2014	Quarterly
Historical Flood Liabilities Landmark Information Group Limited	December 1999	Not Applicable
EA/NRW Risk of Flooding from Rivers and Sea (RoFRS)	Version	Update Cycle
RoFRS - Risk of Flooding from Rivers and Sea Natural Resources Wales	December 2014	Annually
Flood Insurance Risk Data	Version	Update Cycle
Postcode Sector Flood Insurance Claim Ratings Crawford and Company	January 2015	Quarterly

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Natural Resources Wales	
Centre for Ecology and Hydrology	 Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Risk Management Solutions	

Contact	Name and Address	Contact Details
1	Natural Resources Wales Ty Cambria, 29 Newport Road, Cardiff, CF24 0TP	Telephone: 0300 065 3000 Email: enquiries@naturalresourceswales.gov.uk
2	Landmark Information Group Limited Legal and Financial, Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9966 Fax: 0844 844 9980 Email: info@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk
3	British Geological Survey - Enquiry Service British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
4	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
5	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmark.co.uk Website: www.landmark.co.uk
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

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Appendix E – Dwr Cymru Welsh Water Sewer Plans and Correspondence

Miss Angharad Llewelyn
Waterco Limited
Waterco Ltd. Eden Court
Lon Parcwr Business Park
Ruthin
Denbighshire
LL15 1NJ

Date: 13/02/2015
Our Ref: PPA0000813

Dear Miss Llewelyn

Grid Ref: SJ3282852771 332828 352771
Site: Land adjacent Rhosddu Industrial Estate Wrexham
Development: Land adjacent Rhosddu Industrial Estate

We refer to the pre-planning enquiry relating to the above site, and we can provide the following comments in respect to the proposed development.

SEWERAGE

In relation to capacity to accept sewage flows from the proposed development we would confirm the following:

As you may observe from the attached public sewer record plan, the public sewerage system in the vicinity of the proposed development is generally of a foul type.

The foul only discharge from the proposed development can be accommodated within the public sewerage system.

In relation to the surface water flows from the proposed development, these will have to be disposed of separately by other means, such as using soakaways or discharging directly to a watercourse in liaison with the Land Drainage Authority and / or Environment Agency.

Please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

The Welsh Government have introduced new legislation that will make it mandatory for all developers who wish to communicate with the public sewerage system to obtain an adoption agreement for their sewerage with Dwr Cymru Welsh Water (DCWW). The Welsh Ministers Standards for the construction of sewerage apparatus and an agreement under Section 104 of the Water Industry Act (WIA) 1991 will need to be completed in advance of any authorisation to communicate with the public sewerage system under Section 106 WIA 1991 being granted by DCWW.

Welsh Government introduced the Welsh Ministers Standards on the 1st October 2012 and we would welcome your support in informing applicants who wish to communicate with the public sewerage system to engage with us at the earliest opportunity. Further information on the Welsh Ministers Standards is available for viewing on our Developer Services Section of our website - www.dwrcymru.com or on the Welsh Government website - www.wales.gov.uk

If any onsite or offsite sewers are to be offered for adoption they must be constructed to conform with the publication "Sewers for Adoption" - 7th Edition.

Please note that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. Should any drains or sewers be found that are not recorded on the public network plan please contact us to establish the location and status of the sewers as the presence of such assets may affect your proposal. Under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

If a connection is required to the public sewerage system, the developer is advised to contact us on Tel: 0800 917 2652.

SEWAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

We trust the above information is helpful. Our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation.

If you have any queries please contact Developer Services on 0800 917 2652 or via email at developer.services@dwrcymru.com



Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.
Mae Dwr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in
Welsh and English

Dŵr Cymru Cyf, a limited company registered in
Wales no 2366777. Registered office: Pentwyn Road,
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

Please quote our reference number in all communications and correspondence.

Yours faithfully,



Owain George
Lead Development Control Officer
Developer Services

Enc: Sewer Plan
Receipt

Demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.



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Appendix F – Surface Water Runoff Calculations

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref w1762
Client :	D S Holmes Builders Ltd			no of pages attached: 1 of 14
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham			
Section :	Surface Water Runoff			prefix SWR revision A
prepared by: Angharad Llewelyn date: 30/01/2015 checked by: Jordan Jones date: 26/02/2015 approved by: Aled Williams date: 09/03/2015				
<u>Comparison of pre-development and post-development run-off rates and volumes for greenfield or brownfield sites up to 200 Ha</u>				
<u>Site description</u> Proposed development of land adjacent to Rhosddu Industrial Estate, Wrexham, LL11 4RL. Development includes the erection of 50 dwellings with associated access road, parking and amenity areas see page SWR14. National Grid Reference (centre of site) approx. 332877E 352772N				
<u>Design Brief</u> To calculate both pre and post development rainfall runoff in accordance with the requirements of the Interim Code of Practice for Sustainable Drainage Systems. The peak runoff rates are to be estimated for return periods of up to 100 years and the runoff volumes are also to be calculated for a 1 in 100 year event of 6 hour duration. An allowance for climate change should be included only in the case of the post-development runoff calculation.				
<u>Documents Referenced</u> 1. Interim Code of Practice for Sustainable Drainage Systems (ICP-SUDS)(July 2004) 2. I o H Report 124 - Flood Estimation for Small Catchments (Marshall & Bayliss, 1994) 3. FSSR 16 runoff model - Fixed Percentage Runoff Method 4. Wallingford Procedure 1981 5. CIRIA C697 - The SUDS Manual (Feb 2007)				
<u>Basis of estimates</u> The Interim Code of Practice for Sustainable Drainage Systems (July 2004) ^[1] recommends the use of I o H 124 ^[2] for calculating peak greenfield runoff rates for sites up to 200 Ha. For site less than 50 Ha, the runoff should be calculated for 50 Ha and adjusted in proportion for the actual area. For sites greater than 200 Ha, the FEH runoff model should be used. CIRIA C697 ^[5] recommends the use of the FSSR 16 ^[3] runoff method for calculating the runoff volume for greenfield sites. For brownfield sites with a recognised drainage system, the Rational Method ^[4] has been used to calculate the runoff for the impermeable portions of the catchment (pre- & post development). For sites without a proper drainage system, the pre-development runoff is calculated as for a greenfield site, assuming soil type 5, regardless of type indicated on mapping. In accordance with Technical Advice Note: 15 (TAN15) and assuming a 100yr projection, a 30% on peak rainfall intensity increase in rainfall / runoff has been included to allow for the climate change anticipated in the years 2085 - 2115. Rainfall data is taken from maps in Defra / EA Tech Report W5-074/A Rev D (see page SWR10 & 11). Standard Average Annual Rainfall and Soil classification from maps in FSR Report (see page SWR8 & 9).				
N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.				

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
				prefix - page no. SWR2
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham			dated : 30/01/2015
Section :	Surface Water Runoff			

Basis of calculations

Peak run-off rate based on combination of IOH 124 method & Rational method

Run-off volume based on combination of FSSR 16 method & Rational method

N.B. Rational method used for impervious portion of total area for both pre and post development, allowing for pre-development of site where appropriate.

Catchment Details - input data

Proportions of soil type (from maps)

Prop S1	(fraction)		(x 0.15)
Prop S2	(fraction)	1.000	(x 0.30)
Prop S3	(fraction)		(x 0.40)
Prop S4	(fraction)		(x 0.45)
Prop S5	(fraction)		(x 0.50)
Total fraction		1.000	OK - total = 1
Calculated value of SOIL		0.300	
Calculated value of SPR		30.000	

$$\text{SOIL} = (0.15S1 + 0.3S2 + 0.4S3 + 0.45S4 + 0.5S5) / (S1 + S2 + S3 + S4 + S5)$$

$$\text{SPR} = 10S1 + 30S2 + 37S3 + 47S4 + 53S5$$

Region number	9	Select from list
AREA (Ha)	1.9110	(1Ha = 0.01Km ²)
SOIL (fraction)	0.300	Calculated above
SAAR (mm)	775	From FSR maps
CWI	115	From FSR graph
M5-60 rainfall (mm)	17.00	From Defra / EA maps
Ratio M5-60/M5-2d	0.30	From Defra / EA maps
M100-6hr rainfall (mm)	61.00	From Defra / EA maps
Storm duration (min)	15	(To give peak run-off-15 min for small site)
PIMP Pre-develop (%)	0.00	
PIMP Post-develop (%)	26.00	

Pre-dev drain system? **N/A** If "No", whole site assumed pervious - Soil type 5 & pre-dev PIMP taken as zero in following calcs

Climate change

Rainfall increase (%) **30** Based on TAN15 (for years 2085 - 2115)
Applied to post development case only

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220		Calculations		ref : w1762	
						prefix - page no. SWR3	
Scheme :		Land adjacent to Rhosddu Industrial Estate, Wrexham				dated :	
Section :		Surface Water Runoff				30/01/2015	

Pre- & Post-development peak run-off - Rational Method
(for impervious portions of catchment only)

Input data from sheet 2

Total area (Ha)	1.9110	from sht 2	
Pre dev PIMP (%)	0.00	from sht 2	Or zero if no pre-development drainage
Post dev PIMP (%)	26.00	from sht 2	
Pre-dev Imp area (Ha)	0.0000	calculated	
Post-dev Imp area (Ha)	0.4969	calculated	

M5-60min rain (mm)	17.00	from sht 2
Ratio "r"	0.30	from sht 2
Climate change (%)	30	from sht 2
Storm duration (min)	15.00	from sht 2

Rational Method

Peak run-off $Q_i = 2.78 C_v C_r i A$

Z1 Factor from table	0.590	pro-rata
Volume coeff C_v	0.75	(Typical 0.75)
Routing coeff C_r	1.30	(Standard value 1.3)

Calculation

M5-Dmin rain (mm)	10.030	M5-60min * Z1 factor
Climate change factor	1.30	Applied to post-development run-off only

Return period	1 yr	30 yr	100 yr
Z2 factor from table	0.610	1.520	1.910
Rainfall (mm)	6.12	15.25	19.16
Rainfall intensity (mm/hr)	24.5	61.0	76.6
Rainfall + CC (mm)	7.96	19.83	24.91
R. Intensity + CC (mm/hr)	31.8	79.3	99.6

Peak run-off rate

Pre-development Q_i (l/s)	0.00	0.00	0.00
Post-development Q_i (l/s)	42.83	106.80	134.14

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
				prefix - page no. SWR4
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham			dated : 30/01/2015
Section :	Surface Water Runoff			

Pre & Post development peak run-off

IOH124 method for pervious areas - Rational method for impervious areas

Input data from sheet 2

Total Area (Ha)	1.9110	from sht 2	
Pre-dev PIMP (%)	0.00	from sht 2	Or zero if no pre-development drainage
Post-dev PIMP (%)	26.00	from sht 3	
Pre-dev Perv area (Ha)	1.9110	Calculated	< 50 Ha or 0.5 Km2
Post-dev Perv area (Ha)	1.4141	Calculated	< 50 Ha or 0.5 Km2
Region number	9	from sht 2	
SOIL (fraction)	0.300	from sht 2	Pre-dev SOIL 0.300 from sht 2 or fixed 0.5 if no drainage system
SAAR (mm)	775	from sht 2	

Regional growth factors

Multiplier for 1/1 yrs	0.82	FSSR 14 table 1	(lookup table)
Multiplier for 1/30 yrs	1.77	FSSR 14 table 1	
Multiplier for 1/100 yrs	2.18	FSSR 14 table 1	

Climate change factor 1.3 Applied to post-development run-off only

Mean annual flood

$$Qbar = 0.00108 * (AREA/100)^{0.89} * SAAR^{1.17} * SOIL^{2.17}$$

	<u>Pre-development</u>		<u>Post development</u>	
Qbar' (for 50 Ha) (m3/s)	0.10265	basis of pro-rata	0.10265	basis of pro-rata
Qbar (actual area) (m3/s)	0.00392	pro-rata (A/50)*Qbar'	0.00290	pro-rata (A/50)*Qbar'

Peak flows (IoH 124)

Return period	1 yr	30 yr	100 yr	1 yr	30 yr	100 yr
Multiplier	0.820	1.770	2.180	0.820	1.770	2.180
Peak run-off (m ³ /s)	0.00322	0.00694	0.00855	0.00238	0.00514	0.00633
Peak + CC Qp (m ³ /s)	n/a	n/a	n/a	0.00309	0.00668	0.00823

Total peak flows (l/s)

Perv area flow-Qp (l/s)	3.22	6.94	8.55	3.09	6.68	8.23
Imp area flow -Qi (l/s)	0.00	0.00	0.00	42.83	106.80	134.14
Total peak flow Q (l/s)	3.22	6.94	8.55	45.92	113.48	142.37

Peak flow increase (l/s)	42.70	106.54	133.82
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N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
				prefix - page no. SWR5
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham			dated : 30/01/2015
Section :	Surface Water Runoff			

Pre & Post development run-off volume - FSSR 16
Applied to pervious and impervious areas
For 1 in 100yr 6hr storm

Input data from sheet 2

Total area (Ha)	1.9110	from sht 2	
Pre-dev PIMP (%)	0.00	from sht 2	Or zero if no pre-development drainage
Post-dev PIMP (%)	26.00	from sht 2	
Pre-dev Perv Area (Ha)	1.9110	calculated	
Pre-dev Imp Area (Ha)	0.0000	calculated	
Post-dev Perv Area (Ha)	1.4141	calculated	
Post-dev Imp Area (Ha)	0.4969	calculated	
SAAR (mm)	775.0	from sht 2	
CWI	115	from sht 2	
SPR (%)	30.00	from sht 2	

DPR _{CWI} (%)	-2.500	calc	0.25*(CWI-125)
DPR _{RAIN} (%)	5.879	calc	0.45*(P-40)^0.7 for P>40mm
PR _p (%) (perv area)	33.379	calc	SPR + DPR _{CWI} + DPR _{RAIN}
PR _i (%) (imp area)	100.000	defined	100% of impervious area

Rainfall data
(M100-360 min)

Rainfall P (mm)	61.00	from sht 2	
CC factor	1.30	from sht 2	
Rainfall Pcc (mm)	79.30	calculated	

Storm duration (mins)	360	defined	
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Run-off volume $V = PR/100 * A * 10000 * P/1000 = PR * A * P / 10$ (m3)

where PR = Percentage run-off PR_p or PR_i (%)
 A = Catchment area A_p or A_i (Ha)
 P = Rainfall depth (M100-360) P or Pcc (mm)
 (including climate change for post development only)

	Pre-dev	Post dev
	-	incl CC
Run-off volume- Pervious area (m3)	389.10	374.32
Run-off volume- Impervious area (m3)	0.00	394.01
Total run-off volume (m3)	389.10	768.33
Volume increase (m3)	379.23	

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme : Land adjacent to Rhosddu Industrial Estate, Wrexham		prefix - page no. SWR6		
Section : Surface Water Runoff		dated : 30/01/2015		

Z1 Factor for England & Wales (Values from BRE 365 - Table 1)

<u>Ratio</u>	<u>Rainfall Duration (mins)</u>					
<u>r</u>	15	30	60	120	240	360
0.12	0.450	0.670	1.000	1.480	2.170	2.750
0.15	0.480	0.690	1.000	1.420	2.020	2.460
0.18	0.510	0.710	1.000	1.360	1.860	2.250
0.20	0.530	0.723	1.000	1.340	1.800	2.163
0.21	0.540	0.730	1.000	1.330	1.770	2.120
0.24	0.560	0.750	1.000	1.300	1.710	2.000
0.25	0.567	0.753	1.000	1.290	1.687	1.960
0.27	0.580	0.760	1.000	1.270	1.640	1.880
0.30	0.590	0.770	1.000	1.250	1.570	1.780
0.33	0.610	0.780	1.000	1.230	1.530	1.730
0.35	0.617	0.787	1.000	1.223	1.497	1.690
0.36	0.620	0.790	1.000	1.220	1.480	1.670
0.39	0.630	0.800	1.000	1.210	1.460	1.620
0.40	0.633	0.803	1.000	1.207	1.447	1.603
0.42	0.640	0.810	1.000	1.200	1.420	1.570
0.45	0.650	0.820	1.000	1.190	1.380	1.510

Z2 Factors for England & Wales from table 6.2 - Wallingford Procedure

<u>M5 Rain</u>	<u>Diff</u>	<u>M1</u>	<u>M30</u>	<u>M100</u>
<u>(mm)</u>	<u>(mm)</u>			
		1	30	100
5.00	5	0.62	1.45	1.79
10.00	5	0.61	1.52	1.91
15.00	5	0.62	1.55	1.99
20.00	5	0.64	1.58	2.03
25.00	5	0.66	1.57	2.01
30.00	10	0.68	1.55	1.97
40.00	10	0.70	1.50	1.89
50.00	25	0.72	1.45	1.84
75.00	25	0.76	1.36	1.64
100.00	50	0.78	1.32	1.54
150.00	50	0.78	1.26	1.45
200.00		0.78	1.24	1.40
N.B. M30 Factors interpolated graphically				

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme :		Land adjacent to Rhosddu Industrial Estate, Wrexham		prefix - page no. SWR7
Section :		Surface Water Runoff		dated : 30/01/2015

Hydrological Regions (From Defra / EA R&D Tech Report W5-074/A Rev D)



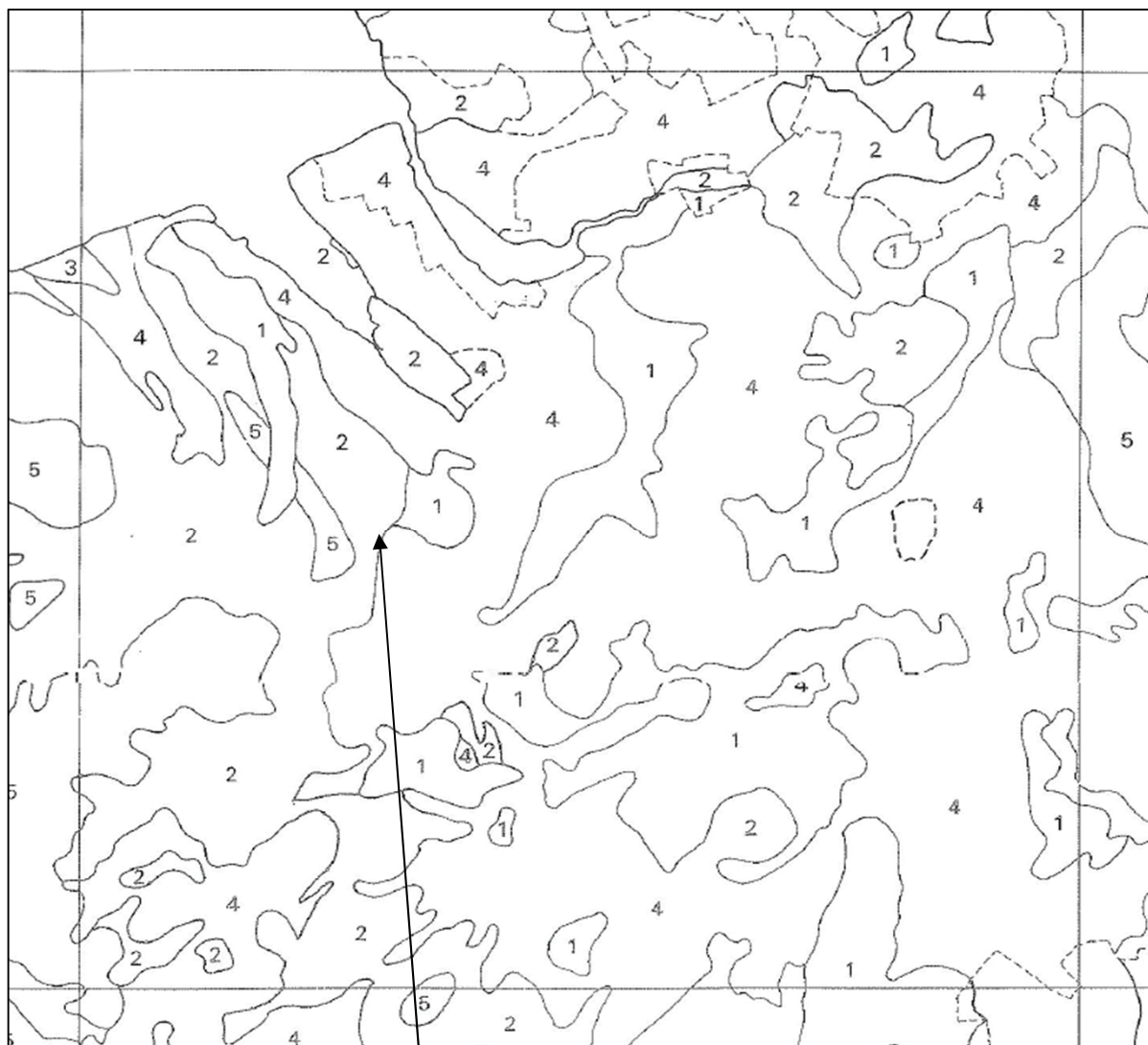
Figure 1.1 Hydrological regions of UK

Grid Ref: - 332877E 352772N - Hydrological Region 9

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

	Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham		prefix - page no. SWR8
Section :	Surface Water Runoff		dated : 30/01/2015

Soil Classification Chart

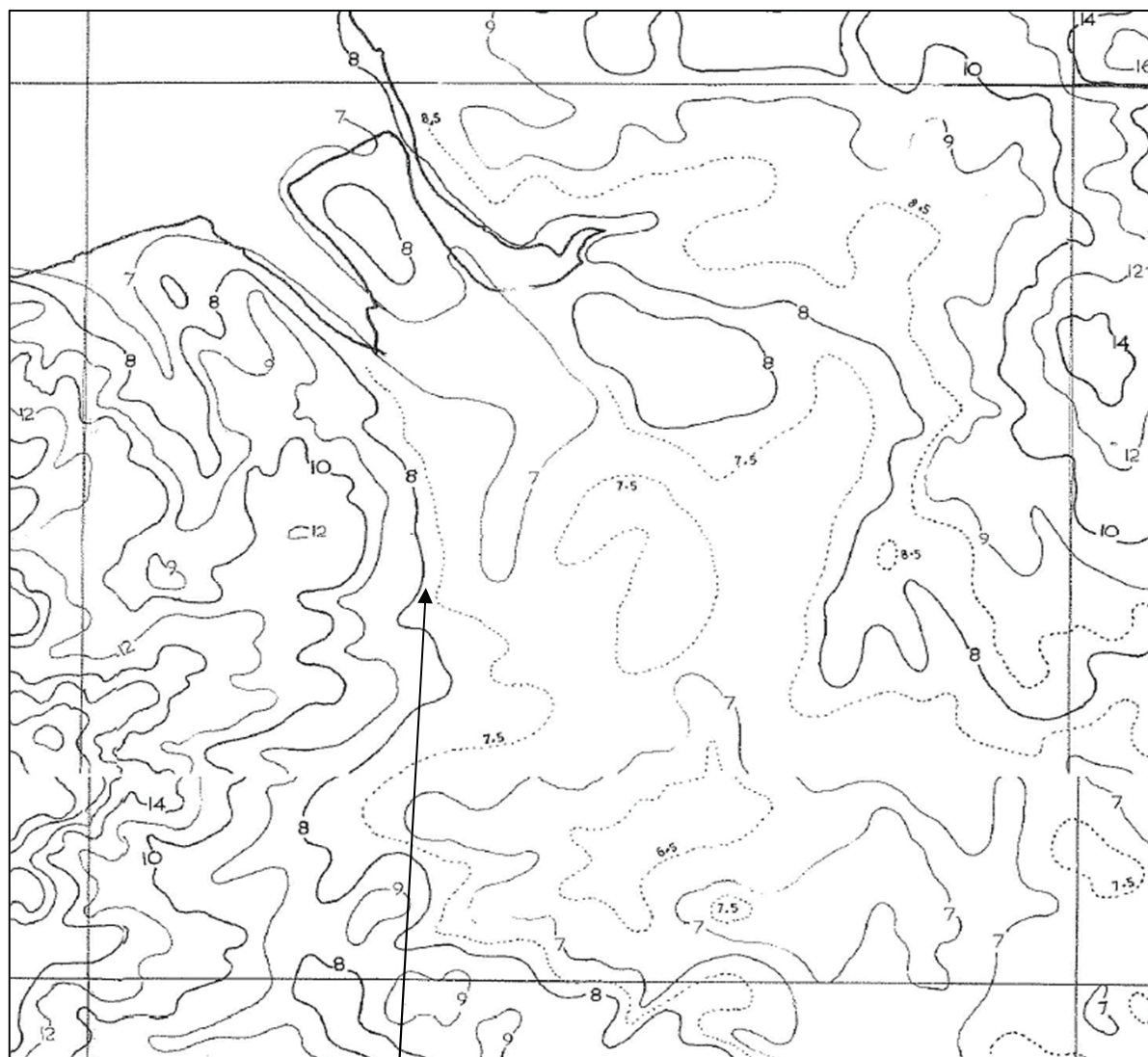


Grid Ref: - 332877E 352772N - Soil Classification = 2

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme : Land adjacent to Rhosddu Industrial Estate, Wrexham				prefix - page no. SWR9
Section : Surface Water Runoff				dated : 30/01/2015

Standard Annual Average Rainfall (SAAR) Chart



Grid Ref: - 332877E 352772N - SAAR = 775mm

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme : Land adjacent to Rhosddu Industrial Estate, Wrexham				prefix - page no. SWR10
Section : Surface Water Runoff				dated : 30/01/2015

M5-60min Rainfall + r (From Defra / EA R&D Tech Report W5-074/A Rev D)

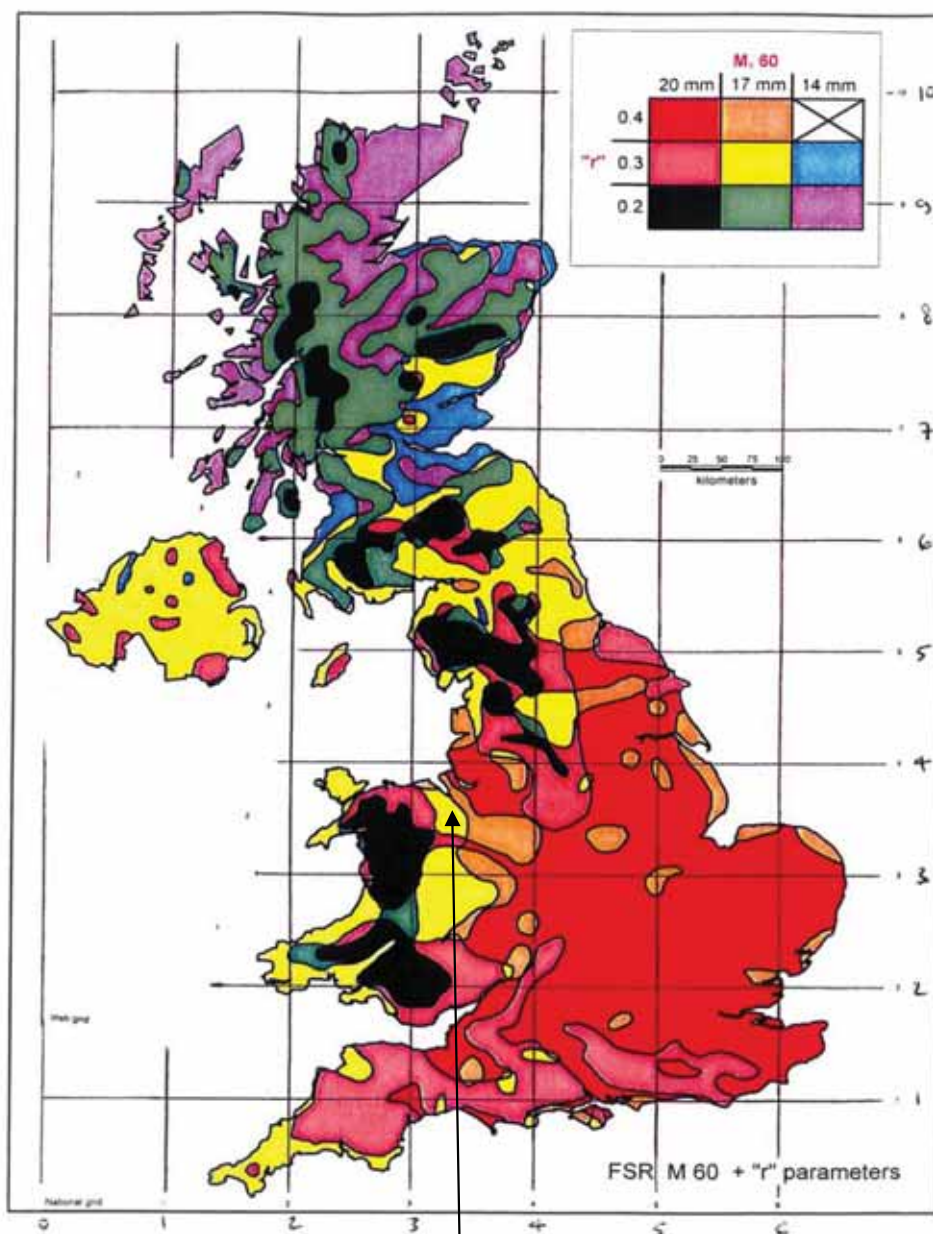


Figure 2 Hydrological rainfall zones of UK

Grid Ref: - 332877E 352772N - M5-60 = 17mm, 'r' = 0.3

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme : Land adjacent to Rhosddu Industrial Estate, Wrexham				prefix - page no. SWR11
Section : Surface Water Runoff				dated : 30/01/2015

M100 6hr Rainfall (From Defra / EA R&D Tech Report W5-074/A Rev D)

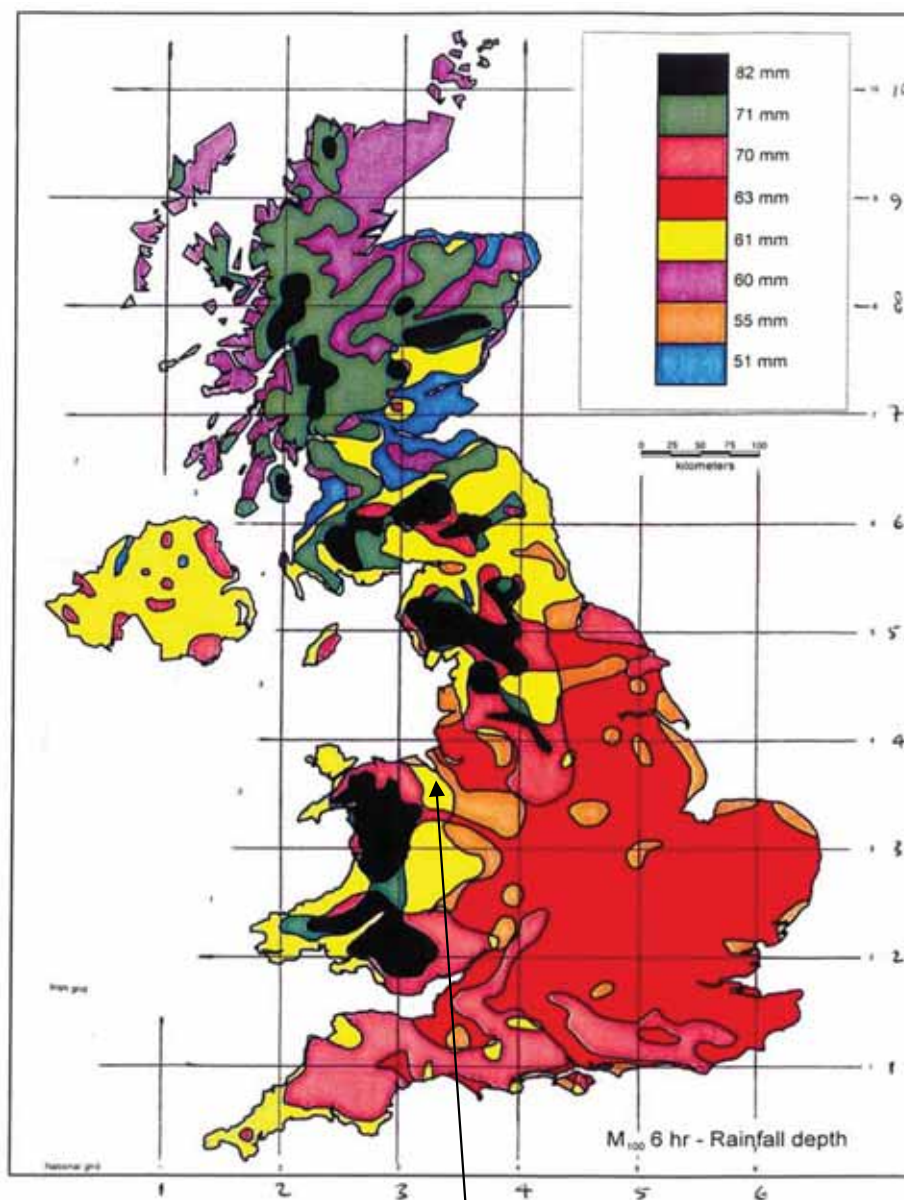


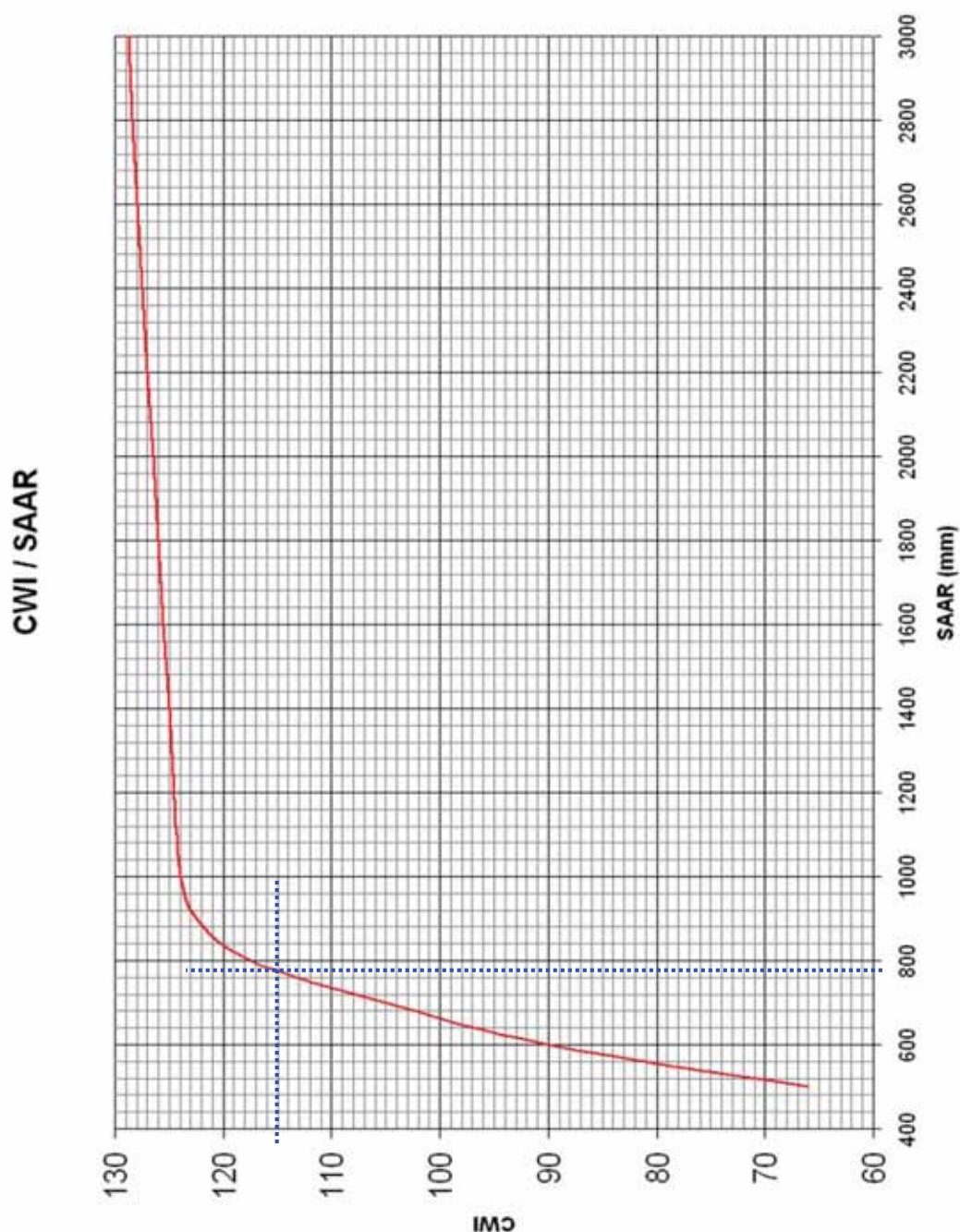
Figure 3.1 100 year 6 hour rainfall depths of UK

Grid Ref: - 332877E 352772N - M100-6hr Rainfall = 61mm

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

		Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme : Land adjacent to Rhosddu Industrial Estate, Wrexham		prefix - page no. SWR12		
Section : Surface Water Runoff		dated : 30/01/2015		

Catchment Wetness Index (CWI) vs Standard Annual Average Rainfall (SAAR)



N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

	Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham		prefix - page no. SWR13
Section :	Surface Water Runoff		dated : 30/01/2015

Pre-development Area



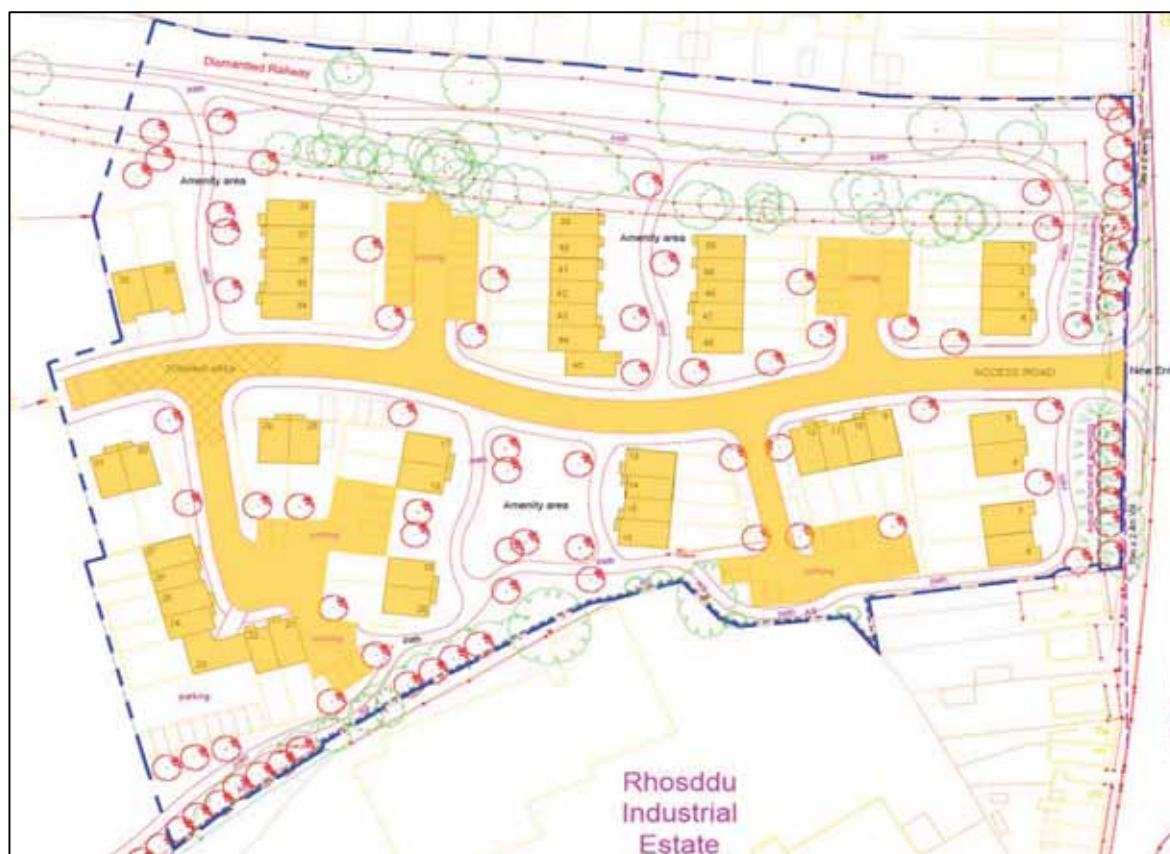
Total Area = 1.911ha
Permeable Area = 100% = 1.911ha
Impermeable Area = 0% = 0ha

 = Site Boundary

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.

	Eden Court, Lon Parcwr, Ruthin, 01824 702220	Calculations	ref : w1762
Scheme :	Land adjacent to Rhosddu Industrial Estate, Wrexham		prefix - page no. SWR14
Section :	Surface Water Runoff		dated : 30/01/2015

Post-development Area



Total Area = 1.911ha
Permeable Area = 74% = 14141.4m²
Impermeable Area = 26% = 4968.6m²

- = Site Boundary

N.B. These calculations are for planning purposes only and will need to be reviewed at the detailed design stage.