

The Alan Johnston Partnership

Flood Risk Assessment



Calder Vale Business Park Simonstone

Ironside Farrar Limited
3 Worsley Court
High Street
Worsley
Manchester
M28 3NJ

3861/SRG

May 2011

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CALDER VALE BUSINESS PARK **SIMONSTONE**

FLOOD RISK ASSESSMENT

1.0 Introduction

Fort Vale Engineering intends to undertake the development of a business park on vacant land adjacent to their existing facility at the site between Altham and Simonstone. Also included in the proposals is an extension to the existing building and a facilities building adjacent to the existing building.

The Environment Agency Flood Map indicates the site is situated in Flood Zone 1 with a chance of flooding of less than 0.1% (or 1 in 1000) but a Flood Risk Assessment, in accordance with Planning Policy Statement 25: Planning and Flood Risk (PPS25) is required to ensure the development is undertaken in a safe manner and to ensure the development will not increase the risk of flooding to other areas due to the development.

2.0 Site Description

The total site area, including the existing building and access roads, is approximately 8.80ha; the proposed development area for re-development is 5.68ha and is accessed via Simonstone Lane to the east of the site. The site is located between Altham to the south and Simonstone to the north, some 2km to the west of Padiham centre. The Location and Site plan are included in Appendices A and B.

The site is divided into two distinct areas on two general level platforms, the existing factory building to the south and the development site to the north. The eastern boundary of the site is formed by Simonstone Lane and the northern boundary by a dismantled railway embankment. Along the western boundary runs the Simonstone Brook that issues from under the railway embankment and beyond there are open, grassed fields extending to the River Calder.

As detailed previously, the southern area of the site is covered with the existing building, tarmac service yards and access roads. On the upper area of the site there is only a test facility building located in the northwest corner; the remainder of the site has the access roads and concrete base slabs of the former factory building, now demolished, still present. In the west the ground is rough grass where the former lagoons have been

infilled and covered. Immediately to the north of the site, adjacent to the former railway embankment, there is an existing gas compound to which access has to be maintained.

The nature of the site is illustrated by the aerial and site photographs that are included in Appendix C. Two photographs detail the nature of the site prior to demolition of the buildings on the northern area of the site.

Generally, the site lies on two distinct platforms with the existing factory building floor level being 68.95m and the associated access road and service yard varying from 69.13m to 68.73m. From this lower level there are roads that rise quickly to the upper level, generally around the 70.70m level; in the extreme north of the site the levels rise to approximately 73.20m on the edge of the existing railway embankment. On the eastern boundary, Simonstone Lane varies in level from 69.83m at the proposed development entrance up to 70.46m at the point where it crosses the former railway; the levels continue to fall in a southerly direction before rising again slightly towards the junction with Burnley Road (69.24m). Along the western boundary Simonstone Brook flows in a channel approximately 1.5m deep with the top of the bank on the site side varying from 72.29m in the north to 68.93m in the west. Generally the levels on the west side of Simonstone Brook are lower than the proposed development and vary from 72.00m in the north to 68.42m in the west. Levels on the fields continue to fall to the west and the River Calder. The topography of the site is indicated by the survey included in Appendix D.

3.0 Forms of Flooding

Planning Policy Statement 25: Development and Flood Risk (PPS 25) requires all forms of flooding to be considered as detailed in Annex C: Forms of Flooding.

3.1 Flooding from Rivers

The Environment Agency Flood Risk map is included as Appendix E.

It can be seen from the map that the site is located in Flood Zone 1 with a chance of flooding of less than 0.1% (or 1 in 1000). It can also be seen the River Calder runs around the south and west of the development site and is approximately 120m from the site at the closest point. Flood levels in the River Calder for the 100 year event have been obtained from the Environment Agency and are detailed in Appendix E. These levels have been compared to the existing topographical levels at the various locations and the results are detailed in Appendix F. Although these river levels do not include an allowance for future climate change, even at the most critical location; close to the junction of Burnley Road and

Simonstone Lane the level difference is 0.87m (between 68.15m and 69.02m). At the confluence of Simonstone Brook and the River Calder the Q₁₀₀ Level is 66.23m; the existing building on the site has a finished floor level of 68.95m and the proposed finished floor levels for the business park development vary from 70.00m to 71.40m.

The site should not, therefore, be at risk of flooding from rivers.

3.2 Flooding from the Sea

This is covered in Section 3.1 above.

3.3 Flooding from Land

Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding.

The site is generally at similar levels to the surrounding areas, or slightly above, apart from the former railway embankment to the north of the site. Due to the level differences along this boundary, a retaining wall will be required, this wall will require drainage to the rear and surface run-off from this small area will therefore be very limited. It is unlikely, therefore, that the site will be at risk of flooding from run-off from adjacent land.

Reference should also be made to section 4 relating to the site drainage.

3.4 Flooding from Groundwater

Reference to the BGS website: www.bgs.ac.uk/britainbeneath indicates the site is not located in a groundwater flooding zone.

The site is therefore not considered to be at risk of flooding from groundwater.

3.5 Flooding from Sewers

The record of Public Sewers has been obtained from United Utilities and is included in Appendix G.

There are no public foul, surface water or combined sewers crossing the site itself. The sewer records indicate a combined and a surface water sewer running to the west of the site in the open fields from north to south. The surface water sewer collects flow from a combined sewer overflow close to the former railway; the outfall location is on the River Calder,

upstream of the confluence with Simonstone Brook. The combined sewer continues under the River Calder and on through Altham to the south. The existing site has a separate system of foul and surface water drainage with foul discharging to a drain running alongside Simonstone Lane and surface water discharging to the public surface water sewer mentioned above to the west of the site via an existing 825mm diameter drain. Where possible, the existing sewers will be re-used within the proposed development.

The site is therefore not considered to be at risk of flooding from sewers.

3.6 Flooding from Reservoirs, Canals and Other Artificial Sources

There are no artificial sources of flood risk in the vicinity of the site.

4.0 Development and Drainage

The nature of the proposed development is indicated in Appendix I and consists of a number of new industrial units with associated access roads, service yards and car parking. As the extension to the existing building is being undertaken on the existing, surfaced service area there will be no increase in impermeable areas and this area has therefore been discounted from the calculations.

The existing development site area has significant impermeable areas that are presently draining to the surface water drain and eventually to the River Calder. Consultation with the Environment Agency and United Utilities (included in Appendix H) has resulted in the following advice: -

- Surface water run-off should be restricted to existing rates to ensure the proposed development does not contribute to an increased risk of flooding.
- Where appropriate, Sustainable Drainage Systems (SUDS) should be used in the drainage layout.
- The site should be drained on a separate system with only foul drainage connected to the foul sewer.

The existing impermeable area draining to the surface water system and ultimately to the River Calder, has been assessed as 3.024ha and the proposed impermeable area from the development as 4.699ha. Without on-site attenuation of flows, the run-off from the development would increase. The layout included in Appendix I has several measures incorporated within the layout to restrict the flows to the same or even slightly reduced run-off rates. Due to the anticipated ground conditions

and the space available within the development, the scope for incorporating SUDS measures involving infiltration techniques is limited. Where possible, attenuation basins can be included and these can be expanded from that shown to include small basins serving individual car park areas; it should also be possible to include swales in certain locations to serve car park and service area drainage. The remainder of the attenuation of flows will be undertaken using flow controls such as orifice plates and vortex flow controls with the storage occurring in oversized pipes. The table below details the existing run-off rates and the proposed rates from the development. Detailed hydraulic calculations are included in Appendix J.

Return Period (years)	Existing Run-off (l/s)	Proposed Run-off (l/s)	Reduction of flow (%)
1	275.7	261.8	5
30	645.7	610.2	5.5
100+30%CC	1012.4	842.5	16.8

In the 100year event plus a 30% allowance for future climate change there are isolated locations where the capacity of the system is exceeded; these locations have been located in car park areas where the volumes can be safely accommodated away from the buildings. The locations are indicated in Appendix I.

5.0 Conclusions

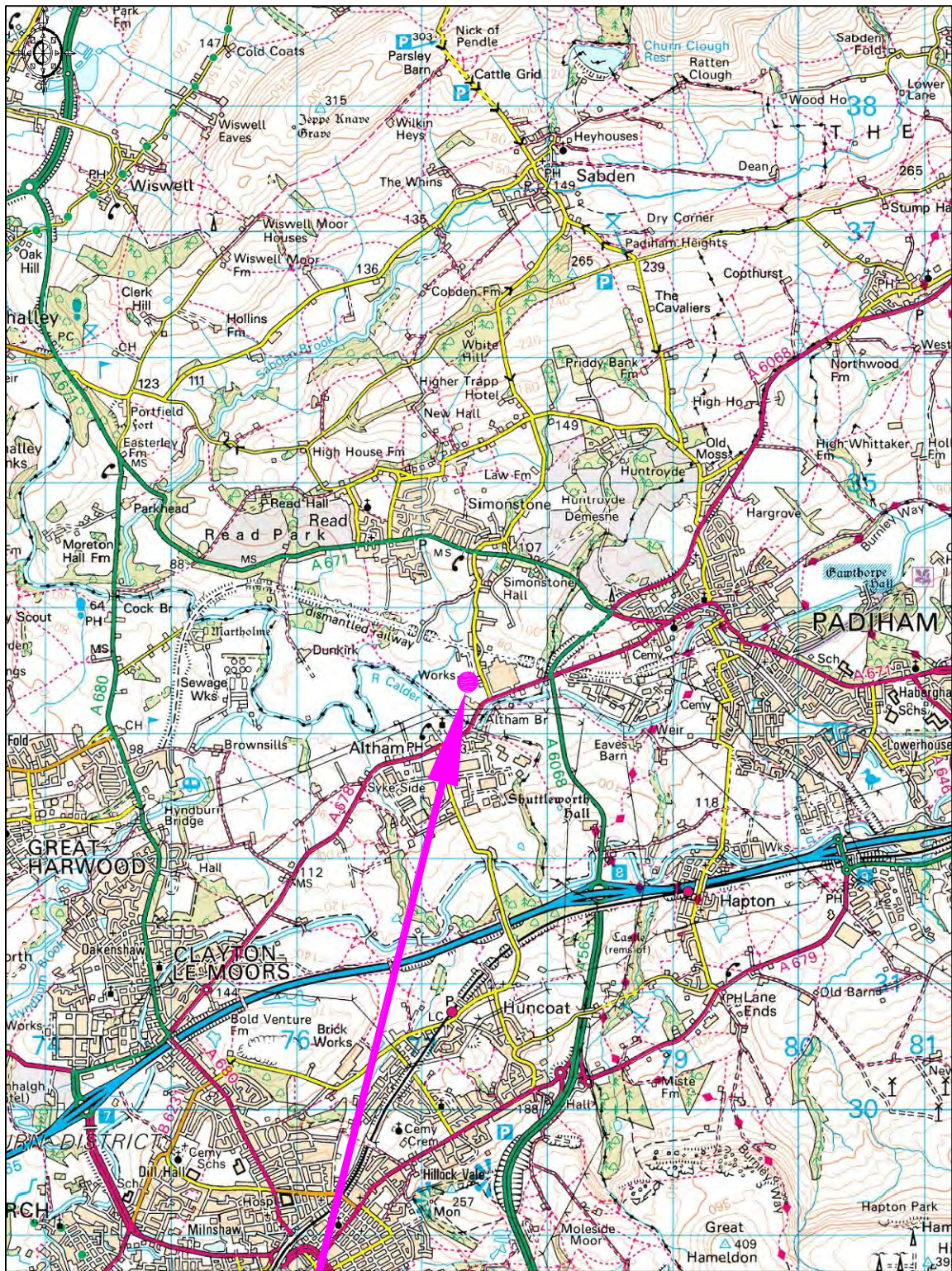
- The site is located within Flood Zone 1 with a low probability of flooding.
- Attenuation can be incorporated into the surface water drainage layout such that the flows from the site are limited to the existing run-off rates. Allowance for future climate change has been made in the assessment of the attenuation volumes required.
- There is no surface flooding from the surface water sewerage system on the site in the 1 in 30 year event; there is some flooding in the 1 in 100 year event plus climate change allowance of 30% but this flooding can be accommodated within car park areas on the site.
- Where possible, SUDS measures in accordance with CIRIA Report C697 have been included in the drainage layout.
- The Q_{100} levels on the River Calder in the critical locations do not result in flooding of the site

6.0 Recommendations

- SUDS facilities should be incorporated in the drainage network where possible and should be designed in accordance with CIRIA Report C697.
- Attenuation measures should be included within the drainage layout to restrict the proposed flows from the development to less than the existing rates and should include an allowance for future climate change.
- The extension of the existing building will have a finished floor level to match the existing of 68.95m; the proposed development will have a minimum finished floor level of 70.00m to ensure the development is protected against the risk of flooding.
- The external levels should be designed to ensure overland flood routes exist through the development for use in exceptional circumstances.
- It will be particularly important to ensure the car park and service yard area levels provide the required volumes of surface storage volume.

APPENDIX A

Location Plan

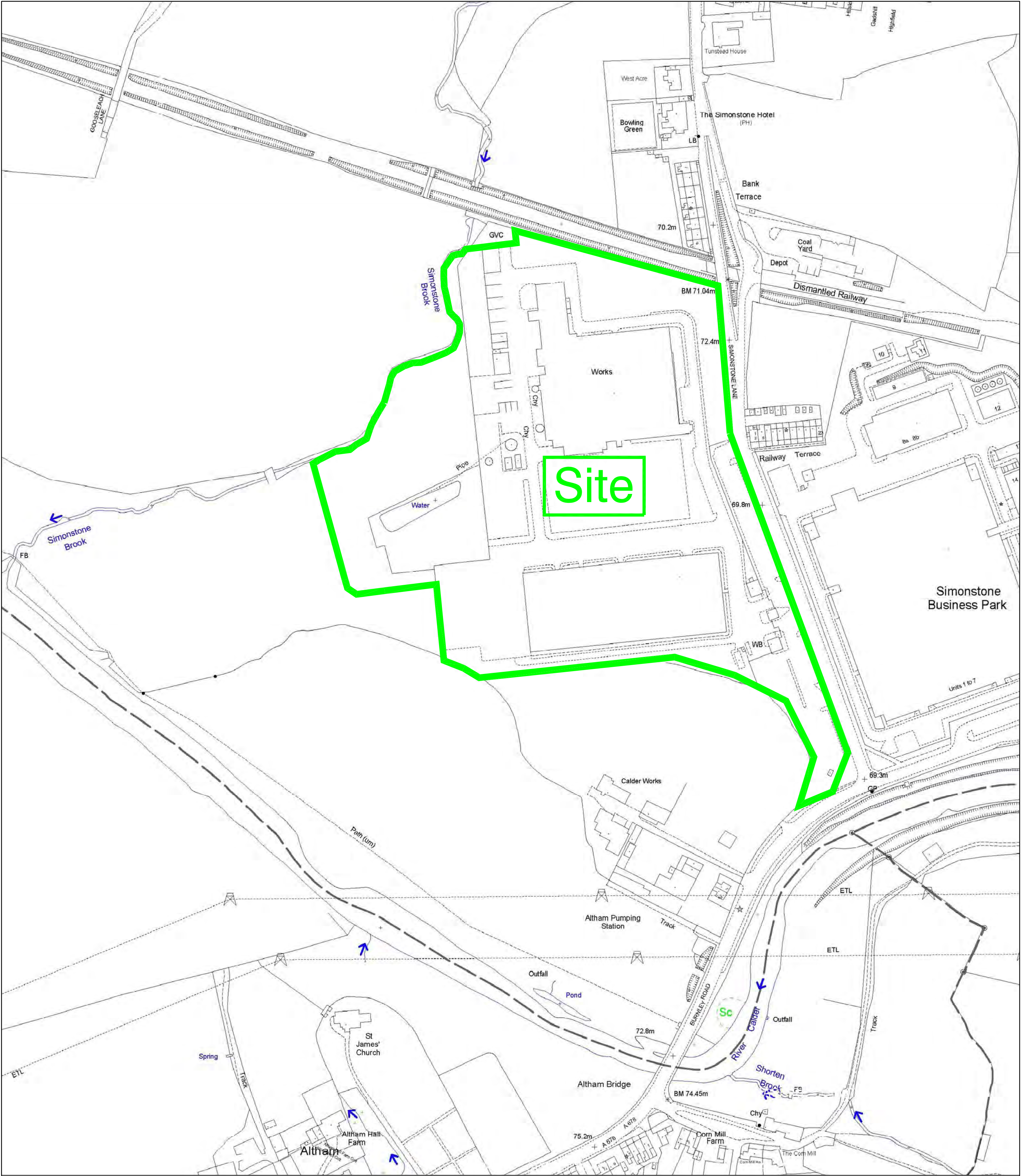


Site Location

   Original Size A4	Project Calder Vale Business Park Simonstone Client The Alan Johnston Partnership Title Location Plan Copyright Acknowledgement ©Crown Copyright. All rights reserved. Licence No. AL1000117966. Drawn NB Date April 11 Checked By SRG Scale 1:50,000	IronsidesFarrar Environmental Planners Civil Engineers Landscape Architects Graphic Design 3 Worsley Court MANCHESTER M28 3NU Tel. 0161 703 8801 Fax. 0161 703 8279 manchester@ironsidesfarrar.com EDINBURGH BELLSHILL Drawing No. 3861/App A Revision
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APPENDIX B

Existing Site Plan



APPENDIX C

Site & Aerial Photographs



Original Size

A3

Quality Ass.



Project
**Calder Vale Business Park
Simonstone**

Client
**The Alan Johnston
Partnership**

Title
**Aerial
Photograph**

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Drawn

NB

Date

April 11

Checked By

SRG

Scale

No Scale

IronsideFarrar
EnvironmentalConsultants

EnvironmentalPlanners
CivilEngineers
LandscapeArchitects
GraphicDesign

3 Worsley Court **MANCHESTER** M28 3NJ
Tel. 0161 703 8801 Fax. 0161 703 8279
manchester@ironsidefarrar.com

EDINBURGH BELLSHILL

Drawing No. Revision

3861/App C



Existing building viewed to West



Existing building viewed to Simonstone Lane



Proposed development Site viewed to West



Proposed development Site viewed to Simonstone Lane



Area for Proposed Extension to existing building



Access to open fields on West boundary



View North to Proposed development area



Proposed development area viewed North West



Simonstone Brook on North West boundary



Proposed development area, view South along Western boundary



Proposed development area viewed South to existing buildings



Existing Slabs and Roads on development area



View South East across proposed development area



View South to existing buildings



Simonstone Lane/Burnley Road junction viewed to South junction



View East along Burnley Road at junction with Simonstone Lane



Site access on Simonstone Lane



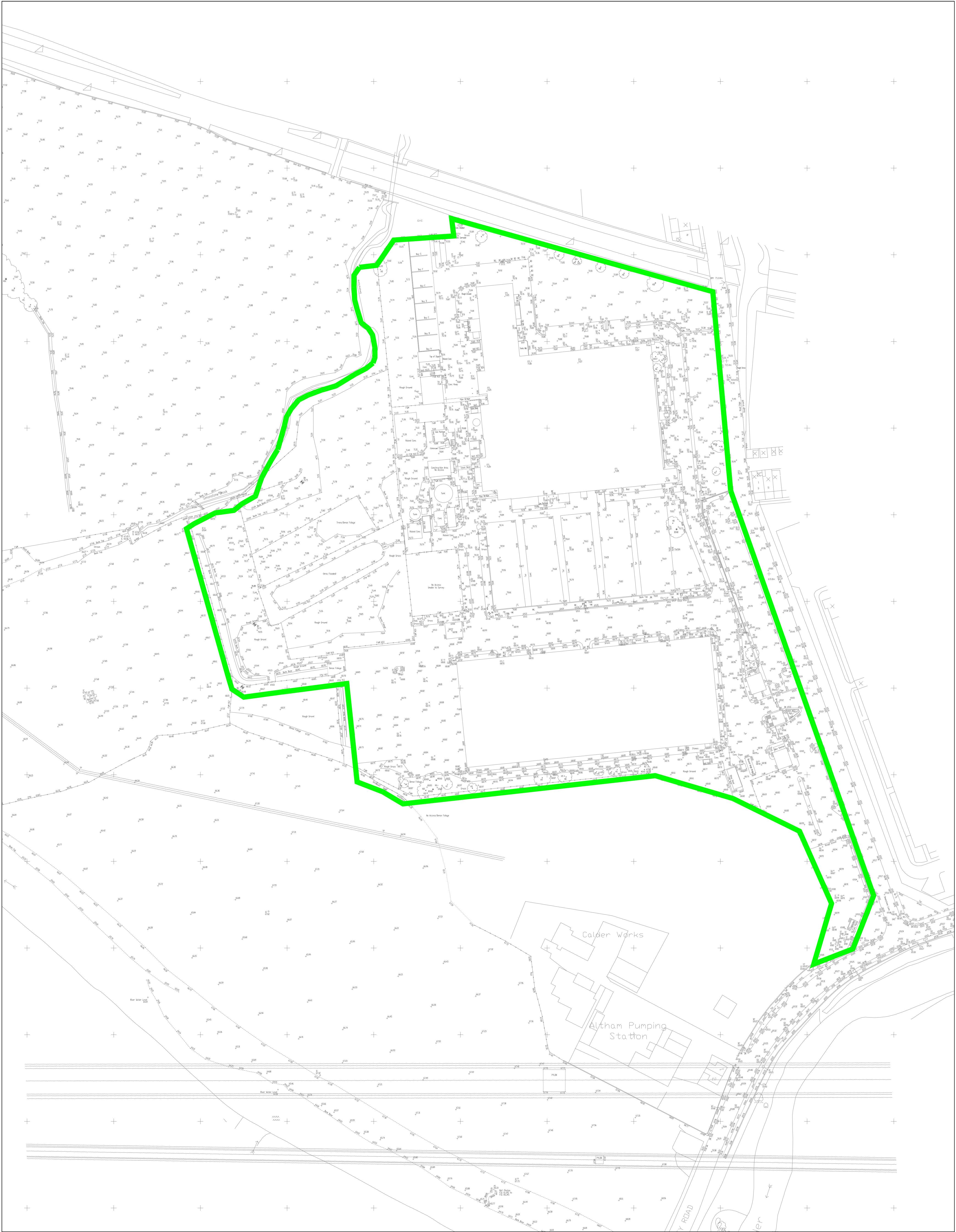
Existing Site prior to demolition



Existing Site prior to demolition

APPENDIX D

Topographical Survey



 North Point	Project Calder Vale Business Park Simonstone			Ironsides Farrar Environmental Consultants Planners Civil Engineers Landscape Architects Graphic Design 3 Worsley Court, MANCHESTER M28 3NU Tel. 0161 703 8801 Fax. 0161 703 8279 manchester@ironsidesfarrar.com EDINBURGH BELLSHILL
	Client The Alan Johnston Partnership			
	Title Topographical Survey			
	Original Size A1			
Quality Ass. 	Copyright Acknowledgement ©Crown Copyright. All rights reserved. Licence No. AL1000117966.	Drawn NB Date April 11	Checked By SRG Scale 1:1000	Drawing No. 3861/App D

APPENDIX E

Environment Agency Flood Risk Map & Data

Flood Map (PRE409) - Simonstone Lane, Simonstone

National Grid
Reference:
SD 77380 33475



North West Region - North Area

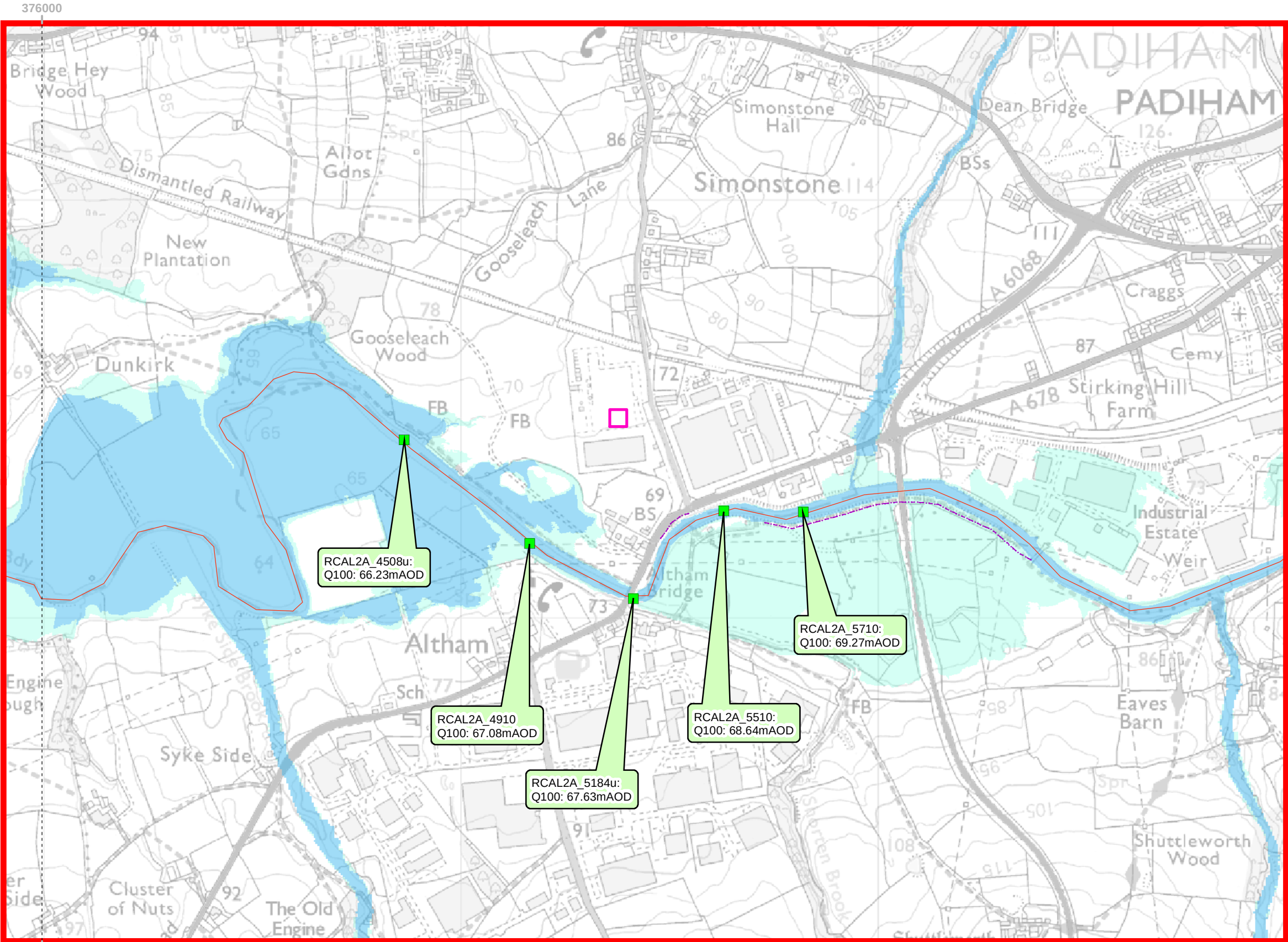
Lutra House, Dodd Way, Off Seedlee Road,
Walton Summit, Bamber Bridge. Preston. PR5 8BX.

Tel: 08707 506 506 www.environment-agency.gov.uk

Produced by
Flood Risk Management

Map produced on:
19th April 2011

- Site
- Node Point Locations
- Main River
- Flood Map Defences
- Historic Flooding
- Flood Zone 3
- Flood Zone 2



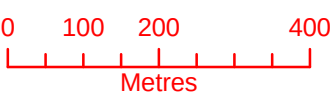
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Flood Zone 3: Shows the area that could be affected by flooding from rivers or the sea, if there were no defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) chance or greater of happening each year.
- or from a river by a flood that has a 1% (1 in 100) chance or greater of happening each year.

Flood Zone 2: Shows the additional extent of an extreme flood from rivers or the sea, if there were no defences. These outlying areas are likely to be affected by a major flood, that has up to a 0.1% (1 in 1000) chance of occurring each year.

Historic Flooding:
No relevant historic flooding could be found.
Other Information
Levels (mAOD) at node points from Burnley, Nelson and Colne Strategy (2010).



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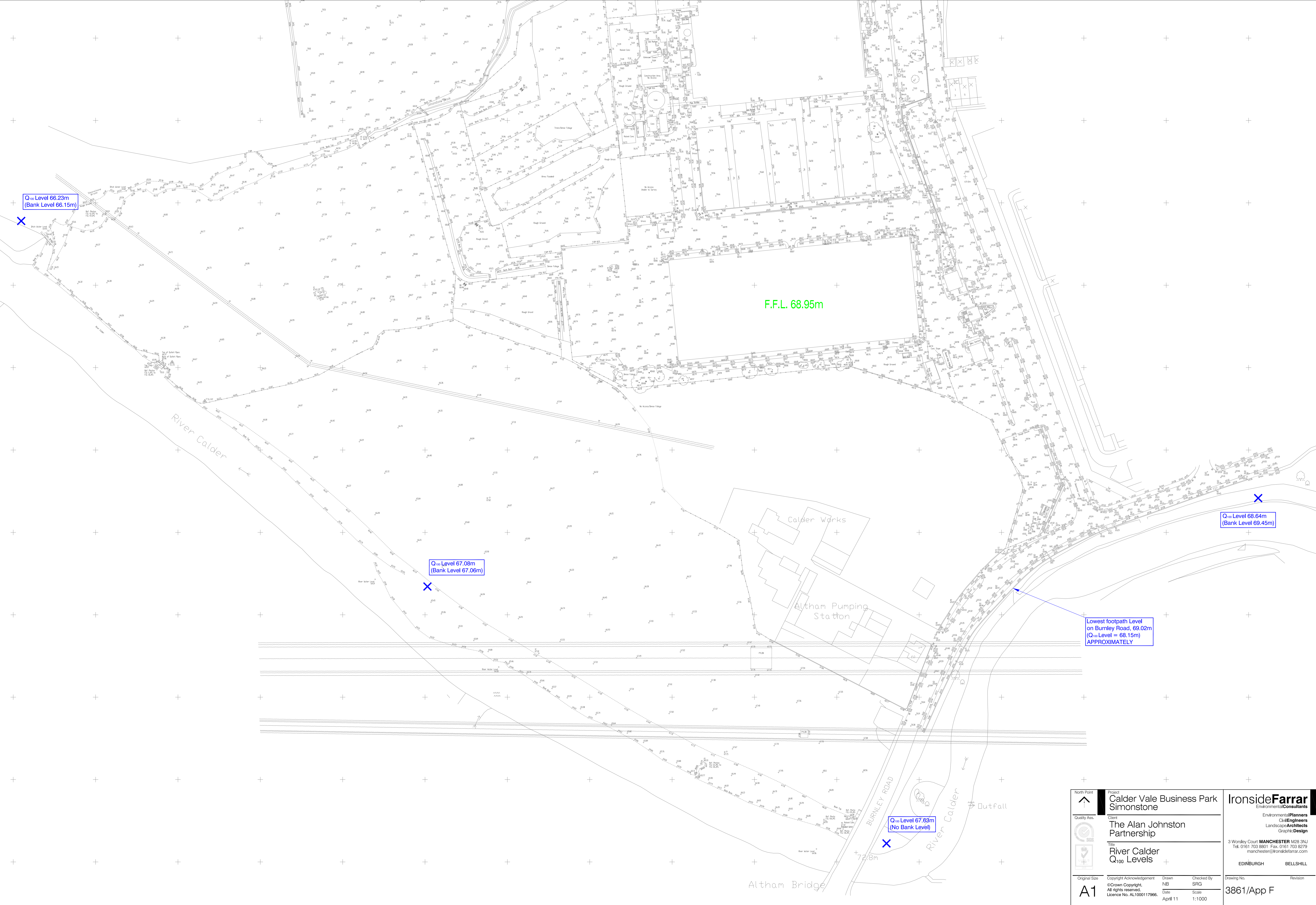
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APPENDIX F

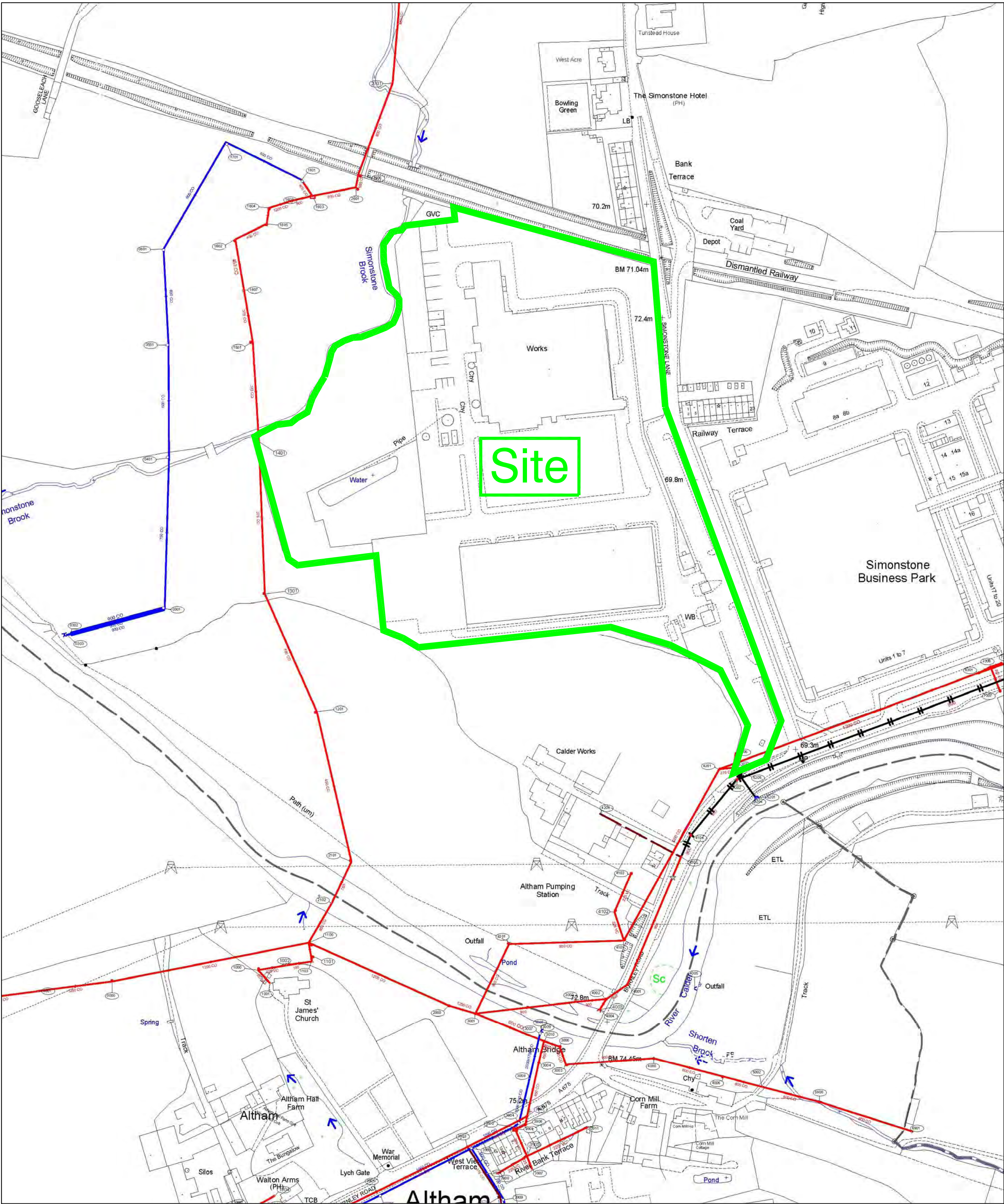
River Calder Q₁₀₀ Levels



 North Point Quality Ass. Original Size	Project Calder Vale Business Park Simonstone	IronsideFarrar EnvironmentalPlanners CivilEngineers LandscapeArchitects GraphicDesign 3 Worsley Court, MANCHESTER M28 3NU Tel: 0161 703 8801 Fax: 0161 703 8279 manchester@ironsidefarrar.com EDINBURGH BELLSHILL	
	Client The Alan Johnston Partnership		
	Title River Calder Q100 Levels		
	Copyright Acknowledgement ©Crown Copyright. All rights reserved. Licence No. AL1000117966		Drawn NB Date April 11
A1		Drawing No. 3861/App F	Revision

APPENDIX G

Sewer Records



APPENDIX H

**Consultation with Environment Agency
&
United Utilities**

Ribble Valley Borough Council
Development Control
Council Offices Church Walk
Clitheroe
Lancashire
BB7 2RA

Our ref: CE/2011/104640/01-L01
Your ref: 3/2011/0222
Date: 21 April 2011

Dear Sir/Madam

**PROPOSED EXTENSION TO REAR OF BUILDING 'S' TO PROVIDE NEW
DESPATCH AND STORAGE AREA ANCILLARY TO INDUSTRIAL USE OF
BUILDING AND ERECTION OF STAND ALONE ANCILLARY FACILITIES
BUILDING
FORT VALE ENGINEERING LTD, CALDER VALE PARK, SIMONSTONE LANE,
SIMONSTONE**

Thank you for referring the above application which was received on 1 April 2011.

We have no objection in principle to the proposed development but wish to make the following comments:-

Surface water run off from this site should be restricted to existing rates in order that the proposed development does not contribute to an increased risk of flooding, ideally through the use of Sustainable Drainage Systems (SUDS). Support for the SUDS approach to managing surface water run-off is set out in paragraph 22 of Planning Policy Statement (PPS) 1: Delivering Sustainable Development and in more detail in PPS 25: Development and Flood Risk at Annex F. Paragraph F8 of the Annex notes that "Local Planning Authorities should ensure that their policies and decisions on applications support and complement Building Regulations on sustainable rainwater drainage". These not only attenuate the rate of surface water discharged to the system but help improve the quality of the water. They can also offer other benefits in terms of promoting groundwater recharge and amenity enhancements. This approach involves using a range of techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands.

Approved Document Part H of the Building Regulations 2000 establishes a hierarchy for surface water disposal, which encourages a SUDS approach. Under Approved Document Part H the first option for surface water disposal should be the use of

Environment Agency
PO Box 519, South Preston, Lancashire, PR5 8GD.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Cont/d..

SUDS, which encourage infiltration such as soakaways or infiltration trenches. In all cases, it must be established that these options are feasible, can be adopted and properly maintained and would not lead to any other environmental problems. For example, using soakaways or other infiltration methods on contaminated land carries groundwater pollution risks and may not work in areas with a high water table. Where the intention is to dispose to soakaway, these should be shown to work through an appropriate assessment carried out under Building Research Establishment (BRE) Digest 365.

Flow balancing SUDS methods which involve the retention and controlled release of surface water from a site may be an option for some developments at a scale where uncontrolled surface water flows would otherwise exceed the local greenfield run off rate. Flow balancing should seek to achieve water quality and amenity benefits as well as managing flood risk.

Further information on SUDS can be found in:

- PPS25 page 33 Annex F
- PPS25 Practice Guide
- CIRIA C522 document Sustainable Drainage Systems-design manual for England and Wales
- CIRIA C697 document SUDS manual
- The Interim Code of Practice for Sustainable Drainage Systems

The Interim Code of Practice provides advice on design, adoption and maintenance issues and a full overview of other technical guidance on SUDS. The Interim Code of Practice is available on both the Environment Agency's website www.environment-agency.gov.uk and CIRIA's website www.ciria.org.uk

Foul drainage from the development of this site must be drained to the foul sewer. Surface water from any areas likely to be contaminated should be connected to the foul sewer for which the formal consent of United Utilities Limited is required.

We recommend that the developer considers the following, as part of the scheme:-

- Water management in the development, including, dealing with grey waters
- Use of sustainable forms of construction including recycling of materials
- Energy efficient buildings

A copy of this letter has been sent to the applicant/agent.

Yours faithfully

Philip Carter
Planning Liaison Officer

Direct dial 01772 714219
Direct fax 01772 697032
Direct e-mail philip.carter@environment-agency.gov.uk

cc JWPC Limited

- 8 APR 2011

FOR THE
ATTENTION OF

Direct Line 01925 678308
Direct Fax 01925 537516
Jillian.Walker@uuplc.co.uk

Jane Tucker
Ribble Valley Borough Council
Council Officers, Church Walk
Clitheroe
BB7 2RA

Your ref	3/2011/0222
Our ref	DC/11/1410
Date	07-APR-11

Dear Ms Tucker,

**Location: Fort Vale Engineering Ltd Calder Vale Park Simonstone Lane
Simonstone Burnley BB12 7ND**

**Proposal: Extend rear of building S new despatch & storage area. Erection of stand
alone facilities building**

Thank you for your planning consultation of 6 April 2011.

This response is based on the details submitted on the planning application form; any changes to the planning application will invalidate this response.

I will have no objection to the proposal provided that the following conditions are met: -

- In accordance with PPS25 surface water should not be allowed to discharge to foul/combined sewer as stated in the planning application. This prevents foul flooding and pollution of the environment. This site must be drained on a separate system, with only foul drainage connected into the foul sewer. Surface water should discharge to the soakaway/watercourse/surface water sewer and may require the consent of the Environment Agency. If surface water is allowed to be discharged to the public surface water sewerage system we may require the flow to be attenuated to a maximum discharge rate determined by United Utilities.

The applicant must discuss full details of the site drainage proposals with John Lunt via Planning.Liaison@uuplc.co.uk

A separate metered supply to each unit will be required at the applicant's expense and all internal pipework must comply with current water supply (water fittings) regulations 1999.

Should this planning application be approved, the applicant should contact our Service Enquiries on 0845 7462200 regarding connection to the water mains/public sewers.

United Utilities encourages the use of water efficient designs and development wherever this is possible. The most up to date advice for water efficiency and water efficiency

products can be found at Water wise who have recently published a best practice guide on water efficiency for new developments. We would encourage utilisation of the following water efficiency activities:

Installing the latest water efficient products, such as a 4.5l flush toilet instead of the 6l type. Minimise run lengths of hot and cold water pipes from storage to tap/shower areas. This minimises the amount of waste during the time the water goes from cold to hot. Utilising drought resistant varieties of trees, plants and grasses when landscaping. Install water efficient appliances such as dishwashers, washing machines.

United Utilities offers a fully supported mapping service at a modest cost for our electricity, water mains and sewerage assets. This is a service, which is constantly updated by our Map Services Team (Tel No: 0870 7510101) and I recommend that the applicant give early consideration in project design as it is better value than traditional methods of data gathering. It is, however, the applicant's responsibility to demonstrate the exact relationship on site between any assets that may cross the site and any proposed development.

Please note that a copy of these comments has been forwarded to the agent.

Yours Sincerely

Jillian Walker
United Utilities
Asset Protection

APPENDIX I

Proposed Development & Drainage



KEY

S.W. Foul
Proposed sewer
1200mm dia I.C.
Proposed Plot Level
Existing Foul sewer
Existing S.W. sewer
Proposed highway gully
Hydraulic model branch and pipe number

Proposed level
Existing Level
Tactile Paving & Dropped Kerb
100yr + 30% Climate Change Significant flood location
Existing Sewer to be abandoned
100yr + 30%CC Overland flood route

Return Period (Critical Storm)	Existing S.W Run-off	Proposed S.W Run-off	Percentage Reduction
1 yr	275.7l/s	261.8l/s	5.1%
30 yr	645.7l/s	618.2l/s	4.3%
100 yr + 30% CC	1012.4l/s	842.5l/s	16.8%

North Point

Project
Calder vale Business Park, Simonstone

Quality Ass.
Client
The Alan Johnston Partnership

Proposed Development & Drainage Layout

Original Size
A0

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Drawn
JCM

Checked By
SRD

Date
May 2011

Scale
1:500

IronsideFarrar
Environmental Consultants
Civil Engineers
Landscape Architects
Graphic Design

3 Wordsley Court MANCHESTER M20 3NU
Tel: 0161 703 8801 Fax: 0161 703 8279
manchester@ironsidefarrar.com

EDINBURGH BELLSHILL

Drawing No.
3861/App I

Revision

APPENDIX J

Hydraulic Calculations

Ironsides Farrar Ltd		Page 1
3 Worsley Court High Street Worsley Manchester	Calder Vale Business Park Simonstone Existing S.W Run-Off	
Date March 2011 File 3861 Existing S.W...	Designed By JCM Checked By	
Micro Drainage	Network W.12.4.1	

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)
1.000	26.500	0.080	331.3	0.000	4.00	0.600	o	225
1.001	54.500	0.620	87.9	0.504	0.00	0.600	o	225
1.002	48.000	1.149	41.8	1.512	0.00	0.600	o	600
1.003	13.200	0.061	216.4	1.008	0.00	0.600	o	825
1.004	122.570	0.600	204.3	0.000	0.00	0.600	o	825
1.005	70.640	0.210	336.4	0.000	0.00	0.600	o	825

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	SW13	69.920	69.000	0.695	69.870	68.920	0.725		1050
1.001	SW12	69.870	68.920	0.725	70.720	68.300	2.195		1050
1.002	SW11	70.720	67.925	2.195	68.940	66.776	1.564		1500
1.003	SW07	68.940	66.551	1.564	68.800	66.490	1.485		1800
1.004	SW07A	68.800	66.490	1.485	68.140	65.890	1.425		1800
1.005	Ex MH	68.140	65.890	1.425	67.650	65.680	1.145		1800

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Storm Duration (mins)	30
Ratio R	0.293		

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Micro Drainage		Network W.12.4.1						
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF Analysis Timestep Fine Inertia Status OFF DTS Status ON								
Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 30								
PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	1	0%	30/15 Summer				
1.001	15 Winter	1	0%	30/15 Summer	30/15 Summer			13
1.002	15 Winter	1	0%					
1.003	15 Winter	1	0%	100/15 Summer				
1.004	15 Winter	1	0%	100/15 Summer				
1.005	15 Winter	1	0%	100/15 Summer				
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	SW13	69.086	-0.139	0.000	0.01	0.0	0.3	OK
1.001	SW12	69.086	-0.059	0.000	0.89	0.0	47.5	OK
1.002	SW11	68.109	-0.416	0.000	0.20	0.0	190.5	OK
1.003	SW07	66.933	-0.443	0.000	0.44	0.0	286.0	OK
1.004	SW07A	66.787	-0.528	0.000	0.27	0.0	279.7	OK
1.005	Ex MH	66.237	-0.478	0.000	0.37	0.0	275.7	OK
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Micro Drainage	Network W.12.4.1	

**30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm**

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%	30/15 Summer				
1.001	15 Winter	30	0%	30/15 Summer	30/15 Summer			13
1.002	15 Winter	30	0%					
1.003	15 Winter	30	0%	100/15 Summer				
1.004	15 Winter	30	0%	100/15 Summer				
1.005	15 Winter	30	0%	100/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	SW13	69.874	0.649	0.000	0.12	0.0	3.1	FLOOD RISK
1.001	SW12	69.874	0.729	4.431	1.48	0.0	79.1	FLOOD
1.002	SW11	68.221	-0.304	0.000	0.48	0.0	447.7	OK
1.003	SW07	67.376	0.000	0.000	1.04	0.0	682.3	OK
1.004	SW07A	66.990	-0.325	0.000	0.65	0.0	662.5	OK
1.005	Ex MH	66.486	-0.229	0.000	0.86	0.0	645.7	OK

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**100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm**

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	30 Winter	100	+30%	30/15 Summer				
1.001	30 Winter	100	+30%	30/15 Summer	30/15 Summer			13
1.002	15 Winter	100	+30%					
1.003	15 Winter	100	+30%	100/15 Summer				
1.004	15 Winter	100	+30%	100/15 Summer				
1.005	15 Winter	100	+30%	100/15 Summer				

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	SW13	69.916	0.691	0.000	0.14	0.0	3.7	FLOOD RISK
1.001	SW12	69.916	0.771	46.064	1.50	0.0	80.3	FLOOD
1.002	SW11	68.403	-0.122	0.000	0.76	0.0	704.0	OK
1.003	SW07	67.774	0.398	0.000	1.68	0.0	1097.5	SURCHARGED
1.004	SW07A	67.471	0.156	0.000	1.04	0.0	1058.7	SURCHARGED
1.005	Ex MH	66.860	0.145	0.000	1.35	0.0	1012.4	SURCHARGED

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Micro Drainage			Network W.12.4.1						
Existing Network Details for Storm									
PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
1.000	45.000	0.265	169.8	0.070	4.00	0.600	o	225	
2.000	25.000	0.250	100.0	0.030	4.00	0.600	o	150	
1.001	55.000	0.324	169.8	0.083	0.00	0.600	o	300	
3.000	66.000	0.220	300.0	0.180	4.00	0.600	o	300	
4.000	18.000	0.060	300.0	0.145	4.00	0.600	o	450	
1.002	33.000	0.110	300.0	0.103	0.00	0.600	o	450	
5.000	41.500	0.166	250.0	0.239	4.00	0.600	o	450	
5.001	24.000	0.096	250.0	0.198	0.00	0.600	o	450	
1.003	59.000	0.144	409.7	0.214	0.00	0.600	o	450	
1.004	13.000	0.032	406.3	0.085	0.00	0.600	o	450	
6.000	23.000	0.092	250.0	0.177	4.00	0.600	o	300	
6.001	21.000	0.084	250.0	0.040	0.00	0.600	o	300	
PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	S32	71.250	69.781	1.244	71.100	69.516	1.359		1200
2.000	S31	71.600	69.846	1.604	71.100	69.596	1.354		1200
1.001	S30	71.100	69.441	1.359	71.000	69.117	1.583		1500
3.000	S33	70.850	69.337	1.213	71.000	69.117	1.583		1800
4.000	S34	71.250	69.027	1.773	71.000	68.967	1.583		2100
1.002	S29	71.000	68.967	1.583	71.100	68.857	1.793		2100
5.000	S36	70.850	69.119	1.281	70.850	68.953	1.447		1500
5.001	S35	70.850	68.953	1.447	71.100	68.857	1.793		1800
1.003	S28	71.100	68.857	1.793	71.000	68.713	1.837		1800
1.004	S27	71.000	68.713	1.837	69.606	68.681	0.475		1800
6.000	S39	70.500	69.139	1.061	70.300	69.047	0.953		1500
6.001	S38	70.300	69.047	0.953	70.350	68.963	1.087		1500
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Micro Drainage			Network W.12.4.1						
Existing Network Details for Storm									
PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
6.002	33.000	0.132	250.0	0.197	0.00	0.600	o	300	
1.005	10.700	0.027	396.3	0.000	0.00	0.600	o	525	
1.006	48.000	0.192	250.0	0.130	0.00	0.600	o	525	
7.000	21.200	0.085	249.4	0.130	4.00	0.600	o	300	
7.001	30.000	0.120	250.0	0.068	0.00	0.600	o	300	
7.002	32.000	0.128	250.0	0.000	0.00	0.600	o	300	
1.007	5.000	0.050	100.0	0.000	0.00	0.600	o	450	
1.008	26.500	0.088	301.1	0.000	0.00	0.600	o	450	
8.000	18.000	0.450	40.0	0.251	6.00	0.600	o	225	
1.009	54.500	0.182	299.5	0.000	0.00	0.600	o	450	
1.010	48.000	1.144	42.0	0.000	0.00	0.600	o	600	
1.011	19.500	0.066	295.5	0.000	0.00	0.600	o	825	
9.000	25.500	0.425	60.0	0.053	4.00	0.600	o	225	
9.001	46.000	0.307	149.8	0.241	0.00	0.600	o	300	
PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
6.002	S37	70.350	68.963	1.087	69.606	68.831	0.475		1500
1.005	Basin	69.606	68.606	0.475	70.250	68.579	1.146		1800
1.006	S26	70.250	68.579	1.146	70.250	68.387	1.338		1800
7.000	S43	70.250	68.700	1.250	70.250	68.615	1.335		1200
7.001	S42	70.250	68.615	1.335	70.250	68.495	1.455		1200
7.002	S41	70.250	68.495	1.455	70.250	68.367	1.583		1200
1.007	S25	70.250	68.217	1.583	69.920	68.167	1.303	Orifice	1500
1.008	S24	69.920	68.167	1.303	69.870	68.079	1.341		1200
8.000	S44	70.550	68.754	1.571	69.870	68.304	1.341		1800
1.009	S23	69.870	68.079	1.341	69.300	67.897	0.953		2100
1.010	SW11	69.300	67.747	0.953	68.940	66.603	1.737		1500
1.011	SW07A	68.940	66.378	1.737	68.940	66.312	1.803		1800
9.000	S13	70.650	69.200	1.225	70.650	68.775	1.650		1500
9.001	S12	70.650	68.700	1.650	70.650	68.393	1.957		1500

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Micro Drainage			Network W.12.4.1							
Existing Network Details for Storm										
	PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
	9.002	24.000	0.160	150.0	0.000	0.00	0.600	o	300	
	10.000	46.000	0.307	149.8	0.227	4.00	0.600	o	300	
	10.001	18.000	0.120	150.0	0.000	0.00	0.600	o	300	
	11.000	18.000	0.180	100.0	0.086	4.00	0.600	o	300	
	9.003	24.000	0.096	250.0	0.000	0.00	0.600	o	300	
	12.000	66.000	0.440	150.0	0.167	4.00	0.600	o	300	
	9.004	72.000	0.393	183.2	0.045	0.00	0.600	o	450	
	13.000	42.000	0.700	60.0	0.137	4.00	0.600	o	225	
	9.005	27.000	0.108	250.0	0.078	0.00	0.600	o	450	
	14.000	29.000	0.483	60.0	0.271	4.00	0.600	o	225	
	9.006	15.000	0.060	250.0	0.000	0.00	0.600	o	450	
	PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
	9.002	S11	70.650	68.393	1.957	70.650	68.233	2.117		1200
	10.000	S15	70.350	68.659	1.391	70.350	68.352	1.698		1500
	10.001	S14	70.350	68.352	1.698	70.650	68.232	2.118		1500
	11.000	S16	70.250	68.413	1.537	70.650	68.233	2.117		1200
	9.003	S11	70.650	68.232	2.118	70.500	68.136	2.064		1200
	12.000	S7	71.000	68.593	2.107	70.500	68.153	2.047		1200
	9.004	S5	70.500	67.986	2.064	69.850	67.593	1.807		1500
	13.000	S9	70.250	68.518	1.507	69.850	67.818	1.807		1500
	9.005	S4	69.850	67.593	1.807	69.850	67.485	1.915		1500
	14.000	S8	70.000	68.193	1.582	69.850	67.710	1.915		1500
	9.006	S3	69.850	67.485	1.915	69.850	67.425	1.975		1500
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Micro Drainage			Network W.12.4.1						
Existing Network Details for Storm									
PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	
9.007	36.000	0.188	191.5	0.166	0.00	0.600	o	450	
15.000	64.000	1.600	40.0	0.090	4.00	0.600	o	150	
9.008	27.000	0.135	200.0	0.000	0.00	0.600	o	450	
16.000	32.500	0.542	60.0	0.128	4.00	0.600	o	225	
16.001	30.000	0.200	150.0	0.000	0.00	0.600	o	225	
17.000	32.000	0.533	60.0	0.200	4.00	0.600	o	225	
16.002	23.000	0.153	150.3	0.000	0.00	0.600	o	300	
16.003	58.000	0.528	109.8	0.125	0.00	0.600	o	300	
9.009	13.000	0.693	18.8	0.000	0.00	0.600	o	450	
1.012	37.000	0.128	289.1	0.345	0.00	0.600	o	825	
1.013	34.000	0.118	288.1	0.000	0.00	0.600	o	825	
1.014	32.000	0.111	288.3	0.000	0.00	0.600	o	825	
1.015	70.000	0.242	289.3	0.000	0.00	0.600	o	825	
PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
9.007	S2	69.850	67.425	1.975	69.850	67.237	2.163		1500
15.000	S22	69.850	69.137	0.563	69.850	67.537	2.163		1500
9.008	38	69.850	67.237	2.163	69.000	67.102	1.448		1500
16.000	S20	70.250	68.750	1.275	70.250	68.208	1.817		1500
16.001	S19	70.250	68.208	1.817	69.000	68.008	0.767		1500
17.000	S21	70.250	68.541	1.484	69.000	68.008	0.767		1500
16.002	S18	69.000	67.933	0.767	69.000	67.780	0.920		1500
16.003	S17	69.000	67.780	0.920	69.000	67.252	1.448		1800
9.009	S1	69.000	67.102	1.448	68.940	66.409	2.081		1500
1.012	SW20	68.940	66.034	2.081	68.800	65.906	2.069		1800
1.013	IC	68.800	65.906	2.069	69.120	65.788	2.507		1800
1.014	IC	69.120	65.788	2.507	68.140	65.677	1.638		1800
1.015	Outfall	68.140	65.677	1.638	67.650	65.435	1.390		1800
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Micro Drainage	Network W.12.4.1	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.500
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Storm Duration (mins)	15
Ratio R	0.293		

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Storage Structures for Storm

Tank or Pond Manhole: Basin, DS/PN: 1.005

Invert Level (m) 68.606

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	189.0	0.400	260.0	0.800	390.0		
0.200	210.0	0.600	325.0	1.000	453.0		

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Micro Drainage	Network W.12.4.1	
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for <u>Storm</u>		
Margin for Flood Risk Warning (mm) 300.0 DVD Status ON Analysis Timestep Fine Inertia Status OFF DTS Status ON Profile(s) Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 30 Summer and Winter		
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Micro Drainage		Network W.12.4.1							
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
PN	Storm	Return Period	Climate Change	First X Surchage	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.	
1.000	15 Winter	1	0%	100/15 Summer					
2.000	15 Winter	1	0%	100/15 Summer					
1.001	15 Winter	1	0%	30/15 Summer					
3.000	15 Winter	1	0%	30/15 Summer	100/15 Summer				4
4.000	15 Winter	1	0%	30/15 Summer					
1.002	15 Winter	1	0%	30/15 Summer					
5.000	15 Winter	1	0%	30/15 Summer	100/15 Winter				2
5.001	15 Winter	1	0%	30/15 Summer					
1.003	15 Winter	1	0%	30/15 Summer					
1.004	15 Winter	1	0%	30/15 Summer					
6.000	15 Winter	1	0%	30/15 Summer					
6.001	15 Winter	1	0%	30/15 Summer					
6.002	15 Winter	1	0%	30/15 Summer					
1.005	30 Winter	1	0%	30/30 Summer	100/60 Winter				1
1.006	60 Winter	1	0%	30/30 Winter					
7.000	15 Winter	1	0%	30/30 Summer					
7.001	15 Winter	1	0%	30/15 Winter					
7.002	30 Winter	1	0%	30/15 Summer					
1.007	15 Winter	1	0%	30/15 Summer					
1.008	60 Winter	1	0%	30/15 Winter					
8.000	15 Winter	1	0%	100/15 Summer					
1.009	60 Winter	1	0%	30/15 Winter					
1.010	60 Winter	1	0%						
1.011	60 Winter	1	0%						
9.000	15 Winter	1	0%	100/15 Summer	100/15 Winter				3
9.001	15 Winter	1	0%	30/15 Summer	100/15 Winter				3
9.002	15 Winter	1	0%	30/15 Summer					
10.000	15 Winter	1	0%	30/15 Summer	100/15 Summer				4
10.001	15 Winter	1	0%	30/15 Summer					
11.000	15 Winter	1	0%	30/15 Summer	100/15 Winter				3
9.003	15 Winter	1	0%	30/15 Summer					
12.000	15 Winter	1	0%	100/15 Summer					
9.004	15 Winter	1	0%	30/15 Summer					
13.000	15 Winter	1	0%	100/15 Summer					
9.005	15 Winter	1	0%	30/15 Summer					
14.000	15 Winter	1	0%	30/15 Summer	100/15 Summer				4
9.006	15 Winter	1	0%	30/15 Summer					
9.007	15 Winter	1	0%	30/15 Summer					
15.000	15 Winter	1	0%	100/15 Summer					
9.008	15 Winter	1	0%	30/15 Summer					
16.000	15 Winter	1	0%	100/15 Summer					
16.001	15 Winter	1	0%	30/15 Summer					
17.000	15 Winter	1	0%	30/15 Summer					
16.002	15 Winter	1	0%	30/15 Summer	100/15 Summer				4
16.003	15 Winter	1	0%	30/15 Summer					
9.009	15 Winter	1	0%	100/15 Summer					
1.012	15 Winter	1	0%	100/15 Summer					
1.013	15 Winter	1	0%	100/15 Summer					
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Date May 2011 File 3861 Proposed S.W...	Designed By JCM Checked By	
Micro Drainage	Network W.12.4.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for
Storm

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.014	15 Winter	1	0%	100/15 Summer				
1.015	15 Winter	1	0%					

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3 Worsley Court High Street Worsley Manchester			Caldervale Business Park Simonstone Proposed S.W Network					
Date May 2011 File 3861 Proposed S.W...			Designed By JCM Checked By					
Micro Drainage			Network W.12.4.1					
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S32	69.855	-0.151	0.000	0.23	0.0	8.8	OK
2.000	S31	69.895	-0.101	0.000	0.23	0.0	3.9	OK
1.001	S30	69.546	-0.195	0.000	0.26	0.0	20.8	OK
3.000	S33	69.465	-0.172	0.000	0.36	0.0	21.9	OK
4.000	S34	69.224	-0.253	0.000	0.11	0.0	16.7	OK
1.002	S29	69.222	-0.195	0.000	0.39	0.0	63.4	OK
5.000	S36	69.250	-0.319	0.000	0.16	0.0	29.9	OK
5.001	S35	69.214	-0.189	0.000	0.24	0.0	40.1	OK
1.003	S28	69.186	-0.121	0.000	0.76	0.0	110.7	OK
1.004	S27	69.133	-0.030	0.000	1.00	0.0	101.7	OK
6.000	S39	69.265	-0.174	0.000	0.37	0.0	22.7	OK
6.001	S38	69.194	-0.153	0.000	0.42	0.0	25.8	OK
6.002	S37	69.150	-0.113	0.000	0.70	0.0	45.0	OK
1.005	Basin	68.908	-0.223	0.000	0.63	0.0	88.9	OK
1.006	S26	68.792	-0.312	0.000	0.34	0.0	93.2	OK
7.000	S43	68.806	-0.194	0.000	0.27	0.0	16.7	OK
7.001	S42	68.742	-0.173	0.000	0.37	0.0	23.2	OK
7.002	S41	68.687	-0.108	0.000	0.25	0.0	16.2	OK
1.007	S25	68.667	0.000	0.000	0.46	0.0	77.0	OK
1.008	S24	68.432	-0.185	0.000	0.64	0.0	101.0	OK
8.000	S44	68.850	-0.129	0.000	0.38	0.0	28.1	OK
1.009	S23	68.345	-0.184	0.000	0.65	0.0	111.2	OK
1.010	SW11	67.884	-0.463	0.000	0.12	0.0	111.1	OK
1.011	SW07A	66.611	-0.592	0.000	0.18	0.0	111.0	OK
9.000	S13	69.250	-0.175	0.000	0.11	0.0	6.9	OK
9.001	S12	68.827	-0.173	0.000	0.37	0.0	31.1	OK
9.002	S11	68.531	-0.162	0.000	0.37	0.0	30.1	OK
10.000	S15	68.781	-0.178	0.000	0.34	0.0	28.6	OK
10.001	S14	68.513	-0.139	0.000	0.34	0.0	26.8	OK
11.000	S16	68.500	-0.213	0.000	0.11	0.0	10.7	OK
9.003	S11	68.485	-0.047	0.000	1.00	0.0	62.1	OK
12.000	S7	68.694	-0.199	0.000	0.25	0.0	21.6	OK
9.004	S5	68.181	-0.255	0.000	0.38	0.0	83.7	OK
13.000	S9	68.598	-0.145	0.000	0.28	0.0	17.8	OK
9.005	S4	67.864	-0.179	0.000	0.59	0.0	102.7	OK
14.000	S8	68.314	-0.104	0.000	0.56	0.0	35.1	OK
9.006	S3	67.793	-0.142	0.000	0.80	0.0	125.3	OK
9.007	S2	67.700	-0.175	0.000	0.68	0.0	139.6	OK
15.000	S22	69.205	-0.082	0.000	0.42	0.0	11.5	OK
9.008	38	67.531	-0.156	0.000	0.75	0.0	145.5	OK
16.000	S20	68.828	-0.147	0.000	0.26	0.0	16.5	OK
16.001	S19	68.309	-0.124	0.000	0.41	0.0	16.1	OK
17.000	S21	68.641	-0.125	0.000	0.41	0.0	25.8	OK
16.002	S18	68.088	-0.145	0.000	0.52	0.0	41.4	OK
16.003	S17	67.936	-0.144	0.000	0.53	0.0	53.1	OK
9.009	S1	67.303	-0.249	0.000	0.41	0.0	193.1	OK
1.012	SW20	66.381	-0.478	0.000	0.37	0.0	268.2	OK
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for
Storm

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.013	IC	66.253	-0.478	0.000	0.37	0.0	267.7	OK
1.014	IC	66.137	-0.476	0.000	0.37	0.0	266.3	OK
1.015	Outfall	66.001	-0.501	0.000	0.32	0.0	261.8	OK

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Micro Drainage	Network W.12.4.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

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Micro Drainage	Network W.12.4.1							
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%	100/15 Summer				
2.000	15 Winter	30	0%	100/15 Summer				
1.001	15 Winter	30	0%	30/15 Summer				
3.000	15 Winter	30	0%	30/15 Summer	100/15 Summer			4
4.000	15 Winter	30	0%	30/15 Summer				
1.002	15 Winter	30	0%	30/15 Summer				
5.000	15 Winter	30	0%	30/15 Summer	100/15 Winter			2
5.001	15 Winter	30	0%	30/15 Summer				
1.003	15 Winter	30	0%	30/15 Summer				
1.004	15 Winter	30	0%	30/15 Summer				
6.000	15 Winter	30	0%	30/15 Summer				
6.001	15 Winter	30	0%	30/15 Summer				
6.002	15 Winter	30	0%	30/15 Summer				
1.005	60 Winter	30	0%	30/30 Summer	100/60 Winter			1
1.006	30 Winter	30	0%	30/30 Winter				
7.000	60 Winter	30	0%	30/30 Summer				
7.001	60 Winter	30	0%	30/15 Winter				
7.002	30 Winter	30	0%	30/15 Summer				
1.007	30 Winter	30	0%	30/15 Summer				
1.008	30 Winter	30	0%	30/15 Winter				
8.000	15 Winter	30	0%	100/15 Summer				
1.009	60 Winter	30	0%	30/15 Winter				
1.010	60 Winter	30	0%					
1.011	60 Winter	30	0%					
9.000	15 Winter	30	0%	100/15 Summer	100/15 Winter			3
9.001	15 Winter	30	0%	30/15 Summer	100/15 Winter			3
9.002	15 Winter	30	0%	30/15 Summer				
10.000	15 Winter	30	0%	30/15 Summer	100/15 Summer			4
10.001	15 Winter	30	0%	30/15 Summer				
11.000	15 Winter	30	0%	30/15 Summer	100/15 Winter			3
9.003	15 Winter	30	0%	30/15 Summer				
12.000	15 Winter	30	0%	100/15 Summer				
9.004	15 Winter	30	0%	30/15 Summer				
13.000	15 Winter	30	0%	100/15 Summer				
9.005	15 Winter	30	0%	30/15 Summer				
14.000	15 Winter	30	0%	30/15 Summer	100/15 Summer			4
9.006	15 Winter	30	0%	30/15 Summer				
9.007	15 Winter	30	0%	30/15 Summer				
15.000	15 Winter	30	0%	100/15 Summer				
9.008	15 Winter	30	0%	30/15 Summer				
16.000	15 Winter	30	0%	100/15 Summer				
16.001	15 Winter	30	0%	30/15 Summer				
17.000	15 Winter	30	0%	30/15 Summer				
16.002	15 Winter	30	0%	30/15 Summer	100/15 Summer			4
16.003	15 Winter	30	0%	30/15 Summer				
9.009	15 Winter	30	0%	100/15 Summer				
1.012	30 Winter	30	0%	100/15 Summer				
1.013	30 Winter	30	0%	100/15 Summer				
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.014	30 Winter	30	0%	100/15 Summer				
1.015	30 Winter	30	0%					

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Micro Drainage			Network W.12.4.1					
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S32	69.972	-0.034	0.000	0.56	0.0	21.3	OK
2.000	S31	69.961	-0.035	0.000	0.56	0.0	9.5	OK
1.001	S30	69.931	0.190	0.000	0.59	0.0	47.8	SURCHARGED
3.000	S33	69.912	0.275	0.000	0.72	0.0	43.9	SURCHARGED
4.000	S34	69.852	0.375	0.000	0.21	0.0	30.5	SURCHARGED
1.002	S29	69.822	0.405	0.000	0.71	0.0	115.5	SURCHARGED
5.000	S36	69.889	0.320	0.000	0.32	0.0	58.4	SURCHARGED
5.001	S35	69.827	0.424	0.000	0.57	0.0	97.6	SURCHARGED
1.003	S28	69.763	0.456	0.000	1.64	0.0	240.0	SURCHARGED
1.004	S27	69.320	0.157	0.000	2.51	0.0	255.2	SURCHARGED
6.000	S39	69.668	0.229	0.000	0.75	0.0	46.4	SURCHARGED
6.001	S38	69.584	0.237	0.000	0.91	0.0	55.8	SURCHARGED
6.002	S37	69.501	0.238	0.000	1.68	0.0	107.4	SURCHARGED
1.005	Basin	69.176	0.045	0.000	1.26	0.0	178.7	SURCHARGED
1.006	S26	69.148	0.044	0.000	0.74	0.0	200.7	SURCHARGED
7.000	S43	69.120	0.120	0.000	0.33	0.0	20.1	SURCHARGED
7.001	S42	69.103	0.188	0.000	0.43	0.0	27.3	SURCHARGED
7.002	S41	69.064	0.269	0.000	0.61	0.0	39.1	SURCHARGED
1.007	S25	69.053	0.386	0.000	1.20	0.0	203.7	SURCHARGED
1.008	S24	68.787	0.170	0.000	1.30	0.0	203.9	SURCHARGED
8.000	S44	68.925	-0.054	0.000	0.93	0.0	68.8	OK
1.009	S23	68.650	0.121	0.000	1.30	0.0	222.0	SURCHARGED
1.010	SW11	67.947	-0.400	0.000	0.24	0.0	222.1	OK
1.011	SW07A	66.720	-0.483	0.000	0.35	0.0	222.4	OK
9.000	S13	69.303	-0.122	0.000	0.27	0.0	16.8	OK
9.001	S12	69.280	0.280	0.000	0.89	0.0	75.6	SURCHARGED
9.002	S11	69.145	0.452	0.000	0.84	0.0	67.7	SURCHARGED
10.000	S15	69.246	0.287	0.000	0.71	0.0	60.5	SURCHARGED
10.001	S14	69.142	0.490	0.000	0.65	0.0	50.9	SURCHARGED
11.000	S16	69.055	0.342	0.000	0.24	0.0	22.8	SURCHARGED
9.003	S11	69.038	0.506	0.000	2.09	0.0	129.9	SURCHARGED
12.000	S7	68.763	-0.130	0.000	0.58	0.0	50.4	OK
9.004	S5	68.683	0.247	0.000	0.71	0.0	158.6	SURCHARGED
13.000	S9	68.654	-0.089	0.000	0.68	0.0	43.2	OK
9.005	S4	68.480	0.437	0.000	1.11	0.0	191.0	SURCHARGED
14.000	S8	68.800	0.382	0.000	1.14	0.0	71.3	SURCHARGED
9.006	S3	68.346	0.411	0.000	1.57	0.0	245.4	SURCHARGED
9.007	S2	68.158	0.283	0.000	1.31	0.0	268.3	SURCHARGED
15.000	S22	69.276	-0.011	0.000	0.97	0.0	26.9	OK
9.008	S8	67.824	0.137	0.000	1.47	0.0	285.0	SURCHARGED
16.000	S20	68.881	-0.094	0.000	0.64	0.0	40.5	OK
16.001	S19	68.548	0.115	0.000	0.88	0.0	34.7	SURCHARGED
17.000	S21	68.789	0.023	0.000	0.94	0.0	59.3	SURCHARGED
16.002	S18	68.405	0.172	0.000	1.08	0.0	86.8	SURCHARGED
16.003	S17	68.232	0.152	0.000	1.13	0.0	113.3	SURCHARGED
9.009	S1	67.420	-0.132	0.000	0.84	0.0	396.0	OK
1.012	SW20	66.628	-0.231	0.000	0.86	0.0	629.7	OK
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Margin for Flood Risk Warning (mm)

300.0

DVD Status

ON

Analysis Timestep

Fine

Inertia Status

OFF

DTS Status

ON

Profile(s)

Duration(s) (mins)

Return Period(s) (years)

Climate Change (%)

15, 30, 60, 120, 180, 240, 360, 480, 960, 1440

1, 30, 100

0, 0, 30

Summer and Winter

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.	
1.000	15 Winter	100	+30%	100/15 Summer					
2.000	15 Winter	100	+30%	100/15 Summer					
1.001	15 Winter	100	+30%	30/15 Summer					
3.000	15 Winter	100	+30%	30/15 Summer	100/15 Summer				4
4.000	15 Winter	100	+30%	30/15 Summer					
1.002	15 Winter	100	+30%	30/15 Summer					
5.000	15 Winter	100	+30%	30/15 Summer	100/15 Winter				2
5.001	15 Winter	100	+30%	30/15 Summer					
1.003	15 Winter	100	+30%	30/15 Summer					
1.004	30 Winter	100	+30%	30/15 Summer					
6.000	15 Winter	100	+30%	30/15 Summer					
6.001	15 Winter	100	+30%	30/15 Summer					
6.002	15 Winter	100	+30%	30/15 Summer					
1.005	60 Winter	100	+30%	30/30 Summer	100/60 Winter				1
1.006	60 Winter	100	+30%	30/30 Winter					
7.000	60 Winter	100	+30%	30/30 Summer					
7.001	60 Winter	100	+30%	30/15 Winter					
7.002	60 Winter	100	+30%	30/15 Summer					
1.007	60 Winter	100	+30%	30/15 Summer					
1.008	60 Winter	100	+30%	30/15 Winter					
8.000	15 Winter	100	+30%	100/15 Summer					
1.009	30 Winter	100	+30%	30/15 Winter					
1.010	60 Winter	100	+30%						
1.011	30 Winter	100	+30%						
9.000	15 Winter	100	+30%	100/15 Summer	100/15 Winter				3
9.001	15 Winter	100	+30%	30/15 Summer	100/15 Winter				3
9.002	15 Winter	100	+30%	30/15 Summer					
10.000	30 Winter	100	+30%	30/15 Summer	100/15 Summer				4
10.001	15 Winter	100	+30%	30/15 Summer					
11.000	15 Winter	100	+30%	30/15 Summer	100/15 Winter				3
9.003	15 Winter	100	+30%	30/15 Summer					
12.000	15 Winter	100	+30%	100/15 Summer					
9.004	15 Winter	100	+30%	30/15 Summer					
13.000	15 Winter	100	+30%	100/15 Summer					
9.005	15 Winter	100	+30%	30/15 Summer					
14.000	15 Winter	100	+30%	30/15 Summer	100/15 Summer				4
9.006	30 Winter	100	+30%	30/15 Summer					
9.007	30 Winter	100	+30%	30/15 Summer					
15.000	15 Winter	100	+30%	100/15 Summer					
9.008	30 Winter	100	+30%	30/15 Summer					
16.000	15 Winter	100	+30%	100/15 Summer					
16.001	15 Winter	100	+30%	30/15 Summer					
17.000	15 Winter	100	+30%	30/15 Summer					
16.002	15 Winter	100	+30%	30/15 Summer	100/15 Summer				4
16.003	30 Winter	100	+30%	30/15 Summer					
9.009	30 Winter	100	+30%	100/15 Summer					
1.012	30 Winter	100	+30%	100/15 Summer					
1.013	30 Winter	100	+30%	100/15 Summer					
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Micro Drainage			Network W.12.4.1					
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
PN	US/MH Name	Water Level (m)	Surch'd Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	S32	71.084	1.078	0.000	0.64	0.0	24.4	FLOOD RISK
2.000	S31	71.069	1.073	0.000	0.69	0.0	11.7	SURCHARGED
1.001	S30	70.988	1.247	0.000	0.73	0.0	58.5	FLOOD RISK
3.000	S33	70.855	1.218	4.994	0.90	0.0	54.8	FLOOD
4.000	S34	70.868	1.391	0.000	0.33	0.0	48.0	SURCHARGED
1.002	S29	70.849	1.432	0.000	1.05	0.0	170.0	FLOOD RISK
5.000	S36	70.851	1.282	0.838	0.49	0.0	88.7	FLOOD
5.001	S35	70.813	1.410	0.000	0.93	0.0	158.2	FLOOD RISK
1.003	S28	70.728	1.421	0.000	2.61	0.0	380.9	SURCHARGED
1.004	S27	69.845	0.682	0.000	3.79	0.0	385.2	SURCHARGED
6.000	S39	70.409	0.970	0.000	1.19	0.0	73.9	FLOOD RISK
6.001	S38	70.274	0.927	0.000	1.49	0.0	91.4	FLOOD RISK
6.002	S37	70.090	0.827	0.000	2.65	0.0	170.0	FLOOD RISK
1.005	Basin	69.619	0.488	6.048	1.59	0.0	225.5	FLOOD
1.006	S26	69.569	0.465	0.000	0.86	0.0	233.9	SURCHARGED
7.000	S43	69.614	0.614	0.000	0.57	0.0	35.1	SURCHARGED
7.001	S42	69.593	0.678	0.000	0.83	0.0	52.8	SURCHARGED
7.002	S41	69.509	0.714	0.000	0.81	0.0	51.8	SURCHARGED
1.007	S25	69.432	0.765	0.000	1.50	0.0	253.6	SURCHARGED
1.008	S24	69.059	0.442	0.000	1.62	0.0	253.6	SURCHARGED
8.000	S44	69.589	0.610	0.000	1.34	0.0	99.0	SURCHARGED
1.009	S23	68.859	0.330	0.000	1.68	0.0	286.0	SURCHARGED
1.010	SW11	67.975	-0.372	0.000	0.31	0.0	287.0	OK
1.011	SW07A	67.203	0.000	0.000	0.47	0.0	295.8	OK
9.000	S13	70.652	1.227	1.933	0.46	0.0	28.4	FLOOD
9.001	S12	70.651	1.651	0.803	1.05	0.0	89.2	FLOOD
9.002	S11	70.403	1.710	0.000	0.97	0.0	78.5	FLOOD RISK
10.000	S15	70.360	1.401	9.514	0.91	0.0	77.1	FLOOD
10.001	S14	70.342	1.690	0.000	0.99	0.0	76.8	FLOOD RISK
11.000	S16	70.252	1.539	1.744	0.34	0.0	32.7	FLOOD
9.003	S11	70.245	1.713	0.000	2.28	0.0	141.9	SURCHARGED
12.000	S7	70.061	1.168	0.000	0.83	0.0	71.5	SURCHARGED
9.004	S5	69.904	1.468	0.000	0.91	0.0	202.0	SURCHARGED
13.000	S9	69.857	1.114	0.000	0.86	0.0	55.1	SURCHARGED
9.005	S4	69.617	1.574	0.000	1.50	0.0	259.8	FLOOD RISK
14.000	S8	70.003	1.585	3.184	1.47	0.0	91.9	FLOOD
9.006	S3	69.389	1.454	0.000	2.08	0.0	324.5	SURCHARGED
9.007	S2	69.072	1.197	0.000	1.81	0.0	371.3	SURCHARGED
15.000	S22	69.848	0.561	0.000	1.05	0.0	29.1	FLOOD RISK
9.008	S38	68.480	0.793	0.000	2.03	0.0	392.3	SURCHARGED
16.000	S20	69.621	0.646	0.000	0.82	0.0	51.8	SURCHARGED
16.001	S19	69.284	0.851	0.000	1.17	0.0	46.2	SURCHARGED
17.000	S21	69.909	1.143	0.000	1.27	0.0	80.0	SURCHARGED
16.002	S18	69.004	0.771	3.624	1.39	0.0	111.2	FLOOD
16.003	S17	68.798	0.718	0.000	1.37	0.0	138.2	FLOOD RISK
9.009	S1	67.929	0.377	0.000	1.11	0.0	519.4	SURCHARGED
1.012	SW20	67.097	0.238	0.000	1.18	0.0	864.2	SURCHARGED
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