HEREFORDSHIRE COUNCIL

County of Herefordshire District Council
Planning Services
PO Box 230
Blueschool House
Blueschool Street
Hereford
HR1 2ZB

Application for approval of details reserved by condition.
Town and Country Planning Act 1990
Planning (Listed Buildings and Conservation Areas) Act 1990

Publication of applications on planning authority websites.
Please note that the information provided on this application form and in supporting documents may be published on the Authority's website.
If you require any further clarification, please contact the Authority's planning department.

1. Applicant Name, Address and Contact Details

Title:	Mr	First Name:	Peter	Surname:	Thomas
Company name:	Acorn Property Group (Cardiff)				
Street address:	3rd Floor				
	8 St Andrews Place		Telephone number:		
			Mobile number:		
Town/City:	Cardiff		Fax number:		
Country:			Email address:		
Postcode:	CF10 3BE				

Are you an agent acting on behalf of the applicant? (•) Yes ( ) No

2. Agent Name, Address and Contact Details

Title:	Mr	First Name:	Ian	Surname:	Blackmore
Company name:	Hammonds Yates Ltd				
Street address:	Kestrel Court				
	Harbour Road		Telephone number:		01275844744
			Mobile number:		
Town/City:	Portishead		Fax number:		
Country:			Email address:		
Postcode:	BS20 7AN				IBlackmore@hammondsyates.com

3. Site Address Details

Full postal address of the site (including full postcode where available)

House: Suffix:

House name:

Street address:

Town/City:

Postcode: HR3 5BE

Description of location or a grid reference
(must be completed if postcode is not known):

Easting: 323158

Northing: 242857

Description:

Land East of Newport Street, Cusop, Hay-on-Wye, Herefordshire.
Application seeking approval of Conditions in relation to approved Outline and Reserved Matters Approvals

4. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application? (•) Yes ( ) No

If Yes, please complete the following information about the advice you were given (this will help the authority to deal with this application more efficiently):

Officer name:

Title: Mr First name: Roland Surname: Close

Reference:

Date (DD/MM/YYYY): (Must be pre-application submission)

Details of the pre-application advice received:

Roland is the Planning Officer for the RM application.

5. Description of the Proposal

Please provide a description of the approved development as shown on the decision letter:

Reserved Matters Application for 26 dwellings (OUTLINE DCSW2008/0118/O approved 31/07/13)

Application reference number: 160679 Date of decision: 11/08/2016

Please state the condition number(s) to which this application relates:
Condition number(s):

OUTLINE CONDITION (S) - Conditions 10 and 12
RESERVED MATTERS CONDITION (S) - Conditions 4 (Parts A, B, C and F), 7 (Parts A - F) and condition 11

Has the development already started? ( ) Yes (•) No

6. Discharge of Condition(s)

Please provide a full description and/or list of the materials/details that are being submitted for approval:

1570 - Finishes Schedule - Rev B - Indication the materials to be use on a plot by plot basis in relation to RM Condition 4 (Parts A, B and C)
1570 - 106 - Proposed Boundary Treatment Drawing indicating enclosure details to Southern Boundary of the site in relation to RM Condition 4 (Part F)
1570 OUT-C10 Rev B - Compound Arrangement Plan in relation to OUTLINE Condition 10 and RM condition 11
Archaeological Mitigation Report in relation to OUTLINE Condition 12.
11674 Hay-on-Wye Site Investigation Report (Rev A) in Relation to RM Condition 7.
Condition 7 (RM) - Supporting Text from Engineering Consultant.
FSC3493 - Aquaflow Design Zones 1-6 inclusive.
FSC3493 - D1B and D100B
Soakaway 1,2 4 and 5

7. Part Discharge of Condition(s)

Are you seeking to discharge only part of a condition? (•) Yes ( ) No

If Yes, please indicate which part of the condition your application relates to:

RM Condition 4 - Full written details of External Materials in relation to External Walls / Roof / Rainwater / Window / Render Colour.
RM Condition 4 - Details of Proposed Boundary Details to the Southern Boundary.
RM Condition 7 - All Parts
RM Condition 11 - All Parts
OUTLINE Condition 10 - Site Compound Arrangement
OUTLINE Condition 12 - Archaeological Report

8. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land? (•) Yes ( ) No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact? (Please select only one)

( ) The agent (•) The applicant ( ) Other person

9. Declaration

I/we hereby apply for planning permission/consent as described in this form and the accompanying plans/ drawings and additional information. I/we confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the person(s) giving them.

☑ Date 31/10/2016

Finishes Schedule - Newport Street, Hay-on-Wye

Acorn Property Group (Cardiff) Ltd

1570 - FS Page 1 **Rev B - Brick types amended to Client comment**

Main Facing Materials and Screen Walls

A WIENERBERGER Terca Witton multi stock
B WIENERBERGER Chartham multi stock
C IBSTOCK - Arundel YellowMulti Stock Buff
D RENDER -Weber through colour with rough cast finish (Colour - Offwhite)
E TIMBER CLAD - Horizontal feather lapped Rustic Timber Boarding

Roof Material

A Marley Eternit Rivendale Fibre Cement Slates

Heads, Cills, Banding Quoins and Below DPC Material

1 WIENERBERGER Terca Witton multi stock WITH WIENERBERGER Avenue Smooth Red (Canted Brick for top of Plinth)
2 WIENERBERGER Chartham multi stock
3 WIENERBERGER Staffordshire Smooth Golden
4 Recon Stone (Colour - Grey)

Windows

A Side Hung Casement with Toplight (Colour - White PVCu)
B Side Hung Casement (Colour - Heritage Grey PVCu)

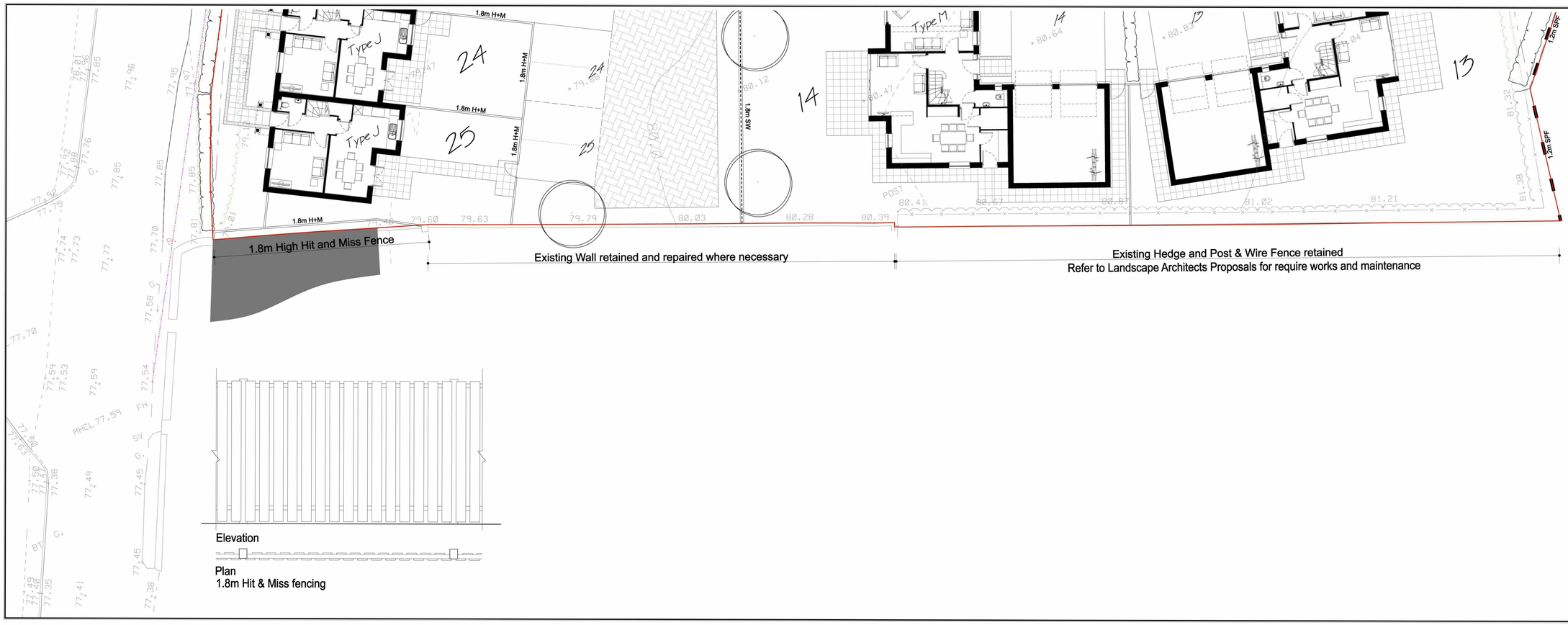
Fascias and RW Goods

A Brilliant White PVCu fascias etc. Black half round gutters and downpipes

Meter Boxes

A External wall mounted Electric meter box painted and semi concealed Gas meter box

Plot No.	Standard			Plot Specific																	
	House Type	Beds.	House Status	Hand	Facing Material	Roof Material	Garage Material	Below DPC Material	Heads	Cills	Band Course and Quions	Screen Wall Material				Window Style and Colour		Rainwater Goods	Meter Box	Parking Space	Garage Space	Other Comments
1	Coleridge	4/S	Semi Det	OPP	B+D	A	N/A	2	3	4	3	B				A		A	A	2	N/A	
2	Kipling	4	Semi Det	AS	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
3	Keats	3	End Terr	OPP	D	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
4	Keats	3	Mid Terr	AS	D	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
5	Carroll	2	Mid Terr	AS	D	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
6	Keats	3	End Terr	AS	D	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
7	Lawrence	4	Detached	AS	A+E	A	Integral	1 (inc Plinth)	N/A	4	N/A	N/A				B		A	A	2	2	Power and Light to Garage
8	Lawrence	4	Detached	OPP	A+E	A	Integral	1 (inc Plinth)	N/A	4	N/A	N/A				B		A	A	2	2	Power and Light to Garage
9	Bronte	4/S	Detached	OPP	A+E	A	A+E	1 (inc Plinth)	N/A	4	N/A	N/A				B		A	A	2	2	Power and Light to Garage
10	Elliot	4/S	Detached	OPP	C	A	A	1 (inc Plinth)	N/A	4	N/A	A				B		A	A	2	1	Power and Light to Garage
11	Austin	4	Detached	OPP	A+E	A	A	1 (inc Plinth)	N/A	4	N/A	A				B		A	A	2	2	Power and Light to Garage
12	Bronte	4/S	Detached	AS	A+E	A	A+E	1 (inc Plinth)	N/A	4	N/A	N/A				B		A	A	2	2	Power and Light to Garage
13	Lawrence	4	Detached	OPP	A+E	A	Integral	1 (inc Plinth)	N/A	4	N/A	N/A				B		A	A	2	2	Power and Light to Garage
14	Lawrence	4	Detached	AS	A+E	A	Integral	1 (inc Plinth)	N/A	4	N/A	A				B		A	A	2	2	Power and Light to Garage
15	Austin	4	Detached	AS	A+E	A	A	1 (inc Plinth)	N/A	4	N/A	A				B		A	A	2	2	Power and Light to Garage
16	Elliot	4/S	Detached	AS	C	A	A	1 (inc Plinth)	N/A	4	N/A	A				B		A	A	2	2	Power and Light to Garage
17	Coleridge	4/S	Semi Det	AS	B+D	A	N/A	2	3	4	3	B				A		A	A	2	N/A	
18	Wordsworth	3	Semi Det	AS	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
19	Keats	3	End Terr	AS	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
20	Carroll	2	Mid Terr	AS	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
21	Keats	3	Mid Terr	AS	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
22	Carroll	2	Mid Terr	AS	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
23	Keats	3	End Terr	OPP	B	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
24	Milton	3	Semi Det	AS	D	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	
25	Milton	3	Semi Det	AS	D	A	N/A	2	3	4	3	N/A				A		A	A	2	N/A	



Elevation

Plan
1.8m Hit & Miss fencing

THE CONTRACTOR IS TO COMPLY IN ALL RESPECTS WITH CURRENT BUILDING BUILDING LEGISLATION, N.H.B.C. AND BUILDING REGULATIONS WHETHER OR NOT SPECIFICALLY STATED ON THIS DRAWING.

THIS DRAWING MUST BE READ & CHECKED AGAINST ANY STRUCTURAL GEOTECHNICAL OR OTHER SPECLIST DOCUMENTATION OR PLANS PROVIDED.

THIS DRAWING IS NOT INTENDED TO SHOW DETAILS OF FOUNDATIONS. GROUND CONDITIONS OR GROUND CONTAMINANTS. EACH AREA OF GROUND RELIED UPONTO SUPPORT ANY STRUCTURE DEPICTED (INCL. DRAINAGE) MUST BE INVESTIGATED BY THE CONTRACTOR. A SUITABLE METHOD OF FOUNDATION SHOULD BE PROVIDED ALLOWING FOR ANTICIPATED GROUND CONDITIONS. WHERE CONSTRUCTIONS SHOWN INDICATE TYPICAL SLOPES FOR GUIDANCE ONLY AND SHOULD BE FURTHER INVESTIGATED BY A SUITABLE EXPERT.

WHERE EXISTING TREES ARE SHOWN TO BE RETAINED THEY SHOULD BE SUBJECT TO A FULL ARBORICULTURAL INSPECTION FOR SAFETY, HEALTH AND THE EXTENT OF FOUNDATION. IS TO BE PROVIDED TO ACCOMMODATE PROPOSED TREE PLANTING.

General Notes

Rev	Date	By	Comment

RESIDENTIAL DESIGN
PLANNING
CIVIL ENGINEERING DESIGN
Hammonds Yates
HAMMONDS YATES LIMITED
Kestrel Court : Harbour Road : Portishead : BS20 7AN
T: 01275 844744 E Mail:info@hammondsyates.com

Client
Acorn Property Group (Cardiff)

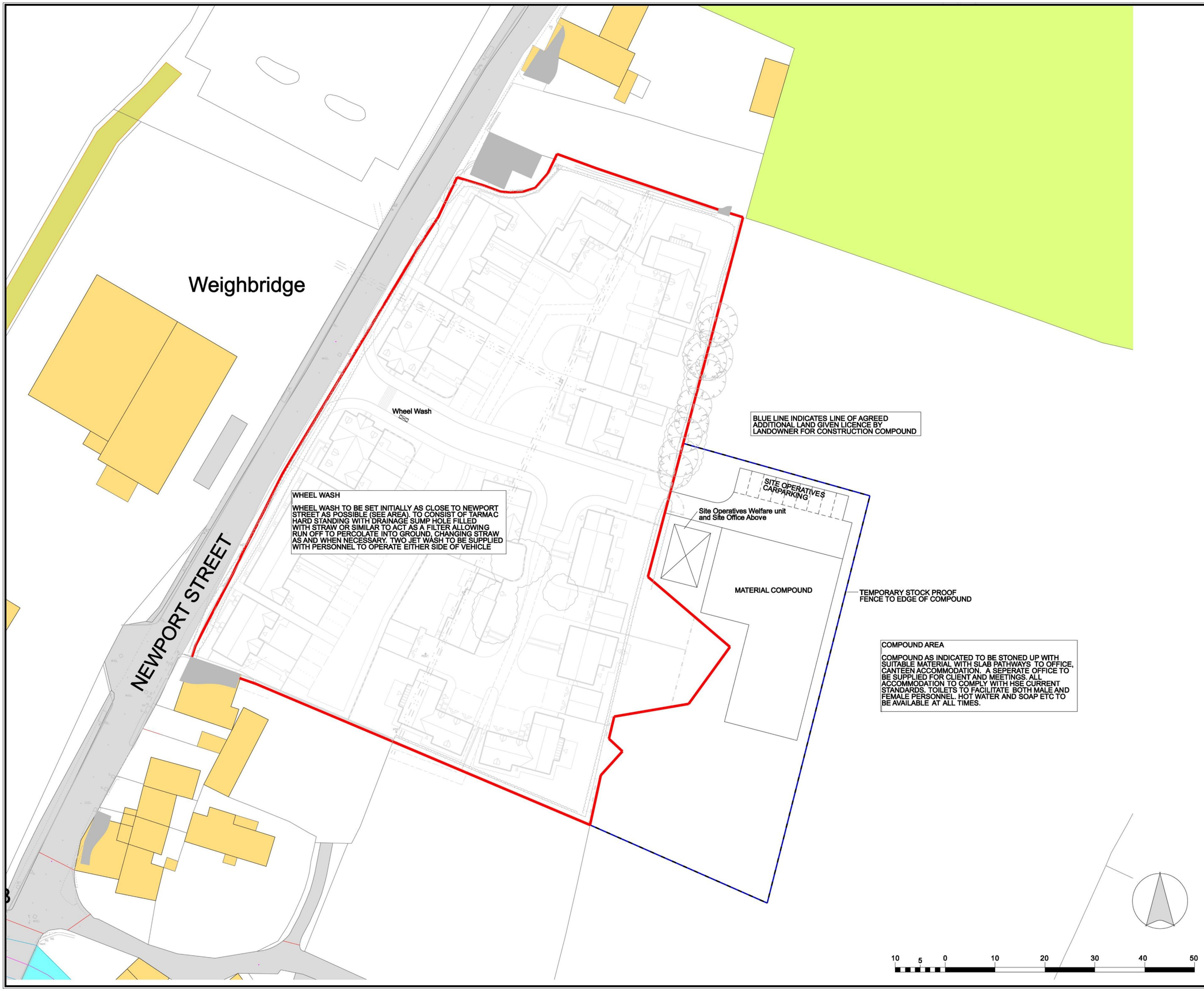
Project Title
Land off Newport Street
Cusop
Hay-on-Wye

Drawing Title
Proposed Sourthern Boundary Treatment

Drawing Status

Drawn By	Scales		Date
IB	1:100	A0	Oct 2016

Job No.	Drawing No.	Rev.
1570	106	



THE CONTRACTOR IS TO COMPLY IN ALL RESPECTS WITH CURRENT BUILDING BUILDING LEGISLATION, N.H.B.C. AND BUILDING REGULATIONS WHETHER OR NOT SPECIFICALLY STATED ON THIS DRAWING.

THIS DRAWING MUST BE READ & CHECKED AGAINST ANY STRUCTURAL GEOTECHNICAL OR OTHER SPECLIST DOCUMENTATION OR PLANS PROVIDED.

THIS DRAWING IS NOT INTENDED TO SHOW DETAILS OF FOUNDATIONS, GROUND CONDITIONS OR GROUND CONTAMINANTS. EACH AREA OF GROUND RELIED UPONTO SUPPORT ANY STRUCTURE DEPICTED (INCL. DRAINAGE) MUST BE INVESTIGATED BY THE CONTRACTOR. A SUITABLE METHOD OF FOUNDATION SHOULD BE PROVIDED ALLOWING FOR EXISTING GROUND CONDITIONS. ANY EARTHWORK CONSTRUCTIONS SHOWN INDICATE TYPICAL SLOPES FOR GUIDANCE ONLY AND SHOULD BE FURTHER INVESTIGATED BY A SUITABLE EXPERT.

WHERE EXISTING TREES ARE SHOWN TO BE RETAINED THEY SHOULD BE SUBJECT TO A FULL ARBORICULTURAL INSPECTION FOR SAFETY. A SUITABLE METHOD OF FOUNDATION IS TO BE PROVIDED TO ACCOMMODATE PROPOSED TREE PLANTING.

General Notes

Rev	Date	By	Comment
B	28.10.16	IB	Revised to Client comments
A	26.10.16	IB	Revised to Client comments

RESIDENTIAL DESIGN
PLANNING
CIVIL ENGINEERING DESIGN
Hammonds Yates
HAMMONDS YATES LIMITED
Kestrel Court : Harbour Road : Portishead : BS20 7AN
T: 01275 844744 E Mail:info@hammondsyates.com

Client
Acorn Property Group (Cardiff)

Project Title
Land off Newport Street
Cusop
Hay-on-Wye

Drawing Title
Compound Arrangement

Drawing Status

Drawn By	Scales		Date
	1:500	A2	Oct 2016

Job No.	Drawing No.	Rev.
1570	Out-C10	B

Ian Blackmore

From: chris.rhys.williams [chris.rhys.williams@healersurveys.co.uk]
Sent: 19 October 2016 10:47
To: Ian Blackmore
Cc: Peter Thomas BSc MCIOB; martin.healer
Subject: Hay-on-Wye - Reserved Matters, Point 7
Attachments: FSC3493 - D1B.pdf; FSC3493- D100B.pdf; FSC3493 - Aquaflow Design Zone 4 - Rev A.pdf; FSC3493 - Aquaflow Design Zone 5 - Rev A.pdf; FSC3493 - Aquaflow Design Zone 6 - Rev A.pdf; FSC3493 - Aquaflow Design Zone 1 - Rev B.pdf; FSC3493 - Aquaflow Design Zone 2 - Rev B.pdf; FSC3493 - Aquaflow Design Zone 3 - Rev B.pdf; Soakaway 4- 4m2 @ 0.8m.pdf; Soakaway 5- 4m2 @ 0.8m.pdf; Soakaway 1- 6m2 @ 1.6m.pdf; Soakaway 2 - 6m2 @ 2.0m.pdf; RE: Land at Cusop, Hay on Wye fronting B4350 between Cherry Tree and Nelson Cottages (our ref DIMS 50512)

Ian,

In reference to the items noted within point 7 of the reserved matter, the information attached is in reference to each point below:

• Clarification of how the calculations submitted relate to the preliminary engineering layout submitted. Calculations should demonstrate there will be no surface water flooding up to the 1 in 30 year event, and no increased risk of flooding as a result of development between the 1 in 1 year event and up to the 1 in 100 year event and allowing for the potential effects of climate change (noting that this also includes exceedance flows that are the result of temporary overwhelming of site drainage systems up to the 100 year event);

Formpave surface water calculations are attached, listed in zones which are indicated on the Formpave drawing 'FSC3493 – D1B'

• Clarification of how surface water drains into infiltration structures across the site;

Permeable paving areas – Construction details shown on drawing 'FSC3493 – D100B'

Aco drains drain to distribution boxes within the permeable paved areas

Carriageway drainage is captured by highway gullies in to the surface water system. The flow then drains to one of two perforated distribution pipes as indicated on 'FSC3493 – D1B' within the permeable paved areas (additional areas of runoff taken in to consideration within Formpave calculations)

• Confirmation of the type of barrier presented to exceedance flood flow in the north of the site, labelled "1.8m H+M" and confirmation that kerbing will prevent water spilling out of roads on site toward properties in the event of exceedance flood flow;

The '1.8m H+M' reference is in relation to 1.8m Hit and Miss fencing. We therefore do not see any issue with potential flood water being unable to pass through the area between plots 7 & 8, however as an additional measure a gap of 150mm can be included beneath the fencing to provide additional space should flood water penetrate this area. All roads will have kerb upstands which will contain the surface water within the roads in the event of flooding.

• Results of infiltration testing undertaken in accordance with BRE365;

Site investigation report contains test results in accordance with BRE365.

• Confirmation of groundwater levels to demonstrate that the invert level of any soakaways or unlined attenuation features can be located a minimum of 1m above groundwater levels;

Site investigation report contains test locations up to 3m in depth where no groundwater has been encountered.

• Evidence that the Applicant has sought and agreed allowable discharge rates for the disposal of foul water from the site with the relevant authorities. PQD Page 4 of 6
If the results of infiltration testing indicate that infiltration will not provide a feasible means of managing surface water runoff, an alternative drainage strategy must be submitted to the Local Planning Authority their consideration

and written approval. Best practice SUDS techniques shall be considered and the Local Planning Authority promotes the use of combined attenuation and infiltration features that maximise infiltration during smaller rainfall events.

The foul water system is to discharge by gravity to an existing system, as discussed with Welsh Water within the attached email trace with David Davies.

Ground water test results obtained from the Site Investigation provide adequate infiltration rates for the use of soakaways for the drainage of private surface water, calculations for varying depths/locations attached.

Please be aware I haven't re-attached the Site investigation report Rev A as the file is 14mb and has already been sent over to you in previous correspondence.

Kind Regards,

Chris Williams
Civil Engineer

Healer Surveys Limited

8 Old Field Road, Bocam Park, Pencoed,
Bridgend, South Wales. CF35 5LJ
Tel:- 01656 865566
Email:- chris.rhys.williams@healersurveys.co.uk

**Running over 100 miles in 2016 for '2 Wish Upon A Star' - https://www.justgiving.com/fundraising/Chris-Williams-2016*

Land off Newport Street, Cusop, Hay-on-Wye

Written Scheme of Investigation for Archaeological Mitigation

Ref: DCSW2008/0118/O Condition 12

Prepared by:
The Environmental Dimension Partnership Ltd (EDP)

On behalf of:
RST Cardiff Ltd

February 2016
Report Reference
EDP3139_01a

ENVIRONMENTAL PLANNING, DESIGN AND MANAGEMENT SERVICES
FOR ALL INVOLVED IN PROPERTY AND DEVELOPMENT

THE ENVIRONMENTAL DIMENSION PARTNERSHIP

Contents

Appendix

This version is intended for electronic viewing only

For EDP use

Report no.	H_EDP3139_01a
Author	John Lord
Peer Review	Andrew Crutchley
Formatted	Fay Greenslade
Proofed	Donna Kraven
Date	4 March 2016

Section 1
Introduction

1.1 This Written Scheme of Investigation (WSI) for archaeological mitigation has been prepared by the Environmental Dimension Partnership Ltd (EDP), acting on behalf of RST Cardiff Ltd (hereafter 'the client').

1.2 This WSI sets out an appropriate response to the imposition of an archaeological planning condition in relation to an application (Ref. DCSW2008/0118/O) for new residential development at Newport Street, Cusop; hereafter referred to as 'the site'. A plan showing the residential layout is included at **Appendix EDP1.**

1.3 Condition 12 of the 'Decision Notice' (dated 31 July 2013) – issued by the County of Herefordshire District Council - identifies the following requirement:

"No development shall take place until the developer has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted and approved in writing by the local planning authority. This programme shall be in accordance with a brief prepared by the County Archaeology Service"

1.4 In light of the above, this WSI presents a methodology for archaeological investigation and recording at the site – comprising the maintenance of a **watching brief** during groundworks associated with its development.

1.5 This WSI is intended to define best practice for the completion of the Archaeological watching brief, although on-site ground conditions cannot fully be anticipated at this stage and so deviations from the submitted WSI may need to be agreed in advance with the council's advisor as the need is identified.

1.6 Subject to the approval of this WSI, a Method Statement will be prepared by the appointed fieldwork contractor and submitted to the council's archaeological advisor for their review and approval prior to commencement.

1.7 This supplementary document will identify the project manager for the fieldwork and subsequent off-site post-excavation assessment/analysis, key site staff and post-excavation specialists (where appropriate) and the details of the relevant systems and processes that will be implemented to deliver the aims and objectives of this WSI once it has been approved by the council and the council's advisor.

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Section 2
Site Location and Description

2.1 The site is situated on the east side of Newport Street, to the north of Hay on Wye, Herefordshire. It comprises a single agricultural field. Commercial premises lie opposite the west.

2.2 The ground within the site is broadly flat, lying at approximately 80m above Ordnance Datum (aOD). The site is currently a pastoral field.

2.3 In terms of the underlying geology, the bedrock is formed of siltsone and mudstone of the Raglan Mudstone Formation, with superficial deposits being formed by Diamicton Devensian till (BGS).

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Section 3
Archaeological Background

3.1 No detailed archaeological background for the site was completed to inform the planning application. Consequently in order to provide a contextual background to inform this document, information from the Herefordshire Historic Environment Record (HER) and from online sources was collated in November and December 2015.

3.2 There are no known heritage assets within the site boundaries.

3.3 The site adjoins one of the medieval routes into the town, although it lies well away from the medieval town itself (Julian Cotton pers com).

3.4 Maps from the early 19th century to the early 20th century which depict the site and its immediate surroundings, seems to indicate that the site was in use as an orchard. From the mid-20th century onwards the orchard is no longer depicted, with the site being depicted as being a field.

3.5 Therefore, in terms of the medieval period and later, the expectation is that any below ground archaeological remains are most likely to represent agricultural/horticultural activity, or chance losses associated with the site being adjacent to one of the main routes into Hay-on-Wye. There is the possibility that remains related to Roman activity in the area may be encountered, but these are not expected to be extensive or highly significant.

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Section 4
Programme, Aims and Strategy

Programme

4.1 The required mitigation will be implemented through the monitoring of construction groundworks, thereby affecting an Archaeological Watching Brief.

4.2 The archaeological watching brief should be maintained (as far as is practicable), on all intrusive groundworks within the site: for instance level reductions and the excavation of building foundations and services.

4.3 Groundworks activities that expose deposits of potential archaeological interest will be monitored as far as practicable, or until it is agreed with the council's advisor that there is no further expectation of any archaeological remains being encountered.

Aims

4.4 The primary aim of this WSI is to define the archaeological work that is to be completed alongside the site's development - in order to ensure that any archaeological remains are treated in accordance with planning policy set out in the National Planning Policy Framework (DCLG 2012) and Policy ARCH6 of the *Herefordshire Unitary Development Plan*, as well as (particularly) the wording of Condition 12 of DCSW2008/0118/O.

4.5 In general, the watching brief will aim to:

(i) Establish the presence or absence, location, extent, nature and heritage significance of any archaeological deposits or materials within the site;

(ii) Make an appropriate record of such deposits and material prior to their destruction;

(iii) Appropriately disseminate the results of the archaeological works, proportionate to the findings of the fieldwork; and

(iv) Deposit a well ordered archive in an appropriate repository following completion.

4.6 In the event that significant archaeological remains are identified during fieldwork, the completion of a process of post-excavation assessment may also be required to feed into dissemination and/or publication of the results. The need for (and extent of) this, will be agreed through prior consultation with the council's archaeological advisor.

4.7 In fulfilling these aims and objectives, the proposed archaeological works will comprise appropriate and satisfactory mitigation for the expected effects of the scheme, and will discharge Condition 12 on the planning permission.

4.8 Nevertheless, it is expected that Condition 12 of DCSW2008/0118/O will not be fully discharged until a suitable report, or draft publication text, has been submitted to, and approved by the council's advisor. However, it is implicit in the agreement to commence a watching brief that the development will itself also commence.

Strategy

4.9 The Archaeological Watching Brief will be implemented to gather data from the direct observation of any features, or deposits of heritage significance encountered during construction works. An appropriate record will be made of all archaeological works, whether or not any deposits or features of heritage significance are encountered, although the nature of the record will be commensurate with the heritage significance of any deposits or features that are encountered.

4.10 Following the completion of the Archaeological Watching Brief, the results will be reviewed by EDP, the client and the council's advisor, in order to establish the heritage significance of any remains identified and their appropriate treatment within the planning process.

General Principles

4.11 All archaeological investigation will be managed by an accredited member of the Chartered Institute for Archaeologists (CIfA).

4.12 Moreover, the following guidelines and standards for archaeological fieldwork, where appropriate, will be adhered to during the execution of the investigation:

(i) CIfA - *Code of Conduct* (revised December 2014).

(ii) CIfA - *Standard and Guidance* documents for archaeological watching brief and the creation, compilation, transfer and deposition of archaeological archives; both also published in December 2014.

(iii) English Heritage - *Management of Archaeological Projects* (MAP2) (1991).

Section 5
Fieldwork Methodology

5.1 This section of the WSI sets out a proposed methodology for the completion of the archaeological mitigation works to satisfy Condition 12 of DCSW2008/0118/O.

5.2 It should be noted that the scope of the archaeological works will be subject to the prior agreement of the council's advisor.

5.3 Prior to commencement, the archaeological contractor appointed to complete the on-site investigation and off-site analysis and reporting/publication, will provide the council's advisor with a Method Statement expanding/augmenting this WSI with information on key project personnel and specialist staff etc.

Introduction

5.4 A watching brief involves specialist monitoring of groundworks, and the observation, sampling and recording of archaeological remains exposed during their completion.

5.5 As a result, it is usually a reactive process, whereby appropriate provision is made, by the groundworks contractor, for any archaeological remains to be preserved by record before they are destroyed by those construction works.

5.6 In this case, archaeological monitoring and supervision; i.e. the Watching Brief; will be undertaken on level reductions and the excavation of new foundations and services within the approved development footprint.

5.7 Groundworks within the site will be completed under archaeological supervision in order to identify, investigate and record any buried features or remains of interest.

5.8 The watching brief will be completed by an appropriate contractor, preferably a Registered Organisation (RO) with the CIfA. It will also be completed in accordance with current professional best practice guidelines and to the approved Method Statement (to be provided by the archaeological contractor), which has been agreed with the council's advisor in advance.

5.9 Subject to the agreement of a detailed methodology, it is anticipated that archaeological works will employ the following approach:

Fieldwork

5.10 All relevant Health and Safety regulations in operation on the site will be followed. Archaeological fieldwork should accord with the guidance set out in the Health and Safety manual of the Federation of Archaeological Managers and Employers (FAME).

5.11 Any archaeological remains exposed during construction works will be appropriately investigated and recorded. Sufficient time will be allowed, within the groundworks contractor's timetable, for the completion of an appropriate level of investigation and recording to achieve the objectives of the archaeological watching brief. Whilst this does not mean that groundworks must stop, it may require the contractor to prioritise other tasks that will enable the appointed archaeological contractor to complete their sampling and recording to a standard acceptable to the council's advisor.

5.12 All excavated features and deposits will be recorded as set out below, with reference to a unique context record system. Artefactual finds will be recovered and samples taken for dating and environmental assessment as appropriate, as set out below.

5.13 If unexpected or complicated archaeological remains of any period are identified, the council's advisor will be notified and a site meeting arranged. The aim of the meeting will be to define a suitable and appropriate mitigation strategy for those remains. The scale and scope of this mitigation strategy will be finalised through negotiation between EDP, acting on behalf of the client, and the council's advisor.

5.14 Equally, the results of the watching brief will be kept under review through negotiation between EDP, acting on behalf of the client, the council's advisor and the appointed contractor, in order to determine the efficacy of maintaining an ongoing programme of archaeological monitoring. It may be desirable to amend the methodology and/or reduce the scope of the ongoing archaeological watching brief.

5.15 It is not anticipated that human remains will be present within the site. In the unlikely event of human remains being encountered during the groundworks they will be left *in situ*, appropriately covered and protected - and the Coroner, council's advisor and, where appropriate, the Police informed of the situation.

5.16 The archaeological contractor will arrange receipt of the appropriate documentation and licence from the Department of Justice to enable the legal removal of any human remains which are encountered. The archaeological contractor is to comply with the conditions of any issued Licence.

5.17 If removal of the human remains is agreed, all subsequent work will comply with relevant regulations (including local authority environmental health regulations) and technical guidance.

5.18 Any items deemed as treasure, which are recovered, will be subject to the provisions of the Treasure Act 1996 and the Treasure (Designation) Order 2002. Such material shall normally be removed from site to a secure location at the end of the working day on which it is found. In addition to the statutory authorities, the relevant Portable Antiquities Officer should be informed. Where removal cannot be completed on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage.

Recording

5.19 All areas that are monitored during the watching brief, whether or not they contain archaeological remains, will be recorded to an appropriate level.

5.20 A full and proper record (written, graphic and photographic as appropriate) will be made. A continuous numbering system will be used and the following registers kept on standardised forms: context, section, plan, and photographs.

5.21 The recording system employed will follow best archaeological practice, as well as current CIfA guidance. Full written and drawn records will be made of all excavated contexts, whilst unexcavated deposits will be recorded to the maximum extent possible.

5.22 The works subject to observation will be accurately related to the Ordnance Survey grid and located on an appropriately scaled map of the area.

5.23 All archaeological deposits and features, representative levels for the current ground surface and the bases of any archaeological interventions, will be recorded with an aOD level, as is reasonably practicable.

5.24 Site plans will be drawn at an appropriate scale, whilst plans of any archaeological features or deposits investigated will be drawn at a scale of 1:20. Equally, sections of trenches and features will also be drawn at 1:10. All plans, sections and elevations will include spot heights in metres aOD, related to Ordnance Datum.

5.25 Context sheets should include all relevant stratigraphic relationships and, for complex stratigraphy, a separate matrix diagram will be employed.

5.26 An adequate photographic record will also be maintained via digital photography using a digital SLR camera, or to include colour images and black-and-white negative photographs. This will be kept to illustrate the principal features and artefact finds both in detail and in a general context. The photographic record will also include working shots to represent more generally the nature of the fieldwork. Other than 'working' shots, they will as appropriate, include clear metric scales and will be taken after the relevant features/areas have been appropriately exposed and cleaned.

Finds and Samples

5.27 Bulk artefact finds such as pottery and animal bone will normally be retained in bulk by context within the intervention in which they are made. The specific location of artefact finds of particular interest or 'small finds' will be recorded in three dimensions as appropriate. All artefacts from excavated contexts will be retained, except those from features or deposits of obviously modern date. In such circumstances, artefacts will be retained (where it is appropriate) to elucidate the date and/or function of the feature or deposit. Artefacts will also be recovered from excavated spoil, excepting those of clearly modern date.

5.28 Consideration will also be given to the recovery of specialist samples for scientific analysis, particularly samples for absolute (e.g. archaeo-magnetic) dating, as well as for structural materials and cultural/environmental evidence.

5.29 Provision will be made to take samples from any appropriate deposits, where there is a potential for the presence of palaeo-environmental and technological evidence.

5.30 All finds and environmental samples will be treated in a proper manner to prevent their deterioration. This will involve cleaning and conservation, where it is deemed necessary and labelling, cataloguing and secure storage in appropriate containers.

5.31 The recording, cleaning and conservation of finds will in all cases follow relevant CIfA Guidelines and the requirements of Herefordshire Museums.

5.32 A discard policy acceptable to the council's advisor and Herefordshire Museums will only be implemented following quantification, assessment and recommendation from artefactual and environmental specialists. Certain classes of material may be discarded, with agreement, after recording if a representative sample is kept.

Reporting

5.33 Subject to the significance and complexity of the results, a post-excavation assessment report will be undertaken following the completion of fieldwork and submitted to the client, EDP and the council's advisor.

5.34 The intention of this report (where it is appropriate), will be to provide a rapid summary of the heritage significance of any archaeological features and deposits encountered and material recovered during fieldwork, in order to allow decisions to be made on any further analysis and dissemination which may be necessary.

5.35 In situations where the watching brief results do not warrant an interim post-excavation assessment, agreement will be sought from the Council's advisor to proceed straight to the preparation and submission of a 'grey literature' report.

5.36 The chosen report format will set out the following relevant archaeological information:

(i) the background, scope and date(s) of archaeological fieldwork;

(ii) the aims and methods employed;

(iii) a summary of the historical and archaeological background of the site;

(iv) a summary of the key features and deposits encountered and recorded, as well as evidence for dates where possible;

(v) quantification of artefactual and any other material recovered;

(vi) a summary of the site archive and any work carried out for assessment, to include site records, artefactual finds, and environmental material;

(vii) an account of the nature, extent, date, and condition of any remains encountered and a statement as to the heritage significance of the results of fieldwork; and

(viii) additional information including supporting illustrations, data, an inventory of the project archive, index, references and disclaimers.

5.37 It is expected that the results of the monitoring works will be reviewed and decisions taken on the need for (and also scope of) further analysis, and information dissemination following the submission/review of the interim post-excavation report.

5.38 As far as 'wider' dissemination is concerned, it is expected that a note of the work and its findings will be provided for the annual review of the appropriate local archaeological journal, even where wholly negative results are returned.

5.39 The main aim of the Online Access to the Index of archaeological investigations (OASIS) project is to provide an online index to the mass of archaeological grey literature that has been produced as a result of the advent of large scale developer funded fieldwork.

5.40 The archaeological contractor will therefore complete the online OASIS form at http://ads.ahds.ac.uk/project/oasis/.

5.41 The report on the archaeological fieldwork will be submitted in both hard copy and electronic (pdf) formats to the Herefordshire Historic Environment Record (HER). Once the report has become a public document, the HER will validate the OASIS form, thus placing the information into the public domain on the OASIS website.

5.42 All spatial data produced by the archaeological fieldwork will be provided to the Herefordshire HER in appropriate GIS formats.

Archiving

5.43 First of all, contact will be made with the landowner and Herefordshire Museums to make the relevant arrangements for the preparation, deposition and curation of the site archive once fieldwork is completed.

5.44 The Method Statement prepared by the appointed archaeological contractor, will specify the arrangements for the deposition of archaeological material and the site archive prior to the commencement of fieldwork.

5.45 All artefacts and ecofacts and all other elements of the site archive will be delivered by the contractor to Herefordshire Museums as one deposit. Where this arrangement is not practicable, lists will be submitted by the contractor of objects not deposited, together with information as to the quantity involved and their current location, reasons for non-deposition and a timetable for their ultimate deposition.

5.46 Artefacts and ecofacts deposited by the appointed contractor in Herefordshire Museums will be accompanied by the remainder of the original site archive, or by a complete duplicate record thereof. A microfiched security copy of the site archive will also be supplied by the contractor to the museum.

5.47 Copyright of the written, drawn and photographic elements of the site archive, will be vested jointly with the appointed contractor and Herefordshire Museums.

5.48 The site archive and the finds will be deposited with Herefordshire Museums within six months of completion of the post-excavation work and report.

Section 6
Monitoring, Access and Review

6.1 All archaeological investigation at the site will be subject to an appropriate Method Statement (provided by the appointed archaeological contractor), which will be submitted to and approved by, the council's advisor in advance of works proceeding.

6.2 The council's advisor will be given an appropriate period of notice prior to the commencement of archaeological fieldwork. They will also be afforded access to visit the site, as required, to inspect the archaeological works and ensure that they are being conducted both to the proper professional standards and also in accordance with the WSI and Method Statement. A projected timetable for the site work will be agreed in advance between EDP and the council's advisor to facilitate this.

6.3 Similarly, the archaeological works will be reviewed as required in consultation with the client, EDP and the council's advisor, to determine the most appropriate response to the results and the appropriateness of maintaining the watching brief.

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Appendix EDP1
Planning Layout

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SCHEDULE OF ACCOMMODATION

Austin	A	4 Bed 2 Storey Long House	1580	5 No.
Bronte	B	4 Bed 2 Storey Cottage	1575	2 No.
Milton	D	4 Bed 2 Storey Cottage	1441	2 No.
Elliot	F	4 Bed 2 Storey Cottage	1521	4 No.
Kipling	G	3 Bed 2 Storey Cottage	1011	2 No.
Wordsworth	H	3 Bed 2 Storey Cottage	1038	2No.
Keats	Y	3 Bed	777	6 No.
Carroll	Z	2 Bed	688	3 No.
TOTAL			30,840sqFt	26 No.

THE CONTRACTOR IS TO COMPLY IN ALL RESPECTS WITH CURRENT BUILDING BUILDING LEGISLATION, N.H.B.C. AND BUILDING REGULATIONS WHETHER OR NOT SPECIFICALLY STATED ON THIS DRAWING.

THIS DRAWING MUST BE READ & CHECKED AGAINST ANY STRUCTURAL GEOTECHNICAL OR OTHER SPECLIST DOCUMENTATION OR PLANS PROVIDED.

THIS DRAWING IS NOT INTENDED TO SHOW DETAILS OF FOUNDATIONS, GROUND CONDITIONS OR GROUND CONTAMINANTS. EACH AREA OF GROUND RELIED UPONTO SUPPORT ANY STRUCTURE DEPICTED (INCL. DRAINAGE) MUST BE INVESTIGATED BY THE CONTRACTOR. A SUITABLE METHOD OF FOUNDATION SHOULD BE PROVIDED ALLOWING FOR EXISTING GROUND CONDITIONS. ANY EARTHWORK CONSTRUCTIONS SHOWN INDICATE TYPICAL SLOPES FOR GUIDANCE ONLY AND SHOULD BE FURTHER INVESTIGATED BY A SUITABLE EXPERT.

WHERE EXISTING TREES ARE SHOWN TO BE RETAINED THEY SHOULD BE SUBJECT TO A FULL ARBORICULTURAL INSPECTION FOR SAFETY. A SUITABLE METHOD OF FOUNDATION IS TO BE PROVIDED TO ACCOMMODATE PROPOSED TREE PLANTING.

General Notes

Rev	Date	By	Comment
L	26.02.16	IB	updated to align with Landscape
K	23.02.16	IB	Layout updated to clients comment
J	11.02.16	IB	Layout amended to Client comments
H	03.02.16	IB	Layout updated to House type chanes to Client comments
G	14.01.16	IB	Amended to Clients comments
F	13.01.16	IB	Plots 12 and 24 Garage amended to Client comments
E	12.01.16	IB	Layout updated to align with house type designs
D	07.01.16	IB	Layout updated to Clients comments
C	06.11.15	IB	Layout updated to Clients comments
B	02.11.15	IB	Layout updated to Clients comments
A	30.10.15	IB	Updated to Clients comments
			WORK - IN - PROGRESS

Hammonds Yates

Architectural
Town Planning
Urban Design
Civil Engineering Design
Planning Supervision
Licensed Code Assessor
Landscape Architecture

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Client
Acorn Property Group (Cardiff)

Project Title
Land off Newport Street
Cusop
Hay-on-Wye

Drawing Title
Planning Layout

Drawing Status

Drawn By	Scales		Date
IB	1:500	A2	Oct 2015

Job No.	Drawing No.	Rev.
1570	100	L

10 5 0 10 20 30 40 50

THE
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Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 1 - Rev B.srcx

Upstream Structures	Outflow To	Overflow To
(None)	(None)	FSC3493 - Aquaflow Design Zone 2 - Rev B.srcx

Half Drain Time : 213 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	79.264	0.354	0.6	2.6	3.1	11.7	O K
30 min Summer	79.273	0.363	0.6	13.5	14.0	12.0	O K
60 min Summer	79.276	0.366	0.6	18.5	19.1	12.1	O K
120 min Summer	79.275	0.365	0.6	16.8	17.3	12.1	O K
180 min Summer	79.273	0.363	0.6	13.5	14.0	12.0	O K
240 min Summer	79.270	0.360	0.6	9.7	10.3	11.9	O K
360 min Summer	79.268	0.358	0.6	6.4	6.9	11.8	O K
480 min Summer	79.267	0.357	0.6	5.2	5.7	11.8	O K
600 min Summer	79.266	0.356	0.6	4.6	5.2	11.8	O K
720 min Summer	79.265	0.355	0.6	3.6	4.1	11.8	O K
960 min Summer	79.265	0.355	0.6	3.1	3.6	11.7	O K
1440 min Summer	79.264	0.354	0.6	2.2	2.7	11.7	O K
2160 min Summer	79.263	0.353	0.6	1.4	1.9	11.6	O K
2880 min Summer	79.262	0.352	0.6	0.7	1.2	11.6	O K
4320 min Summer	79.206	0.296	0.6	0.0	0.6	9.8	O K
5760 min Summer	79.087	0.177	0.6	0.0	0.6	5.8	O K
7200 min Summer	79.008	0.098	0.6	0.0	0.6	3.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	107.399	0.0	0.4	17
30 min Summer	72.787	0.0	4.4	21
60 min Summer	47.182	0.0	8.5	36
120 min Summer	29.584	0.0	12.3	64
180 min Summer	22.197	0.0	14.0	92
240 min Summer	17.979	0.0	14.6	124
360 min Summer	13.262	0.0	14.7	178
480 min Summer	10.690	0.0	14.2	238
600 min Summer	9.037	0.0	13.7	302
720 min Summer	7.873	0.0	13.2	358
960 min Summer	6.327	0.0	12.1	490
1440 min Summer	4.640	0.0	10.0	730
2160 min Summer	3.396	0.0	6.7	1128
2880 min Summer	2.717	0.0	3.6	1528
4320 min Summer	1.980	0.0	0.0	2464
5760 min Summer	1.580	0.0	0.0	3168
7200 min Summer	1.325	0.0	0.0	3816

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 1 - Rev B.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	78.967	0.057	0.6	0.0	0.6	1.9	O K
10080 min Summer	78.957	0.047	0.5	0.0	0.5	1.5	O K
15 min Winter	79.271	0.361	0.6	11.2	11.7	11.9	O K
30 min Winter	79.278	0.368	0.6	23.1	23.7	12.1	O K
60 min Winter	79.277	0.367	0.6	21.2	21.8	12.2	O K
120 min Winter	79.271	0.361	0.6	11.2	11.7	11.9	O K
180 min Winter	79.269	0.359	0.6	7.7	8.2	11.9	O K
240 min Winter	79.268	0.358	0.6	6.4	6.9	11.8	O K
360 min Winter	79.266	0.356	0.6	4.6	5.2	11.8	O K
480 min Winter	79.265	0.355	0.6	3.6	4.1	11.7	O K
600 min Winter	79.265	0.355	0.6	3.1	3.6	11.7	O K
720 min Winter	79.264	0.354	0.6	2.6	3.1	11.7	O K
960 min Winter	79.263	0.353	0.6	1.7	2.3	11.7	O K
1440 min Winter	79.263	0.353	0.6	1.4	1.9	11.7	O K
2160 min Winter	79.262	0.352	0.6	1.0	1.6	11.6	O K
2880 min Winter	79.261	0.351	0.6	0.4	1.0	11.6	O K
4320 min Winter	79.107	0.197	0.6	0.0	0.6	6.5	O K
5760 min Winter	78.971	0.061	0.6	0.0	0.6	2.0	O K
7200 min Winter	78.954	0.044	0.5	0.0	0.5	1.4	O K
8640 min Winter	78.948	0.038	0.4	0.0	0.4	1.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
8640 min Summer	1.149	0.0	0.0	4416
10080 min Summer	1.018	0.0	0.0	5136
15 min Winter	107.399	0.0	1.9	14
30 min Winter	72.787	0.0	6.4	20
60 min Winter	47.182	0.0	11.2	34
120 min Winter	29.584	0.0	15.7	60
180 min Winter	22.197	0.0	17.8	90
240 min Winter	17.979	0.0	18.8	114
360 min Winter	13.262	0.0	19.2	168
480 min Winter	10.690	0.0	18.9	226
600 min Winter	9.037	0.0	18.2	280
720 min Winter	7.873	0.0	17.5	362
960 min Winter	6.327	0.0	16.0	494
1440 min Winter	4.640	0.0	12.7	712
2160 min Winter	3.396	0.0	7.6	1160
2880 min Winter	2.717	0.0	2.7	1600
4320 min Winter	1.980	0.0	0.0	2552
5760 min Winter	1.580	0.0	0.0	3056
7200 min Winter	1.325	0.0	0.0	3672
8640 min Winter	1.149	0.0	0.0	4376

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 1 - Rev B.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m^3)	Status
10080 min Winter	78.944	0.034	0.4	0.0	0.4	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Overflow Volume (m^3)	Time-Peak (mins)
10080 min Winter	1.018	0.0	0.0	5136

Cascade Rainfall Details for FSC3493 - Aquaflow Design Zone 1 - Rev B.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.062

Time (mins) From:	To:	Area (ha)
0	4	0.062

Cascade Model Details for FSC3493 - Aquaflow Design Zone 1 - Rev B.srcx

Storage is Online Cover Level (m) 79.570

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	10.5
Membrane Percolation (mm/hr)	4500	Length (m)	10.5
Max Percolation (l/s)	137.8	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	78.910	Membrane Depth (m)	0

Weir Overflow Control

Discharge Coef 0.544 Width (m) 5.500 Invert Level (m) 79.260

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 2 - Rev B.srcx

Upstream Structures	Outflow To	Overflow To
FSC3493 - Aquaflow Design Zone 1 - Rev B.srcx	(None)	(None)

Half Drain Time : 239 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	78.786	0.096	1.0	5.7	O K
30 min Summer	78.879	0.189	1.0	11.3	O K
60 min Summer	78.968	0.278	1.0	16.6	O K
120 min Summer	79.034	0.344	1.0	20.5	O K
180 min Summer	79.048	0.358	1.0	21.4	O K
240 min Summer	79.049	0.359	1.0	21.4	O K
360 min Summer	79.035	0.345	1.0	20.6	O K
480 min Summer	79.016	0.326	1.0	19.5	O K
600 min Summer	78.995	0.305	1.0	18.2	O K
720 min Summer	78.974	0.284	1.0	16.9	O K
960 min Summer	78.932	0.242	1.0	14.4	O K
1440 min Summer	78.857	0.167	1.0	10.0	O K
2160 min Summer	78.772	0.082	1.0	4.9	O K
2880 min Summer	78.733	0.043	0.9	2.6	O K
4320 min Summer	78.714	0.024	0.5	1.4	O K
5760 min Summer	78.709	0.019	0.4	1.1	O K
7200 min Summer	78.706	0.016	0.3	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	107.399	0.0	19
30 min Summer	72.787	0.0	33
60 min Summer	47.182	0.0	62
120 min Summer	29.584	0.0	122
180 min Summer	22.197	0.0	170
240 min Summer	17.979	0.0	200
360 min Summer	13.262	0.0	258
480 min Summer	10.690	0.0	328
600 min Summer	9.037	0.0	396
720 min Summer	7.873	0.0	466
960 min Summer	6.327	0.0	598
1440 min Summer	4.640	0.0	856
2160 min Summer	3.396	0.0	1212
2880 min Summer	2.717	0.0	1588
4320 min Summer	1.980	0.0	2204
5760 min Summer	1.580	0.0	2936
7200 min Summer	1.325	0.0	3672

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 2 - Rev B.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	78.704	0.014	0.3	0.8	O K
10080 min Summer	78.703	0.013	0.3	0.7	O K
15 min Winter	78.823	0.133	1.0	7.9	O K
30 min Winter	78.929	0.239	1.0	14.3	O K
60 min Winter	79.033	0.343	1.0	20.4	O K
120 min Winter	79.115	0.425	1.0	25.3	O K
180 min Winter	79.139	0.449	1.0	26.8	O K
240 min Winter	79.138	0.448	1.0	26.7	O K
360 min Winter	79.117	0.427	1.0	25.5	O K
480 min Winter	79.091	0.401	1.0	23.9	O K
600 min Winter	79.060	0.370	1.0	22.1	O K
720 min Winter	79.028	0.338	1.0	20.1	O K
960 min Winter	78.964	0.274	1.0	16.4	O K
1440 min Winter	78.853	0.163	1.0	9.7	O K
2160 min Winter	78.747	0.057	1.0	3.4	O K
2880 min Winter	78.722	0.032	0.6	1.9	O K
4320 min Winter	78.708	0.018	0.4	1.0	O K
5760 min Winter	78.704	0.014	0.3	0.8	O K
7200 min Winter	78.702	0.012	0.2	0.7	O K
8640 min Winter	78.700	0.010	0.2	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
8640 min Summer	1.149	0.0	4376
10080 min Summer	1.018	0.0	5136
15 min Winter	107.399	0.0	19
30 min Winter	72.787	0.0	33
60 min Winter	47.182	0.0	62
120 min Winter	29.584	0.0	118
180 min Winter	22.197	0.0	174
240 min Winter	17.979	0.0	228
360 min Winter	13.262	0.0	284
480 min Winter	10.690	0.0	360
600 min Winter	9.037	0.0	432
720 min Winter	7.873	0.0	510
960 min Winter	6.327	0.0	652
1440 min Winter	4.640	0.0	910
2160 min Winter	3.396	0.0	1236
2880 min Winter	2.717	0.0	1672
4320 min Winter	1.980	0.0	2204
5760 min Winter	1.580	0.0	2888
7200 min Winter	1.325	0.0	3672
8640 min Winter	1.149	0.0	4416

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 2 - Rev B.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
10080 min Winter	78.699	0.009	0.2	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
10080 min Winter	1.018	0.0	5120

Cascade Rainfall Details for FSC3493 - Aquaflow Design Zone 2 - Rev B.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.030

Time (mins) From:	To:	Area (ha)
0	4	0.030

Cascade Model Details for FSC3493 - Aquaflow Design Zone 2 - Rev B.srcx

Storage is Online Cover Level (m) 79.350

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600
Membrane Percolation (mm/hr)	4500
Max Percolation (l/s)	248.5
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	78.690
Width (m)	14.1
Length (m)	14.1
Slope (1:X)	100000.0
Depression Storage (mm)	0
Evaporation (mm/day)	0
Membrane Depth (m)	0

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 3 - Rev B.srcx

Upstream Structures	Outflow To	Overflow To
(None)	(None)	FSC3493 - Aquaflow Design Zone 4 - Rev A.srcx

Half Drain Time : 178 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	79.964	0.174	0.8	0.0	0.8	7.9	O K
30 min Summer	80.018	0.228	0.8	0.0	0.8	10.4	O K
60 min Summer	80.069	0.279	0.8	0.0	0.8	12.7	O K
120 min Summer	80.103	0.313	0.8	0.0	0.8	14.2	O K
180 min Summer	80.109	0.319	0.8	0.0	0.8	14.5	O K
240 min Summer	80.106	0.316	0.8	0.0	0.8	14.4	O K
360 min Summer	80.094	0.304	0.8	0.0	0.8	13.8	O K
480 min Summer	80.080	0.290	0.8	0.0	0.8	13.2	O K
600 min Summer	80.065	0.275	0.8	0.0	0.8	12.5	O K
720 min Summer	80.050	0.260	0.8	0.0	0.8	11.8	O K
960 min Summer	80.020	0.230	0.8	0.0	0.8	10.4	O K
1440 min Summer	79.964	0.174	0.8	0.0	0.8	7.9	O K
2160 min Summer	79.899	0.109	0.8	0.0	0.8	5.0	O K
2880 min Summer	79.859	0.069	0.8	0.0	0.8	3.1	O K
4320 min Summer	79.834	0.044	0.7	0.0	0.7	2.0	O K
5760 min Summer	79.825	0.035	0.5	0.0	0.5	1.6	O K
7200 min Summer	79.820	0.030	0.5	0.0	0.5	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	107.399	0.0	0.0	18
30 min Summer	72.787	0.0	0.0	33
60 min Summer	47.182	0.0	0.0	62
120 min Summer	29.584	0.0	0.0	120
180 min Summer	22.197	0.0	0.0	158
240 min Summer	17.979	0.0	0.0	190
360 min Summer	13.262	0.0	0.0	254
480 min Summer	10.690	0.0	0.0	324
600 min Summer	9.037	0.0	0.0	392
720 min Summer	7.873	0.0	0.0	460
960 min Summer	6.327	0.0	0.0	590
1440 min Summer	4.640	0.0	0.0	850
2160 min Summer	3.396	0.0	0.0	1192
2880 min Summer	2.717	0.0	0.0	1528
4320 min Summer	1.980	0.0	0.0	2204
5760 min Summer	1.580	0.0	0.0	2936
7200 min Summer	1.325	0.0	0.0	3672

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 3 - Rev B.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	79.816	0.026	0.4	0.0	0.4	1.2	O K
10080 min Summer	79.813	0.023	0.4	0.0	0.4	1.0	O K
15 min Winter	79.986	0.196	0.8	0.0	0.8	8.9	O K
30 min Winter	80.048	0.258	0.8	0.0	0.8	11.7	O K
60 min Winter	80.108	0.318	0.8	0.0	0.8	14.4	O K
120 min Winter	80.142	0.352	0.8	0.7	1.4	16.0	O K
180 min Winter	80.143	0.353	0.8	0.9	1.7	16.0	O K
240 min Winter	80.142	0.352	0.8	0.7	1.4	16.0	O K
360 min Winter	80.140	0.350	0.8	0.0	0.8	15.9	O K
480 min Winter	80.119	0.329	0.8	0.0	0.8	14.9	O K
600 min Winter	80.096	0.306	0.8	0.0	0.8	13.9	O K
720 min Winter	80.072	0.282	0.8	0.0	0.8	12.8	O K
960 min Winter	80.024	0.234	0.8	0.0	0.8	10.6	O K
1440 min Winter	79.939	0.149	0.8	0.0	0.8	6.8	O K
2160 min Winter	79.853	0.063	0.8	0.0	0.8	2.9	O K
2880 min Winter	79.834	0.044	0.7	0.0	0.7	2.0	O K
4320 min Winter	79.822	0.032	0.5	0.0	0.5	1.5	O K
5760 min Winter	79.816	0.026	0.4	0.0	0.4	1.2	O K
7200 min Winter	79.812	0.022	0.3	0.0	0.3	1.0	O K
8640 min Winter	79.809	0.019	0.3	0.0	0.3	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
8640 min Summer	1.149	0.0	0.0	4400
10080 min Summer	1.018	0.0	0.0	5136
15 min Winter	107.399	0.0	0.0	18
30 min Winter	72.787	0.0	0.0	32
60 min Winter	47.182	0.0	0.0	60
120 min Winter	29.584	0.0	0.5	104
180 min Winter	22.197	0.0	1.0	132
240 min Winter	17.979	0.0	0.8	174
360 min Winter	13.262	0.0	0.0	274
480 min Winter	10.690	0.0	0.0	352
600 min Winter	9.037	0.0	0.0	428
720 min Winter	7.873	0.0	0.0	500
960 min Winter	6.327	0.0	0.0	636
1440 min Winter	4.640	0.0	0.0	894
2160 min Winter	3.396	0.0	0.0	1192
2880 min Winter	2.717	0.0	0.0	1496
4320 min Winter	1.980	0.0	0.0	2204
5760 min Winter	1.580	0.0	0.0	2936
7200 min Winter	1.325	0.0	0.0	3640
8640 min Winter	1.149	0.0	0.0	4408

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 3 - Rev B.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m^3)	Status
10080 min Winter	79.807	0.017	0.3	0.0	0.3	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Overflow Volume (m^3)	Time-Peak (mins)
10080 min Winter	1.018	0.0	0.0	5112

Cascade Rainfall Details for FSC3493 - Aquaflow Design Zone 3 - Rev B.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.042

Time (mins) From:	To:	Area (ha)
0	4	0.042

Cascade Model Details for FSC3493 - Aquaflow Design Zone 3 - Rev B.srcx

Storage is Online Cover Level (m) 80.450

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600
Membrane Percolation (mm/hr)	4500
Max Percolation (l/s)	189.1
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	79.790
Width (m)	12.3
Length (m)	12.3
Slope (1:X)	100000.0
Depression Storage (mm)	0
Evaporation (mm/day)	0
Membrane Depth (m)	0

Weir Overflow Control

Discharge Coef 0.544 Width (m) 3.700 Invert Level (m) 80.140

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 4 - Rev A.srcx

Upstream Structures	Outflow To	Overflow To
FSC3493 - Aquaflow Design Zone 3 - Rev B.srcx	(None)	(None)

Half Drain Time : 226 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	79.829	0.189	0.5	5.7	O K
30 min Summer	79.889	0.249	0.5	7.4	O K
60 min Summer	79.945	0.305	0.5	9.1	O K
120 min Summer	79.985	0.345	0.5	10.3	O K
180 min Summer	79.992	0.352	0.5	10.6	O K
240 min Summer	79.990	0.350	0.5	10.5	O K
360 min Summer	79.979	0.339	0.5	10.1	O K
480 min Summer	79.965	0.325	0.5	9.7	O K
600 min Summer	79.950	0.310	0.5	9.3	O K
720 min Summer	79.934	0.294	0.5	8.8	O K
960 min Summer	79.903	0.263	0.5	7.9	O K
1440 min Summer	79.845	0.205	0.5	6.1	O K
2160 min Summer	79.774	0.134	0.5	4.0	O K
2880 min Summer	79.725	0.085	0.5	2.5	O K
4320 min Summer	79.687	0.047	0.5	1.4	O K
5760 min Summer	79.678	0.038	0.4	1.1	O K
7200 min Summer	79.672	0.032	0.3	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	107.399	0.0	18
30 min Summer	72.787	0.0	33
60 min Summer	47.182	0.0	62
120 min Summer	29.584	0.0	120
180 min Summer	22.197	0.0	168
240 min Summer	17.979	0.0	196
360 min Summer	13.262	0.0	260
480 min Summer	10.690	0.0	328
600 min Summer	9.037	0.0	398
720 min Summer	7.873	0.0	464
960 min Summer	6.327	0.0	598
1440 min Summer	4.640	0.0	854
2160 min Summer	3.396	0.0	1212
2880 min Summer	2.717	0.0	1556
4320 min Summer	1.980	0.0	2204
5760 min Summer	1.580	0.0	2936
7200 min Summer	1.325	0.0	3672

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 4 - Rev A.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
8640 min Summer	79.668	0.028	0.3	0.8	O K
10080 min Summer	79.665	0.025	0.2	0.7	O K
15 min Winter	79.853	0.213	0.5	6.4	O K
30 min Winter	79.921	0.281	0.5	8.4	O K
60 min Winter	79.987	0.347	0.5	10.4	O K
120 min Winter	80.056	0.416	0.5	12.5	O K
180 min Winter	80.085	0.445	0.5	13.3	O K
240 min Winter	80.075	0.435	0.5	13.0	O K
360 min Winter	80.032	0.392	0.5	11.8	O K
480 min Winter	80.012	0.372	0.5	11.1	O K
600 min Winter	79.988	0.348	0.5	10.4	O K
720 min Winter	79.964	0.324	0.5	9.7	O K
960 min Winter	79.916	0.276	0.5	8.3	O K
1440 min Winter	79.826	0.186	0.5	5.6	O K
2160 min Winter	79.725	0.085	0.5	2.5	O K
2880 min Winter	79.688	0.048	0.5	1.4	O K
4320 min Winter	79.675	0.035	0.3	1.0	O K
5760 min Winter	79.668	0.028	0.3	0.8	O K
7200 min Winter	79.664	0.024	0.2	0.7	O K
8640 min Winter	79.660	0.020	0.2	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
8640 min Summer	1.149	0.0	4384
10080 min Summer	1.018	0.0	5136
15 min Winter	107.399	0.0	18
30 min Winter	72.787	0.0	32
60 min Winter	47.182	0.0	62
120 min Winter	29.584	0.0	120
180 min Winter	22.197	0.0	174
240 min Winter	17.979	0.0	226
360 min Winter	13.262	0.0	280
480 min Winter	10.690	0.0	358
600 min Winter	9.037	0.0	434
720 min Winter	7.873	0.0	506
960 min Winter	6.327	0.0	646
1440 min Winter	4.640	0.0	908
2160 min Winter	3.396	0.0	1236
2880 min Winter	2.717	0.0	1492
4320 min Winter	1.980	0.0	2208
5760 min Winter	1.580	0.0	2944
7200 min Winter	1.325	0.0	3648
8640 min Winter	1.149	0.0	4408

Cascade Summary of Results for FSC3493 - Aquaflow Design Zone 4 - Rev A.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
10080 min Winter	79.658	0.018	0.2	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
10080 min Winter	1.018	0.0	5080

Cascade Rainfall Details for FSC3493 - Aquaflow Design Zone 4 - Rev A.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.030

Time (mins) From:	To:	Area (ha)
0	4	0.030

Cascade Model Details for FSC3493 - Aquaflow Design Zone 4 - Rev A.srcx

Storage is Online Cover Level (m) 80.300

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	10.0
Membrane Percolation (mm/hr)	4500	Length (m)	10.0
Max Percolation (l/s)	125.0	Slope (1:X)	10000.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	79.640	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 153 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	79.185	0.145	0.5	4.1	O K
30 min Summer	79.229	0.189	0.5	5.3	O K
60 min Summer	79.269	0.229	0.5	6.5	O K
120 min Summer	79.292	0.252	0.5	7.1	O K
180 min Summer	79.295	0.255	0.5	7.2	O K
240 min Summer	79.292	0.252	0.5	7.1	O K
360 min Summer	79.279	0.239	0.5	6.8	O K
480 min Summer	79.265	0.225	0.5	6.4	O K
600 min Summer	79.250	0.210	0.5	5.9	O K
720 min Summer	79.236	0.196	0.5	5.5	O K
960 min Summer	79.207	0.167	0.5	4.7	O K
1440 min Summer	79.159	0.119	0.5	3.3	O K
2160 min Summer	79.110	0.070	0.5	2.0	O K
2880 min Summer	79.089	0.049	0.5	1.4	O K
4320 min Summer	79.077	0.037	0.3	1.0	O K
5760 min Summer	79.070	0.030	0.3	0.8	O K
7200 min Summer	79.065	0.025	0.2	0.7	O K
8640 min Summer	79.062	0.022	0.2	0.6	O K
10080 min Summer	79.060	0.020	0.2	0.5	O K
15 min Winter	79.203	0.163	0.5	4.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	107.399	0.0	18
30 min Summer	72.787	0.0	32
60 min Summer	47.182	0.0	62
120 min Summer	29.584	0.0	116
180 min Summer	22.197	0.0	146
240 min Summer	17.979	0.0	178
360 min Summer	13.262	0.0	246
480 min Summer	10.690	0.0	314
600 min Summer	9.037	0.0	380
720 min Summer	7.873	0.0	448
960 min Summer	6.327	0.0	578
1440 min Summer	4.640	0.0	822
2160 min Summer	3.396	0.0	1152
2880 min Summer	2.717	0.0	1472
4320 min Summer	1.980	0.0	2204
5760 min Summer	1.580	0.0	2936
7200 min Summer	1.325	0.0	3672
8640 min Summer	1.149	0.0	4400
10080 min Summer	1.018	0.0	5128
15 min Winter	107.399	0.0	18

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	79.255	0.215	0.5	6.1	O K
60 min Winter	79.302	0.262	0.5	7.4	O K
120 min Winter	79.333	0.293	0.5	8.3	O K
180 min Winter	79.336	0.296	0.5	8.4	O K
240 min Winter	79.330	0.290	0.5	8.2	O K
360 min Winter	79.312	0.272	0.5	7.7	O K
480 min Winter	79.290	0.250	0.5	7.0	O K
600 min Winter	79.266	0.226	0.5	6.4	O K
720 min Winter	79.243	0.203	0.5	5.7	O K
960 min Winter	79.199	0.159	0.5	4.5	O K
1440 min Winter	79.127	0.087	0.5	2.5	O K
2160 min Winter	79.086	0.046	0.4	1.3	O K
2880 min Winter	79.077	0.037	0.4	1.0	O K
4320 min Winter	79.067	0.027	0.3	0.8	O K
5760 min Winter	79.062	0.022	0.2	0.6	O K
7200 min Winter	79.058	0.018	0.2	0.5	O K
8640 min Winter	79.056	0.016	0.1	0.4	O K
10080 min Winter	79.054	0.014	0.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	72.787	0.0	32
60 min Winter	47.182	0.0	60
120 min Winter	29.584	0.0	116
180 min Winter	22.197	0.0	168
240 min Winter	17.979	0.0	190
360 min Winter	13.262	0.0	268
480 min Winter	10.690	0.0	342
600 min Winter	9.037	0.0	414
720 min Winter	7.873	0.0	484
960 min Winter	6.327	0.0	616
1440 min Winter	4.640	0.0	848
2160 min Winter	3.396	0.0	1124
2880 min Winter	2.717	0.0	1480
4320 min Winter	1.980	0.0	2204
5760 min Winter	1.580	0.0	2936
7200 min Winter	1.325	0.0	3672
8640 min Winter	1.149	0.0	4408
10080 min Winter	1.018	0.0	5064

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.022

Time (mins) From:	To:	Area (ha)
0	4	0.022

Model Details

Storage is Online Cover Level (m) 79.600

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600
Membrane Percolation (mm/hr)	4500
Max Percolation (l/s)	117.6
Safety Factor	2.0
Porosity	0.30
Invert Level (m)	79.040
Width (m)	9.7
Length (m)	9.7
Slope (1:X)	100000.0
Depression Storage (mm)	0
Evaporation (mm/day)	0
Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 176 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	79.100	0.260	0.8	7.5	O K
30 min Summer	79.150	0.310	0.8	9.8	O K
60 min Summer	79.196	0.356	0.8	12.0	O K
120 min Summer	79.226	0.386	0.8	13.4	O K
180 min Summer	79.231	0.391	0.8	13.6	O K
240 min Summer	79.229	0.389	0.8	13.5	O K
360 min Summer	79.219	0.379	0.8	13.0	O K
480 min Summer	79.205	0.365	0.8	12.4	O K
600 min Summer	79.191	0.351	0.8	11.8	O K
720 min Summer	79.177	0.337	0.8	11.1	O K
960 min Summer	79.150	0.310	0.8	9.8	O K
1440 min Summer	79.101	0.261	0.8	7.6	O K
2160 min Summer	79.049	0.209	0.8	5.1	O K
2880 min Summer	79.023	0.183	0.7	3.9	O K
4320 min Summer	78.987	0.147	0.6	2.5	O K
5760 min Summer	78.964	0.124	0.5	1.8	O K
7200 min Summer	78.947	0.107	0.4	1.3	O K
8640 min Summer	78.934	0.094	0.4	1.0	O K
10080 min Summer	78.924	0.084	0.3	0.8	O K
15 min Winter	79.120	0.280	0.8	8.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	107.399	0.0	18
30 min Summer	72.787	0.0	32
60 min Summer	47.182	0.0	62
120 min Summer	29.584	0.0	120
180 min Summer	22.197	0.0	152
240 min Summer	17.979	0.0	184
360 min Summer	13.262	0.0	250
480 min Summer	10.690	0.0	318
600 min Summer	9.037	0.0	386
720 min Summer	7.873	0.0	454
960 min Summer	6.327	0.0	586
1440 min Summer	4.640	0.0	836
2160 min Summer	3.396	0.0	1172
2880 min Summer	2.717	0.0	1528
4320 min Summer	1.980	0.0	2248
5760 min Summer	1.580	0.0	2944
7200 min Summer	1.325	0.0	3672
8640 min Summer	1.149	0.0	4408
10080 min Summer	1.018	0.0	5136
15 min Winter	107.399	0.0	18

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	79.177	0.337	0.8	11.1	O K
60 min Winter	79.232	0.392	0.8	13.6	O K
120 min Winter	79.271	0.431	0.8	15.5	O K
180 min Winter	79.279	0.439	0.8	15.8	O K
240 min Winter	79.274	0.434	0.8	15.6	O K
360 min Winter	79.259	0.419	0.8	14.9	O K
480 min Winter	79.239	0.399	0.8	14.0	O K
600 min Winter	79.217	0.377	0.8	13.0	O K
720 min Winter	79.195	0.355	0.8	11.9	O K
960 min Winter	79.152	0.312	0.8	9.9	O K
1440 min Winter	79.079	0.239	0.8	6.5	O K
2160 min Winter	79.023	0.183	0.7	3.9	O K
2880 min Winter	78.994	0.154	0.6	2.8	O K
4320 min Winter	78.957	0.117	0.5	1.6	O K
5760 min Winter	78.935	0.095	0.4	1.0	O K
7200 min Winter	78.920	0.080	0.3	0.7	O K
8640 min Winter	78.909	0.069	0.3	0.6	O K
10080 min Winter	78.902	0.062	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	72.787	0.0	32
60 min Winter	47.182	0.0	60
120 min Winter	29.584	0.0	118
180 min Winter	22.197	0.0	172
240 min Winter	17.979	0.0	196
360 min Winter	13.262	0.0	272
480 min Winter	10.690	0.0	348
600 min Winter	9.037	0.0	422
720 min Winter	7.873	0.0	492
960 min Winter	6.327	0.0	626
1440 min Winter	4.640	0.0	868
2160 min Winter	3.396	0.0	1192
2880 min Winter	2.717	0.0	1556
4320 min Winter	1.980	0.0	2248
5760 min Winter	1.580	0.0	2944
7200 min Winter	1.325	0.0	3672
8640 min Winter	1.149	0.0	4408
10080 min Winter	1.018	0.0	5080

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.040

Time (mins) From:	To:	Area (ha)
0	4	0.040

Model Details

Storage is Online Cover Level (m) 79.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	26.0
Membrane Percolation (mm/hr)	4500	Length (m)	6.0
Max Percolation (l/s)	195.0	Slope (1:X)	30.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	78.840	Membrane Depth (m)	0

FORMPAVE RECTANGULAR AQUAFLOW BLOCKS
(SUB-BASE DESIGN INCORPORATES 80mm DBM LAYER. REFER TO DRAWING FSC3493 FOR CONSTRUCTION DETAIL)

FORMPAVE RECTANGULAR AQUAFLOW BLOCKS WITH LEVEL SUB-FORMATION.
(FOR FORMATION DETAILS REFER TO DRAWING FSC3493-D100)

DBM SURFACING WITH AQUAFLOW SUB-BASE

DBM CONSTRUCTION DESIGNED BY ENGINEER

AREA OF CATCHMENT INCLUDED IN DESIGN

FORMPAVE SINGLE DISTRIBUTION TANK
0.35m x 0.70m x 0.15m DEEP
CONNECTED TO 110mmØ OUTLET

FULL HEIGHT RESTRAINT

HALF HEIGHT RESTRAINT

BAFFLE

FIN DRAIN WITH 110mm OUTLET PIPES

0.000 (0.000) AMENDED PROPOSED LEVELS / PROPOSED INVERT LEVELS

NOTES:
1. FOR CONSTRUCTION AND FORMATION DETAILS REFER TO DRAWING FSC3493-D100
2. DRAINAGE RUNS SHOWN FOR INDICATIVE PURPOSES ONLY - TO BE DESIGNED BY OTHERS.
3. LOWER FORMATION LOCALLY WHERE REQUIRED TO SUIT INVERT OF DISTRIBUTION BOXES

Rev. No.	Revision	Drawn By	Date
B	Layout change. Full ReDesign	J.K	28.06.16
A	Layout update. Roof catchment added	J.K	04.03.16
-	First Issue	TU	15.12.2015

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E-mail: design.services@formpave.co.uk
forterra.co.uk/formpave

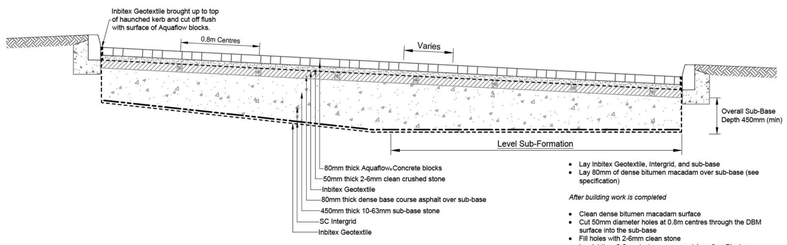
FORTERRA

Project
COOPERS HALL, CUSOP,
HAY-ON-WYE, POWYS

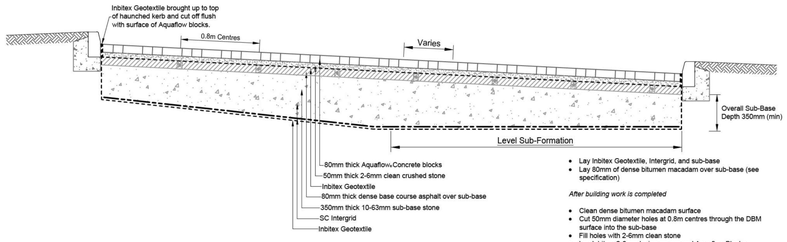
Title
AQUAFLOW PERMEABLE PAVING LAYOUT FOR PARKING AREA AND ACCESS ROAD

Scale	Date	Drawn	Checked	Approved
1:200	15.12.2015	T.U	J.L	J.L

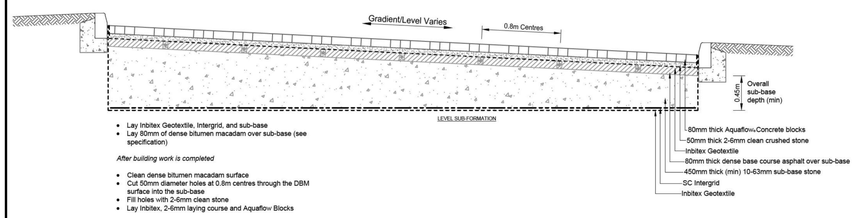
Project No.	Drg. No.	Revision
FSC3493	D1	B



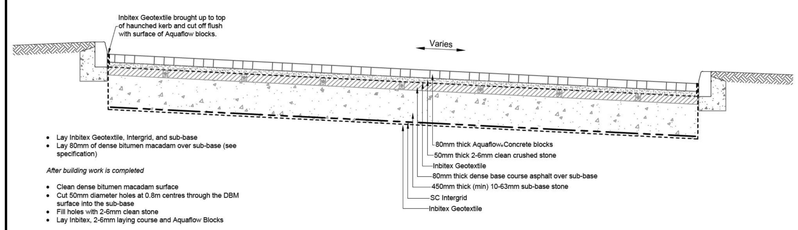
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM
(LEVEL FORMATION AREA WITHIN DASHED BOUNDARY REFER TO DRAWING FSC3493-D1)
ZONES 1, 2 & 4



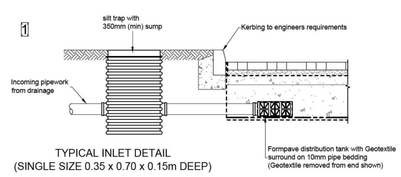
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM
(LEVEL FORMATION AREA WITHIN DASHED BOUNDARY REFER TO DRAWING FSC3493-D1)
ZONE 5



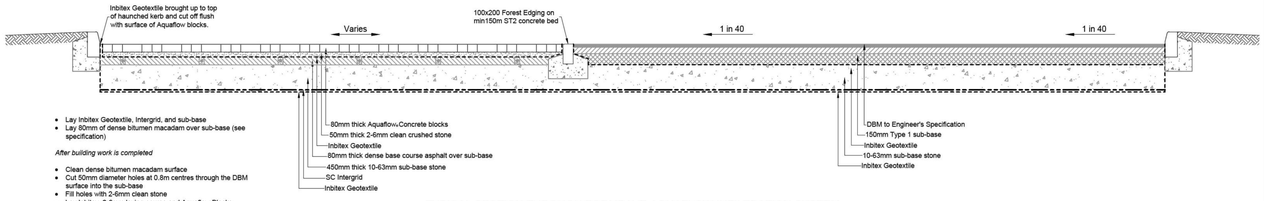
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM
(LEVEL FORMATION AREA WITHIN DASHED BOUNDARY REFER TO DRAWING FSC3493-D1)
ZONE 3



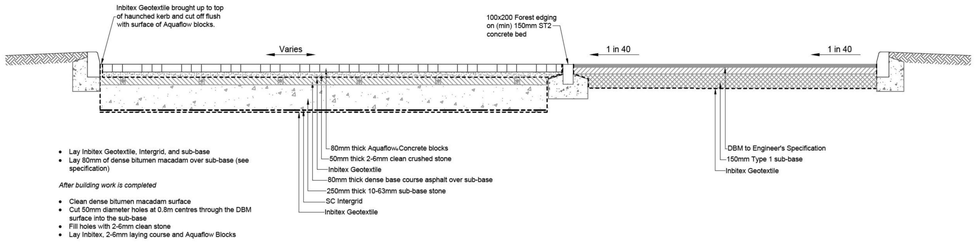
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM
ZONE 6



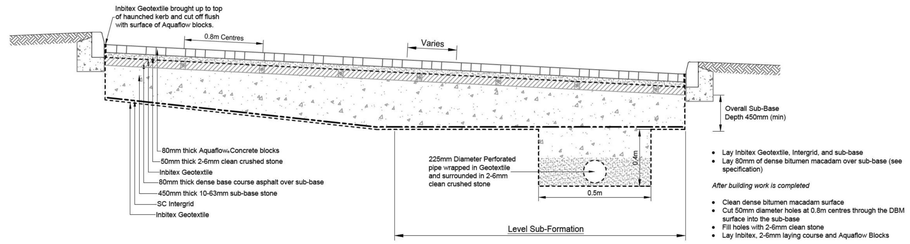
TYPICAL INLET DETAIL
(SINGLE SIZE 0.35 x 0.70 x 0.15m DEEP)



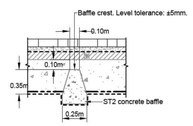
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM
(AREAS WHERE AQUAFLOW SUB-BASE EXTENDS UNDERNEATH DBM PARKING BAYS)



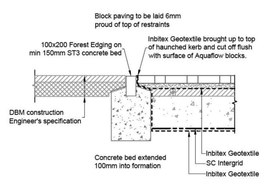
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM DBM PARKING BAYS



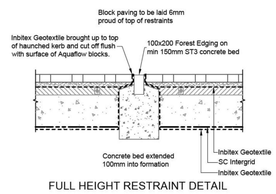
TYPICAL SECTION THROUGH FORMPAVE AQUAFLOW INFILTRATION SYSTEM
(LEVEL FORMATION AREA WITHIN DASHED BOUNDARY REFER TO DRAWING FSC3493-D1)
PERFORATED DISTRIBUTION PIPE DETAIL



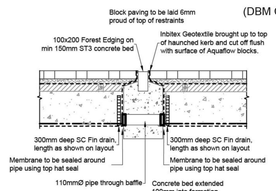
CONCRETE BAFFLE DETAIL



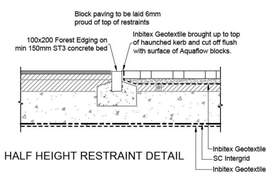
FULL HEIGHT RESTRAINT DETAIL
(DBM CONSTRUCTION TO FORMPAVE AQUAFLOW TRANSITION)



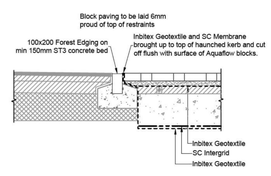
FULL HEIGHT RESTRAINT DETAIL



FULL HEIGHT RESTRAINT DETAIL 110mm CONNECTING PIPE



HALF HEIGHT RESTRAINT DETAIL



HALF HEIGHT RESTRAINT DETAIL

STORM WATER SOURCE CONTROL SYSTEM
Aquaflow paving.

TYPE(S) OF PAVING
Permeable concrete block paving

REFERENCE
Aquaflow

SIZE
100 x 200 x 80 Thick

COLOURS
Red brindle, Golden brindle, Natural, Charcoal, Burnt red.

SETTING OUT
Aquaflow and Aquasetts:
90Ø herringbone with double stretcher course around all perimeters.

KERBS
Standard kerb system or Forest Edging: both to be haunched with concrete.

LAYING COURSE*
50mm depth of 5mm. single size clean crushed stone to BS882.

GEOTEXTILE
Inbitex Geotextile as noted

SUB-BASE SPECIFICATION*
The granular sub-base material shall comprise crushed rock or concrete possessing well defined edges. It must be sound, clean, non friable and free from clay or other deleterious matter.

The material must be non plastic when tested in accordance with BS1377 Test No 4 *The crushed stone used for the laying course and sub-base must have a minimum 10% fines value of 150kN when tested in accordance with BS812 Part 111.

The selected test samples not be over dried and should be soaked in water at room temperature for 48-hours before the test. The 100mm deep upper layer of sub-base material should be graded 20mm-5mm to BS882.

The 63-10mm material should be graded as follows:-

BS Sieve size	%passing
100mm	100
63mm	90-100
37.5mm	60-80
20mm	15-30
10mm	0-5

DEPTH OF SUB-BASE
It is recommended that a sub-base depth of 350mm should be used. The depth of sub-base may be varied at the discretion of the engineer.

Intergrid(S) * - SC Intergrid

ASPHALT RUNNING COURSE
To be 20mm dense bitumen base course manufactured with 125pen bitumen to BS4987.

SURFACE FINISH
The blocks should be vibrated with a vibrating plate Type DVP75/22" or similar. Following the first pass with a vibrating plate a light dressing of 3mm single size clean stone should be applied to the surface and brushed in, approximately 2kg per m2. (available from Formpave in 40 kg bags). Blocks should again be vibrated and any debris brushed off.

Rev. No.	Revision	Drawn By	Date
B	Details changed to suit redesign	J.K	29.06.16
A	Details Ammended	JL	03.03.2016
-	First Issue	TU	15.12.2015

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Project
COOPERS HALL
CUSOP, HAY ON WYE, POWYS/HEREFORD

Title
AQUAFLOW PERMEABLE PAVING
FORMATION AND CONSTRUCTION DETAILS

Scale	Date	Drawn	Checked	Approved
N.T.S	15.12.2015	TU	JL	JL

Project No.	Drg. No.	Revision
FSC3493	D100	B

Martin Healer Development Services Ltd		Page 1
Nodor House South Road Bridgend CF31 3SY		Micro Drainage
Date 23/11/2015 15:34 File 6M²@16m Soakaway 1	Designed By epowell Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 220 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	78.065	0.565	0.2	3.2	O K
30 min Summer	78.260	0.760	0.2	4.3	O K
60 min Summer	78.454	0.954	0.3	5.4	O K
120 min Summer	78.606	1.106	0.3	6.3	O K
180 min Summer	78.650	1.150	0.3	6.6	O K
240 min Summer	78.665	1.165	0.3	6.6	O K
360 min Summer	78.669	1.169	0.3	6.7	O K
480 min Summer	78.656	1.156	0.3	6.6	O K
600 min Summer	78.633	1.133	0.3	6.5	O K
720 min Summer	78.606	1.106	0.3	6.3	O K
960 min Summer	78.549	1.049	0.3	6.0	O K
1440 min Summer	78.446	0.946	0.3	5.4	O K
2160 min Summer	78.315	0.815	0.3	4.6	O K
2880 min Summer	78.207	0.707	0.2	4.0	O K
4320 min Summer	78.039	0.539	0.2	3.1	O K
5760 min Summer	77.914	0.414	0.2	2.4	O K
7200 min Summer	77.818	0.318	0.2	1.8	O K
8640 min Summer	77.743	0.243	0.1	1.4	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	107.316	25
30 min Summer	73.597	39
60 min Summer	48.287	66
120 min Summer	30.595	122
180 min Summer	23.054	160
240 min Summer	18.705	190
360 min Summer	13.896	256
480 min Summer	11.246	326
600 min Summer	9.534	396
720 min Summer	8.326	464
960 min Summer	6.715	604
1440 min Summer	4.949	872
2160 min Summer	3.637	1260
2880 min Summer	2.919	1648
4320 min Summer	2.136	2384
5760 min Summer	1.710	3120
7200 min Summer	1.441	3832
8640 min Summer	1.253	4584

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	77.682	0.182	0.1	1.0	O K
15 min Winter	78.136	0.636	0.2	3.6	O K
30 min Winter	78.356	0.856	0.3	4.9	O K
60 min Winter	78.577	1.077	0.3	6.1	O K
120 min Winter	78.756	1.256	0.4	7.2	O K
180 min Winter	78.809	1.309	0.4	7.5	O K
240 min Winter	78.822	1.322	0.4	7.5	O K
360 min Winter	78.821	1.321	0.4	7.5	O K
480 min Winter	78.796	1.296	0.4	7.4	O K
600 min Winter	78.759	1.259	0.4	7.2	O K
720 min Winter	78.717	1.217	0.3	6.9	O K
960 min Winter	78.631	1.131	0.3	6.4	O K
1440 min Winter	78.480	0.980	0.3	5.6	O K
2160 min Winter	78.298	0.798	0.2	4.6	O K
2880 min Winter	78.155	0.655	0.2	3.7	O K
4320 min Winter	77.945	0.445	0.2	2.5	O K
5760 min Winter	77.798	0.298	0.1	1.7	O K
7200 min Winter	77.689	0.189	0.1	1.1	O K
8640 min Winter	77.608	0.108	0.1	0.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Summer	1.113	5256
15 min Winter	107.316	25
30 min Winter	73.597	39
60 min Winter	48.287	66
120 min Winter	30.595	120
180 min Winter	23.054	172
240 min Winter	18.705	196
360 min Winter	13.896	272
480 min Winter	11.246	350
600 min Winter	9.534	424
720 min Winter	8.326	498
960 min Winter	6.715	644
1440 min Winter	4.949	924
2160 min Winter	3.637	1324
2880 min Winter	2.919	1728
4320 min Winter	2.136	2472
5760 min Winter	1.710	3232
7200 min Winter	1.441	3960
8640 min Winter	1.253	4664

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	77.554	0.054	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Winter	1.113	5240

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.400	Shortest Storm (mins)	15
Ratio R	0.312	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.017

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.006	4-8	0.006	8-12	0.006

Model Details

Storage is Online Cover Level (m) 80.000

Cellular Storage Structure

Invert Level (m) 77.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.12240 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.12240

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	6.0	6.0	1.601	0.0	22.0
1.600	6.0	22.0			

Martin Healer Development Services Ltd		Page 1
Nodor House South Road Bridgend CF31 3SY		
Date 23/11/2015 15:34 File 6m² @ 2m Summary 2	Designed By epowell Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 773 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	77.689	0.589	0.1	3.4	O K
30 min Summer	77.903	0.803	0.1	4.6	O K
60 min Summer	78.140	1.040	0.1	5.9	O K
120 min Summer	78.382	1.282	0.1	7.3	O K
180 min Summer	78.510	1.410	0.1	8.0	O K
240 min Summer	78.585	1.485	0.1	8.5	O K
360 min Summer	78.670	1.570	0.1	8.9	O K
480 min Summer	78.708	1.608	0.1	9.2	O K
600 min Summer	78.726	1.626	0.1	9.3	O K
720 min Summer	78.740	1.640	0.1	9.3	O K
960 min Summer	78.753	1.653	0.1	9.4	O K
1440 min Summer	78.746	1.646	0.1	9.4	O K
2160 min Summer	78.695	1.595	0.1	9.1	O K
2880 min Summer	78.628	1.528	0.1	8.7	O K
4320 min Summer	78.494	1.394	0.1	7.9	O K
5760 min Summer	78.381	1.281	0.1	7.3	O K
7200 min Summer	78.286	1.186	0.1	6.8	O K
8640 min Summer	78.203	1.103	0.1	6.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	107.316	26
30 min Summer	73.597	41
60 min Summer	48.287	70
120 min Summer	30.595	128
180 min Summer	23.054	186
240 min Summer	18.705	246
360 min Summer	13.896	362
480 min Summer	11.246	480
600 min Summer	9.534	526
720 min Summer	8.326	586
960 min Summer	6.715	710
1440 min Summer	4.949	984
2160 min Summer	3.637	1392
2880 min Summer	2.919	1816
4320 min Summer	2.136	2636
5760 min Summer	1.710	3408
7200 min Summer	1.441	4184
8640 min Summer	1.253	5008

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	78.130	1.030	0.1	5.9	O K
15 min Winter	77.761	0.661	0.1	3.8	O K
30 min Winter	78.001	0.901	0.1	5.1	O K
60 min Winter	78.267	1.167	0.1	6.7	O K
120 min Winter	78.542	1.442	0.1	8.2	O K
180 min Winter	78.688	1.588	0.1	9.1	O K
240 min Winter	78.775	1.675	0.1	9.5	O K
360 min Winter	78.875	1.775	0.1	10.1	O K
480 min Winter	78.925	1.825	0.1	10.4	O K
600 min Winter	78.945	1.845	0.2	10.5	O K
720 min Winter	78.952	1.852	0.2	10.6	O K
960 min Winter	78.965	1.865	0.2	10.6	O K
1440 min Winter	78.940	1.840	0.1	10.5	O K
2160 min Winter	78.855	1.755	0.1	10.0	O K
2880 min Winter	78.756	1.656	0.1	9.4	O K
4320 min Winter	78.566	1.466	0.1	8.4	O K
5760 min Winter	78.407	1.307	0.1	7.4	O K
7200 min Winter	78.279	1.179	0.1	6.7	O K
8640 min Winter	78.169	1.069	0.1	6.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Summer	1.113	5752
15 min Winter	107.316	26
30 min Winter	73.597	40
60 min Winter	48.287	70
120 min Winter	30.595	126
180 min Winter	23.054	184
240 min Winter	18.705	240
360 min Winter	13.896	354
480 min Winter	11.246	462
600 min Winter	9.534	566
720 min Winter	8.326	596
960 min Winter	6.715	740
1440 min Winter	4.949	1046
2160 min Winter	3.637	1496
2880 min Winter	2.919	1936
4320 min Winter	2.136	2776
5760 min Winter	1.710	3624
7200 min Winter	1.441	4400
8640 min Winter	1.253	5192

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	78.074	0.974	0.1	5.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Winter	1.113	5960

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.400	Shortest Storm (mins)	15
Ratio R	0.312	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.017

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.006	4-8	0.006	8-12	0.006

Model Details

Storage is Online Cover Level (m) 80.000

Cellular Storage Structure

Invert Level (m)	77.100	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.03600	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.03600		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	6.0	6.0	2.001	0.0	26.0
2.000	6.0	26.0			

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 135 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	78.540	0.240	0.1	0.9	O K
30 min Summer	78.620	0.320	0.1	1.2	O K
60 min Summer	78.692	0.392	0.1	1.5	O K
120 min Summer	78.735	0.435	0.1	1.7	O K
180 min Summer	78.744	0.444	0.1	1.7	O K
240 min Summer	78.742	0.442	0.1	1.7	O K
360 min Summer	78.728	0.428	0.1	1.6	O K
480 min Summer	78.710	0.410	0.1	1.6	O K
600 min Summer	78.691	0.391	0.1	1.5	O K
720 min Summer	78.672	0.372	0.1	1.4	O K
960 min Summer	78.635	0.335	0.1	1.3	O K
1440 min Summer	78.571	0.271	0.1	1.0	O K
2160 min Summer	78.496	0.196	0.1	0.7	O K
2880 min Summer	78.440	0.140	0.1	0.5	O K
4320 min Summer	78.370	0.070	0.1	0.3	O K
5760 min Summer	78.347	0.047	0.1	0.2	O K
7200 min Summer	78.340	0.040	0.1	0.2	O K
8640 min Summer	78.335	0.035	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	107.316	23
30 min Summer	73.597	36
60 min Summer	48.287	64
120 min Summer	30.595	108
180 min Summer	23.054	140
240 min Summer	18.705	174
360 min Summer	13.896	242
480 min Summer	11.246	312
600 min Summer	9.534	380
720 min Summer	8.326	448
960 min Summer	6.715	580
1440 min Summer	4.949	838
2160 min Summer	3.637	1212
2880 min Summer	2.919	1564
4320 min Summer	2.136	2252
5760 min Summer	1.710	2936
7200 min Summer	1.441	3672
8640 min Summer	1.253	4400

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	78.331	0.031	0.0	0.1	O K
15 min Winter	78.570	0.270	0.1	1.0	O K
30 min Winter	78.661	0.361	0.1	1.4	O K
60 min Winter	78.746	0.446	0.1	1.7	O K
120 min Winter	78.799	0.499	0.1	1.9	O K
180 min Winter	78.808	0.508	0.1	1.9	O K
240 min Winter	78.803	0.503	0.1	1.9	O K
360 min Winter	78.780	0.480	0.1	1.8	O K
480 min Winter	78.751	0.451	0.1	1.7	O K
600 min Winter	78.721	0.421	0.1	1.6	O K
720 min Winter	78.692	0.392	0.1	1.5	O K
960 min Winter	78.638	0.338	0.1	1.3	O K
1440 min Winter	78.548	0.248	0.1	0.9	O K
2160 min Winter	78.448	0.148	0.1	0.6	O K
2880 min Winter	78.380	0.080	0.1	0.3	O K
4320 min Winter	78.342	0.042	0.1	0.2	O K
5760 min Winter	78.334	0.034	0.1	0.1	O K
7200 min Winter	78.329	0.029	0.0	0.1	O K
8640 min Winter	78.325	0.025	0.0	0.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Summer	1.113	5088
15 min Winter	107.316	23
30 min Winter	73.597	36
60 min Winter	48.287	62
120 min Winter	30.595	116
180 min Winter	23.054	146
240 min Winter	18.705	184
360 min Winter	13.896	262
480 min Winter	11.246	336
600 min Winter	9.534	408
720 min Winter	8.326	480
960 min Winter	6.715	618
1440 min Winter	4.949	882
2160 min Winter	3.637	1256
2880 min Winter	2.919	1588
4320 min Winter	2.136	2208
5760 min Winter	1.710	2936
7200 min Winter	1.441	3648
8640 min Winter	1.253	4416

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	78.322	0.022	0.0	0.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Winter	1.113	5104

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.400	Shortest Storm (mins)	15
Ratio R	0.312	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.005

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.002	4-8	0.002	8-12	0.001

Model Details

Storage is Online Cover Level (m) 80.000

Cellular Storage Structure

Invert Level (m)	78.300	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.12240	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.12240		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	4.0	4.0	0.801	0.0	10.4
0.800	4.0	10.4			

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 538 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	78.556	0.256	0.0	1.0	O K
30 min Summer	78.649	0.349	0.0	1.3	O K
60 min Summer	78.749	0.449	0.0	1.7	O K
120 min Summer	78.846	0.546	0.0	2.1	O K
180 min Summer	78.893	0.593	0.0	2.3	O K
240 min Summer	78.917	0.617	0.0	2.3	O K
360 min Summer	78.937	0.637	0.0	2.4	O K
480 min Summer	78.944	0.644	0.0	2.4	O K
600 min Summer	78.947	0.647	0.0	2.5	O K
720 min Summer	78.947	0.647	0.0	2.5	O K
960 min Summer	78.940	0.640	0.0	2.4	O K
1440 min Summer	78.915	0.615	0.0	2.3	O K
2160 min Summer	78.871	0.571	0.0	2.2	O K
2880 min Summer	78.830	0.530	0.0	2.0	O K
4320 min Summer	78.755	0.455	0.0	1.7	O K
5760 min Summer	78.692	0.392	0.0	1.5	O K
7200 min Summer	78.639	0.339	0.0	1.3	O K
8640 min Summer	78.594	0.294	0.0	1.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	107.316	25
30 min Summer	73.597	39
60 min Summer	48.287	68
120 min Summer	30.595	126
180 min Summer	23.054	184
240 min Summer	18.705	242
360 min Summer	13.896	356
480 min Summer	11.246	410
600 min Summer	9.534	472
720 min Summer	8.326	534
960 min Summer	6.715	670
1440 min Summer	4.949	948
2160 min Summer	3.637	1364
2880 min Summer	2.919	1764
4320 min Summer	2.136	2556
5760 min Summer	1.710	3344
7200 min Summer	1.441	4104
8640 min Summer	1.253	4840

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	78.555	0.255	0.0	1.0	O K
15 min Winter	78.588	0.288	0.0	1.1	O K
30 min Winter	78.692	0.392	0.0	1.5	O K
60 min Winter	78.805	0.505	0.0	1.9	O K
120 min Winter	78.917	0.617	0.0	2.3	O K
180 min Winter	78.972	0.672	0.0	2.6	O K
240 min Winter	79.001	0.701	0.1	2.7	O K
360 min Winter	79.029	0.729	0.1	2.8	O K
480 min Winter	79.036	0.736	0.1	2.8	O K
600 min Winter	79.037	0.737	0.1	2.8	O K
720 min Winter	79.036	0.736	0.1	2.8	O K
960 min Winter	79.026	0.726	0.1	2.8	O K
1440 min Winter	78.988	0.688	0.1	2.6	O K
2160 min Winter	78.922	0.622	0.0	2.4	O K
2880 min Winter	78.860	0.560	0.0	2.1	O K
4320 min Winter	78.754	0.454	0.0	1.7	O K
5760 min Winter	78.668	0.368	0.0	1.4	O K
7200 min Winter	78.598	0.298	0.0	1.1	O K
8640 min Winter	78.540	0.240	0.0	0.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Summer	1.113	5552
15 min Winter	107.316	25
30 min Winter	73.597	39
60 min Winter	48.287	68
120 min Winter	30.595	124
180 min Winter	23.054	180
240 min Winter	18.705	238
360 min Winter	13.896	348
480 min Winter	11.246	450
600 min Winter	9.534	484
720 min Winter	8.326	560
960 min Winter	6.715	716
1440 min Winter	4.949	1022
2160 min Winter	3.637	1460
2880 min Winter	2.919	1884
4320 min Winter	2.136	2724
5760 min Winter	1.710	3520
7200 min Winter	1.441	4256
8640 min Winter	1.253	5024

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	78.491	0.191	0.0	0.7	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Winter	1.113	5752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.400	Shortest Storm (mins)	15
Ratio R	0.312	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.005

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.002	4-8	0.002	8-12	0.001

Model Details

Storage is Online Cover Level (m) 80.000

Cellular Storage Structure

Invert Level (m) 78.300 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03600 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	4.0	4.0	0.801	0.0	10.4
0.800	4.0	10.4			