

# **APPENDIX C**

## **BJH SURFACE WATER GREENFIELD RUN-OFF ESTIMATION ON SITE RETENTION VOLUME**

<b>BAILEY</b> <b>JOHNSON</b> <b>HAYES</b> CONSULTING ENGINEERS <b>Bailey Johnson Hayes</b> Grange House, John Dalton Street Manchester. M2 6FW Tel: 0161 279 7777 Fax: 0161 236 3552 Web: www.bjh.co.uk	Project	Proposed Development Skimmingdish Lane, Bicester. for Albion Land Ltd.	Project No. S1230	Sheet No. D1A
			Drawing No.	Rev.
	Section	Surface Water Drainage Design	By P.A.B.	Date Apr 15
			Checked	Date

Calculations

PROPOSED DEVELOPMENT,

SKIMMINGDISH LANE, BICESTER

FOR

ALBION LAND LTD

SURFACE WATER DRAINAGE DESIGN

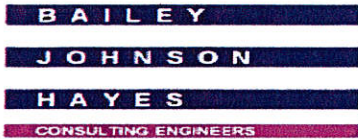
GREENFIELD RUN OFF AND STORAGE VOLUME ESTIMATIONS

1.0 INTRODUCTION

The following calculations are prepared to justify the principles for design of below-ground surface water drainage systems for the above development.

The site has a total area of 12.6 ha and exhibits a gentle gradient from north to south. The site is presently undeveloped and comprises of open fields used as arable land. The proposed scheme is to redevelop the site with new roads, buildings and external yard / hardstanding areas for warehousing.

The surface water drainage strategy for the developed site is to limit flows to existing greenfield values by utilising a series of retention swales and/or ponds and incorporating flow control devices to the drainage network. The drainage will discharge via a new outfall to Langford Brook to the south east of the site. The design for the site drainage shall include an allowance for climate change.

 <p><b>Bailey Johnson Hayes</b> Grange House, John Dalton Street Manchester. M2 6FW Tel: 0161 279 7777 Fax: 0161 236 3552 Web: www.bjh.co.uk</p>	Project	Proposed Development Skimmingdish Lane, Bicester. for Albion Land Ltd.	Project No. S1230	Sheet No. D2A
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Calculations

2.0 GROUND CONDITIONS

The published geology map indicates the site to be underlain by Alluvium, overlying Oxford Clay and Kellaway Beds, overlying Cornbrash Limestone.

3.0 DESIGN

3.1 GREENFIELD RUNOFF ESTIMATE

Greenfield runoff estimation is undertaken using the UK SuDS Tools Website. Based upon local knowledge, of the ground conditions the SOIL is considered to be type 4 for the purpose of greenfield runoff estimation. The default value of SOIL type 1 (sandy highly permeable material), allocated by the UK SuDS Tools Website for the subject site, is considered inappropriate and is therefore edited within the input data.

Greenfield runoff is calculated using the Institute of Hydrology Report 124 methodology, assuming a site area of 50ha, and linearly interpolating the final value for the formally drained site area of 9.62ha. The greenfield runoff estimation for a 50ha site in this location is presented on the following sheet.

The greenfield runoff estimate of Qbar for a 50ha site is 209.4 litres/sec.

Accordingly the value of Qbar for the subject site is  $(9.62 / 50) \times 668 = 128.5$  **litres/sec**

For the purpose of initial sizing of flood storage requirements it shall be assumed that the outflow from the whole site shall be restricted to Qbar for all rainfall events up to and including the 1 in 100 year event (inclusive of an allowance of 20% for climate change).

Drainage design is undertaken using the Source Control module of Microdrainage Windes software. The input data and results of a Quick Storage Estimate are presented on the following sheet. For 1 in 100 year +20% storm events (using FEH design rainfall) the software predicts storage volumes between 5906 m<sup>3</sup> and 8259 m<sup>3</sup> will be required.



# Greenfield runoff estimation for sites

Site name: Skimmingdish Lane  
Site location: Bicéster

Site coordinates  
Latitude: 51.90824° N  
Longitude: 1.12735° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance 'Preliminary rainfall runoff management for developments' (W5-074A, TR1.1 rev. E (2012)) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Reference: gcppq3e56v6b / 50  
Date: 26 Nov 2014

## Site characteristics

Total site area	50	ha
Significant public open space	0	ha
Area positively drained	50	ha

## Methodology

Greenfield runoff method	IH124
Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	4
HOST class	N/A
SPR	0.47

## Hydrological characteristics

	Default	Edited	
SAAR	620	620	mm
M5-60 Rainfall Depth	20	20	mm
r Ratio M5-60/M5-2 day	0.4	0.4	
FEH/FSR conversion factor	0.88	0.88	
Hydrological region	6	6	
Growth curve factor: 1 year	0.85	0.85	
Growth curve factor: 10 year	1.62	1.62	
Growth curve factor: 30 year	2.3	2.3	
Growth curve factor: 100 year	3.19	3.19	

## Greenfield runoff rates

	Default	Edited	
Qbar	7.29	209.44	l/s
1 in 1 year	42.50	178.02	l/s
1 in 30 years	115.00	481.71	l/s
1 in 100 years	159.50	668.11	l/s

Please note that a minimum flow of 5 l/s applies to any site

**Quick Storage Estimate**

**Micro Drainage**

**Variables**

FEH Rainfall		Cv (Summer)	0.750
Return Period (years)	100	Cv (Winter)	0.840
Site Location		Impemeable Area (ha)	9.620
460200 223700 SP 60200 23700	...	Maximum Allowable Discharge (l/s)	128.5
C (1km)	-0.022	D3 (1km)	0.244
D1 (1km)	0.324	E (1km)	0.290
D2 (1km)	0.320	F (1km)	2.477
		Infiltration Coefficient (m/hr)	0.00000
		Safety Factor	2.0
		Climate Change (%)	30

Analyse OK Cancel Help

Enter Maximum Allowable Discharge between 0.0 and 999999.0

**Quick Storage Estimate**

**Micro Drainage**

**Results**

Global Variables require approximate storage of between 4694 m<sup>3</sup> and 6618 m<sup>3</sup>.

These values are estimates only and should not be used for design purposes.

Variables

Results

Design

Overview 2D

Overview 3D

Vt

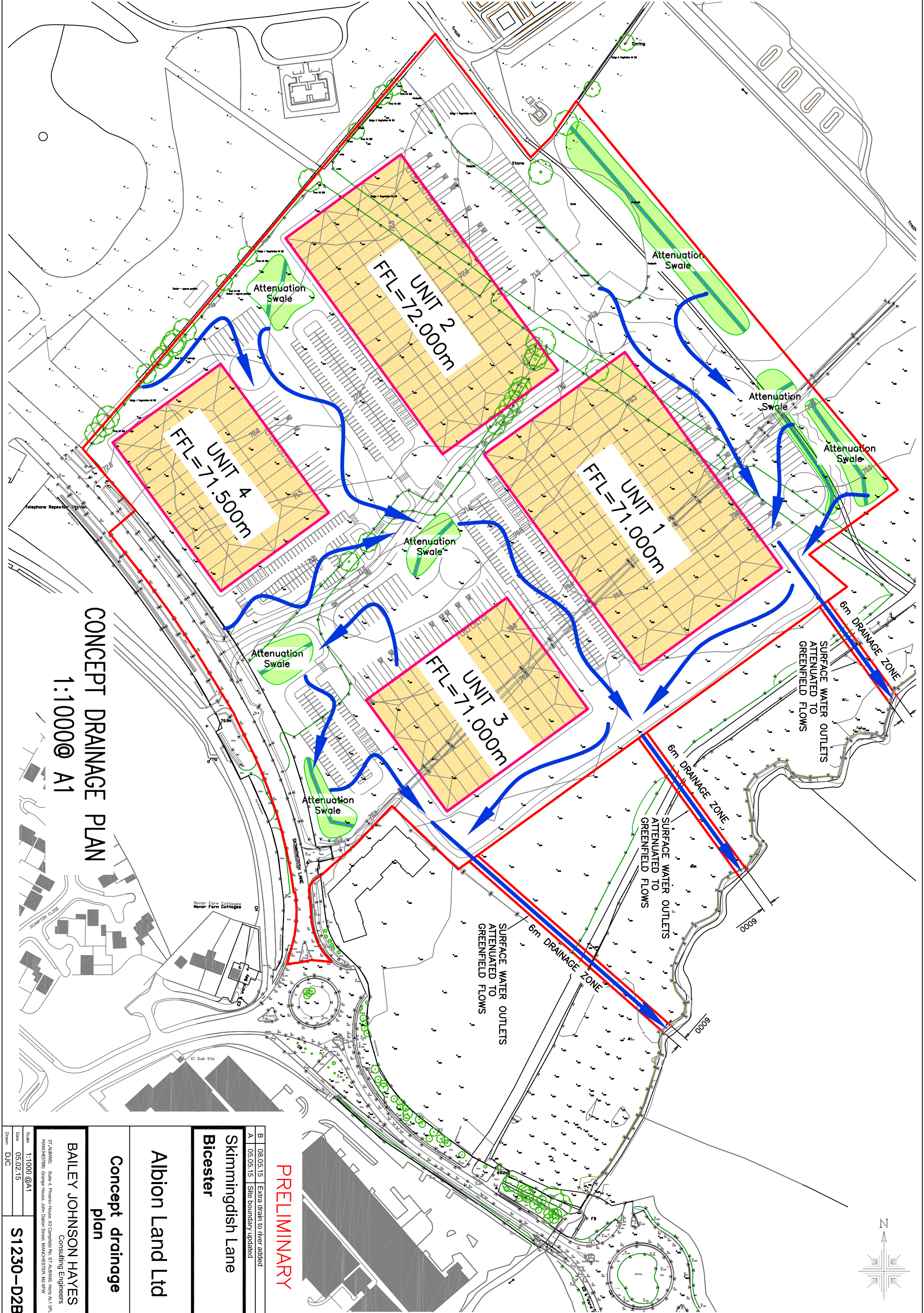
Analyse OK Cancel Help

Enter Maximum Allowable Discharge between 0.0 and 999999.0



# **APPENDIX D**

## **BJH SURFACE WATER DRAINAGE PLAN S1230/D2B**



**CONCEPT DRAINAGE PLAN**

1:10000 @ A1

**PRELIMINARY**

08.05.15 | Extra drain to river added  
 05.05.15 | Site boundary updated

**Skimmingdish Lane**  
**Bicester**

**Albion Land Ltd**

**Concept drainage plan**

**BAILEY JOHNSON HAYES**  
 Consulting Engineers

ST ALBANS - Suite 4, Phoenix House, 63 Campbell Rd, ST ALBANS, Herts AL1 5PL  
 WINDCHESTER - Orange House, John Dalton Street, WINDCHESTER, Wiltshire SN2 6JW

Scale 1:1000 @ A1  
 Date 05.02.15  
 Drawn DJC

**S1230-D2B**