APPENDIX H

SURFACE WATER DRAINAGE CALCULATIONS

ARP ASSOCIATES
AND GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

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Client : STRATA GROUP.		Project No. 374/17	Sheet. 1 of 8
Project : BURNTWOOD ROAD.		Calc By. ARP	Date. 25/11/09
Element : SURFACE WATER DRAINAGE		Chkd By.	Date.

EXISTING DISCHARGE RATE

Using plan presented on page 2,

Existing Impermeable Area =

Houses to North East	(14 x 7) x 4No.
Houses to Nancy Crescent	(14 x 7) x 10No.
Houses to North West	(14 x 7) x 6No.
Private Drive & Garages to East	(50 x 4) + (60 x 3) + (30 x 15) + (40 x 3) + (5 x 2.5) x 10No.
Private Drive to West	(45 x 2.5) + (16 x 10)
Nancy Crescent	(104 x 6)

Ex Imp Area = 3931.5 m^2

= 0.393 ha

Existing Discharge Rate, using 50 mm/hr Storm.

= 2.78 x 0.393 x 50.

$\therefore Q$ = 54.6 l/sec

PROPOSED DISCHARGE RATE

Reduce existing Rate by 30%.

$\therefore Q_{PROP} = \frac{54.6}{1.3}$ = 42 l/sec



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Envirocheck®

Ordnance Survey Plan
Published 1973
Source map scale - 1:2,500

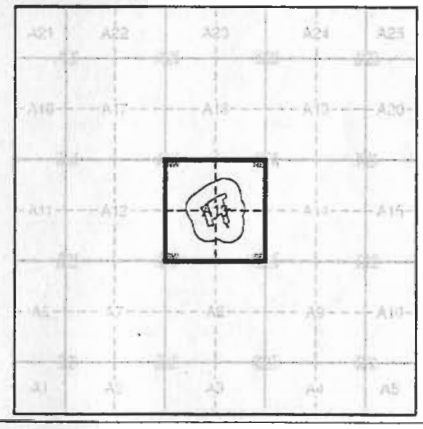
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SE4109
1973
1:2,500

SE4108
1973
1:2,500

Historical Map - Segment A13



Order Details

Order Number:	29191210_1_1
Customer Ref:	32376/JMW/RAN
National Grid Reference:	441720, 408850
Slice:	A
Site Area (Ha):	2.17
Search Buffer (m):	100

Site Details

Site at 441500, 408500

Landmark® Information Group
Tel: 0844 844 9952
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Web: www.envirocheck.co.uk

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Element : SURFACE WATER DRAINAGE	Chkd By.	Date.

PROPOSED IMPERMEABLE AREA

Using the proposed layout on page 4,
the proposed Impermeable Area =

House Type Aix. $(10.8 \times 5.8) \times 1$

" " Geneva. $\{(9.0 \times 5.0) + (3.6 \times 1.8)\} \times 13.$

" " Limoges $(11.0 \times 5.5) \times 12.$

" " Cadiz. $(8.0 \times 5.5) \times 11.$

" " Rowen. $(11.0 \times 5.5) \times 14$

" " Malmo $\{(9.0 \times 5.0) \times (3.6 \times 1.8)\} \times 11$

" " Dublin $(9.5 \times 5.0) \times 12.$

" " 2 Bed. $\{(8.0 \times 5.0) + (3.6 \times 1.8)\} \times 11$

" " Faro. $\{(9.0 \times 5.0) + (3.6 \times 1.8)\} \times 11$

" " Lucca. $(13.0 \times 5.5) \times 4$

Garages $(5.5 \times 3.0) \times 11.$

Drives / Car Parking Spots $(6.0 \times 3.0) \times 108$

Private Drives / F'path link $(13.5 \times 3.0) + (33.0 \times 9.0) + (29.5 \times 4.5) + (15.0 \times 3.0)$

Nancy Crescent (125.0×10.5)

Shared Accesses $(4.5 \times 6.7) + (6.7 \times 5.5) + (7.0 \times 6.7) + (5.2 \times 6.7) + (5.0 \times 6.7) + (11.0 \times 5.5 \times 6 \text{ No's})$

PROPOSED IMP AREA = 10,974.7 m^2

= 1.097 ha

PRELIMINARY

All work to be carried out in accordance with the requirements of the Building Regulations, Water Authority and the Construction (Design and Management) Regulations currently in force.

Do not scale from this drawing. Architect to be notified of any discrepancies.

Verify relevant dimensions on site before commencing work or preparing shop drawings. This drawing is copyright.

Rev:	Date:	Action:	Initial:



Additional windows to enhance both street scene and security

Important vistas to landmark buildings

ACCOMODATION SCHEDULE		SITE:	Burntwood Road Grimethorpe	
DRAWING NUMBE	SK04			
House Type	Abb.	No	Bedrooms	Storey Height
Aix	Ai	1	2	2
Colmar	Col	3	2	2
Vigo	Vi	2	2	2
Lucca	Lu	2	1	3.5
Lucca	Lu	2	1	3.5
Dublin	Db	18	2	3
Lisbon	Lis	1	1	2
2 Bed	2B	0	2	2
Cadiz	Ca	4	3	2.5
Faro	Fa	4	3	2
Geneva	Gh	11	3	2.5
Malmo	Ma	7	3	2.5
Rouen	Ro	9	4	3
Limoges	Li	18	4	3
Toulon	To	3	5	3.5
Genoa	Ge	1	5	3.5
Sub Total		84		
Affordable Units				
Aix	Ai	0	2	2
Lisbon	Lis	0	2	2
Vigo	Vi	2	2	2
Colmar	Col	0	2	2
Lucca	Lu	2	1	2
Lucca	Lu	2	1	2
Dublin	Db	4	2	3.5
2 Bed	2b	6	2	2
Faro (2b)	Fa	0	2	2
Faro (3b)	Fa	2	3	2
Cadiz	Ca	6	3	2.5
		0		
AH Sub Total		24		
	Total	108		

PRELIMINARY

homes by strata

strata homes limited quay point lakeside doncaster DN4 5PL
T 01302 308808 F 01302 308501 www.homesbystrata.co.uk

scale: 1/500 | drawn by: | date:

Project: Burntwood Rd Grimethorpe

Drawing: Skefch layout

Drawing Number: SK05 | Revision A

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Project : BURNTWOOD ROAD.	Calc By. ARP	Date. 25/11/09
Element : SURFACE WATER DRAINAGE	Chkd By.	Date.

ATTENUATION

Using the WINDES Source Control computer program.

1 in 30yr Storage Volume = 211.6 m^3

Discharge Rate = 42 l/s.

Climatic Change = 20 %.

Possible option for attenuation of 211.6 m^3
= 94m of Twin 1.2m dia Pipes.

Computer Print Out details are presented on pages 6-8.

Northwest House Servia Hill Leeds LS6 2QH	Strata Group Burntwood Road 374/17
Date 25=11=09 File 374-17PrelimStorage30y...	Designed By ARP Checked By
Elstree Computing Ltd	Source Control W.11.3

Summary of Results for 30 year Return Period (+20%)

Storm Duration (mins)	Maximum Control (l/s)	Maximum Overflow (l/s)	Maximum Outflow (l/s)	Maximum Water Level (m OD)	Maximum Depth (m)	Overflow Volume (m³)	Maximum Volume (m³)	Status
15 Summer	41.3	0.0	41.3	100.8698	0.8698	0.0	147.0	O K
30 Summer	41.3	0.0	41.3	101.0058	1.0058	0.0	175.0	O K
60 Summer	41.3	0.0	41.3	101.0523	1.0523	0.0	183.7	O K
120 Summer	41.3	0.0	41.3	101.0043	1.0043	0.0	174.7	O K
180 Summer	41.3	0.0	41.3	100.9273	0.9273	0.0	159.2	O K
240 Summer	41.3	0.0	41.3	100.8478	0.8478	0.0	142.1	O K
360 Summer	41.3	0.0	41.3	100.6873	0.6873	0.0	106.2	O K
480 Summer	41.3	0.0	41.3	100.5487	0.5487	0.0	75.1	O K
600 Summer	41.3	0.0	41.3	100.4547	0.4547	0.0	54.9	O K
720 Summer	40.7	0.0	40.7	100.3947	0.3947	0.0	42.8	O K
960 Summer	35.2	0.0	35.2	100.3288	0.3287	0.0	30.4	O K
1440 Summer	27.7	0.0	27.7	100.2657	0.2657	0.0	19.7	O K
15 Winter	41.3	0.0	41.3	100.9683	0.9683	0.0	167.6	O K
30 Winter	41.3	0.0	41.3	101.1593	1.1593	0.0	201.1	O K
60 Winter	41.3	0.0	41.3	101.2572	1.2573	0.0	211.6	O K
120 Winter	41.3	0.0	41.3	101.1418	1.1418	0.0	198.6	O K
180 Winter	41.3	0.0	41.3	101.0048	1.0048	0.0	174.8	O K
240 Winter	41.3	0.0	41.3	100.8738	0.8738	0.0	147.8	O K
360 Winter	41.3	0.0	41.3	100.6133	0.6133	0.0	89.5	O K
480 Winter	41.2	0.0	41.2	100.4337	0.4337	0.0	50.6	O K
600 Winter	37.8	0.0	37.8	100.3597	0.3597	0.0	36.1	O K
720 Winter	33.9	0.0	33.9	100.3127	0.3127	0.0	27.6	O K
960 Winter	27.8	0.0	27.8	100.2663	0.2662	0.0	19.9	O K
1440 Winter	20.5	0.0	20.5	100.2178	0.2178	0.0	12.7	O K

Storm Duration (mins)	Rain (mm/hr)	Time-Peak (mins)
15 Summer	85.76	21
30 Summer	56.07	35
60 Summer	35.09	54
120 Summer	21.33	88
180 Summer	15.78	122
240 Summer	12.69	156
360 Summer	9.29	220
480 Summer	7.44	276
600 Summer	6.27	330
720 Summer	5.44	384
960 Summer	4.35	504
1440 Summer	3.17	740
15 Winter	85.76	21
30 Winter	56.07	35
60 Winter	35.09	58
120 Winter	21.33	94
180 Winter	15.78	132
240 Winter	12.69	168
360 Winter	9.29	230
480 Winter	7.44	276
600 Winter	6.27	330
720 Winter	5.44	386
960 Winter	4.35	502
1440 Winter	3.17	740

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Rainfall Details

Region	ENG+WAL	Shortest Storm (mins)	15
Return Period (years)	30	Longest Storm (mins)	1440
M5-60 (mm)	19.000	Summer Storms	Yes
Ratio-R	0.391	Winter Storms	Yes
Cv (Summer)	0.750	Climate Change %	+20
Cv (Winter)	0.840		

Time / Area Diagram

Total Area (ha) = 1.097

Time from:	(mins) to:	Area (ha)	Time from:	(mins) to:	Area (ha)
0	4	0.000	4	8	1.097

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Double Pipe Details

Diameter (m) 1.200 Length (m) 94.000 Cover Level (m) 103.000
Slope (1:x) 500.0 Invert Level (m) 100.000

Hydro-Brake Outflow Control

Design Head (m) 1.388 Diameter (mm) 214
Design Flow (l/s) 42.0 Invert Level (m) 100.000
Hydro-Brake Type MD4

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.10	4.5	0.80	34.7	2.00	50.3	4.00	71.1	7.00	94.0
0.20	17.8	1.00	36.2	2.20	52.7	4.50	75.4	7.50	97.3
0.30	32.8	1.20	39.1	2.40	55.1	5.00	79.5	8.00	100.5
0.40	41.2	1.40	42.1	2.60	57.3	5.50	83.3	8.50	103.6
0.50	41.3	1.60	45.0	3.00	61.6	6.00	87.1	9.00	106.6
0.60	38.0	1.80	47.7	3.50	66.5	6.50	90.6	9.50	109.5

Weir / Flume Overflow Control

Discharge Coef 0.544 Width (m) 3.000 Crest Level (m) 101.388

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