

Technical Note 002A

Project:	North Wales Prison	Project No.:	112859	 TPS
		Phase No.:	0120	
Subject:	Greenfield Run-off Estimation			
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Rev	Description	Made by	Date of Issue
00	First issue	M.Waitimas	03.10.2014
0A	Section 2.5 Added.	M.Waitimas	15.10.2014

1.0 INTRODUCTION

This technical note outlines the different methods used to determine an estimate of the Greenfield run-off for the North Wales Prison Site. This has been prepared as part of our response of the objection of the surface water management strategy previously proposed by TPS and aims to address part of 'Reserve Matters, Conditions 7 & 8'.

This technical note when read in conjunction with our site wide drainage strategy drawing NWP-CE-TPS-099-DR-XX-0400 intended to address the observations and conditions set out in letter ref NT/2014/116126, dated 8th September 2014

2.0 ESTIMATION METHODS

2.1 IH124

2.1.1 UK Sustainable Drainage Website Software

Using the software available on the UK Sustainable Drainage Guidance & Tools website, a Qbar value of 2.82 l/s/ha was obtained. Given the site area of 17 ha, this gives a total Qbar of 47.94 l/s (see Appendix A for report).

2.1.2 Microdrainage

Using the Source Control Module available in the Micro Drainage programme a site QBAR value of 98.3l/s was obtained. Micro Drainage warns that the IH124 method is not appropriate for sites less than 50ha in size. See Appendix B for results.

2.2 ADAS 345

Using the ADAS 345 method in Micro Drainage a Greenfield run-off estimation of QBAR 40.4 l/s was obtained. See Appendix C for results.

2.3 Greenfield Volume

The Greenfield Volume calculation in Micro Drainage gives a Greenfield Run-off volume 134.751m³. Taking a 60 minute storm gives 37.43 l/s. See Appendix D for results.

2.4 Unit Hydrograph Method

Using Micro Drainage to model a ditch scenario whereby the surface water flow is simulated by means of a hydrograph, a ditch outflow value of 43.8l/s for a 15 minute one year storm was obtained. See Appendix E for results.

2.5 Flood Estimation Handbook.

The FEH method is currently being reviewed. The design will be updated as necessary subject to the results.

3.0 Greenfield Run-off Summary

Assessment Method	QBAR value
IH124 – UK Sustainable Drainage IH 124 - Microdrainage	47.9 l/s 98.3 l/s
ADAS345	40.4 l/s
Greenfield Volume	37.4 l/s
Unit Hydrograph	42.7 l/s

The IH 124 value calculated using Micro Drainage will be discounted given that it is not a recommended assessment method for sites less than 50ha in size.

Taking into account the suitability of the assessment method and the various QBAR values obtained, the most onerous value of **37.4l/s** will be used as a limiting outflow value for detailed design.

4.0 Tank Size

Tank Dimensions	
Volume	2000 m3
Plan Area	1000 m2
Depth	2 m
Bottom of Tank Level	27.717 m
Top of Tank Level	29.717 m
Ground Level	31.300 m



Greenfield runoff estimation for sites

Site name: North Wales Prison
 Site location: Wrexham

Site coordinates

Latitude: 53.03591° N
 Longitude: 2.92764° 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", W5-074/A/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: gcmvtquht41q / 17
 Date: 24 Sep 2014

Site characteristics

Total site area	17	ha
Significant public open space	0	ha
Area positively drained	17	ha

Methodology

Greenfield runoff method	IH124
Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	1
HOST class	N/A
SPR	0.10

Hydrological characteristics

	Default	Edited	
SAAR	692	692	mm
M5-60 Rainfall Depth	17	17	mm
'r' Ratio M5-60/M5-2 day	0.3	0.3	
FEH/FSR conversion factor	1.01	1.01	
Hydrological region	9	9	
Growth curve factor: 1 year	0.88	0.88	
Growth curve factor: 10 year	1.42	1.42	
Growth curve factor: 30 year	1.78	1.78	
Growth curve factor: 100 year	2.18	2.18	

Greenfield runoff rates

	Default	Edited	
Qbar	2.82	2.82	l/s
1 in 1 year	14.96	14.96	l/s
1 in 30 years	30.26	30.26	l/s
1 in 100 years	37.06	37.06	l/s

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

Appendix B

IH 124

IH 124 Input

Return Period (Years)
Area (ha)
SAAR (mm)
Soil
Growth Curve

Partly Urbanised Catchment (QBAR)

Urban
Region Region 9

Warning: It is unusual to use the IH124 method with an area < 50ha. The Interim Code of Practice recommends that the IH124 method is applied with 50ha and the resulting discharge is linearly interpolated for the required

Results

QBAR rural (l/s)

95.2

QBAR urban (l/s)

95.2

Return Period Flood

Region	QBAR (l/s)	Q (1yrs) (l/s)	Q (1 yrs) (l/s)	Q (2 yrs) (l/s)	Q (5 yrs) (l/s)	Q (10 yrs) (l/s)	Q (20 yrs) (l/s)	Q (25 yrs) (l/s)	Q (30 yrs) (l/s)	Q (50 yrs) (l/s)	Q (100 yrs) (l/s)	Q (200 yrs) (l/s)	Q (250 yrs) (l/s)	Q (1000 yrs) (l/s)
Region 1	95.2	80.9	80.9	86.5	114.2	137.5	162.6	172.0	179.8	202.1	236.0	267.4	277.9	345.4
Region 2	95.2	82.8	82.8	87.0	112.3	135.1	162.5	172.4	180.5	206.9	250.3	283.6	295.0	366.4
Region 3	95.2	81.8	81.8	89.8	118.9	138.0	156.3	162.3	167.3	180.2	197.9	224.6	233.1	289.3
Region 4	95.2	79.0	79.0	85.3	117.0	141.8	169.1	178.7	186.4	209.5	244.6	287.4	301.6	395.9
Region 5	95.2	82.8	82.8	85.0	122.8	157.5	199.0	215.2	228.6	270.4	338.8	398.7	417.7	548.1
Region 6/Region 7	95.2	80.9	80.9	83.8	121.8	154.2	190.6	204.4	215.7	249.3	303.6	356.8	374.0	491.0
Region 8	95.2	74.2	74.2	84.1	117.0	141.8	166.4	174.7	181.4	201.5	230.3	271.2	283.6	372.1
Region 9	95.2	83.7	83.7	88.4	115.1	135.1	155.2	162.1	167.8	184.2	207.4	235.0	244.6	303.6
Region 10	95.2	82.8	82.8	88.6	113.2	131.3	149.6	156.1	161.3	176.0	197.9	224.6	233.1	289.3
Ireland National	95.2	80.9	80.9	91.4	114.2	128.5	142.9	147.5	151.3	161.8	175.1	189.4	n/a	n/a
Ireland East	95.2	80.9	80.9	91.4	115.1	131.3	146.5	151.3	155.1	165.6	180.8	195.1	n/a	n/a
Ireland South	95.2	80.9	80.9	91.4	113.2	128.5	142.9	147.5	151.3	161.8	175.1	189.4	n/a	n/a
Ireland West	95.2	80.9	80.9	91.4	112.3	126.6	139.5	143.7	147.0	156.1	169.4	181.7	n/a	n/a
Ireland Greater Dublin	95.2	80.9	80.9	87.5	130.4	158.9	186.3	195.1	202.1	221.7	248.4	275.0	n/a	n/a

Appendix C

ADAS 345

ADAS 345 Input

Area (ha)

17.000

Length (m)

400.000

Average Slope (1:X)

130.0

AAR (mm)

778

Soil Type Factor (St)

0.450

Growth Curve

(None)

Partly Urbanised Catchment (QBAR)

Return Period (Years)

1

Region

Region 9

Paved Area (%)

0.000

Calculate

Results

Q0 - Peak Flood Flow (l/s)

37.5

Total Q0 (l/s)

37.5

Region	QBAR (l/s)	Q (1yrs) (l/s)	Q (1 yrs) (l/s)	Q (2 yrs) (l/s)	Q (5 yrs) (l/s)	Q (10 yrs) (l/s)	Q (20 yrs) (l/s)	Q (25 yrs) (l/s)	Q (30 yrs) (l/s)	Q (50 yrs) (l/s)	Q (100 yrs) (l/s)	Q (200 yrs) (l/s)	Q (250 yrs) (l/s)	Q (1000 yrs) (l/s)
Region 1	41.3	35.1	35.1	37.5	49.6	59.7	70.6	74.7	78.0	87.7	102.4	116.1	120.6	150.0
Region 2	41.1	35.7	35.7	37.5	48.5	58.3	70.1	74.4	77.9	89.3	108.0	122.4	127.3	158.1
Region 3	39.8	34.2	34.2	37.5	49.7	57.7	65.3	67.9	69.9	75.4	82.8	93.9	97.5	121.0
Region 4	41.9	34.8	34.8	37.5	51.5	62.4	74.5	78.7	82.1	92.2	107.7	126.5	132.8	174.3
Region 5	42.0	36.6	36.6	37.5	54.2	69.5	87.8	95.0	100.9	119.4	149.6	176.0	184.4	242.0
Region 6/Region 7	42.6	36.2	36.2	37.5	54.5	69.0	85.4	91.5	96.6	111.6	135.9	159.8	167.5	219.9
Region 8	42.5	33.1	33.1	37.5	52.3	63.3	74.3	78.0	81.0	90.0	102.8	121.1	126.6	166.1
Region 9	40.4	35.6	35.6	37.5	48.9	57.4	65.9	68.9	71.3	78.3	88.1	99.8	103.9	128.9
Region 10	40.3	35.1	35.1	37.5	48.0	55.6	63.4	66.1	68.3	74.6	83.8	95.1	98.8	122.5
Ireland National	39.1	33.2	33.2	37.5	46.9	52.8	58.7	60.6	62.2	66.5	72.0	77.8	n/a	n/a
Ireland East	39.1	33.2	33.2	37.5	47.3	54.0	60.2	62.2	63.7	68.0	74.3	80.2	n/a	n/a
Ireland South	39.1	33.2	33.2	37.5	46.5	52.8	58.7	60.6	62.2	66.5	72.0	77.8	n/a	n/a
Ireland West	39.1	33.2	33.2	37.5	46.1	52.0	57.3	59.1	60.4	64.1	69.6	74.7	n/a	n/a
Ireland Greater Dublin	40.8	34.7	34.7	37.5	55.9	68.1	79.9	83.7	86.7	95.1	106.5	117.9	n/a	n/a

Appendix D

Greenfield Volume

Greenfield Runoff Volume Input

Rainfall Model

FSR Rainfall

Return Period (years)

1

Storm Duration (mins)

60

Region

England and Wales

Area (ha)

17.000

Map

M5-60 (mm)

18.000

SAAR (mm)

761

Ratio R

0.347

CWI

112.871

Urban

0.000

Areal Reduction Factor

1.00

SPR

10.000

Calculate

Results

PR%

6.97

Greenfield Runoff Volume (m³)

134.751

