

NOTE TO FILE

JBA Project Code 2015s2285
Contract Wombwell Wetlands Extension Scheme
Client The Garganey Trust
Day, Date and Time 15 October 2015
Author Harriett Twohig-Howell
Subject Wombwell Wetlands Extension Scheme

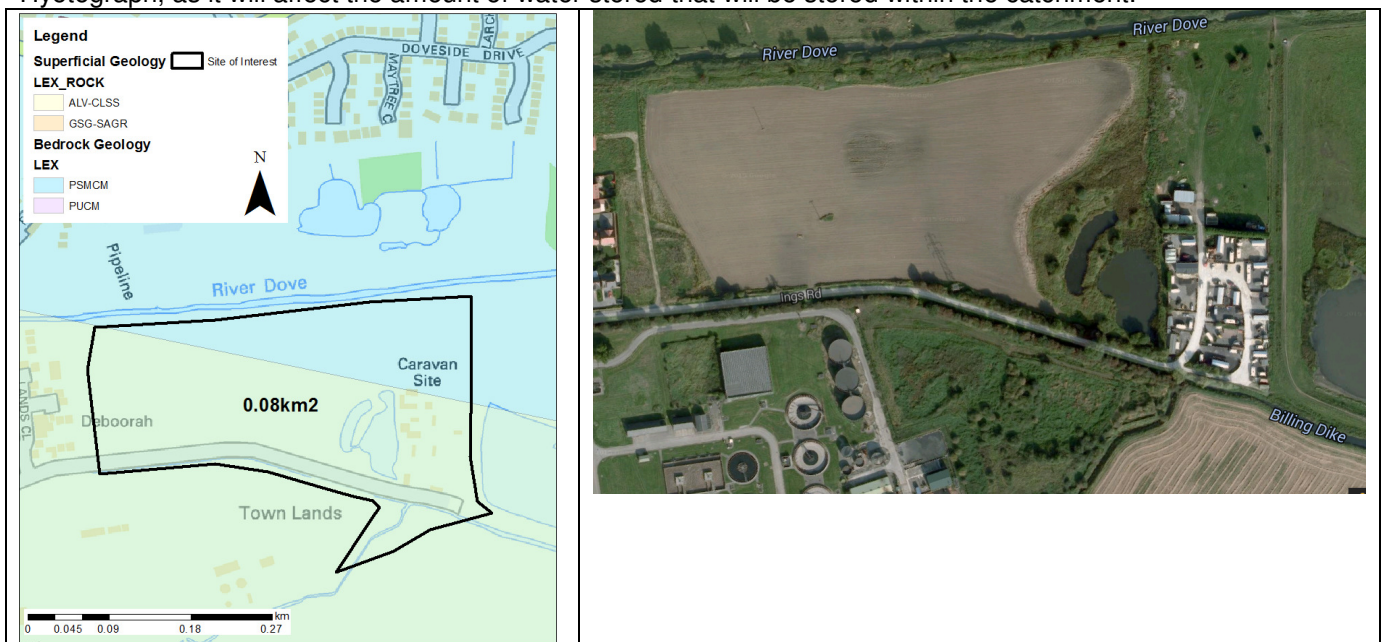


Deriving instantaneous net rainfall for site of interest

The model requires a net rainfall hyetograph for this small site, to understand the potential for surface water runoff to pond behind a proposed flood embankment. This note to file explains how this was derived.

1 Site of interest

The site is extremely small as 0.08km², situated on the right bank of the river dove. Half of the area lies within the Dove catchment, while the other half lies within the Bulling's dike catchment. Much of the area is rural, comprising a large field, however there is also a caravan site, a main road, and a small lake. The bedrock geology is carboniferous coal measures partially overlain with alluvium. This will impact in the derivation of the net Hyetograph, as it will affect the amount of water stored that will be stored within the catchment.



1.1 Method

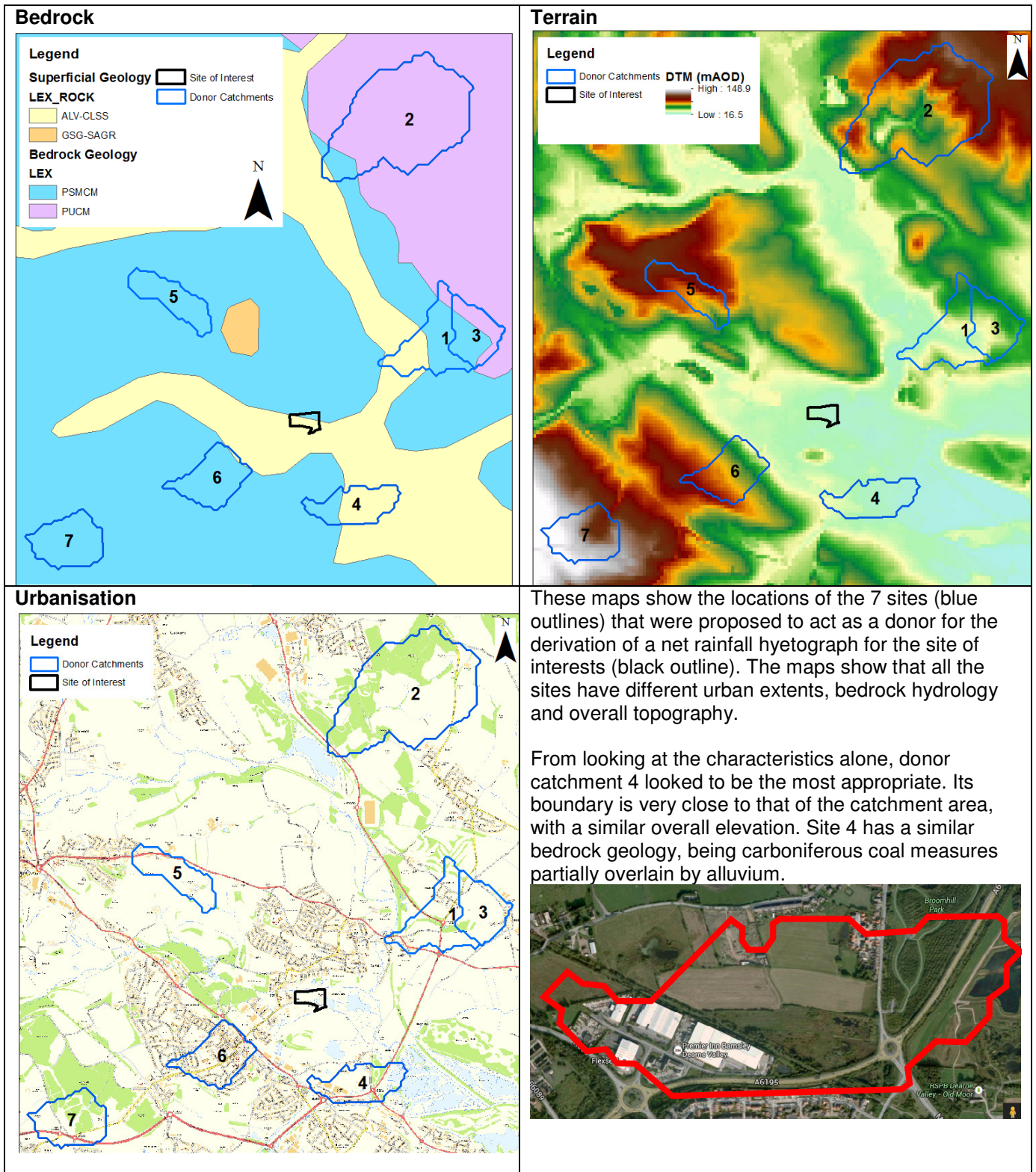
The site of interest is not located within a single catchment, and thus it was not possible to scale the respective catchment descriptors to the area of interest. An alternative method was therefore adopted, in which potential donor sites near to the site of interest were proposed, and the most appropriate donor catchment selected.

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1.2 Sites



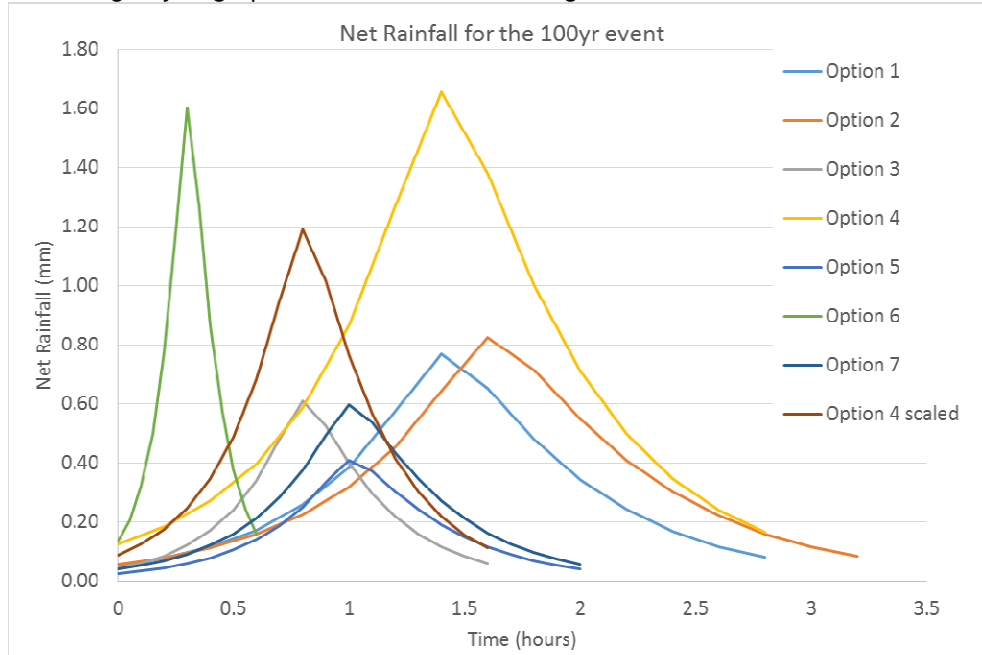
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1.3 Donor site net rainfall

The design hyetograph for site 4 has a much higher rainfall volume than all the other sites.



Catchment Descriptors

Name	AREA	FARL	BFIHOST	SAAR	SPRHOST	PROPWET	URBEXT 2000
Option1	1.19	1	0.702	600	13.97	0.32	0.0241
Option2	2.48	0.95	0.675	616	14.85	0.32	0.0051
Option3	0.5	1	0.681	599	14.27	0.32	0.03
Option4	0.55	1	0.502	610	34.77	0.32	0.1598
option5	0.5	1	0.737	626	10.44	0.32	0.0475
option6	0.58	1	0.334	621	38.36	0.32	0.5751
option7	0.62	1	0.673	660	14.84	0.32	0.0081

The catchment characteristics which influence the net rainfall calculation are SPRHOST and PROPWET. The PROPWET values are identical for each of the option sites, however there are significant differences between the SPRHOST values. SPRHOST is the standard percentage runoff (%) associated with each HOST soil class, and the higher the value, the more impermeable the soil is, thus resulting in a greater net rainfall. The SPRHOST values for the two catchments on which the site of interest is located, the Dove and Bulling's Dike, have SPRHOST values of 24.14 and 36.67 respectively. Option 4 has the closest SPRHOST value, at 34.77. This high value would also provide a worst case scenario for the net rainfall, for which to run the model. Option 4 was therefore chosen as the donor site from which to derive the net rainfall for the site of interest.

1.4 Calculating the Net rainfall for the Site of Interest

The catchment descriptors for option 4 were modified, so that they could be used as a donor for the site of interest. The Area was changed to 0.08, and the DPLBAR was changed to 0.26 (Area^{0.548}). These modified CDs were subsequently used as input for ReFH, and a new net rainfall derived.

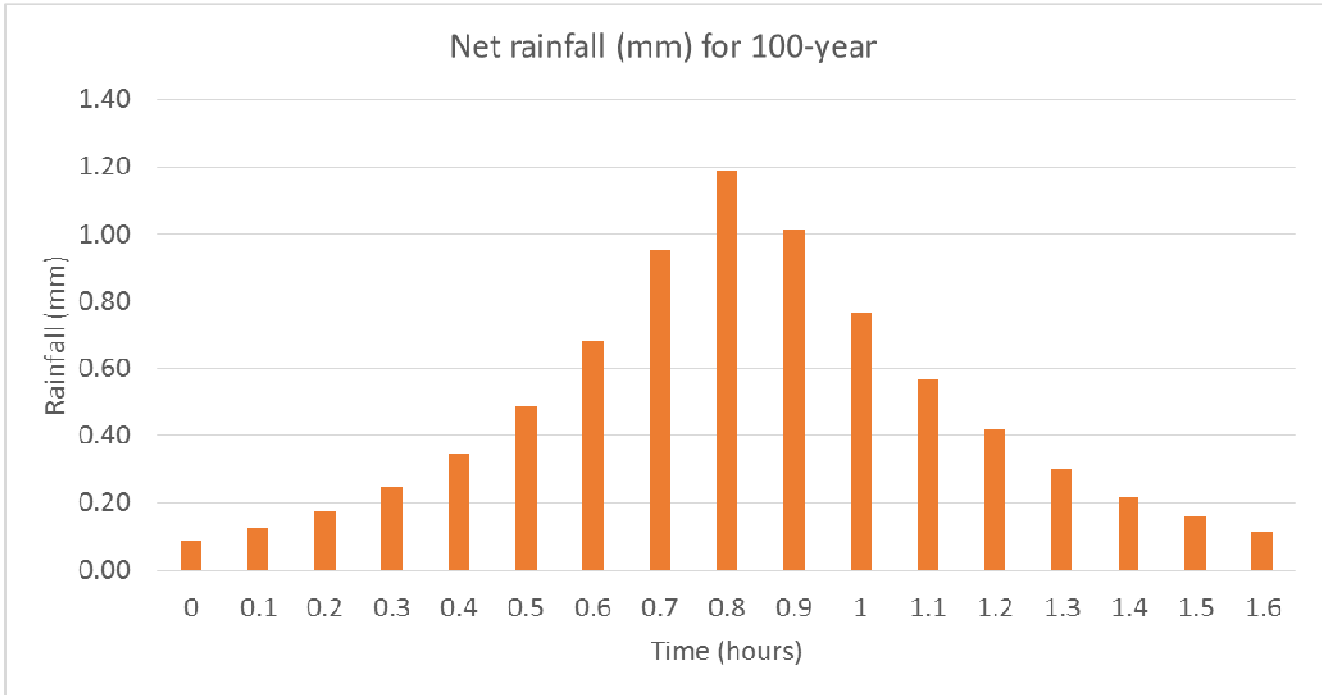
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2 Final net rainfall

2.1 Graphical



2.2 Tabular

Time (hours)	Net Rainfall (mm)
0	0.09
0.1	0.13
0.2	0.18
0.3	0.25
0.4	0.35
0.5	0.49
0.6	0.68
0.7	0.95
0.8	1.19
0.9	1.02
1	0.77
1.1	0.57
1.2	0.42
1.3	0.30
1.4	0.22
1.5	0.16
1.6	0.11

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3 Volume analysis

The total net rainfall for the 100-year event, as calculated above is 7.86mm. When multiplied by the catchment area of the surface water catchment behind the proposed bund, this gives a total net runoff volume of 628m³. To undertake a conservative assessment of the risk of surface water ponding behind the flood bund, this total surface water volume can be compared against the storage available behind the bund in a flood event (assuming no outflow for the whole event).

A flood volume of 628m³ ponded behind the bund in a flood event would give rise to a water level of 21.15mAOD. The ground level at the lowest property in the caravan park is about 21.6mAOD. This analysis indicates that even in the 100-year flood event any surface water ponding behind the flood bund which be 0.45m lower than the ground level at the lowest plot on the caravan site.