

Blue-Green Infrastructure for an Entire City A Study for Yorkshire Water

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17th October 2018

Intelligently identifying where to locate blue-green infrastructure

Background and why blue-green

Water, water everywhere – the Arup approach

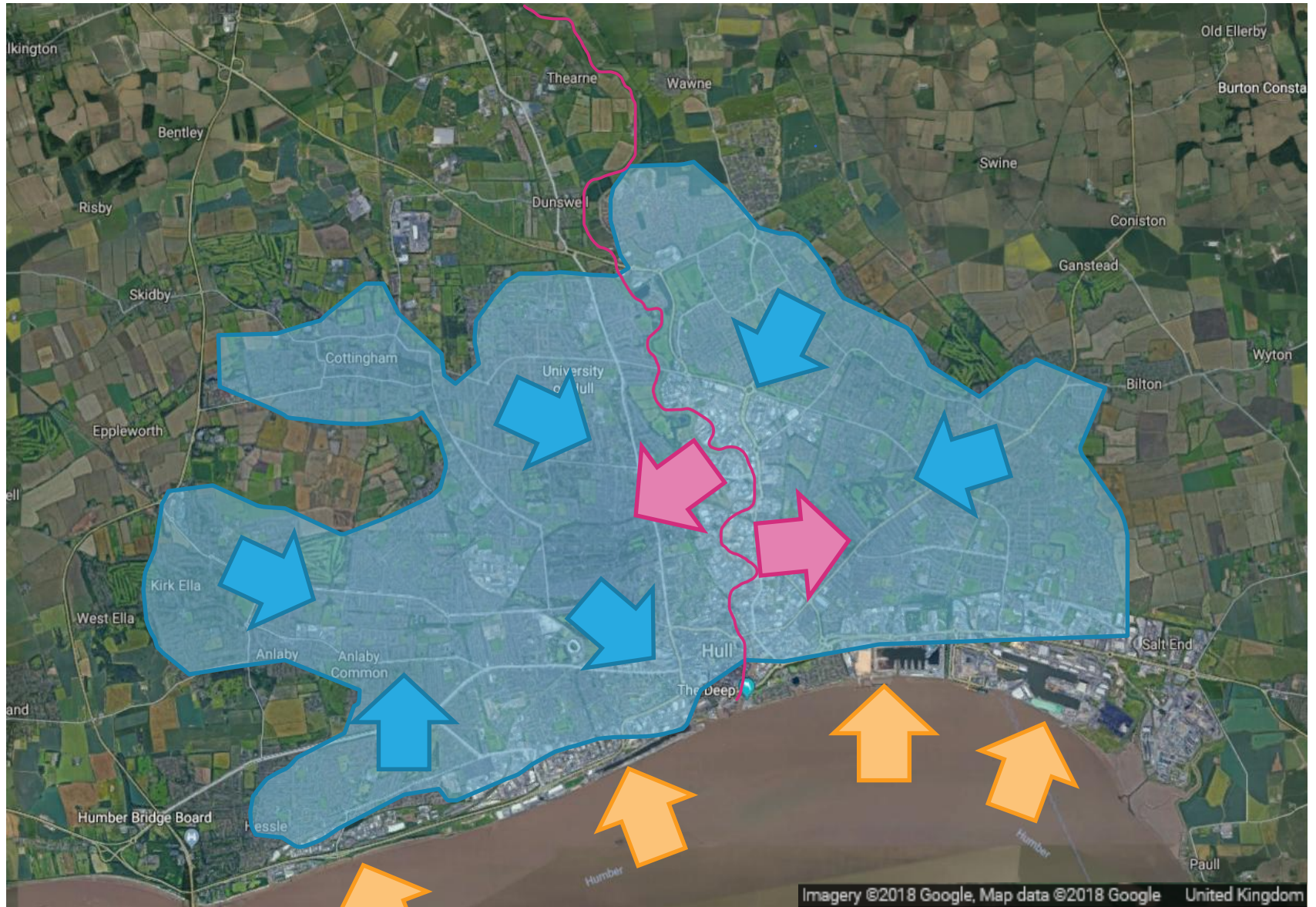
Study results

Approach outcomes and next steps

Conclusions

Arup/Giles Rocholl Photography

Background

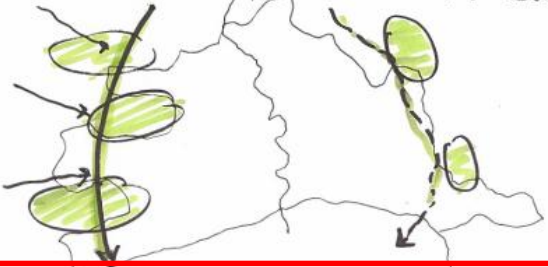


YWS F.A.S CONCEPTS UNDER CONSIDERATION

① OPTIMISE PUMPING STATIONS OPERATIONS INCLUDING CONSIDERATION OF CSOs AND OPERATING AGREEMENTS



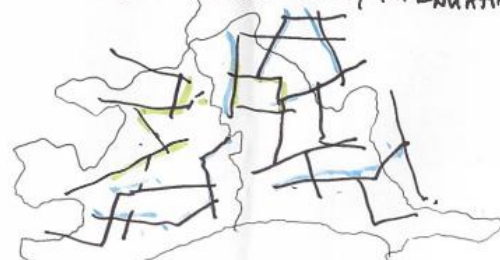
② INTERCEPT OVERLAND FLOWS WITH LARGE SCALE INFRASTRUCTURE AT OR NEAR SURFACE (LINKED TO F.A.S SCHEMES)



③ MAXIMISE CAPACITY OF MAIN DRAINS AND RIVER TML INCLUDING TIDAL OPERATING REGIME



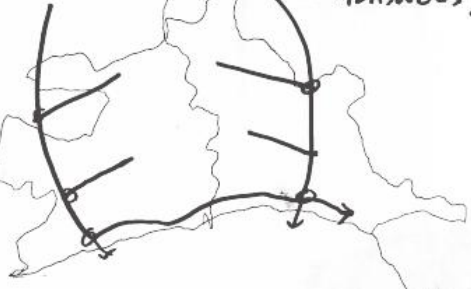
④ REVIEW LAND DRAINS AND WATERCOURSES AND OPTIONS FOR DISCONNECTION / ATTENUATION



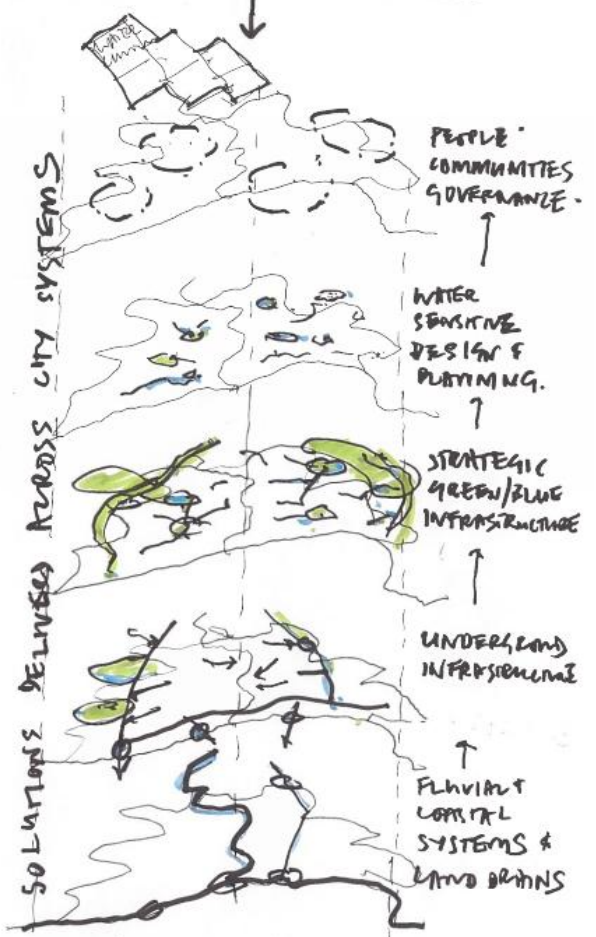
⑤ LOCALISED STRATEGIES FOR SUDS, REDUCTION IN CREEP, DISCONNECTION PUBLIC REALM INTERVENTIONS ETC



⑥ LARGE SCALE INTERCEPTOR SEWERS (CAPACITY OPTIMISED ALONGSIDE ABOVE MEASURES)

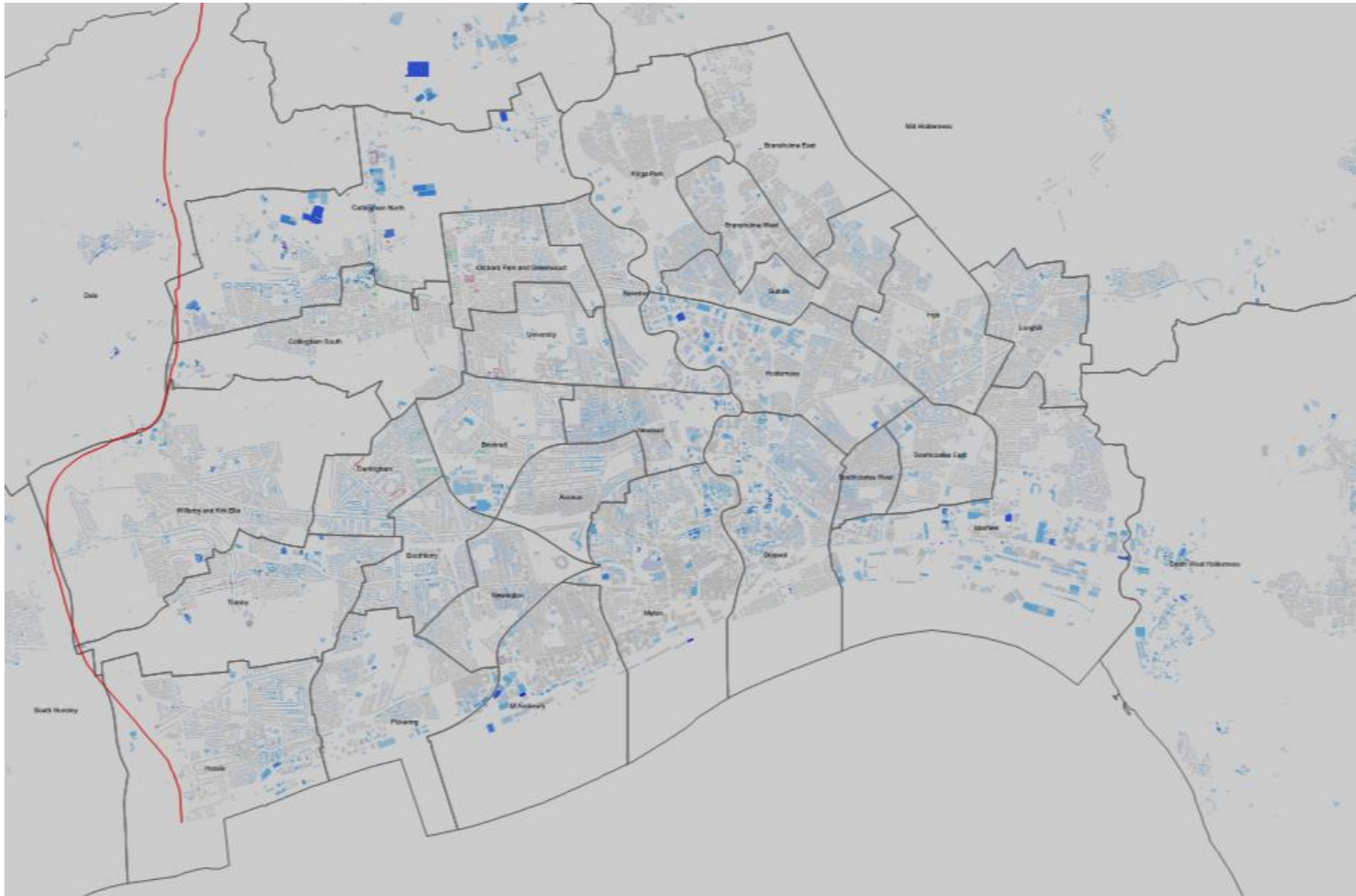


UNDERSTANDING HOW SOLUTIONS WORK ACROSS CITY SYSTEMS TO IDENTIFY PARTNERSHIP OPPORTUNITIES PROJECTS AND ACTIONS



NOT ALL CAN BE DELIVERED BY YORKSHIRE WATER

Locating Blue-Green Infrastructure Across an Entire City

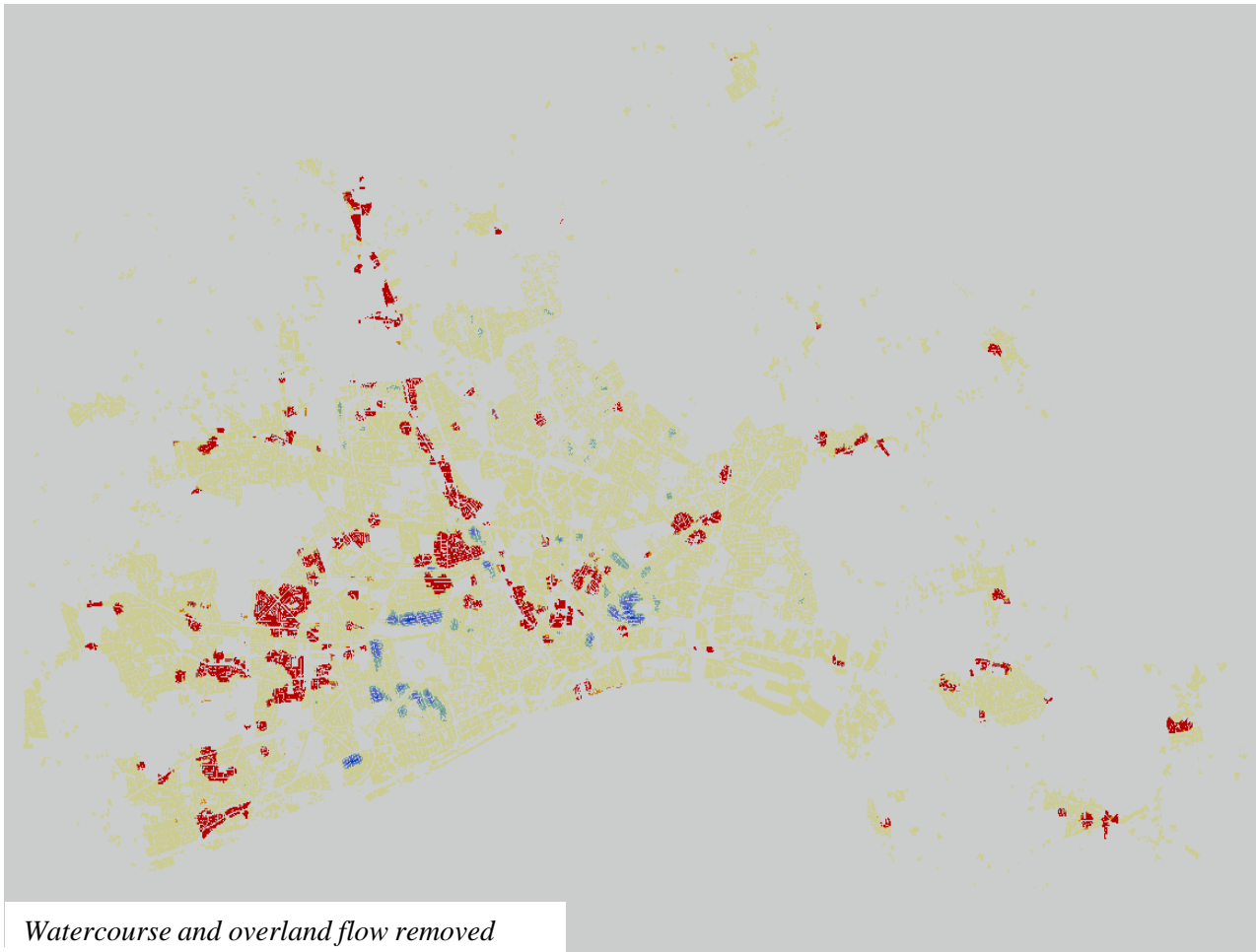


Where to focus investment to be most cost beneficial?

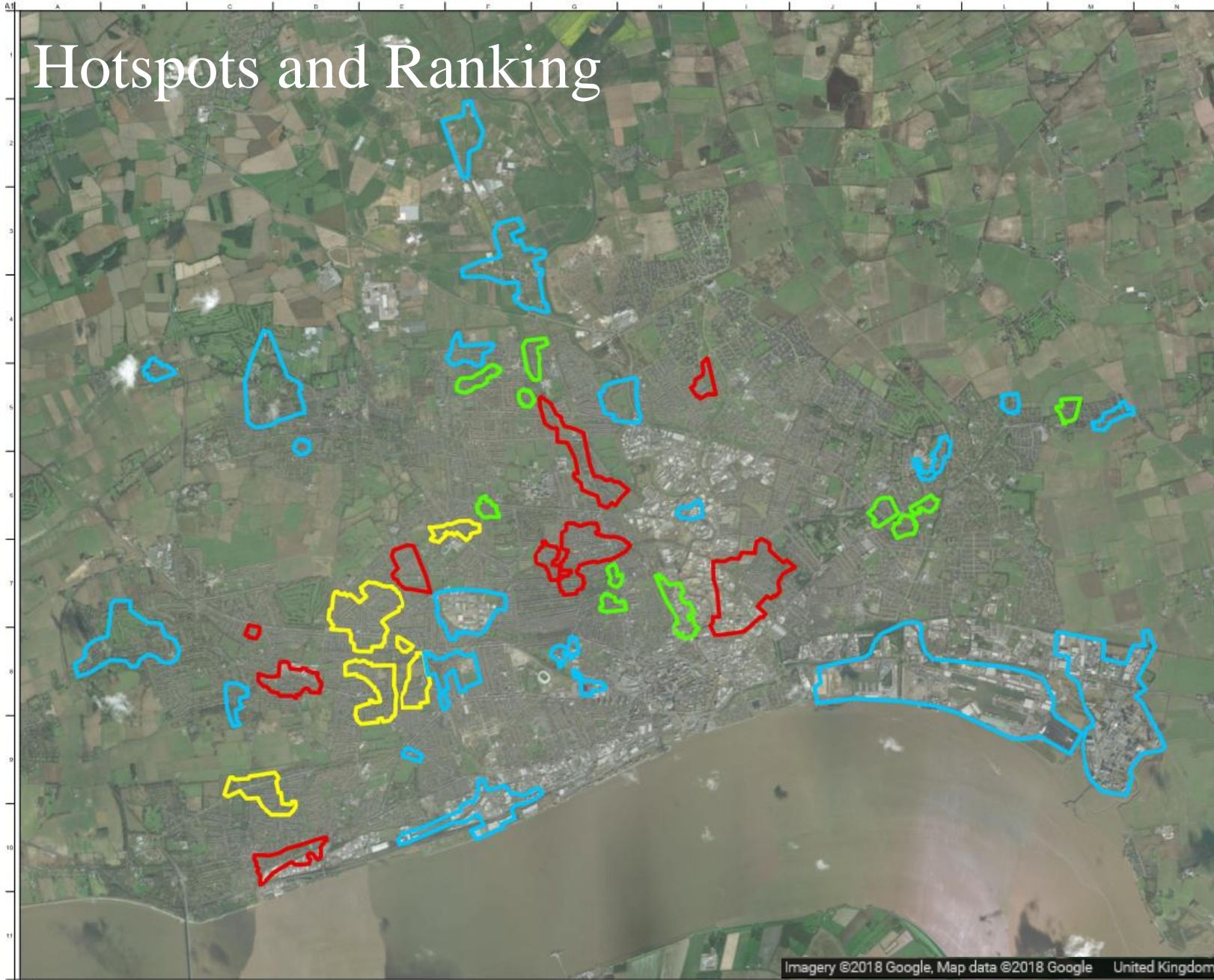
Our Approach

- Digitally identifying Hotspots
- Beneficial surface water removal
- Ranking

Flood Hotspots



Hotspots and Ranking



Legend

Colours highlighting the most beneficial storm water removal method for each hotspot

Hotspot Outline

- Watercourse / Overland
- Roofs
- Roads
- Roofs and Roads

1	27/06/18	KB	HM	PP
As Modelled				
Issue	Date	By	Checked	Approved

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Job No:
 YWS PR19 Hull and Haltemprice
 Flood Alleviation Study

Hotspots and Impermeable Area Removal

Scale: 1:1 N.T.S.

Discipline: Water

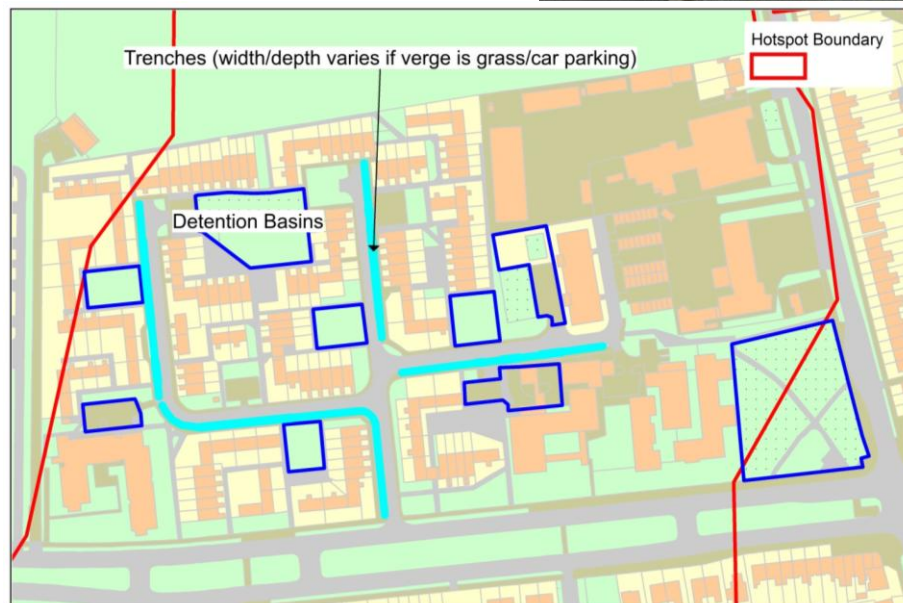
Drawing No: 245811 As Modelled

Drawing No: DWG_008 Issue: 1

Imagery ©2018 Google, Map data ©2018 Google United Kingdom

Collaborative Workshop, SuDS & Modelling

- Validated Hotspots & rankings
- Agreed on 4 Notional Solution Hotspots
- Remainder to have “broadbrush” modelling



(credits: left – Google streetview Hull, right - Google streetview Portland)

- Community Appropriate SuDS techniques

Following this

- Notional designs and modelling

Results – Flood Risk Reduction

Hotspot No.	Total Reduction in Flooding Properties during the 1 in 5yr return period storm event	% Reduction
2	1,017	61%
4	65	8%
13	77	22%
27	92	28%
Remainder of Hull inc. Broadbrush areas	1,191	5%
Total (the whole of Hull)	2,442	9%

- **Overall reduction** in internal and external flood risk of **approximately 9%** across the entire city of Hull.
- **>2,400 properties** seeing a reduction in flooding during a 1 in 5 year return period storm.
- Community appropriate notional solutions

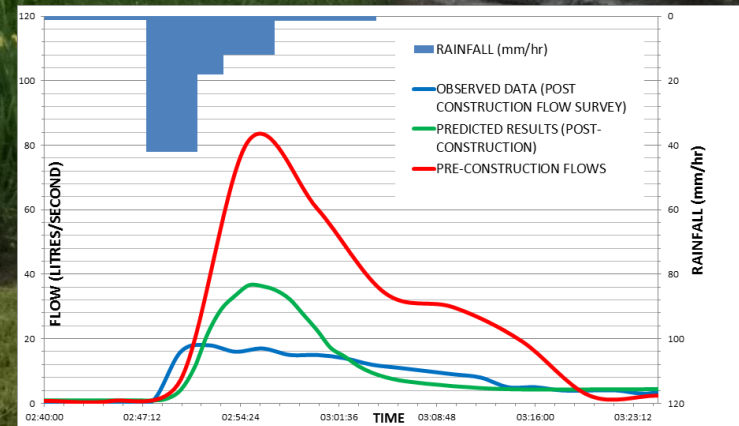
Results – Cost Estimation

Hotspot No.	Capital Cost (£) Total Cost to YW	
	Blue-Green	Traditional
2	£33.2m	£35.7m
4	£2.5m	£4.9m
13	£11.3m	£25.7m
27	£3.4m	£5.7m
Broadbrush Only	£105m	£149m
Total	£155m	£221m

- Introducing the blue-green infrastructure solutions, instead of traditional solutions of comparable size, can result in **30% Capital Cost saving**.

Limitations

- High level study
- 4 Notional Design Areas
- Evapotranspiration



A photograph of a landscaped green space. In the foreground, there are tall, feathery grasses and clusters of pink and white flowers. A small stream flows through the middle ground, bordered by stone walls. The background shows a grassy area with more trees and a building in the distance under a cloudy sky.

Next Steps

PR19 inclusion

Living with Water Partnership maturity

Multiple benefits promotion

Encouraging developments to play part



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locate blue-green infrastructure