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

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Intelligently identifying where to locate blue-green infrastructure

Background and why blue-green

Water, water everywhere – the Arup approach

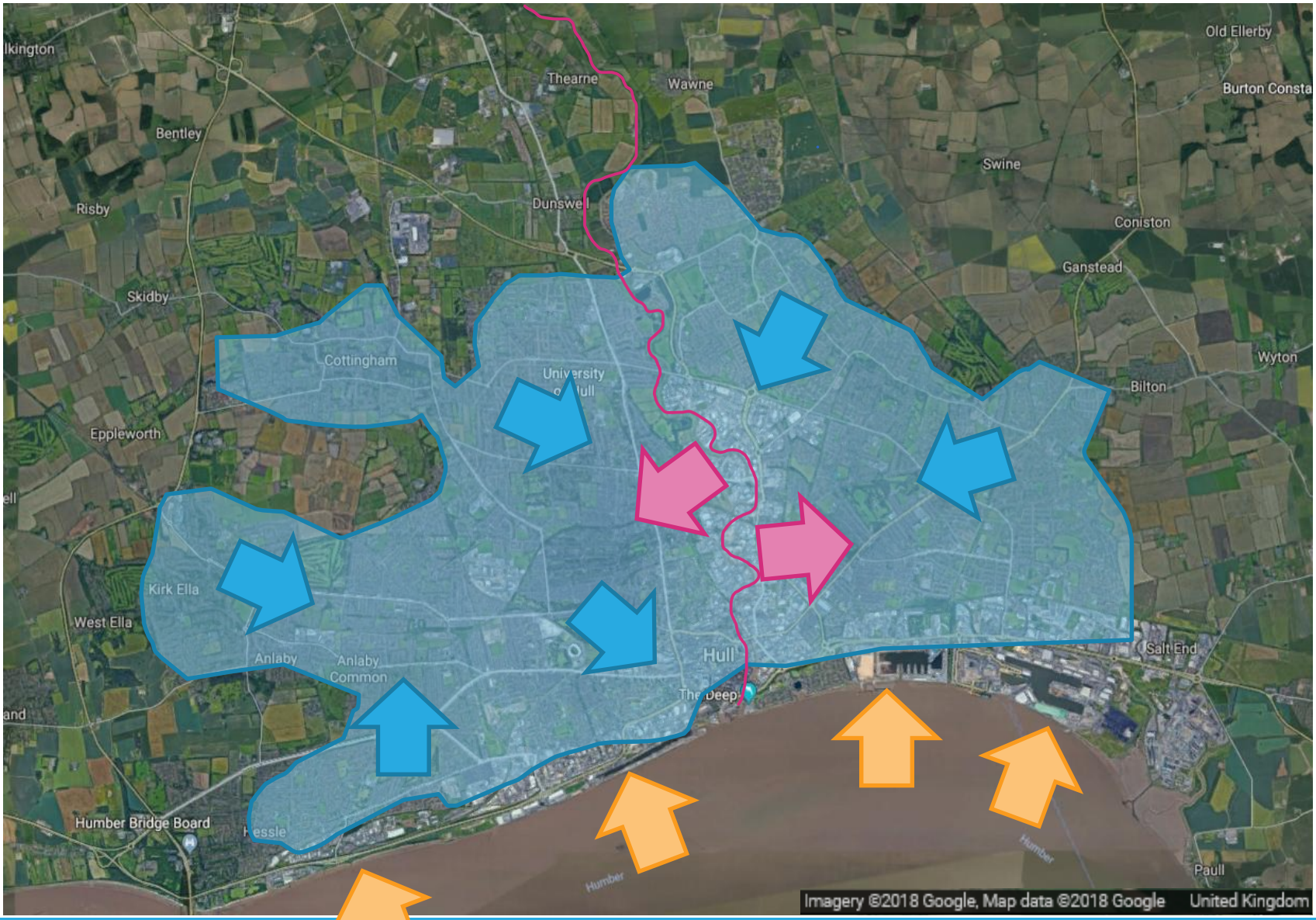
Study results

Approach outcomes and next steps

Conclusions

Arup/Giles Rocholl Photography

Background



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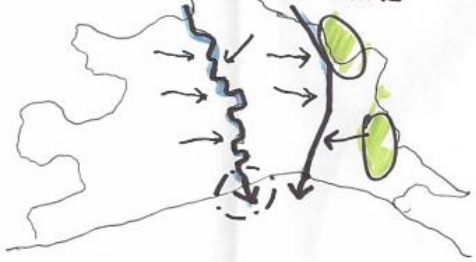
YWSF.A.S CONCEPTS UNDER CONSIDERATION

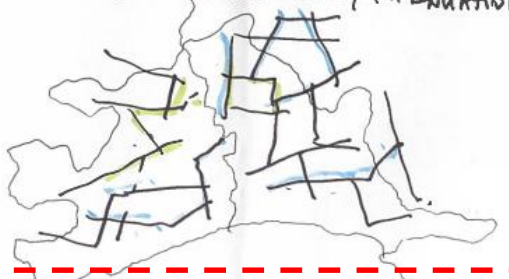
1. OPTIMISE PUMPING STATIONS OPERATIONS INCLUDING CONSIDERATION OF CSOs AND OPERATING AGREEMENTS

2. MAXIMISE CAPACITY OF MAIN DRAINS AND RIVER FLOW INCLUDING TIDAL OPERATING REGIME



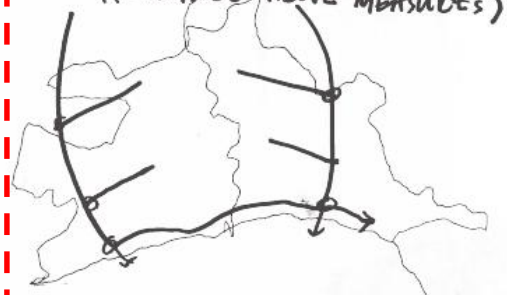
3. INTERCEPT OVERLAND FLOWS WITH LARGE SCALE INFRASTRUCTURE AT OR NEAR SURFACE (LINKED TO F.A.S SCHEMES)

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



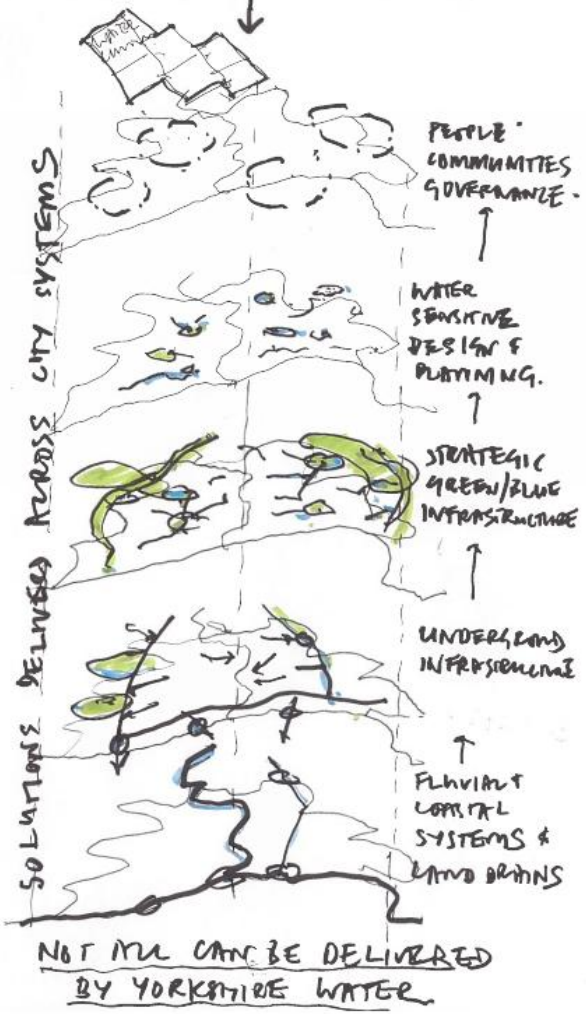
5. LOCALISED STRATEGIES FOR SUDS, REDUCTION IN CREEP, DISCONNECTION PUBLIC REALM INTERVENTIONS ETC

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



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

SOLUTIONS DELIVERED ACROSS CITY SYSTEMS



NOT ALL CAN BE DELIVERED BY YORKSHIRE WATER

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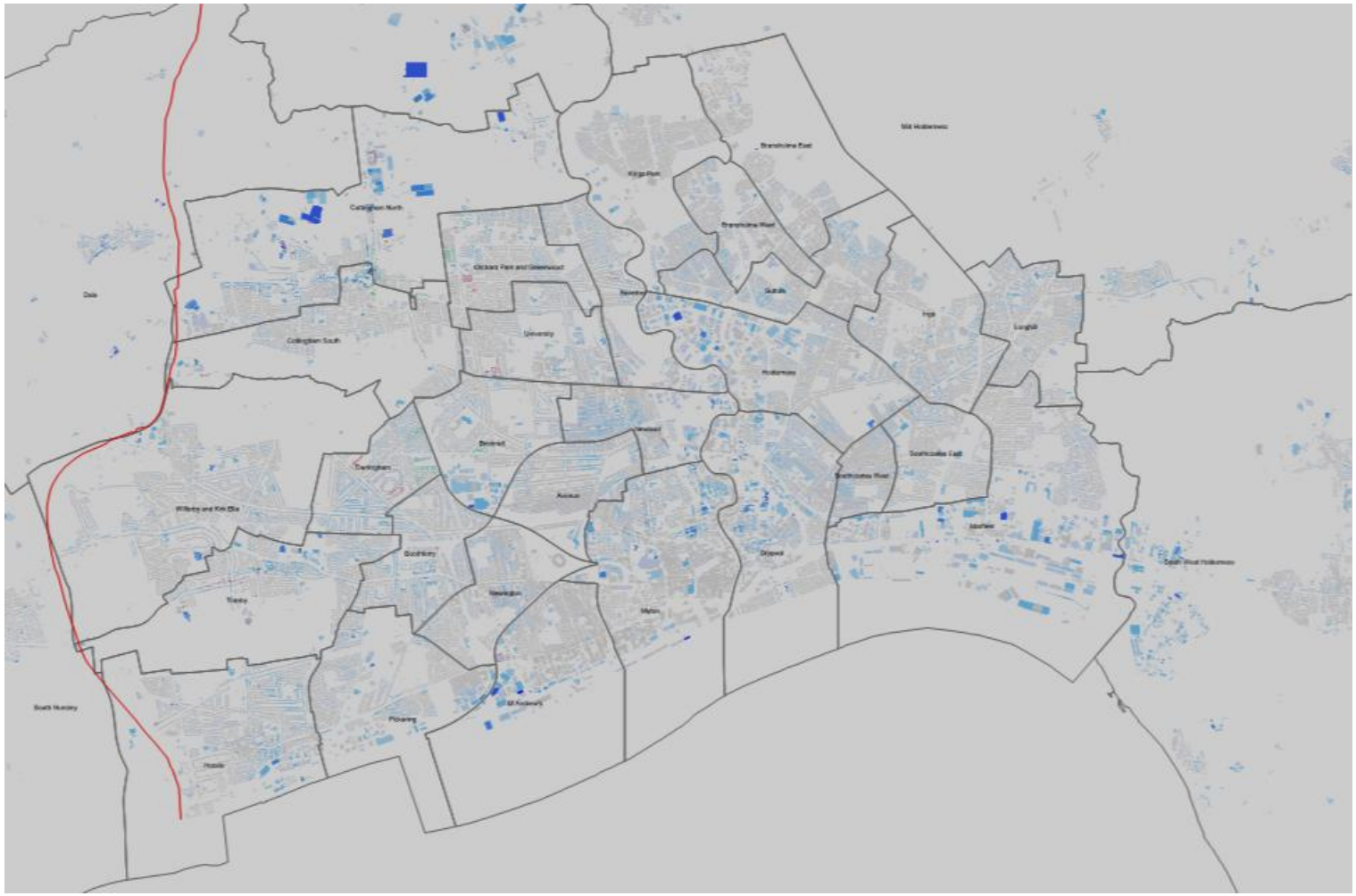
Locating Blue-Green Infrastructure Across an Entire City



Where to focus investment to be most cost beneficial?

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Our Approach

- Digitally identifying Hotspots
- Beneficial surface water removal
- Ranking

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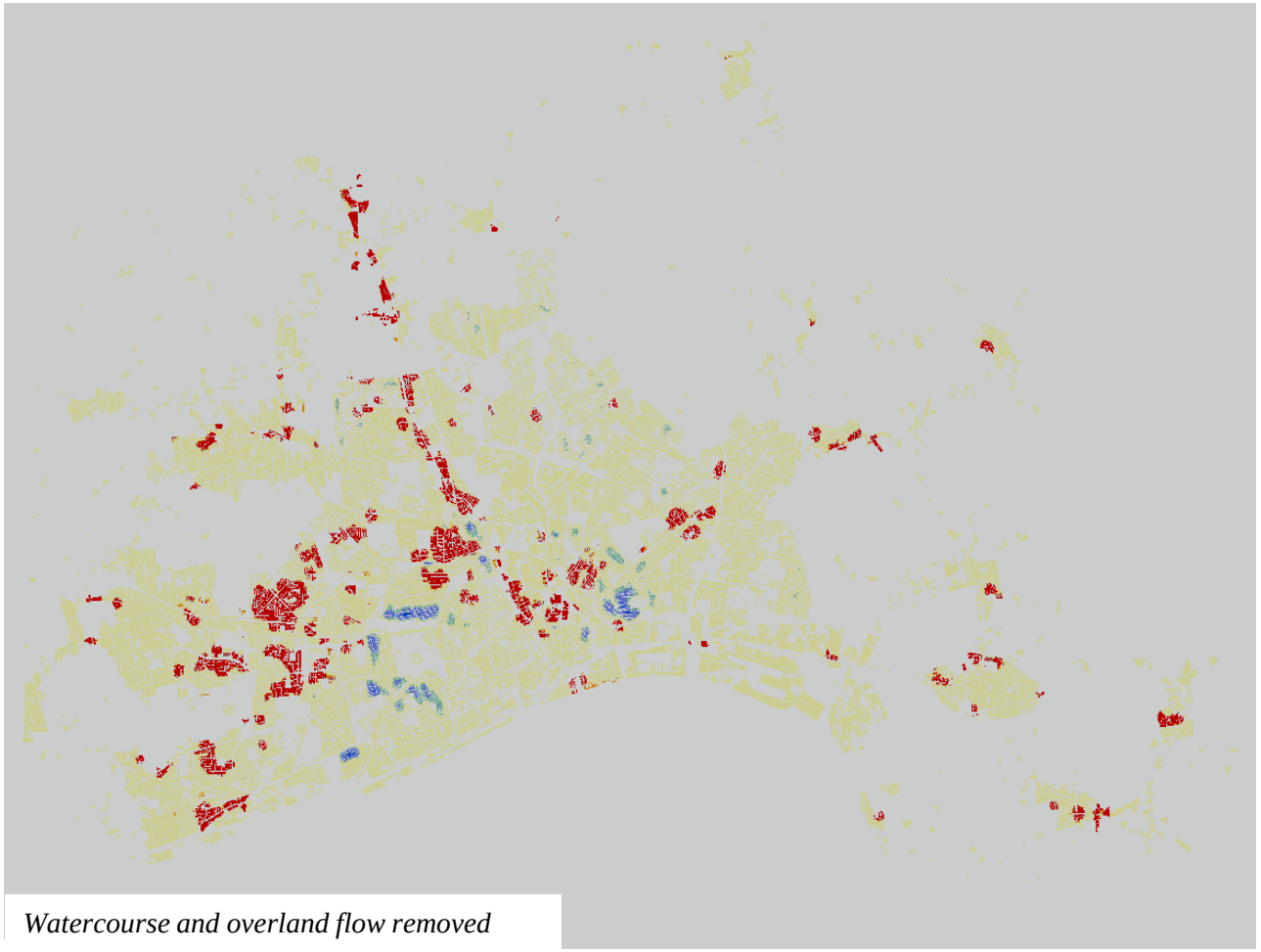
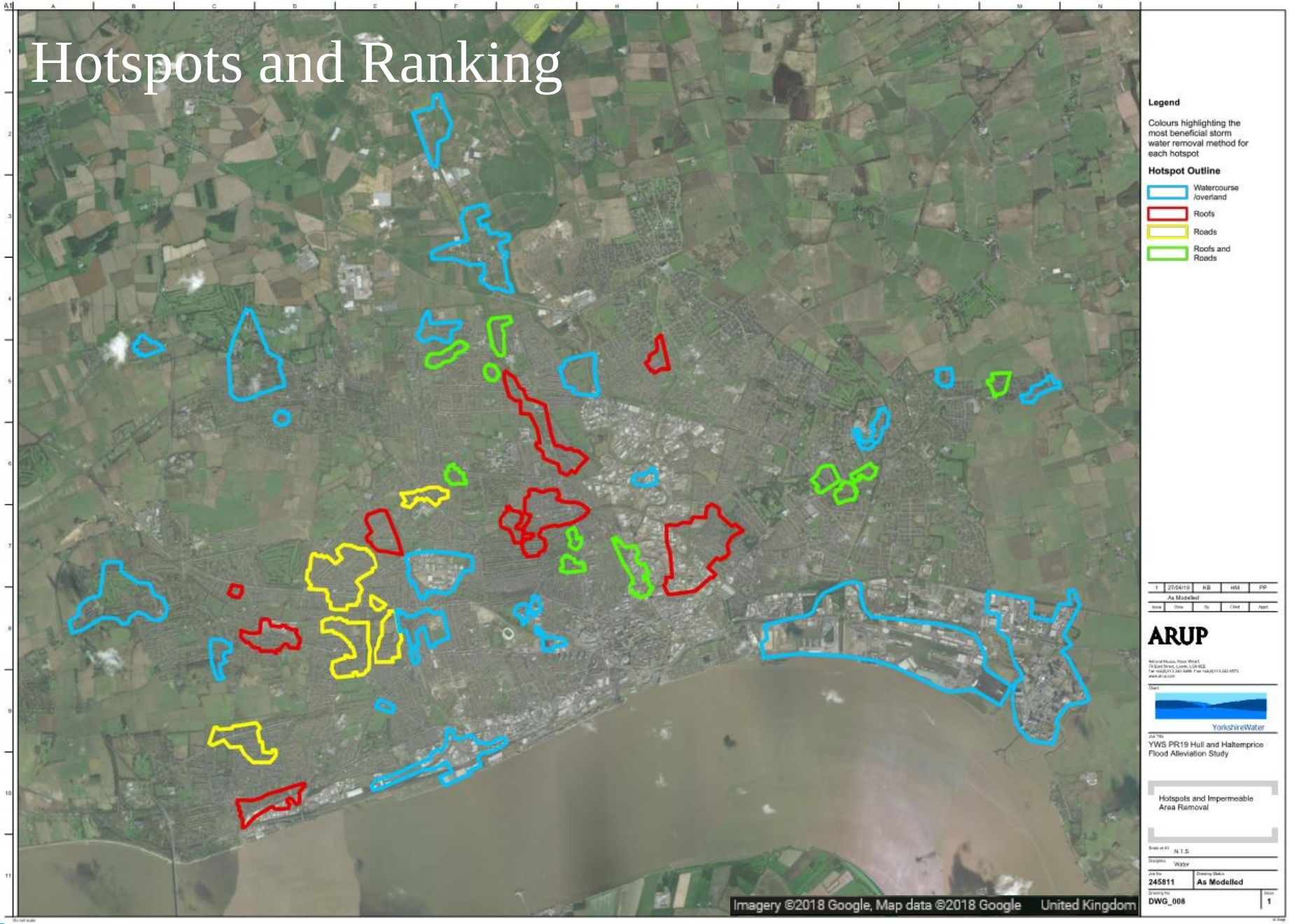
Flood Hotspots



Watercourse and overland flow removed

Hotspots and Ranking



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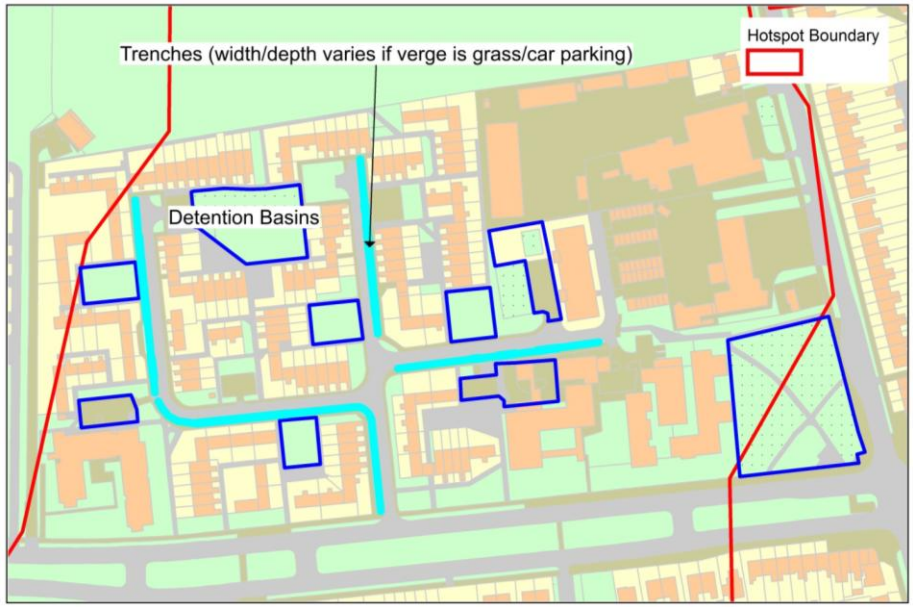
Collaborative Workshop, SuDS & Modelling

- 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

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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

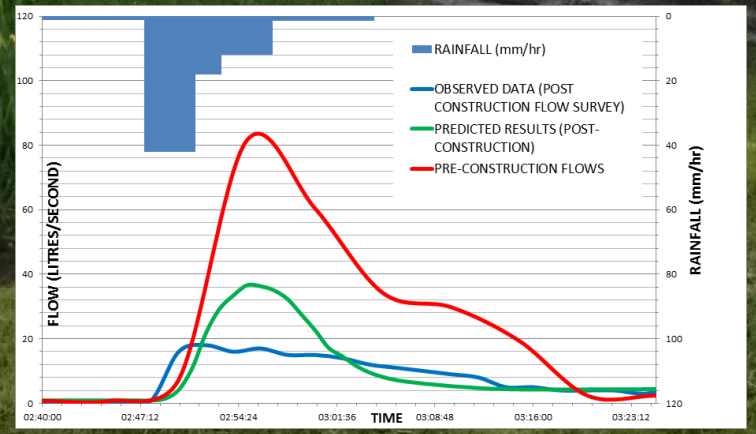
Hotspot No.	Capital Cost (£) Total Cost to YW	
	Blue-Green	Traditional
2	£33.2m	£35.7m
4	£2.5m	£4.9m
13	£11.3m	£25.7m
27	£3.4m	£5.7m
Broadbrush Only	£105m	£149m
Total	£155m	£221m

- 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



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Next Steps

PR19 inclusion

Living with Water Partnership maturity

Multiple benefits promotion

Encouraging developments to play part

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