



Financial comparison of the installation costs of retrofit flood alleviation methods that do and do not require power for operation

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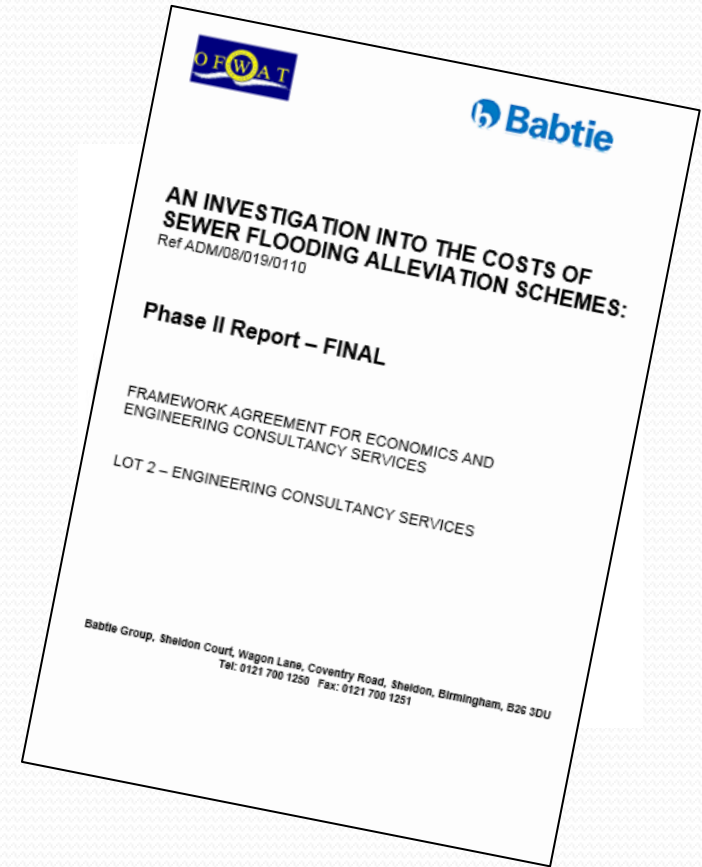
Water Efficiency Conference 2015

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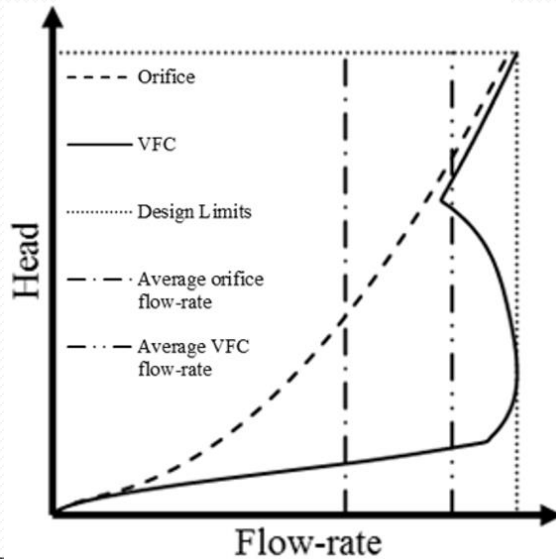
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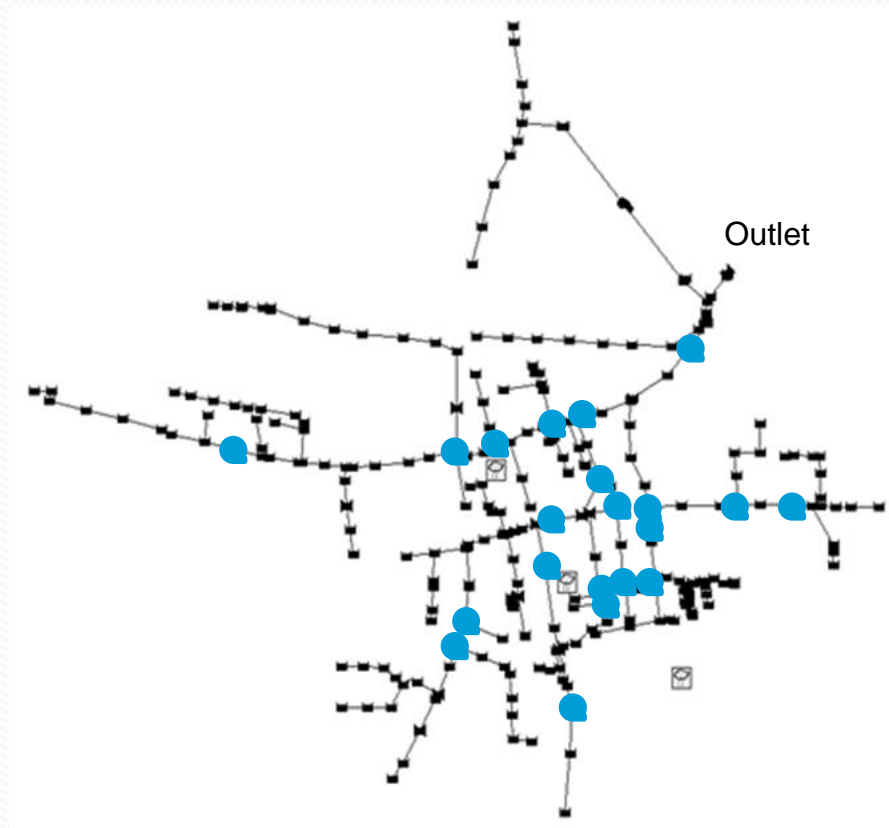
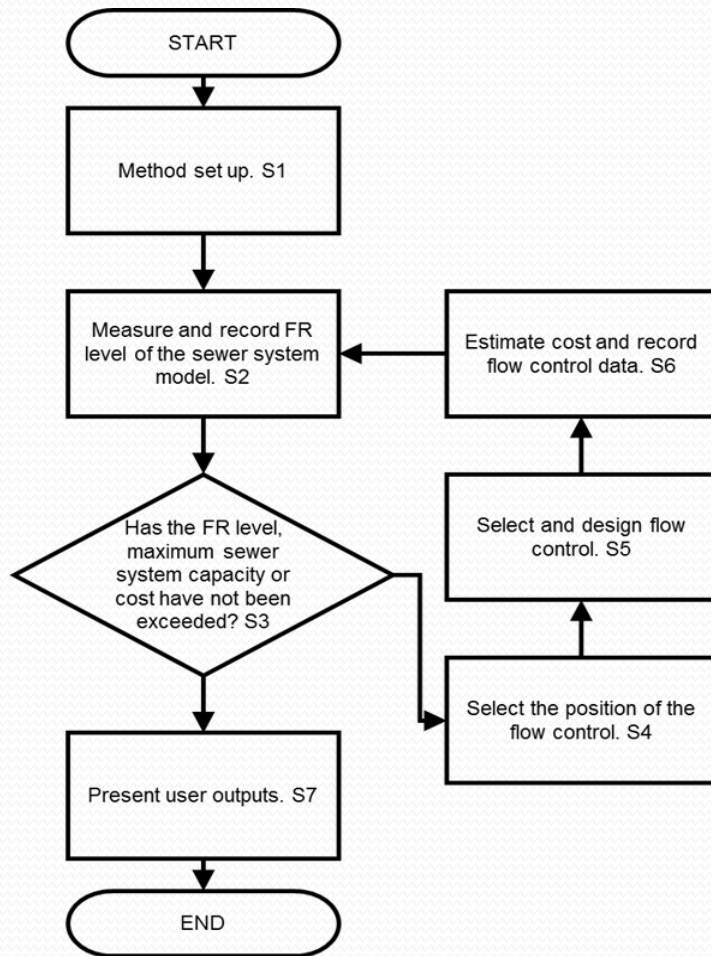
Outline of work



V



Flow control positioning method



Flow control positioning method

Costs from flow control positioning method	Cost (£)
Costs of flow controls (VFCs and orifice plates)	Provided by the VFC manufacturer
Estimated consultancy fee	+20% of the final cost
Approximate cost of installing flow control through manhole	3,500*
Approximate cost of installing flow control by removing chamber lid	13,000*
Approximate cost of replacing chamber with a larger chamber.	22,000*

*Davis Langdon, editor. Spon's Civil Engineering and Highway Works Price Book. 27th ed. Spon Press (UK): Davis Langdon; 2013.

Babtie Ltd & Ofwat's report

Flood alleviation schemes	Possible solutions.	Mean average cost per property (£)	Power required?
Flow control positioning method	VFCs and orifice plates	-	No
Flow attenuation by increasing storage	Storage tanks, above ground infiltration, detention ponds and water butts.	58,000	No
Sewer Upsizing	Storage, sewer upsizing and possible pumping station.	48,000	Possibly
Manage flow	Pumping station or combined sewer overflow.	32,000	Possibly
Isolate from the system	Non-return valve or pumping station.	18,000	Possibly
New pumping station	Pumping station.	15,000	Yes

Comparison methodology

Flow control positioning method:

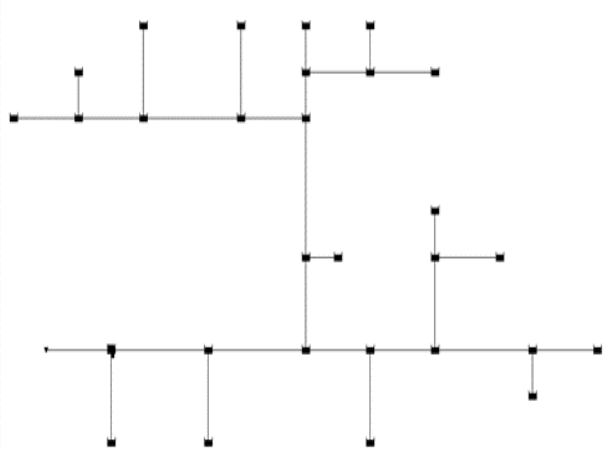
- The cost of the flow controls
- Cost of installing the flow controls
- Cost of increasing the size of the manhole chamber if required
- An estimated consultancy fee of an additional 20%.

Babtie Ltd & Ofwat's report:

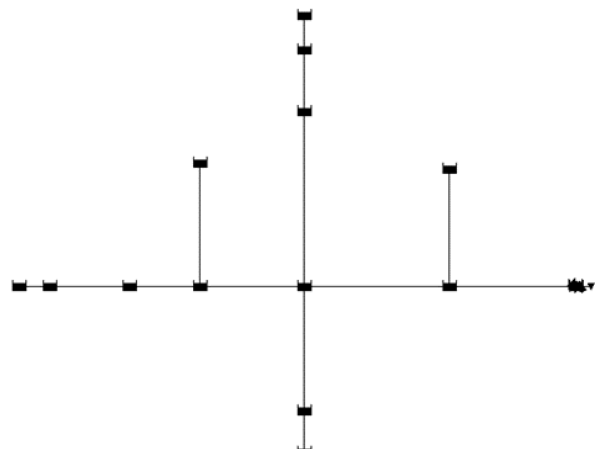
- Determine greatest rainfall return period
- Simulate the sewer system model
- Calculate the flooded area from the simulation
- Estimate the number of properties flooded
- Calculate the cost of installing each flood alleviation scheme.

Case studies

A



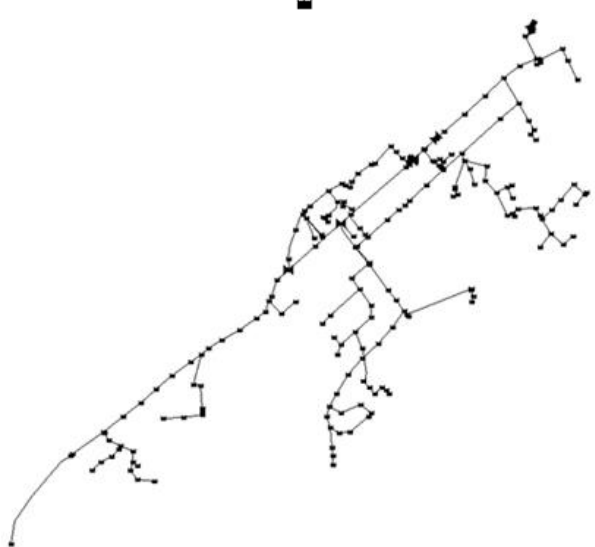
B



C



D

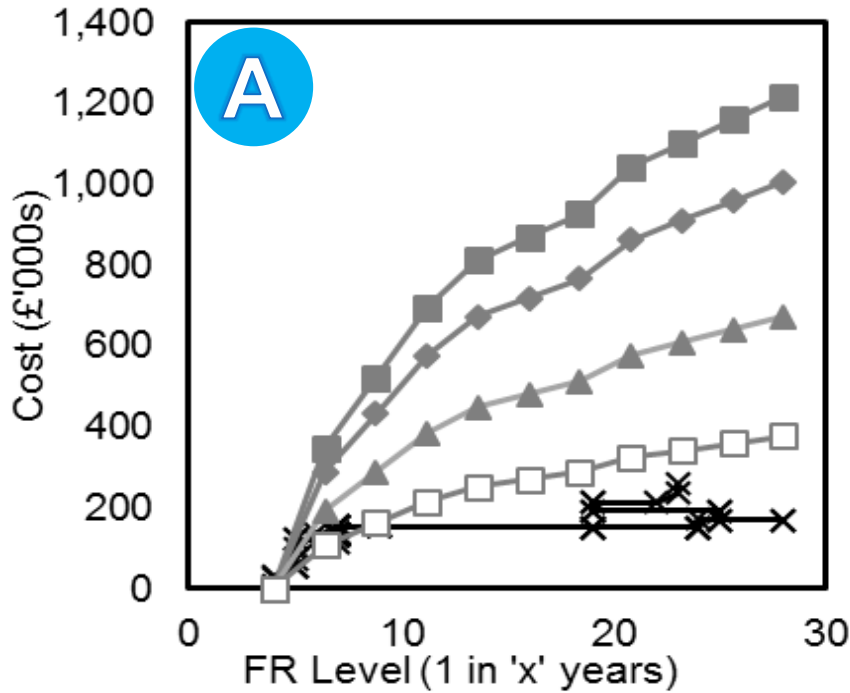


Results

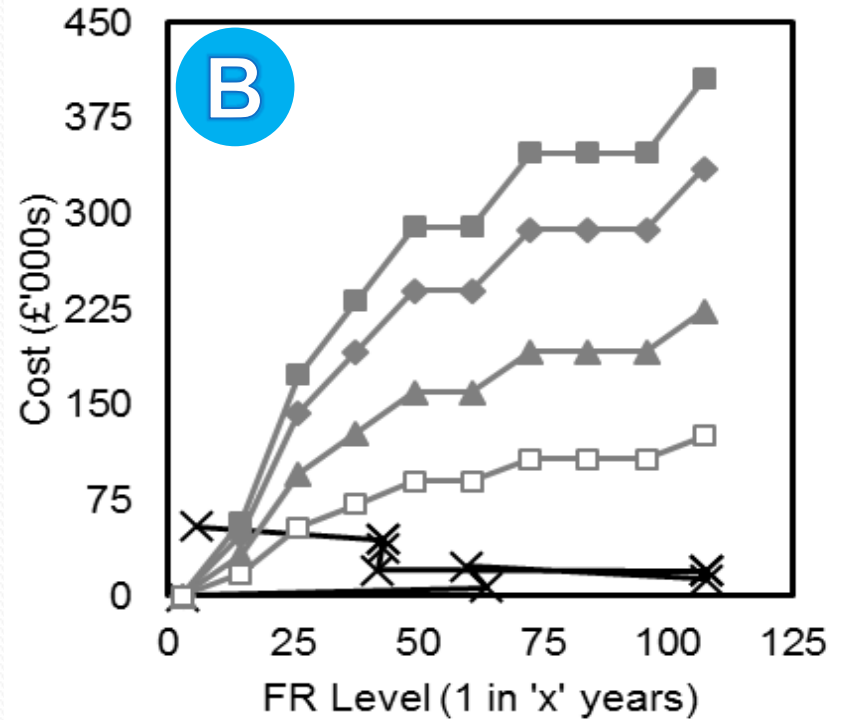
Flood Alleviation Method	Costs to install flood alleviation methods on each case study (£)					
	Wadley Road*	Evanston*	A	B	C	D
Number of properties flooded	-	-	21	7	10	2
Flow control positioning method (VFCs)	24,000	143 M	170,500	13,250	162,500	6,500
Flow attenuation by increasing storage	-	-	1,218,000	406,000	580,000	116,000
Sewer Upsizing	-	290 M	1,008,000	336,000	480,000	96,000
Manage flow	90,000	-	670,000	224,000	320,000	64,000
Isolate from the system	-	-	378,000	126,000	180,000	36,000
Percentage difference to cheapest scheme	-73%	-51%	-56%	-89%	-10%	-82%

≈60.2%

Results

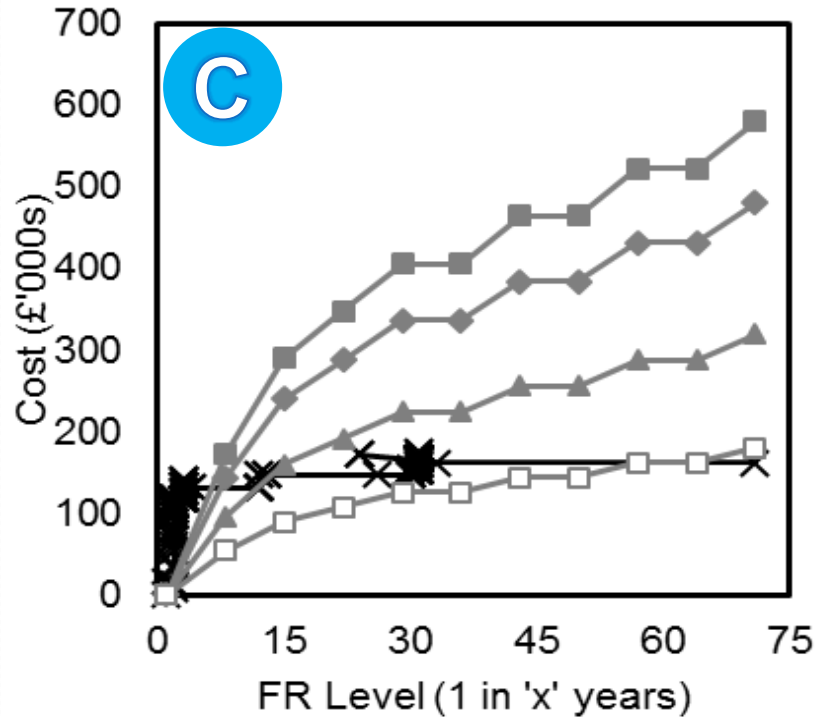


- ✕ VFC
- Flow Attenuation
- ◆ Sewer Upsizing
- ▲ Manage flow
- Isolate from the system

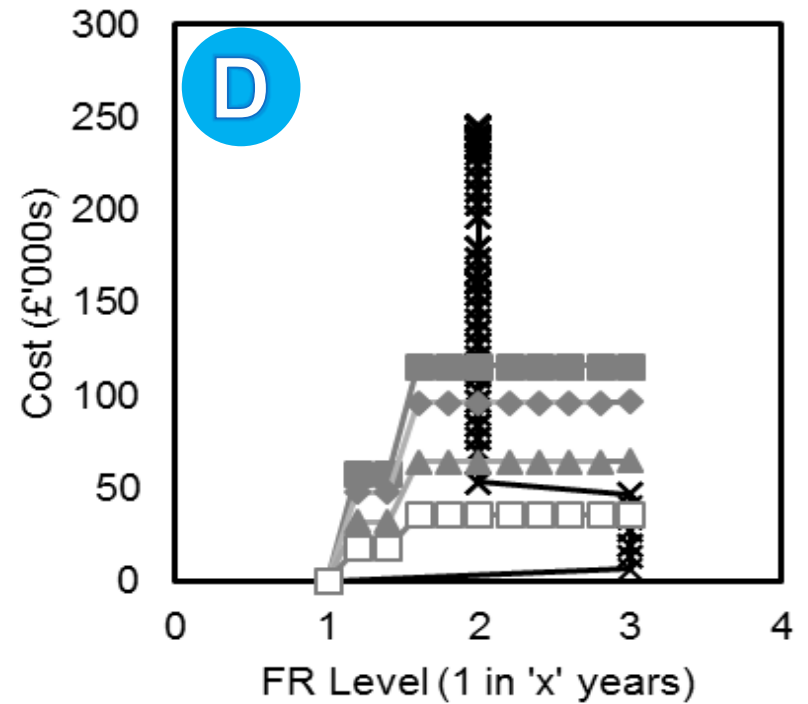


- ✕ VFC
- Flow Attenuation
- ◆ Sewer Upsizing
- ▲ Manage flow
- Isolate from the system

Results



- ✕ VFC
- Flow Attenuation
- ◆ Sewer Upsizing
- ▲ Manage flow
- Isolate from the system



- ✕ VFC
- Flow Attenuation
- ◆ Sewer Upsizing
- ▲ Manage flow
- Isolate from the system

Conclusions

- Installing passive VFCs can be, on average, a 60% cheaper sewer retrofit solution, compared to the other solutions that often require power to operate. This is because:
 - VFCs require no electricity supply, and
 - no overly major construction projects for installation.
- The outputs do not show that the installation of passive flow controls is the cheapest solution for all flood resistance levels below the maximum achieved, however, final selection of the most appropriate solution requires other additional considerations, other than cost.
- The results from case studies A, B, C and D concur with the installed solutions presented by Andoh, Declerck & Lamb.



Thank you!

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