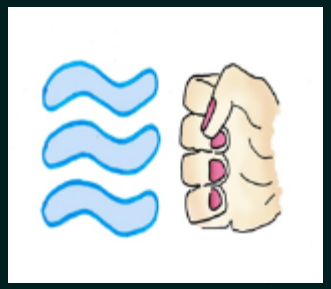
Conference Options to adapt the Dutch rivers to climate change
Nijmegen, 30th January 2014

European Rivers embraced

Evening program: foreign perspectives



Great Britain

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Welcome to Britain – shame about the weather

Stiff upper lip

What we learned from the Dutch

Who is to blame?

- God?
- Climate change?
- Gay marriage (seriously)
- No, it's the Dutch!

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400 years of use and counting

What the British are Doing

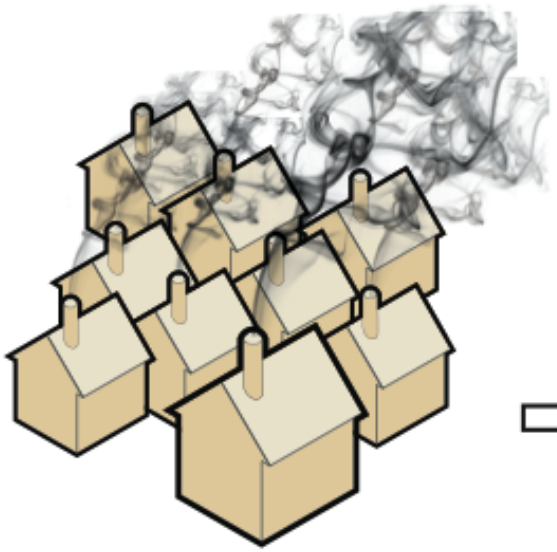
Making Space for Water

ORAS HS GR, Nijmegen, 30th january 2014

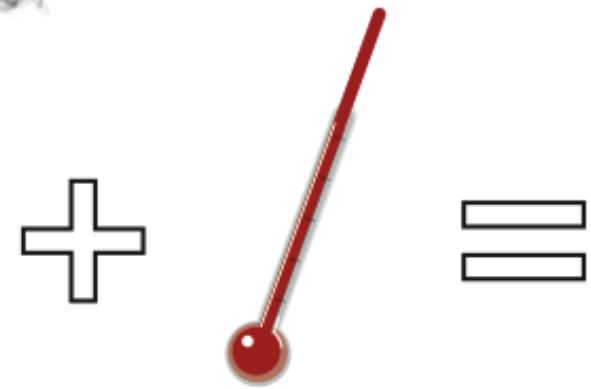
INFRASTRUKTUR & UMWELT
Professor Böhm und Partner

Aqua-δ

What we need



new homes increase
CO^2 emissions further



CO^2 increases
global warming

more intense rainfall

more flooding

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Where shall we put them?

- Not here!

Where shall we put them?

- Not here!

Where shall we put them?

- Definitely not here!

Where shall we put them?

- Okay, maybe here?

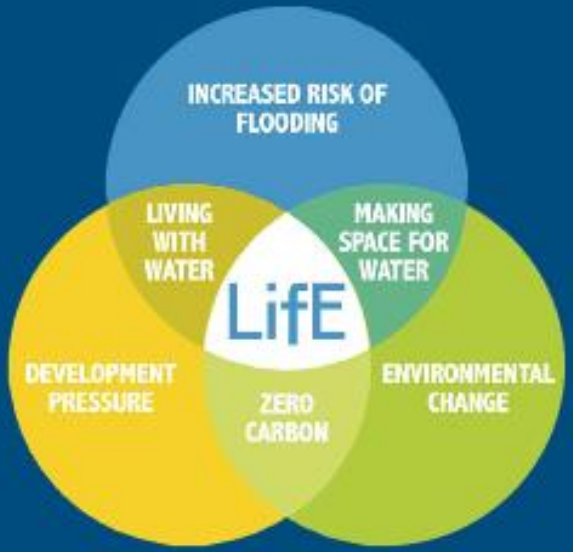
Where shall we put them?

- Or here?

The LifE Project

baca ARCHITECTS

Long-term Initiatives for Flood-risk Environments adopts an integrated approach to adaptable, zero carbon, flood resilient development.

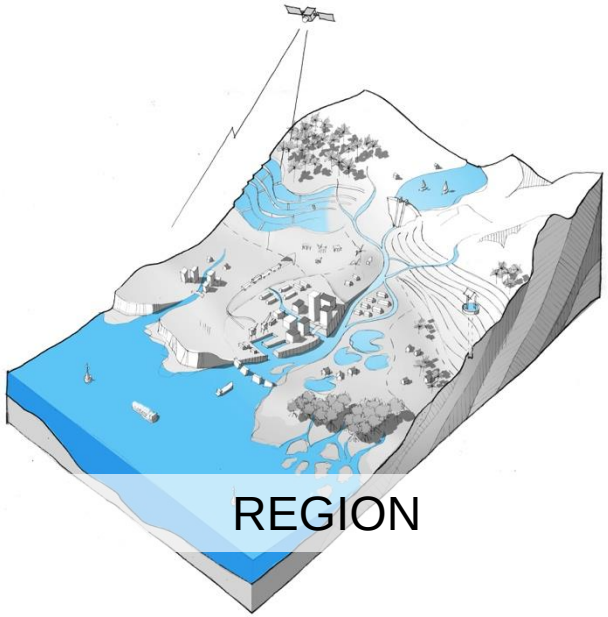


defra — Innovation Fund
The LifE Project

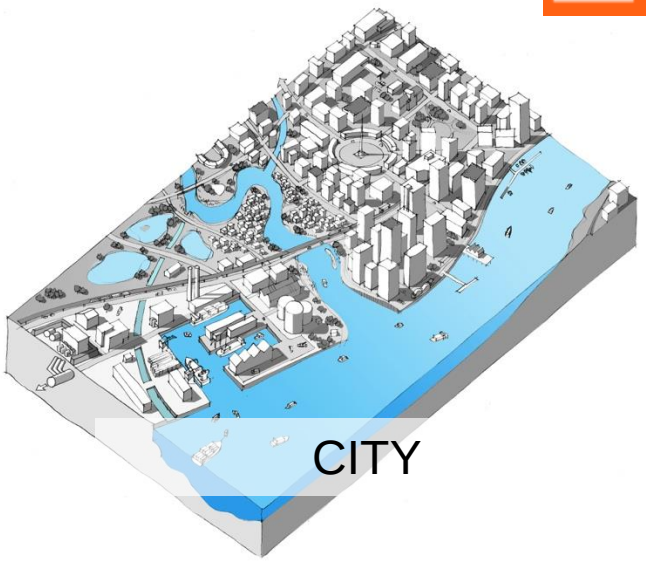
IULA '09 — International Urban Design Award 2009, Bronze Medal

RIBA — RIBA President's Award for Professional Practice Research 2009

Homes & Communities Agency — HCA Sustainability Framework Consultant 2010

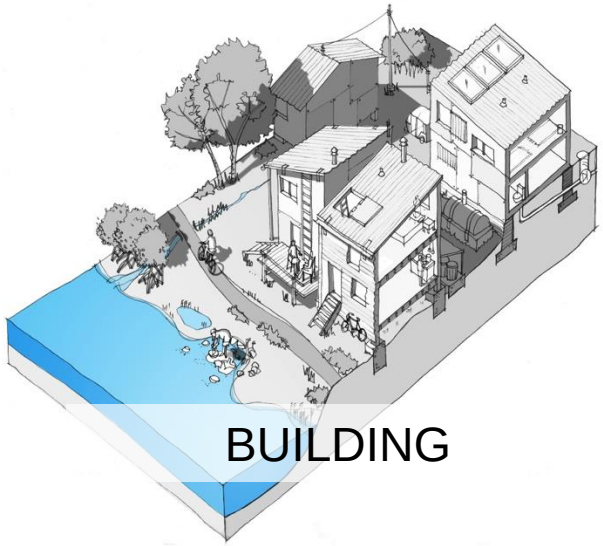


REGION



CITY

NEIGHBOURHOOD



BUILDING

Flood risk and development p

grabs
green and blue space adaptation for urban areas and eco towns

PPS 25

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✔	✔	✔	✔	✔
	Zone 2	✔	✔	Exception Test required	✔	✔
	Zone 3a	Exception Test required	✔	✗	Exception Test required	✔
	Zone 3b 'Functional Floodplain'	Exception Test required	✔	✗	✗	✗

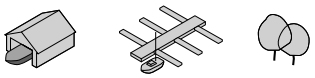
Key:

✔ Development is appropriate

✗ Development should not be permitted

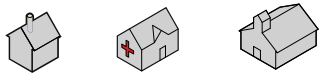
Water Compatible Uses

boat yards, marinas and open space...



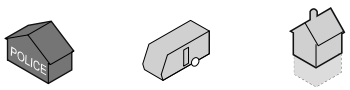
More Vulnerable Uses

houses, hospitals, schools...



Highly Vulnerable Uses

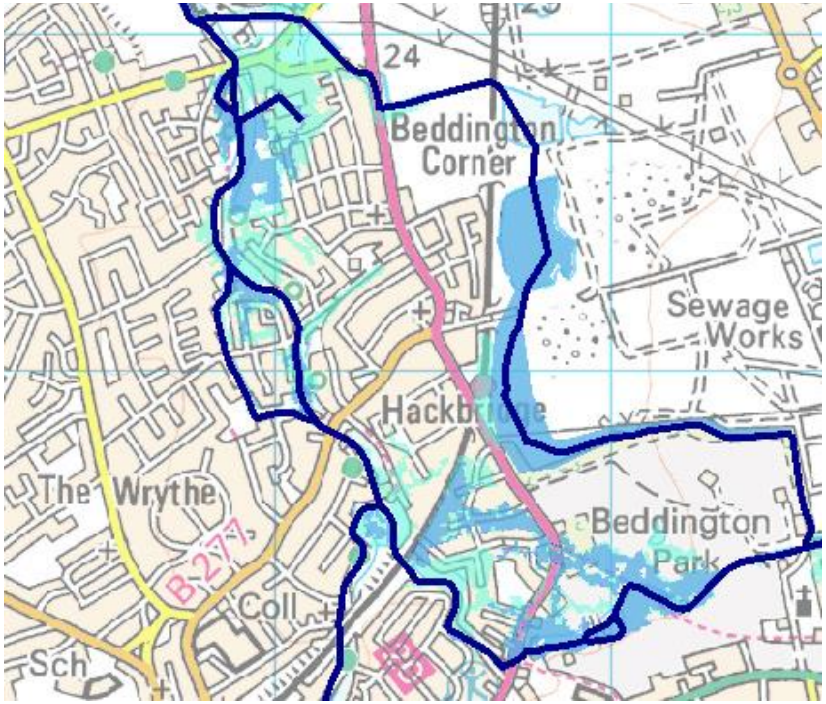
emergency services, caravans, basements...



Less Vulnerable Uses

offices, retail, commercial or civic buildings...

Environment Agency Flood Zones



Flood Zone 1

Flood Zone 2

Flood Zone 3

Main River

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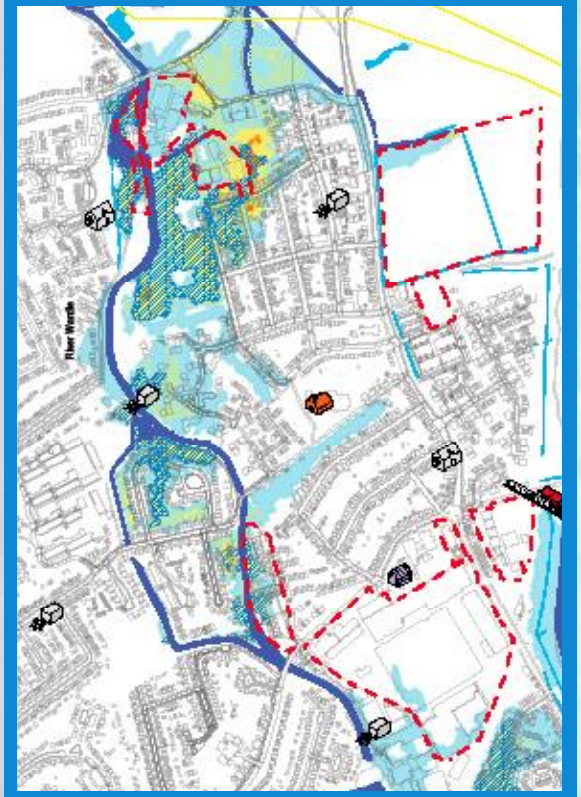
Flood risk mapping

grabs
green and blue space adaptation for urban areas and eco towns

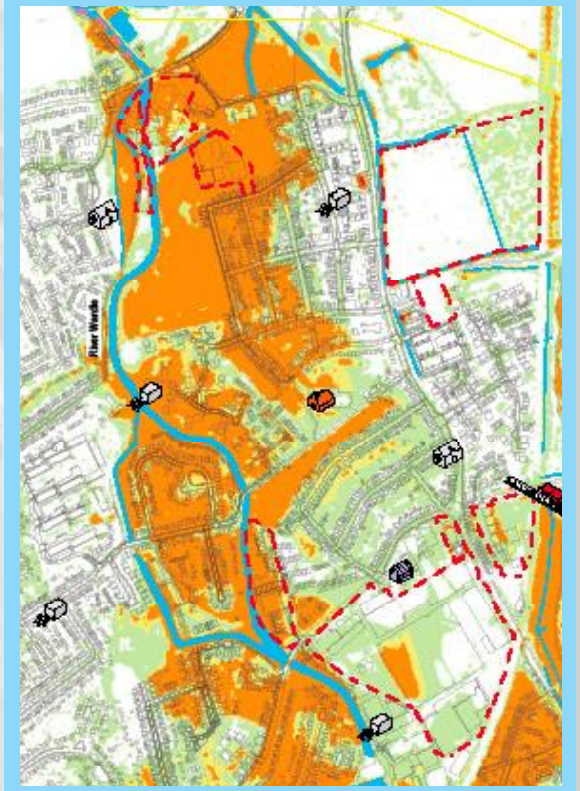
Fluvial Flood Vulnerability

(from the river)



Pluvial Flood Vulnerability

(from the land)



- The EA produce maps of flooding from the river (fluvial)
- LBS produce detailed maps of the flood hazard (depth+velocity) from river flooding with climate change
- LBS also produce a range of maps for current and future surface water flooding (pluvial)
- **The toolkit combines this info into just two maps**

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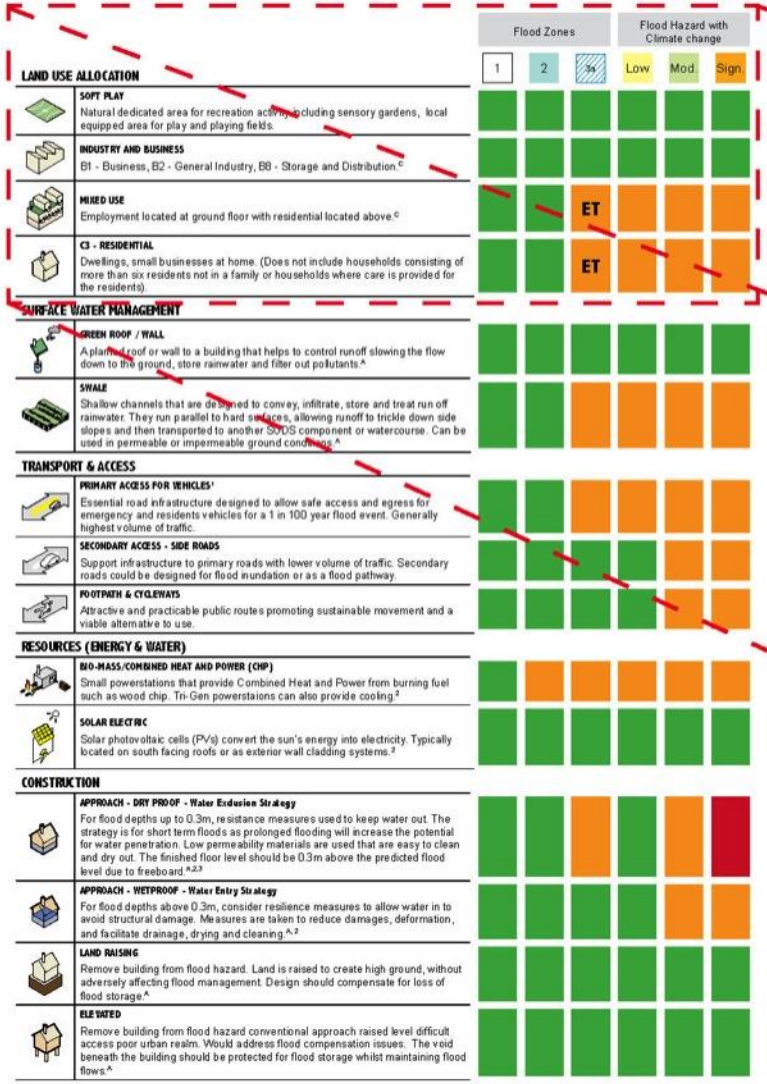
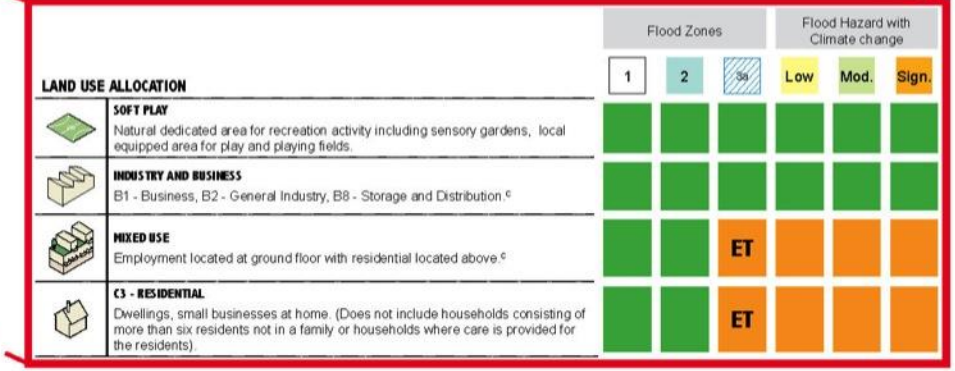
Toolkit on Blue Infrastructu

grabs
green and blue space adaptation for urban areas and eco towns





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Toolkit on Blue Infrastructur Planning for LifE

grabs
green and blue space adaptation for urban areas and eco towns

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What can you learn from the British?

Learn to live with flooding

Learn to love water

INFRASTRUKTUR & UMWELT
Professor Böhm und Partner

Aqua-δ

Deal Ground, Norwich

Baca Architects (UK)
Atelier PRO (NL)

Deal Ground, Norwich

Flood Zones

Predominant risk from the River Yare

Flood Levels for Yare (from EA, Isis modelling)

1:20 = 1.36m AOD

1:100 = 1.85m AOD

1:1000 = 3.09m AOD

1:100+CC = 2.04m AOD

sources of information:
levels based on ISISNODE YART2_4384

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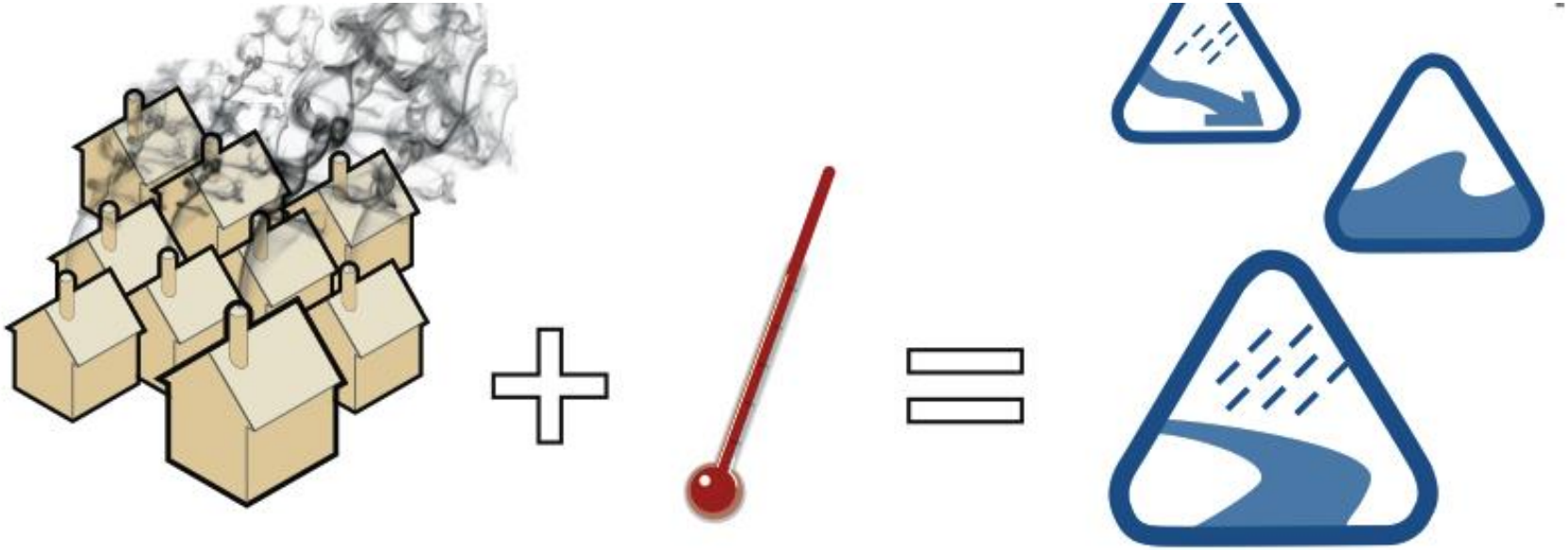
Norwich


Mesh Module Dep NOR2_634
2.5
2.0
1.5
1.0
0.5
0.0
Vector Legend
2.75 m/s
0.00 m/s

Deal Ground, Norwich


cental swale

Maybe we can’t stop this…



new homes increase CO^2 emissions further

CO^2 increases global warming

more intense rainfall

more flooding

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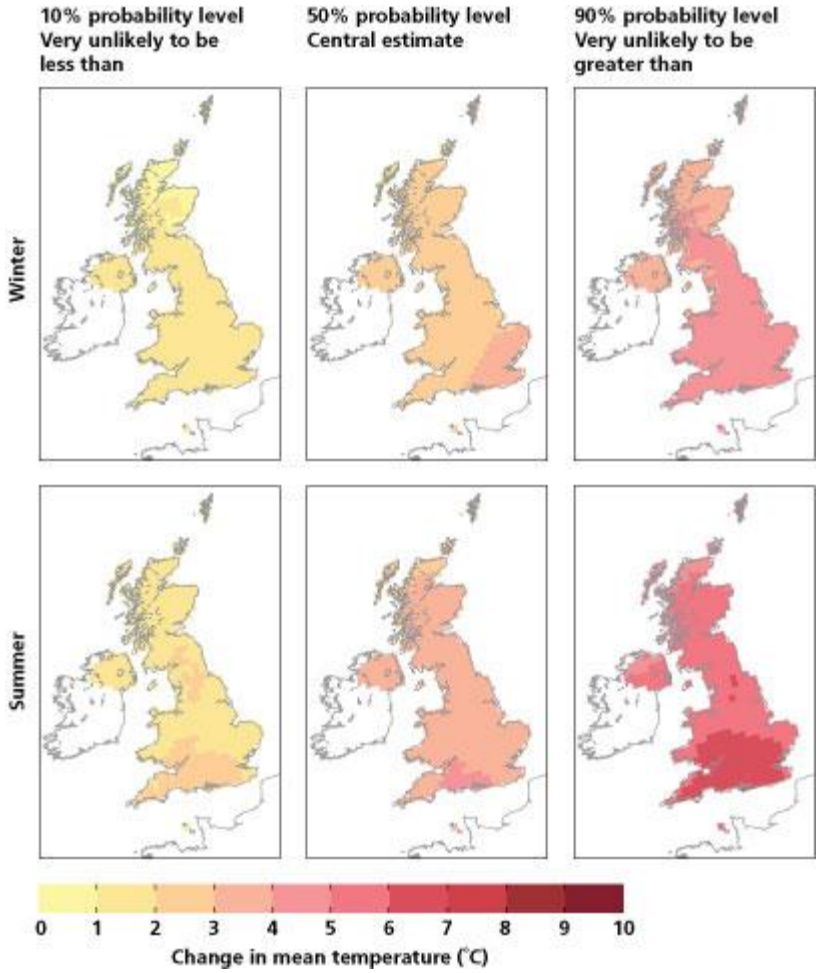
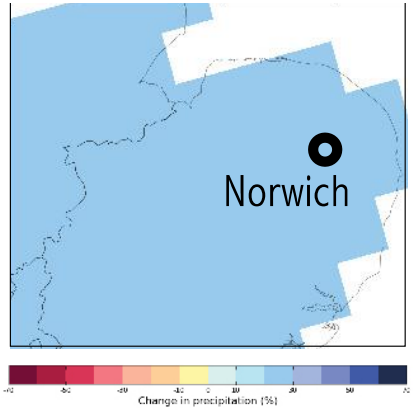
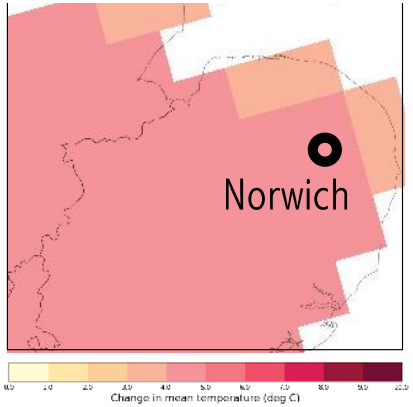
…but maybe we can adapt?





2050s - 90% probability to be no greater than this change in winter precipitation (%). Medium Emissions Scenario, UKCP09



2050s - 90% probability to be no greater than this change in summer mean high temperature (°C). Medium Emissions Scenario, UKCP09

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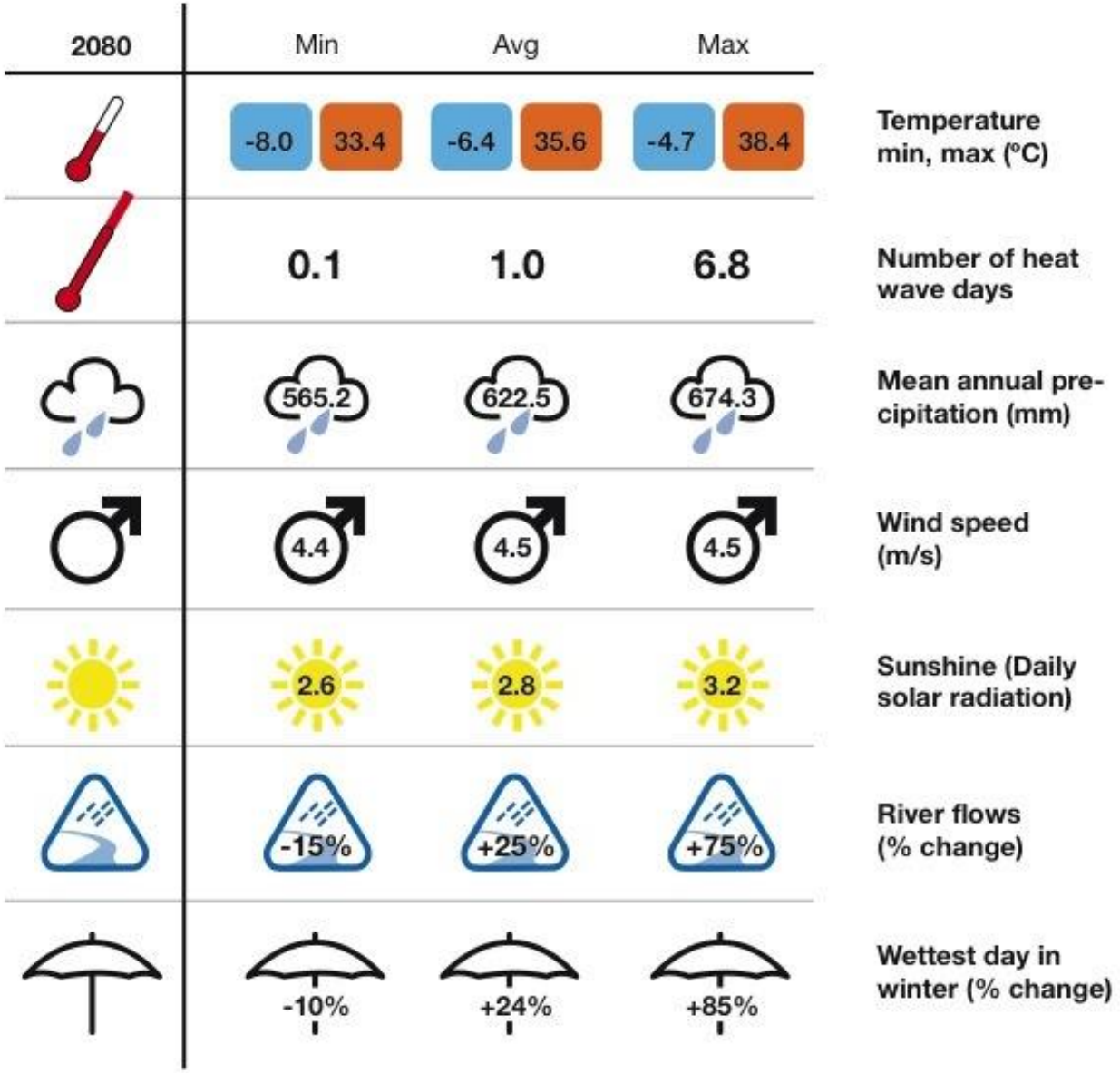
What's the weather like?



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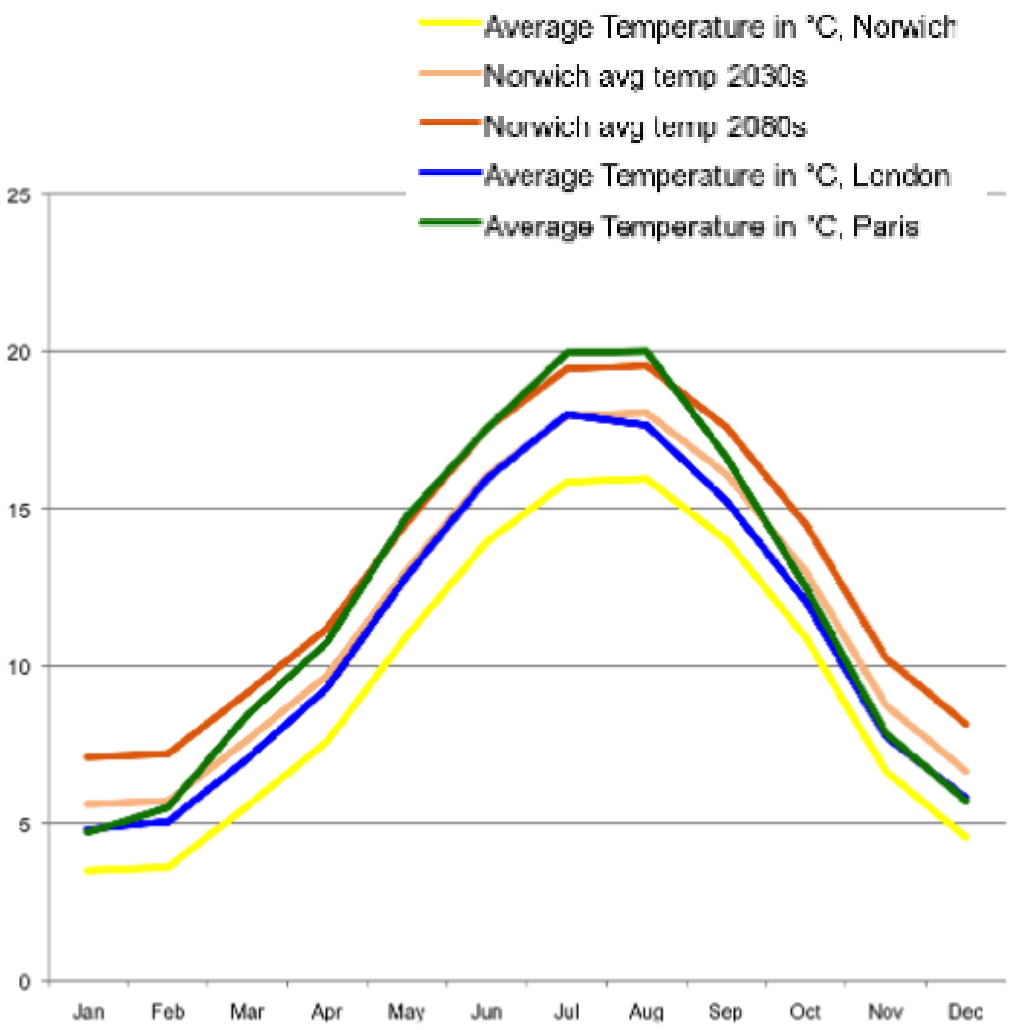
And what's that like?



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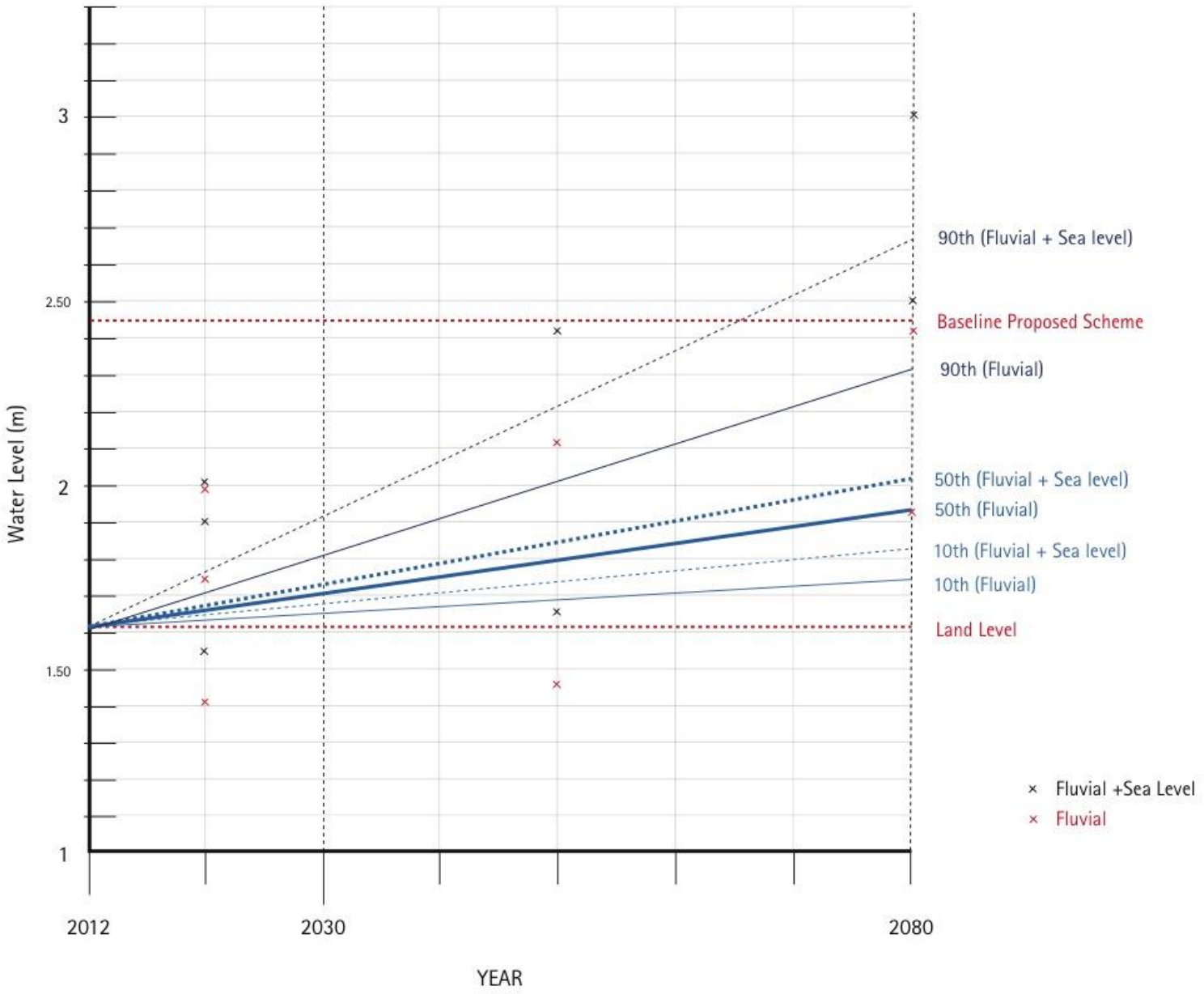
Predicted Peak Water Levels For 1 in 100 Year Event

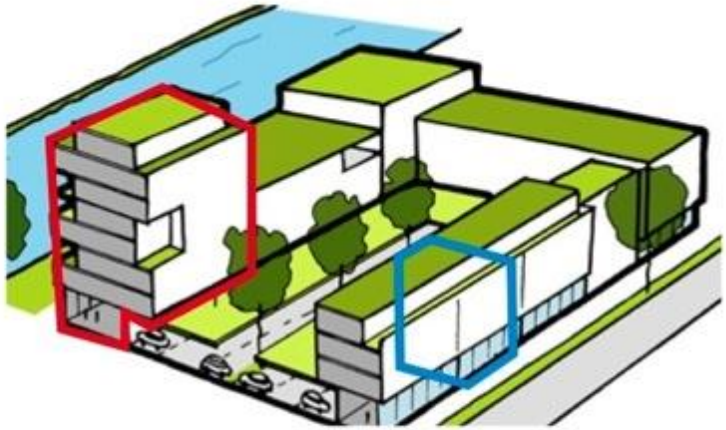


Climate Adaptive Neighbourhoods

Appendix 1: Typical Plans

Characteristics of the development

- Duplexes with apartments above
- Or townhouses
- All units at ground floor must have an upper level as safe refuge
- Bedrooms to ground floor is to be prohibited due to risk of flooding
- Courtyard parking (Landscaped) with podium deck as refuge
- Rainwater storage to courtyard



LAYOUT

Key Rooms:

- Kitchen at high level
- Living spaces above GF
- Bedrooms above max flood level

Services:

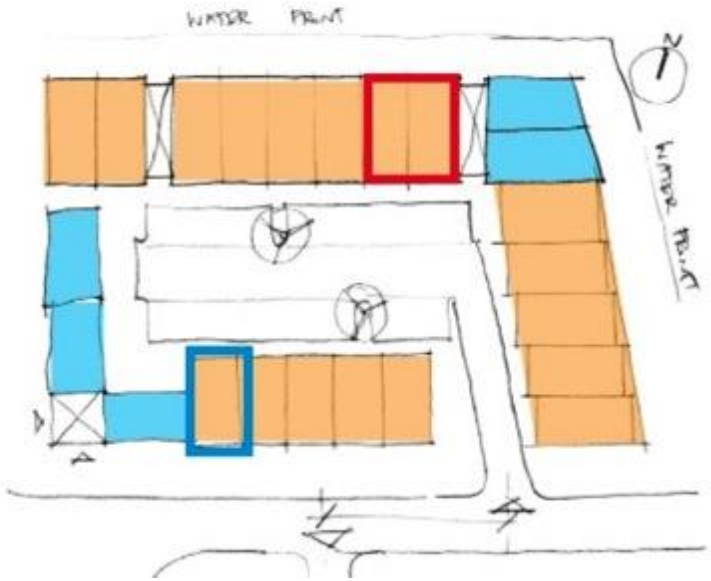
- Electrics at high level
- Drainage
- Main services and emergency backup

Daylighting:

- Solar Gain (Cooling)
- Reduce need for artifical lighting

Safety during flood scenarios

- Early warning system
- Refuge



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Rainwater Harvesting > BUILDING

Options

1. Communal system located below ground in the courtyard (need for pipes, pumps, treatment etc)
2. Communal system located at high level (New York style+need for pipes, pumps, treatment etc)
3. Individual RW systems located on terraces or within flats (space take on flats)

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Plant selection > SITE

1. Trees and planting on the streets

2. Trees and planting in the courtyard

3. Planting to individual terraces

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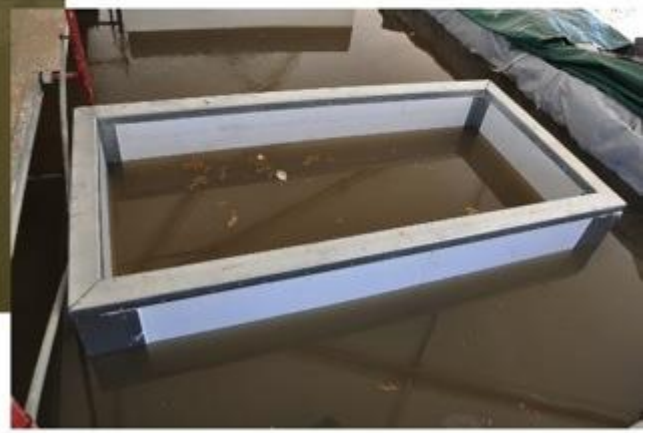
Resilient materials, WALLS > CONSTRUCTION DETAILS

1. Brick and block, cavity masonry wall construction

2. Timber frame and insulated timber infill. Brick, timber, render or metal panel finish

3. Steel or concrete frame with steel stud infill and render/ single brick skin (mass house builder approach)



source:
http://gccds.org/
Gulf Coast
Community Design
Studio

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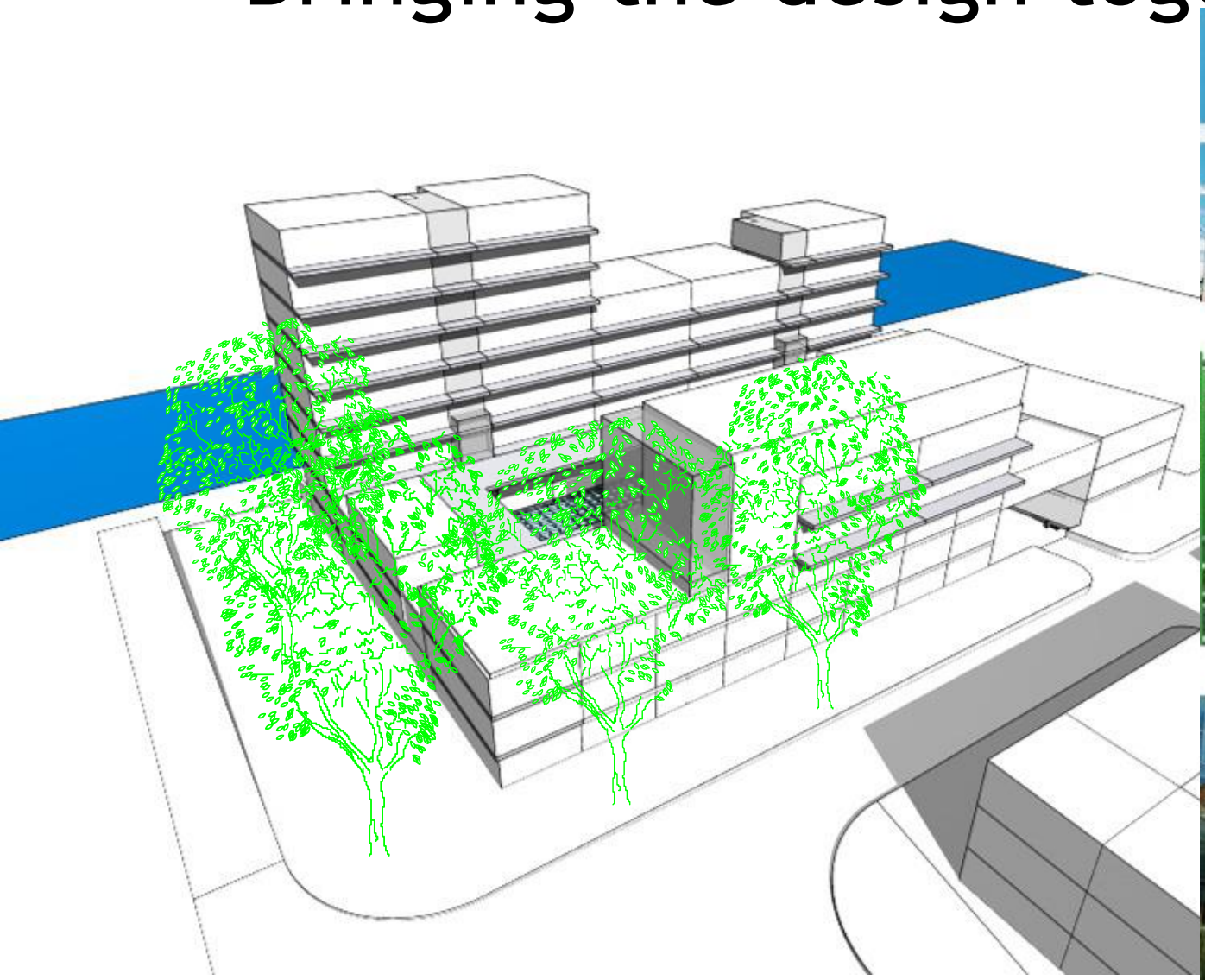
Bringing the design together



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And how the building is constructed

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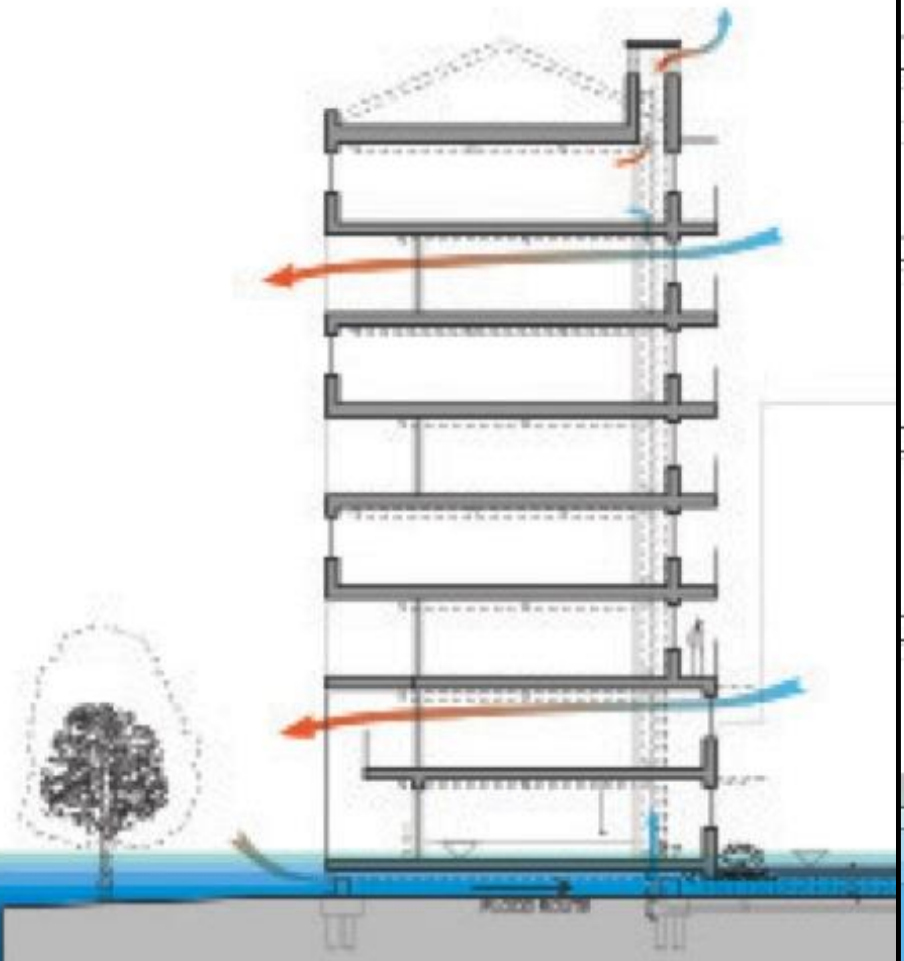
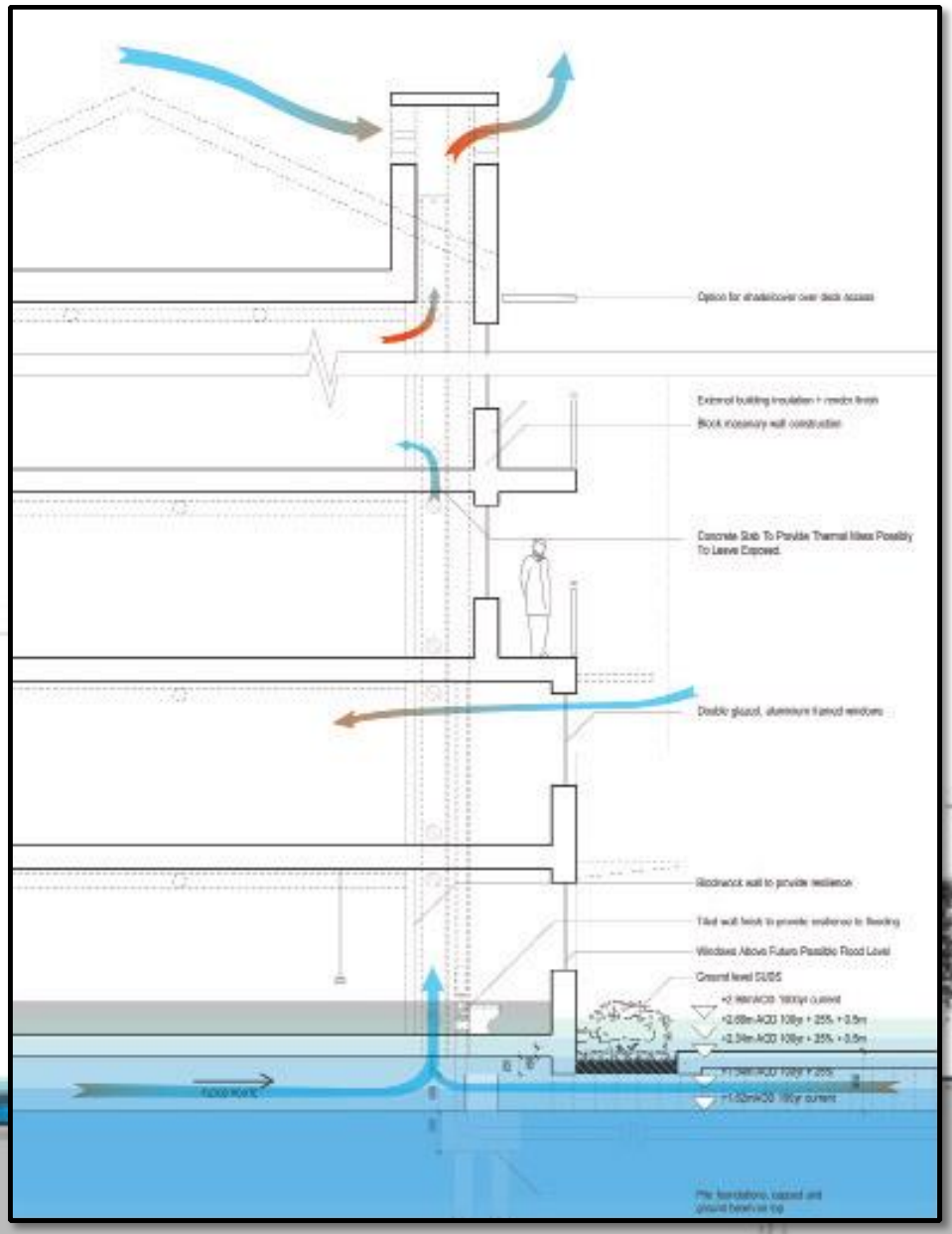
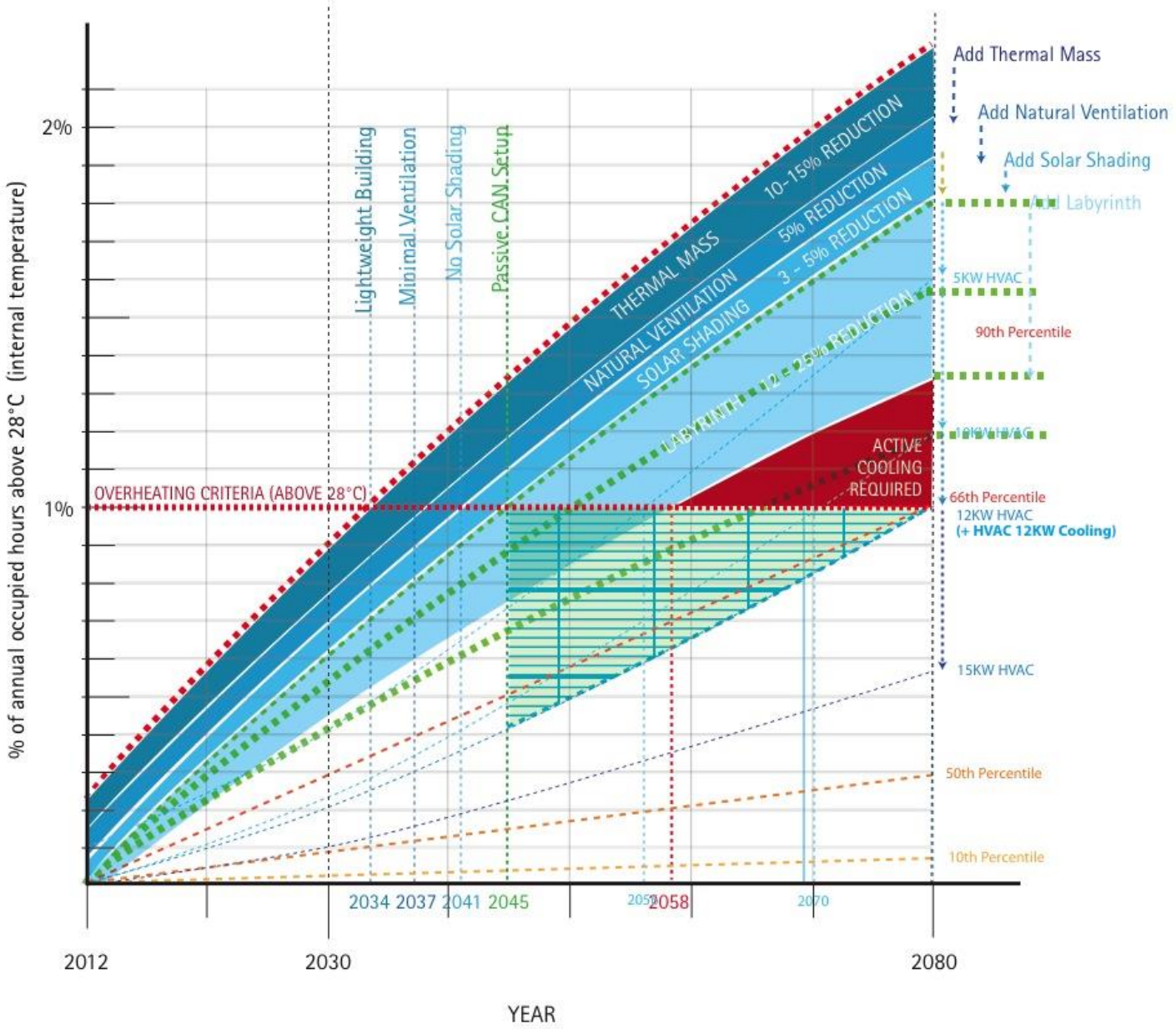
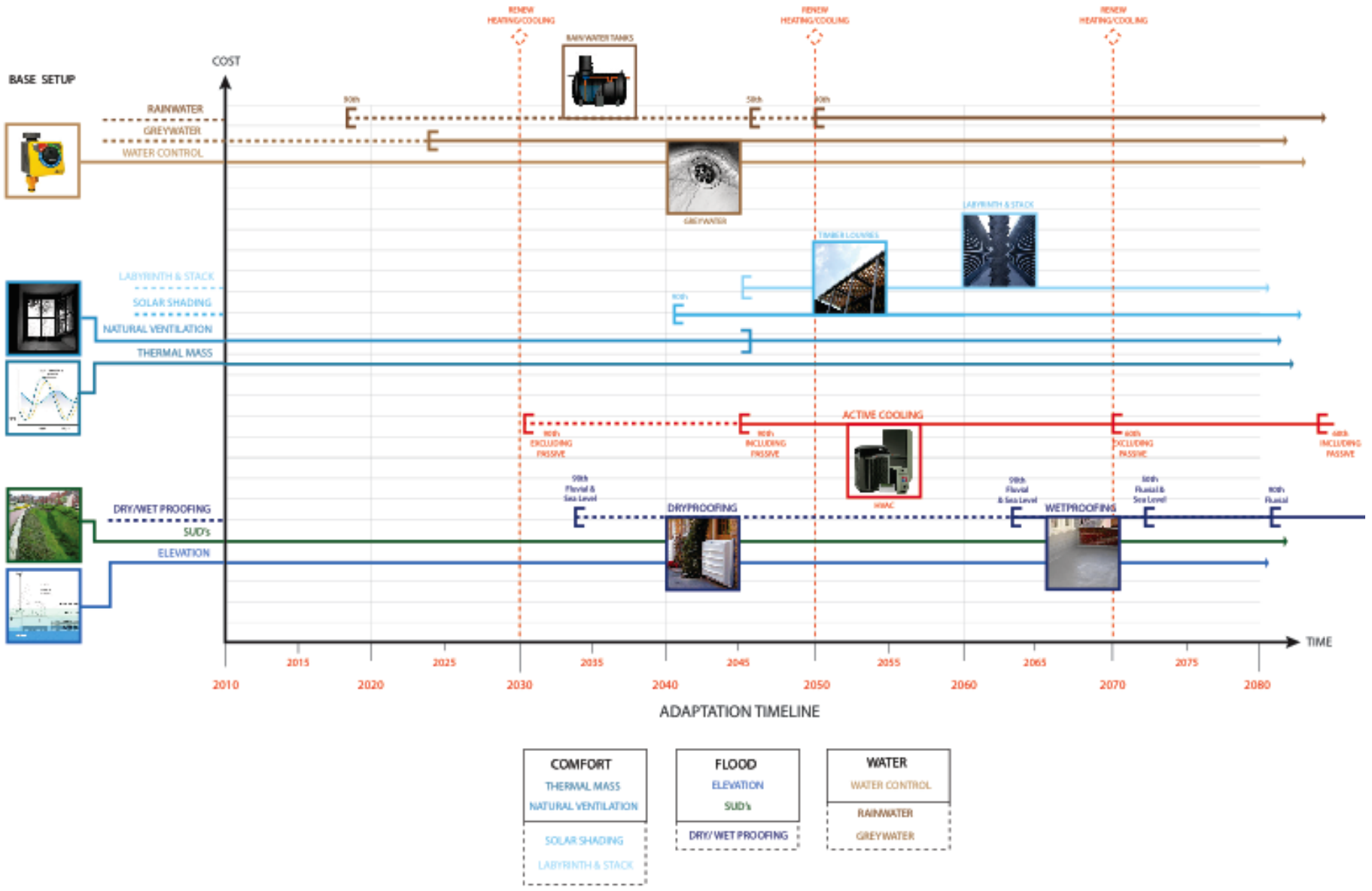
Integrated Section






Incremental Effects Of Cooling Strategies On Base Scheme
For 90th Percentile Future Climate
% of annual occupied hours above 28°C (internal temperature)
2%
1%
Lightweight Building
Minimal Ventilation
No Solar Shading
Passive CAN Setup
THERMAL MASS
10-15% REDUCTION
NATURAL VENTILATION
5% REDUCTION
SOLAR SHADING
3 - 5% REDUCTION
LABYRINTH 2 - 5% REDUCTION
ACTIVE COOLING REQUIRED
OVERHEATING CRITERIA (ABOVE 28°C)
Add Thermal Mass
Add Natural Ventilation
Add Solar Shading
Labyrinth
5KW HVAC
90th Percentile
66th Percentile
12KW HVAC
(+ HVAC 12KW Cooling)
15KW HVAC
50th Percentile
10th Percentile
2034 2037 2041 2045
2052
2058
2070
2012
2030
2080
YEAR



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We HAVE options

Let us not keep using the same one?

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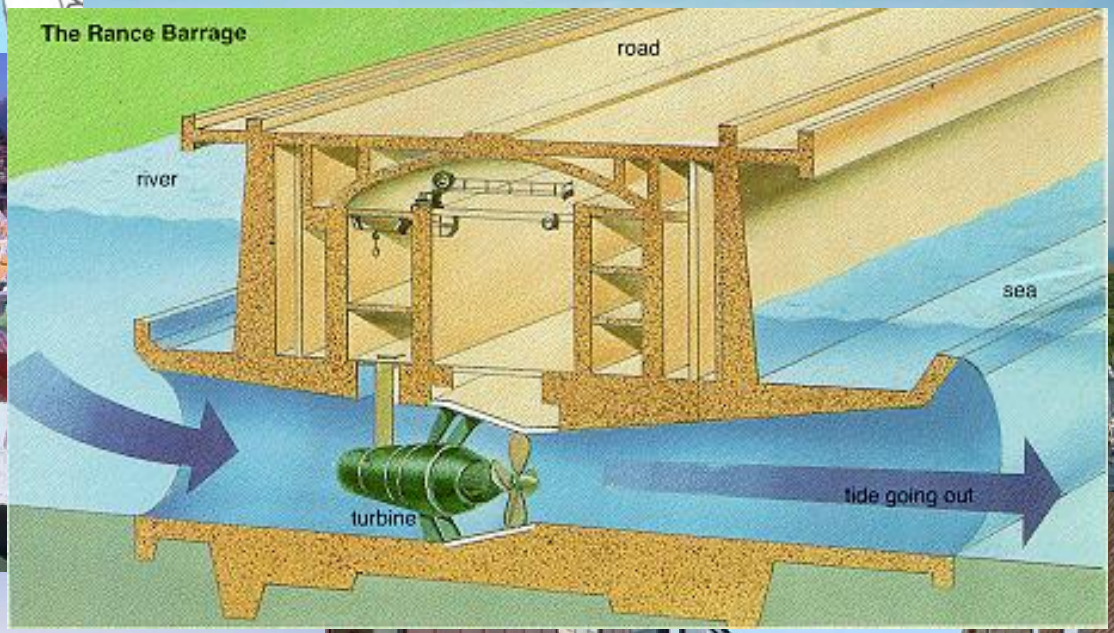
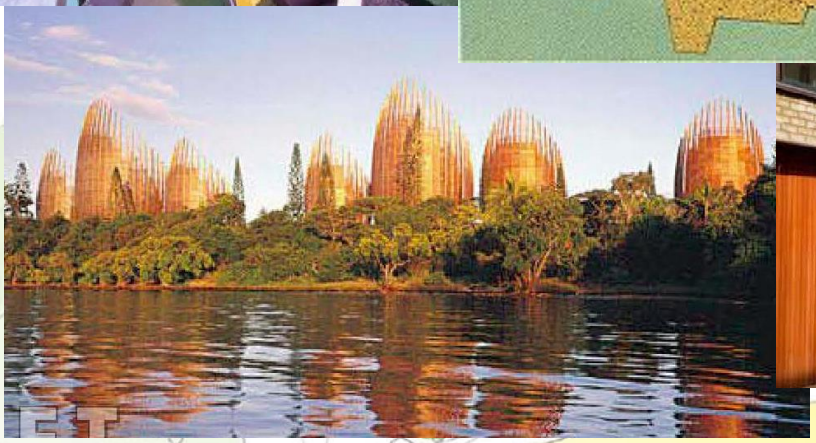
Professor Böhm und Partner

Aqua-δ

Concept Plan - Coastal Destination

Littlehampton > West Bank





cyril sweett

Knight Frank

ROYAL HASKONING

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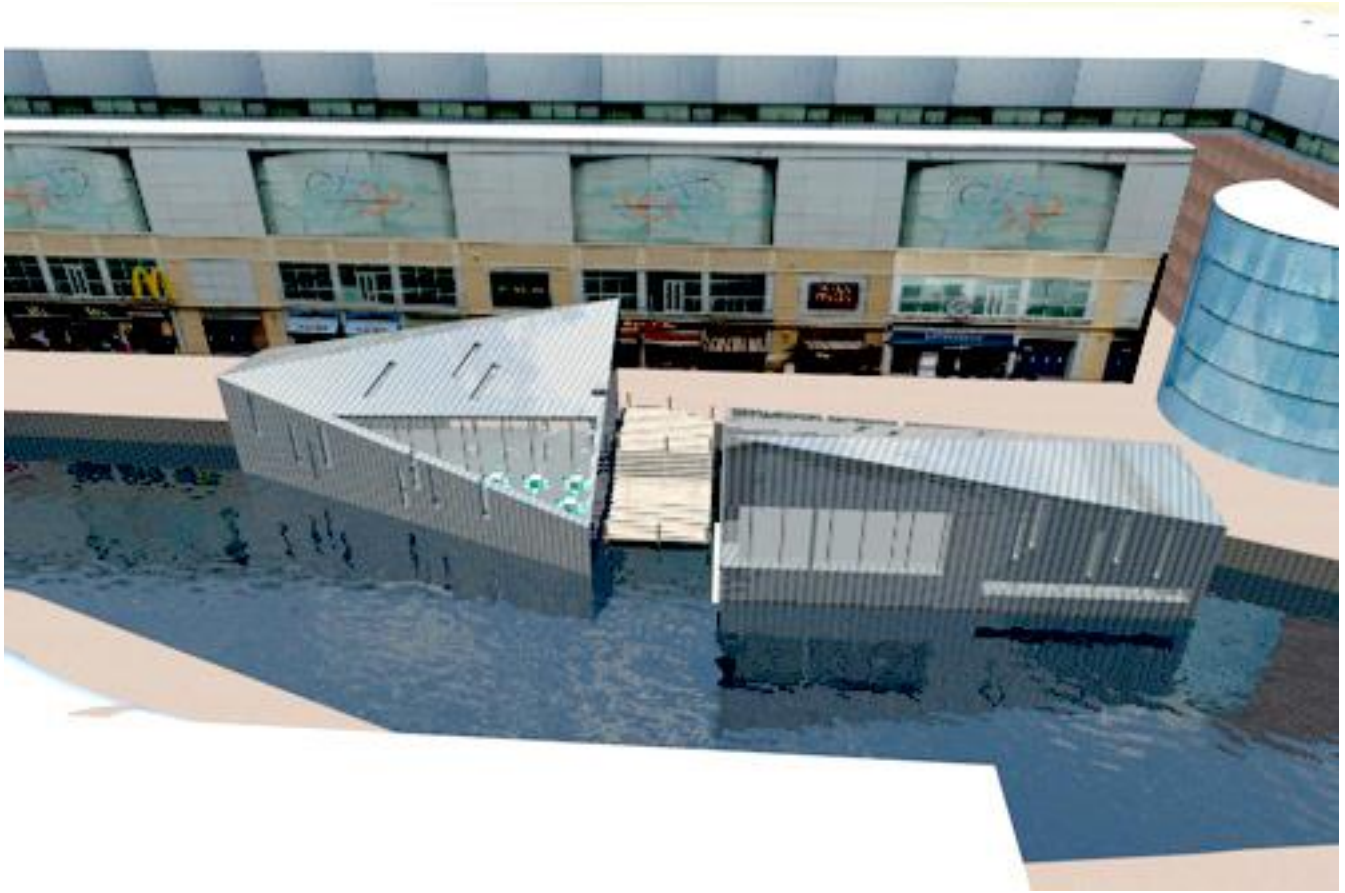
Elevated

Or resilient

Or floating



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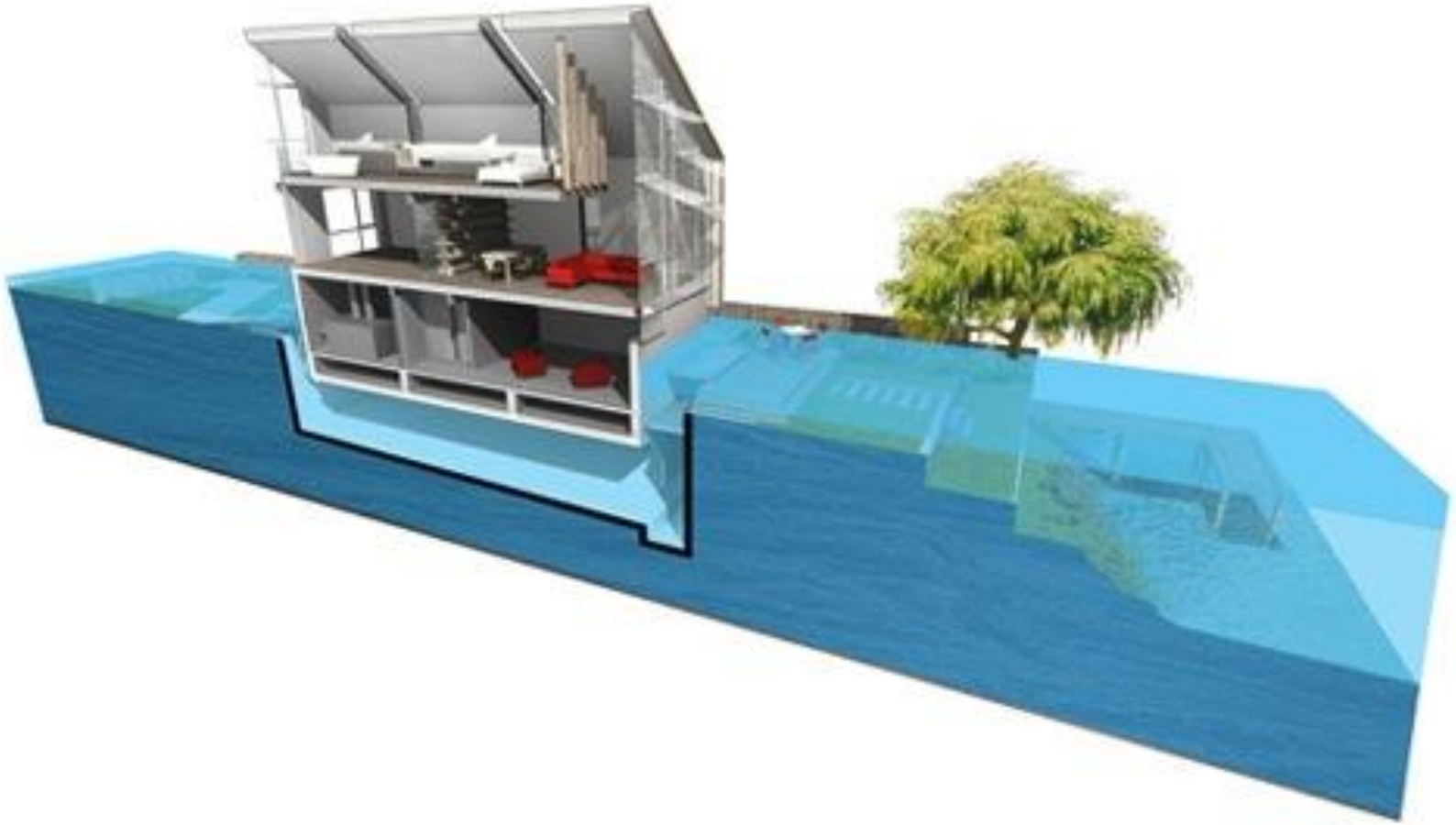
Or this…The Amphibious House



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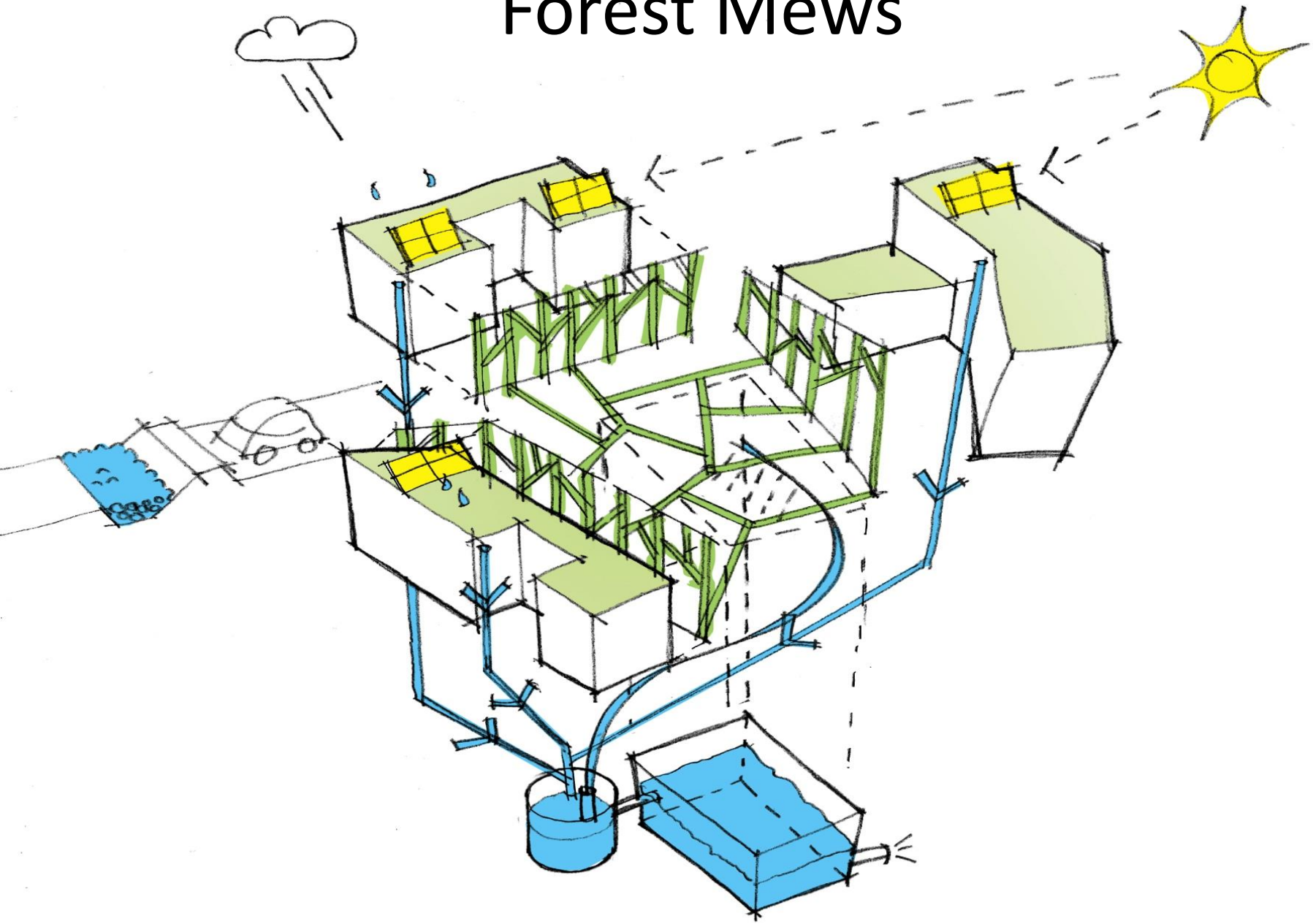
Forest Mews



Thanks for your attention!

You can find more information on:

.....

Robert Barker, Stephen Ndzerem or Peter Heiland
www.baca.uk.com