Politics, Planning, Payments

- New 'National Water Plan' in 2015
  - Delta Works Commission - plan for rise of North Sea of 1.3 meters by 2100 and 4 meters by 2200
  - Implementation planned for 2020-2100 at cost of €100 billion
- Netherlands
  - 408 municipalities, 25 water authorities, 10 drinking water authorities, 1 ministry
- Amsterdam – WaterNet – water company
  - One entity serves 1.2 million people, $575M budget
  - Integration of entire water cycle - groundwater/drinking water, wastewater, stormwater
  - Annual cost per household (2012): €627 ($824)

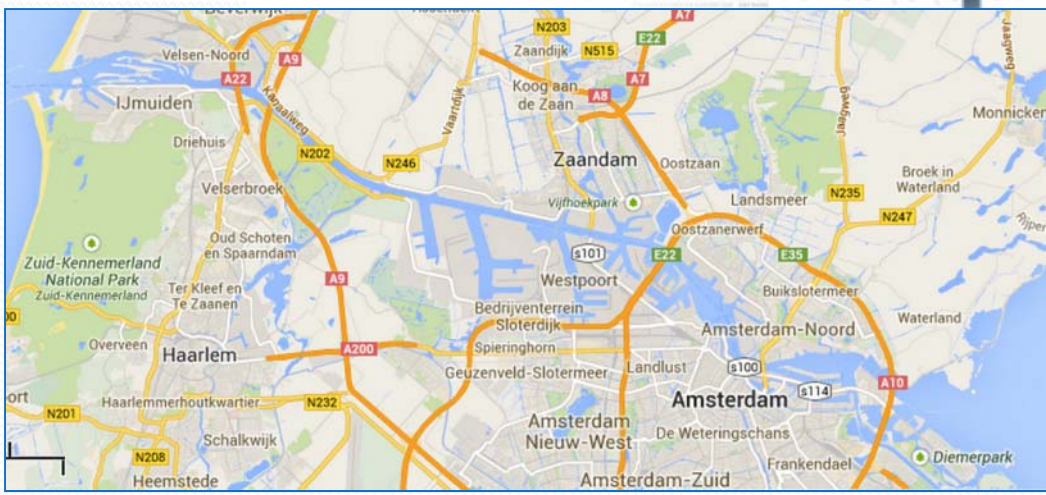
Water Planning - Amsterdam

- Existing conditions
  - City owns most land, 30-50 yr leases
  - Public shoreline makes additional protection easier
  - Inside 1:10,000 protection zone (dike ring)

- Approach
  - Reduce flood risk at 'front door' – check every 6 years
  - Relocate critical infrastructure
  - First priority - protect electric and communications facilities
  - Ensure new development is flood-resistant
  - Some areas more economical to evacuate/recover quickly
  - Integrate water infrastructure with spatial planning

Water Planning - Amsterdam

- Flood Resistant Westpoort Study - 2013
  - Protection measures for the "Western Port'
  - By City Planning Dept.
  - Plan for climate change, increased urbanization
  - Virtually no residents
  - High-risk industrial plants with hazardous materials
  - Large wastewater treatment plant
  - Electrical supply to City
  - Largest petroleum port
  - Data centers



Water Planning - Amsterdam

- Flood Resistant Westpoort – Individual and Collective Actions for Continuity
  - Individual businesses invest to maintain operations during flood. Requires guaranteed access by municipality
  - Individual businesses invest to limit damages and recover quickly. Requires quick restoration of power/telecommunications
  - Collective investment to improve flood protection in whole sections of Westpoort. Create water-resistant compartments
  - Collective action for rapid evacuation and movement of key equipment
- Must do Actions
  - Fortify and raise dike along Rhine River (benefit:cost=84)
  - Fortify and raise dike along Harbor
  - Build dikes/walls around selected critical infrastructure
  - Elevate key roads
  - Couple with planned projects

Water Planning - Rotterdam

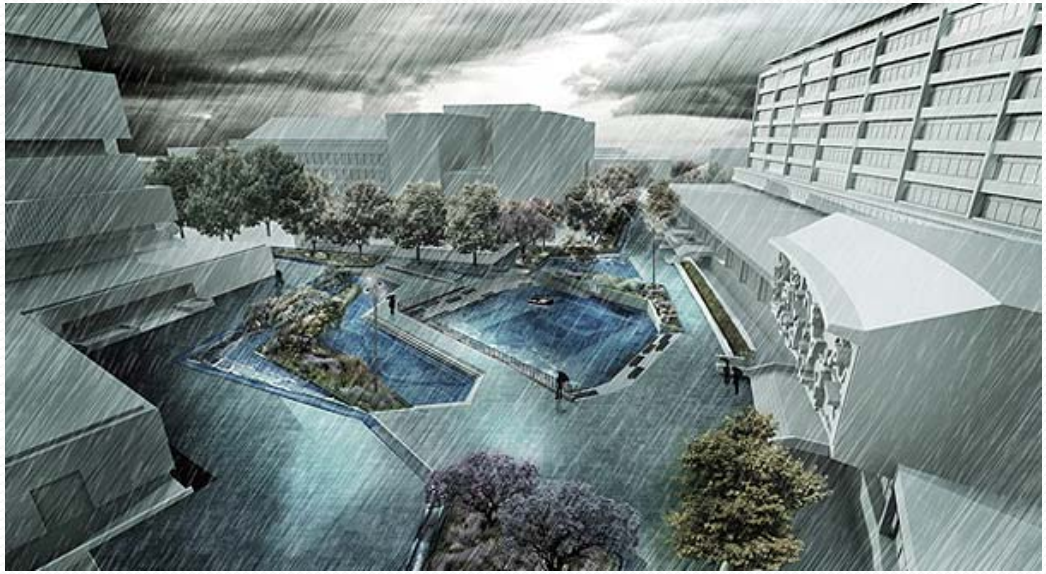
- Rotterdam Climate Proof
  - 612,000 people, 2nd largest city, rebuilt after WWII
  - One of world's largest ports
  - 400 km canals, 1,000 pumping stations
  - Shallow groundwater
  - SLR, increasing river discharge, increasing rainfall
  - Goal: 100% climate proof in 2025
  - Long term vision → short-term plan
  - Knowledge / action / marketing

Water Planning - Rotterdam

- Rotterdam Climate Proof - Storage
  - Public plazas for aesthetics, play, gathering, *and water storage*
  - Water features built with storage
  - Underground storage
  - Beneath plaza, garage, street

Water Planning - Rotterdam

- Rotterdam Climate Proof - Water Plaza Storage
  - 1.8M liters (2,354 CY storage)
  - Automated operation



Build with/in Water

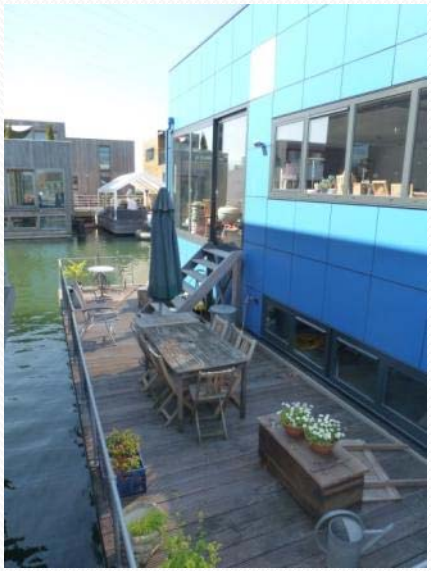
- Watergraafsmeer polder
  - Reclaimed in Amsterdam harbor
  - Protective dike, canals/pumps/locks
  - On land and in water residential

Build with/in Water

- Canals for storage/aesthetics
- Closable barriers/locks

Build with/in Water

- Homes on piles



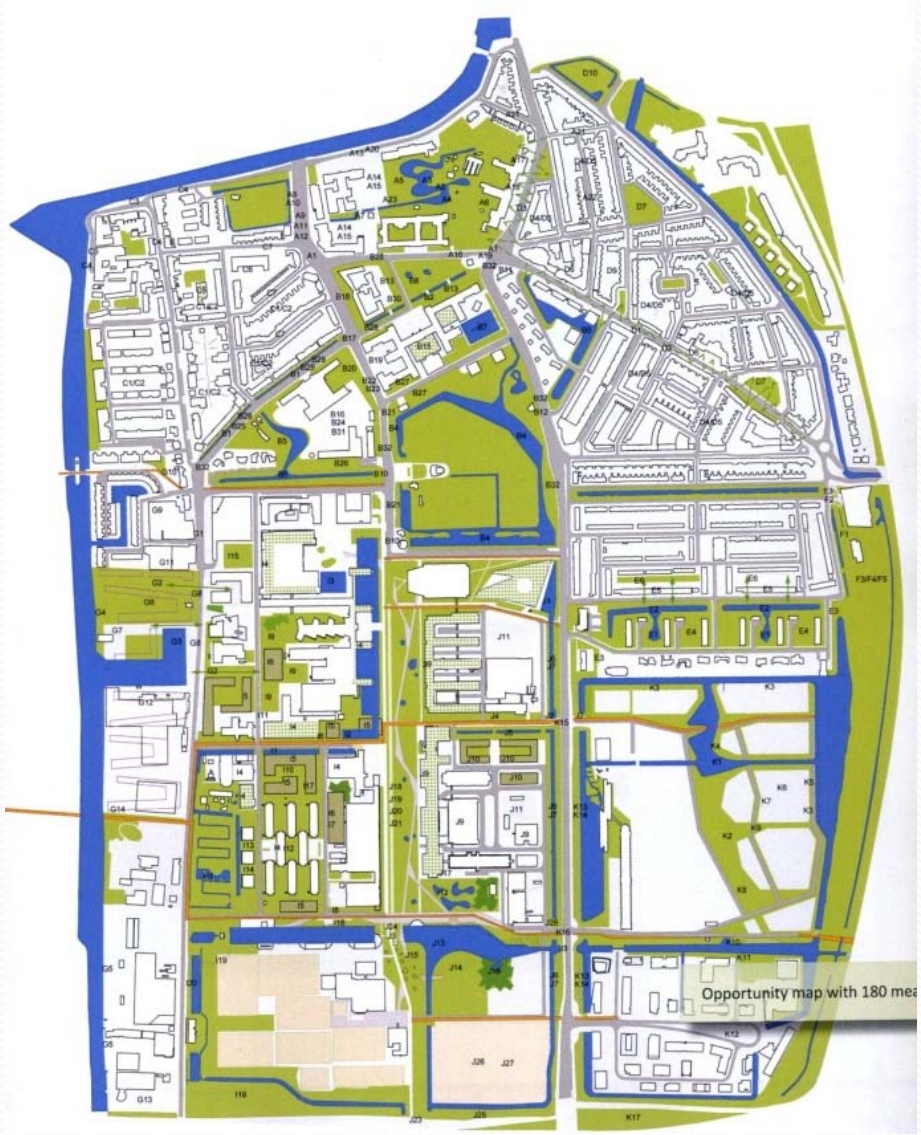
Green Blue Delft

- University requests building permit
  - Permit for density increase if increase quality of life with 'natural' elements
- Issues
  - Flooding from more intense and frequent rainfall
  - Inadequate stormwater capacity
- Project Sponsors
  - City of Delft, Delft Technical University, Delfland Water Board

Images source: LUZ Architecture

Green Blue Delft

- More ‘blue’ storage
- More green spaces
- More natural treatments



Images source: LUZ Architecture

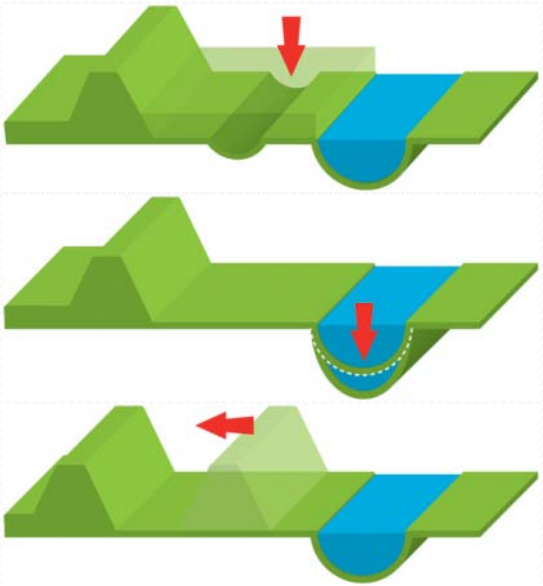
Technical University Delft - Library

Room for the River

- Rhine, Meuse, Waal, and Ijssel Rivers
- Problem
  - Sediments reduced 'room for rivers'
  - Floods greater with more snow melt
- Solution
  - Public process/marketing
  - Structural changes
  - 'Green channel' bypass to sea
  - Residential relocation

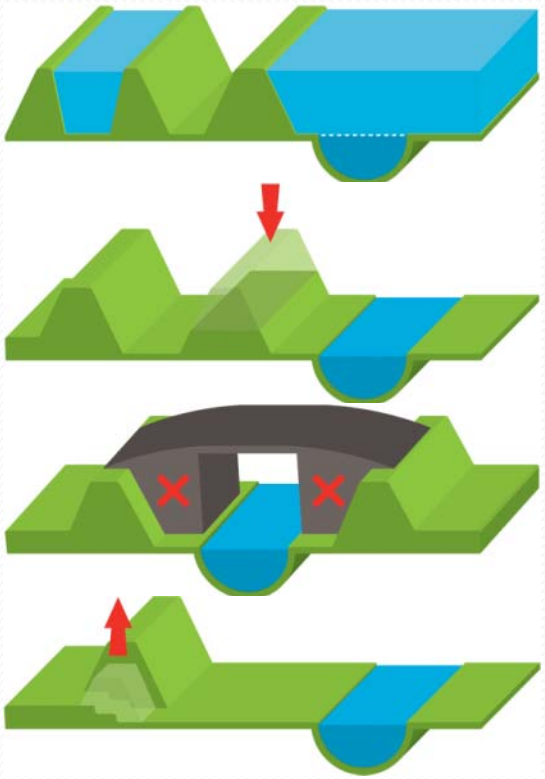
Room for the River

- Lower floodplain
- Deepen bed
- Relocate dike



Source: http://www.ruimtevoorderivier.nl/

- Provide high water channel
- Depolder
- Remove obstacles
- Strengthen dikes



Climate Change & Transportation

Amsterdam

- **Transit 20%**
- Cycling 30%
- Auto 50%

Climate Change & Transportation

Amsterdam

- Transit 20%
- **Cycling 30%**
- Auto 50%

Climate Change & Transportation

Amsterdam

- Transit 20%
- Cycling 30%
- **Auto 50%**

Climate Change & Transportation

If the 1:10,000 event occurs, the Dutch have options

Windmills

David Berg, AICP, LEED AP
516-827-4900 x206
dberg@cameronengineering.com

Climate Smart Communities Webinar

E-Mail Addresses

- Mark Lowery
  mdlowery@gw.dec.state.ny.us
- Kim Farrow
  kxfarrow@gw.dec.state.ny.us
- Climate Change Office
  climatechange@gw.dec.state.ny.us

Climate Smart Communities Webinar

Website Address

http://www.dec.ny.gov/energy/50845.html