Waterscapes and Soft Infrastructures for the Thames Gateway: Buffering Scarcity and Abundance

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The recent concept and logistical model of "Peak Water" and its finer definition of "Peak Renewable Water," "Peak Non-Renewable Water" (fossil water) and "Peak Ecological Water," underline water's significance as a future capital resource. In the context of global population increase the 'water grab' for energy and food production, alongside altered agricultural uses, which rely on non-sustainable methods of irrigation, puts an inconceivable strain on the megacities and rural communities of the developing world. The increased entanglement of the natural and the technological will inevitably lead to an infrastructural landscape of mass production and distribution networks, resource territory conflicts and further disparity between the haves and the have-nots. This is apparent even in the seemingly well-tempered environment of London where the city is preparing for a future of water scarcity and stress.

LONDON'S WATER STRESS

London is a recognized area of serious water stress due to its limited water resources and its vulnerability to drought. Surprisingly it is one of the driest capital cities in Europe, with available water resources per head of population similar to Israel. Generally speaking, the quantity of water in the Thames, its tributary the River Lea and the London Basin chalk aquifer is enough to meet London's current demands, but after sustained periods of low rainfall, water has to be drawn from reservoirs to meet the demands. The present balance of supply and demand in London is in deficit by approximately 180 million litres per day.

This research project considers the design of a soft hydrological infrastructure fused with housing and sited in the proposed Thames Gateway regeneration zone. The threat of rising sea levels and increased probability of flooding holds a potential threat to the proposed Thames Gateway developments which will extend east, downstream from the Thames Barrier, beyond Greater London to the extent of the Thames Estuary. This substantial housing and commercial development of at least 120,000 new homes will sprawl through East London's predominantly low-lying brownfield land and extensive Thames floodplain.

The proposal is an architectural, infrastructural and technological landscape that manages, distributes and displays water—river flood, sea surges, drought and rain fall. It deals with the commodity, excess and scarcity of water and concentrates and localizes the infrastructure as an alternative to the extensive and embedded water management systems global cites rely on. It adapts a selection of technological systems and integrates them into an architectural infrastructure as inhabitable spaces. Three territories are proposed:

1. Hydro-infrastructural terrains form an active and inhabitable landscape that yields to unpredictable variations in fluvial flow and moderates water use in subterranean cisterns, a network of canals and header tanks

2. Hydro-agricultural landscape is a mechanized topography that responds systematic cultivation techniques to lift automated fields up and away from flood zones and unworkable land.

3. Porous architectural landscape acts as an absorbent and permeable terrain to cope with the contrasting threats of scarcity and abundance.

Water provision The majority of London's water supply comes from two sources: from rivers such as the Thames and Lea, and from boreholes that are driven deep into the chalk aquifers. The city is situated at the eastern edge of the London Basin Syncline, which is Britain's most extensive chalk aquifer. Groundwater is an essential source of high quality water and accounts for approximately 40% of public water supply in the Thames region. However, although borehole water is of a better quality than the water from rivers and requires less treatment, the supply is limited; river water is stored in reservoirs before being transported into the Water Treatment Works, where it is turned into domestic supply.

London's reservoirs store on average 30 million cubic meters of water and are found to the north in the Lea Valley, and to the west of London. The reservoirs to the west of London are supplied by the tributaries of the Thames while the reservoirs in the Lea Valley are supplied by the River Lea and the New River, a 400-year old aqueduct. Although used primarily for water storage, reservoirs are also utilized in the first phases of the water treatment process.

Thames Water Ring Main After passing from the reservoirs and through the Water Treatment Works, the water enters the Thames Water Ring Main. This is an 80km loop of pipe, buried 40m below the surface of London's streets, which connects water treatment works and pumping stations, and forms the primary loop of domestic supply for the city. The project was originally completed in 1994 and is constantly being updated with new connections to improve the water supply for London's future.

Access Shaft ●
Water Treatment Works ⊗
Pumping Station O
New Pipe Connections --

Victorian Pipes Thames Water loses approximately 685 million liters per day to leaking Victorian pipes which still make up much of the supply network in London. More than half the mains are reckoned to be over 100 years old. One third are over 150 years old. Over 20% of pipes in the capital are over 150 years old. Investment by Thames Water in detecting leaks and replacing the Victorian pipes is slowly reducing the rate of leakage, but there is still more work to do.

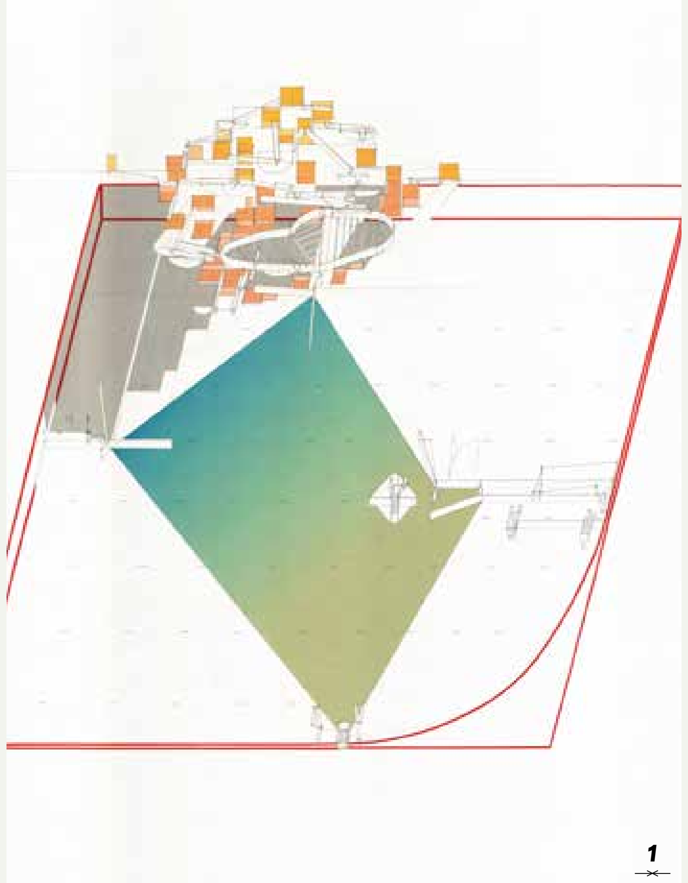
Flood risk Current statistics indicate that the River Thames is rising on average approximately 3mm per year. Due to the fact that a significant proportion of the city lies in the flood plain of the river and its tributaries, London is exposed to a higher potential of flooding than any other urban area in the UK. 15% of London is in the floodplain, which includes 49 railway stations, 75 underground stations and 10 hospitals. London's flood risk comes from five different sources—tidal, fluvial, surface, sewer and groundwater—and the city is prevented from flooding by a complex system of flood defences. South East England is sinking due to 'isostatic rebound' from the last ice-age.

London's lost rivers The expansion of London over the last 200 years has resulted in the loss of several open rivers which have been culverted underground or turned into canals. This has a large effect on the potential flood risk of the city, as these underground rivers cannot aid with the drainage of high rates and volumes of runoff following excessive precipitation or snow melt.

1. The River Neckinger
2. The River Walbrook
3. The River Fleet
4. The River Tyburn
5. The River Effra
6. The River Westbourne

Major flood defense systems The Thames Barrier, upstream sea walls, and 32km of embankments downstream were designed to provide a 1-in-1000 year level of protection up until 2030 for London and surrounding areas. Between 1983 and 2001 the Thames Barrier was closed 62 times to protect London from tidal flooding. By 2100 it is estimated that the Thames Barrier will need to close about 200 times per year to protect London from tidal flooding. Unless further investments into flood management measures are continued, current flood protection systems will not be able to cope with the increased risk of flooding that are associated with climate change predictions.

A. The Barking Barrier
B. Royal Docks Impounding Flap and the Gallions Reach Flood Gate
C. The King George V Flood Gate
D. The Thames Barrier. London's primary flood defense system was completed in 1983. It is made up of 10 different floodgates and is engineered to protect London from a tidal surge of up to 7m. The barrier will stop meeting its original design standards in 2030 due to rising sea levels.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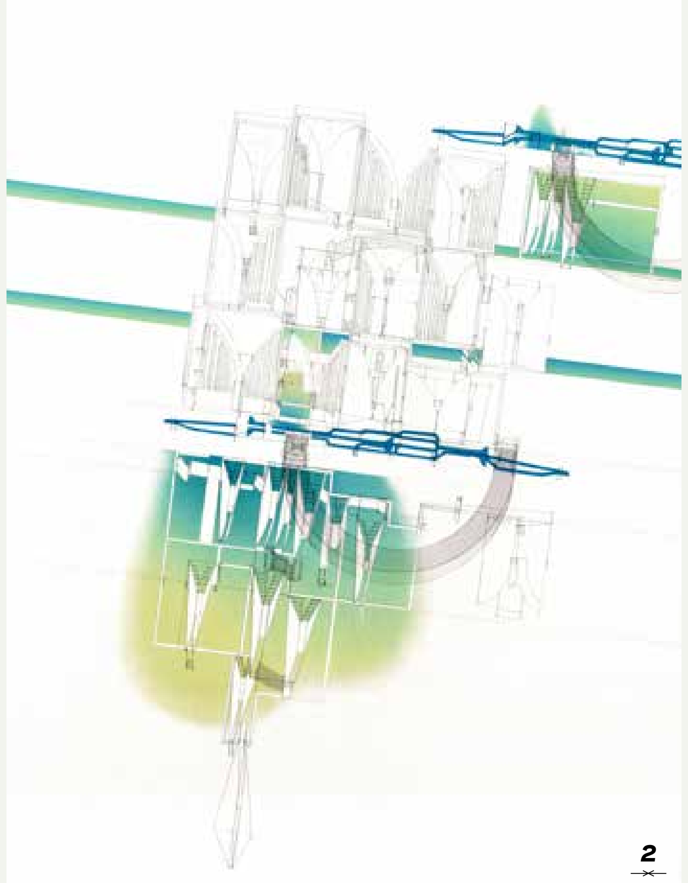
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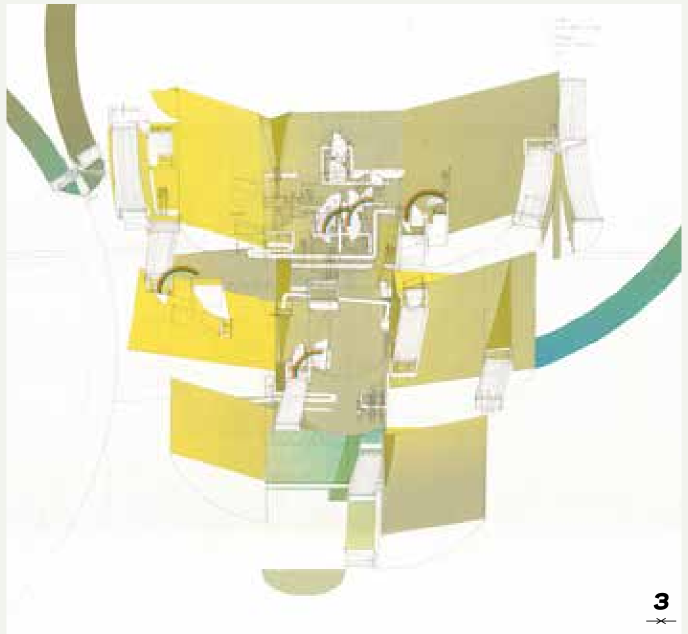
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