

Formosa, The Amphibious House

The owners of the UK's first amphibious house – Formosa - on the banks of the River Thames in Marlow will be moving in by the end of 2014.

Designed by Baca Architects - specialists in waterfront architecture and flood-resilient developments – the unique house is located on an island in the picturesque stretch of the River Thames that passes through Marlow, in Buckinghamshire, a site designated as Flood Zone 3b and a Conservation Area.



Project Team Baca Architects:

Project Architects:	Richard Coutts and Robert Barker
Design Team:	Riccardo Pellizzon and Robert Pattison
Client:	Private
Project Value:	Private
Consultants:	
Structural Engineer:	Techniker
Contact name:	Matthew Wells
Hydrological Engineer:	HR Wallingfords
Ground works:	Greenfords
Main contractor:	Creative Interior Construction
Timber Frame:	Benfield ATT
Zinc supplies:	SIG Zinc & Copper
Glazing:	Bournemouth Glass & Glazing
Mechanical & Electrical:	Daikin
Project Management:	NRJ Project Management



What is an Amphibious House ?

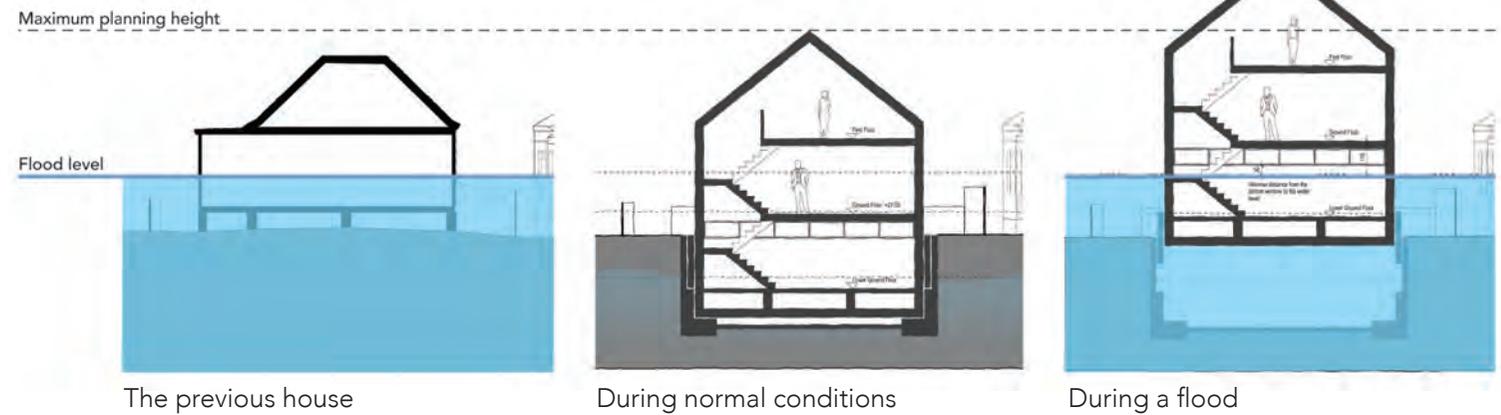
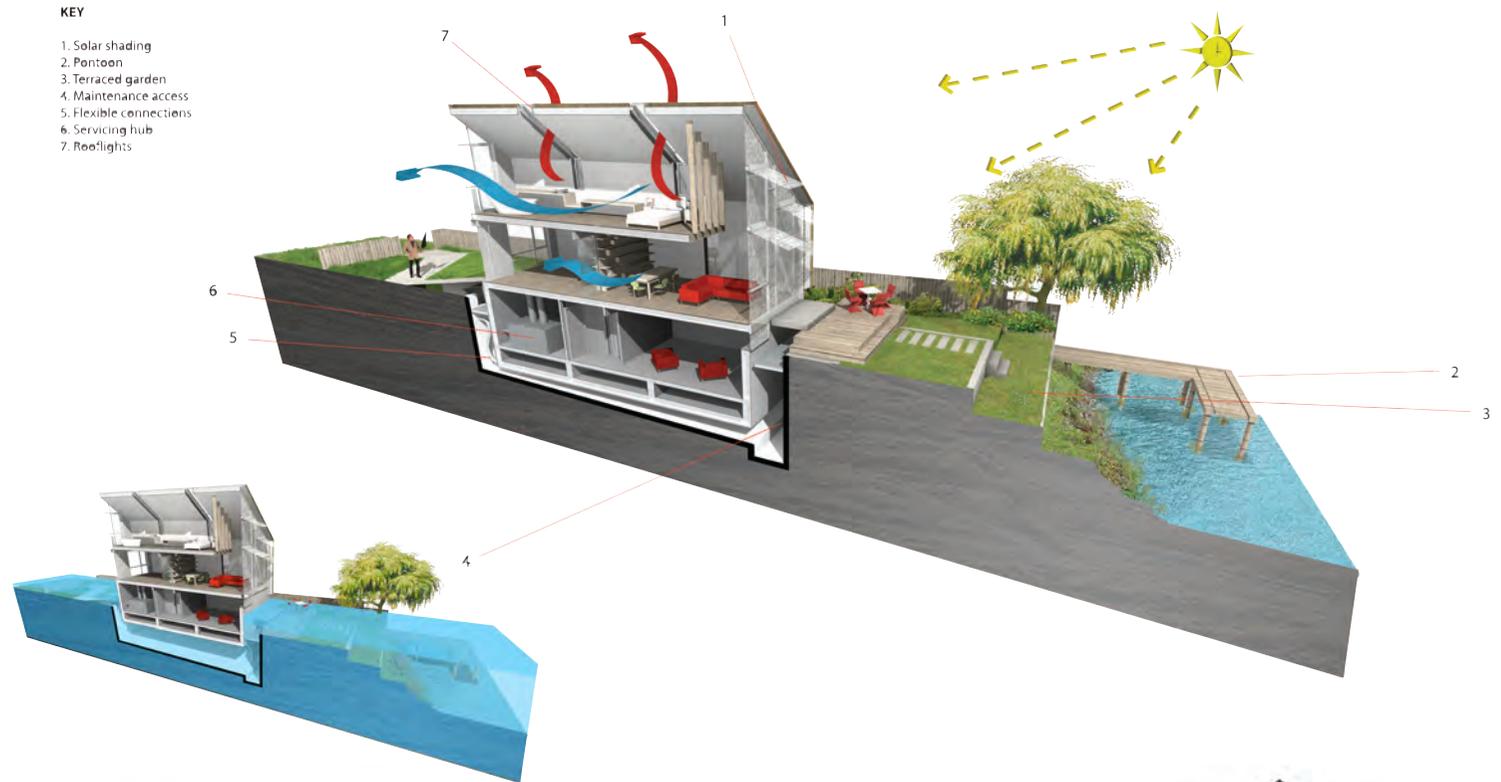
An amphibious house is a building that rests on the ground but whenever a flood occurs, the entire building rises up in its dock, where it floats, buoyed by the floodwater.

Amphibious construction brings together standard components from the construction and marine industries to create an intelligent solution to flooding.

The house itself sits in the ground and the floating base is almost invisible from the outside. Amphibious designs can vary to suit the location and owners' preferences.

The amphibious design allowed the floor level to be set less than 1m above the ground level instead of 2m, had the house been static. This enabled a 225sqm 3-bed dwelling to be constructed over three floors in place of the existing 1-storey 90sqm house without significantly increasing the ridge height, and therefore achieved full planning.

Construction is slightly more expensive than mainstream house building due to the requirement for two foundation systems: the dock and the hull; but overall the costs are comparable to a typical basement extension, or around a 20-25% uplift on a similar size new house. The technology is ideally suited to areas of high flood-risk or if there is uncertainty regarding future flooding levels, as well as in historical or sensitive landscape settings where more heavy-handed solutions would be unacceptable.



How it Works

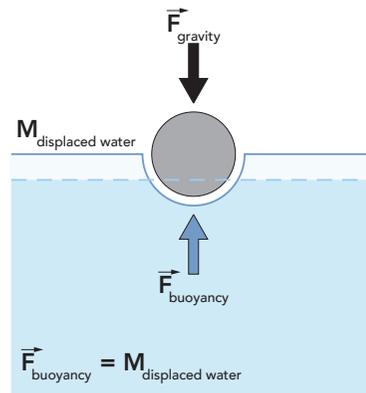
River and ground water are hydrologically linked, so during a flood here as the River Thames rises so too will the ground water beneath the surface. The dock fills gradually from the ground, gently raising the building, as the river level rises. When the water is just below the ground level the house becomes buoyant. The house can rise upto 2.7 m to cope with a 1 in 100 flood event. The guide posts extend almost 4 m above the ground level such that in the event of an even bigger flood the house would still be retained between the posts.

The flexible pipes are designed to extend up to 3m allowing all of the services to remain clean and operational during any flood event and crucially to allow the occupants to return to the property immediately after a flood, maximising the continuity of their daily lives.

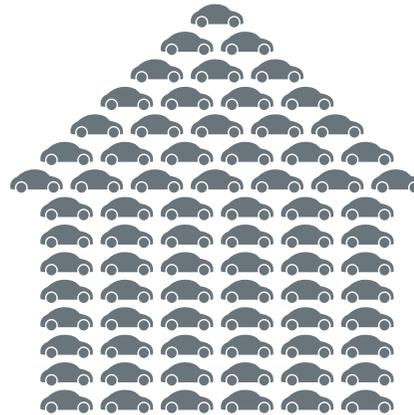
Maintenance

The Amphibious House is designed with minimal moving parts but like any house it requires maintenance and like a car or a boat it requires testing. The house may not float for several years therefore it is important to proactively test and maintain the can-float base and flotation system to ensure that the parts are in good working order, ready for when a flood occurs.

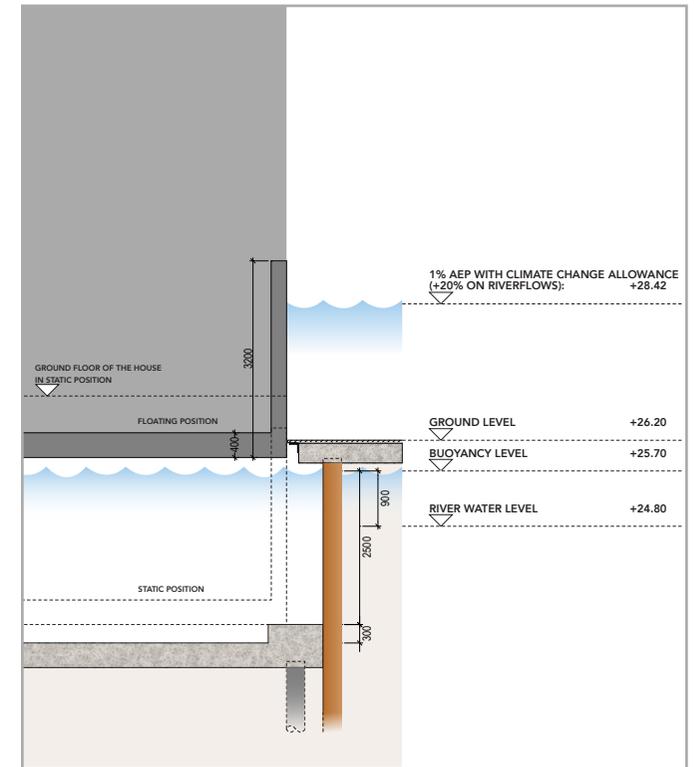
Every five years the dock will be pumped full of water to repeat the flotation test when the house will rise up to 50 cm to test the integrity and free movement, before the water is slowly released and the building allowed to touch down again.



Archimedes Principle



The house is equal in weight to 170 cars



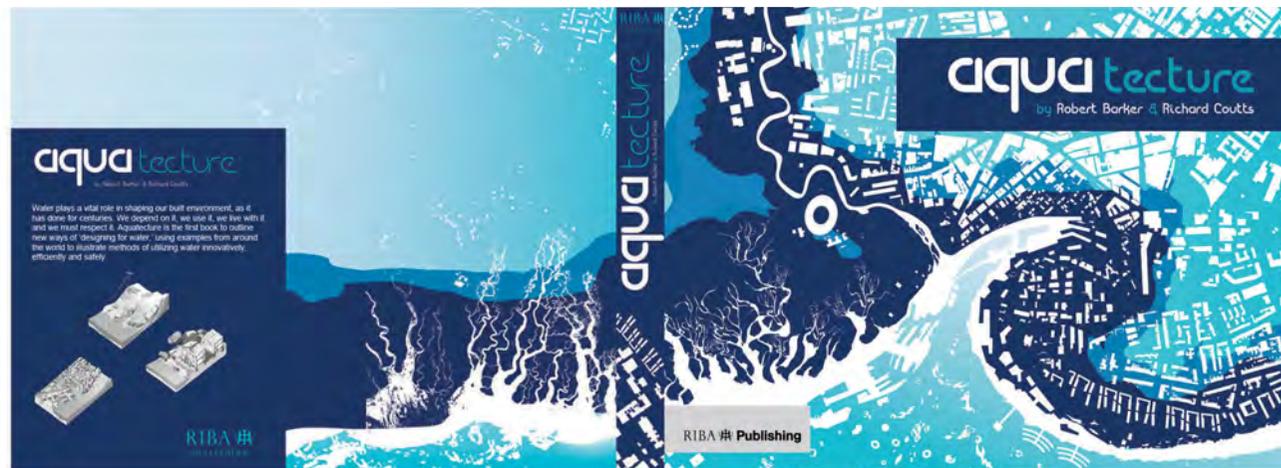
How to design in Flood Risk Areas

In a new book, titled 'Aquatecture' and published by the RIBA, Robert Barker and Richard Coutts explore how to design in flood-risk areas and how water can be used to enhance architecture and design.

Water plays a vital role in shaping our built environment, as it has done for centuries. We depend on it, we use it, we live with it and we must respect it. Aquatecture is the first book to outline new ways of 'designing for water,' using examples from around the world to illustrate methods of utilizing water innovatively, efficiently and safely.

The first part of the book explores the historical relationship between water and architecture, examining how cities and civilisations have been drawn to water and have attempted to control it. The chapters go on to assess how this relationship has changed over time, and introduce readers to a range of brand new techniques that will revolutionise the way we think about water, design and urban planning. Solutions such as amphibious housing, wet-proof buildings, zero carbon development, rain gardens, flood storage and new methods of waterfront design are discussed and their effectiveness assessed.

This book is an ideal reference tool for all architects, urban designers, planners and sustainability experts who have an interest in creating a beautiful, sustainable, intelligent and pleasurable built environment on land, in water and with water.



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Other publications by the authors include:



Flood aware design chapter, for the Metric Handbook Fifth edition



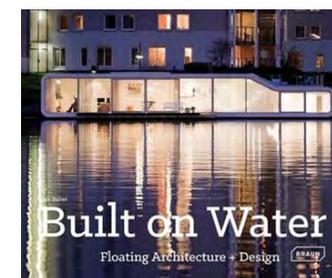
LifE project, for Defra



Flood Resilient Property, for Defra



Cities and Flooding, for the World Bank



Floating Architecture Examples, for Built on Water

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