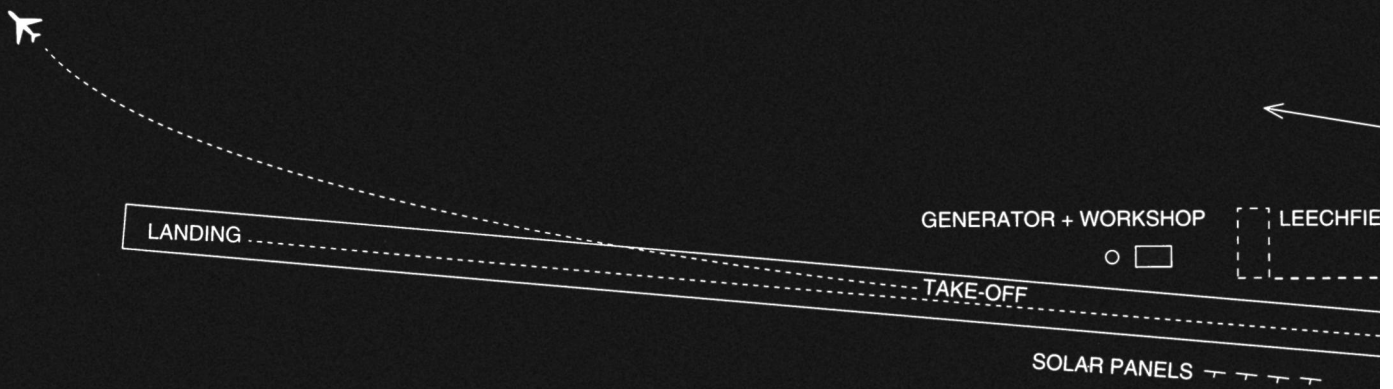
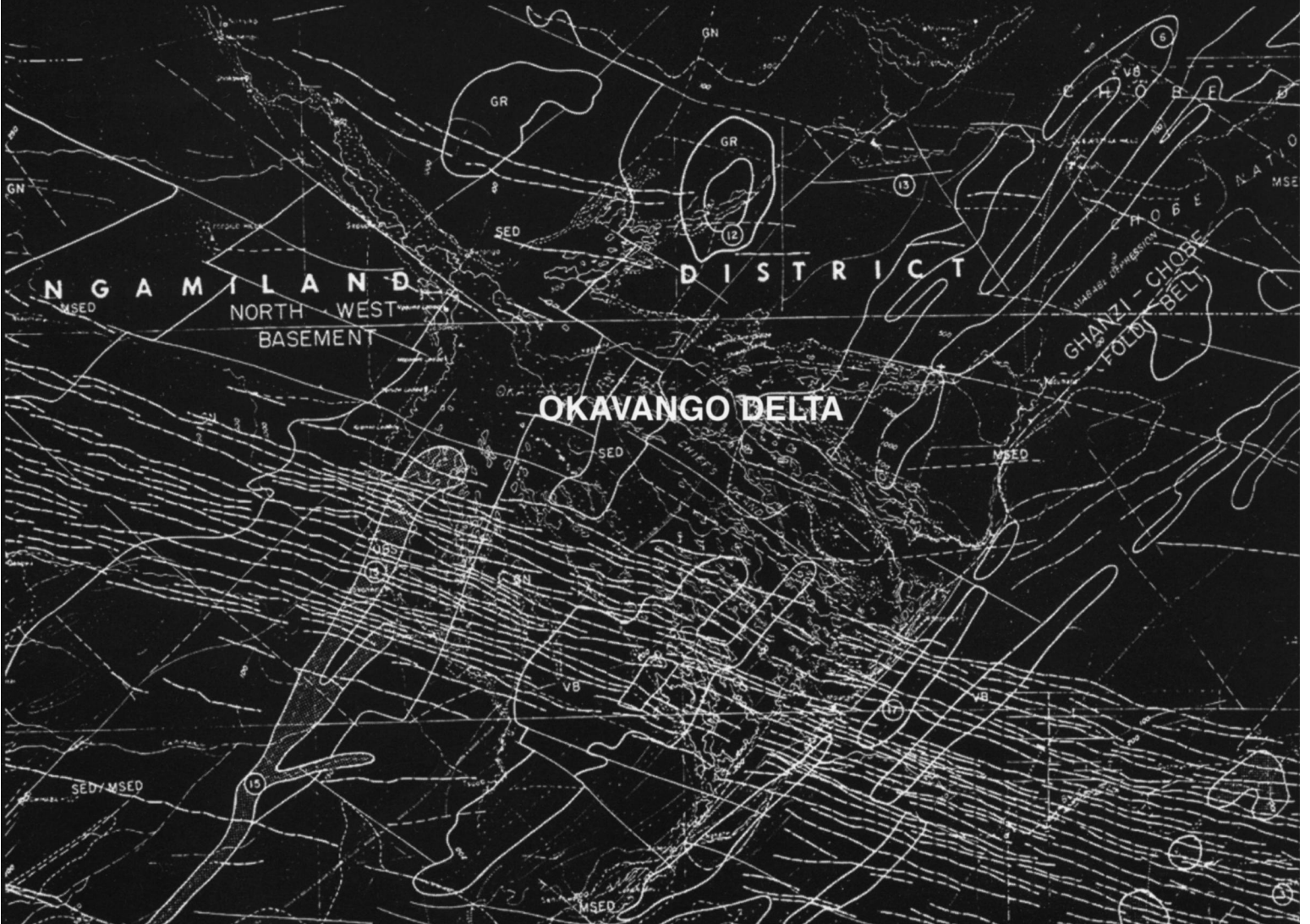
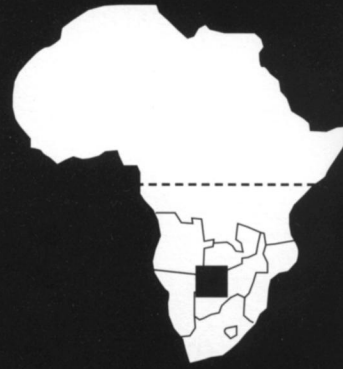
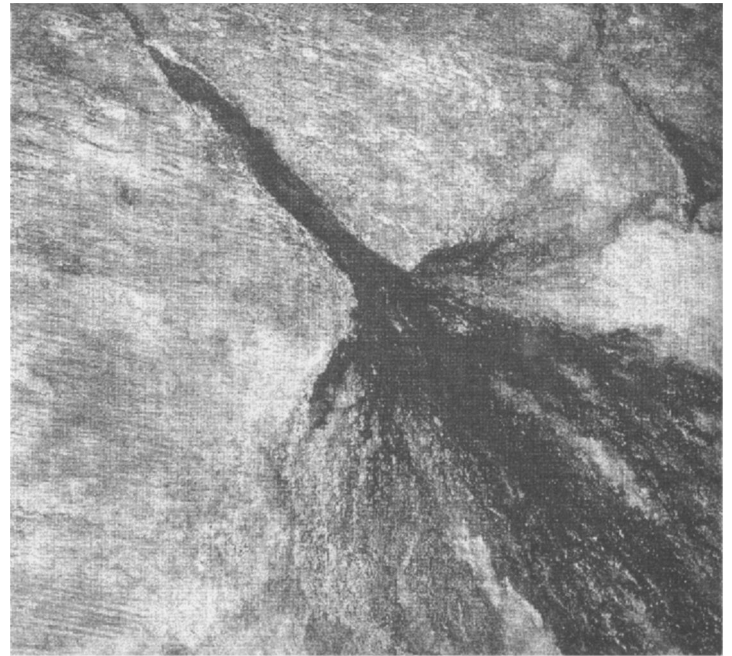


Coordination: African Delta Spa
Lindy Roy









Okavango Delta region, showing perennial (dark) and seasonal (light) swamp zones and migratory patterns of wild herds

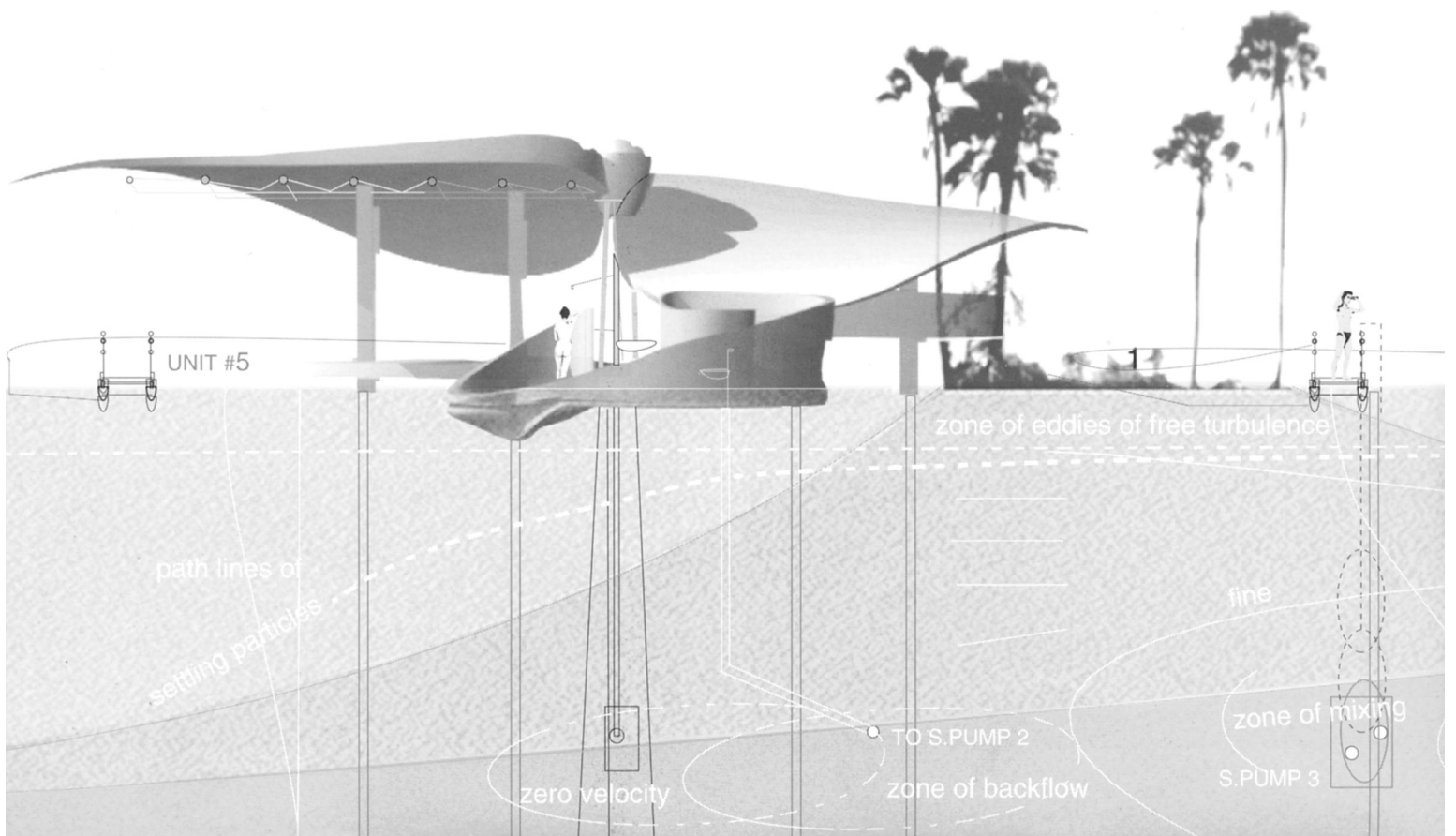
The Delta photographed from the space shuttle Columbia

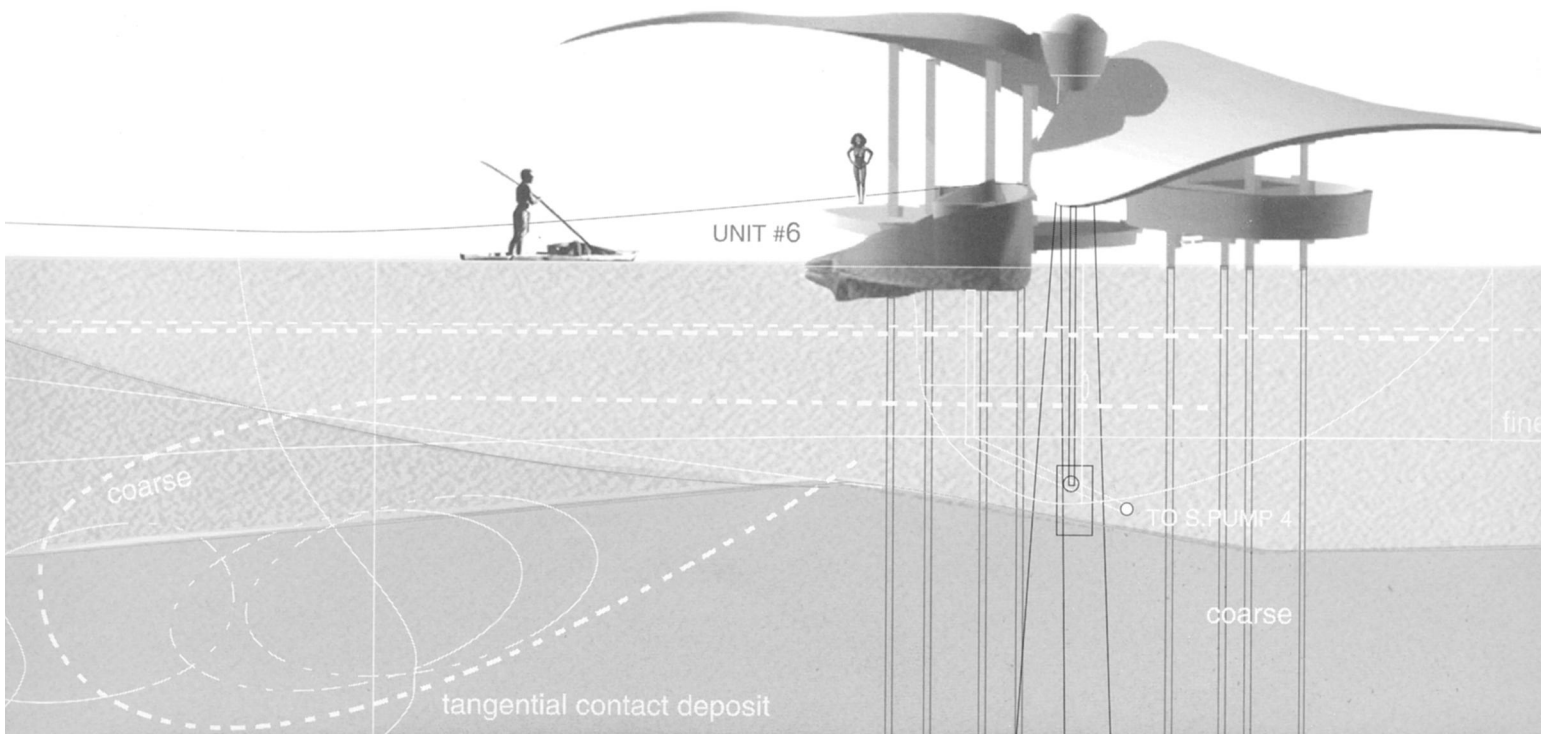
This holistic health spa in the Okavango Delta, Botswana, integrates two current trends in tourism: the industry is responding to an increasing demand for ecotourism destinations at the same time that a pervasive marketing of stress has triggered a “spa boom.” This project combines an African wildlife ecotourism experience with the spa program.

The site lies deep in the Okavango Delta. The Delta is a thin veneer of water covering some 15,000 square kilometers of an otherwise arid terrain, the Kalahari Desert of northern Botswana. The Okavango River begins as a spring-fed stream in the highlands of Angola. Interrupted by a series of geologic faults — the southernmost extension of the Great Rift Valley system — the river divides into a labyrinth of waterways. Forming a fan of papyrus-lined channels, pristine lagoons, and small islands, it is one of the most robust wetlands on earth. Tracks of migratory animals crisscross the waterscape linking seasonal grazing grounds and sources of water.

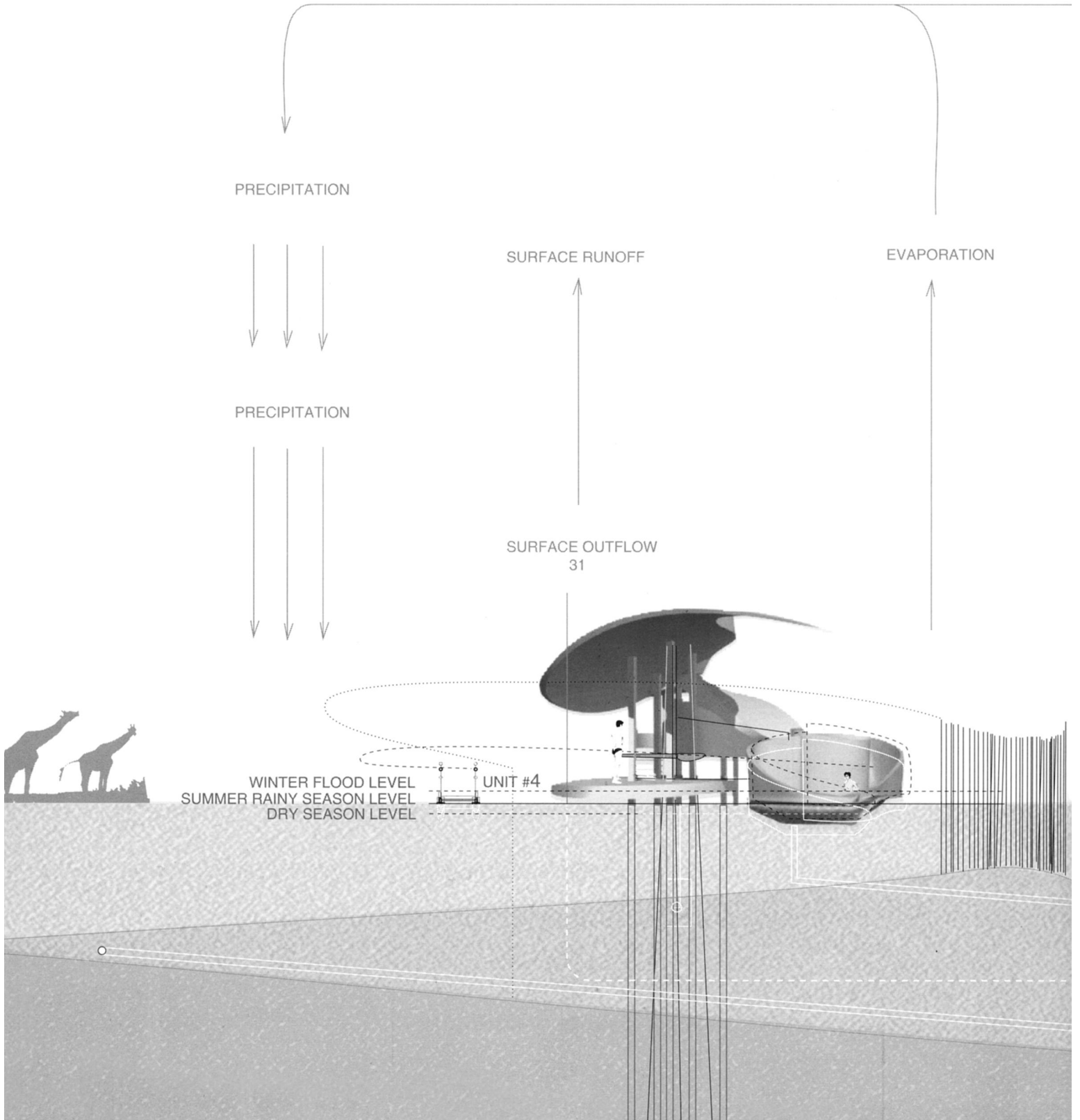


No tracks for vehicles penetrate this deep into the Delta swamps. The only way in is by small airplane or helicopter. Mokoros — dugout canoes carved from ebony trees — operate as local water taxis, ferrying people and goods across open lagoons and through reed and papyrus corridors.

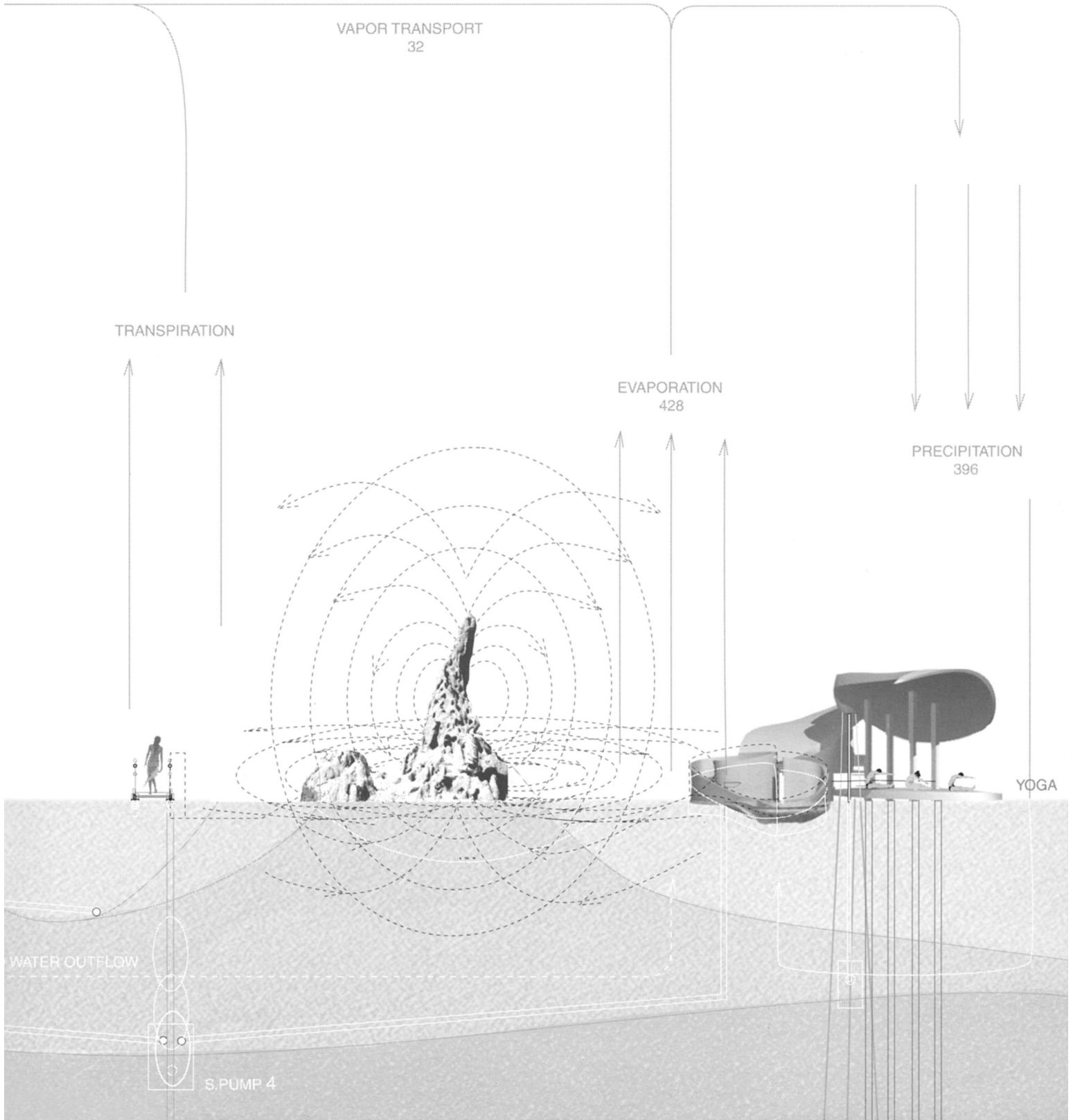


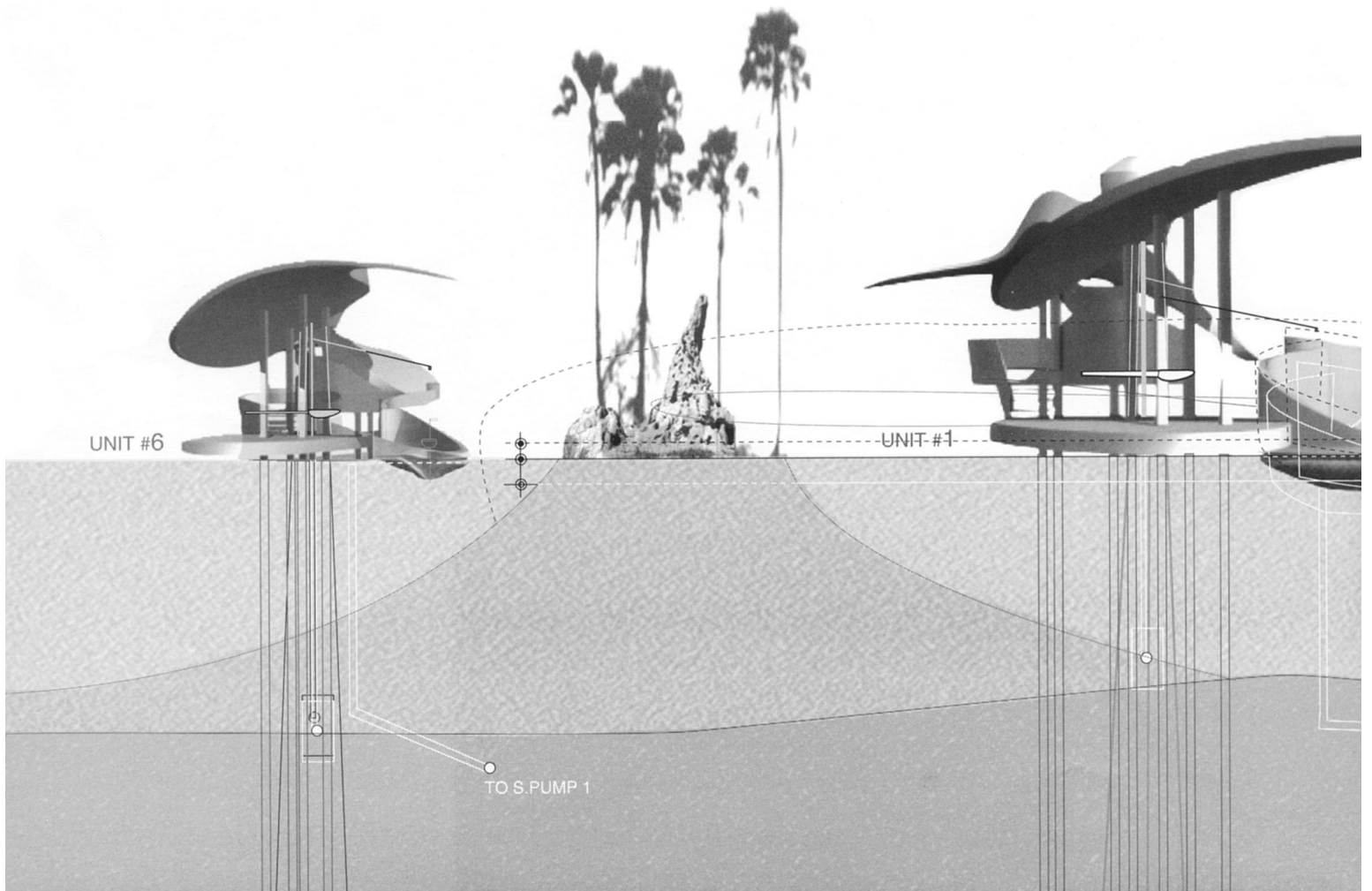


Under the Kalahari sun ninety-five percent of the Delta water evaporates annually. While the outer edges of the system fluctuate with seasonal rains, the inner zone, where the spa is located, is a perennial swamp. Floodwaters rushing southward from Angola replenish the region in winter. As the floods recede in the sum-

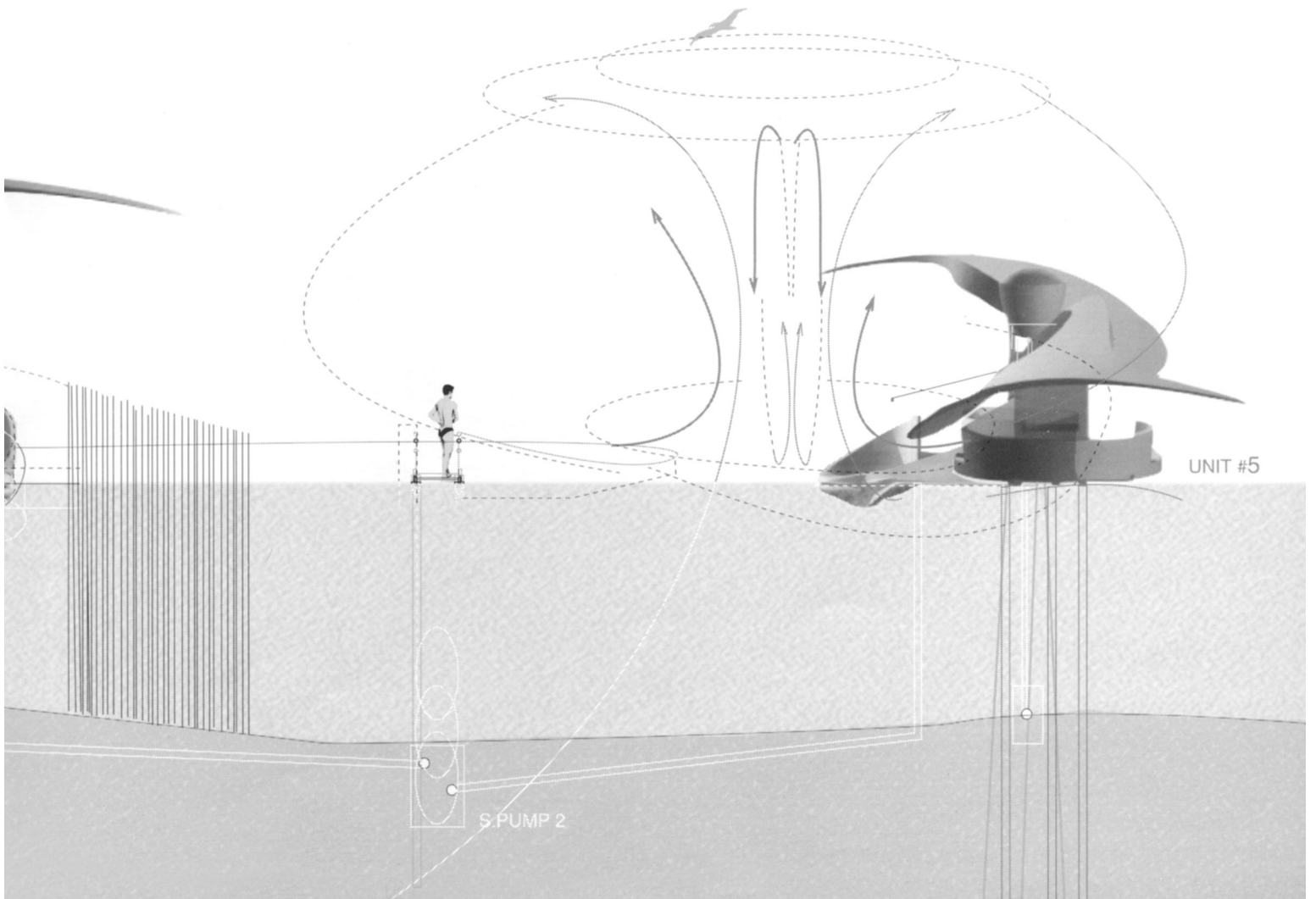


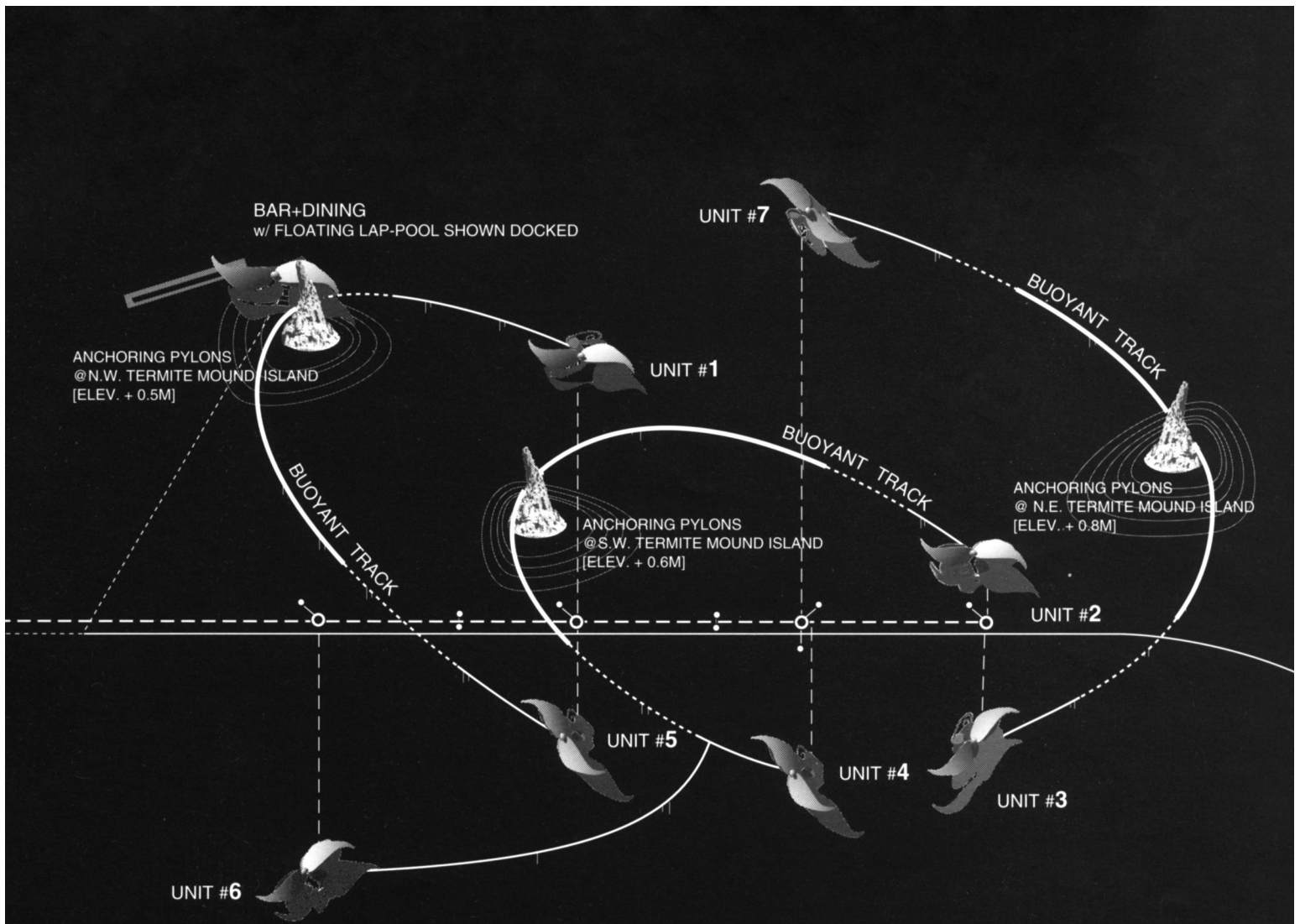
mer, fresh grazing land is exposed. Vast migratory herds, including elephant, zebra, and wildebeest, traverse the terrain, following the constantly shifting pastures.



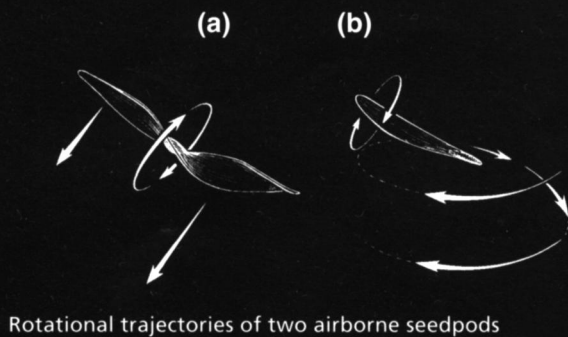


Islands with palm trees are scattered around the Delta. Most of these islands have formed slowly around old, abandoned termite mounds.

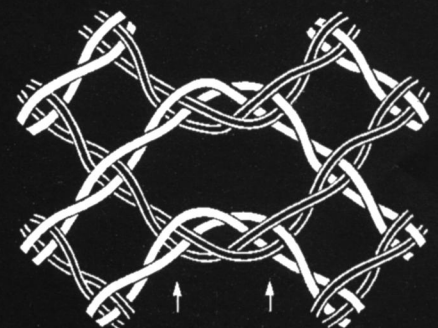




Seven thatch-roofed guest units are placed in natural clearings in the papyrus beds, optimizing views and breezes while maintaining privacy. Kitchen and other service facilities are shaded by trees along the edge of the main island. Buoyant wood and fiberglass tracks weave through the papyrus, connecting pairs of units to three termite mound islands. A floating fiberglass spa is tethered to each unit. Water is filtered and pumped into a solar collector drum located on an aluminum tripod at roof level. Two pivoting arms feed heated water to the tub or shower and large sink. A grid of waste pipes (linked to septic tanks and pumps) is submerged and runs along the Delta floor connecting to each unit. Waste water is pumped to a leech field on the main island.

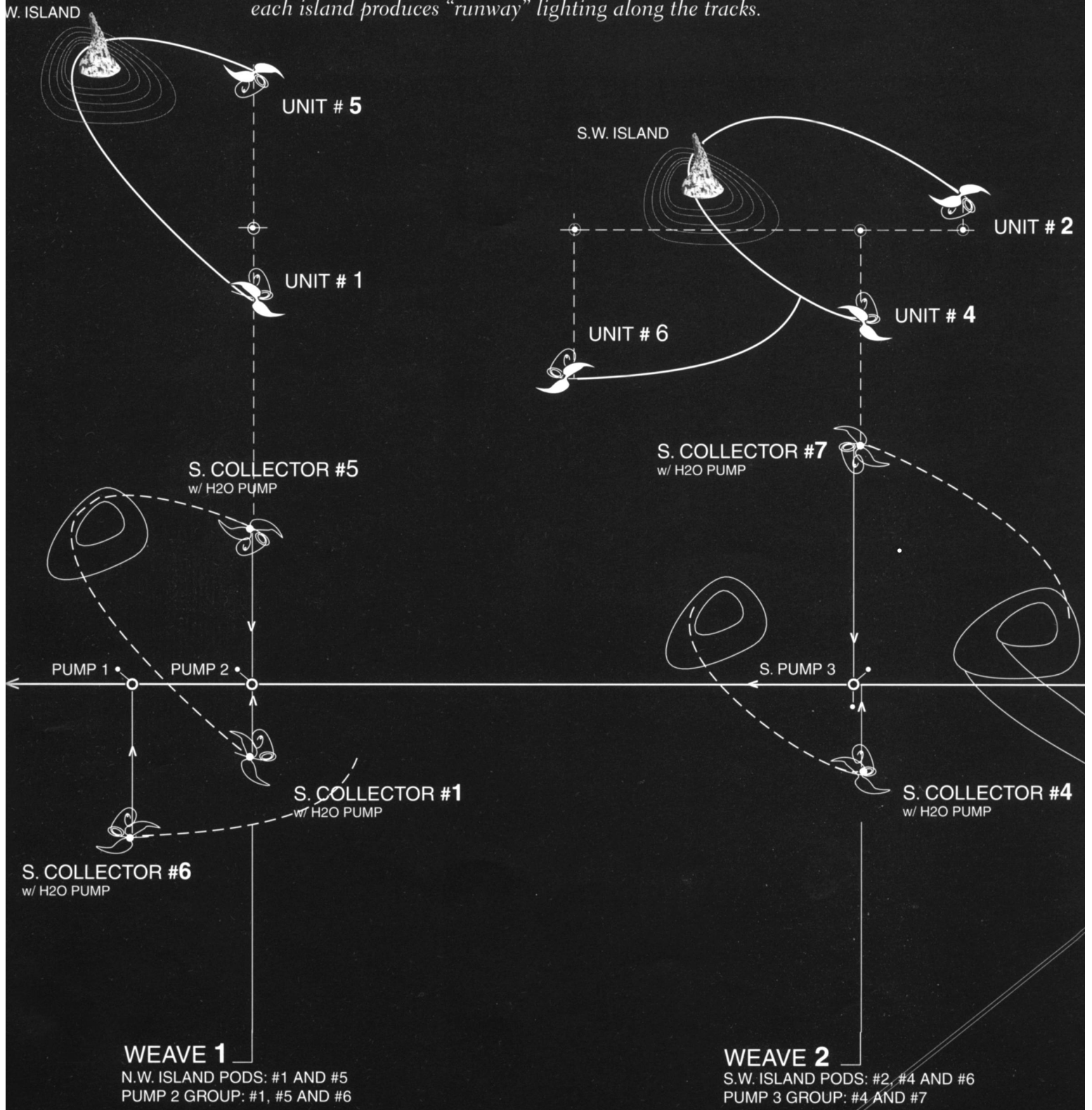


Rotational trajectories of two airborne seedpods

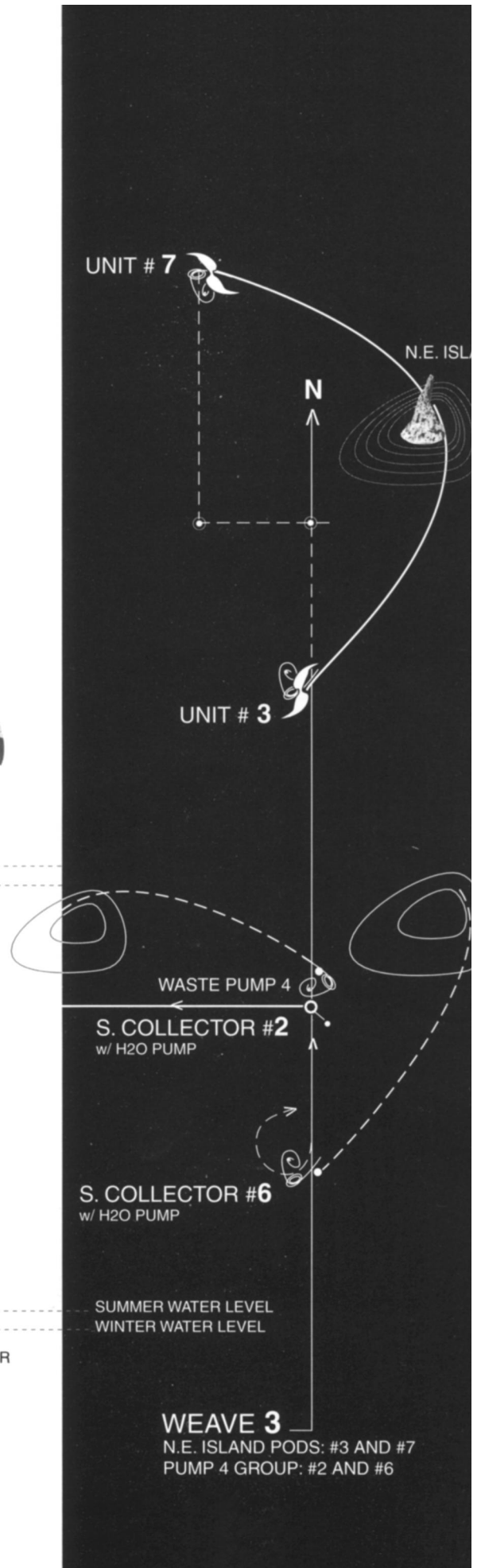
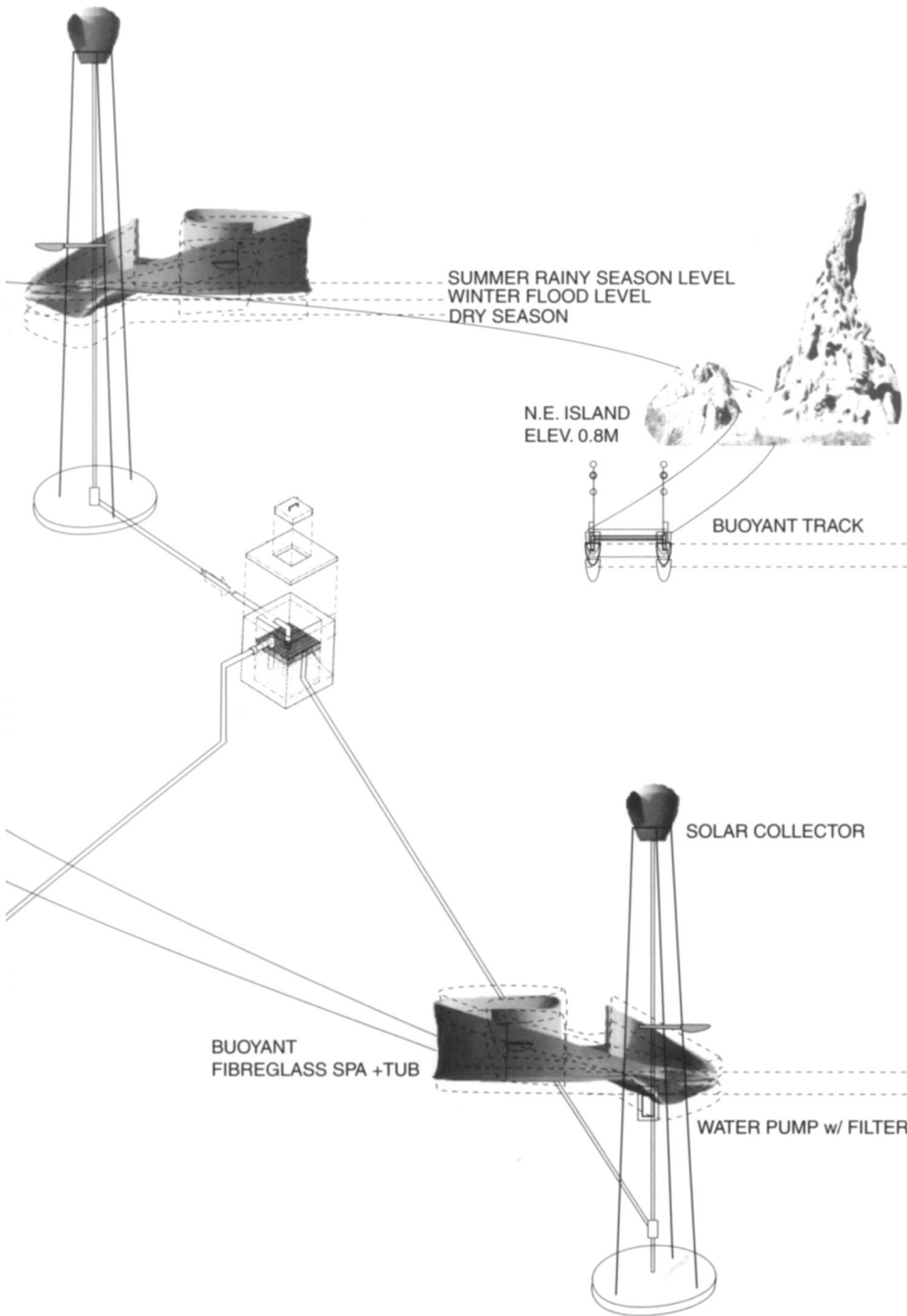


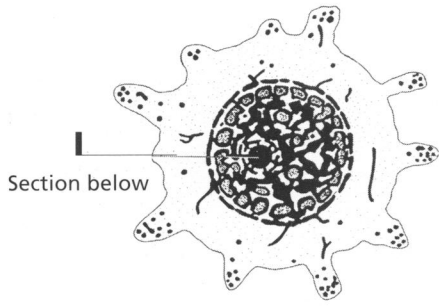
An intertwined sprang weave pattern with an active warp

Above water, anchoring pylons secure the buoyant tracks at each termite mound island. The tracks flex and relax with the changing water levels. Fiber-optic cables, woven using local basket-weaving techniques, are integrated into the guardrail. A solar-powered light source at each island produces "runway" lighting along the tracks.



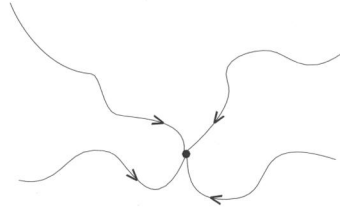
Below water, the grid of waste pipes, tanks, and pumps processes and separates waste in accordance with environmental regulations.



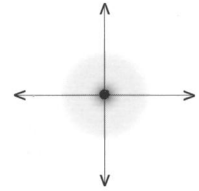


Plan of typical termite mound

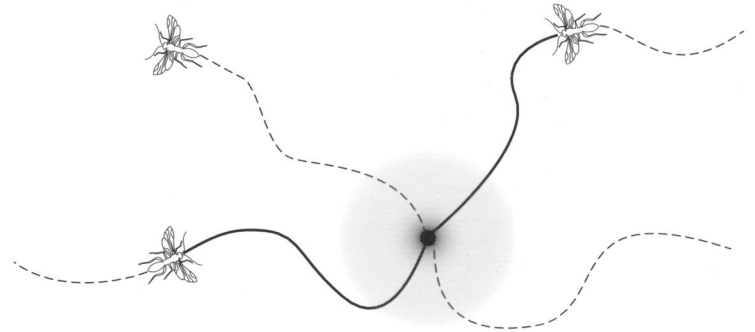
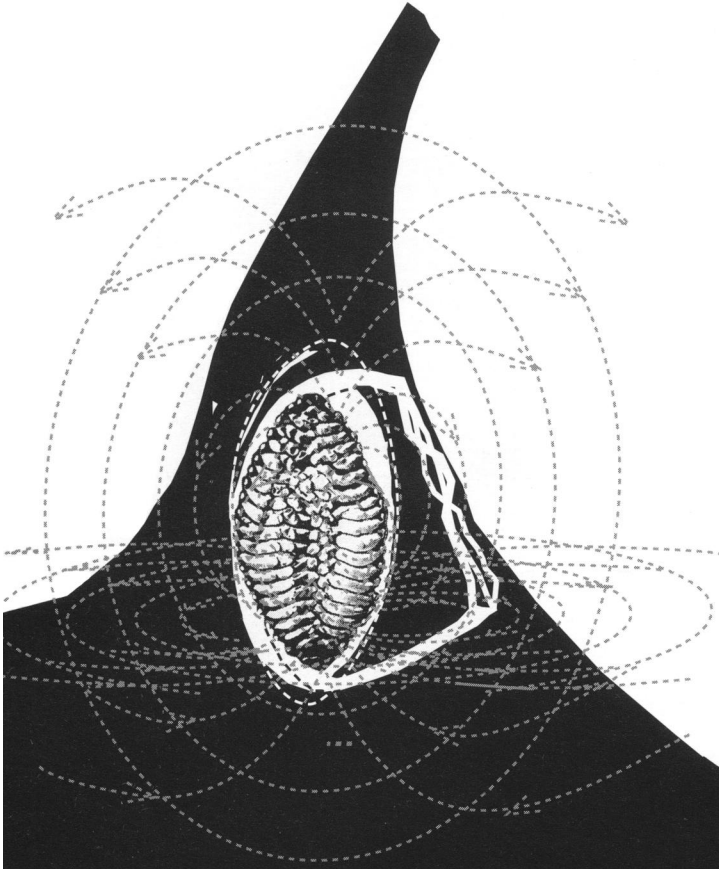
Termite mounds, around which the islands are formed are, in fact, highly efficient air-conditioning systems. Fungus is farmed by termites in the lower chambers of the nest. Air temperature in these chambers must be maintained some thirty to forty degrees cooler than the average daytime temperature. The nest is separated from the outer walls of the mound, connected only by bundles of vertical tubes that create a porous surface. During the day, when the outer walls heat up, warm air diffuses outward through this porous surface, and cooler air is



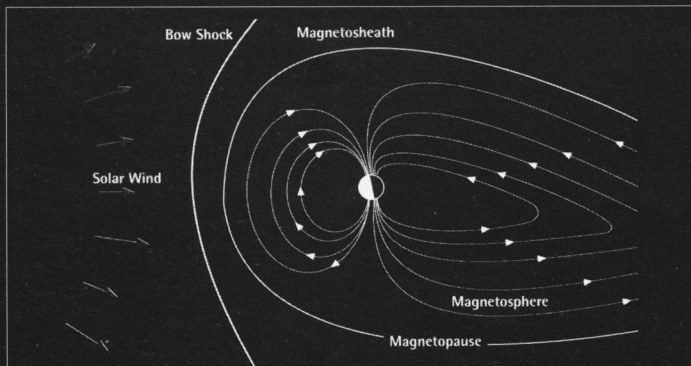
1a. MACRO-SCALE
Termite flight paths



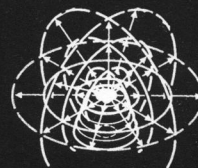
1b. MICRO-SCALE
A diffusion gradient permeates the site where pheromone-impregnated earth is randomly deposited by airborne termites.



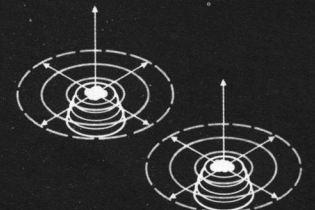
1c. MESO-SCALE
Macro/micro couplings of termite flight paths and the diffusion gradient develop. Flight paths and deposits are coordinated by this pulsing pheromone field.



Electric currents are generated by molten iron flowing in the earth's outer core. The earth's magnetic field (extending up to 60,000 kilometers into space) is formed by these currents. Termites are highly sensitive to magnetic forces and collectively use this field for orientation during mound and nest construction.



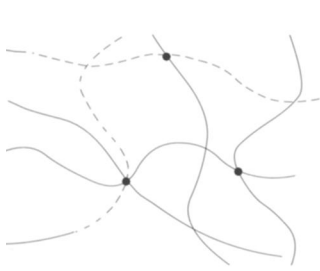
Development of a single pillar. The uppermost surface of the pillar where pheromone-impregnated earth is continually deposited is the active source of pheromone diffusion.



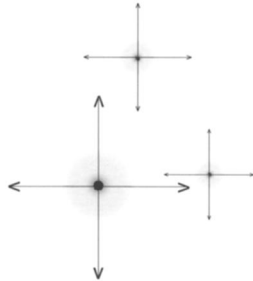
Development of a pair of pillars. The site only stays active while pheromone levels are high enough. If the gradient is completely diffused the site loses its ability to

sucked up from the lower chambers. At night, when the inner chambers are warmer than the cold outer walls, the direction of air flow changes accordingly. A consistent interior temperature is maintained.

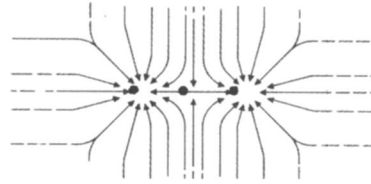
How do hundreds of thousands of termites coordinate their actions to produce coherent, effective form? All forms of cooperative, interactive behavior from foraging to nest building are triggered by pheromones, hormonelike chemicals regulated by airborne gradients. A swarm takes and produces form by integrating a myriad of individual performances. It is a network of distributed decision making: a real-time generator, processor, and integrator of stimulus-response patterns. The termite technology sequence of nest building is described below.



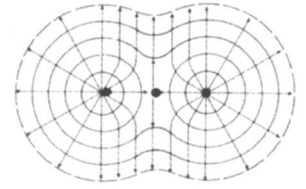
2a. MACRO
Interwoven flight paths



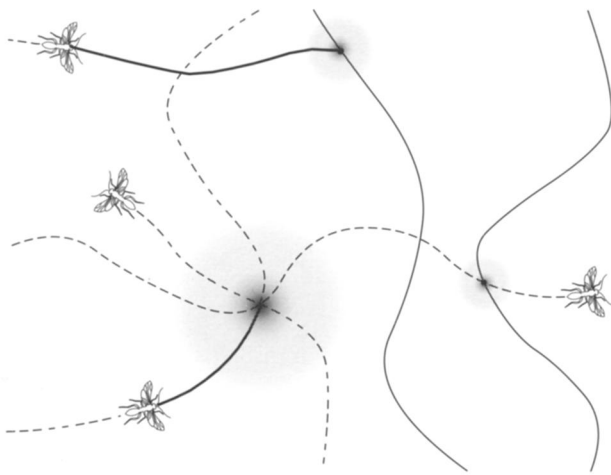
2b. MICRO
Competing diffusion fields develop in areas where random deposit sites are in close proximity.



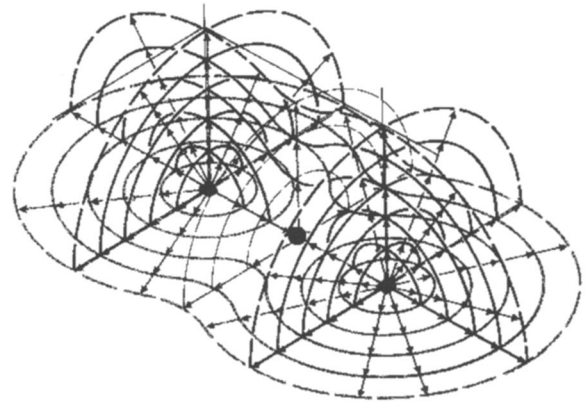
3a. MACRO
Flight paths and earth deposits are now guided by more complex patterns resulting from interacting diffusion fields.



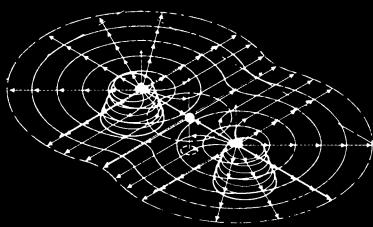
3b. MICRO
Two interacting fields establish a virtual saddle point midway between competing deposit sites. Pheromone intensity is strongest in this overlap zone.



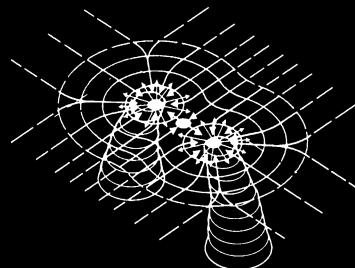
2c. MESO
Preferred deposit sites arise in areas of highest pheromone concentration. Intensifying pheromone levels trigger still more deposits.



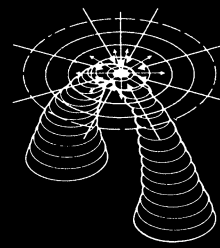
3c. MESO
A temporal scaffold emerges. Always changing diffusion patterns guide the construction process. Specific site characteristics — such as wind — are integrated into, and shape, the transitory scaffold.



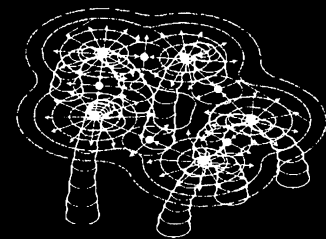
Establishment of a virtual saddle point



Generation of curvature. Attracted to the virtual saddle point of highest pheromone intensity, termites make deposits closer to this point and away from the centers of individual pillars.

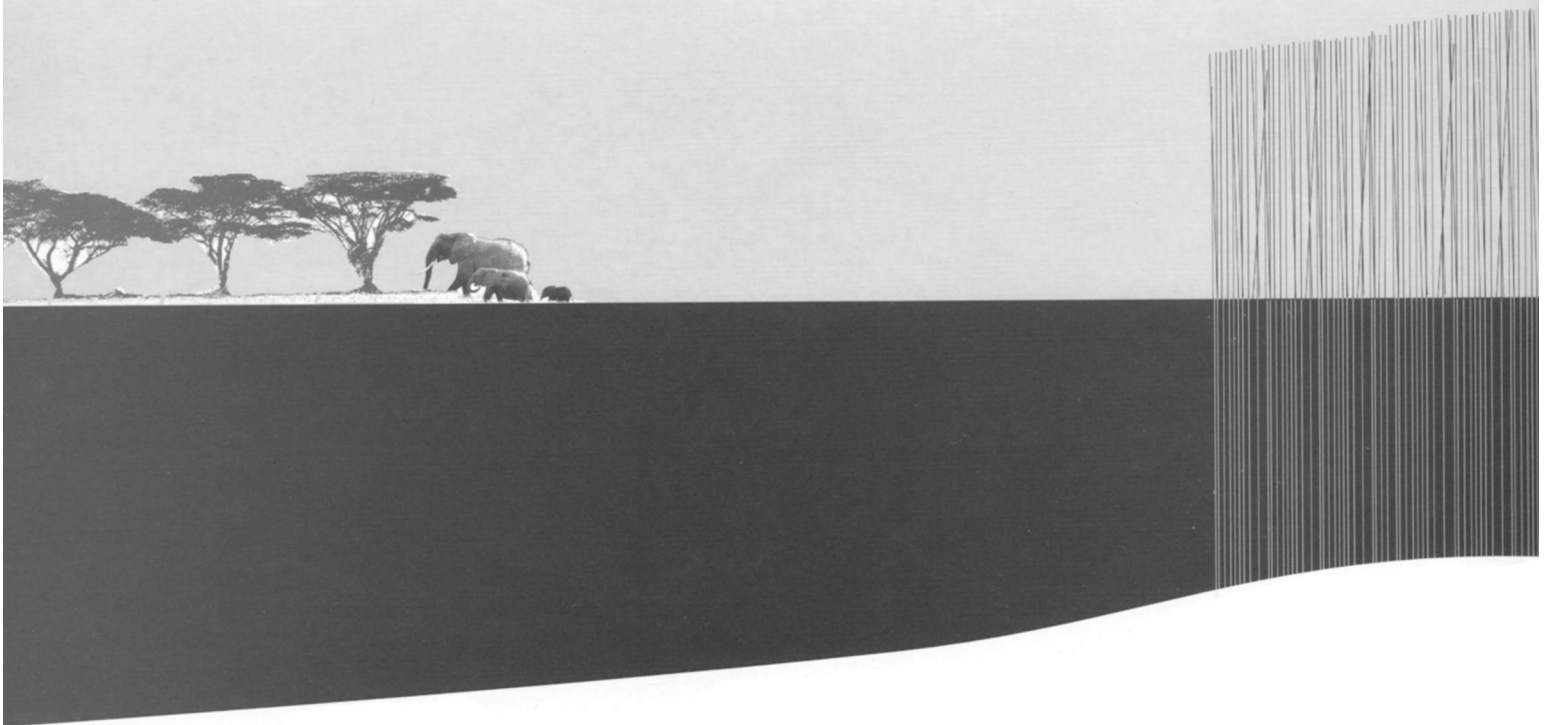


Completion of an arch

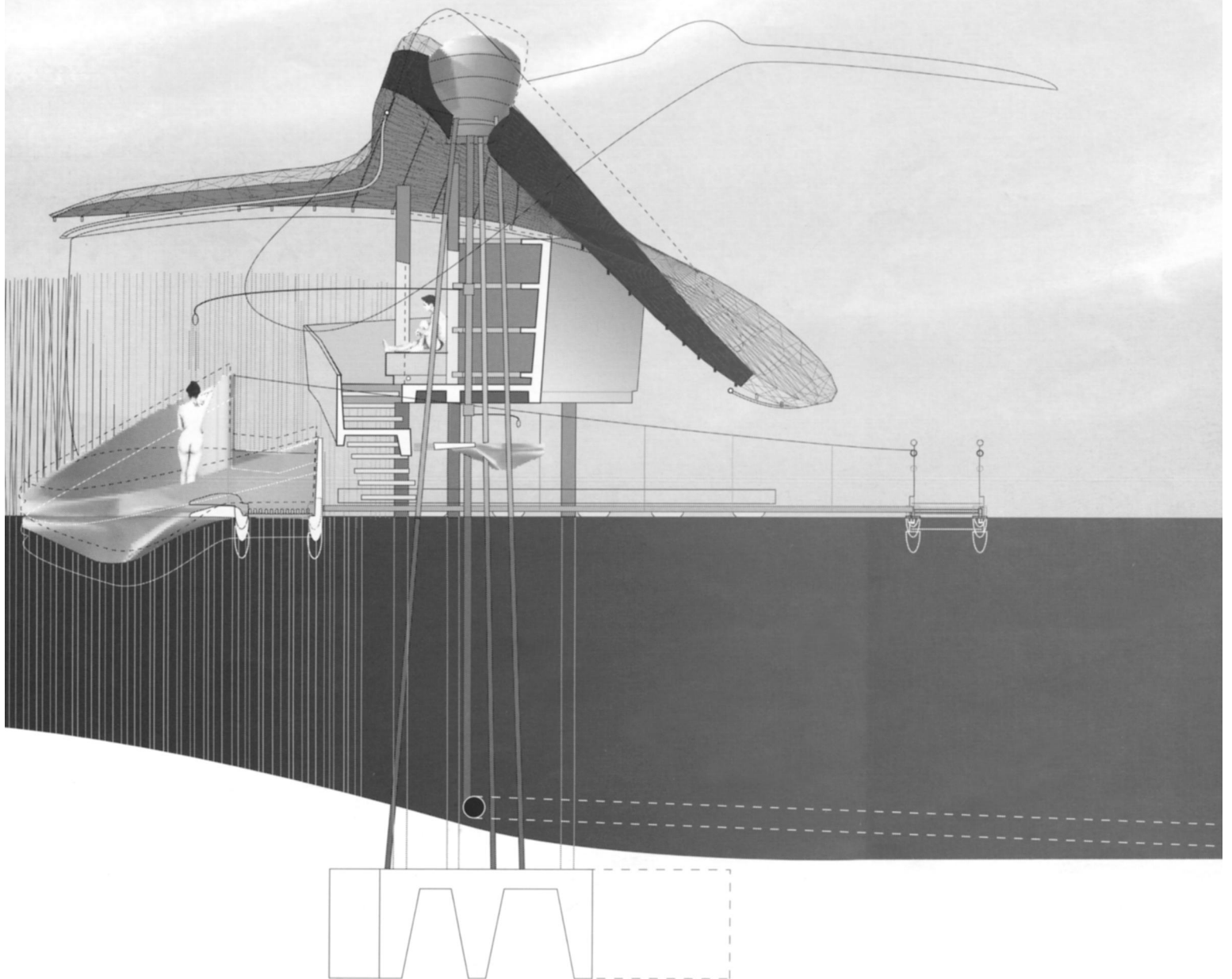


Process continues with the establishment of new saddle points between the arches.

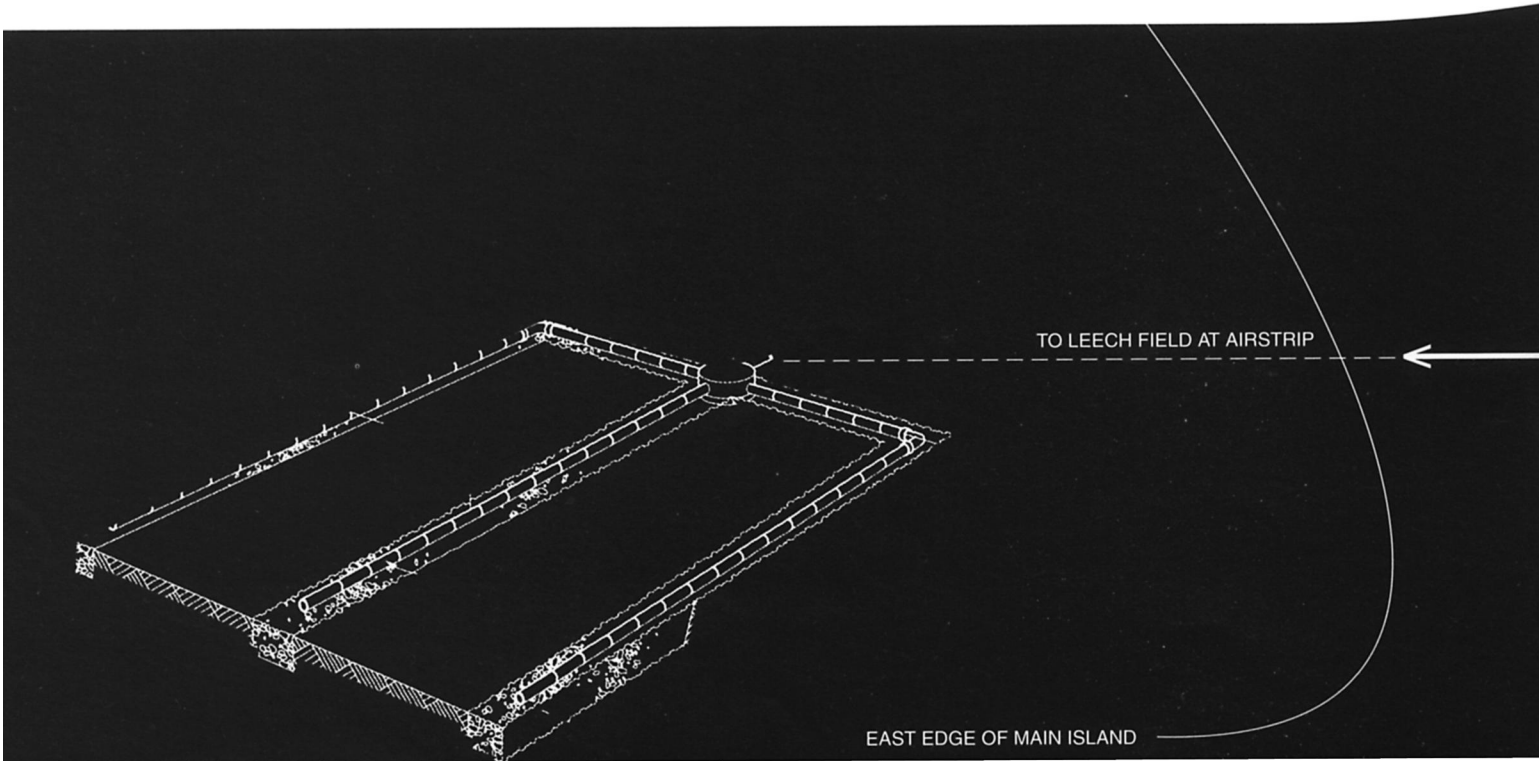
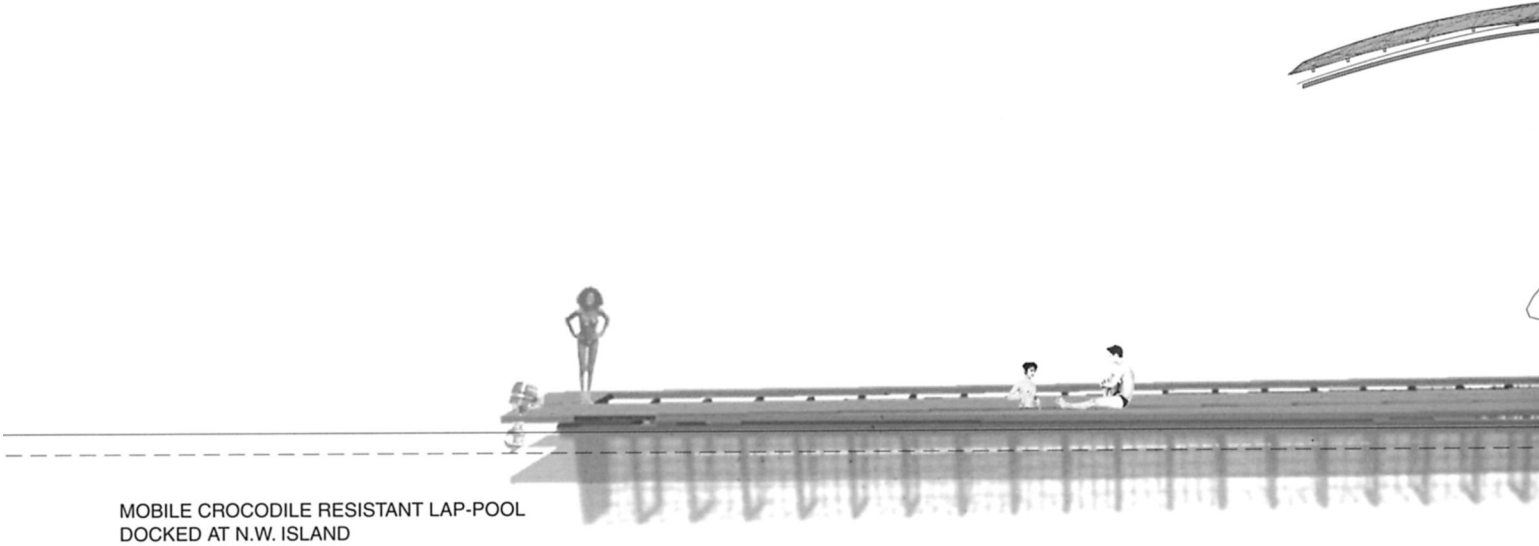
Daytime temperatures during peak tourist season often exceed ninety degrees. Thatch roofs are oriented to maximize shade and take advantage of shifting winds. The buoyant fiberglass spa moves with the fluctuating water level and is shaded by the roof. High-tech tent fabric can be drawn in a light-weight aluminum



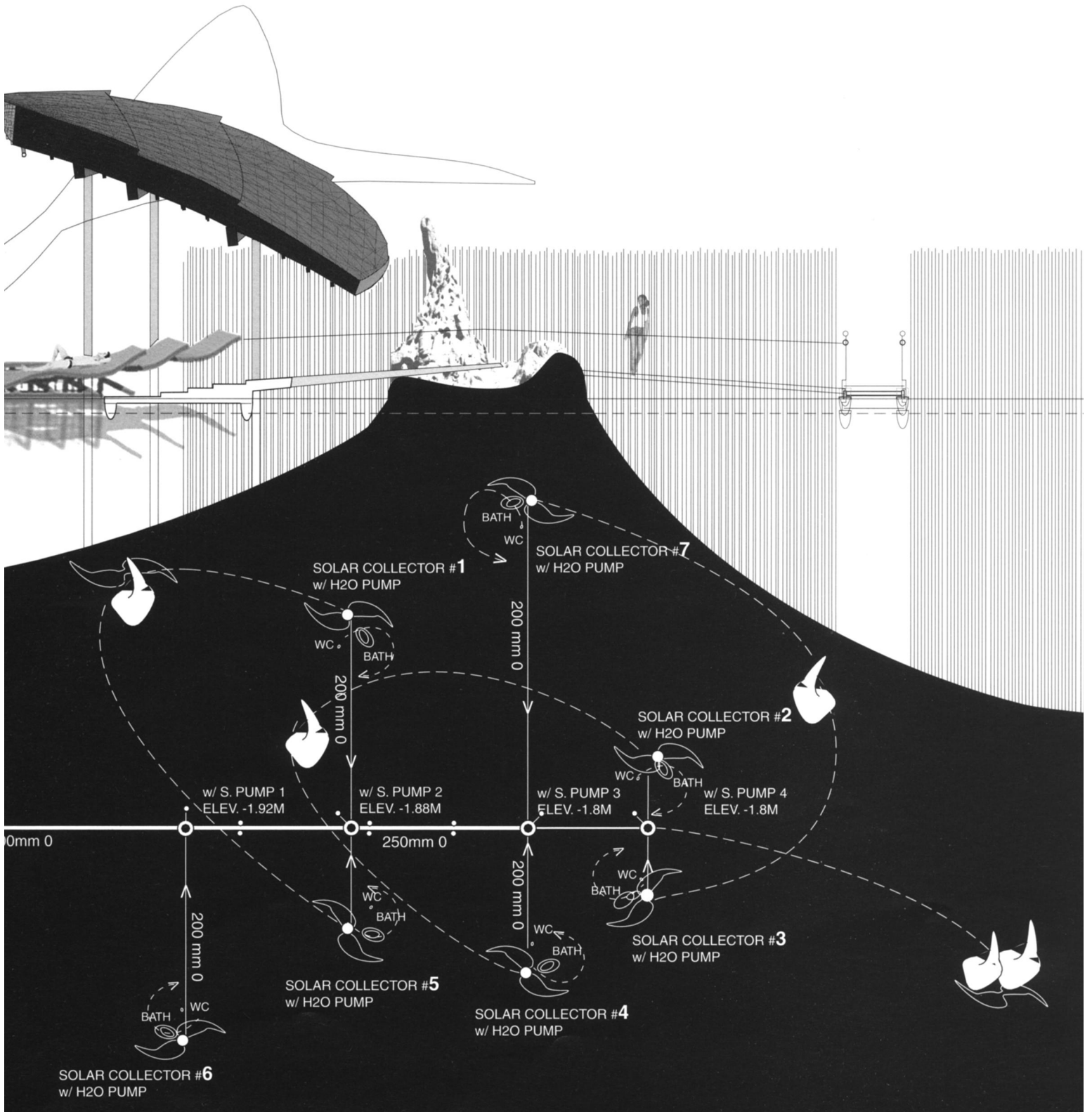
frame along the edge of the roof overhang, following the thatch profile. The degree of enclosure and shade is adjustable. Extended overhang allows for areas of water to be incorporated into the enclosed space.

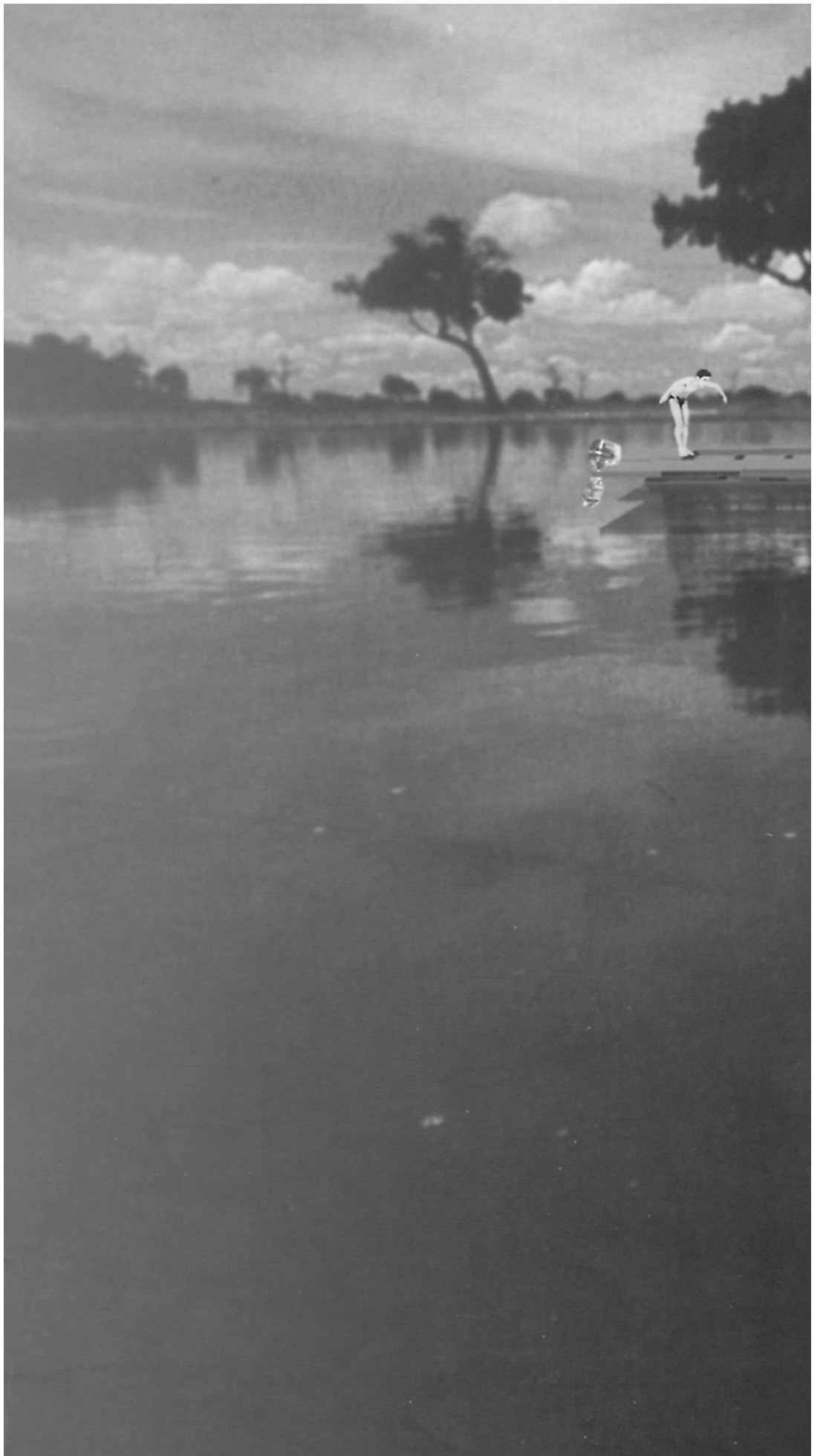


The spa comprises a series of fixed (bar/dining and guest units), tethered (buoyant fiberglass spas and tracks), and free elements. Four mobile meditation pavilions and a crocodile-resistant lap pool are powered by low-speed outboard motors and can be maneuvered through the reed beds or docked in the shade of the



bar/dining roof overhang. The lap pool, a steel frame lined with steel mesh, allows guests to swim in filtered Delta water. There is also a bentwood deck for sunbathing.





Lindy Roy is an architect in
New York City.

Project Team

John Mueller, Ana Miljacki,
Aline Cautis, Mary Springer,
and Heidi McDowell

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Bousfield

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