

Analysis & Planning: The Beijing Olympic Forest Park

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ABSTRACT

The Beijing Olympic Forest Park lies at the north end of the 2008 Olympic Plan, "Axis to Nature," and terminates the Olympic axis with a model ecosystem and scenic vistas. The park is a combination of urban green lung, ecological buffer, traditional Chinese park, Olympic park, native forest, and urban retreat. Chinese traditional park concepts, modern landscape architecture, and ecological techniques are merged into one project for the 29th Olympic Games and the citizens of Beijing.

Key Words: Landscape Architecture, Olympic Forest Park, Green; Technology, Humanism, Chinese Classical Garden

As the largest green public space ever to be built in Beijing, we see the creation of the Olympic Forest Park as an opportunity to introduce a new urban-ecological balance to Beijing, which is quickly exhausting its capacity to support a healthy environment. This project uses traditional Chinese landscape arts with contemporary design concepts, and forms a long term sustainable integrated system based on modern knowledge and technology.

I. Criteria

As a key component of the Beijing Olympic Green, the concepts behind the plan of the Forest Park follow those established by the Olympic Committee: Green Olympics, Hi-Tech Olympics and People's Olympics. The planning process is therefore guided by an ecological concept named Axis to Nature that takes into consideration the project's severe urban context - rapid urbanization, increasing popula-

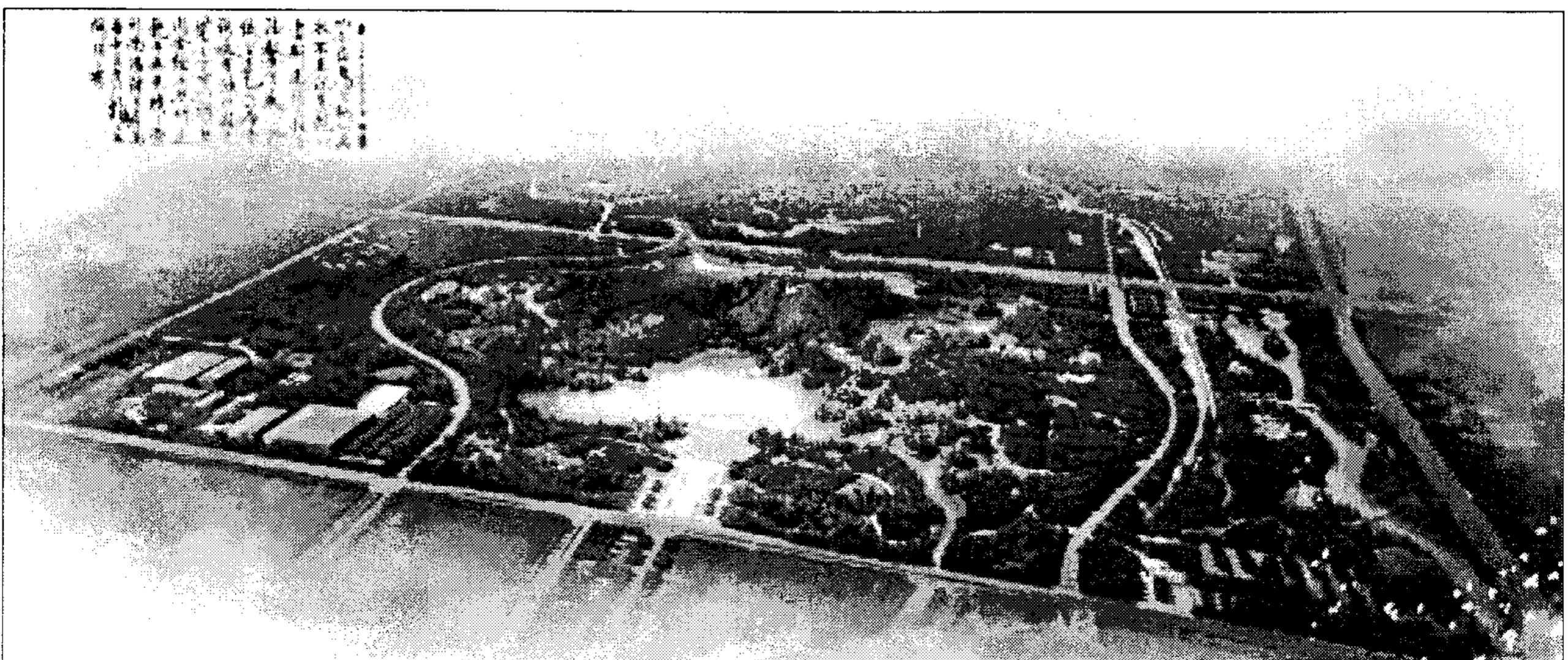


Figure 1. Rendered View of the Beijing Olympic Forest Park

tion density, large-scale construction and development, an upsurge in traffic volumes, aging urban infrastructure, water shortage and diminishing open green space - attempting to resolve issues on site through the use of modern technological developments. This establishment of a new green infrastructure in the city will also make way for a public recreation and leisure environment to benefit all residents and visitors of Beijing.

II. Guidelines & Objectives

- To construct the 'Beijing Green Lung' where visitors can easily escape to nature, and where improved environmental conditions are protected from the harsh urban scene. Careful planning is required to consider the programmatic change from a controlled Olympic venue in 2008, to an open public park following the Games.
- To balance Urban Ecology with an ecological buffer within the city, encouraging the internalization of Beijing, and compensating for the incredible strain upon the inner city's resources and open spaces resulting from mass development, and an upsurge in population over the last decades.
- To recognize Urban Historical Context and the site's significance as the Northern-most point on the imperial Central Axis of Beijing, around which the city developed. As a national landmark project, the Olympic Forest Park must respect the balance and integrity of the axis and the other monuments situation along it.
- To create a Long-Term Sustainable Eco-System that through research and analysis, can develop a model where tradition meets contemporary ideas and technologies to simulate a natural ecosystem, maintaining regional biodiversity, conserving energy, reclaiming water, and relying as little as possible on municipal services, facilities and resources.
- To consider Cultural Design Heritage and to refer to Chinese landscape art whose principles express the harmony between man and nature. Though the Olympic Forest Park may be an exceptionally large-scale landscape, the project should adhere to the traditional syntax and aesthetics of FengShui, ShanShui and Chinese garden design.

III. Site & Plan Synopsis

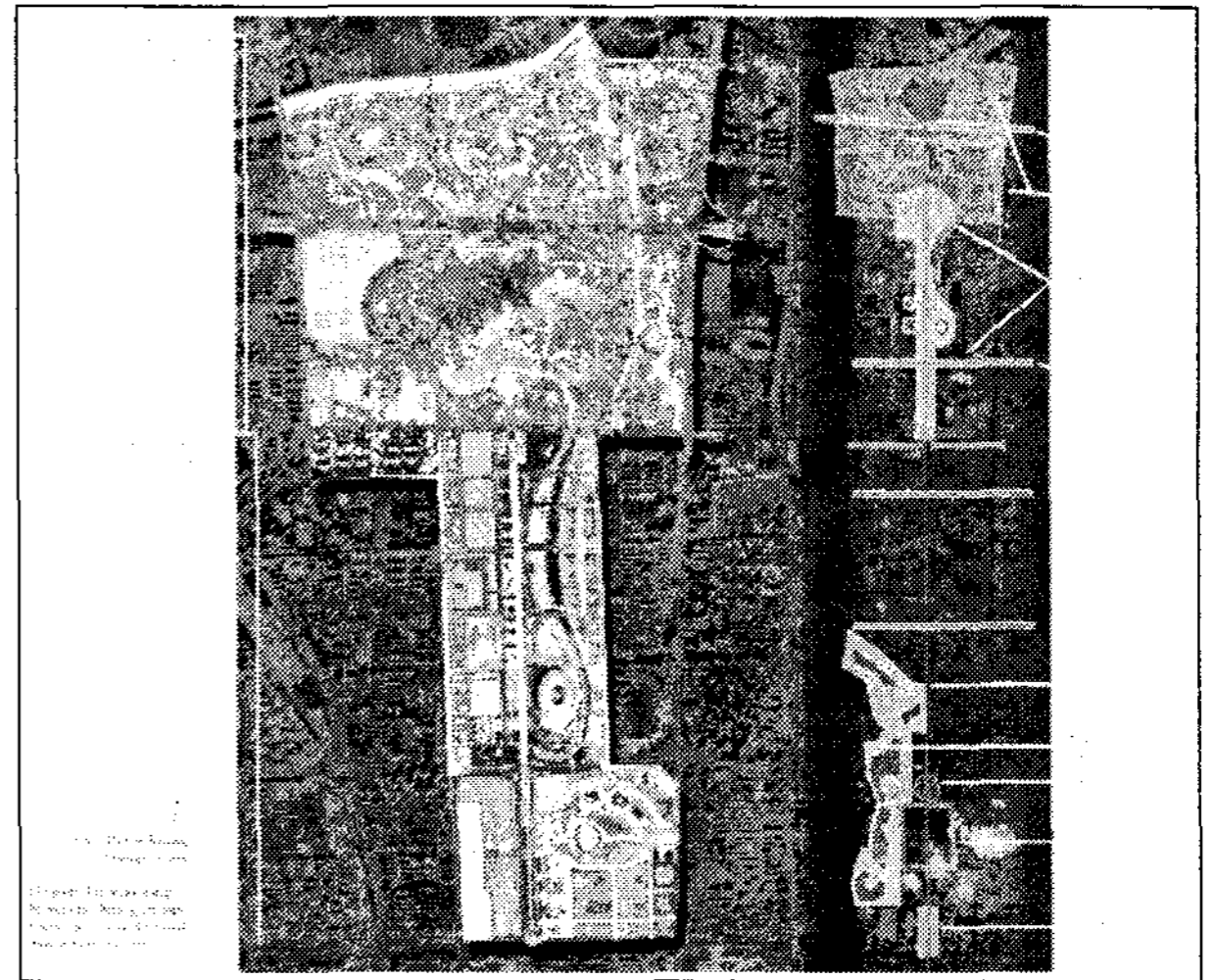


Figure 2. Axis to Nature

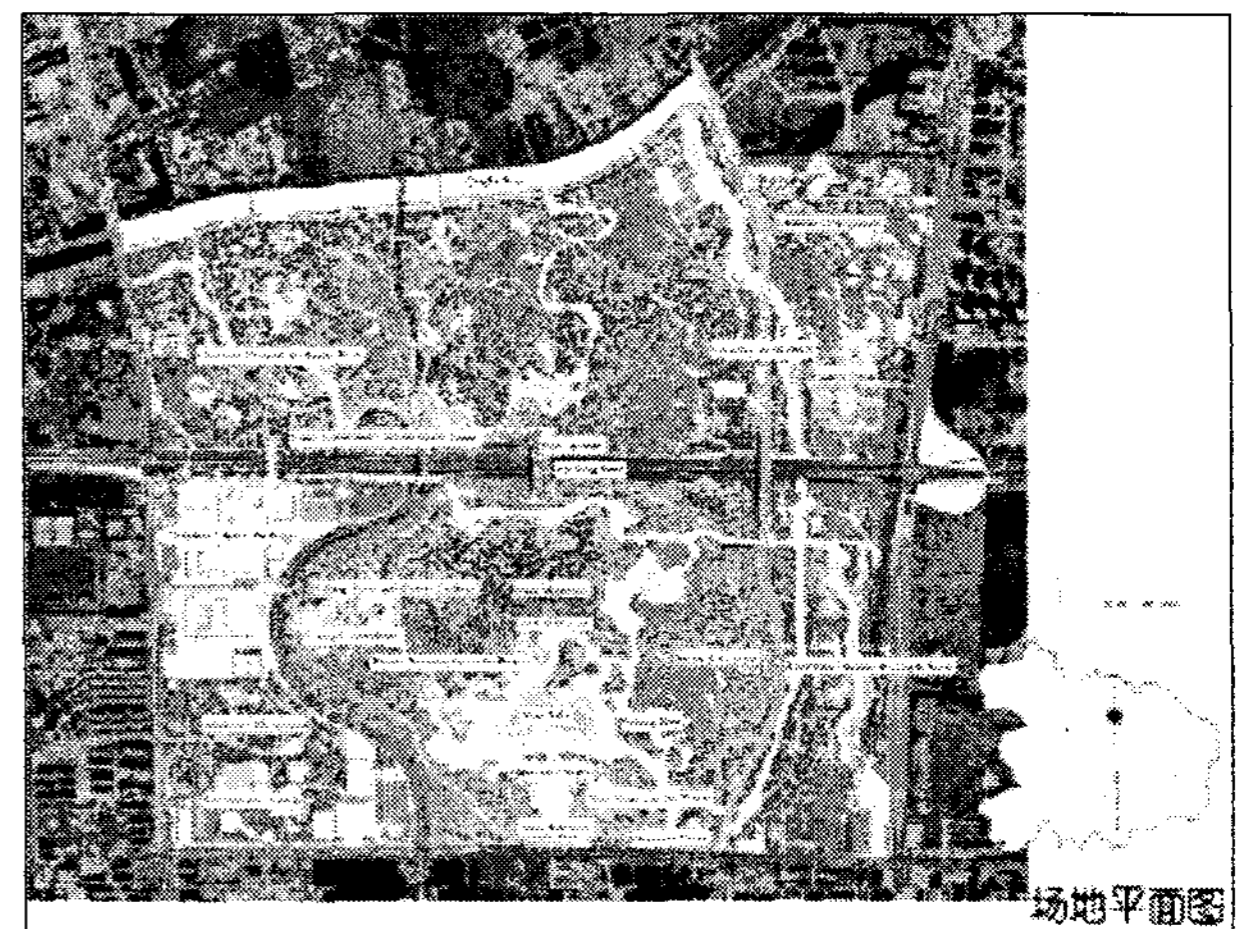


Figure 3. Site Plan

The site of the Olympic Forest Park is 6.8sq.km. and is located in the North of urban Beijing at the northern end of the historical South-North Central Axis. The site borders on the Qinghe River to the North, the Yanshan Canal to the East, wetlands to the West, and Olympic venues to its South, and is surrounded by residential areas to its East and West. The site is divided in two by the Fifth Ring Road - a super-highway that cuts it from East to West. In the southern area of the site are two existing parks - Wali and Jade - with two lakes.

The landscape of the Olympic Forest Park has been planned to make a transition from the urban environment northward to nature. The northern park is planned as a natural reserve to protect and recover part of the regional

ecosystem, retaining its natural landform and vegetation with minimal facilities and interventions, and will limit the number of simultaneous visits in order to maintain an environment favorable to plants and animals. The southern park is designed as an active and vital public space for the citizens and visitors of Beijing, using an ecological model for an artificial landscape and hosting Olympic venues, sports, leisure and entertainment facilities.

IV. From Analysis to Planning and Implementation

Throughout the research, analysis and planning phases, every field was considered in terms of ecological conservation and generation, available engineering and technological solutions, traditional Chinese landscape planning and design values, and aesthetic impact. Joining our team were experts invited for consultations, joint investigations and regular brainstorming workshops at every level of analysis and development. The Chaoyang government has established The Beijing Olympic Forest Park Construction and Management Committee, whose representatives were often also actively involved in the work process, and whose job it is to oversee all of the construction, management, maintenance, and monitoring of

the park during and following its two phases of implementation - before and after the Olympics.

V. Traditional Landforms

Located at the Northern-most point of the ancient imperial Central Axis of Beijing, the site's importance and cultural significance has a great influence on the FengShui of Beijing. Our study therefore began with an in-depth historical study and traditional analysis of the Central Axis, and masters of FengShui were invited to assist in guiding our preliminary landform design. Consultations revealed that a screen of mountains must be planned to mark the end of the axis in the North, and that according to the Chinese tradition of ShanShui(Mountain-Water), waters must flow just south of the heights. The laws of traditional Chinese landscape art emphasize the need for the artificial to appear natural and in which mountain piling and water forming are among the most crucial elements, and these laws were all examined and interpreted for the planning and design of the Park. An analysis of other important mountains and significant Shan-Shui sites in Beijing helped to establish the location, orientation, dimensions and design of our new landforms. In accordance with these laws, an artificial mountain has been

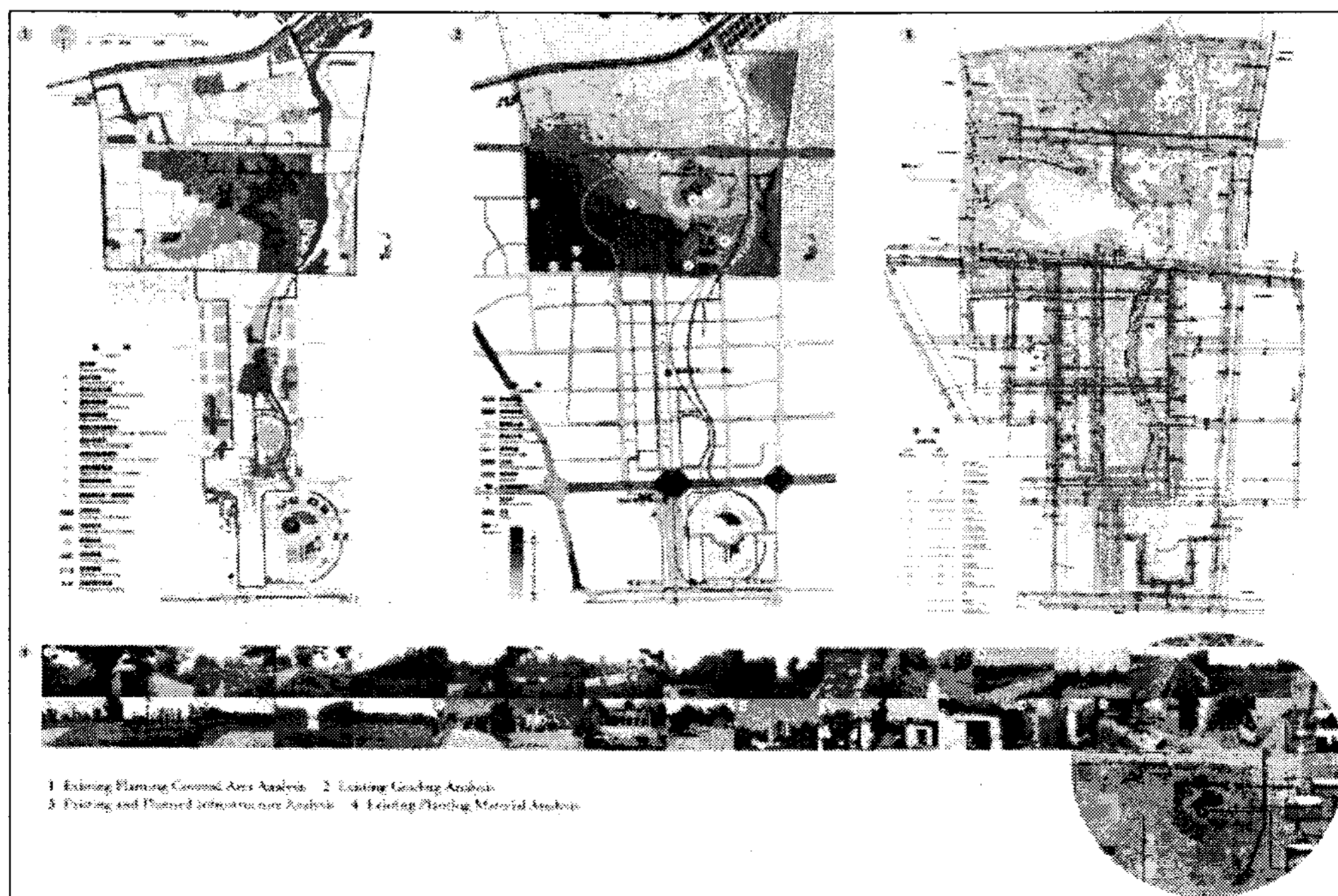


Figure 4. 1) Existing Planting Covered Area Analysis, 2) Existing Grading Analysis, 3) Existing and Planned Infrastructure Analysis

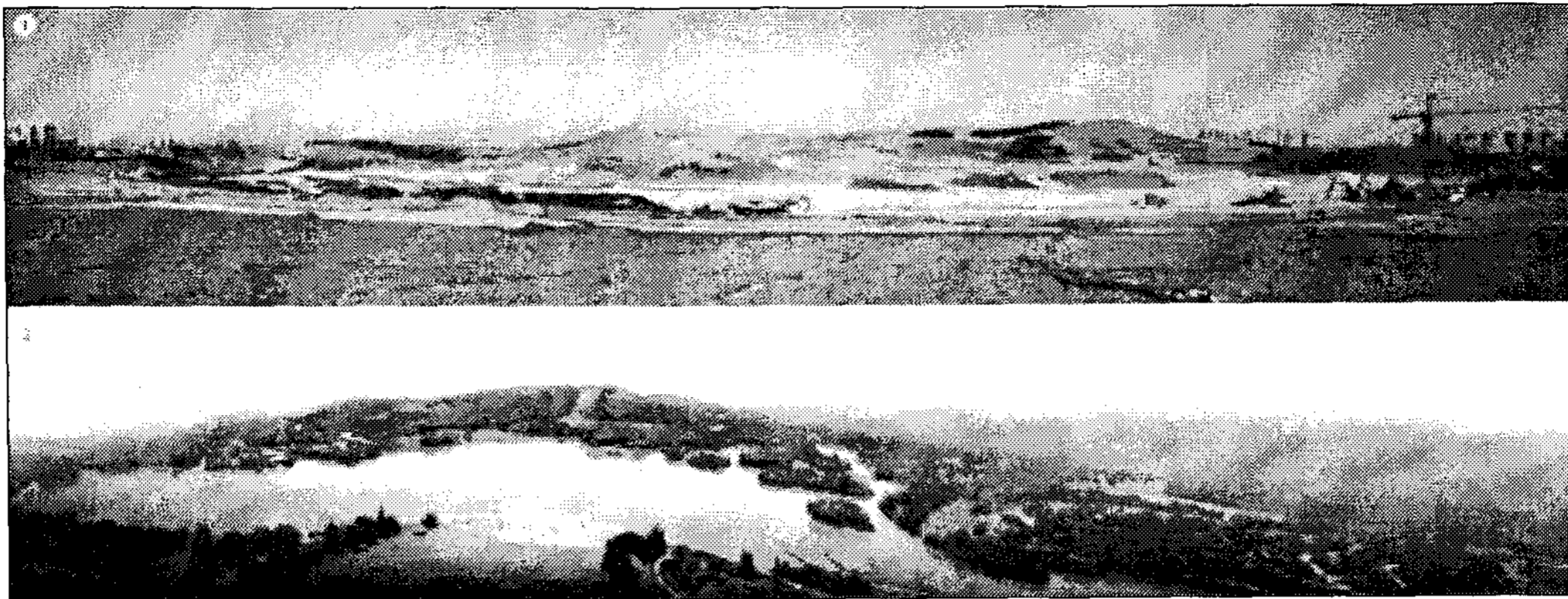


Figure 5. 1) Site photograph of Main Hill and Lake under construction, 2) Rendered view of Main Hill and Lake

planned, with its highest point on the Central Axis line, and just South of it, a dragon-shaped body of water and winding system flowing northward along the axis, has been designed.

Further study was then administered to analyse the effects that diverse terrains and landforms - hilltops, sloping banks, valleys, lakes and wetlands, ecological forests integrated with other landscape types - may have on the city in sheltering it from wind and sand, tempering humidity and temperature, increasing storm water detention and collecting precious rainwater.

VI. Water

The largest technical challenge of the Olympic Forest Park involves the construction of a self-sustaining and self-regulating water body, requiring solutions to problems associated with the dry climate and high evaporation rate, necessary to ease ecological pressures on the city and its scarce water resources. Therefore, studies were necessary to evaluate how to

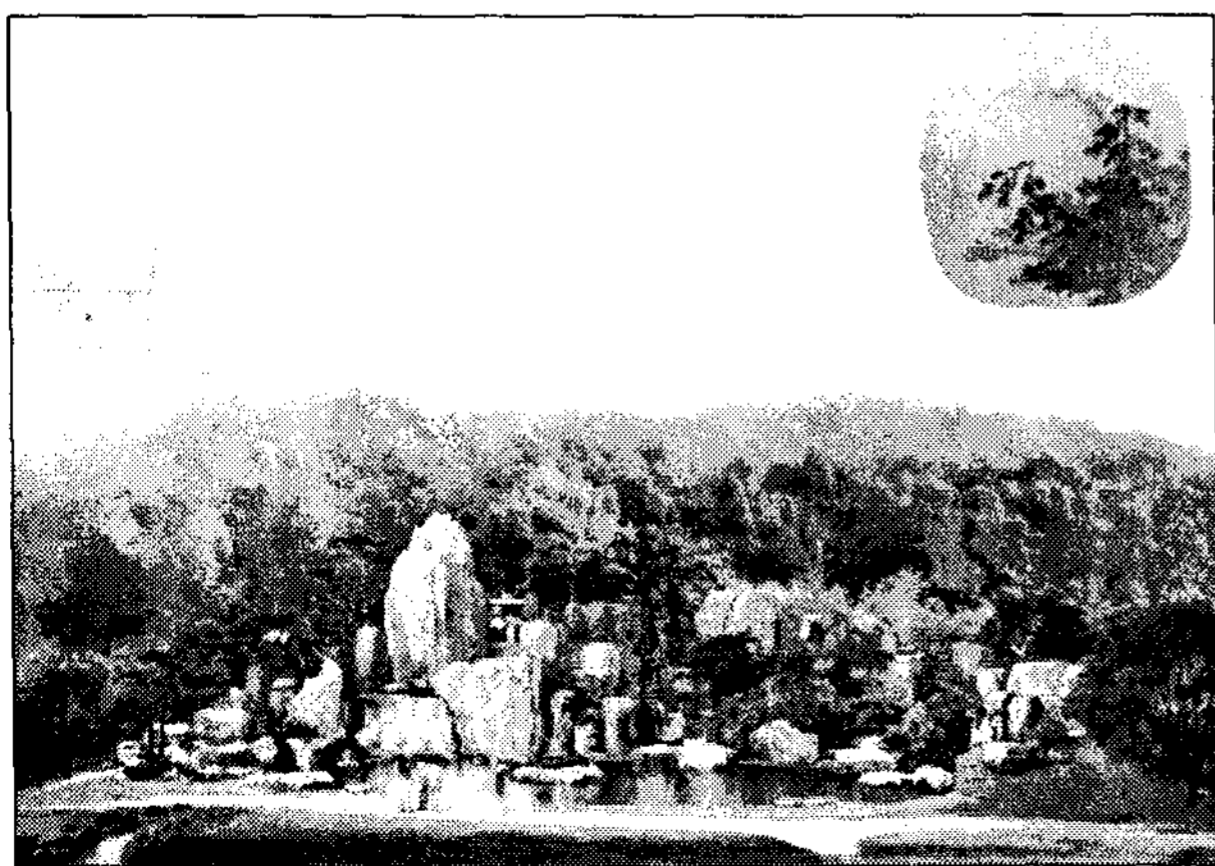


Figure 6. Rendering of "Brooks running down the forests"

best use the existing natural water on and around the site, how to collect and reclaim rain and flood water, to plan an effective water purifying and maintenance system, to optimize the water circulation and irrigation system through recycling and replenishing, to maximize drainage and to create a practicable ecological waterfront.

Different patterns of water circulation have been analyzed and will be implemented to address the differences between the flood and other seasons. A hydrological and water quality simulation process (EFDC, WASP) was used to study water system maintenance and a compound water treatment system of hierarchical processes was established.

With the help of experts and engineers, the water system has been planned to integrate the Qinghe Diversion Channel and the Yangshan Ditch, forming a dynamic water reclamation and reuse system whose source is 95% reclaimed rain and flood water, with zero discharge of sewage water. A high-efficiency ecological water treatment system installed beneath ground level of the new 15.28sq.hm wetland system to ensure water purification and quality, which creates a balanced ecosystem above ground with earth mulch, trees and the variety of wetland plants will, together, form wetland sceneries. Most of the water's edges are constructed as natural-form banks so that aquatic plants naturally cleanse the water and amplify the effect of the water landscape. The two water circulation systems designed in addition to the two wetlands, can replenish water to the city in dry seasons and help the city discharge flood water in rainy seasons, and a dynamic water quality simulation and early warning system was established to forecast water quality changing patterns, issue advanced warnings, and allow to take proper action to avoid damage.

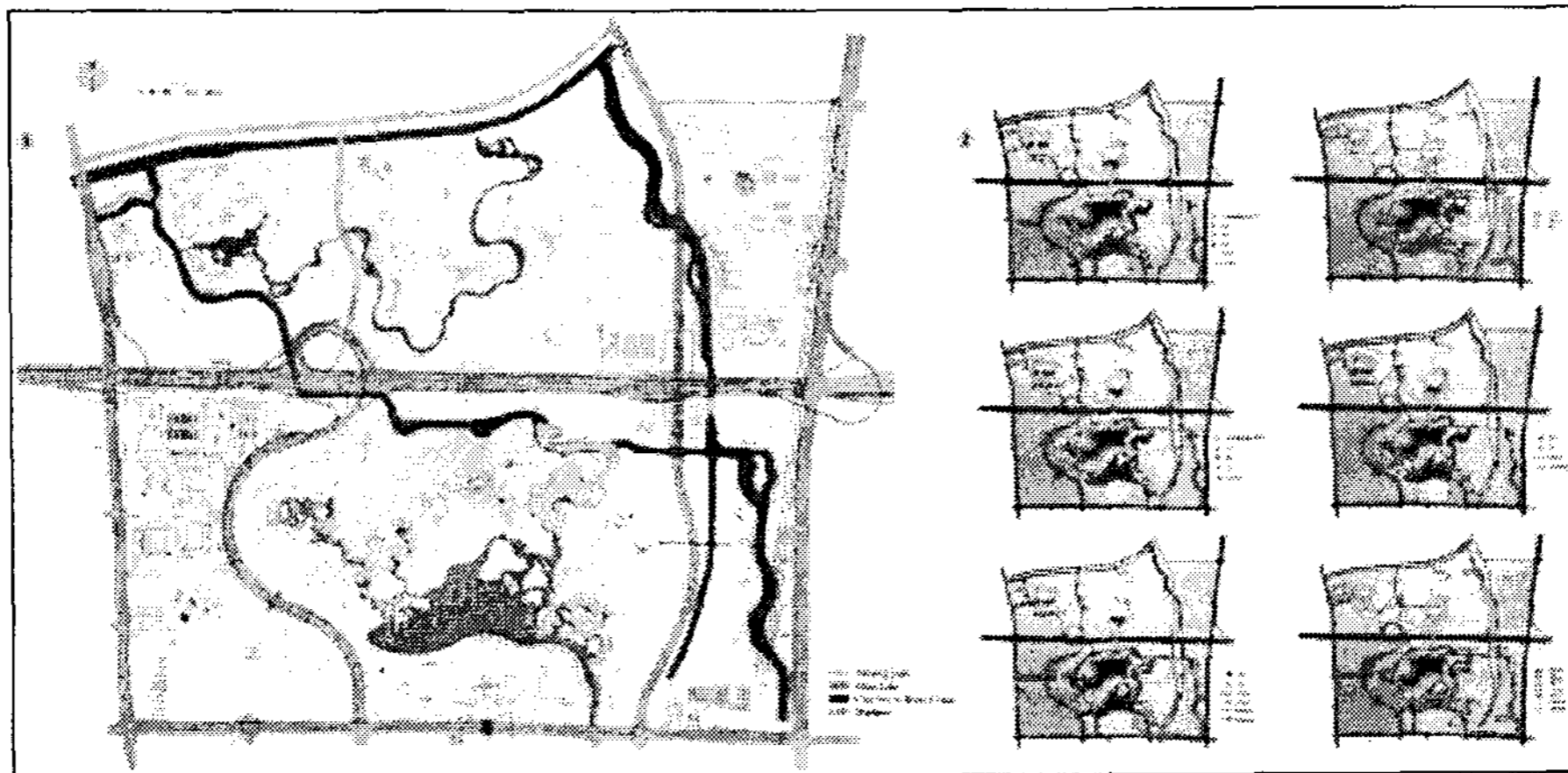


Figure 7. 1) Water System Diagram, 2) Water Circulation and Control Diagrams

VII. Planting

The selection and placement of plant species for the Olympic Forest Park required a study and analysis of local plants, their communities and conditions. The study began with an investigation of plant communities of individual species and of plant communities, and of their conditions and ecological efficiency in 3 sample locations - urban, suburban and remote rural areas - to identify patterns of plant species, frequency, dimensions, seasonal features and application conditions. Indigenous plant species suitable for urban landscape application were analyzed according to their limiting factors including: tolerance capability (cold resistance, draught tolerance, pest resistance, pollution tolerance), eco-efficiency (capacity of absorbing carbon dioxide and emitting oxygen, temperature and humidity regulating capability, antiseptic capacity, noise reduction capacity, contribution to biodiversity) and aesthetic value (visual feature, ability to represent local cultural identity). The selection of plant species also



Figure 8. Rendered view of Wetland with Greenhouse

considered the food sources that they may provide to local wildlife. 158 plant families commonly used in Beijing were selected for the Forest Park.

An ecological corridor bridge crosses the 5th ring road and connects the southern and northern parts of the Forest Park, maintaining the connection of urban ecological systems, facilitating migration and distribution of plant species, protecting biodiversity, and connecting forest patches. Citygreen software was used to evaluate ecological efficiency of botanical landscape planning, and to fine tune the design accordingly.

VIII. Program

As part of the planning for the Olympic Forest Park, a program had to be developed and coordinated with the needs and requirements of the Olympics as well as the needs and possible wants of the residents and visitors of Beijing.

Research was done as to the various facilities and residential communities around the site, and possible strategies to convert Olympic venues into open public facilities following the Games were analyzed. Studies of leisure areas, cultural facilities and congregational spaces around Beijing were conducted to evaluate how the programmatic contribution of the Park may benefit its environs and the city at large. Technological investigation provided a basis for the establishment of architectural guidelines and parameters for low-energy consumption buildings and green power, with a waste resource utilization system that recycles 90% energy. Traffic systems were analysed to find how to best connect to the city, all the while creating control points for the management

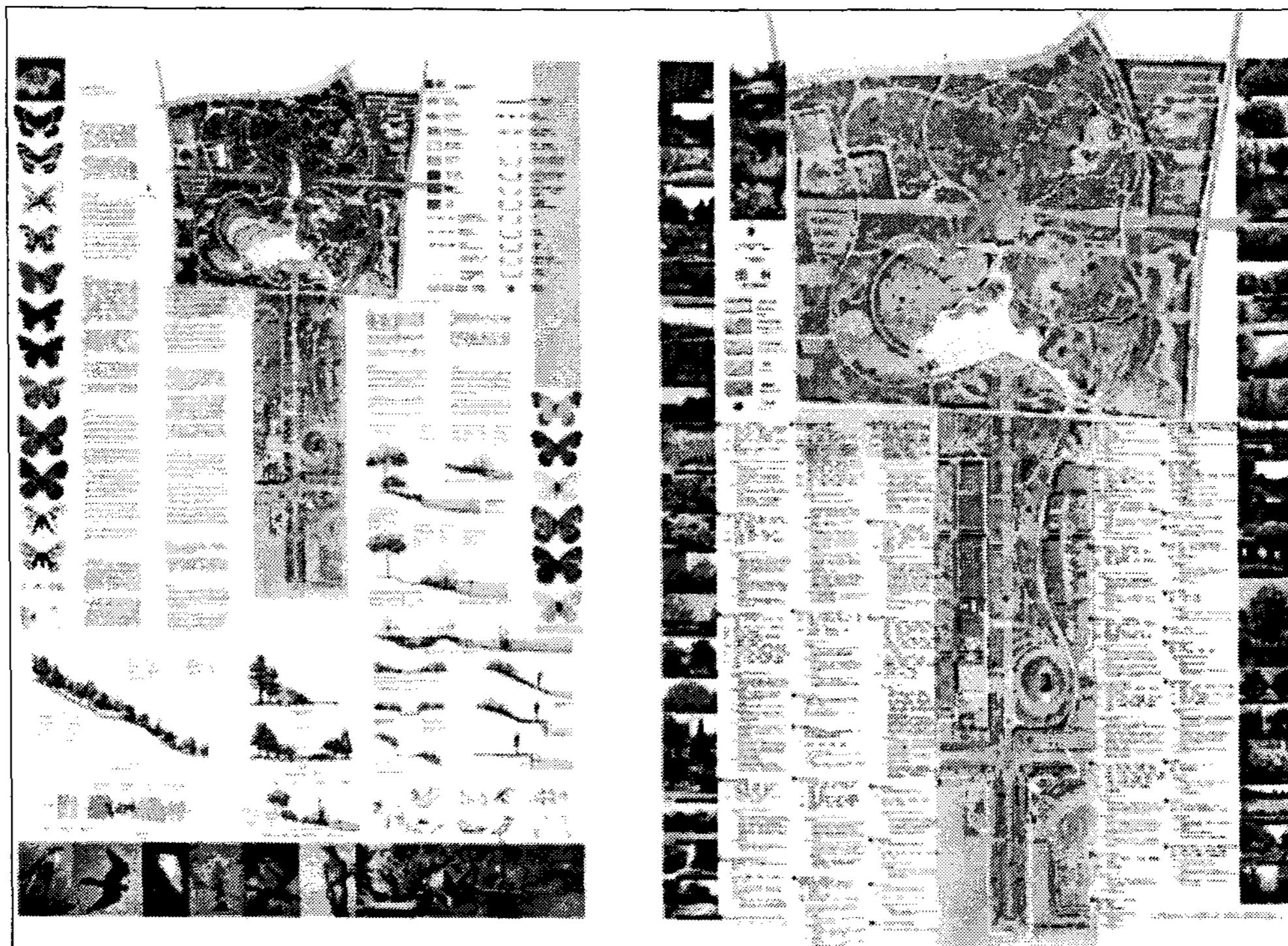


Figure 9. Ecological Diversity Analysis Diagram & Planting Design Diagram

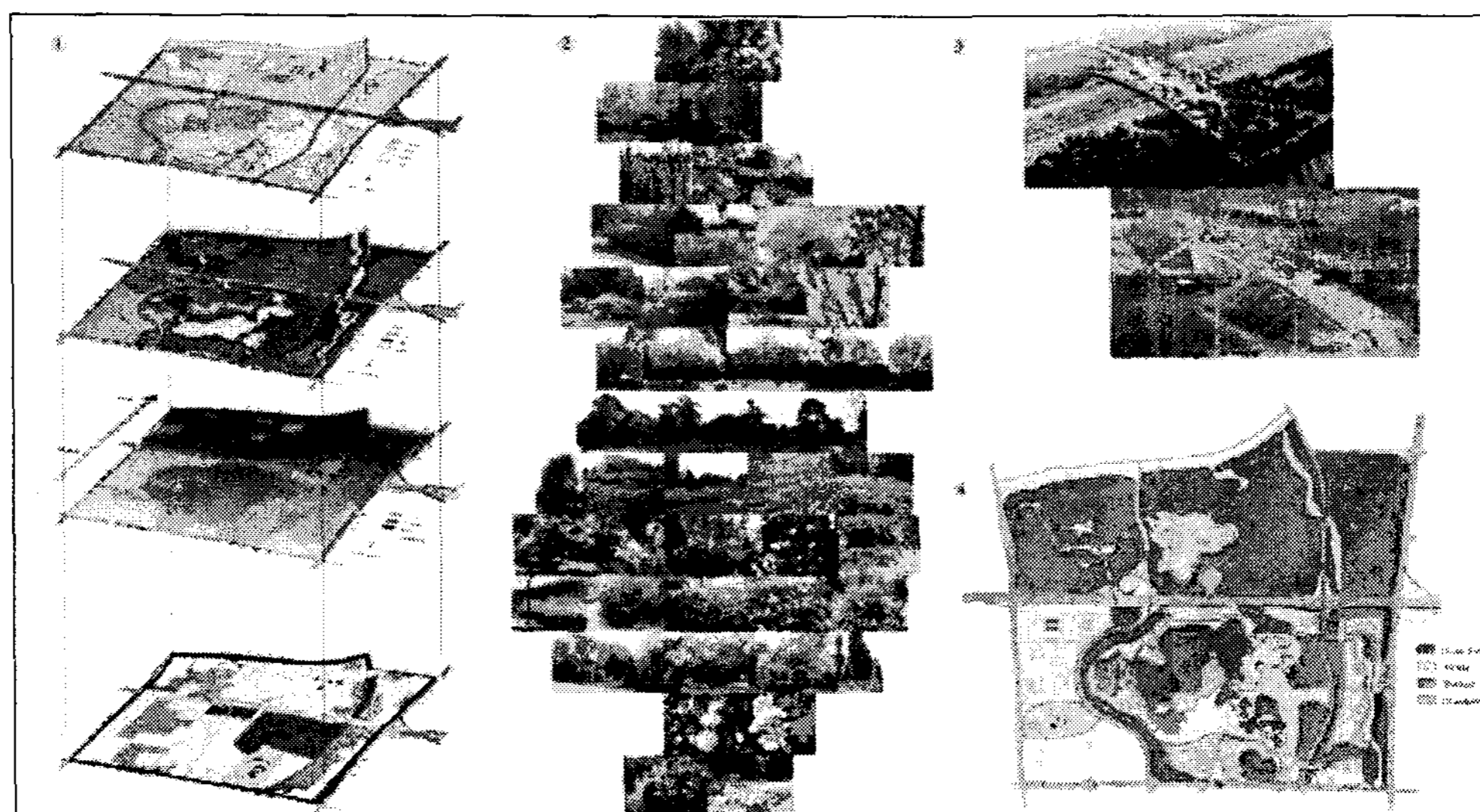


Figure 10. 1) Planting Design Process and Concept, from top down: Elevation, Humidity, Urban to Nature and Existing Planting, 2) Selected Native Planting Materials, 3) Planting Plan

of the park and its natural resources. We implemented barrier-free planning and design throughout the Olympic Forest Park - all slopes and radii of paths and roads, as well as the buildings, have been planned for the convenience of children, the elderly and disabled persons.

The Park's road system connects to but is independent of municipal roads, all are constructed with permeable pave-

ments to allow surface water to infiltrate the ground and improve the quality of the water in the lake.

IX. Urban Ecology

A broad regional study of the Olympic Forest Park's possible eco-environmental influence upon Beijing was executed to

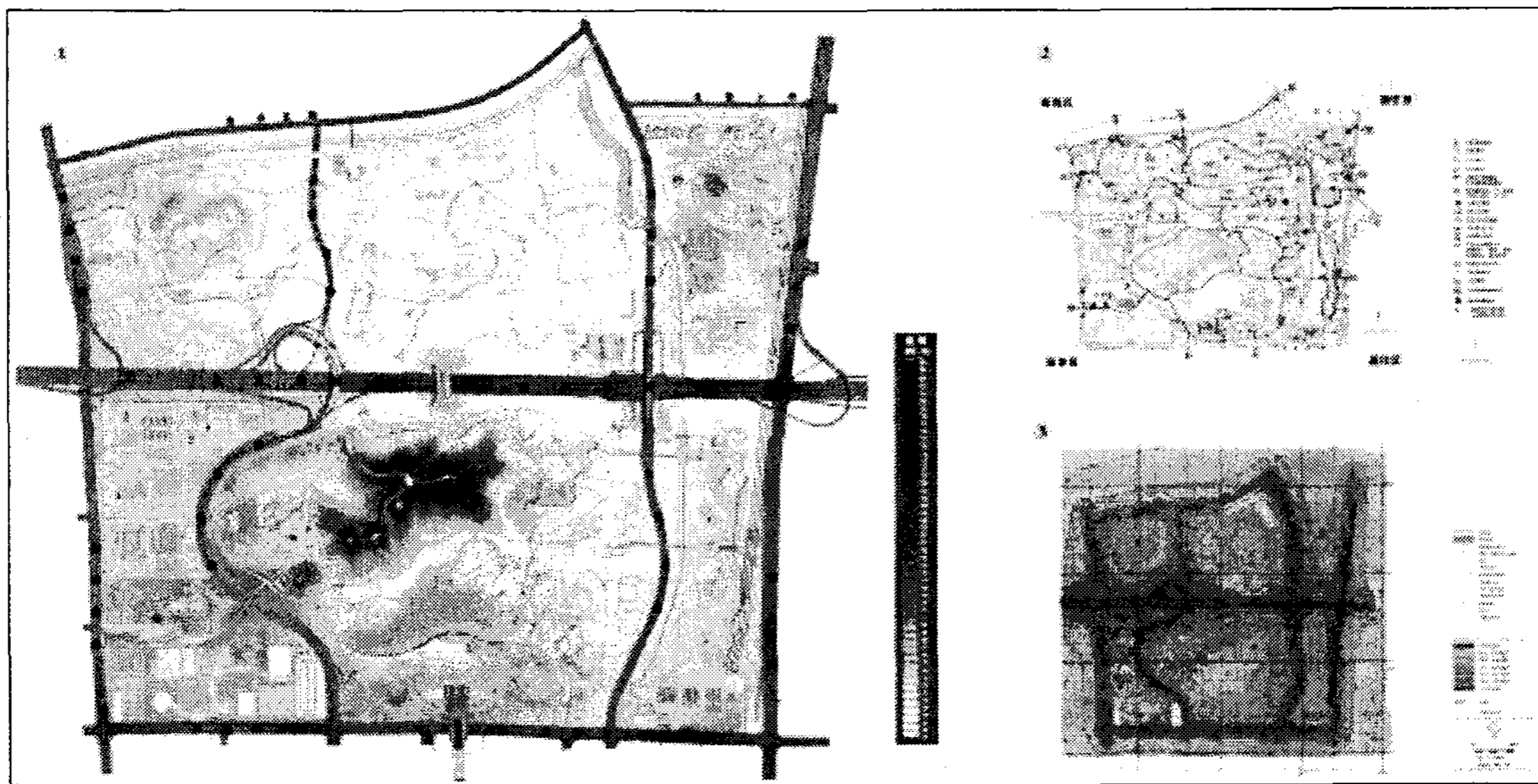


Figure 11. 1) Grading Design Plan, 2) Emergency Use Diagram (Human and Wildlife), 3) Soundscape and Traffic Noise Control Analysis Diagram

investigate how it might be beneficial to the improvement of current conditions such as the urban heat island effect, dust detention, noise pollution, to increase oxygen and oxygen anion content in the air, as well as to water conservancy. Plants with high leaf area indices and high WUE, for instance, were selected to produce fresh oxygen for the city, to absorb carbon dioxide and to release anions, and planting plans and selections were made to minimize their consumption of ecological resources while maximizing their ecological benefits.

Guidelines for the continuous evaluation and monitoring of the Forest Park's ecological function and efficiency were established so as to maintain and continue to explore the consequences of the planning. A GPS application has and will continue to be used to collect, monitor and analyze ecological parameters of sample locations during the different seasons of the year, including parameters of soil condition, carbon dioxide content, airborne microbial content, acoustic quality (the first example of soundscape planning in China), temperature and humidity.

China's growth over the past three decades, while reducing poverty levels, has placed great pressures on the environment. Creating truly comprehensive and lasting responses to China's energy and environment challenges requires local capacity development to respond to the challenges of pollution, biodi-

versity loss and climate change, to remove barrier that hinder expanded use of energy efficiency and renewable energy technologies, and to promote innovative solutions in the industry. It is hoped that this project, its ecological considerations combined with technological advancements, will provide a source of information and knowledge that will be instrumental in the analysis, planning and design of future landscape projects.

Biographies

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