

URBAN REGENERATION UNDER WASTE LANDSCAPE:

Lugang Park, Baoding City, China

PROJECT STATEMENT

- The project is located in Jingxiu District, Baoding City, Hebei Province, China, in the northwest corner of the city centre, adjacent to three city arteries, namely the North Second Ring Road, Xidi Road and Lekai North Street, and is an approximately 8.2 hectares of parkland on the side of the North Second Ring Road. The park was formerly a typical suburban spoil ground. The accumulation of spoil and refuse formed a 13-metre high mountain of rubbish, which created a poor ecological environment. As a triangular-shaped site adjacent to the main urban road, the site is in urgent need of renewal and is required to provide a comfortable and vibrant recreation area for the surrounding citizens and become an urban open space to activate the surrounding area.
- Based on the overall planning of the area and the need for ecological restoration of the site, the design team takes Nature-Based Solutions(NbS) as the most important guidelines, bringing the strengths of ecology, architecture, energy, hydrology and other disciplines to plan a series of sustainable regeneration plans and circulation models. By assessing the ecological restoration problems and resources available to the site, a problem-oriented strategy for restoration of earth, reuse of resource and reactivation of space.
- The aim is to change the topography, hydrology and vegetation conditions of the site with relatively little intervention and to restore the ecological background. Using natural succession and solar and wind energy resources, the site's flora will enter a state of natural succession and the site's energy demand will enter a virtuous cycle. The concept and measures of the design scheme will provide a technical model for similar projects.

PROJECT NARRATIVE

■ 01 Background

In the late 20th century, due to improper urban construction, industrial pollution and waste disposal, a large number of brownfields such as suburban spoil ground and landfills were formed, which directly or indirectly affected the urban ecological environment. Especially after the change of urban industrial layout, these brownfield sites gradually evolved from urban peripheral space to internal negative space. Due to the specificity of the site matrix, this type of urban regeneration faces more complex and urgent problems.

The design project is located in the northern part of Baoding's Jingxiu district, adjacent to three urban arteries, namely the North Second Ring Road, Xidi Road and Lekai North Street, and is a parkland on the side of the North Second Ring Road, covering a total area of approximately 8.2 hectares. In recent years, with the development of innovative industries and new energy industries in the north of Baoding, the city has expanded to the north, and technology parks and automobile centres will be built around the site, and a large number of residential areas will be built.

■ 02 Challenges and Opportunities

Challenges: The site has been a spoil ground since 2000 and after twenty years of accumulation has a large amount of spoil disposal piles, large areas of bare soil and autochthonous vegetation, an unorganised drainage system and a poor natural base. Specifically, there are challenges in the following areas: [1] Site base: There are three spoil piles on the site, the eastern pile is 4-6m in height and the central and western piles are 10-13m in height. The spoil is deposited in the form of a terrace, with a large area of bare soil and a large number of shrubs, weeds and other autochthonous plants, with no landscape ecological value. [2] Soil condition: The site is covered by residue, with a thickness of 1.3 to 14.3m, mainly consisting of plain soil, construction waste, bricks and a small amount of domestic waste, which cannot be used directly as planting soil for landscaping. [3] Limitations: A high voltage tower inside the site bends from west to east and crosses the site to the north, and there may be a city fibre optic cable buried on the side of the adjacent road, which is more restrictive.

PROJECT NARRATIVE

■ 02 Challenges and Opportunities

Opportunities: Benefits from the renewal of the city's industrial layout, the design area will be surrounded by various urban functional areas, with residential areas to the north and south, connected to Beihu Park and the fire brigade to the east, and to China Electric Valley to the west, with strong advantages in terms of location characteristics.

■ 03 Strategies

The design team, in conjunction with the geotechnical engineering and soil science disciplines, carried out a wetland survey and analysis of the site's geological structure, stratigraphic structure, soil composition, geotechnical bearing capacity and other factors, and developed a series of restoration and regeneration strategies based on the findings. The design plan focuses on three segments: abandoned land forms and contamination, available resources and spatial activation, and proposes the least intrusive and most efficient implementation strategy for each segment:

Restoration of Earth:

The contaminated earth is transformed into landscape earth by shaping the topography of the site in a low-intervention manner through digging, cutting, filling and piling. On the basis of a balanced earthwork, diverse spaces such as peaks, mountains, valleys, pings, docks and hills are shaped to create a naturally undulating topography of the area. While adjusting the topography, the lower bedding surface is improved to form a topographic configuration of terraces and sliding slopes, which solves the problem of steep slopes and easy collapse of the current soil slopes. A low impact development runoff organisation model is constructed, following the trend and combining movement and static, divided into permanent and seasonal water surfaces, creating a variety of water features such as lakes, vertical flow wetlands, multi-stage submerged wetlands, gravel vegetation beds, grass planting ditches, etc. Relying on the landscape system to create plant landscape features, form multi-type characteristic themes, enrich planting levels and create diverse plant landscapes.

PROJECT NARRATIVE

■ 03 Strategies

Reuse of Resource:

The site's resources are recycled and reused through waste utilisation and energy recycling. On the one hand, the construction waste and discarded stones within the site provide the raw material for the retaining wall. On the other hand, the site absorbs part of the energy consumption of the garden through the installation of photovoltaic panels on the roof of the structure, and the windmill structure uses wind energy to form a non-powered fun facility.

Reactivation of Space:

The park offers a variety of play, science and up-close contact with nature areas tailored to children. These include a display area for the use of wind and light energy and the popularisation of science, providing children with good outdoor practical experience materials. The play area includes a sandpit slide, which provides a playground for children to engage in educational activities such as sports and group games. A sea of sunflowers and a variety of wetland plants provide children with a natural classroom for plant awareness and outdoor sketching. The park offers a variety of options for young and middle-aged people to exercise and relax outdoors. The Wind and Light corridors with their stacks and pavilions combined with the sea of sunflowers provide a pleasing view for conversation and office work. The Wind Chime Bridge's whimsical shape and clever interactive experience are worthy of a young person's visit. The diverse terrain of the sponge flower valley, flower terrace and flower stream provides a venue for outdoor fitness.

PROJECT NARRATIVE

■ 04 Future Vision

By the time the project was completed, the pioneering plant communities introduced to the site had gradually rehabilitated the damaged site, increasing the abundance of herbaceous plants and creating a basic animal habitat. The ecological restoration and functional implantation has brought vitality and value to the site. In addition, through the use of solar and wind energy, some of the site's energy consumption has been dissipated, forming a good demonstration of low carbon construction. In the future, the site's ecosystem will stabilise and blend in with the surrounding natural environment, creating ecological value. In addition, the site provides the surrounding public with a comprehensive range of outdoor facilities and activities, providing a higher quality open space for the public, and gradually becoming a link to the surrounding area through the holding of urban events such as photography exhibitions, flower displays and children's activities.

The design concept and technical solution correctly considers the 'abandoned landscape' and relies on 'nature-based solutions' to efficiently restore the site's ecosystem services with minimal intervention, providing a forward-looking technical model for similar projects.

URBAN REGENERATION UNDER WASTE LANDSCAPE

Lugang Park, Baoding City, China



CHALLENGE

Waste Landscape

New Mixed-use Development
Constructed Work

Fire Station
Constructed Work

Restoration
Constructed Work

Waste Land



Waste Trash



Waste Space



Future Development

TV Tower

North Second Ring Road

Under Construction

Car Sales Centre

Gas Station

Lekai North Street

With the current accumulation of waste hills up to 13 metres high, the site is a typical dumping ground containing lots of waste types including construction waste and domestic waste. This waste causes secondary pollution on the site, generating a variety of pollutants such as corrosive waste liquids, bad odours, mounds and so on. Its pollution have a negative impact on the residents and employees around the site.

SITE PLAN

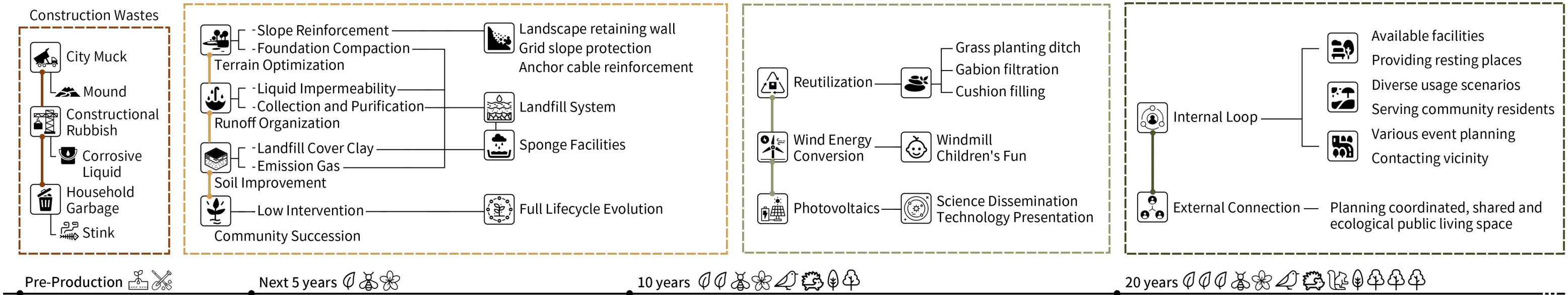
Design Approach



Restoration of Earth

Reuse of Resource

Reactivation of Space



The site has the distinct current characteristics of muck mounds. Targeting construction wastes and abandoned resources, it solves site problems through naturalization methods.

We have proposed three major strategies for the entire life cycle to repair the ecological environment, and restore landscape value: restoration of earth, reuse of resource, and reactivation of space.

RESTORATION OF EARTH

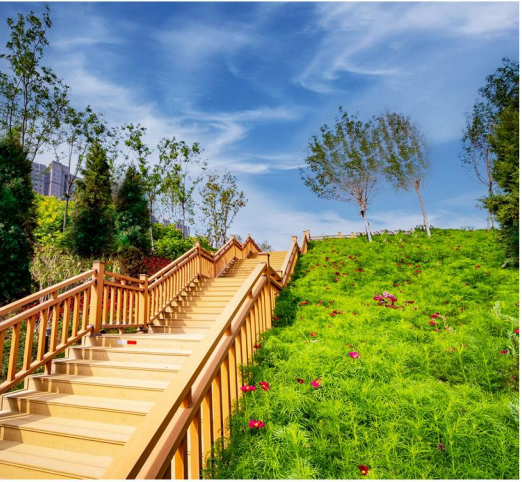
Base Rehabilitation



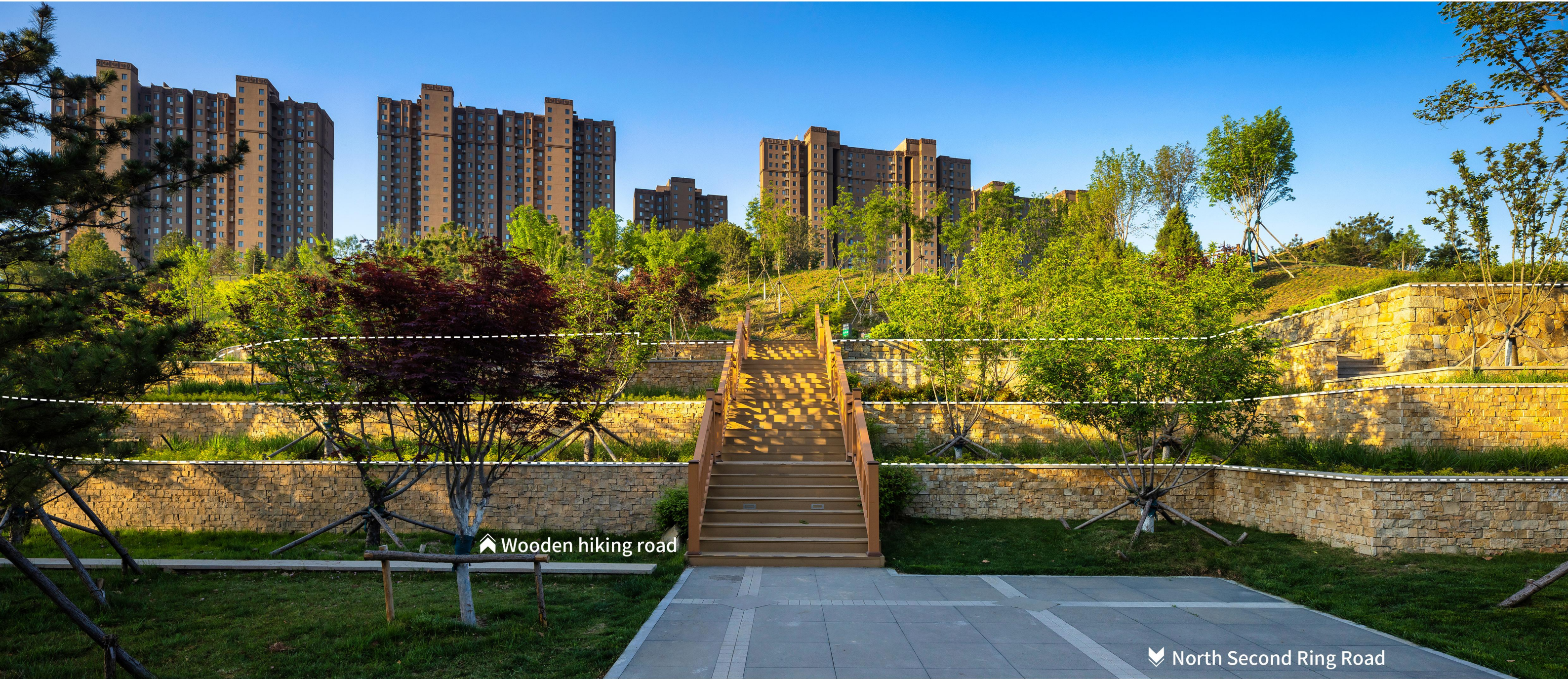
The original amount of building debris on the site is 252150m³. After design, the terrain filling volume is 19735.88m³, and the terrain excavation volume is 99427.85m³. The total designed excavation volume is 79691.97m³. To address the pollution caused by waste, the landfill system will be used to restore the soil of muck mounds, by carrying out plant ecological restoration and runoff purification.

RESTORATION OF EARTH

Terrace Reshaping



 Reutilization — Cobblestones--Grass planting ditch; Rubble--Gabion filtration; Brick fragments--Cushion filling. —————• Sponge purification facilities —————• Photos of current situation of phytoremediation



⬆ Wooden hiking road

⬇ North Second Ring Road

The ecological restoration of the site reflects the layout trend of the mountain, utilizing the original muck mound, and shaping various spaces such as mountains and valleys on the basis of earthwork balance. By reusing the abandoned resources, sponge purification and low intervention vegetation soil fixation restoration are carried out on the site, which creates a naturally undulating and pleasant scenic park.

RESTORATION OF EARTH

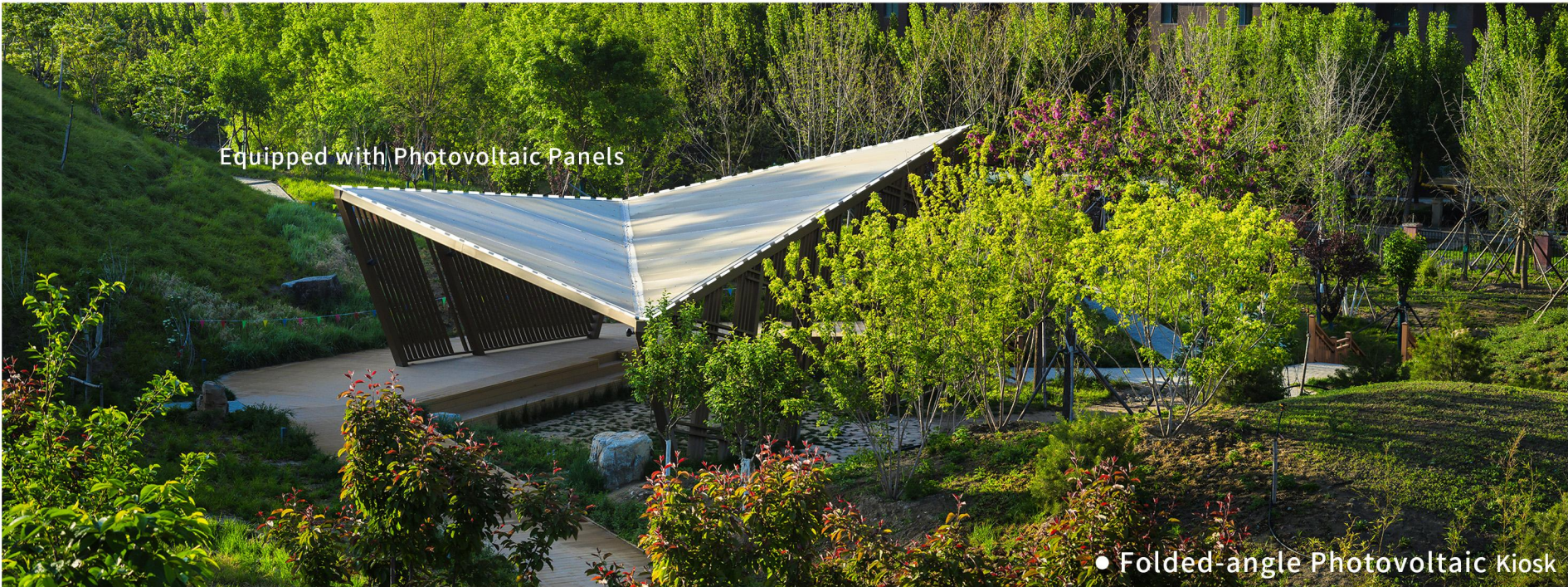
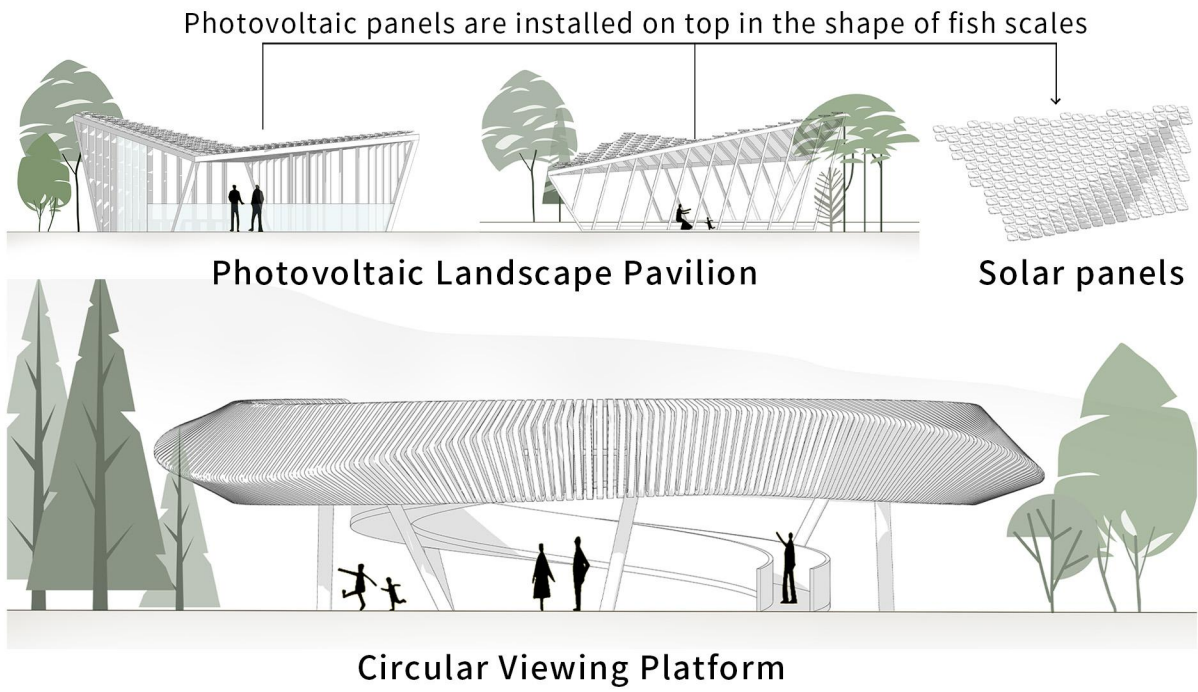
Dynamic Urban Natural Communities



The site habitat is designed in accordance with the natural law of plant community succession. At the beginning, ground cover plants are planted for vegetation restoration in response to the original condition of the landfill, and now it has entered the second stage of succession, planting tall herbs and shallow-rooted shrubs, which will form a stable habitat of trees, shrubs and ground cover in the future.

REUSE OF RESOURCE

Energy Cycle System

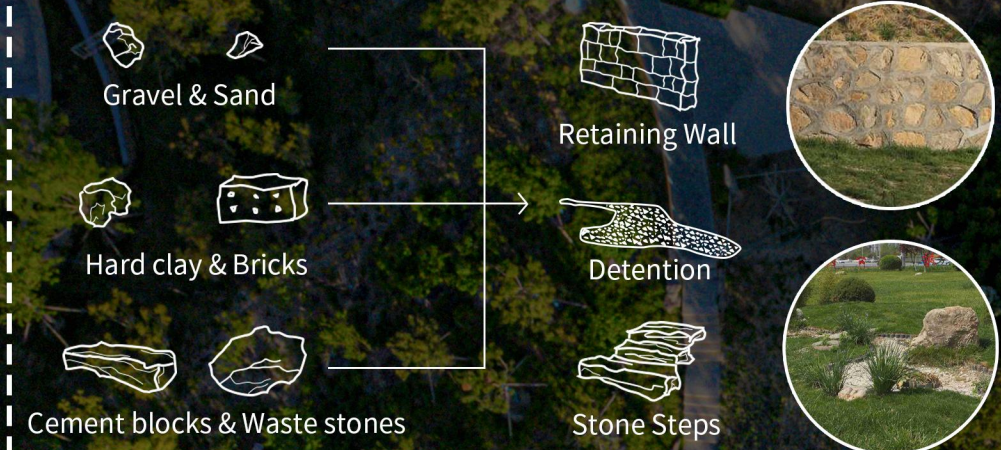


Wind power generation devices such as windmills are set up to utilize wind energy. Solar panels are laid on the top of the landscape pavilion to achieve the effect of photovoltaic power generation while viewing and relaxing function.

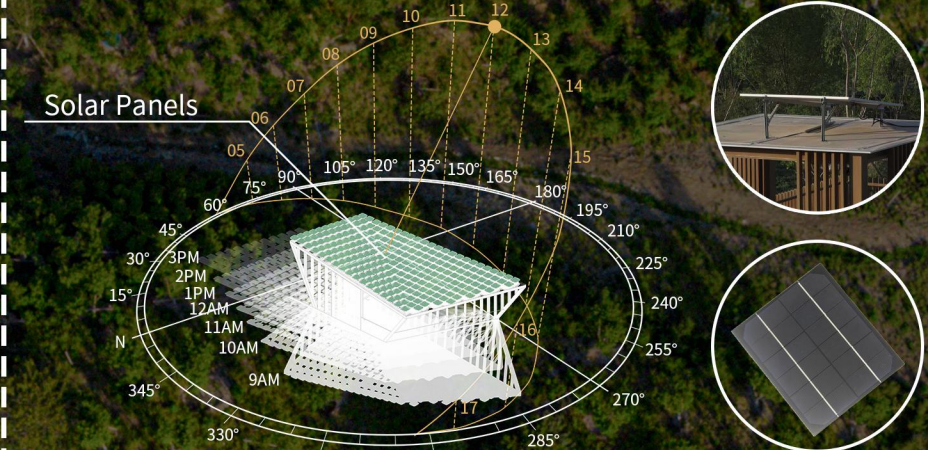
REUSE OF RESOURCE

Energy Cycle System

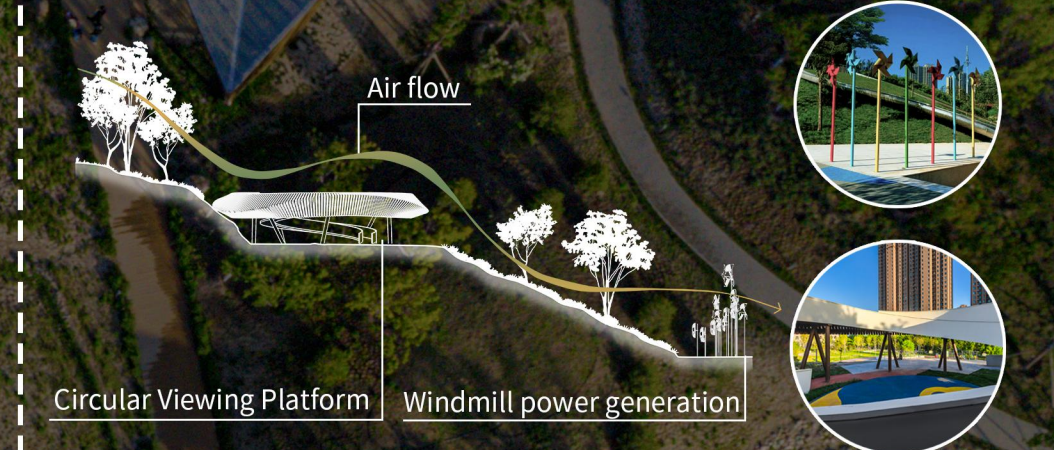
Construction Waste



Solar Energy



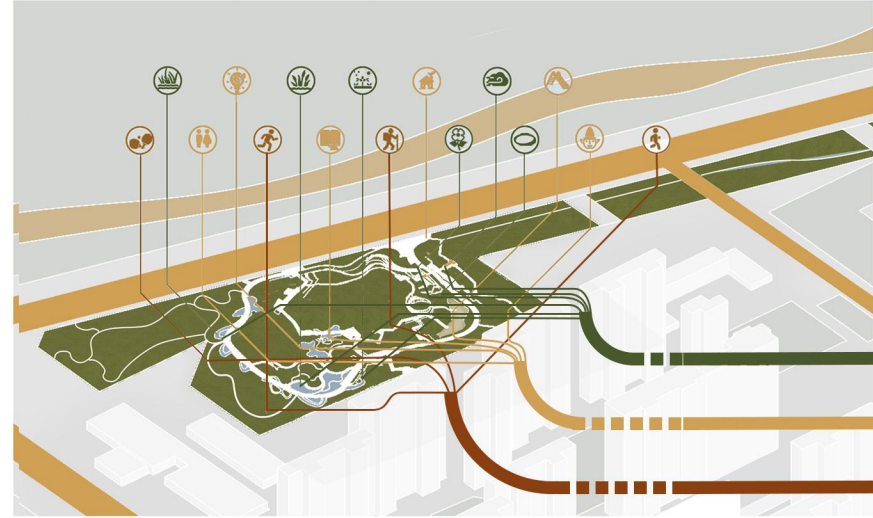
Wind Energy



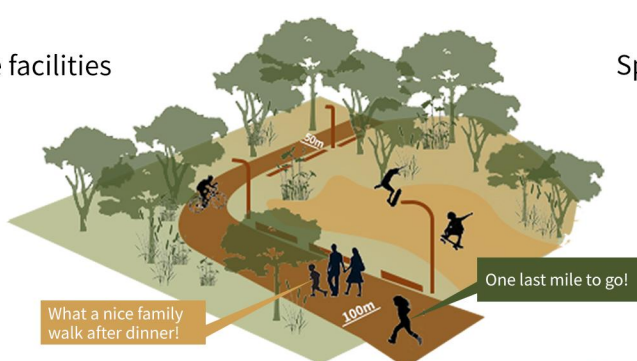
The construction waste accumulated in the original site is reused, and light and wind energy are effectively used through the installation of photovoltaic landscape pavilions and wind power generation devices to form an environmentally sustainable park as a whole.

REACTIVATION OF SPACE

Community Integration



Leisure facilities



Sports facilities



Children's facilities



Viewing

Recreation

Exercise

- Valley of Wind
- Water fall
- Rainwater Garden
- Flower Terrace
- Science
- Elf land
- Bedminton
- Flower
- Architecture
- Re-stroom
- Service Building
- Children activities
- Climbing trail



In this project, our emphasis on ecological restoration, landscape renewal, and the spatial experience when various activities people might participate in. For nearby residents, the negative space represented by the garbage mound has become an accessible community park, which meets the different needs of surrounding communities for outdoor natural experiences and communication.

REACTIVATION OF SPACE

Community Link Activation



Ecological restoration and functional implantation bring vitality and value to the site, which provides comprehensive outdoor activity facilities and venues for all age groups. Relying on photography exhibitions, gardening exhibitions, children's science education activities and other city level events, our park has gradually become a connecting link between the surrounding areas.

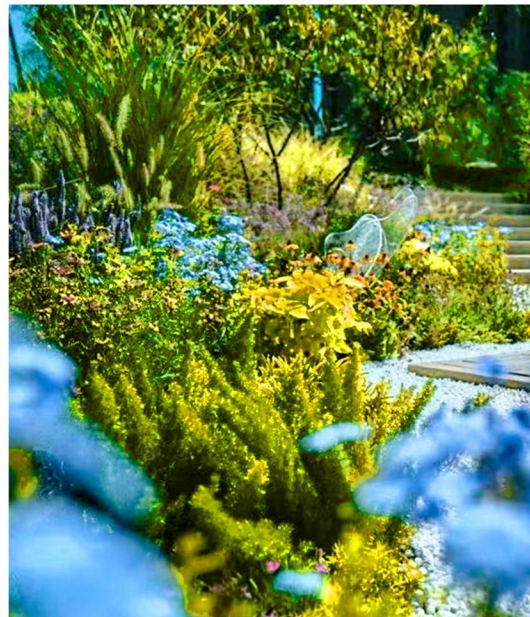
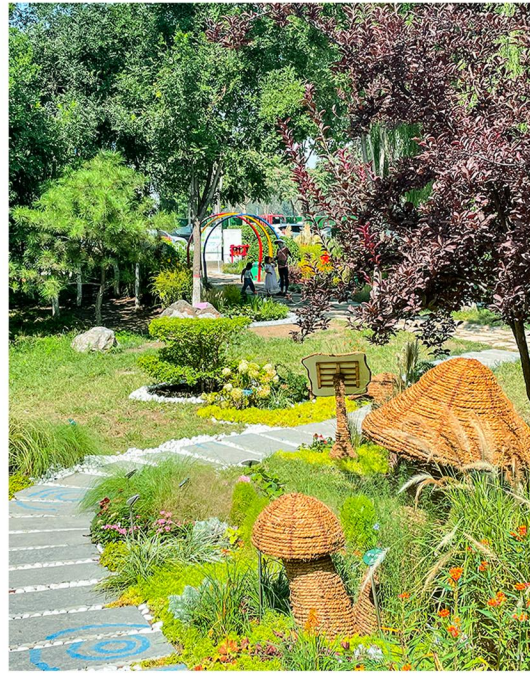
BENIFIT REVIEW

Community Link Activation

ALL-AGES RECREATIONAL ACTIVITY



NEW HABITAT AFTER ECOLOGICAL RESTORATION



When the project construction is completed, the herb abundance has been continuously improved. It provides comprehensive outdoor activity facilities for all age groups, as well as higher quality open spaces. Further more, the site ecosystem service function has been efficiently restored, providing a forward-looking technical model for similar projects with minimal intervention.