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青海省玉树扎西科湿地公园防灾避险体系规划设计

Disaster Prevention System Planning of Zhaxike Wetland Park in Yushu, Qinghai

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摘要

青海省玉树县自古就是地震多发地。2010年玉树地震发生后, 大批受灾群众等待家园的重建。在这期间, 人们的基本生活需要维持, 而扎西科湿地公园的建设则成为承载这些功能的良好载体。本文以此为契机, 采用理论与实践相结合的方法, 对扎西科湿地公园防灾避险体系的规划与构建进行了研究。

关键词

地震; 防灾公园; 平灾结合; 设施活用; 应急避险; 景观设计

Abstract

Yushu County in Qinghai Province is geologically prone to earthquakes, and after the most recent Yushu Earthquake in 2010 a large number of people had to rebuild their homes. During this reconstruction period, subsistence needed to be maintained through landscape. Combining theory with practice, this essay focuses on the planning and construction of the Zhaxike Wetland Park disaster prevention system.

Key words

Earthquake; Disaster Prevention Park; Integrated Design of Normal and Earthquake; Disaster Facility; Emergency Hedge; Landscape Design

项目地址: 中国青海省玉树藏族自治州玉树县结古镇
项目面积: 267.3hm²
项目委托: 中国城市规划设计研究院、结古镇政府
景观设计: 中国城市规划设计研究院
项目团队: 清华大学建筑学院景观系李树华研究室
设计时间: 2012年

Location: Gyegu Town at Yushu Tibetan Autonomous Prefecture, Qinghai, China

Area (size): 267.3 hm²

Client: China Academy of Urban Planning and Design, Government of GyeguTown

Landscape Architecture: China Academy of Urban Planning and Design
Project Team: Li Shuhua Research, Department of Landscape Architecture, Tsinghua University

Design Period: 2012

1. 避难一区应急生活效果图
2. 场地现状与周边环境
1. Perspective of emergency life at the Refuge Zone I
2. The current situation and surrounding environment of the site



扎西科湿地公园位于玉树县结古镇镇中心偏西的位置, 东西长约4km, 南北宽约1km, 总面积267.3hm²。玉树大地震发生后, 结古镇内尺椽片瓦荡然无存, 城市风貌毁于一旦, 当地民众几乎无地可居。扎西科湿地公园防灾避险体系是在考虑其作为长期避难生活空间的可能性的基础上, 并遵循安全性、地区适宜性、尊重景观方案、平灾结合、以避难群众的行动及需求为基点等原则下进行规划设计。

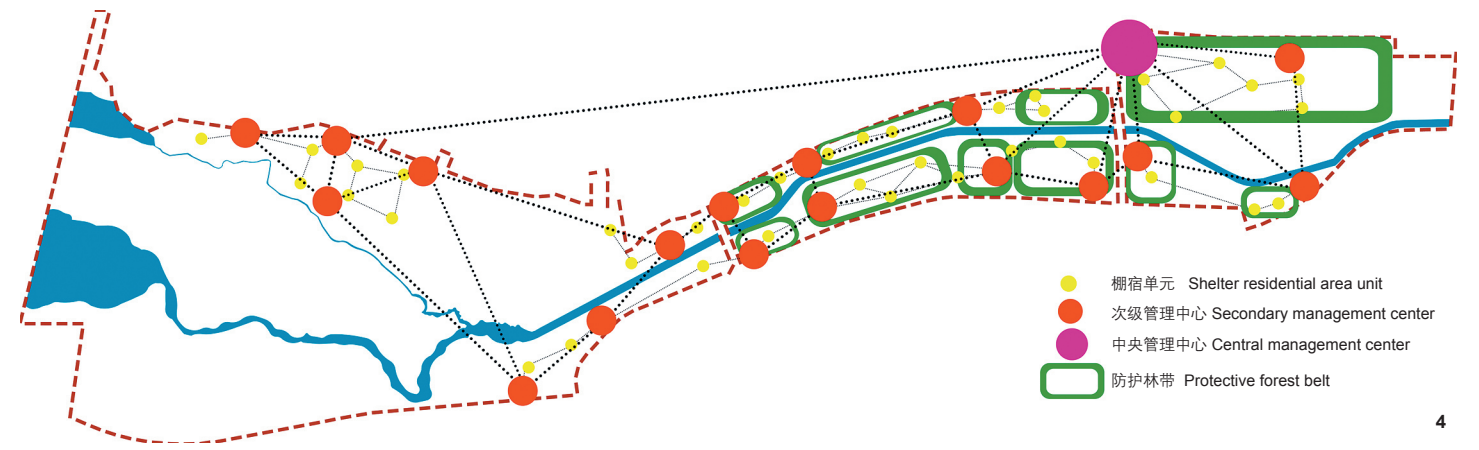
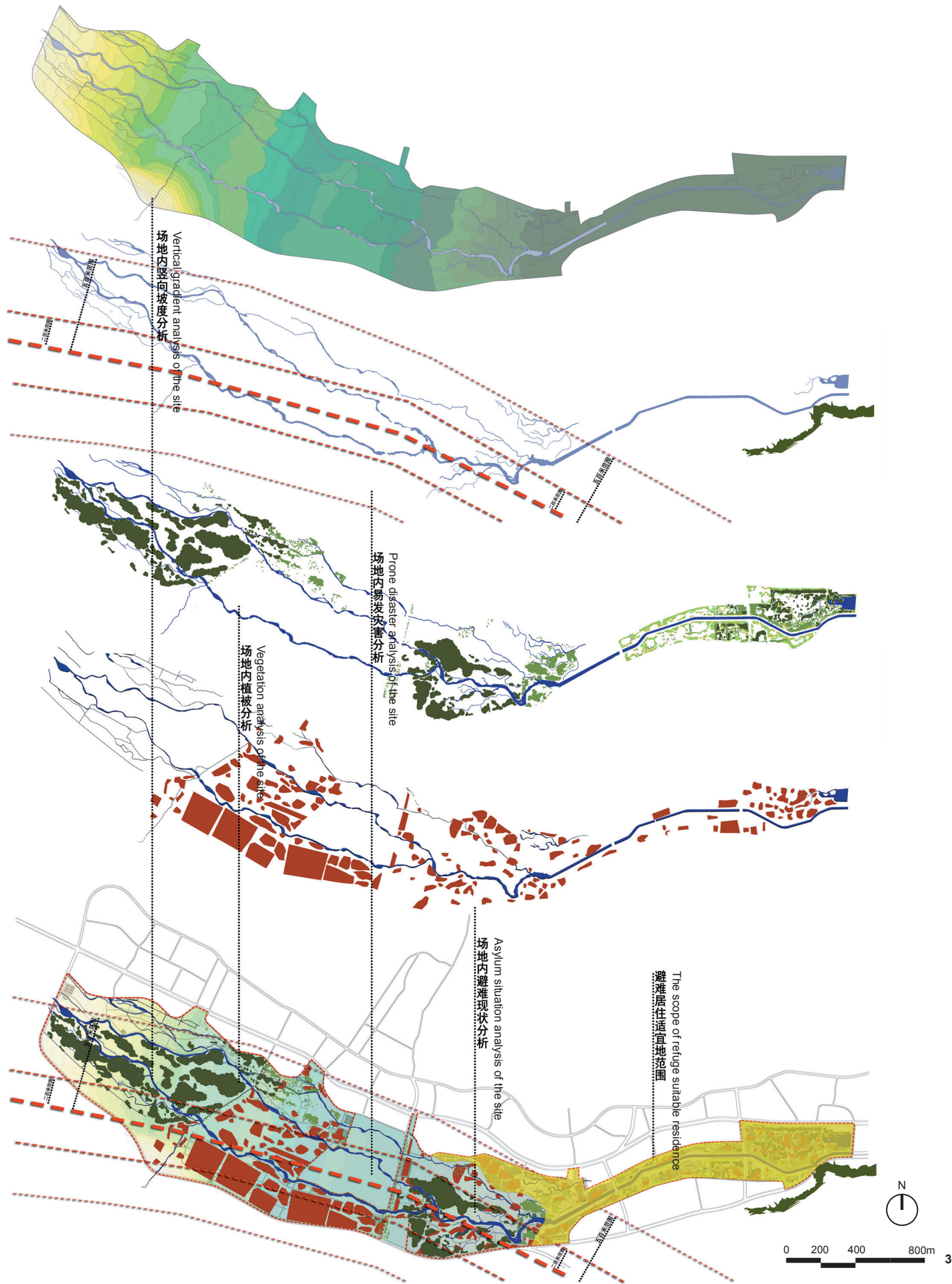
扎西科湿地公园景观设计方案分为三个部分: 东段城市公园、中段城市湿地、西段赛马场郊野公园。场地内最高点与最低点高差达51m, 用地坡度均小于30%。园区内的道路均与中心城区次干路相连, 形成贯穿园区东西的网络结构。园区内一级园路为4m宽透水砖园路, 加之由于结古镇属于高原藏区, 当地民众有骑马或赶马车的习惯, 所以园区内还特设6m宽的沥青混凝土马道。二级园路为3m宽透水砖路, 由于规划场地狭长, 将城市公园段内的游览二级园路缩窄到2m, 以增加场地的景观实用性。其他景观游步道宽1.5m。

景观方案对场地进行了适量的乔木及灌木补植, 在重要节点及场地外围利用植物进行围合。乔木品种主要选用祁连圆

柏 (*Sabina przewalskii*)、糙皮桦 (*Betula utilis*)、川西云杉 (*Picea likiangensis*)、青杨 (*Populus cathayana*)、紫果云杉 (*Picea purpurea*) ; 灌丛品种主要包括金露梅 (*Potentilla fruticosa*)、紫丁香 (*Syringa oblata*)、中国沙棘 (*Hippophae rhamnoides*)、连翘 (*Forsythia suspensa*)、沙地柏 (*Sabina vulgaris*)、榆叶梅 (*Prunus triloba*) 等抗性较强的树木。

在对场地现状、规划用地范围、植被设计、竖向条件等进行综合分析后, 我们将多个条件分别叠加进公园的规划场地内, 清晰地得出用作紧急避难的适宜性用地, 包括湿地公园东段及城市公园段大部, 并将此地块作为重点来进行防灾设施的指标计算与设计。赛马场湿地地块被用作防灾避险后备区域, 不增设防灾设施。

扎西科湿地公园的防灾避险适宜性场地呈狭长分布, 并且被城市规划道路分隔成三个不同区域, 从东到西依次为避难一区、避难二区、避难三区。为提高灾时信息及应急管理的工作效率, 灾时公园的管理工作区及棚宿区采用网络配置模式, 由“中央”管理中心直接与不同地块的次级管理中心对接, 这些次级管理中心再辐射



各个应急生活区。管理中心与应急生活区构成了公园的灾时骨架，引导灾时应急与疏散工作，应急棚宿区穿插分散于各个应急生活区，构成整个公园的灾时规划模式图。

根据中国台湾及日本的经验，30%~40%的避难者会选择公园绿地作为避难场所。结古镇灾后重建的人口规模控制在10万左右。因此在扎西科湿地公园防灾功能的规划过程中，应考虑可容纳约3万人规模（理论上约占规划总人口的1/3）的防灾设施。场地灾时功能有效面积内共计规划3m×4m规格帐篷2305座，4m×6m规格帐篷2461座，基本可以满足上位城市

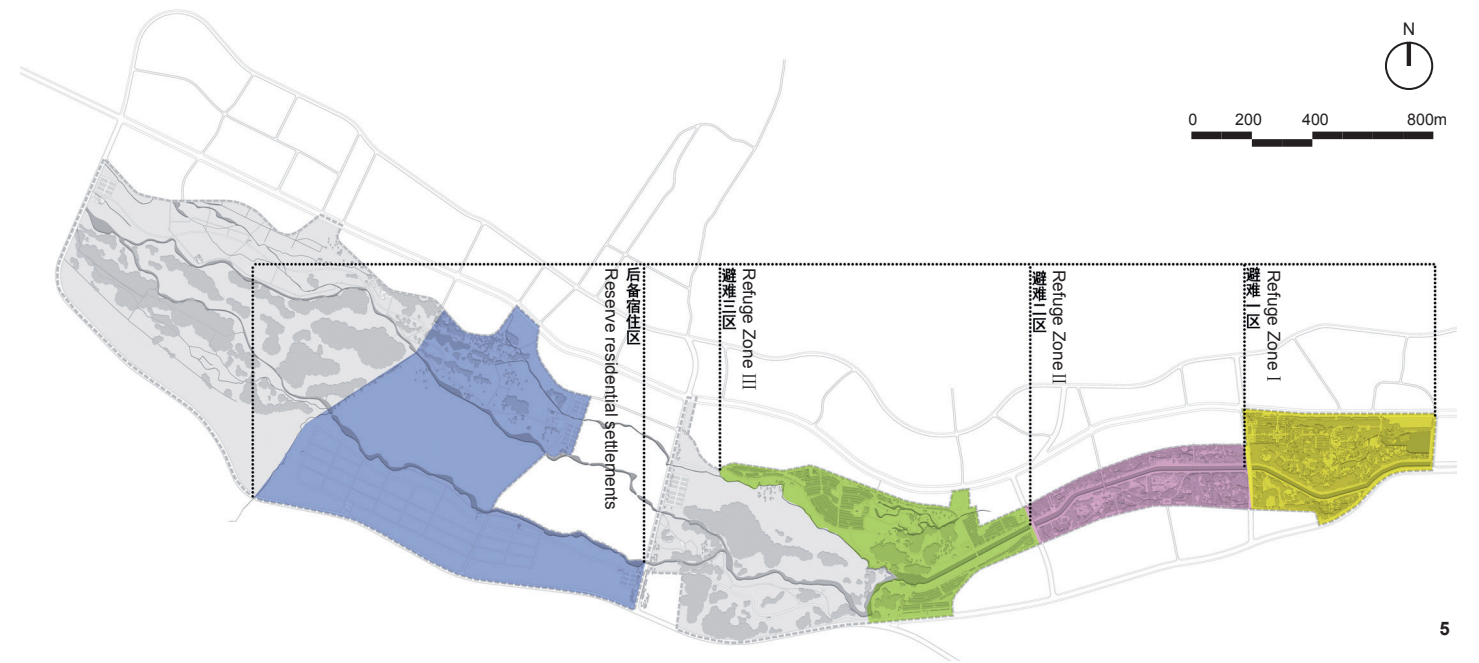
规划的需求。

扎西科湿地公园灾时功能规划设计的有效面积为59.7hm²，其中约30%的面积用作交通及应急设施用地，其余作为应急棚宿区，后备棚宿区面积达74.3hm²。灾时应急宿住地规划的第一原则是安全并且开阔，棚宿地多选址于被乔灌树丛所围合的平坦草坪，从而保障避难疏散工作及时高效，并且能够有效缓解避难过程中人们的紧张情绪。按照园区道路、地块的不同，应急棚宿区又分设为不同的避难棚宿单元。棚宿单元之间预留出4~6m的空间作为应急通道，单元内部棚宿地之间预留2m左右的空间作为通道。如有必要，应急时

可对公园内的部分灌木进行修剪及砍伐。

应急生活给排水设施的服务主体包括提供生活用水和排放污水。园区内部的给水系统采用平时与灾时两套系统：平时景观给水与市政给水系统连接，发挥苗木灌溉等作用；灾时应急给水自成系统，除与市政给水管网相连接外，该系统还设有位于中央管理中心处的采水井与泵房。灾时一旦市政设施遭到破坏无法实现供水，园

- 3. 避难适宜性场地分析图
- 4. 应急管理模式规划示意图
- 5. 防灾避险功能规划分区平面图
- 3. Site analysis of refuge potentials
- 4. Diagram of emergency operation mode planning
- 5. Zoning plan of disaster prevention



扎西科湿地公园应急避难设施配置一览表

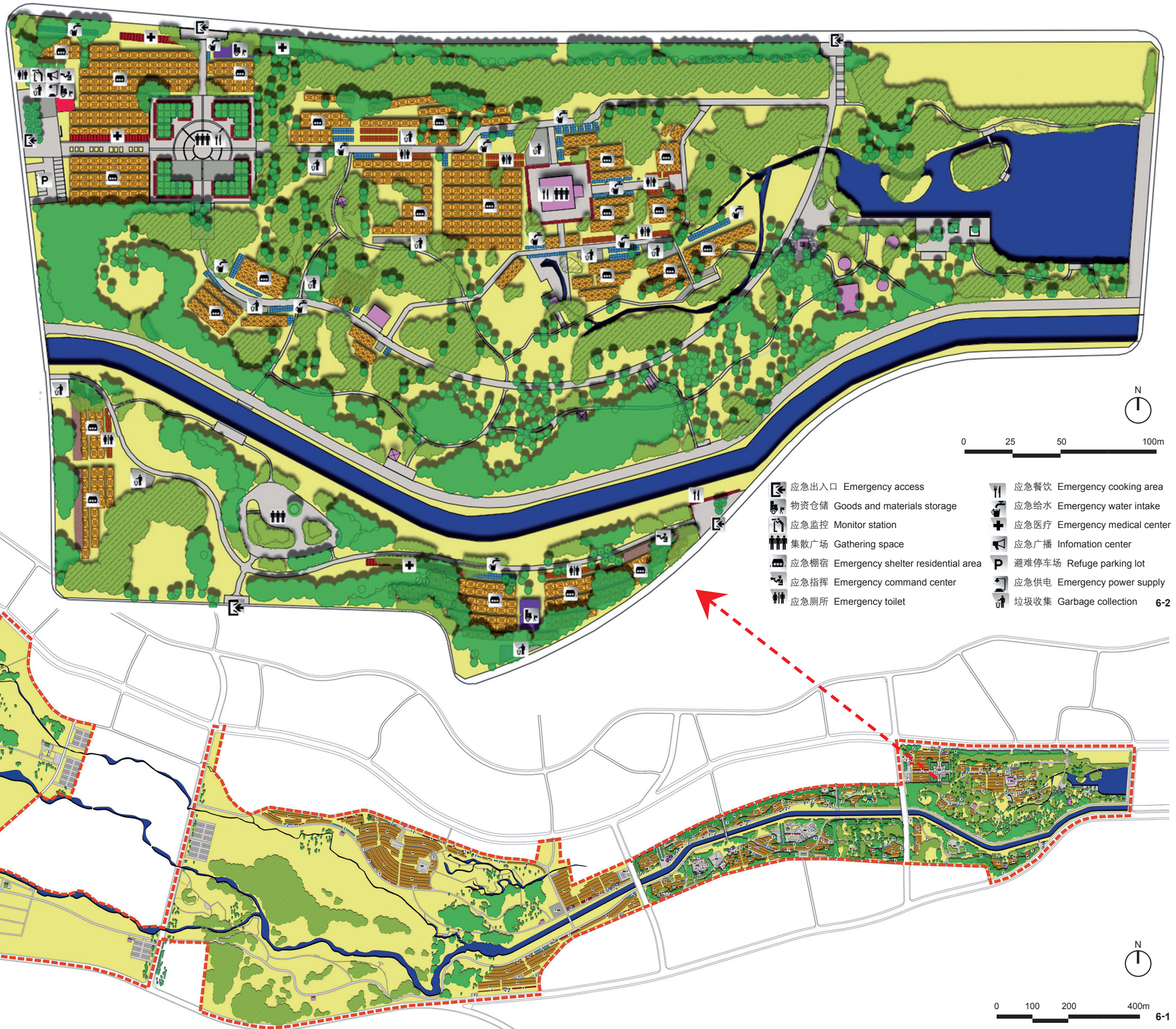
Inventory of Distribution of Emergency Facilities in Zhaxike Wetland Park

避难一区 (面积: 19.3hm ²) Zone I (Area: 19.3 hm ²)			
设施类别 Category	单位 Unit	数量 Quantity	
应急帐篷 Tent	3m×4m	个	345
	4m×6m	个	578
应急取水 Water Supply	取水处 Water Intake Hub	处	12
	取水点 Water Intake Facility	个	454
应急厕所 Toilet	厕所区域 Sanitation Area	处	7
	坑位 Pit	个	398
应急管理区 Emergency Command Center	m ²		528
应急医疗区 Emergency Medical Center	m ²		720
垃圾收集 Garbage Collection	m ²		2093
集散广场 Gathering Space	m ²		2090
临时炊事 Food and Beverage Facility	炊事区域 Cooking Area	处	3
	灶炉 Stove	眼	211
物资仓储 Goods and Materials Storage	m ²		384
信息发布 Information Center	m ²		226

避难三区 (面积: 25.2hm ²) Zone III (Area: 25.2 hm ²)			
设施类别 Category	单位 Unit	数量 Quantity	
应急帐篷 Tent	3m×4m	个	0
	4m×6m	个	1845
应急取水 Water Supply	取水处 Water Intake Hub	处	10
	取水点 Water Intake Facility	个	585
应急厕所 Toilet	厕所区域 Sanitation Area	处	9
	坑位 Pit	个	570
应急管理区 Emergency Command Center	m ²		1008
应急医疗区 Emergency Medical Center	m ²		960
垃圾收集 Garbage Collection	m ²		1881
集散广场 Gathering Space	m ²		2763
临时炊事 Food and Beverage Facility	炊事区域 Cooking Area	处	2
	灶炉 Stove	眼	120
物资仓储 Goods and Materials Storage	m ²		288
信息发布 Information Center	m ²		—

避难二区 (面积: 15.2hm ²) Zone II (Area: 15.2 hm ²)			
设施类别 Category	单位 Unit	数量 Quantity	
应急帐篷 Tent	3m×4m	个	1960
	4m×6m	个	38
应急取水 Water Supply	取水处 Water Intake Hub	处	20
	取水点 Water Intake Facility	个	905
应急厕所 Toilet	厕所区域 Sanitation Area	处	13
	坑位 Pit	个	622
应急管理区 Emergency Command Center	m ²		1056
应急医疗区 Emergency Medical Center	m ²		576
垃圾收集 Garbage Collection	m ²		2040
集散广场 Gathering Space	m ²		1600
临时炊事 Food and Beverage Facility	炊事区域 Cooking Area	处	2
	灶炉 Stove	眼	117
物资仓储 Goods and Materials Storage	m ²		576
信息发布 Information Center	m ²		—

6-1. 规划设计总平面图
6-2. 一区平面图
6-1. Master plan
6-2. Enlarged view of master plan of Zone I



- 应急出入口 Emergency access
- 物资仓储 Goods and materials storage
- 应急监控 Monitor station
- 集散广场 Gathering space
- 应急棚宿 Emergency shelter residential area
- 应急指挥 Emergency command center
- 应急厕所 Emergency toilet
- 应急餐饮 Emergency cooking area
- 应急给水 Emergency water intake
- 应急医疗 Emergency medical center
- 应急广播 Information center
- 避难停车场 Refuge parking lot
- 应急供电 Emergency power supply
- 垃圾收集 Garbage collection

0 100 200 400m
6-1

原创实践

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Original Practices

101



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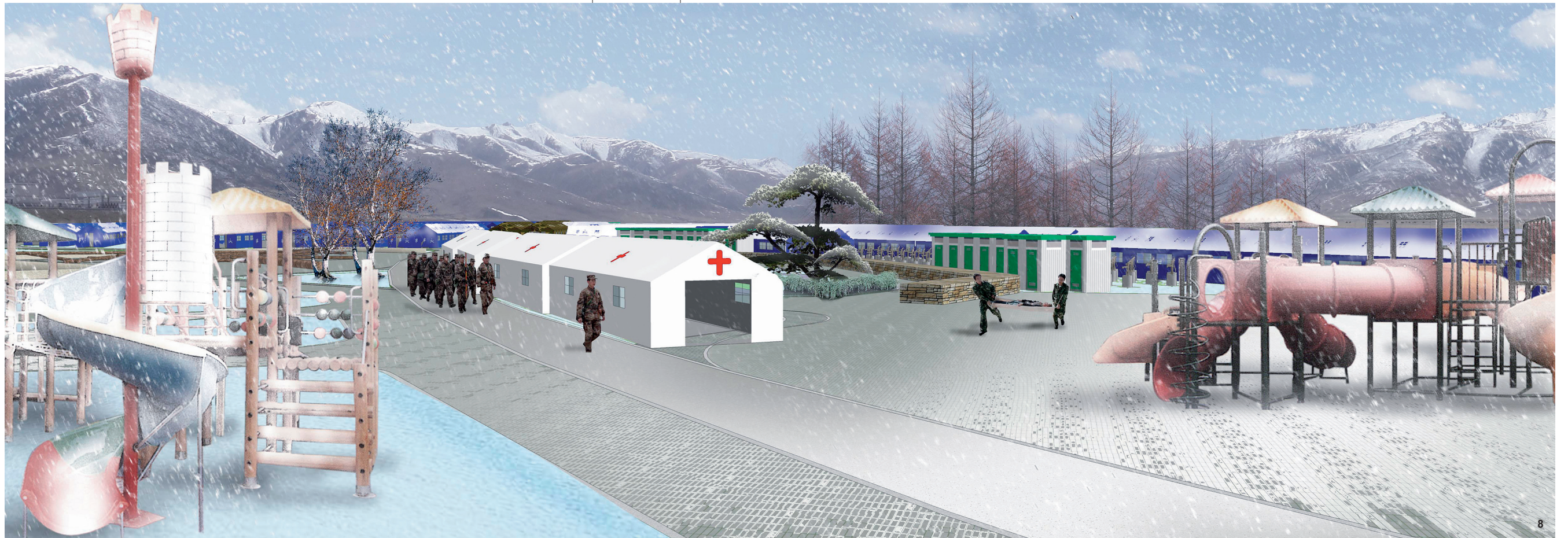


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Covering 267.3 hm² hectares, and stretching 4 km east to west and 1 km north to south, the Zhaxike Wetland Park is located west of Gyegu, Yushu County. After the most recent regional earthquake in 2010, the urban landscape was completely destroyed and there was nowhere for local people to live. The integration of disaster prevention into the Zhaxike Wetland Park is based on consideration of the park as a long-term planning and design project that will remain safe and sustainable to respond to earthquakes and needs of refugees.

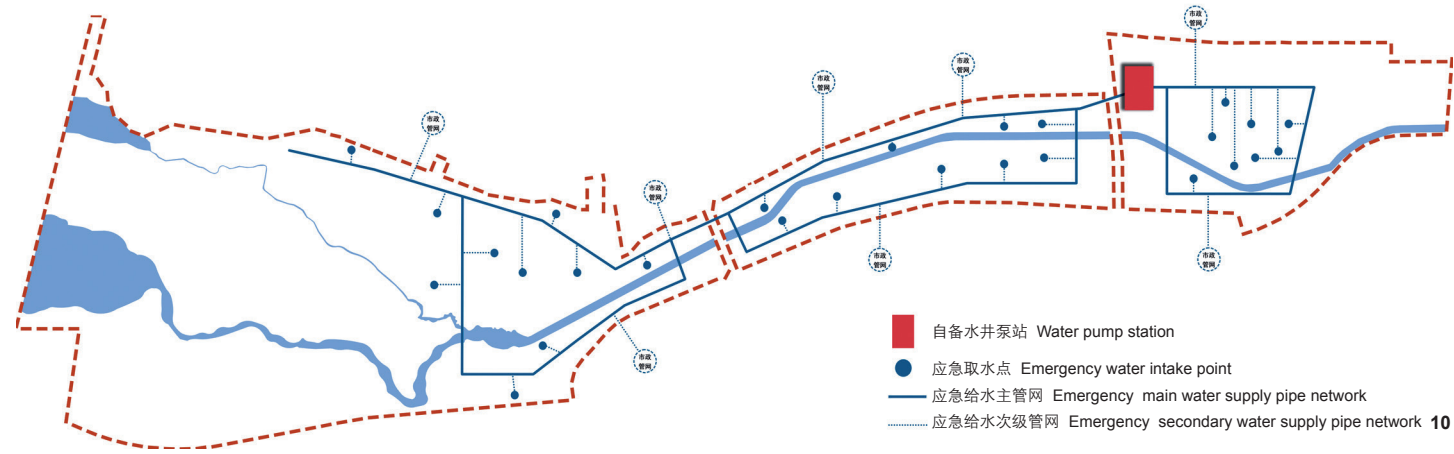
The landscape design of Zhaxike Wetland Park contains three parts covering a grade change of 51 m with an average gradient less than 30%: an eastern city park, a middle urban wetland, and western racecourse park. All the park roads are connected with secondary

区的应急采水井会立刻启动,以供灾时给水。取水设施采用外观上呈原始生态风格的手压井,操作简单方便,并以其古朴的外形与周边环境相融合。排污系统包括应急排污与景观排污两套系统,接入市政排污管网的灾时应急排污系统能够独立发挥作用。在园区应急供电方面,中央管理中心设置了太阳能光伏发电设备,能够利用高原地区的太阳高辐射在灾时发挥作用。临时餐饮设施分为两种类型,一种是活用硬化广场座椅,将广场座椅靠背拆除后即为炉灶;另一种借助景观置石围合形成炉灶,不但使用方便,亦体现出藏民生活的特色。LAF



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- 7. 一区主入口广场效果图
- 8. 二区儿童广场效果图
- 9. 三区临时炊事点效果图
- 7. Rendering of the entrance plaza in Zone I
- 8. Rendering of the children's playfield in Zone II
- 9. Rendering of the emergency cooking facilities in Zone III



■ 自备水井泵站 Water pump station
● 应急取水点 Emergency water intake point
— 应急给水主管网 Emergency main water supply pipe network
- - - 应急给水次级管网 Emergency secondary water supply pipe network 10



10. 应急给水网络示意图
 11. 应急生活设施——取水
 12. 应急生活设施——餐饮
 13. 应急生活设施——厕所
 10. Water supply network
 11. Emergency facility — water intake facility
 12. Emergency facility — cooking facility
 13. Emergency facility — toilet

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roads in the central city, forming a network that connects the park east to west and to the larger urban area. Because of Gyegu's location in the Qinghai-Tibet Plateau, local people often ride horses or driving carriages, and a 6 m wide bridle path paved with asphalt concrete was specially designed for the park. Since the site is so narrow, the width of the park roads to the city are decreased from 3 m to 2 m in order to provide more space for the landscapes. The other paths are 1.5 m in width.

Newly planted trees and shrubs focus on



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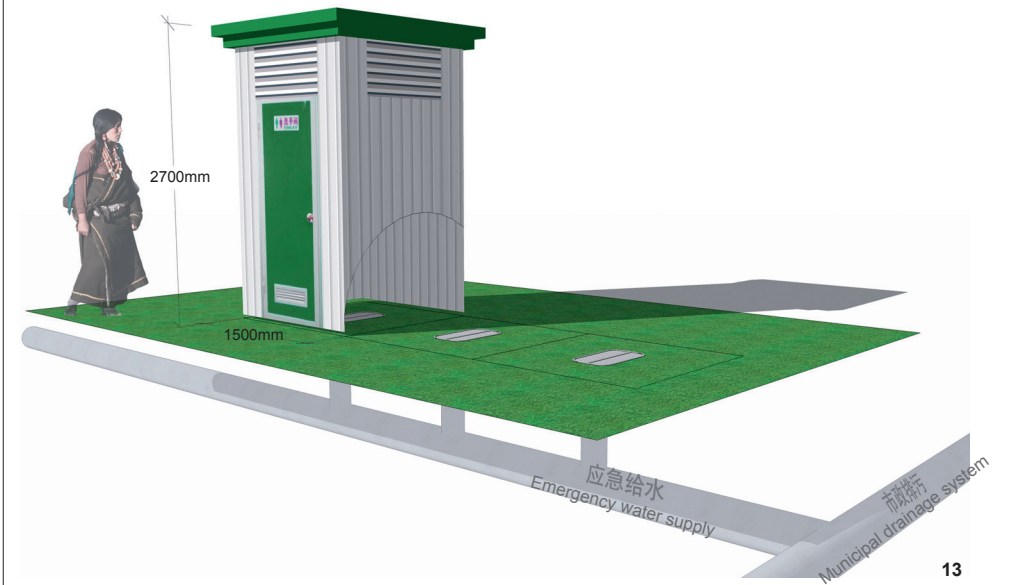
important nodes and perspective distances. The principal tree species include *Sabina przewalskii*, *Betula utilis*, *Picea likiangensis*, *Populus cathayana* and *Picea purpurea*. The main shrub species include hardy specimens of *Potentilla fruticosa*, *Syringa oblata*, *Hippophae rhamnoides*, *Forsythia suspensa*, *Sabina vulgaris* and *Prunus triloba*.

After comprehensive site analysis, each layer of the park was added to reduce danger and increase future resiliency. The design of disaster prevention facilities was mainly concentrated to these study areas. The racecourse wetland considered as reserved refuge area and not designed with disaster facilities.

The disaster prevention study divided the narrow park into three refuge zones: Zone I, Zone II, and Zone III, from east to west. To improve efficiency of information and emergency management, a network configuration is applied to management workspaces and emergency residential areas of the park. The central management is directly connected with sub-management centers in different parcels. The management center and emergency living area constitutes the skeleton of the park that guides emergency and evacuation procedures. Emergency living quarters are deployed within the emergency residential areas, forming a disaster planning model for the entire park.

Based on the precedents in Taiwan, China and Japan, about thirty to forty percent of refugees will choose parks as shelters. During post-earthquake reconstruction, the population of Gyegu will be about 100,000. Therefore, during the process of integrating disaster prevention into the park design, a population of 30,000 was used as a standard for designing the building facilities. The park site has room for 2,305 smaller 3 m × 4 m tents and 2,461 larger 4 m × 6 m .

In the event of a disaster, about thirty



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percent of the Zhaxike Wetland Park can be converted to become transportation and emergency facilities, while the rest will serve as an emergency residential area. The area of reserved residential area is about 74.3 hm². The first principle of emergency residential planning is that the area be safe and open. In response, most of the emergency residential area is a lawn enclosed by shrubs and trees, which helps bring a mood of calm and safety. Within the emergency residential area, roads divide the unit into parcels, each of which could potentially take on a unique emergency function. The space with a width of 4 ~ 6 m between each unit reserved as an emergency passage. If necessary, park vegetation can be trimmed or cut down to respond to an urgent need.

The emergency drainage system includes domestic water and wastewater. There are two operational modes of water supply systems in the park: during normal periods, the system connects with the municipal water supply network; during disaster events, the system can connect with emergency water supply system which includes wells and

pump houses. In the event that the connection with municipal facilities is destroyed, the emergency facilities will immediately begin to supply water. Hand pressure wells are used as water intake facilities. The ancient appearance of the hand wells are integrated with the surrounding environment. The pollution discharge system includes both emergency pollution discharge and landscape pollution discharge. When the emergency drainage system is connected with the municipal sewage network it can still work independently. For emergency power supply, the central management center has a solar energy generating facility takes advantage of solar radiation on the high plateau. On site, there are two types of temporary food and beverage facilities. The first has removable seatbacks and a plaza that can house additional stoves. The second uses landscape stones as heating devices that can also be used as enclosed stoves. The methods for disaster readiness employed at the Zhaxike Wetland Park are not only convenient to use, but also reflect important features of Tibetan life. **LAF**