1. 湿地自然游径效果图
1. Wetland nature trail concept.

© McGregor Coxall
1

候鸟机场 ——天津临港经济开发区 鸟类保护湿地公园项目设计

BIRD AIRPORT — TIANJIN LINGANG BIRD SANCTUARY WETLAND PARK DESIGN

McGregor Coxall设计事务所 / McGregor Coxall

1 项目背景

项目位于天津滨海新区CBD以南大沽口港区填海围垦的土地上。110hm²的场地最初被规划为工业港配套生活区。然而，尚未完全完成吹砂填海的场地在建设过程中被长期弃置，逐渐成为一个状态稳定的滩涂湿地，并在整个渤海湾海岸湿地逐渐消失的情况下吸引了大量候鸟驻留栖息。途经场地的候鸟品种众多，以鸻鹬类为主。每年有逾百万只鸟沿东亚-澳大利西亚候鸟迁飞区（EAAF）往返南极地区与地球北端，沿途寻找食物和栖息地，在上万公里的飞行路程中经停黄渤海区域众多“驿站”进行短暂休息和补给。然而，联合国环境规划署的报告指出，由于各国填海造地、海岸带城镇化进程加剧，EAAF上的栖息地正不断遭受破坏，迁飞区上超过60%的种群遭受数量锐减的巨大威胁^[1]，黑尾塍鹬等候鸟甚至濒临灭绝。^[2]

亚洲发展银行和天津临港建设开发有限公司以此处地块为目标场地，联合举办了设计竞赛：一方面希望尽可能保留现有自然生态资源，最大程度地保留天津港区域所剩无几的鸟类栖息地；另一方面，也希望通过设计和开发，为市民提供一处具有自然教育和城市休闲服务功能的湿地公园。McGregor Coxall设计事务所提出的“候鸟机场”鸟类

DOI:10.15302/J-LAF-20170409 | 收稿时间 RECEIVED DATE / 2017-07-27
中图分类号 / TU986.2
文献标识码 / B

摘要

东亚-澳大利西亚候鸟迁飞区（EAAF）是全球九大贯穿南北半球的候鸟迁飞区之一，每年都有全球五分之一的濒危水鸟在这条迁飞区上飞行。在沿海地区城市蓬勃发展的大环境下，鸟类栖息地与觅食场地逐渐消失，鸟类数量急剧下降。为了增加中国渤海湾核心鸟类栖息地的数量，McGregor Coxall设计事务所计划在临港经济开发区的一块填海围垦地上建立一处110hm²的鸟类保护湿地公园，并提出世界上首个“候鸟机场”设计。由于部分鸟类在迁飞途中会不间断飞行超过11 000km、长达10天不进食饮水，位于渤海湾上的“候鸟机场”将是EAAF上鸟类进行补给和繁衍的至关重要的一站，对中国、澳大利亚，乃至全球生态系统具有重要意义。

关键词

候鸟机场；东亚-澳大利西亚候鸟迁飞区；沿海景观；湿地；自然教育

ABSTRACT

Each year more than 50 million birds make the return journey from the Antarctic reaches to the northern tip of the earth along the East Asian-Australasian Flyway (EAAF) seeking food and shelter. As one of the nine global north-south fly ways, the EAAF is now the world's most threatened due to the loss of bird foraging habitat by coastal urbanization. One in five globally threatened water birds including the Black-Tailed Godwit fly the EAAF but they are suffering rapid declines in population.

In a bid to increase critical bird habitat on the shores of the Bohai Bay in China, the Asian Development Bank encouraged the Port of Tianjin to embark upon an international design competition for a wetland bird sanctuary on a degraded land fill site in Lingang. McGregor Coxall won the first prize in the competition with a proposal of establishing the world's first migratory "Bird Airport" — a 110-hectare wetland park and bird sanctuary. With some birds flying non-stop for more than 11,000 km and up to 10 days without food or water, the airport will be a crucial re-fueling and breeding stop on the EAAF.

KEY WORDS

Bird Airport; East Asian-Australasian Flyway; Coastal Landscape; Wetland; Natural Education

整理 汪默英 田乐

EDITED BY Moying WANG Tina TIAN

5 百万只涉禽和滨鸟沿该迁飞区迁徙
million migratory waders and shorebirds

22 个国家和地区位于迁飞区之中
countries intersected

29 种保护物种
protected species

55 种迁徙物种
migratory species

10,000 km的迁徙飞行距离（跨越大洋洲和东南亚）
km through Oceania and South-East Asia

15,000 只滨鸟在此栖息（每年）
shorebirds supported annually

25,000 只水鸟在此栖息（每年）
waterbirds supported annually

52 种鸟类途经临港湿地
bird species fly through Lingang Wetland

2.1.2 划分水单元，增强可控性

将百余公顷的湿地公园通过堤岸划分为超过16个水单元，并通过每个水单元入口和出口处的自动化远程遥控水闸实现单独调控和维护。一方面，创造了多样化的栖息地环境。另一方面，也避免了对整体水位的干扰。

2.1.3 多级净化，最小干扰

设计对新引入水源及降水均采取多级净化措施，保护生态敏感地带。从一期湿地引入的补充水源依次经过北侧开放深水区沉淀、北部芦苇区过滤、滩涂湿地区曝晒和边缘缓冲区最终净化。其中，边缘缓冲区中的水渠可以通过远程水泵调整，避免水体长时间滞留及赤潮或低溶氧，维持鸟类核心保育区内的水质。另一层意义上，边缘湿地水渠对企图进入南部核心保育区的流浪狗等捕食者而言是一种威慑和障碍，也为水鸟提供了所需的安全距离，保证鸟类栖息免受干扰。

2.2 修复鸟类栖息地

项目参考了渤海湾、北大港水库等地的候鸟潜在造访湿地中的鸟类种群，及其生活习性、栖息地特征、食物类型、繁殖区域等，以精确设计新的栖息地形态，例如为涉禽准备的低植被覆盖的滩涂湿地、为水鸟设计的深水池塘，以及为滨鸟设计的高草植被覆盖区，最终将临港鸟类保护湿地公园划分为5种主要的鸟类栖息地类型。

2.2.1 滩涂湿地区

方案将南部原生滩涂湿地作为核心保育区，致力于保留和提高该区域的环境质量。该区域以水深小于10cm的浅水区为主，具有大面积的软湿沉积物，可供弯嘴滨鹬、泽鹬、黑尾塍鹬、反嘴鹬、白翅浮鸥等鸟类觅食。为满足不同鸟类物种的需求，设计在原生滩涂湿地中适当增加光滩等栖息和筑巢的场所，并在远离岸线处设计形状、高程各异的滩涂小岛。通过洪涝管理和清洁管理等方法清除过度繁殖的植被，以控制植被范围。

- 4. 设计策略
- 5. 全区鸟瞰图
- 4. Site strategies
- 5. Aerial view across the site

2.2.2 北部芦苇区

芦苇湿地是东方大苇莺、褐柳莺、黑眉苇莺、暗绿绣眼鸟、黄腹山鹪莺等鸟类的典型栖息地，也是史氏蝗莺、远东苇莺、黄胸鹀等濒危物种的栖息地。芦苇区的设计水位为50~250mm，拥有稳定的含盐量，土质为砂土到粘土。考虑到芦苇属植物具有提供鸟类食物来源、筑巢材料、庇护泥滩、净化水体等优势，设计将芦苇属植物作为该区主要物种，以使生态效益最大化。

2.2.3 开放深水区

开放深水区水深大于1m。在湿地建设初期人为投放一定数量的鱼苗和昆虫，作为野鸭、苍鹭等鸟类的食物来源。深水区中设置一系列群岛，使鸟类远离人类干扰。沿深水区边缘种植一系列湿生草本植物，为鸟类提供食物来源和筑巢材料。并于深水区中安放

一定数量的栖木，供鸟类在其上筑巢或作为观察猎物伺机捕食的据点。

2.2.4 边缘缓冲区

通过建造一面简单的堤墙，可在最少的挖掘工作下建立起边缘缓冲区，保障了鸟类所需的安全距离，并通过流动水体在外围湿地的再循环，确保了滩涂湿地区的水质。这一缓冲区域水深小于30cm，着力营造种类丰富的湿地群落和净水植物。

2.2.5 陆地森林区

森林区环绕在湿地公园外围，聚集着大量乔木，是城市大型交通基础设施和场地之间的缓冲带。众多鸟类选择在林地筑巢，并从湿地获取资源。对陆地森林区的设计和改造主要包括丰富林下植被，为地面鸟类提供额外的食物；增设少量由灌木和草地组成的

图例 LEGEND

1 湿地公园主入口
Main Entrance	6 湿地教育中心
Water Pavillion	11 管理用房
Maintenance Building	16 湿地栈桥
Boardwalk Bridge	21 思闲亭
Shelter	26 南部鸟类核心保育区
Southern Bird Sanctuary	31 未来规划高架
Future Planned Overpass
2 主入口桥梁
Main Bridge	7 千雀台
Bird Hides	12 泵站
Water Pump Station	17 飞虹桥
Bridge	22 滩涂探险步道
Mudflat Delta Walk	27 植被隔离带
Buffer Planting	32 未来规划道路
Future Planned Road
3 游客停车场
Visitor Parking	8 候鸟栖木
Bird Resting Stake	13 高架下的骑行廊道
Underpass Crossing	18 林中探险步道
Forest Walk	23 湿地观鸟台
Bird Hides (Sanctuary)	28 高速隔音墙
Noise Wall	
4 北部入口广场
Northern Entry Plaza	9 雁栖湖
Moon Lake	14 高架下的步行道
Underpass for Pedestrian	19 林中步道
Forest Promenade	24 南部入口小广场
Southern Entry Plaza	29 南部水渠
Water Channel	
5 百鸟朝凤水下游廊
Bird-song Tunnel	10 湖滨草台
Grassland	15 金台夕照观鸟亭
Wetland Trail Shelter	20 湿地游径
Wetland Trail	25 咖啡茶座
Café	30 高堤骑行道
Cycling Circuit on Bund	

© McGregor Coxall
6

区域，为小型鸟类提供额外的栖息地；以及适当营造人造树洞、鸟舍等人工栖息地。

2.3 多功能景观建筑

秉承最小干预原则，主要的景观建筑设施和人类活动相对较多的空间主要集中在靠近入口和城市环境的场地北侧，并向南部地区逐渐减少。

建设在水上的湿地教育中心占地面积3 500m²，是整个湿地保护公园的中心建筑，也是天津地区湿地候鸟的高科技教育和研究中心。该建筑将湿地环境教育融入空间序列的体验中，比如在连接入口的水下游廊中悬挂鸟类艺术作品、播放鸟鸣音效，在巨型LED幕墙上播放由埋设于公园各处的隐藏摄像机拍摄的鸟类实时影像等。该建筑还连接着三个悬浮于湖面之上的观鸟台，一条埋

设于水下的游廊将观鸟台与建筑主体相连。观鸟台前设置了供鸟类驻足停歇的栖木，能够吸引大量鸟类来此，因此，这三座观鸟台又被统称为“千雀台”，是游人观赏鸟类的绝佳地点。

全园共有13座观鸟台疏密有致地分布在湿地教育中心周边的公共展示区、中部人工湿地区、南部滩涂湿地核心保育区等区域中。设计尽可能在观鸟台前创造岛屿、

6. 总平面图

7. 水系统规划设计策略
6. Site plan

7. WSUD strategy

光滩来吸引鸟类停靠驻留，为游人带来最全面的观鸟体验。

3 愿景与挑战

在项目设计过程中，我们遇到的挑战首先来源于场地勘察和监测资料的缺乏。由于场地是近年来填海造陆形成的区域，岩土信息、地下水水质水量等数据普遍缺失，无法对环境系统进行精准建模，只能倚赖现场考察和场地监测进行补充。

此外，考虑到海岸盐碱地的强侵蚀性，设计鼓励使用稳定持久、维护成本低的材料，

如混凝土。但这一材料在设计造型、施工技术上颇具挑战，也考验着委托方和市民对充满野趣的自然美学和材料美学的接受程度。

最后，我们在这个项目上提倡国际合作模式。在设计伊始即邀请了澳大利亚、新加坡等国的鸟类学顾问和生态学家为项目提供咨询服务，同时联合国内的水鸟专家和湿地专家提供意见，充分认知并确立了场地与全球生态语境环环相扣的重要性。在未来的投资开发、设计运营、管理维护过程中，也希望联合国内外研究平台、环境保护机构、学术机构、公园管理机构等力量，真正实现大型生态湿地公园的长期而有效的发展。**LAF**

1 Project Background

Located at the heart of the Shipping Port of Tianjin, a man-made wetland in Lingang that has fortuitously appeared on the reclaimed shoreline of Bohai Bay. It has been born out of the earth works from surrounding highway construction and urban development that have created an artificial stormwater basin. The thin layer of water and marine soils have interacted to create an ecological habitat for foraging, resting and breeding

by more than 10,000 water birds each year among which are internationally protected migratory species. Birds on the East Asian-Australasian Flyway (EAAF) such as the critically endangered Black-tailed Godwit have made it their transitory home in spring and autumn.

This master plan recognizes the importance of the site to China, Australia and the global ecosystems by proposing the establishment of a “Bird Airport” — a wetland park and bird sanctuary. As a

8. 全园剖面与竖向设计
9. 栖息地食物网设计策略

8. Sections and elevations of the whole park
9. Food web creation strategies

sister site to the recently completed Lingang Wetland Stage 1, the sanctuary comprises a 110-hectare wetland bird reserve, including 16 bird hides and a 20-hectare forest with a modern visitor, education and research center called the Water Pavilion.

2 Design Strategies

2.1 Bird Habitat Planning and Design

The project studied the migratory bird species in the Bohai Bay and Beidagang Reservoir, including their behavior, habitat, feed type, and breeding, which well informed the bird sanctuary planning and design. The bird preservation planning is based on the following four principles:

- 1) Minimal changes to the southern zone, currently used by thousands of migratory shorebirds;
- 2) Creation of new habitat in the northern zone for three different types of water birds including additional non-vegetated mudflats for shorebirds, a deep pond area for water birds and a vegetated wetland zone for wetland birds;
- 3) Creation of new habitat targeted for specific vulnerable and threatened shorebird as well as water bird species. This will be done through the creation of cells with specific conditions (such as water level,

salinity level, amount of islands, types of prey, breeding requirements) suitable for the targeted bird species in the new northern delta mudflat zone;

4) A scientific observation and adaptive management approach which makes use of a range of monitoring to make informed management decisions to maximize the potential use by different bird species.

Finally, five types of bird habitat are planned: mudflats, reed beds, open water, perimeter edge wetland, and terrestrial forest.

2.1.1 Mudflats for Shorebirds (Particularly Migratory Shorebirds)

The shallow semi-vegetated ponds in the southern zone are important habitats for a number of migratory birds on the EAAF, such as Curlew Sandpiper (*Calidris ferruginea*), Marsh Sandpiper (*Tringa stagnatilis*), Black-tailed Godwit (*Limosa limosa*), Pied Avocet (*Recurvirostra avosetta*), and White Winged Black Tern (*Chlidonias leucopterus*). To establish habitat for these migratory shorebirds, water in the mudflats should be very shallow (typically less than 10 cm in depth). Regular drown could help to clean up the overgrown vegetation to ensure large area of wet soft sediments exposed for shorebirds foraging.

10. 湿地教育中心剖透视觉效果图

10. Sections and elevations of the Water Pavillion

© McGregor Coatl
10-1

This exposing mud flat areas will attract a great number of shorebirds opportunistically use the ponds to roost in at high tide when the intertidal shores are covered in water and not able to be used for foraging. Cells in mudflats zone are also designed in the way to target for certain vulnerable or threatened species which would potentially use the mudflat areas, such as Lesser Sand Plover (*Charadrius mongolus*) (EN), Great Knot (*Calidris tenuirostris*) (VU), Bar-tailed Godwit (*Limosa lapponica*) (VU), Red Knot (*Calidris canutus*) (VU), Dunlin (*Calidris alpina*) (VU), and Greater Sand Plover (*Charadrius leschenaultii*) (VU). All of these species have been observed to use similar shallow pond habitat on the Luannan Coast on the Bohai Bay immediately north of Lingang Bird Sanctuary. Although these species have not been observed in Lingang, it is highly likely that with the creation of appropriate habitat, a number of these species would start to visit the Lingang Bird Sanctuary.

2.1.2 Reed Beds for Wetland Birds

Reed bed wetlands provide a substantially different type of habitat which provide: 1) insect food sources as reed beds support abundant populations of insects which are prey for small reed warblers and

similar birds; 2) seed food sources when the reeds are in flower, including providing a food source for birds which predominantly use both the forested and open water habitat; and 3) materials for nesting. The water in the reed beds is shallow, typically varying from 50 mm to 250 mm in depth. The palette of vegetation is selected to maximizes food availability, particularly the ability to attract a variety of insects, and to create large areas of leaf litter and high basal stem density which have been shown to be positively correlated to bird numbers.

As a sheltered habitat different from the exposed mudflats, the birds typically use the reed bed wetlands include Oriental Reed Warbler (*Acrocephalus orientalis*), Dusky Warbler (*Phylloscopus fuscatus*), Black-browed Reed Warbler (*Acrocephalus bistrigiceps*), Japanese White-eye (*Zosterops japonicas*), Yellow-bellied Prinia (*Prinia flaviventris*), etc. Reed beds can also be used by threatened species such as Styan's Grasshopper Warbler (*Locustella pleskei*), Manchurian Reed Warbler (*Acrocephalus tangorum*), and Yellow-breasted Bunting (*Emberiza aureola*).

2.1.3 Open Water for Waterbirds and Perching Posts

Deep open water zones also provide

a different type of habitat and are used by water birds. The water in this area is quite deep, one meter at least. These habitats support aquatic insects and small fish which provide a feed source for a range of water birds, including teals, ducks, and herons. Perch posts create an iconic habitat for birds (kingfishers) to nest on and to use them as observations points for fishing.

2.1.4 Perimeter Edge Wetland for Wetland Birds

The perimeter edge wetland is designed as: 1) a buffer zone for shorebirds to provide a safe distance to alert them to potential predators and threats; 2) a protection zone to prevent access by stray dogs from entering the southern bird preservation zone; 3) an additional habitat for reed birds including reed warblers and praniias; 4) a source of food resources for birds roosting and nesting in the adjacent woodland areas.

Furthermore, the perimeter wetland is an important part of the water management strategy. It enables the water in the mudflat zone to be recirculated preventing stagnation and free of algal blooms by recirculating water through the perimeter wetland.

The perimeter wetland is to be constructed by building a simple bund wall to create the perimeter wetland with

© McGregor Coxall

10-2

minimal excavation. New automated and remote controlled sluice gates are supposed to add to allow water into the mudflat cells. The water in this area is very shallow, no more than 30 cm.

2.1.5 Terrestrial Forest

The terrestrial planted area currently substantially exists around the perimeter of the bird preservation wetlands. The existing woodland consists of large numbers of planting of trees. This area is very important in terms of habitat structure as it is the main location where trees are proposed which is significant to the habitat structure. Many bird species use the woodlands to nest in and wetlands for resources.

The terrestrial forest also plays a number of important roles, providing:

- 1) habitats for a range of smaller birds including thrushes, fly catchers, orioles, warblers, buntings, and wagtails;
- 2) habitats for a range of larger birds including owls, eagles, falcons, and kingfishers;
- 3) a buffer zone to the surrounding development area and infrastructure;
- 4) shade and amenity

for visitors to the site along the perimeter path; 5) habitats for other species including butterflies and lizards.

Hydro-seeding is used to provide an understory of native grasses underneath the existing planted woodland trees in order to provide for additional food such as seed and insects as well as ground cover for ground birds. A number of created habitats, such as artificial tree hollows and bird boxes for hollows, are supposed to be added in this area.

2.2 Water System Planning and Design

2.2.1 Use of Treated Wastewater

Currently the Lingang Bird Sanctuary is filled with rainwater that falls on the site. Diverting wastewater into the bird sanctuary may cause a change in prey availability, salinity and toxicity of water, nutrient composition, sediment deposition, and impact the current groundwater-surface water interactions at the site.

The proposed strategies for reuse of the wastewater include:

- 1) Pump treated wastewater from the existing channel near the northern boundary

11. 湿地教育中心室内效果图
12. 从湿地教育中心望向千雀台效果图

11. Render view of the Water Pavillion
12. Render view from the Water Pavillion to the Bird Hides

© McGregor Coxall
12

of the site;

2) Treated wastewater is to be pumped into the deep pond area to ensure sufficient flow through the deep pond area to prevent stagnation and poor water quality;

3) Treated wastewater is then typically discharged by gravity to the existing channel;

4) If water levels are too low in the northern reed bed and delta mudflat zones, treated wastewater is released by gravity into these cells through automated and remote controlled water level control gates;

5) If water levels are too low in the southern mudflat bird sanctuary zone, treated wastewater is released by gravity into the southern zones through automated and remote controlled water level control gates.

2.2.2 Northern Zone of Reed Bed and Delta Mudflat for Water Management

The northern zone of reed bed and

delta mudflat is proposed to consist of shallow water areas interspersed with islands for roosting and nesting by birds. Rainwater falling in this zone is collected as the main water supply. Drainage of the cells is introduced for water management, including sediment removal, mudflat reshaping, and addition of new habitat. The northern zone is supposed to be able to reduce long residence times and increase turnover of water in the wetland system by allowing treated water into the system.

2.2.3 Southern Zone of Mudflat Bird Sanctuary for Water Management

The southern mudflat bird sanctuary zone currently consists of very shallow water areas interspersed with higher areas of mudflats. In some sections there are vast areas of vegetation which is tolerant of brackish water, including Phragmites.

The general philosophy of water

management in the southern zone is to make minimal changes to the existing bird habitat area until better knowledge and greater observations are made in this area. Any change needs to be audited post construction to ensure that no negative impact on use of the area by shorebirds occurs.

Similar to the delta mudflats, this zone is primarily a habitat area for birds and water is supplied to the area to manage the zone to maintain suitable habitat. Rainwater falling in this zone is collected as the main water supply. The physical structure of the southern mudflat zone is proposed to minimize the impact to the zone and ensure that any new works do not significantly impact on the current bird habitat of important EAAF migratory birds.

2.3 Major Architecture and Structure Design

The Lingang Bird Sanctuary is proposed

to have a range of world class visitor facilities and education resources. The Water Pavilion is the central building on the wetland providing a venue for year round activities. Visitation and research activities are likely to peak in spring and autumn when the migratory birds come to the site. In winter the building will be a popular venue for conferences, school groups and lectures. In summer when birds are not present the wetland trail network will be open for people to walk and enjoy the small bridges and shade shelters. The Pavilion has a large green roof and a glass louvred façade for environmental control of indoor air temperature. A giant LED wall in the pavilion will display real time movie footage of birds broadcast from hidden cameras in the bird hides. The screen will also display

educational information including the international fly ways and locations of birds as they move. School and tour groups can occupy the long benches to view the screen and also walk around the environmental exhibition panels hung from the roof. The theater compliments the LED wall and exhibition space providing year round activation and income for the building.

Bird Hide is another major structure in the bird sanctuary. It is proposed to include a technical design layer to the Bird Hide design based on the following principles:

1) Designs to minimize impact of sun on viewing through location of multiple Bird Hides around the site which enables a hide to be found at all times which is not looking into the sun;

2) Creation of islands, particularly small

13. 观鸟台效果图

13. Bird Hide concept

© McGregor Coxall

mudflat islands in front of the Bird Hides to maximize the chances of seeing birds;

3) Designs to avoid distracting birds including minimizing the silhouetting of people entering the bird hides;

4) Design of the Bird Hides to maximize ease of observations including viewing heights for viewing areas, provision of benches for comfortable viewing as well as desktops to enable observations to be made and to place materials such as books and writing pads;

5) Screening of people entering the bird hides to minimize the disturbance;

6) Information to help users at the park understand the best time to view birds including both times of a year when the birds are more likely to be seen, and times of a day including tide times to understand when birds may be using the area to roost at high tide;

7) An education role including information on bird species that can be seen;

8) Provision of telescopes to enable more opportunities to see birds.

3 Visions and Challenges

China’s environmental challenges are far reaching with water, soil and air pollution emerging as critical to the health of its people. Protection of critical and endangered ecological habitat needs a strong mandate from the central government so that local projects are required to demonstrate environmental performance. We found that there is a lack of experience in delivering constructed wetland / habitat projects in China so it was important to educate the client and the local design institute on the design and construction methods needed for such a complex environmental project. We also observed an absence of site environmental controls in China for protecting environmental values during construction. Correct observation of site construction processes will be critical to

make this project a success.

One of the key challenges in preparing the design was the lack of scientific data to allow accurate modelling of the environmental systems. 3D survey, soil science and geotechnical data were difficult to obtain. Also the design program was too short to allow proper scientific investigation and design exploration needed to properly inform the project.

After winning the competition, the primary landscape design challenge was to convince the client that the project needed to have a “wild” nature aesthetic instead of being a manicured picturesque garden so that the environmental values could be protected. The design utilised simple robust materials with a low carbon footprint that could be readily constructed and that would require little future maintenance. The project needed to strike a careful balance between the competing client interests of a park that could be used for recreation and real estate marketing purposes, together with international ecological conservation measures.

The Lingang Bird Airport masterplan by McGregor Coxall advances environmental landscape design in China but will be a big test on the ability of the local design institute in Bohai to deliver an international quality design and conserve the endangered birds. Meanwhile scientific evaluation and monitoring of the birds on site will continue. **LAF**

REFERENCES

[1] Conklin, J. R., Verkuil, Y. I., & Smith, B. R. (2014). Prioritizing Migratory Shorebirds for Conservation Action on the East Asian-Australasia Flyway (p. 66). Hong Kong: World Wildlife Fund.

[2] United Nations Environment Programme. (2014). United Nations Environment Programme Annual Report 2013. Retrieved from: <https://wedocs.unep.org/bitstream/handle/20.500.11822/8607/-UNEP%202013%20Annual%20Report-2014UNEP%20AR%202013-LR.pdf?sequence=8&isAllowed=y>