

DESIGNING FOR INDETERMINACY

by Xuan He

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*Department of Landscape Architecture
Faculty of Architecture
University of Manitoba
Winnipeg*

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ABSTRACT

The relocation of Chongqing Iron and Steel Company (CIS) in 2011 resulted in its old site's demolition in 2012. As one of the largest post-industrial sites in Chongqing, it faces many future challenges. Framed by an existing redevelopment plan, this practicum proposes a design that responds to the current site conditions and lays groundwork for its future.

The design capitalizes on the existing attributes of the site to create a variety of experiences. It employs phytotechnology to remediate contaminated soil and also offers opportunities for research, education and recreation.

Personal experiences and reflections on China's post-industrial regeneration are also discussed.

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INTRODUCTION

This practicum develops a design strategy for the former site of Chongqing Iron and Steel Company in the light of its industrial past and urban future.

This enquiry falls under the umbrella of post-industrial landscapes and urban regeneration. Landscape architecture projects in these areas have resulted in some iconic precedents. Perhaps most notably, the international building exhibition championed by German government and the European Union in the 1980s led to the repurposing of the Thyssen steel plant to be reborn as the widely known Duisburg-Nord Landschaftspark.

With an awareness of this and other such projects, here, in 2016, I explore what post-industrial regeneration might mean to a developing country such as China, by developing design strategies for a site in one of the country's oldest heavy industrial centres along the Yangtze River, Chongqing.

The site is located along the Yangtze River, under the jurisdiction of Dadukou district. The steel plant was first established on this site in 1938. In 2011, it was relocated to a satellite city, Changshou, 75 kilometres northeast of the main city areas of Chongqing.



CHONGQING

Area

city: 657.78 km²

municipality: 82,403 km²

Population

city: 7,457,589

municipality: 32,800,000



The demolition of the CIS's plant took place in 2012. By June 2015, very little remained of the former industrial compound. Currently the site is overgrown with wild vegetation and devoid of human presence.

In 2007, while the plant was still in production, a competition was held for proposals for the redevelopment of the site. The winning entry proposed to keep parts of the factory structures in order to preserve the site's industrial characters. However, the subsequent demolition process deviated from the approved plan, resulting in an almost complete obliteration of the plant's former routing network and its unique spatial character.



As of now, this large piece of land is owned by a government corporation whose aim is to auction off the entire area by 2025. The plan for future development will roughly follow the winning proposal of 2007, with a few modifications due to the hasty demolition in 2012.

The site at present is in limbo, caught between its previous identity and its rosy future projections. It is a ruin waiting to be reborn, an ambiguous existence waiting to be redefined. This transient stage has been given very little thought or imagination, as if the site's sole purpose is to wait for the arrival of some future finality .

Yet this wait is unlikely to be a short one. It may take 10 years or longer for redevelopment to even start, during which time this land will be open to all kinds of natural and human-induced processes. Instead of laying it to waste, I would like to imagine the possibilities and opportunities for this space. How might it be utilized in this seemingly unimportant transitory period? What kind of ground work can be laid so as to support the site's ecological, economic and social present as well as its future development?

In June 2015, when I first went on site, I was mesmerized by the stark contrast between the vigorously growing vegetation and the crumbling blast furnace. Within two years after the site was scrubbed clean, plants have colonized the abandoned industrial structures and the vast open land, turning the place into a hotbed for natural succession.

I had spent a month back in 2007 in and around this steel plant, working on a film crew. The factory buildings, towering furnaces, busy rail tracks, webs of overhead skywalks, rolling steam clouds and the perpetual smell of dust made a deep impression on me. I was shocked to find all traces of these dramatic elements gone when I revisited the site for this practicum. If it were not for the last remaining blast furnace, a gas tower, a few smokestacks sprinkled over the large open space, I would not have recognized the area as the steel plant I had once known.



I was initially filled with a sense of loss and frustration. I had imagined a very different situation; I thought at least the rail tracks and the groups of huge furnaces along them would be preserved. I could almost picture them in my mind as the preserved structures in Duisburg-Nord, peacefully living their second life as relics, telling stories through their awe-inspiring presence as witnesses of the city's industrial past. Instead I was presented with the aftermath of a hasty demolition process; a ruin with very little indication of what had once been there. Had there been more left, a designer might have more to "play with". With so many interesting and successful post-industrial regeneration projects as precedents around the world, one could immediately see the potentials for such a huge steel plant, that is, if it had been substantially preserved. But given the present situation, this site needs to be approached very differently.

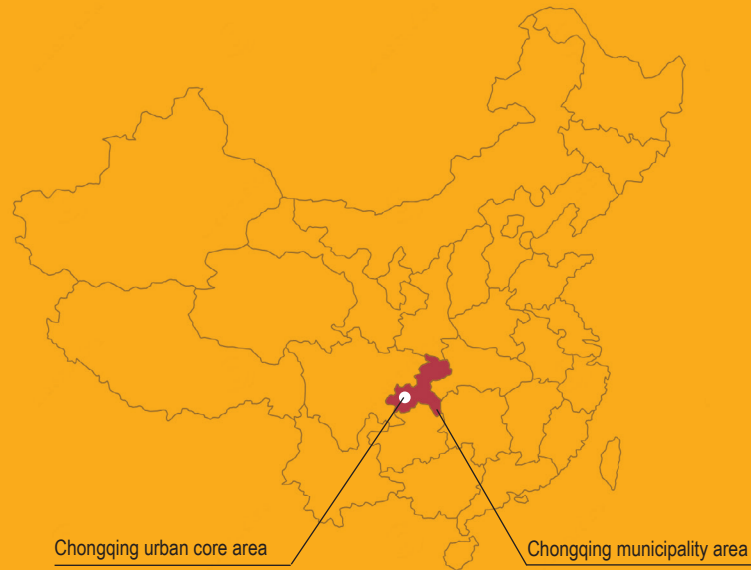
Since a general development plan for this site is already in place and an industrial heritage museum, converted from a former rolling mill, is already under construction, I realized that I must see the site as it is now. Understanding what the site is at present, knowing what it will become in the near future, I have turned my focus on the transitory period: this seemingly ambiguous stage between its past and future identities. The site is in a fluid state, undefined, and therefore free to become many things, and the designer is free to pursue an array of potentials. Therefore, I no longer think of this site as a victim of careless negligence, but a land of exciting opportunities. There are many well known post-industrial redevelopments in China, many of which are similar to one another in their approaches and visions. Perhaps the CIS site, with its previous structures mostly demolished, invites a different kind of thinking, another way of interpreting a post-industrial landscape.

The site's redevelopment plan envisions a new urban quarter of mixed residential and commercial uses, along with some tourism and public green space due to its prime location on the Yangtze River. Therefore, the site's heavily contaminated soil needs to be treated and its basic infrastructure laid in before any other development. Works related to such functional concerns are usually carried out with very little imagination. Yet for a site of over 1,300 acres, these undertakings would be very costly and require great effort. As this is the main issue before this site's redevelopment, it becomes the primary focus of this practicum.

The goal of this practicum is to develop a design that integrates **soil treatment, phytotechnologies, educational opportunities and recreational public uses**. It is intended to serve the functional needs of the site while also realizing its potential to be a meaningful if transient landscape.

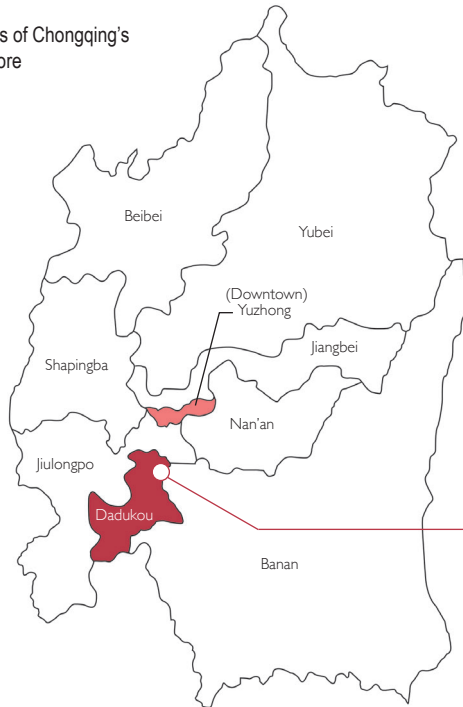
SITE CONTEXT

Chongqing, Located in Southwest China, is the nation's latest and largest municipality under the direct control of the central government. It consists of 38 subdivisions, 9 of which make up the urban core area.



Site Location

9 Districts of Chongqing's Urban Core



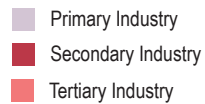
Site area 1,334 acres

The site of the former Chongqing Iron and Steel Company is under the jurisdiction of Dadukou District, one of the nine urban core districts of Chongqing. It is situated on the northwest bank of a bend of the Yangtze River, adjacent to residential and commercial blocks of medium density.



Site in Its District

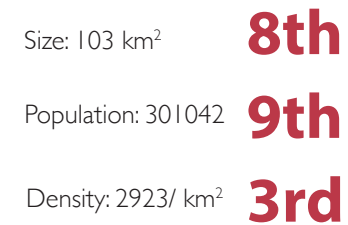
The former Chongqing Iron and Steel Company plant was one of Dadukou district's best known features. It defined the identity of this part of the city. This district's economy once depended heavily on its industrial productions, much more so than that of other districts. Since the late 1990s, the Chinese service sector has experienced accelerating growth, and the proportion of traditional secondary industries (mining, construction, manufacturing, etc.) in the country's economy has decreased. This is especially evident in Dadukou district. Its gross domestic product (GDP) make-up has changed dramatically since the relocation the steel plant, a change greater than that of all nine urban districts combined (see figure below).



Dadukou District GDP Make-Up



Dadukou District Profile in Relation to 9 Urban Core Districts

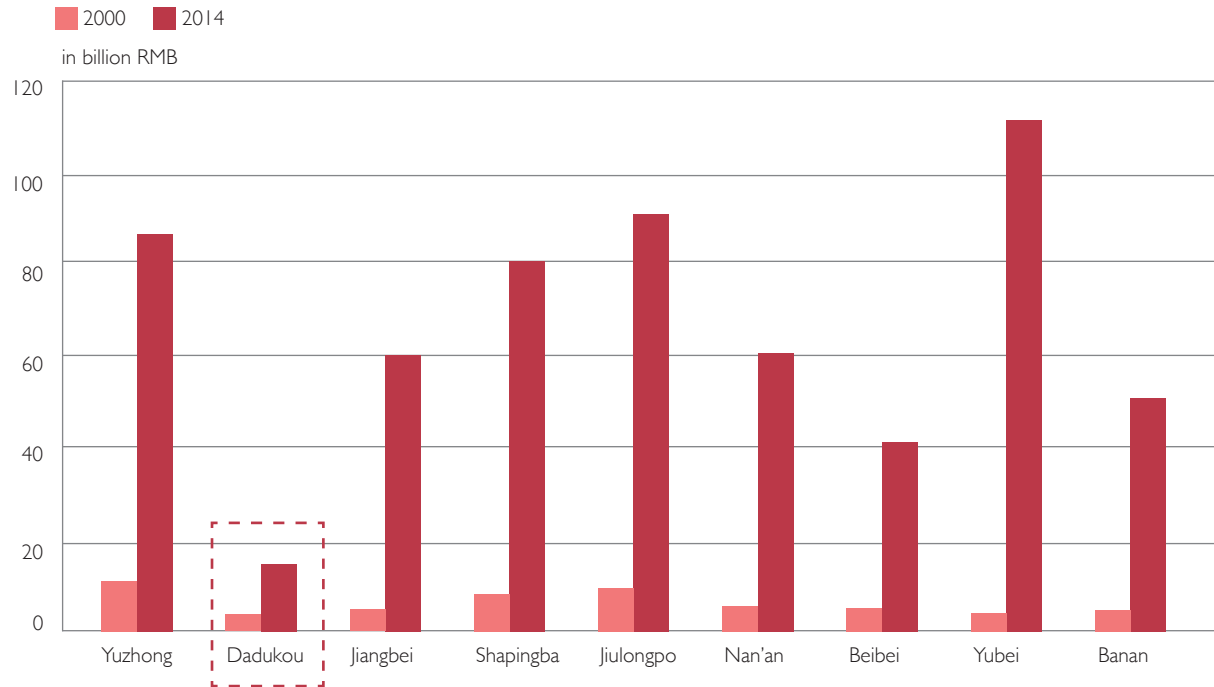


9 Urban Core Districts Combined GDP Make-Up



*charts derived from combining statistics from chapter 2-9, *Chongqing Statistics Year Book 2001* and chapter 20-3, *Chongqing Statistics Year Book 2015*.

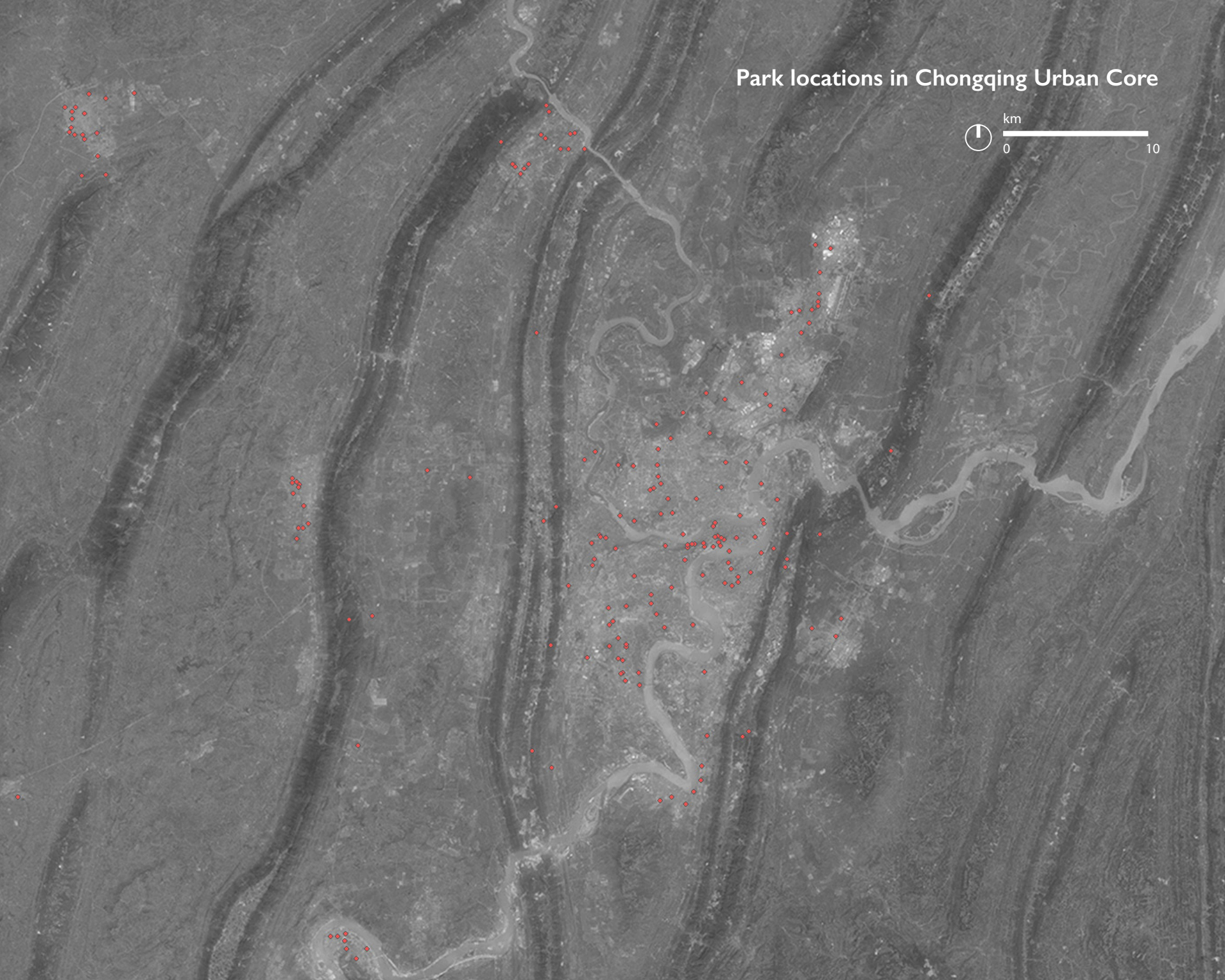
Chongqing Urban Core GDP Growth 2000 vs 2014



*charts derived from combining statistics from chapter 2-9, *Chongqing Statistics Year Book 2001* and chapter 20-3, *Chongqing Statistics Year Book 2015*.

Between 2000 and 2014, Dadukou had the lowest GDP growth rate among Chongqing's nine urban districts, a significantly poorer performance than that of any other district. The retreat of heavy industry from Chongqing, the once famous steel town, has made a huge impact on Dadukou's economy.

Park locations in Chongqing Urban Core



City Parks

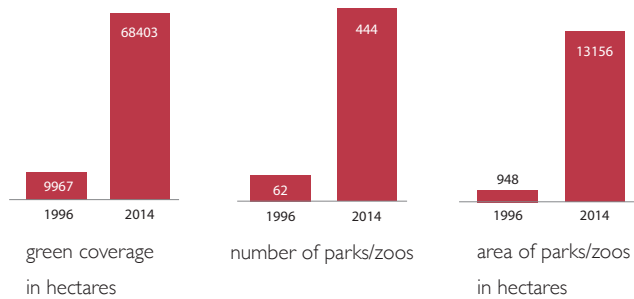


- scenic area/forest park
- public park
- golf course residence

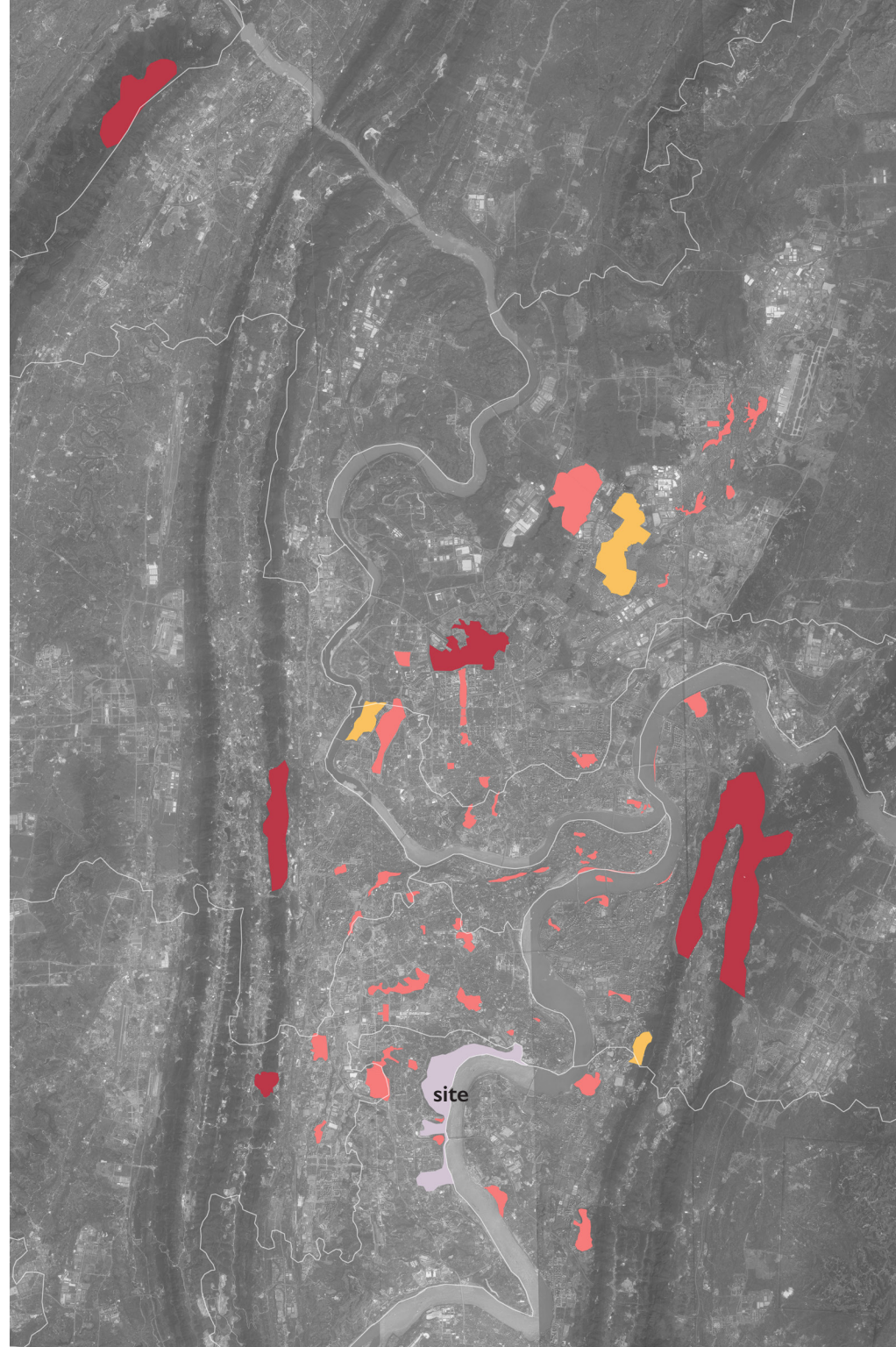
In the past decade, Chongqing has put much effort into building green infrastructure in the city, resulting in a sharp increase of the city's green coverage and park areas. This site has great potential as another sizable public green space, however it is not a pressing need as there are a good number of parks in its proximity.

14

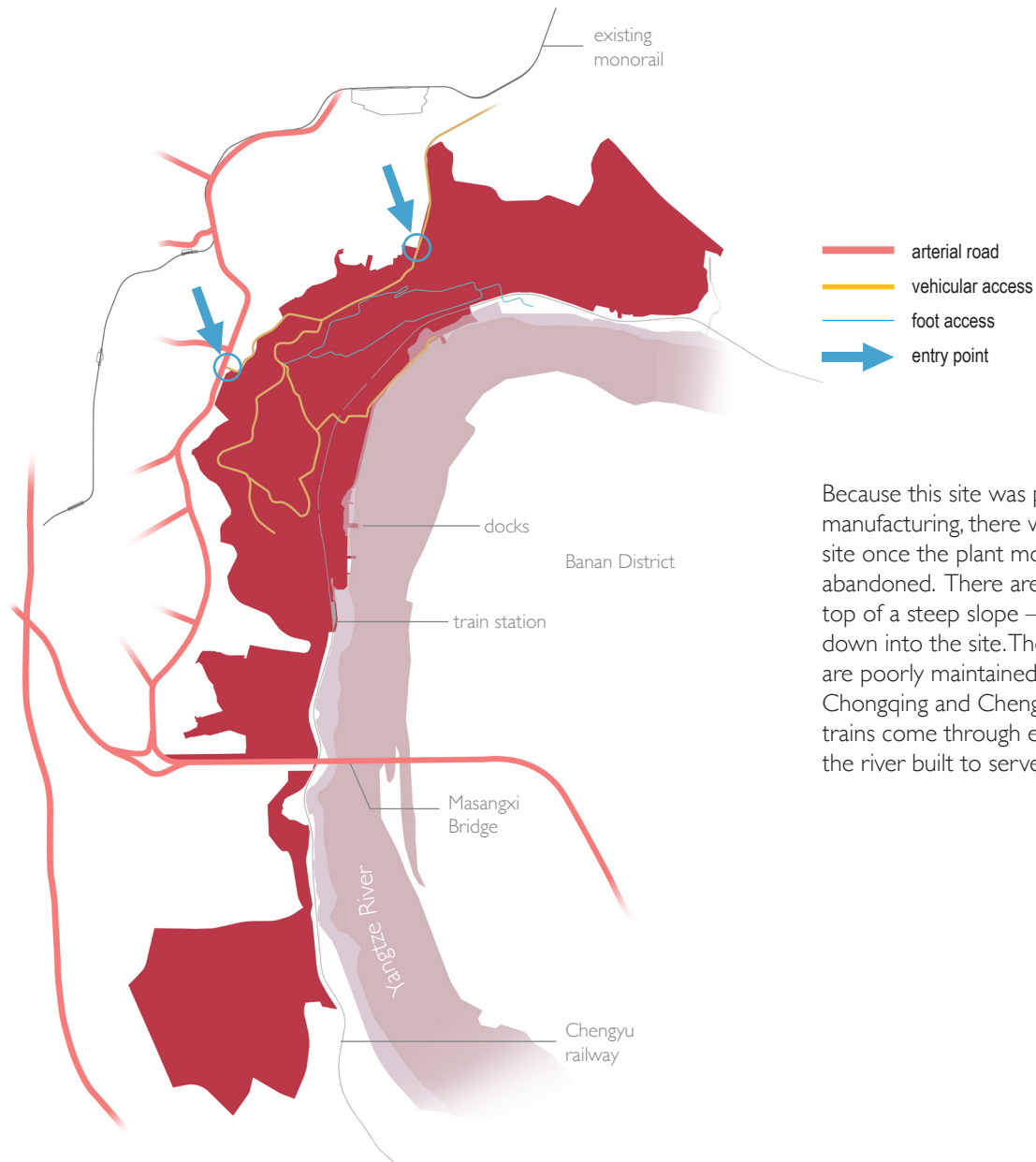
Chongqing Green Infrastructure Census 1996 vs 2014



*charts derived from combining statistics from chapter 7-11, *Chongqing Statistics Year Book 2001* and chapter 8-4, *Chongqing Statistics Year Book 2015*.



Access

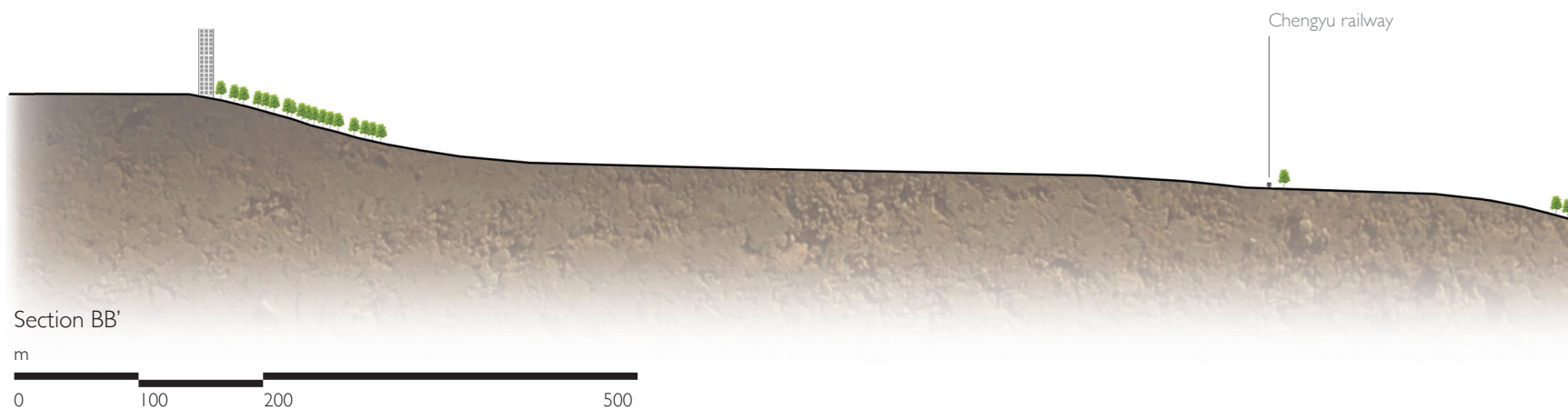


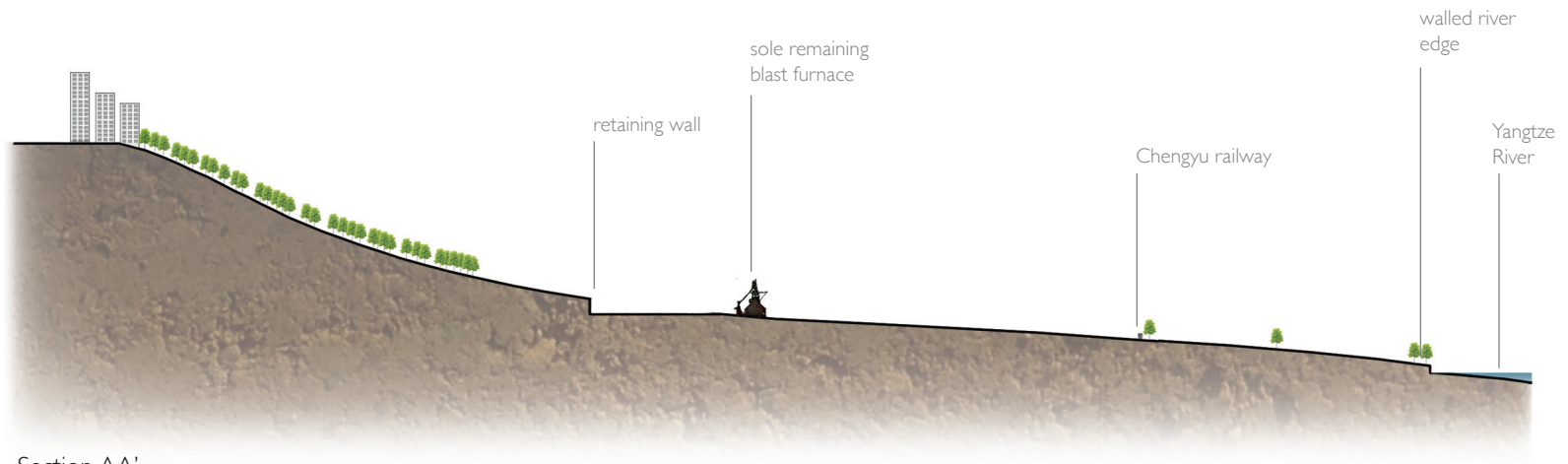
Because this site was previously exclusively used for steel manufacturing, there was no reason for anyone to visit the site once the plant moved away. The area is now mostly abandoned. There are only two access points – both on the top of a steep slope – that allow vehicular traffic to come down into the site. The roads within and along the site's edge are poorly maintained. A railway along the river connecting Chongqing and Chengdu is still in operation, but only four slow trains come through everyday. There are also a few docks on the river built to serve the steel plant.

Topography



This stretch of relatively flat land housed the main production factories of the steel plant. Bordered by a steep cliff rim, the site is difficult to access and cut off from the residential and commercial activities immediately above.





Section AA'

Yangtze
River



The main access route connecting the site to the residential areas above is a steep and winding dilapidated two-lane road.



On the main access road looking south at the only remaining gas tower and the river. Such openness is rare in mountainous Chongqing.

Remaining Relics

Much of the steel plant has been demolished, leaving only three smokestacks, one water tower, one gas tower and one rolling mill behind. The rolling mill has been designated as industrial heritage and is currently under construction to become Chongqing's first industrial heritage museum.



Due to the site's proximity to the river and its steep cliff edge, the steel plant had many elevated walkways connecting factory buildings to give this industrial compound an unique spatial quality. After the demolition, this character was replaced by flatness.

2007



2015



Vegetation



3

The site has been left abandoned since the demolition of its buildings in 2012. Secondary succession plants have naturally propagated. Most of these are locally viewed as weeds. Ferns and horseweed are the most distinguishable.

During the demolition process, most site buildings and existing vegetation were removed. There are no significant mature trees on the site except the rows along the edge of the river.

1. *Conyza Canadensis*(L.)Cronq
Canadian horseweed
小蓬草
2. Fern
蕨类
3. *Chimonanthus praecox*
Wintersweet
腊梅



Artemisia argyi
Chinese mugwort
艾草

I visited similar industrial factory river sites without recent disturbance and found a more diverse palette of species.



Dendranthema indicum
Chrysanthemum
野菊花



Humulus japonicus
Japanese Hop
葎草



Pterocarya stenoptera
Chinese Wingnut
枫杨



Debregeasia orientalis C.J. Chen
Yanagi Ichigo
水麻



Achillea Millefolium
Yarrow
欧蓍草



Leonurus sibiricus
siberian motherwort
益母草

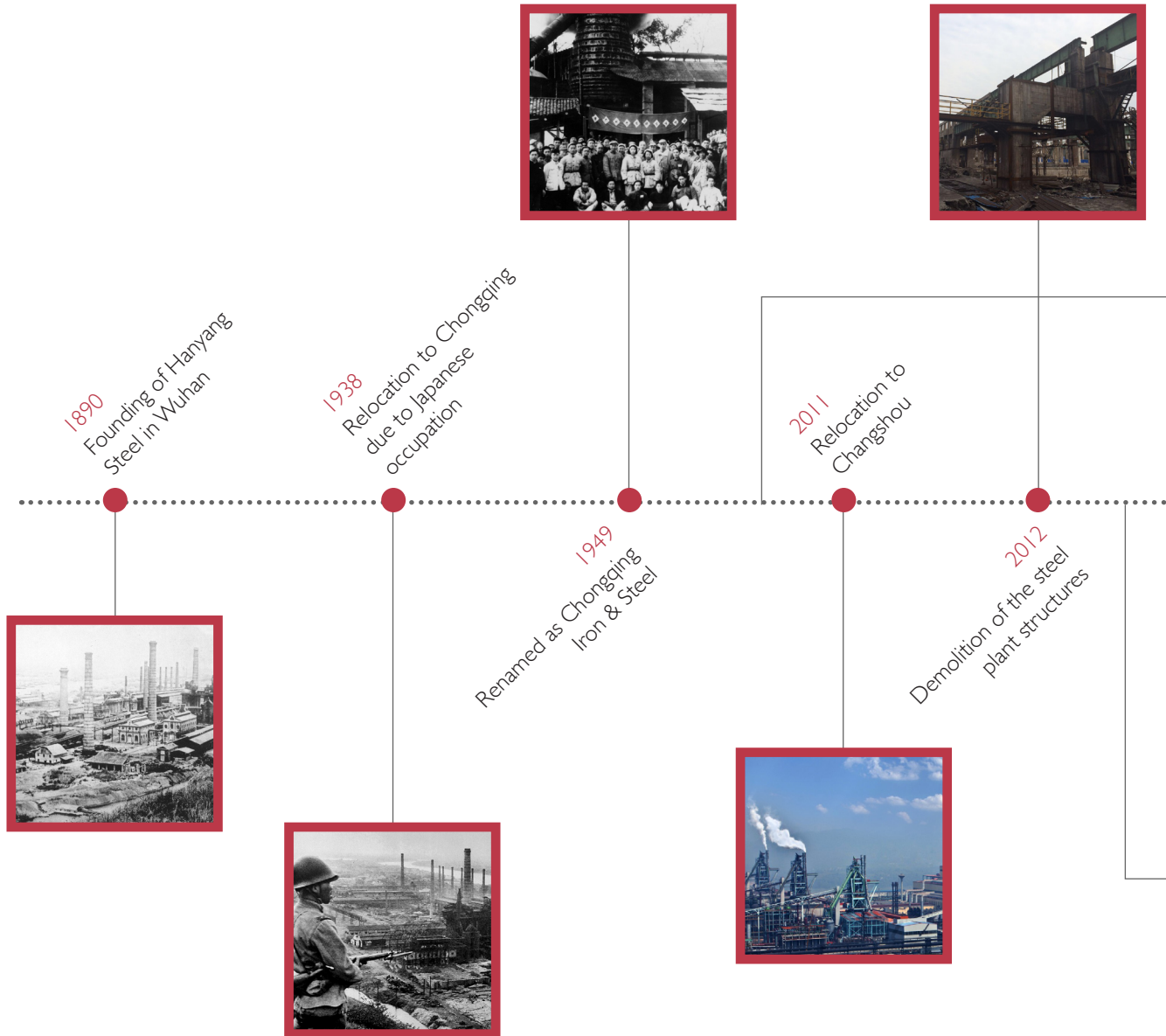


Cirsium setosum
Thistle
小蓟



Gnaphalium affine D. Don
Jersey Cutweed
鼠曲草

History of Chongqing Iron and Steel Company





Chongqing Iron and Steel before demolition

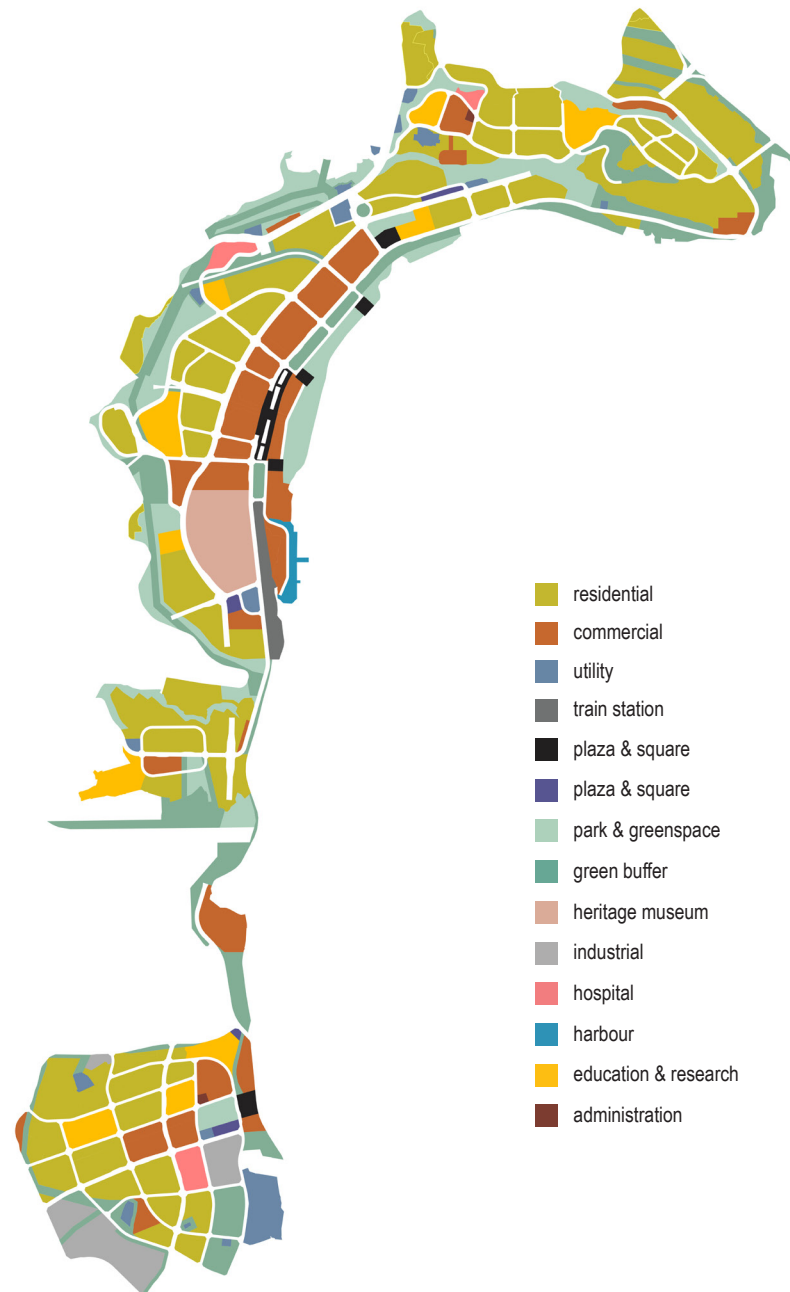


Chongqing Iron and Steel after demolition

Redevelopment Plan

The proposal submitted by a joint team of La Cime (China) and Eristics (Canada) won the 2007 competition for the redevelopment of the site. The winning entry proposed that the railway system, many of the factory buildings, smokestacks and a few skywalks be kept. It envisioned the area as a mixed-used development with medium density by Chongqing's standards.

However, the demolition did not follow the 2007 proposal, therefore the re-development plan needs to be adjusted accordingly. The divided parcels, designated land use and street system still largely follow the 2007 proposal.



*reworked from land use plan provided by Chongqing Yufu Asset Management Group

2007 winning proposal rendering



DESIGN CONSIDERATIONS

This chapter surveys post-industrial redevelopment precedents inside and outside China. The direction of the design proposal for the CIS site emerges via discussion of these projects.



Post-Industrial Redevelopment in China



798 Art Zone

Converted from a military factory compound built in the 1950s, 798 Art Zone is one of China's best known post-industrial redevelopments. In the 1990s, the decommissioned factory buildings began to attract artists due to their cheap rent and suitability for producing and exhibiting art works. By the early 2000s, 798 had become a hot spot for artists and art exhibitions in Beijing. As its commercial value increased, the rent also increased dramatically, forcing many of its original resident artists out of the district. Though the art community has criticized 798's gentrification problem, it is still a popular place, frequented by both local and foreign visitors, housing a mixture of galleries, studios, publishing houses, high-end boutique shops, pubs and restaurants.

China is no stranger to post-industrial redevelopment projects. In large metropolises such as Beijing and Shanghai, many abandoned industrial compounds have been converted, often into art districts and exhibition spaces. Examples include, 798 Art Zone and Xintiandi Shanghai (the latter an urban rather than post-industrial redevelopment) which have achieved international fame. However whether or not they are successful regenerative urban projects is heavily debated.

These projects are based on similar visions. A formula of mixing art, creative industries and their related commerce is repeated. These post-industrial sites are viewed as potential chic urban quarters with both cultural and commercial attributes. While this approach has proved successful in many cases, it is only applicable to sites that are of manageable size, integrated with existing urban fabric, and have preserved built structures and industrial character.

The CIS site has none of these attributes. Therefore its re-imagining requires a very different design approach.

Xintiandi

As one of a series of redevelopment projects all titled Xintiandi (new heaven and earth) by Shui On Land across China, this one in Shanghai is an urban renewal development. Although it is tagged to be a renovation, it actually demolished some old Shikumen houses only to rebuild new ones in the same style to accommodate commercial uses. Since its opening in 2002, it has become an ever bustling place that mainly houses fancy eateries and boutique shops.



Shanghai 1933

This British designed massive poured concrete slaughter house was constructed in 1933. Through the years it also served many other industrial uses. It was renovated in 2008 and now houses many high-end clubs and boutique shops. Its unique building style and haunting spatial quality makes it a truly unique place to be in.





Design Inspirations

Compared to many Chinese post-industrial redevelopment, the CIS site's massive size, difficult accessibility and few remaining structures all suggest a much less urban and commercial outlook in the near future. Some successful landscape architecture precedents have dealt with similar site conditions and are great sources from which to draw design

Cultuurpark Westergasfabriek

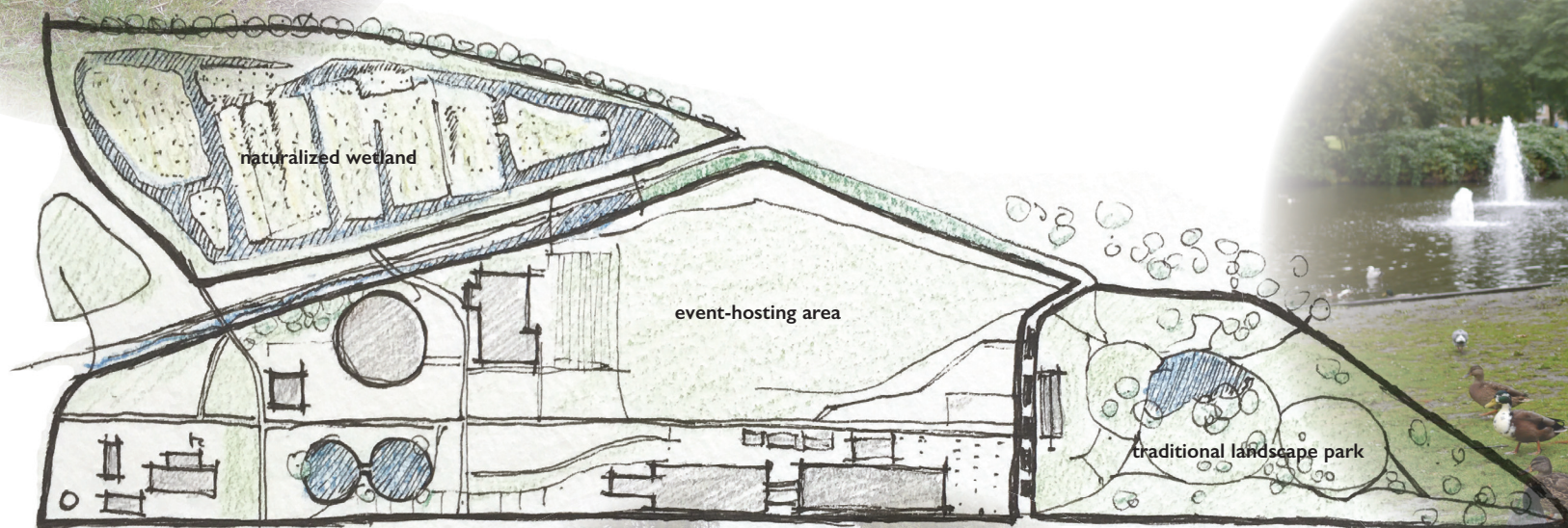
designer: Kathryn Gustafson

size: 11.5 hectare

location: Amsterdam, Netherlands

completion: 2014

The park is built on a nineteenth century gasworks. It has three distinctive parts: a traditional well-maintained landscape park on the east corner; an event-hosting middle that integrates landscape design with industrial structures; and a naturalized wetland on the northwest corner. The design makes good use of the existing structures, provides a rich array of experiences and reminds visitors of the city's industrial past and its much more environmentally sensitive present.



Duisburg-Nord Landschaftspark

designer: Latz + Partner, Latz-Riehl, G. Lipkowsky

size: 230 hectare

location: Duisburg, Germany

completion: 2002

Duisburg-Nord has many similarities with the CIS site. Both sites were previously occupied by steel industry, both are substantial in size. Duisburg-Nord has many preserved industrial structures, including buildings, furnaces, walkways, pipes and ponds. The design takes full advantage of these interesting features and repurposes them as links and highlights in a new landscape. It encourages the natural recolonization of plants, which overtime remediates the contaminated soil. It provides for a range of cultural and recreational activities, both indoor and outdoor. It is one of the best examples of repurposing a large post-industrial site in the era of deindustrialization.









Champ des Possibles

designer: Les Amis du Champ des Possibles

size: 1 hectare

location: Montreal, Canada

completion: 2010

The site was an abandoned Canada Pacific classification yard for over 40 years. Championed by the non-profit organization Les Amis du Champ des Possibles, it was repurposed as a public green space in 2010. The design was a multi-disciplinary collaboration between landscape architect, biologist, environmental scientist, geographer and civil engineer. The site was carefully profiled for the development of a remediation plan. Management of existing contamination, enhancement of existing vegetation cover and opportunities for public uses are incorporated into the design.

Design Guidelines



A decommissioned industrial military factory on the north bank of Jialing river,. The redevelopment plan has already been approved and will soon be underway.

Chongqing has been an industrial centre for interior China since the end of 19th century. It has a great legacy of heavy industries, including heavy machinery, weapon and metal manufacturing. The city's situation on two large rivers and its hilly topography lent many industrial establishments unique spatial and architectural qualities. As these old industries phase out with increasing speed, Chongqing will see many post-industrial sites demanding re-imagining in the near future.

Among these industrial sites, the CIS site is one of the largest. Had its original structures been better preserved, one could imagine its future as a sort of marriage between Duisburg Nord and 798. However: as it stands now, neither model is appropriate. Its current conditions demand tailored solutions that cannot and should not be copied and pasted from other projects.

The hasty demolition at the CIS Site reflects how heavy industries are presently viewed in China. Environmental problems have long threatened people's safety and the country's economic sustainability. In recent years, the smog problem in northern China has sparked major concerns over environmental issues. Under these circumstances, heavy industries are seen as the culprit of these problems and as scars on a city's landscape. The removal of the old plant shows the city's eagerness to make itself "greener", if not in reality (the plant is now somewhere else), then at least in appearance. This mentality has resulted in the obliteration of many historically and architecturally iconic structures that cannot be replaced. It has also destroyed the character of a place that gave meaning and a sense of belonging to people who spent their lives nearby.

As I moved forward into my design, perhaps the most important lesson I took from the site's history was to avoid adopting a narrow set of values and ideals when envisioning its possibilities. Instead of lamenting the loss of the old plant and making the place into a memorial of past glories, I have focused on the things at hand and how to best utilize these existing attributes to create an interesting place that can be enjoyed by many, in many ways.



Design Challenges

1. Access

Both foot and vehicular accesses were built primarily to facilitate the steel plant's operations. These access points do not encourage recreational visits and are all dilapidated. Since the industrial heritage museum is already under construction, the roadways connecting it to the rest of the district will be built before other new routes, therefore, major vehicular access to the main part of the site in the near future will likely come from the southwest corner. The design should be sensitive to this when proposing new access routes. To reduce unnecessary costs between present and future redevelopment, the design proposal should focus on pedestrian access.

2. Contamination

Since the site was used for steel production for more than seven decades, its soil is almost certainly contaminated with organic and inorganic pollutants. This problem needs to be addressed before redevelopment takes place.

3. Identity

The site's wasteland state is in stark contrast to its former iconic presence. The steel plant anchored generations of local residents' identities. Its presence's importance is also reflected in many aspects of the surrounding urban fabric, for instances, road names that literally mean "steel road" and "steel flower road", or residential communities with names such as "steel flower garden". The steel plant complex was undoubtedly one of the district and city landmarks. Now with most of the plant's structure erased, this area of over 1,300 acres is without an identity. The name "Chongqing Iron and Steel" now refers to the relocated plant 75 kilometres northeast of urban Chongqing. The site is an overgrown wasteland, neither physically nor conceptually defined.

Design Considerations

From the discussions in this chapter, I have derived principles to which my design proposal should adhere. They are behind every design decision I have made.

cost/disturbance

A large investment has gone into the relocation of the plant and the purchase of its old site, thus keeping the cost of the redesign low is essential to ensure that the management company can at least break even in the long run. Design moves should be realistic in terms of cost and the amount of disturbances they could introduce to the site.

existing conditions

To create an interesting design in keeping with the cost and environmental concerns, one needs to find ways to best utilize the site's existing attributes. Design strategies should respond to the site's specific conditions, highlighting its points of visual interest and taking advantage of what is already present.

ecology/environment

Contamination is a major concern in repurposing this site. Design strategies need to address soil, sediment and groundwater contamination and provide realistic treatment goals. The proposal should consider the remediation of what has been left behind and lay the groundwork for what is to come.

past/future

This proposal is focused on creating a transitory landscape, thus it is important for the design to be mindful of both the past and the future of this place.



DESIGN PROPOSAL

The design's **three main aspects** are presented in detail: soil remediation through phytotechnologies, a range of heightened landscape experiences, and intergration with the existing redevelopment plan.

I. Phytotechnologies

The current management of the CIS site intends to apply the “dig and haul” method to treat the contaminated soil (transport the soil to off-site facilities to be incinerated), which will be an expensive undertaking for a site this size. I would like to take a more ecologically sensitive approach. The site provides an ideal study opportunity for phytotechnologies as major redevelopment is not expected for at least a decade, and Chongqing’s subtropical climate allows fast establishment and vegetation growth. By integrating landscape design and phytoremediation, this site could be utilized for research, education and recreation activities, potentially lowering the cost of soil treatment while generating profit.

Phytotechnologies are defined as the use of plants to treat contaminated soil and/or groundwater. The specific methods, strategies and techniques involved in the process have been termed “phytotechnology”. As defined by Kirkwood and Kennen:

phytotechnology is the use of vegetation to remediate, contain or prevent contaminants in soils, sediments and groundwater, and/or add nutrients, porosity and organic matter. It is also a set of planning, engineering and design tools and cultural practices that can assist landscape architects, site designers, engineers and environmental planners in working on current and future individual sites, the urban fabric and regional landscapes.

Phytotechnologies have many advantages over the traditional “dig and haul” method. They are less costly and therefore are particularly plausible when the site is too large to be treated via soil removal. They also offer opportunities for other site uses while the remediation process is going on; “dig and haul” serves a single purpose (pp. 5-6).

The downside of phytotechnologies is that they are time consuming and have uncertain outcomes. The performance of a particular plant to perform a specific phytotechnology is influenced by many factors, such as the concentration and bio-availability of the contaminants, soil pH, etc. Every site is unique and treatment strategies need to be tailored to each specific case. Certain contaminants take decades, possibly centuries to be fully removed, making it unrealistic to rely on phytoremediation as the only measure.

Therefore my proposal for site remediation is not meant to fully replace “dig and haul”, but rather to use this site for research on phytotechnology under Chongqing’s local conditions. The objective is to obtain useful data while providing for other uses in the interim before the site’s full redevelopment.

(2015. p. 3)



Estimated Contamination Areas

■ Coke & Smelting $\approx 288,742 \text{ m}^2$

■ Stock Yard $\approx 178,204 \text{ m}^2$

■ Rolling Mill $\approx 363,861 \text{ m}^2$

This estimated soil contamination map derives from analyses of satellite images of the former steel plant*. The contaminated area is divided into three types based on different former industrial uses. The coke production and smelting area is expected to have the highest contamination level; the stockyard top soil a high contamination of the iron ore and lime stone. The rolling mill areas will have both heavy metal and petroleum related contaminants as byproducts of their processes. The contaminated areas are derived from the size of these workshop buildings footprint plus 10%.

This compound of preserved rolling mills is under construction to be repurposed as an industrial museum. This is also the only part of the site where analysis for soil contamination has been performed. From this $94,600 \text{ m}^2$ area, $31,084 \text{ m}^3$ of contaminated soil, water and waste has been removed.

*The full extent of contamination has not been delineated and contaminants of potential concern have not been identified via environmental site assessment work.

Breakdown of removed volumes

hazardous waste	381.3m ³
waste water with petroleum	44.55m ³
contaminated soil	
TPHs	23517m ³
SVOCs	5897m ³
Ni	476.5m ³
Pb	191.1m ³
THPs and Ni mixed	810.4m ³
THPs and Hg mixed	191.5m ³

*

THPs: Total petroleum hydrocarbons
SVOCs: Semivolatile organic compounds

Ni: Nickel

Pb: Lead

Hg: Mercury

*data derived from contamination treatment proposal provided by Chongqing Yufu Asset Management Group Co. Ltd.

As the “dig and haul” method was employed at the future museum site, the concentration of each pollutant was not identified. However, the types of contaminants found were identified. Since a complete soil test is unlikely to be conducted in the near future, I can only make a rough estimate. Listed here are some of the most common contaminants in and around a steel plant.

Inorganic pollutants

CN Cyanide

Cyanide is used for case-hardening of steel and is known to be extremely toxic.

Cu Copper

Copper is often added to increase steel strength. Copper contaminated soil affects both animal and plant health.

Pb Lead

A well-known heavy metal that is hazardous to human health. It is commonly used in metal refining processes.

Zn Zinc

A by-product of steel making that is often found in the dust and sludge. High concentrations adversely affect plant growth and animal health.

Hg Mercury

Mercury is often produced during scrap steel production. It is a well-known toxic metal and highly hazardous to human health.

Ni Nickel

An essential alloy for stainless steel. Exposure to nickel increases risks of cancer and damages nerve and reproductive systems.

As Arsenic

A by-product of the metal smelting process. Its toxicity depends on its chemical form.

Both organic and inorganic contaminants may be hazardous to human and environmental health, and often require long periods of time to achieve remediation. Some metals such as Ni, Cd, Zn and As are readily accumulated into plant tissue, whereas others such as Cu and Pb are much more difficult to be extracted from the soil by plants (Kirkwood and Kennen, 2015, p.56). Since this site is expected to remain vacant for only one to two decades, remediation via phytotechnologies is unlikely to be 100% effective.

Organic pollutants

TPH Total petroleum hydrocarbons

A term used to describe all hydrocarbons in crude oil. Since this steel plant produces its own coke, TPHs are expected to be widely distributed throughout the site.

PCB Polychlorinated biphenyls

A group of synthetic organic compound that is widely used in many industrial procedures. they have been phase out since 1970s but its contamination problem is global in scale.

PAH Polycyclic aromatic hydrocarbons

Naturally existing in fossil fuel and produced under insufficient oxygen combustion situation. It is carcinogenic and adversely affects human health.

PCDD Polychlorinated dibenzodioxins

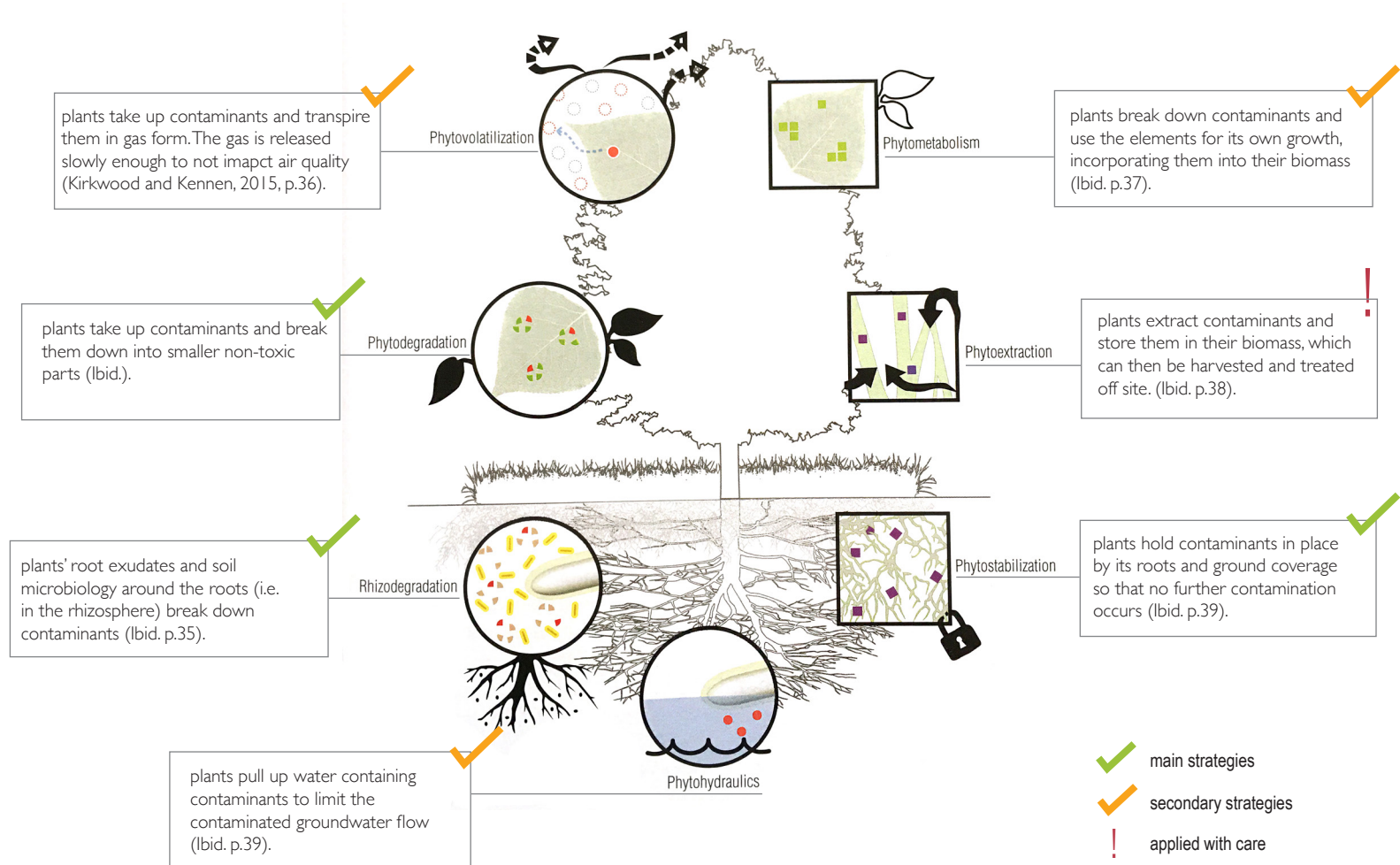
Produced during metal smelting, it can accumulate in human fat tissue and eventually cause serious conditions such as cancer.

Phytoremediation Mechanisms

Plants remediate pollutants through seven main mechanisms*.

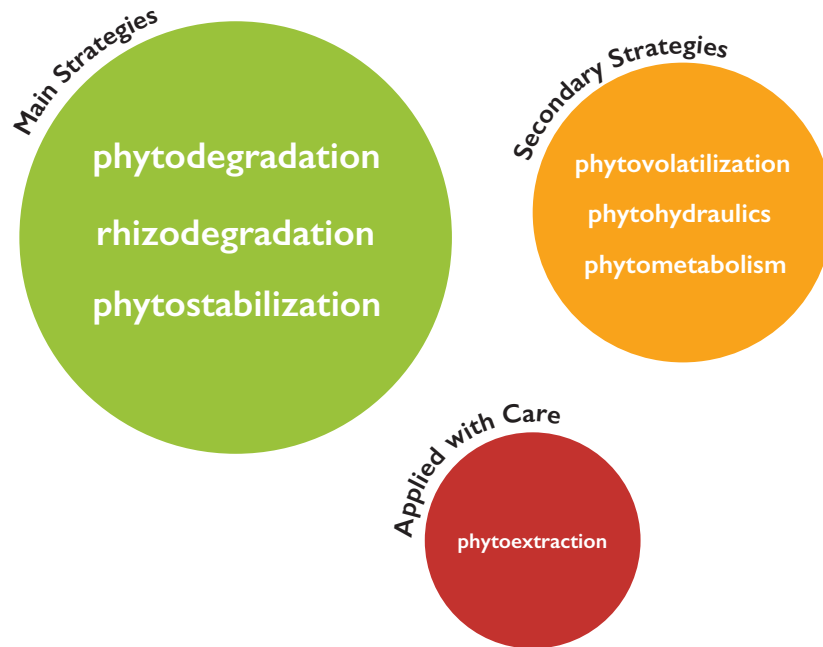
○ organic contaminants

□ inorganic contaminants



*diagram modified from Kirkwood and Kennen's chart, *Phyto*, 2015, p.41

For this site, certain techniques are better than others. The site is to be educational and recreational, therefore danger of exposure to both human and wildlife is a major concern. Plant may accumulate toxic elements in their foliage, flowers and seeds that exceed recommended safety level. Therefore the phytotechnologies employed here should focus on stabilization and degradation of the contaminants. Phytoextraction needs to be used with caution and carefully managed. The main mechanisms in treating the soil of the CIS site are phytodegradation, rhizodegradation and phytostabilization. Phytovolatilization, phytohydraulics and phytometabolism will occur naturally as the plants grow.



Incorporation of Biochar



Biochar is a carbon rich residue produced by thermal decomposing organic matter under low oxygen conditions. It has a number of benefits when mixed into the soil as an amendment.

Benefits

Reduced the bioavailability (i.e. ability for plants and animals to take up contaminants) of organic and inorganic contaminants

Reduce soil tensile strength to make it easier for plants to grow

Maintain soil moisture

Increase survival rate of earthworms

Waste byproduct of energy production, thus inexpensive

* Denyes, M., Laglois, V., Rutter, A., and Zeeb, B., 2012, pp. 76-82

Biochar is the carbon-rich waste byproduct produced from the pyrolysis of organic waste materials. It has a very high porosity and the slow oxidation of its surface produces negatively charged sites which increases the cation exchange capacity of the soil.

Biochar has been investigated for its potential as a cost effective sustainable remediation technology via the absorption of contaminants in situ. Organic contaminants are absorbed into the porous surfaces of the biochar; whereas positively charged metal cations are attracted to the biochar's negatively charged surface sites and adsorbed. Thus contaminants are no longer taken up by plants and soil vertebrates and the risk to human and environmental health is reduced. (Denyes et al., 2012, p.79).

Currently, biochar is available at around \$1 CAD/kg in China; it is inexpensive compared to a similar product called Activated Carbon (\$3/kg). Though it should be noted that the data used for the calculation below is based on field experiments conducted in Canada using Canadian produced biochar. Locally sourced biochar in China may vary in performance.

In the field, biochar can be tilled into the soil. Amendment to soil at 2.8% (by weight) has been shown to be an effective amount to achieve desirable results (p.81). Mixed to a depth of 10 cm in soil, the calculation for one hectare is shown below.

Site: 100 m x 100 m (1 hectare)

Soil bulk density: 1330 kg/m³

Area= 10,000 m² X depth of 10 cm (0.1 m)

Volume = 100 m³

Weight of Soil= 100 m³ x 1330 kg/m³=133,000 kg

133,000kg X 2.8%=3724 kgs of biochar required

3724kg X \$1 CAD= \$3724 CAD cost

Plant Selection – Herbaceous

		TPH	BTEX	PAH	Cd	Cu	Zn	Ni	As
1 Oilseed <i>Brassica juncea</i> 油菜花									
2 Alfalfa <i>Medicago sativa</i> 紫花苜蓿									
3 Clover <i>Trifolium spp.</i> 三叶草									

Notes

Also called rapeseed, *Brassica juncea*, is a hyperaccumulator (i.e. phytoextractor) for both organic and inorganic pollutants. The species specifically developed for commercial production is known in North America as canola. Oilseed is widely planted in Chongqing's countryside as a commercial crop. Its carpet of yellow flowers in spring is a well loved sight that attracts many visitors. Two to three different varieties of oilseed should be planted for comparative studies. Their hyperaccumulative nature means they need to be carefully managed.

Alfalfa can degrade some organic pollutants in its rhizosphere. It can also accumulate (i.e. phytoextract) certain heavy metals such as cadmium, zinc and nickel from the soil. To reach maximum growth it requires cutting three times per year. Like oilseed, it is an extractor and therefore requires careful management.

Clover is a powerful phytoextractor which also degrades organic pollutants in its rhizosphere. Like alfalfa, it is nitrogen-fixing.

*plants selected from Kennen, K. and Kirkwood, N., 2015. *Phyto*. Dordrecht ; New York: Springer. pp. 74-162.

These herbaceous plants will be planted in strips and managed much like agricultural fields. Their main phytotechnology mechanisms are phytoextraction and rhizodegradation. As extractors, they are easier to manage than woody plants, and they densely cover the ground to prevent contaminants from moving off site. Their seasonal colours are also significant. As a hilly city, Chongqing lacks wide open expanses. these crops improve the soil quality without obstructing site's openness, indeed they may enhance it.



Dawn Redwood
Metasequoia glyptostroboides

水杉

Widely known in China as a “living fossil” tree species, *Metasequoia glyptostroboides* is fast growing and native to Chongqing’s geological region. Its love for moist conditions makes it a great choice for Chongqing’s humid and mild climate.

Plant Selection – Trees and Shrubs

Five tree species and one shrub are selected as woody plants for phytotechnologies. All are fast growing. This is important since biomass production is important for phytoremediation. All are also native to Chongqing’s region and can be easily found elsewhere in the city. Each has very distinctive foliage, flowers, barks and seeds. Their main phytotechnology mechanism is phytodegradation, although phytovolatilization and phytohydraulics will also be in play as the roots come in contact with the water and extract from the water table.



Weeping Willow
Salix babylonica

垂柳

Willows are well known for their fast growth and high demand of water. This makes them a common choice for controlling ground water flow to prevent contamination and for quick biomass production. Weeping willows are a common tree across China. Culturally, they are well loved for their elegant forms.



Wintersweet
Chimonanthus praecox

腊梅

Seedlings of this tree are already present on site. This is a beloved tree for its blossoms’ incredible fragrance in winter. It is traditionally cut and sold during Chinese New Year in Chongqing as a natural air freshener. Scientific tests have shown its ability to hyperaccumulate cyanide (Ashraf et al., 2010, p. 407), which is likely to be present on the site due to its previous industrial activities.

The level of contaminants concentration in plant biomass generally decreases from roots to shoots. These trees do not produce fruit that may be consumed by humans. Dawn redwood produces cones; Chinese wingnut and weeping willow produce catkins in spring; Chinese elm, wintersweet and empress tree seed in late summer early fall. In Chongqing's sub-tropical climate. These trees will shed leaves in winter and sometimes old leaves stay on the branches until new leaves push them off. This means leaves need to be collected and disposed safely off site to prevent contaminants from re-concentrating into the soil.



Chinese Elm
Ulmus parvifolia

榔榆

Chinese elm is often used for bonsai in China. It is also planted in scholar gardens for its twisted and spreading form. It is commonly found in Chongqing. Kennen and Kirwood list it as a phytodegradation species for organic contaminants (2015, p. 85).

Chinese Wingnut
Pterocarya stenoptera

枫杨

Chongqing's subtropical climate is not ideal for popular phytodegradation species such as poplars to grow. This tree is similar to poplars in its fast growth. It is very commonly found on hillside and river banks in the city due to its abilities to quickly establish and propagate.



Empress Tree
Paulownia tomentosa

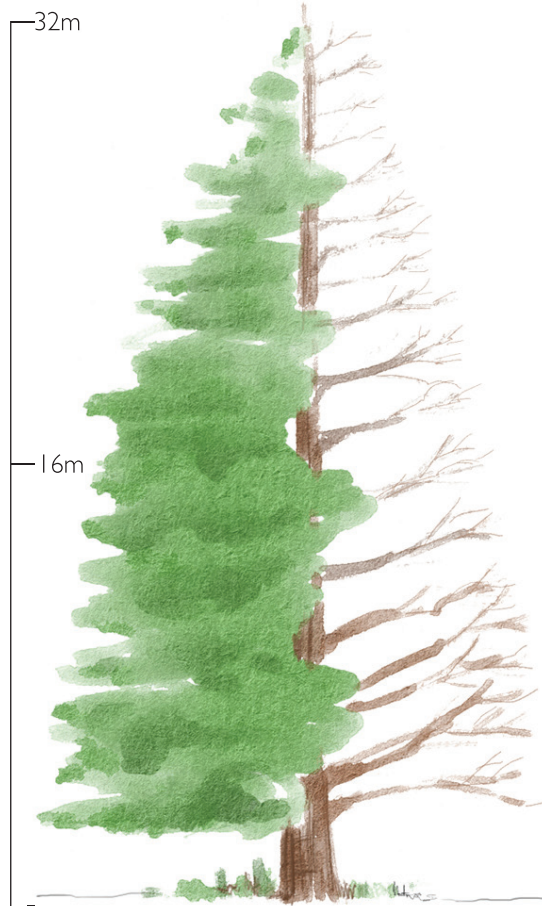
泡桐树

This fast growing species has showy light purple flowers in spring. It is very common throughout Chongqing and loved for its flowers. Its fast growth makes it a great choice for performing phytodegradation on organic contaminants (Kennen and Kirwood, 2015, p.80).



Tree and Shurb Characteristics

requires full sun
easy to transplant
straight, reddish brown trunk
prefer moist, well-drained and slightly acidic soil
can tolerate a period of standing water
deciduous leaves turning from fresh green to brown and drops in late fall early winter



Mature Form

Dawn Redwood

requires full sun
fluffy flying catkin in April
elegant weeping branches
high demand for water
one of the first trees to leaf out in spring



Weeping Willow

requires full sun
dark green leaves turn yellow and brown
resistant to Dutch Elm disease
droopy branches in maturity
prefers moist, well-drained, fertile soil
gray, olive green and orange bark colours
are its most interesting feature



Chinese Elm

requires medium sun/dappled shade
dark green leaves
prefers soft, acidic soil
extremely fragrant bright yellow flowers
before leafing out in spring



Wintersweet

requires full sun
showy light purple flowers in April
salt, drought, urban tolerant
prefers moist, well-drained soil
greatly valued lumber



Empress Tree

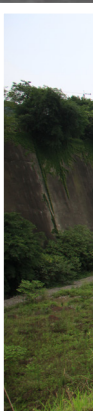
requires full sun
highly visible catkins in May
drought tolerant
needs large room
shallow roots may damage sidewalk



Chinese Wingnut



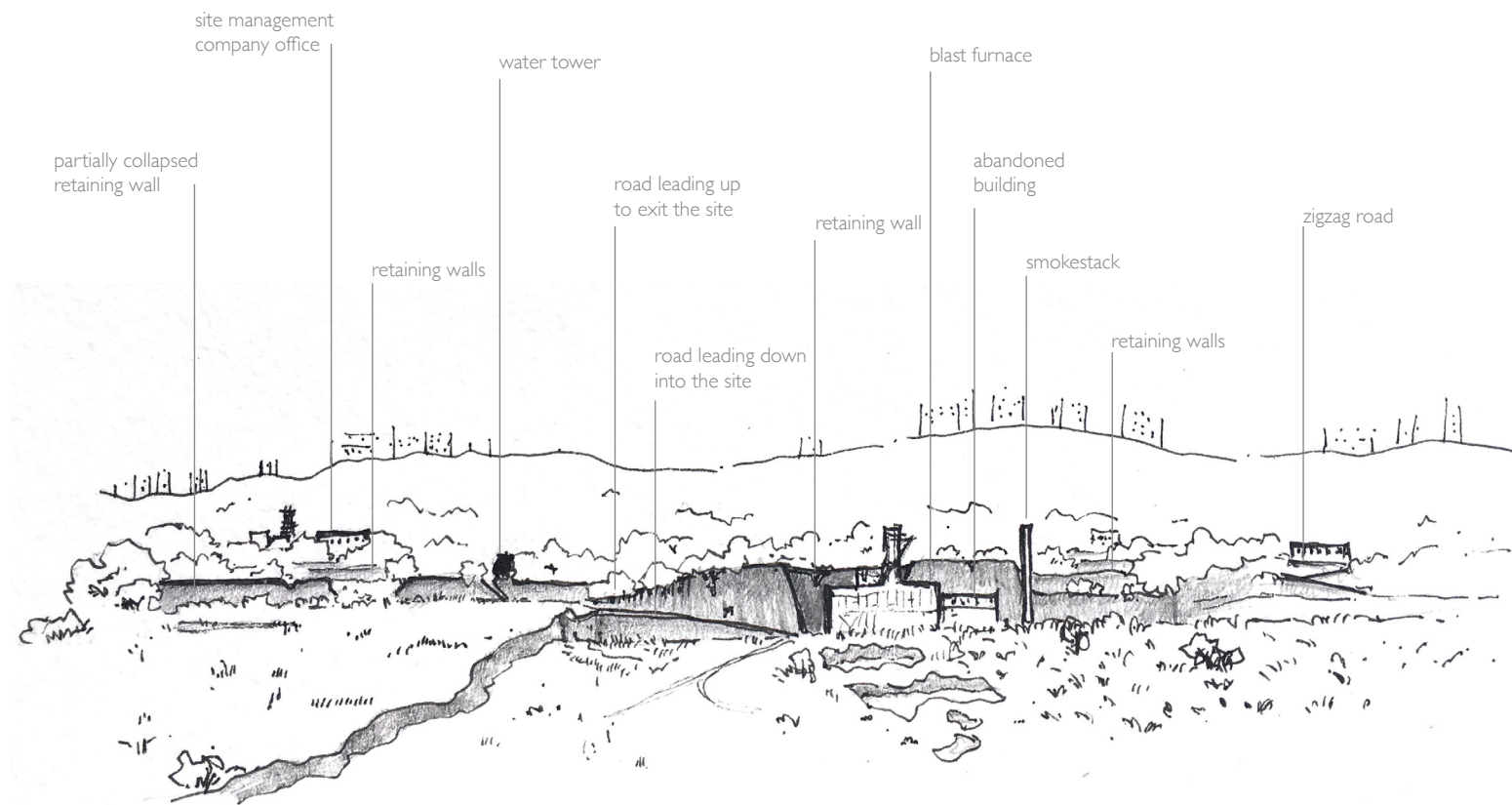
2. Design for Experiences



The site's dramatic topography is best experienced when taking a east-west walk along the spine of the former routing network of the steel plant. Much cut and fill work was done over the years to allow workshops to be constructed along the steep slopes. This has resulted in many layers of retaining walls. The tallest walls (~ 15 meters tall) are situated around the remaining blast furnace. The furnace's towering size and blackened surface are very imposing when viewed in close range. This interesting layering of walls is one of the site's unique feature and offers great design opportunities.

sand dock in operation
(outside site boundary)







Design Focus Area

This design focuses on the northern part of the site, the steel plant's main production area. Taking the existing topography and vegetation into consideration, this area is broken into several smaller regions. The layered retaining walls and platforms are ideal for a tiered wetland for water purification and tree groves for phytoremediation. The large and deep impressions in the ground left from the removal of ore slag can be utilized as ponds in a naturalized wetland. The relatively flat and less vegetated area will be great for mass plantings of remediation herbaceous plants. The already densely vegetated area can be largely left to natural succession, a relatively unmanipulated landscape, contrasting to the managed areas while also acting as a control to the phytoremediated area. .

phytotechnologies area: field

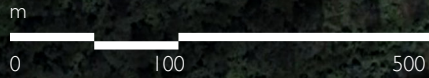
maintained naturalized area

constructed wetland

phytotechnologies area: shrubs & trees

heritage park

Focus Area Plan



- wintersweet garden
- Chinese wingnut grove
- empress tree bosque
- wintersweet belt
- dawn redwood belt
- oilseed field
- paved viewing platform
- Chinese wingnut bosque
- paved plaza
- filtration ponds
- forest
- naturalized wetland
- clover field
- alfalfa field





Access

entry point

entry point

boat watching

Design Focus Area

train spotting

entry point

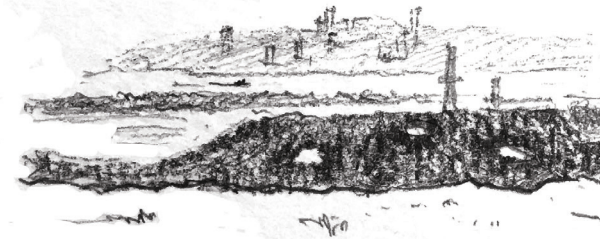
Industrial Museum
(under construction)

- two-lane road
- service road
- vehicular entry point from outside
- vehicular entry point from museum

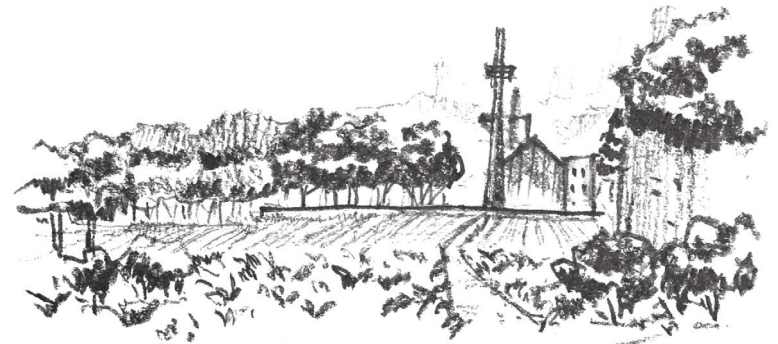
The two-lane roads for vehicular access are based on existing roads. The aim is to capitalize on the existing infrastructure and minimize construction cost. The service roads allow phytotechnology management vehicles to access all parts of the site to harvest and collect plant biomass. Vehicular traffic into the site will be coming from the three directions as indicated by the arrows.



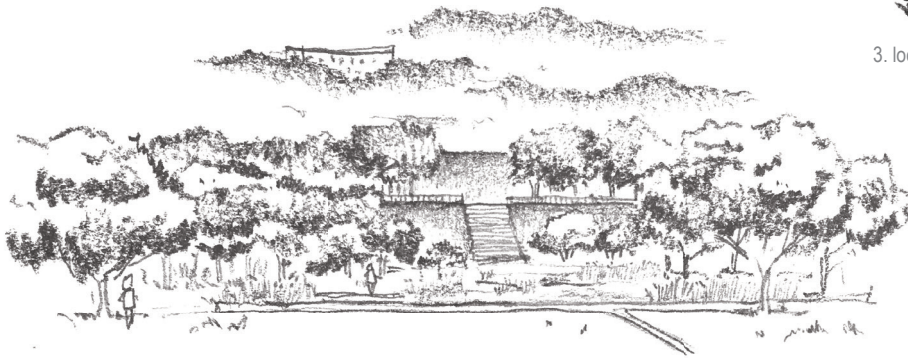
2. empress tree bosque garden



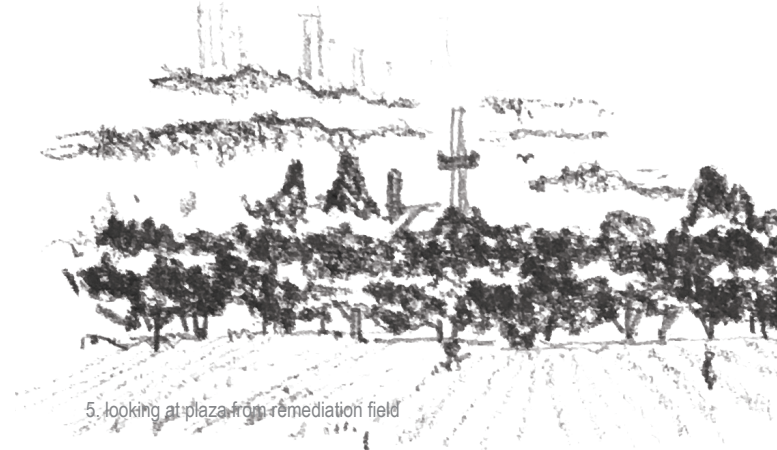
1. looking down on the site



3. looking at the plaza from the naturalized area



4. sediment and filtration ponds



5. looking at plaza from remediation field



Detail Plan Areas 1-4

1. Terrace Garden

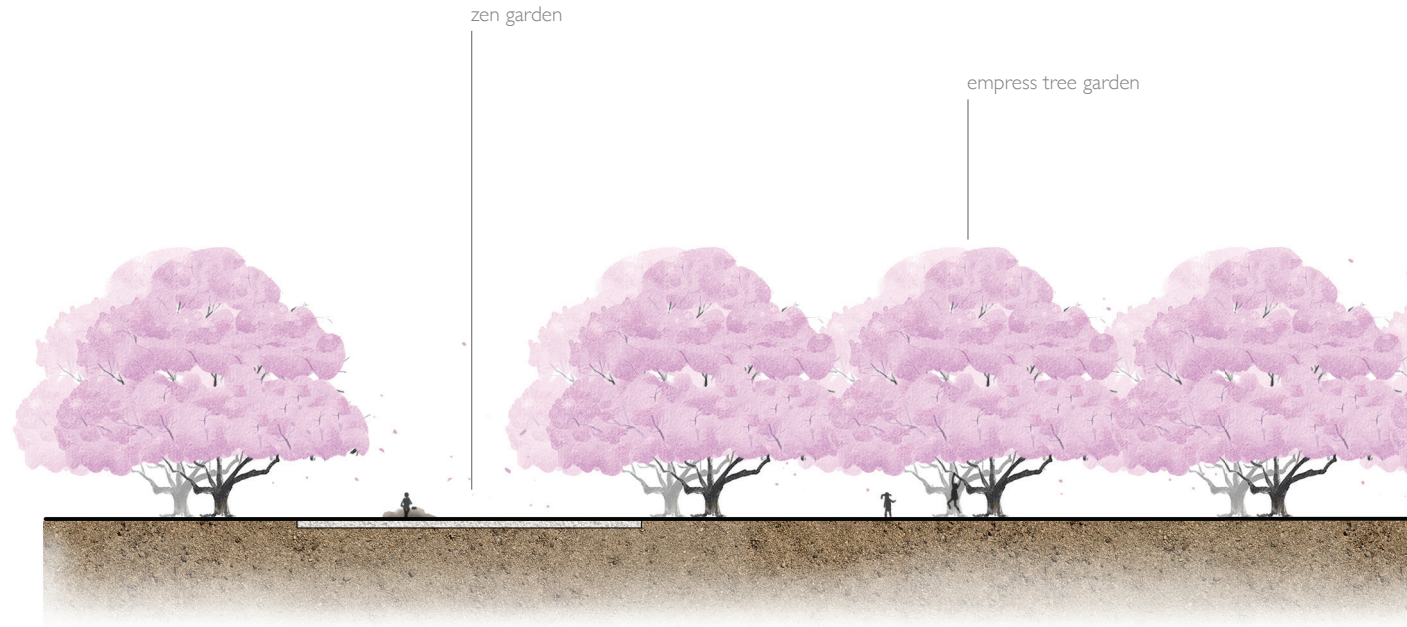
2. Blast Furnace Plaza

3. Naturalized Wetland

4. Split Point

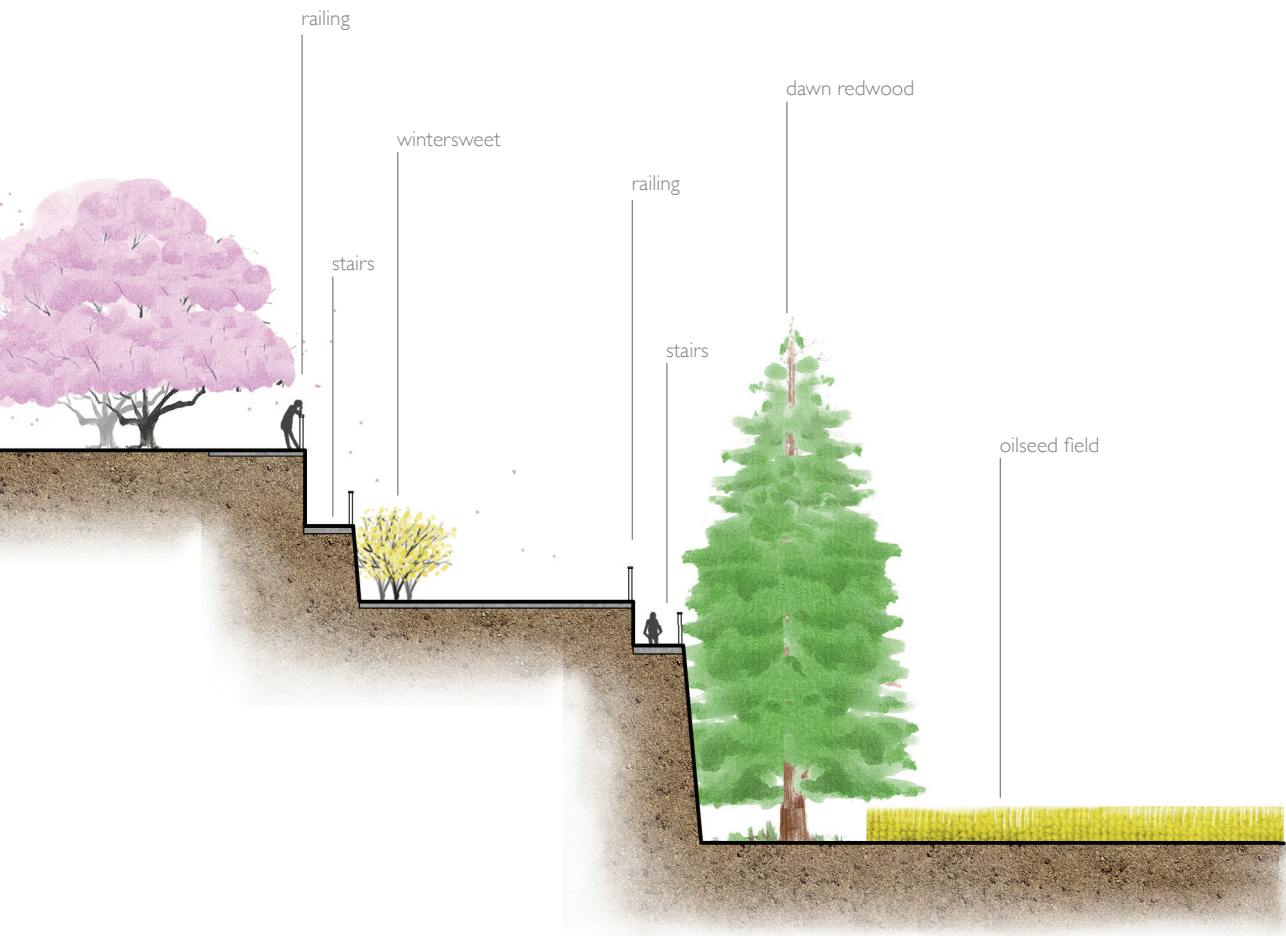




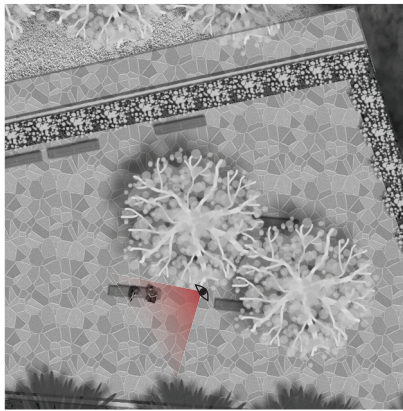


Section 11'
1:250

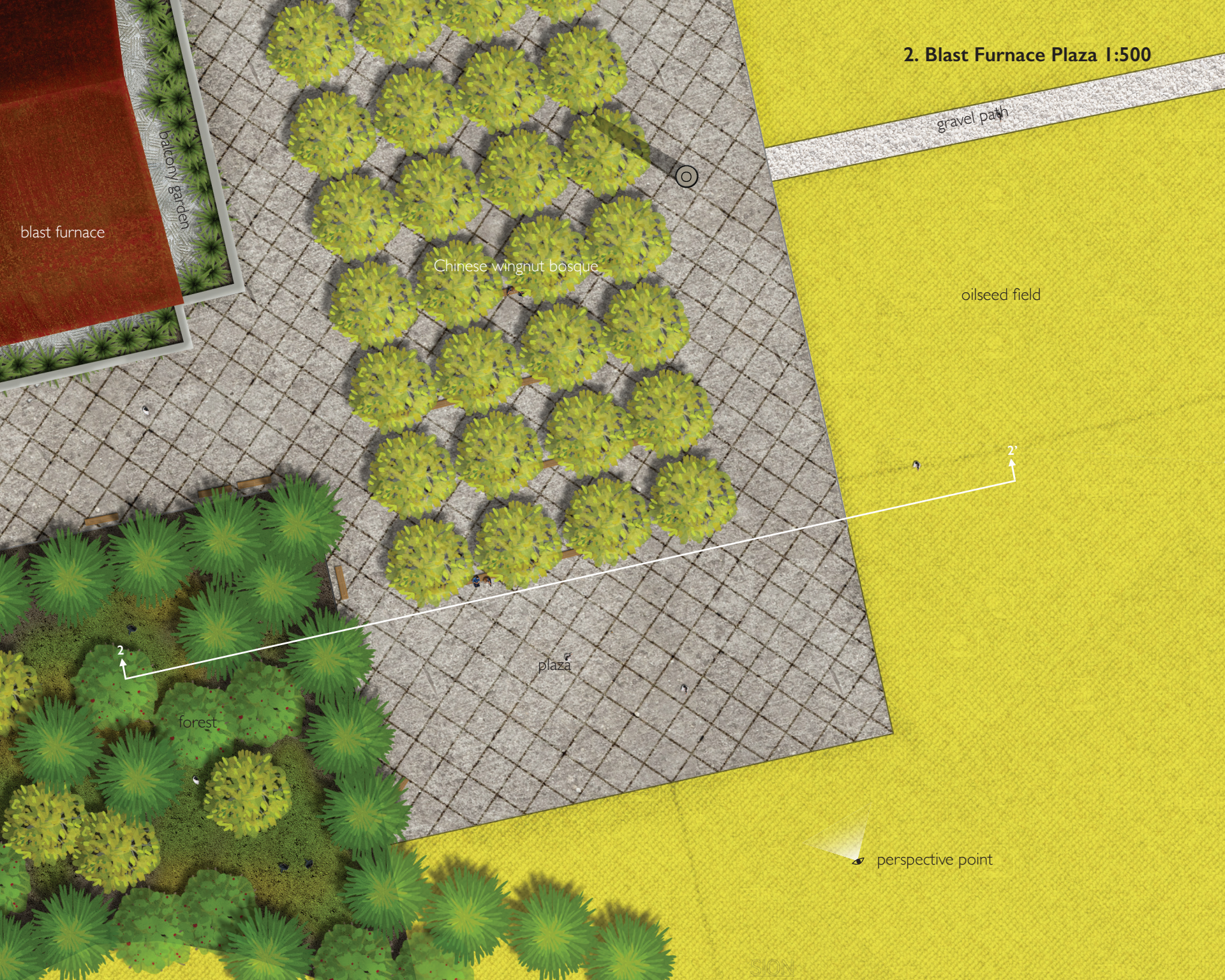
At this location, four levels of retaining walls still stand on the slope. The steel plant had a series of factories built upon terraces. With all the buildings removed, this area is ideal for these terrace gardens that provide pedestrian access off the main road down into the heart of the site. The different layers of tree and shrub foliage and flowers will be visible from both the bottom and the top of the slope. Walking through the different layers, one can experience the contrast between wooded enclosure and the fields' expansiveness.



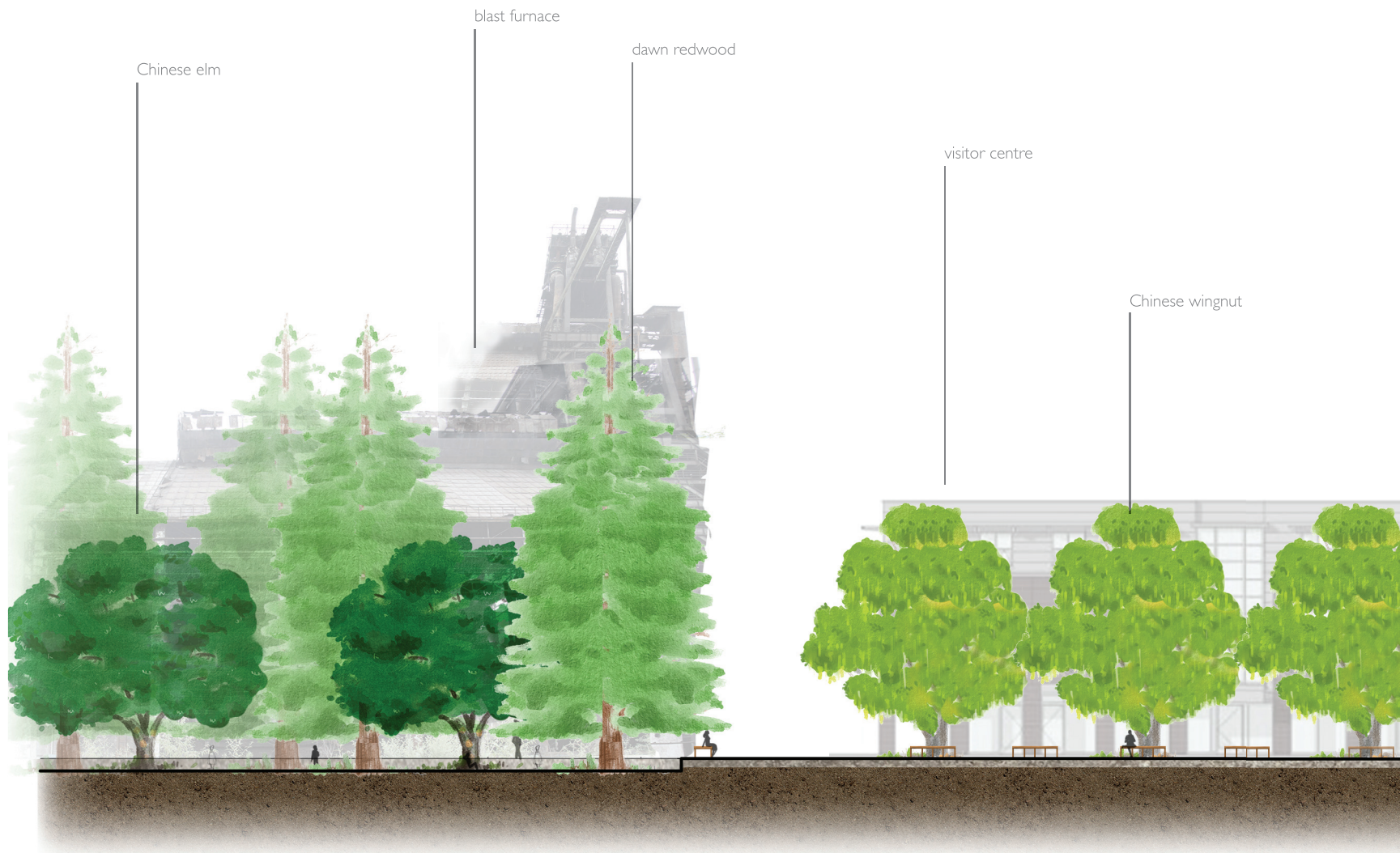




2. Blast Furnace Plaza 1:500





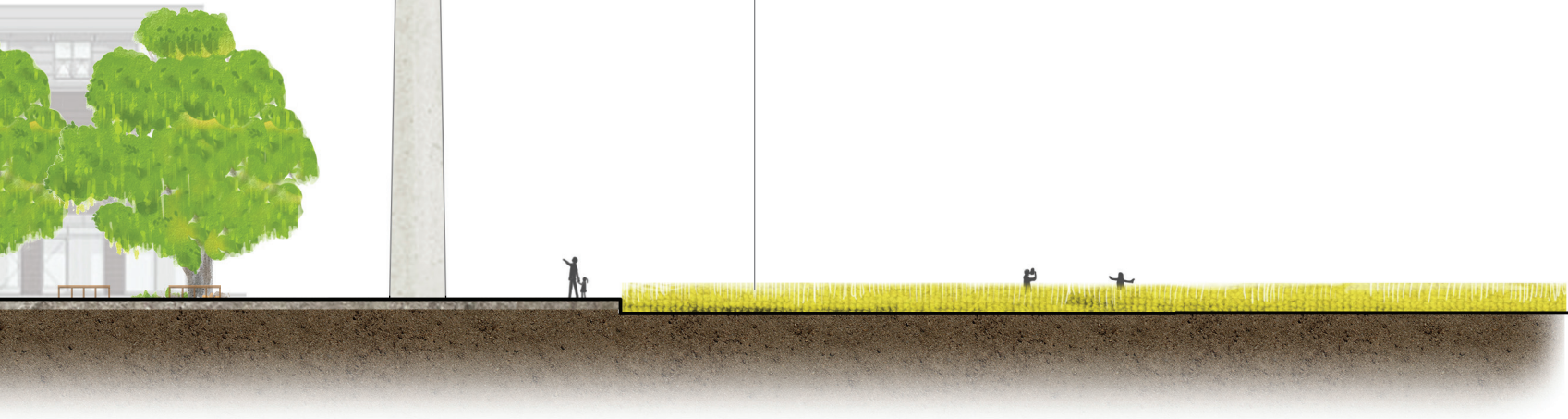


Section 22'
1:250

smokestack

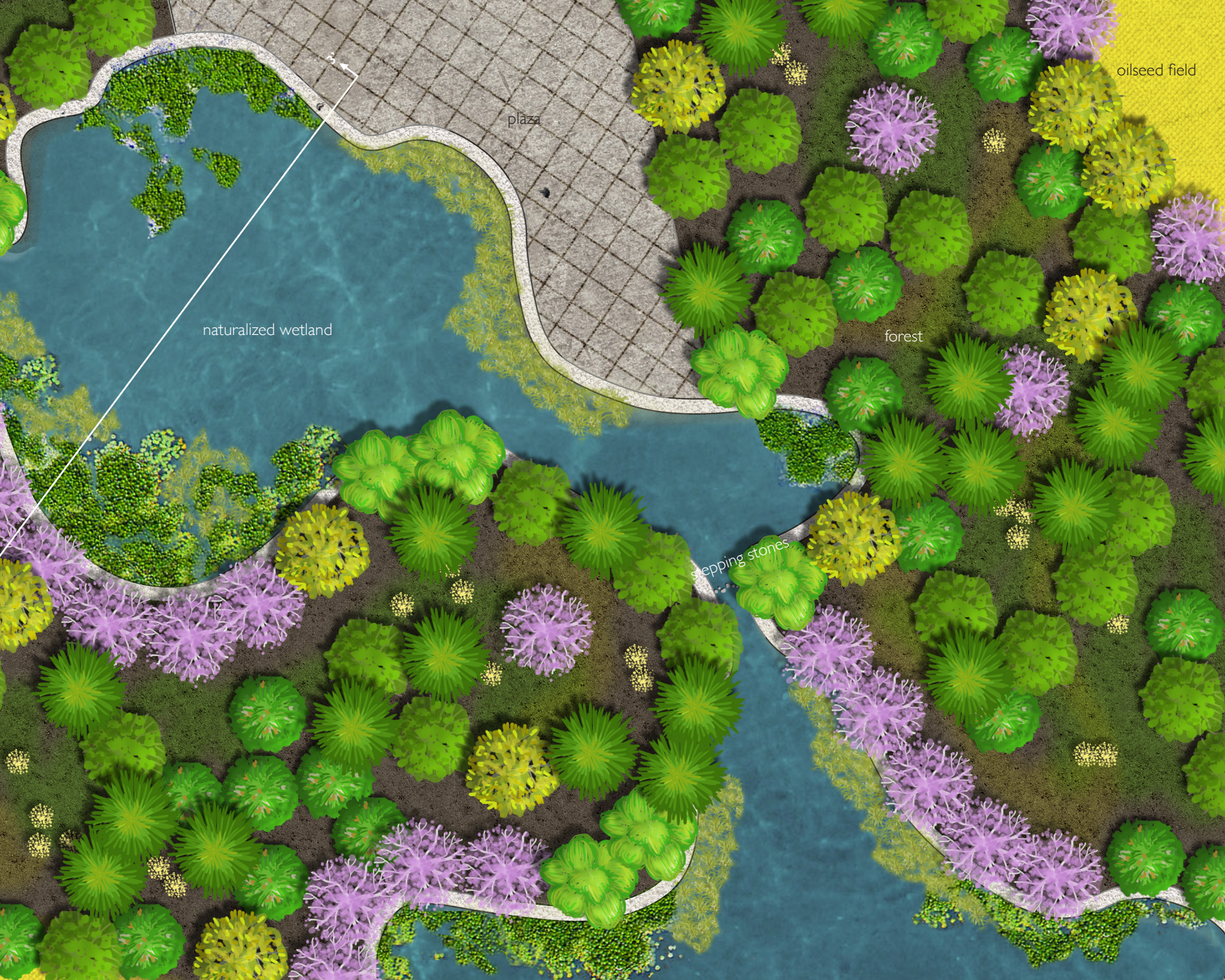
The area immediately surrounding the remaining furnace is defined by tall retaining walls on the northwest. To preserve this strong spatial quality, a paved plaza is created around the blast furnace. Oilseed planted around the plaza will remediate the soil through phytoextraction and phytostabilization while serving as a backdrop to towering the industrial structures. The remaining building to the east of the furnace will be turned into a visitors' centre and management office.

oilseed field



3. Naturalized Wetland 1:500





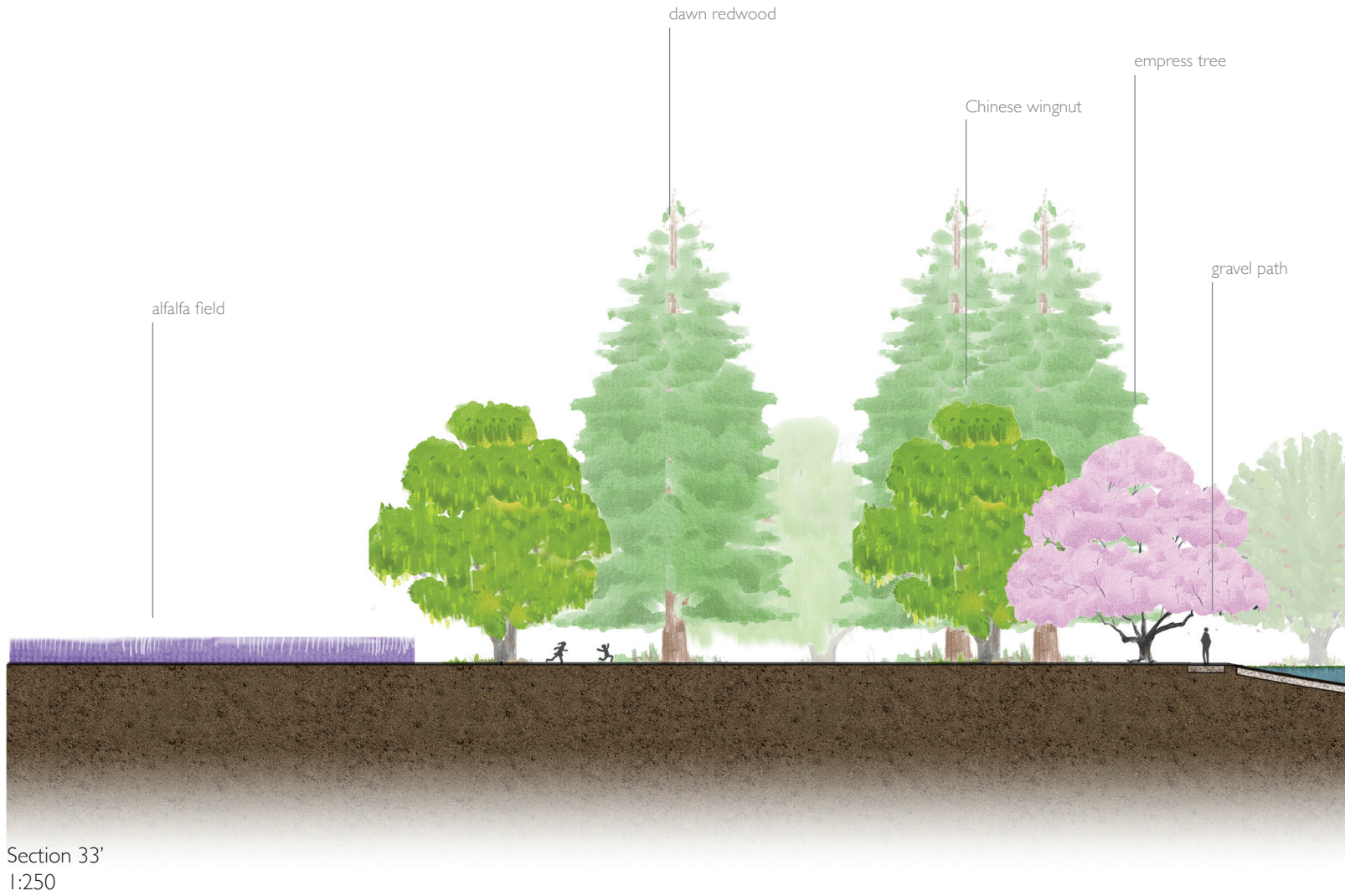
oilseed field

plaza

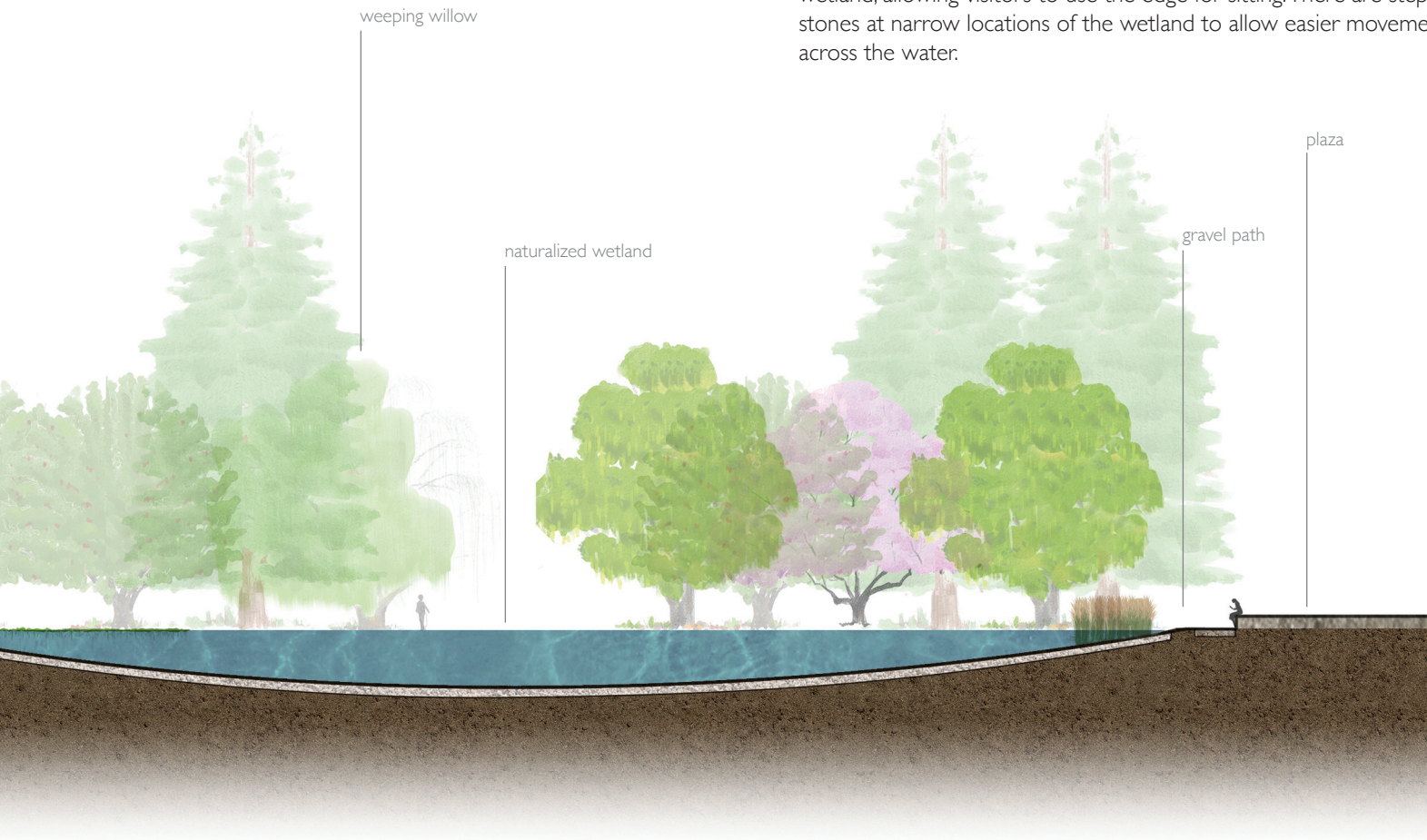
naturalized wetland

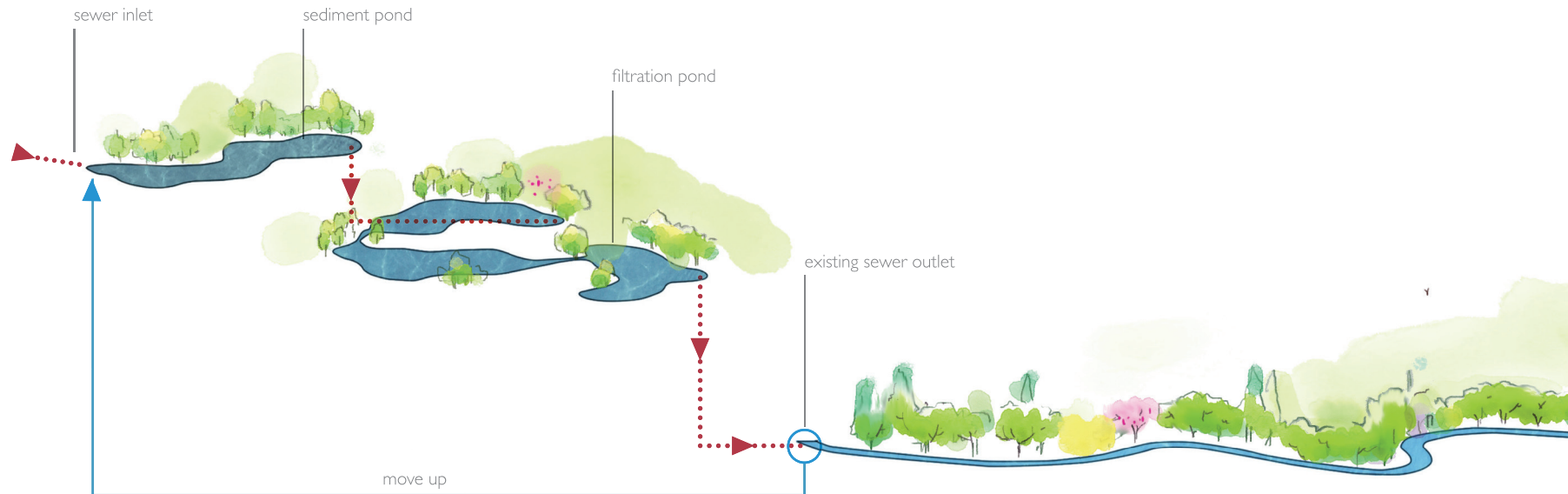
forest

stepping stones



This section elevation shows the edge conditions between the phytoremediation field, the forest, the naturalized wetland and the plaza. As the site's topography slopes down from northwest to southeast, the south end of the plaza is raised above the gravel path surrounding the wetland, allowing visitors to use the edge for sitting. There are stepping stones at narrow locations of the wetland to allow easier movement across the water.



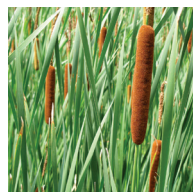


The design of the constructed wetland system capitalizes on the site's topography and the large holes in the ground from slag removal. The proposed wetland moves an existing sewer outlet further up the hill. The combined sewer from the residential and industrial area uphill is diverted into the sediment pond situated on a terrace that used to house factory workshops. After settling in the first pond, it flows through pipes to the filtration ponds to be further cleaned by aquatic plants. The treated water then flows through pipes to the naturalized wetland, where it is further cleaned. Water eventually flows into the river through pipes buried below ground.

Wetland Species



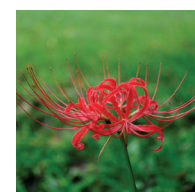
Pickerel Weed
Pontederia cordata
梭鱼草



Cattail
Typha angustata
香蒲



Water Hyacinth
Eichhornia crassipes
凤眼莲



Red Spider Lily
Lycoris radiata
曼珠沙华

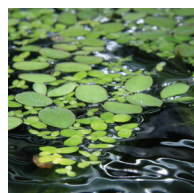
Wetland Processes



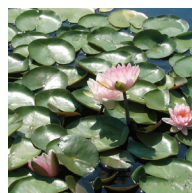
77



Yellow Iris
Iris pseudacorus
鸢尾



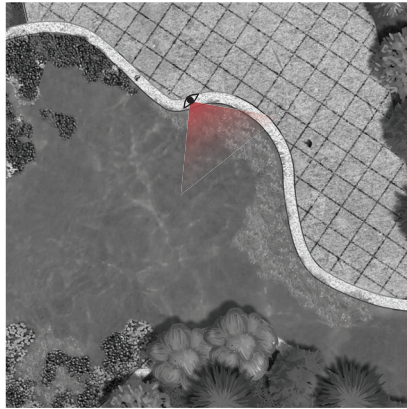
Floating Fern
Salvinia natans
槐叶萍

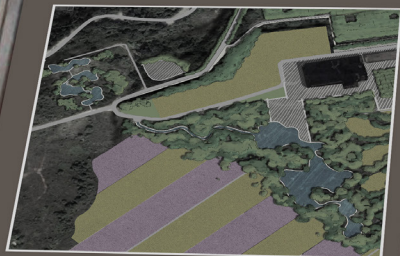


Water Lily
Nymphaea tetragona
睡莲



Reed
Phragmites japonicus
芦苇





工業遗址園林公園

該園以工業遗址為背景，結合自然生態環境，通過景觀設計，將工業遗址轉化為一個集生態、文化、休閒、娛樂為一體的綜合性公園。公園內設有步行道、自行車道、兒童遊樂場、健身廣場等設施，為市民提供了一個良好的休閒場所。公園的綠化設計注重生態效益，選用了多種本土植物，營造出一個自然、和諧的生態環境。



該園在設計過程中，充分考慮了生態環境的保護與修復，通過景觀設計，將工業遗址轉化為一個集生態、文化、休閒、娛樂為一體的綜合性公園。公園內設有步行道、自行車道、兒童遊樂場、健身廣場等設施，為市民提供了一個良好的休閒場所。公園的綠化設計注重生態效益，選用了多種本土植物，營造出一個自然、和諧的生態環境。

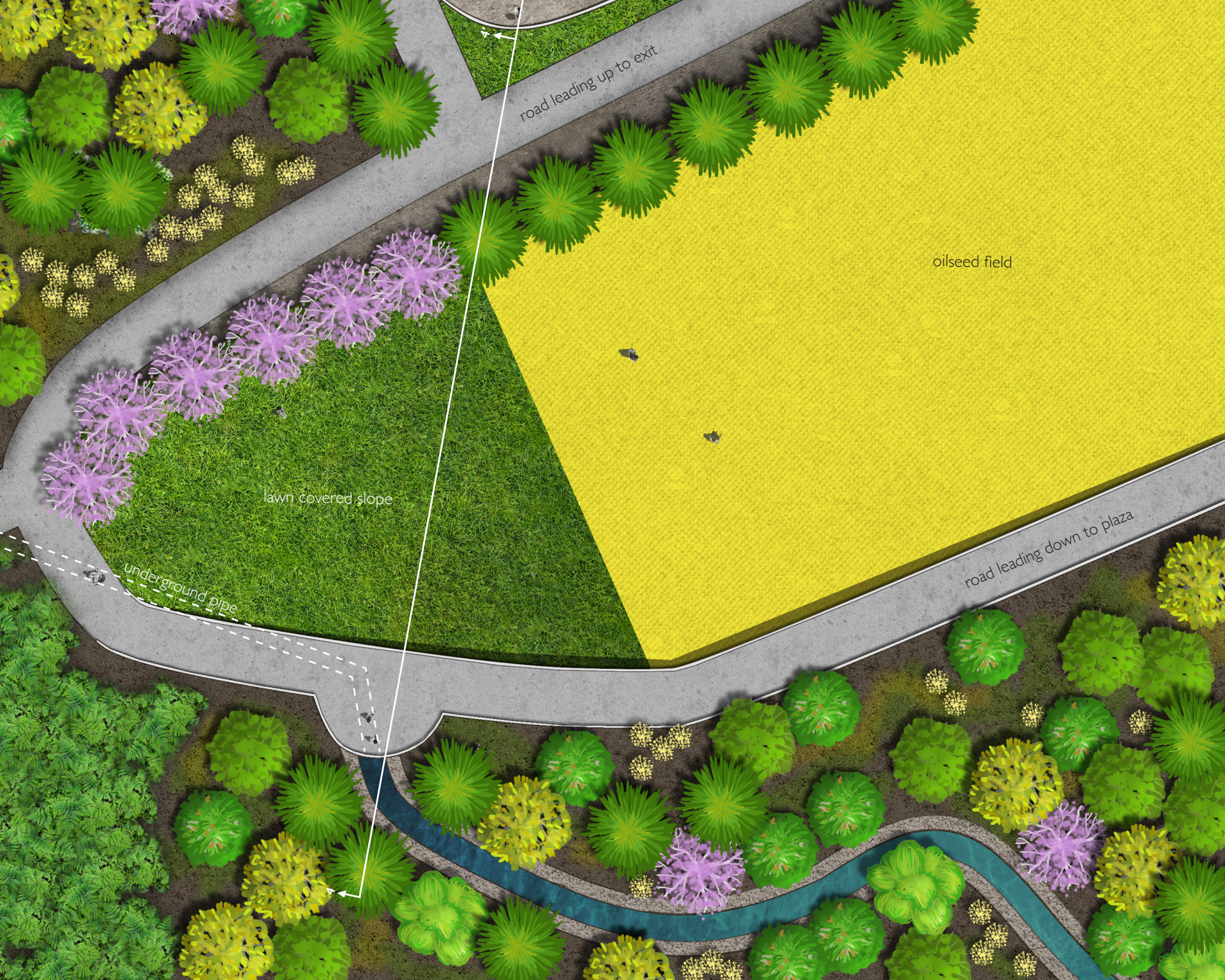
4. Split Point 1:500



filtration ponds

natural succession vegetation

natural succession vegetation



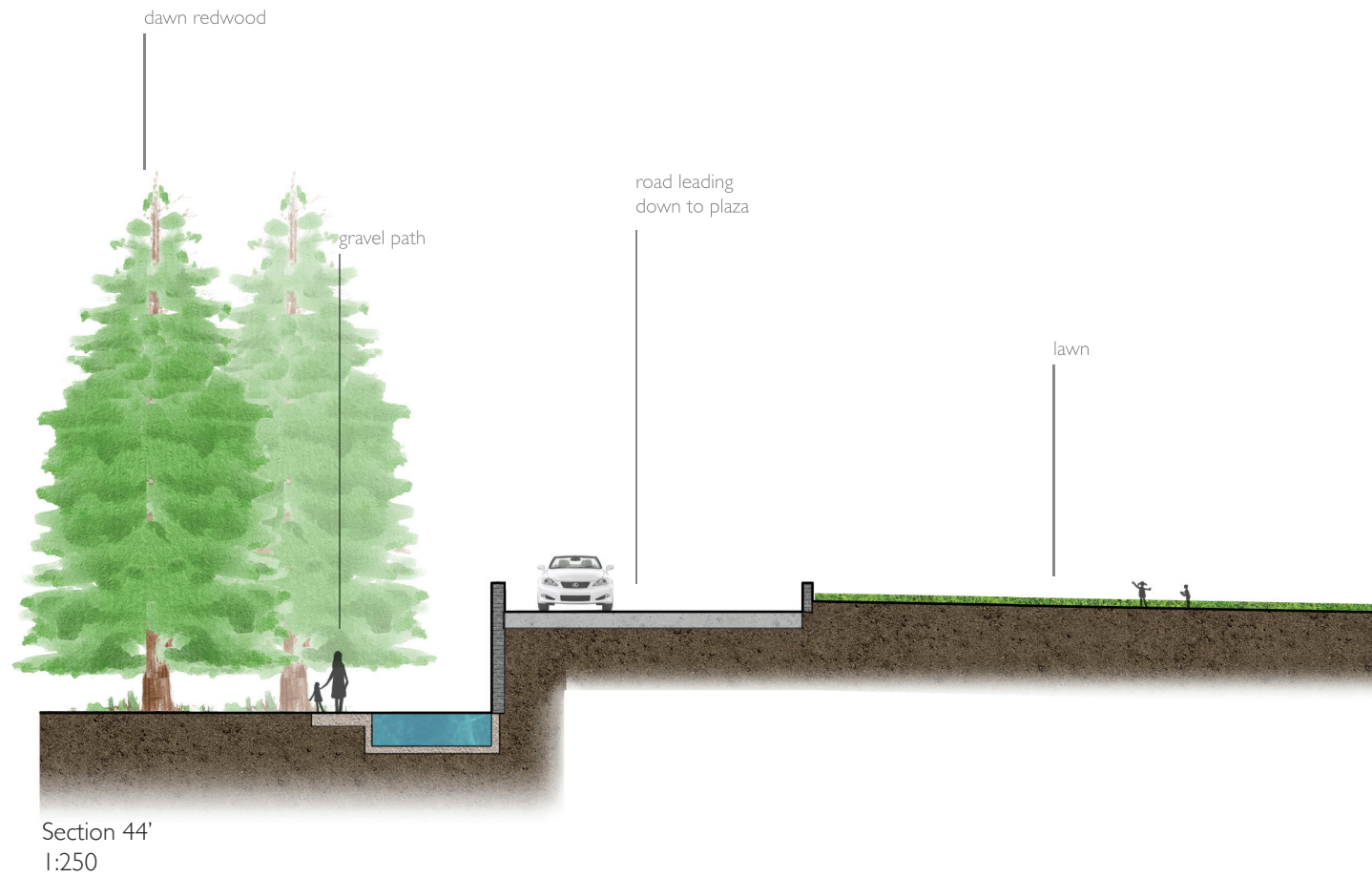
road leading up to exit

oilseed field

lawn covered slope

underground pipe

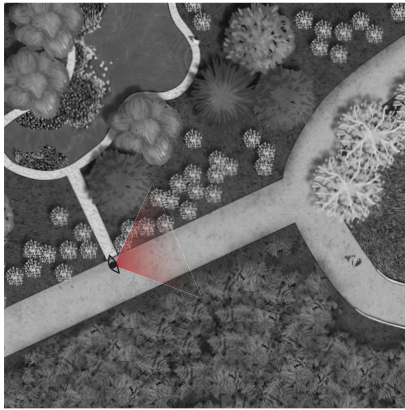
road leading down to plaza





Vehicular traffic in and out of the site meet in this area. The meeting point of the uphill and the downhill roads also marks an experiential split. The location of the empress trees partially obscures views of the blast furnace from the west, so as to create a more dramatic revelation as one moves towards them. The dawn redwoods along the road's retaining wall create a sense of walking in tree canopies as one climbs uphill.





Management Plan

FIELDS



Rotation Table

		ol-oilseed cl-clover al-alfalfa v.- variety							
year	area	1	2	3	4	5	6	7	8
1		os v.1	os v.2	os v.3	os v.1	os v.2	os v.3	os v.1	os v.2
2		os v.2	os v.3	os v.1	os v.2	os v.3	os v.1	os v.2	os v.3
3		al	al	al	os v.1	al	al	al	os v.2
4		os v.1	cl v.1	os v.2	cl v.2	os v.3	cl v.3	os v.1	cl v.1
5		cl v.1	os v.1	cl v.2	os v.2	cl v.3	os v.3	cl v.1	os v.1
6		os v.2	cl v.2	os v.3	cl v.3	os v.1	cl v.1	os v.2	cl v.2
7		cl v.2	os v.2	cl v.3	os v.3	cl v.1	os v.1	cl v.2	os v.2
8		os v.3	cl v.3	os v.1	cl v.1	os v.2	cl v.2	os v.3	cl v.3
9		cl v.3	os v.3	cl v.1	os v.1	cl v.2	os v.2	cl v.3	os v.3
10		os v.3	cl v.2	os v.2	cl v.1	os v.1	cl v.3	os v.2	cl v.1
11		al	al	al	os v.2	al	al	al	os v.3

*Since there are many varieties of both oilseed and clover, the specific varieties will be determined after further consultation with local plant experts.

Oilseed
25-30 kg seeds per hectare
annual harvest before seeding
pesticide application before harvest

Alfalfa
25-30 kg seeds per hectare
three cuttings per year

Clover
25-30 kg seeds per hectare
three cuttings per year

Pre-sowing

Pesticide and fertilizer should be applied before sowing to aid crop establishment. Since the planting is intended for phytotechnical and research purposes, these measures are necessary for producing results. Biochar also needs to be tilled into the soil.

Planting

All crops are planted from seeds. Oilseed and clover are planted annually, whereas alfalfa is planted every three years. Planting density is 25-30kg seed per hectare.

Harvest and disposal

Oilseed should be harvested annually before reseeding; alfalfa and clover need three cuttings per year. The harvested biomass should be composted on site to reduce volume. Then, depending on the level of concentration of the contaminants, the material will be sent to a hazardous waste landfill or be incinerated at a designated facility.

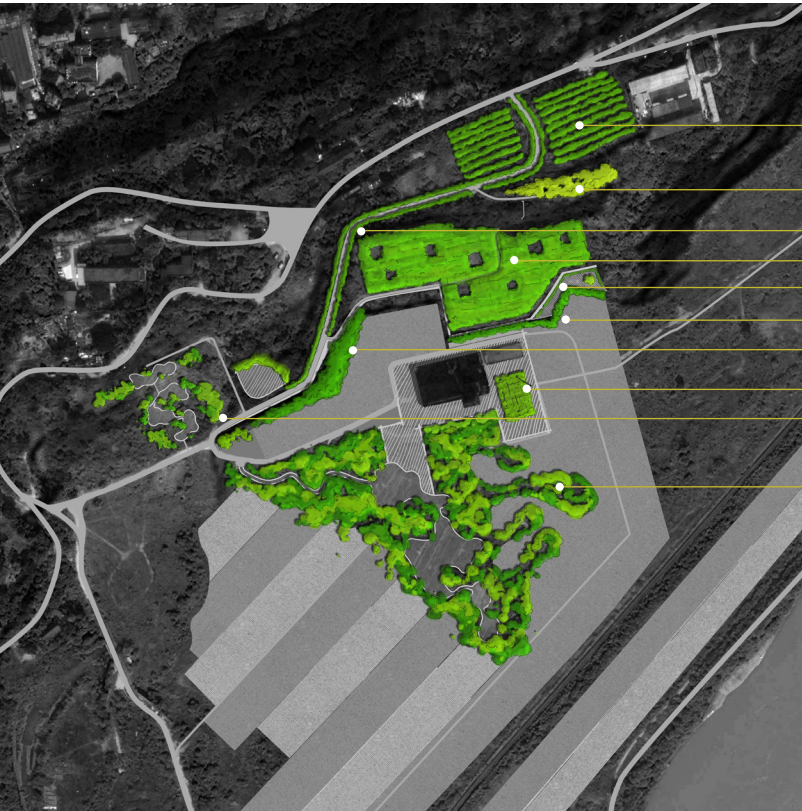
Testing and monitoring

Soil samples from both remediation and natural succession areas should be collected before planting. Afterwards, they should be collected and analyzed annually after harvest. Harvested plant biomass from both areas should also be analyzed to compare the performance of phytotechnologies.

Integration with education

Soil sample collections, composting plant biomass and lab tests can be incorporated into adjacent schools' curriculum. Test results should be made available to these education institutions.

TREES and SHRUBS



wintersweet garden

Chinese wingnut grove

empress tree allée

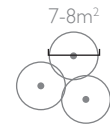
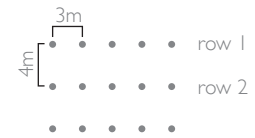
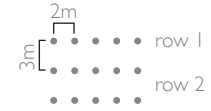
empress tree bosque

wintersweet belt

dawn redwood belt

Chinese wingnut bosque

mixed forest



Pre-planting

Fertilizer may be used to help the trees establish. Biochar may also be tilled into the soil to improve phytotechnology performance.

Planting

Trees are planted from seedlings. As the selected tree species are similar in their requirement for space, planting intervals are shown by the diagrams on the left. Apart from the mixed forest areas, trees and shrubs are planted in evenly spaced rows.

Maintenance and disposal

Watering and pruning as needed. Collection of fallen seeds and leaves should be carried out in late summer and late fall. Similar to the field crops, the harvested biomass will be composted then sent to appropriate facilities for disposal.

Testing and monitoring

Soil samples should be collected before planting and afterwards tested annually. Harvested biomass should also be tested for concentrations of contaminants in different parts of the plant tissue.

Integration with education

Apart from similar programmes to the field crops, the tree planting process itself can be incorporated into school activities. For example, on Chinese Arbor day every March. The spatial quality of the forest and bosque can also be utilized as outdoor classrooms.

WETLAND



Preparation

The sediment and filtration ponds will be cut out of the ground. The volume of soil could then be used as fill for the naturalized wetland since the existing impressions are very deep.

Maintenance and disposal

The settling pond will receive most of the sediment thus requires regular dredging. Plant biomass should be composted on site and sent to appropriate facilities for disposal.

Testing and monitoring

Water sample should be collected monthly to assess the wetland system's performance. Harvested plants tissue should be analyzed for their contamination level.

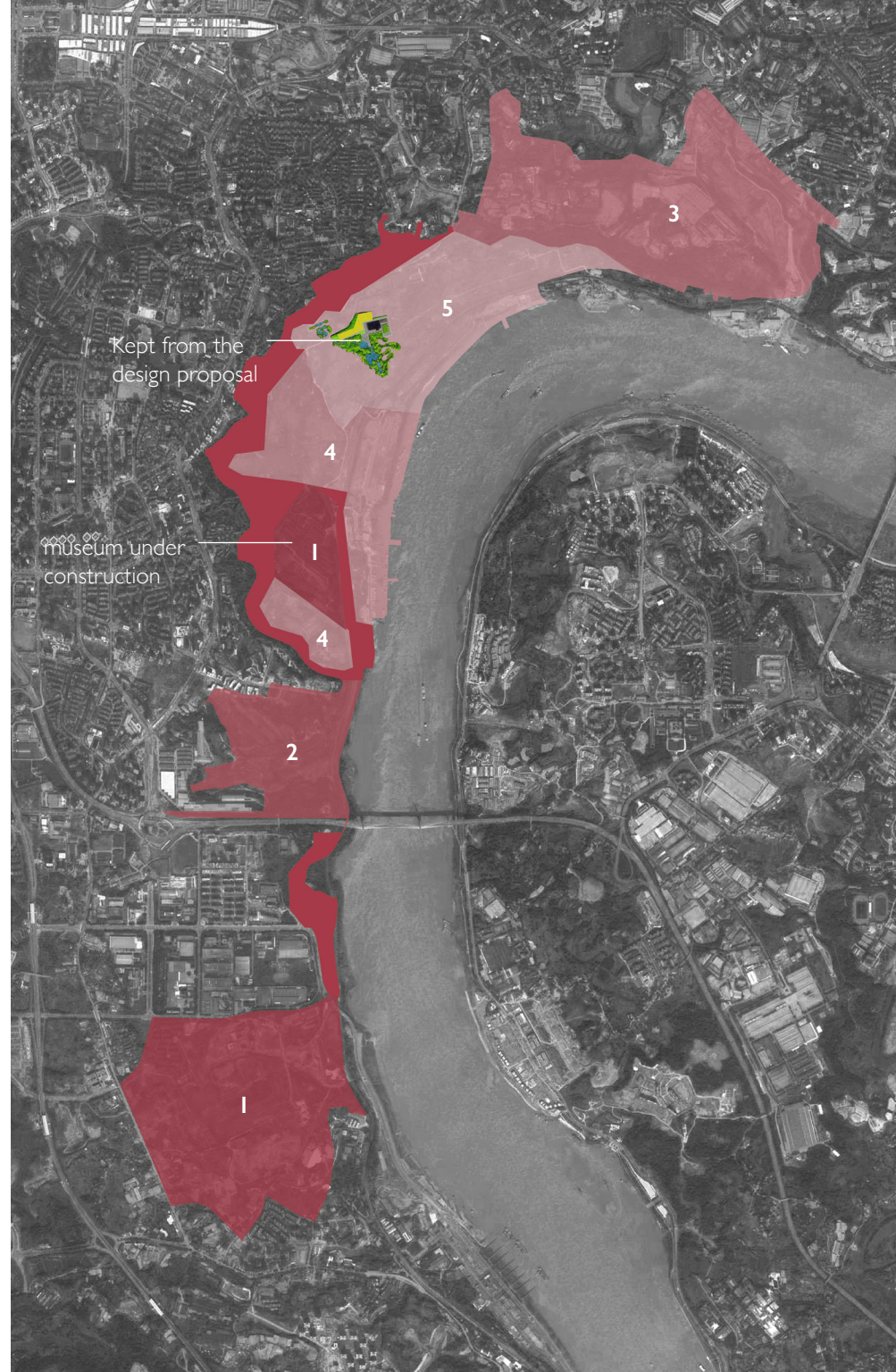
Integration with education

It is hoped that the wetland system can be incorporated into the future site redevelopment. The settling and filtration ponds are within future school ground in the land use plan. Therefore they could potentially be used by the school as an education facility, though for safety reasons the ponds should be fenced and students' access supervised to prevent exposure to contaminants.

3. Integration with Existing Plan

The approved redevelopment plan is largely based on La Cime and Ekistics' winning entry of the 2007 competition. It was revised in 2012 by the city's planning bureau. The plan designates new roads, land parcels and their land uses.

The phasing proposed here roughly follows that of the 2007 plan. The most significant alterations of this design are the wetland system and the blast furnace plaza.



Phase 1 The first part of the site to be redeveloped includes the industrial museum and the southmost land parcel. Both sites have already seen some construction. The southmost parcel is being developed for residential purposes. The museum is intended to function as a catalyst to attract investors for further site development.

Phase 2 The middle parcel is also intended for residential development. Since the site used to house rolling mills and stockyard, its contamination level is presumed to be lower than that of the main steel plant site, therefore it should be the first to see redevelopment after a period of remediation.

Phase 3 The northmost parcel is mostly on the hill top and adjacent to some existing residential neighbourhoods. In the 2007 redevelopment plan, it is planned to be developed before the main site.

Phase 4 These areas used to mostly house rolling mills. They also include a portion of the riverfront currently used as sand barge dock. By this stage of the redevelopment, there should be some residential demand for recreational access to the river; therefore partly develop the waterfront should be considered.

Phase 5 This part of the site has the highest level of soil contamination, therefore should be developed last. It will have a mixture of commercial and residential development. The wetland, forest and blast furnace plaza can be kept from my design proposal by a few alterations to the 2007 plan, keeping a piece of the site's industrial identity alive in the heart of the new urban fabric.



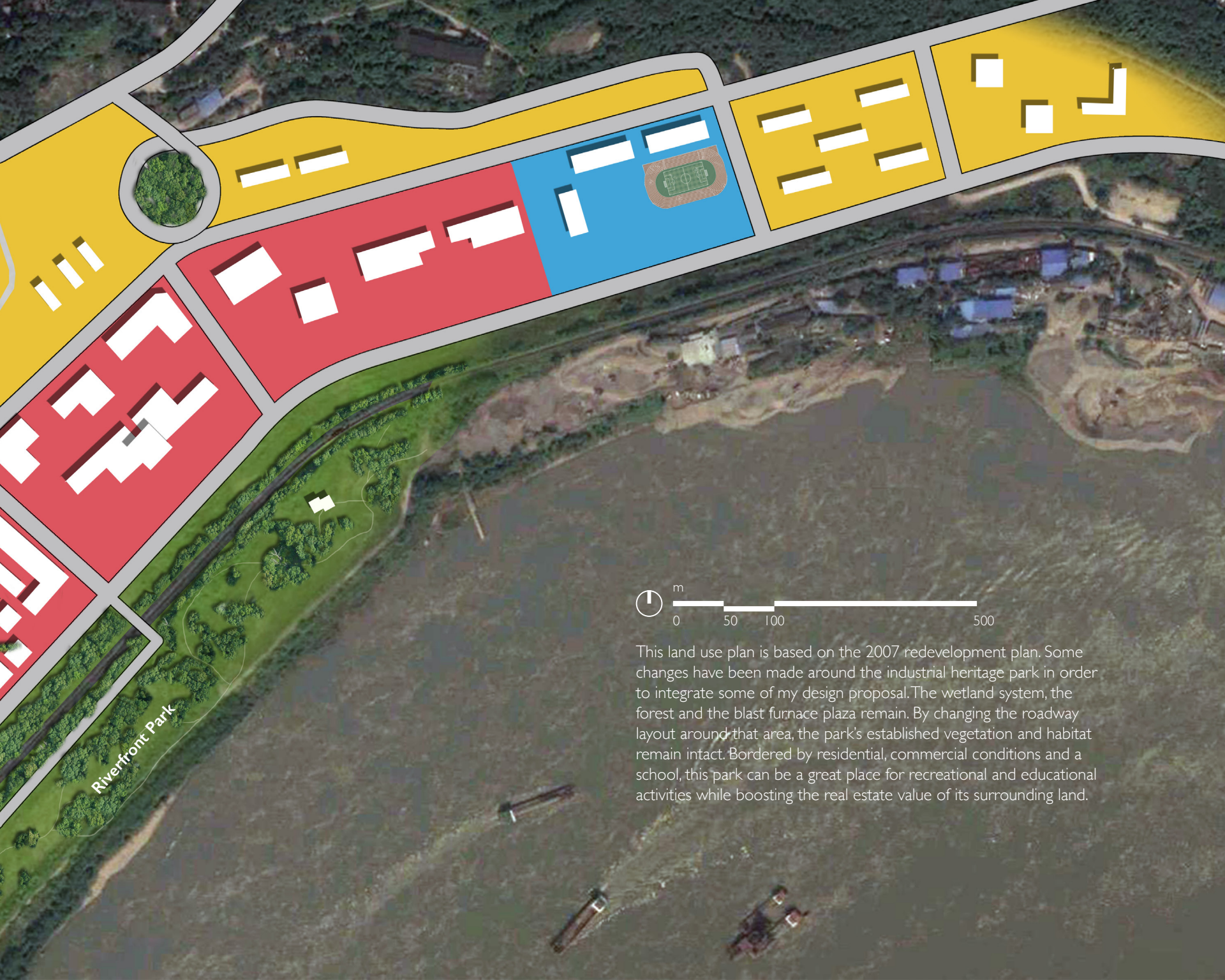
To keep the forest and wetland area intact from my design proposal, the roadways in the 2007 plan need to be modified to preserve the integrity of the area. Depending on the needs of the future developments, the wetlands system can continue to treat some of the site's grey water while acting as a recreational space.

Land Use Plan

- Commerical
- Education
- Residential
- Hospital



Industiral Heritage Park



This land use plan is based on the 2007 redevelopment plan. Some changes have been made around the industrial heritage park in order to integrate some of my design proposal. The wetland system, the forest and the blast furnace plaza remain. By changing the roadway layout around that area, the park's established vegetation and habitat remain intact. Bordered by residential, commercial conditions and a school, this park can be a great place for recreational and educational activities while boosting the real estate value of its surrounding land.

CONCLUSION

This chapter looks at my design process in retrospect and offers some of my thoughts on this particular project and landscape architecture on post-industrial site in general.

In fall 2012, as a freshly enrolled student of landscape architecture, I went on a field trip with the rest of the class to Europe at the start of the semester. I had travelled to a fair number of places before that, but mostly with the mindset of a tourist. This time, everything was seen and analyzed from the perspective of a designer. It was the first time I consciously paid attention to the structures and details of the places I visited.

We visited quite a few post-industrial projects, including Duisburg-Nord Landschaftspark, Parc de la Villette and Westergasfabriek park. They left a strong impression on me. A few years later, as I began to search for a topic for my practicum, I was quick to decide on post-industrial landscapes.



Duisburg-Nord Landschaftspark, 2012.



Chongqing Iron and Steel, 2007

My hometown Chongqing has a wealth of interesting industrial sites to choose from. It was not until I decided on the CIS site that I realized I had spent substantial time in and around it some years before.

In my memory, the steel plant is filled with rolling steam clouds and towering structures. The rail tracks are always busy with trains pulling giant pots of molten steel. The film crew I was with had to stop every few minutes to wait out the noise.

When I decided on this site for my practicum, I knew the plant had relocated in 2011 and its previous site was out of production. Before I went on site, I had already started to imagine what I could do with it by mentally assembling a collage. The collage is partly Duisburg-Nord, partly Parc de la Villette and partly 798 Art Zone. It was both exciting and irresistible to indulge these presumptions.

Of course, they were instantly shattered when I was faced with over 1,000 acres that was almost scraped clean of its past. After the initial shock, I thought “now what?”, and I thought of changing my site. I even wrote a very bitter poem as I sat in a Starbucks chilling from the heat after my excursion on the steaming hot site.



Industrial Heritage Museum under construction, March 2016



Newly built walkway, March, 2016

Before long though, I realized my frustration was my own fault. I had decided what the site should be before I even saw it. This prompted me to ask myself what makes a post-industrial site post-industrial? Should remnant architectural structures be the only legitimizing symbols for a post-industrial site? If so then where does landscape fit in? Could a landscape by itself speak for an industrial past with little or no presence of industrial structures?

And ultimately, what should this site be and what can it offer in the present?

This realization set the trajectory of my design. I try to treat the site as it is by remediating its problems and amplifying its strengths. In my Special Topics course at University of Manitoba, I analyzed five contemporary Chinese artists' work on industrial landscapes in five different visual mediums. By comparing these contemporary portrayals of China's industries to earlier works of the revolutionary era, I concluded that views on industries have always been simplistic and extreme. In the early years they were symbols of national pride, now they are culprits of environmental degradation. China's industries have been depicted as either good or bad (He, 2015). Such rather incomprehensive views are perhaps one reason why the steel plant was so quickly and carelessly demolished, since "green" is now a favourite tag on a city's image.

My design proposal tries to avoid such simplistic judgement. Whether designing for particular spatial experiences or for remediation of contaminated soil via phytotechnologies, I treat every attribute of this site as an opportunity to create something unique and interesting. I recognize the temporal nature and limitation of these designs, but I also believe they are sensible, implementable and would be beneficial to the site and its potential users.

The surge of China's real estate development that began in the 1990s, is drawing to a close. In recent years, many metropolises have seen a dramatic decrease of new development projects. In large cities such as Beijing and Shanghai, as prices continue to soar, oversupply threatens to burst the property bubble. Many signs already indicate an ongoing shift in the country's economic structure and development strategies. Under these circumstances, the CIS site and sites of similar nature may have to face vacancy much longer than initially anticipated. This practicum in many ways is a response to these adjusted expectations for the future. If implemented, its strategies can make this and similar sites relevant in present and initiate an evolutionary process for an indeterminate future.



In the remediation field looking at the Yangtze



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And lastly, to Mom and Dad, who have always supported my decisions no matter how outlandish they become, I am the luckiest person to have you as my parents.

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[*Hanyang steel 1906*] n.d. Image provided by Chongqing Yufu Asset Management Group Co Ltd.

[*Japanese occupied Hanyang steel*] n.d. Image provided by Chongqing Yufu Asset Management Group Co Ltd.

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bottom

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