

Sandpit Urbanism

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Ranked among the oldest of technologies, the extractive industries involve the removal and processing of raw materials from the earth and their global-scale operations have transformed entire regions and markets. The term “urban ruin” will be used to describe a rural site of operation that services an urban- or infrastructural-scale agenda, and as Lucy Lippard describes, gravel mines are metaphorically cities turned upside down, though urban culture is unaware of its origins and rural birthplaces. Today, rural America is littered with evidence showing the country’s former industrial prowess over the last two centuries, and many of these places (now abandoned) hold latent value for their transformation and reuse. The industrial legacy of Nebraska’s sand and gravel operations provides an opportunity to balance resource extraction with a more complex understanding of ecological systems. In essence, these remediated pits are becoming catalysts for the fabric of isolated rural communities—a new form of urbanism. In a state without significant bodies of water, sandpit mines transformed into freshwater lakes have generated an emergent city growth pattern and constructed ecologies that mask the extraction process in rural Nebraska.

“Extraction sustains our society. We rely on energy to power the technology in our lives but are disconnected from the landscapes that must be exploited to yield that energy. We dig and blast materials to construct and repair the physical infrastructure of our towns and cities, but rarely pause to think about the origin of the gravel, concrete, steel, foam and bitumen that comprise the built environment.”¹

INTRODUCTION

Among the oldest of technologies, the extractive industries involve the removal and processing of raw materials from the earth and their global-scale operations have transformed entire regions and markets. The term “urban ruin” will be used to describe a rural site of operation that

services an urban- or infrastructural-scale agenda, and as Lucy Lippard describes, “gravel mines are metaphorically cities turned upside down, though urban culture is unaware of its origins and rural birthplaces.”² Today, rural America is littered with evidence showing the country’s former industrial prowess over the last two centuries, and many of these places (now abandoned) hold latent value for their transformation and reuse.

Prior to industrialization, city and landscape existed not in a state of conflict, but in a state of support. During this period we can see the logic and spaces of extraction-informing patterns of urbanism, including San Francisco’s gold rush, Montana’s copper mines, and Houston’s oil and gas fields. It was only with the coming of the industrial era that cities, countries, and landscapes became isolated zones of occupation and practice. Nebraska and the larger Great Plains region are examples of this division: for over a century the industrial-scale sites of natural resources have been servicing large metropolitan regions. Nebraska’s landscape in particular has given rise to several world-class extractive industries that mine sand for use in building and infrastructural projects, though unlike landscape-scale brickyards, cement plants, and quarries that pose enormous difficulties for adaptation, the Nebraska sandpits are an example of landscape-scale urban ruin latent with opportunities for emerging recreational-, ecological-, and architectural-scale interventions.

NEBRASKA SANDPITS

In Nebraska, sand is a building block both for the ecosystem and for construction. The Nebraska Sandhills, a national natural landmark, are a region of mixed-grass prairie on grass-stabilized sand dunes in north-central Nebraska, covering just over one quarter of the state. The Sandhills are the largest and most intricate wetland ecosystem in the United States containing a large array of plant and animal life. In addition to being an ecological building block, Nebraska’s sand has been considered a commodity since the settlement of urban areas in the 1800s and continuing with the expansion of continental infrastructure systems such as the interstate highways. The population of Omaha quadrupled from 30,000 to 120,000 in the late 1800s, and the city’s first asphalt pavement was laid in 1882, sparking an ambitious street improvement project that would last for the next forty years and expand the city’s transportation network while providing a huge market for the sand used in making asphalt. At the time, sand plants were mostly located along railroad

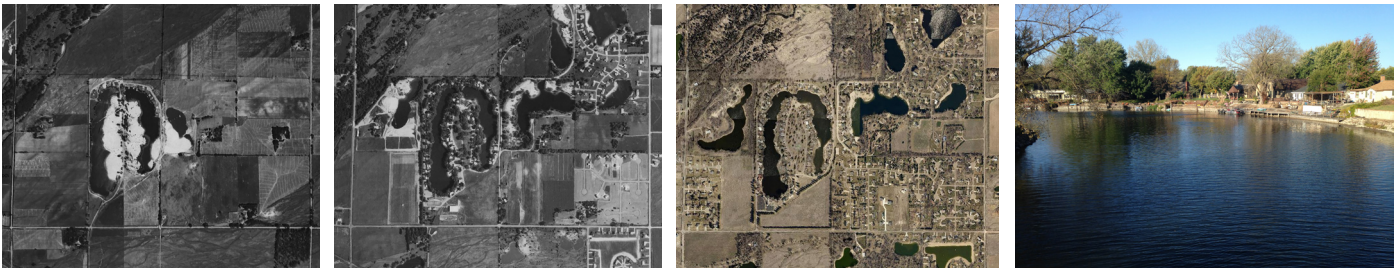


Figure 1: Kuester Lake, located in east Grand Island. Aerial photographs describe the active- and post-extraction landscape. From left to right, photos date from 1938, 1975, 2013, and 2016. Aerial photos from Google Earth, right photo by A. O'Neill.

tracks, making it easy to use steam-powered drag-line as well as to transport material across the state.

Between 1900 and 1993, Nebraska hosted 3,228 separate sand and gravel pits covering nearly 40,000 acres. In 1986 alone over 9,600 short tons of sand and gravel with a value of nearly \$24 million were sold or used by producers in Nebraska. In 1999, the annual production value of Nebraska sand and gravel was valued at approximately \$40 million. Following the reduction in construction activity that began with the 2008–2009 recession and continued through 2011, the construction industry again began expanding in 2014, with increased production and consumption of cement, construction sand and gravel, crushed stone, and gypsum, mineral commodities that are used almost exclusively in construction. As a result of regulations, the movement of sand and gravel operations away from densely populated regions is expected to continue.

The majority of sand and gravel extraction mines in Nebraska are located directly above the largest aquifer in North America—the Ogallala Aquifer. Unlike other national mining locations, the water table extends only 0-5 feet below the surface in certain regions, causing the sandpits to quickly fill with water and form ephemeral wetlands. In a state without significant bodies of water, sandpit mines transformed into freshwater lakes have generated an emergent city growth pattern and constructed ecologies that mask the extraction process in rural Nebraska.

FROM PITS TO RESIDENTIAL DEVELOPMENTS: A CASE STUDY IN GRAND ISLAND

Centered around the idea that an infinite supply of gravel exists in central Nebraska, the sandpits are helping to facilitate growth in Grand Island, the state's second fastest-growing city. Grand Island has a population of about 50,000 people and is the third-largest city in Nebraska behind Lincoln and the Omaha metro area. Historically located in close proximity to the Platte River, Grand Island is also located on Interstate 80. The city's sand and gravel demand figures to be about 388,450 tons per year based on population estimates from the Regional Planning Department, with the majority of sand and gravel being used for streets, highways, and buildings.³

There are currently over seventy industrial-scale sandpit extraction sites within and surrounding the city of Grand Island. These sites are typically mined for as little as a single season or a few years, with the majority

currently out of production. Classified as inactive mines, these ruins have been allowed to become freshwater sandpit lakes, and provide opportunities for adaptive design.⁴ The shape and form of these sandpits are based on resource material and the unseen networks that shape them. The location and overall form of the sandpits is not arbitrary, but rather driven by local and state needs for resources and a response to more complex, dynamic systems. Of the seventy mining sites, thirty-four formerly active sites have been converted into high-end housing subdivisions, with each home built on the lakefront property of a former pit.

The residential development Kuester Lake is one of the oldest sandpits in Grand Island and was mined from 1919 to 1937 by an Omaha sand and gravel company to support asphalt pavement in Omaha (see Figure 1). While an active mining site, rail cars would take sand and gravel to building projects, though after operations ceased in 1937 the mine's two ponds were dredged to create the lake's distinct horseshoe shape. As shown in the aerial images, resource extraction and mining operation in this part of the city was replicated over the years, creating new pits, lakes, and residential developments.

The residential development Ponderosa Lake Estates also ranks as one of the most prestigious sandpit residential sites in Grand Island (see Figure 2). The sandpit was developed, mined, and pumped by Missouri Valley Construction in the 1960s and 1970s. The lake is surrounded by 88 homes with an average square footage of 3,311 and the largest covering 10,582 square feet. Currently, some of the houses are undergoing issues with settling because most of them were built on sand that had not yet completely settled after the dynamite mining.

In addition to these developed residential sites, the city has repurposed ten former extraction sites into city parks. Finally, eight "active" and fourteen "inactive and undeveloped" extraction sites exist across the city, all of which will become the next projects for developer-driven adaptation unless an alternative design that addresses a wider range of social and ecological needs is considered. In the future, these sites hold potential as hybrid cultural-natural spaces that bring nature, culture, and community together in a new form of urbanism. The industrial- and ecological-scale networks in Nebraska are forming new urban development patterns that no longer rely on the Jeffersonian grid to organize space, but instead use the operating procedures of a sandpit extraction site. These sites are "a multi-scaled and multi-layered urbanism involving cultural, social, political, economic, infrastructural, and ecological conditions that are layered, tangled, and mutually dependent."⁵



Figure 2: Ponderosa Lake Estates, located in south Grand Island. Aerial photographs describe the pre- and post-extraction landscape. From left to right, photos date from 1938, 1975, 2013, and 2016. Aerial photos from Google Earth, right photo by A. O'Neill.

CONSTRUCTED ECOLOGIES

Constructed ecologies can be seen as those situations or constructs that have come into being as accidental or haphazard by-products of human exigency,⁶ or as David Fletcher discusses in his essay “Flood Control Freakology,” are the unavoidable result of the interaction of infrastructural and natural systems.⁷ Building on this line of thinking, the reconsideration of space and opportunistic potential for the sand-pit ruins can be seen as a constructed ecology for recreational activities and endangered birds. The first constructed ecology (the unavoidable result of the interaction of infrastructural and natural systems) occurred when Interstate 80 was built across Nebraska from 1957 to 1974. Mel Steen, head of the Fisheries Division of the Nebraska Game and Parks Commission, knew the geology of the Platte Valley and understood that it had a very high water table. During the construction of the interstate’s overpasses and on-off-ramps, there were often lakes located alongside the construction areas that were known as the “I-80 lakes.” The sand, gravel, and fill from these lake pits were needed to build the roadbeds and overpass approaches, and mining the sand and gravel off the right-of-way was an easy way to complete the task. At the time, Steen knew these excavations would fill with water and could create unique fishing opportunities for anglers. He lobbied hard to keep these areas within the public right-of-way of the interstate and was eventually successful, with the result that the section of I-80 stretching the 150 miles from Grand Island to Hershey, Nebraska currently has more than 60 small lakes available for public fishing.⁸ These lakes are visible from the highway and offer habitats that attract new wildlife above and below the water. These artificially constructed freshwater lakes were an almost overlooked typology but hold immense potential for our urban and rural growth patterns.

The second unavoidable result of the interaction of infrastructural and natural systems occurred when endangered birds began depending on heavy industry for survival. The lower Platte River and its major tributaries provide important nesting and migratory stopover habitat for two bird species of special concern: the state and federally endangered Interior Least Tern and the threatened Piping Plover (both on the endangered species list since January 1986). Historically, terns and plovers have flourished on the sparsely-vegetated midstream sandbars of local rivers, but recently much of this natural habitat has been lost due to broad-scale alterations of natural river systems. The amount of suitable sandbar habitat has been reduced by the presence of invasive plant species, the construction of dams and reservoirs, river channelization, bank

stabilization, hydropower generation, and water diversion. As a result, these birds frequently nest in human-created habitats outside of the river channel. These habitats are created by industrial and commercial activities such as sand and gravel mining, dredging, and construction operations. Although these birds only remain in the area about four months of the year, significant effort has been made by local activists, university partnerships, and mining and construction companies to incorporate bird nesting into the industrial process⁹ (see Figure 3).

FUTURE SCENARIOS

The last decade of large-scale post-industrial “urban” projects has seen landscape and ecology become primary vectors in contemporary urbanism.¹⁰ This can also be seen at the small scale in the countryside, where landscape and ecology are inherent to occupation and survival. Landscape has always been a vital factor in the Great Plains, but in more recent years ecology has also become a design parameter in contemporary development.

The question that arises pertains to the types of architecture, landscape architecture, urban design/planning, and ecology that will emerge as an unavoidable result of interaction between these infrastructural and natural systems. As central Nebraska continues to extract sand and gravel, the manmade lakes will increasingly serve as desirable places in which to live,



Figure 3: Nebraska sandpits are transforming from large-scale industrial operations to areas of beneficial occupation by anglers and endangered species. Photo by J. Farrar.

yet the current planning and execution process of these sandpits would benefit from alternative strategies fostering an improved calibration of the environment. Sandpits form a spatial element with the capacity to organize space and ecologies related to patterns of urbanism, and the size, shape, and performative qualities of these sandpits could be made more productive by addressing factors of location, scale, extraction process, and the potential of constructed ecosystems. Accomplishing this goal requires a larger focus on the plan for reclamation after mining operations end, including allowing access to city services (such as eliminating issues with septic systems and leech fields).

Grand Island's future sandpit development will occur near the city's southern edge, since a majority of the city's sandpits are located in this area because of the sand and gravel quality, the amount of land for sale, and easy access to the highway or the interstate for moving material. The existing and new lakes on the city's southern edge will create a pattern of urbanism based on both resource extraction and community housing needs.

CONCLUSION: A NEW PATTERN OF URBANISM

The industrial legacy of Nebraska's sand and gravel operations provides an opportunity to balance resource extraction with a more complex understanding of ecological systems. In essence, these remediation pits are becoming catalysts for expanding the fabric of isolated rural communities—a new form of urbanism (see Figure 4). The urban ruin still holds emergent spatial value beyond the void of a rustbelt urban fabric. If the region defined as rural, countryside, hinterland, or the breadbasket continues to service densely populated urban and metropolitan areas, then we must broaden our definition of urban ruin to include operations that support the urban existence. The countryside should be acknowledged as an emergent system more easily adaptable than the bound and confined ruins of the more densely populated urban areas. The Grand Island examples provide an unexamined precedent by our disciplines toward a new alternative practice of repurposing, transforming, recalibrating, and reviving urban ruins in rural sites.

ACKNOWLEDGEMENTS

The author would like to thank Anna O'Neill for her help in researching and developing this article.



Figure 4: Repurposing, transforming, recalibrating, and reviving ecological habitats towards a new adaptive form of urbanism. Drawing by A. O'Neill.

ENDNOTES

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