

Landfill Re-morial

A Postmodern Reclamation of the City of Fargo Landfill



Kene Charles
Landscape Architecture Design Thesis
[1]

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A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

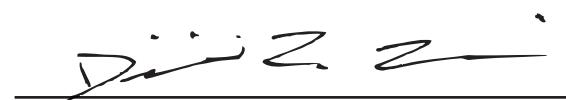
By

Kene Okigbo

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for the Degree of
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Primary Thesis Advisor



Secondary Thesis Advisor

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Table of Contents

Table of Contents	5
Abstract	7
Statement of Intent	9
Literature Review	11
Methodology	21
Results	27
Site Inventory	35
Surrounding Cities	37
Site Concerns	47
Theoretical Premise	49
Design Development	55
Results	67
Works Cited	68

Abstract

This thesis takes a quantitative look at closed landfills to determine a feasible and sustainable solution that can be used in the City of Fargo Landfill, which is expected to close between 2019 and 2023. The solution proposed is the creation of a recreational park for the Fargo-Moorhead community. Some of the elements included within this park are winter sports including downhill and cross-country skiing, and snowboarding. Bike Motor Cross (BMX) amenities are included for the summer months while a proposed community center provides demonstration spaces.

The design of the park has two purposes. The first is to make an amenity of value for the community. The second purpose is to educate the people of Fargo-Moorhead of how their waste management practices can be changed and how a cradle-to-cradle mentality in waste management is beneficial to them.

Statement of Intent

I intend to prove that the reclamation of the City of Fargo Landfill, by transforming it into a recreational park, is not only a sustainable solution to the closing of the landfill, but is beneficial to the city and its citizens. I plan to do this through 1) a quantitative analysis of inactive landfills, documenting current uses and site attendance compared to the size of the landfill and 2) a comprehensive look at the effect of the landfill on the surrounding community and how these effects may benefit said community.

Through this thesis I hope to design a park that educates community members of the possibilities and opportunities of closed landfill sites. These deserted locations could have the potential to be reclaimed and incorporated into the city once more. I plan to create a master plan of the park. This master plan would designate the site uses and programming elements that have been taken into consideration. Sections and elevations will be used to convey the new site topography. Though the entire site will not be designed to the same level of detail, a planting plan will be incorporated to depict the use and reasoning behind the plant selection. Lastly, mapping of access to the site and circulation inside of the park will assist in an understanding of how people are to move to and through the former landfill.

Literature Review

Critical Evaluation of Sited Papers

Before the explanation of this thesis it is pivotal to define a reclamation project, as it applies to the park. As defined by Innovative Waste Consulting Services, a landfill reclamation is "the process of excavating previously disposed materials from a landfill to the means of preventing potential groundwater impacts, recovering airspace, or recycling," (Innovative Waste Consulting Services, LLC, 2009). This thesis goes further to state that the reclamation of the City of Fargo Landfill is the recovery of lost potential and the recycling of unused land.

In the United States sanitary landfills have been in use since 1937 (National Historic Landmarks Program, 2007). The number of landfills in the U.S. has plummeted from 7,683 in 1986 to 1,908 in 2009 (Palmer, 2011). The two probable outcomes of the 5,775 landfills that closed in the past two decades are capping with a grassy plain on top or capping and subsequent transformation into a park.

The City of Fargo Landfill, located between 12th Avenue North and 7th Avenue North will be closing its current operating site and transitioning to its new location in 2019. The new location is on the same section

of land, but mirroring the old site with the bisecting 45th Street. When Fargo's landfill closes I am proposing that it will be capped as a Category 2 closed landfill site, meaning that moderately intense activity can be done on the site, though large infrastructure projects like new buildings and major structures would be not possible (National Solid Waste Management Association, 2006).

Fred J. Anderson, a state of North Dakota geological surveyor, explains that during excavation of the City of Fargo Landfill, Brenna Formation slickensided clay was discovered (Anderson, 2005). Slickensided clay is known for its shrink-swell action, which means that foundations and land formations will need to factor for this in the final design (McDaniel, 2014). The knowledge of existing soil conditions will also affect the decision as to what category of inactive landfill Park will be.

Alameda County, in western California, explained the discrepancy between landfills and dumps. Landfills are the sanitary successor to the dump (Alameda County Environmental Health, 2014). With the lining incorporated to keep contamination confined, to the systematic layering of refuse to keep debris at a minimum, the landfill is far more ecologically

friendly than the dump.

The largest reason people avoid landfills is the smell. The Atlantic County Utilities Authority, managers of the disposal and recycling of materials, wastewater, and, green initiatives drafted a web-page titled Landfill Odor Control. The web-page describes the history of landfills, but then explains how landfill odors can be controlled. The method with the most potent results is the Landfill Gas to Energy (LFGE) plant (Atlantic County Utilities Authority, 2014). This LFGE plant vacuums the gas created through the decomposition process and uses it to create energy. This decomposition gas is what creates the stench that is associated with landfills. If an LFGE plant were to implemented in the new landfill location and installed in the former landfill, the largest reason for avoiding the landfill would be eliminated.

In a 1998 article published in the Environmental Science & Technology Journal, Bark Eklund studies in detail the gases produced by landfills and their potential impact on communities (Eklund et al, 1998). He and other researchers found that more than 250 gas samples were collected at Fresh Kills Landfill in New York. The paper focuses on non-methane organic compounds. This is important because with methane being the prominent gas released by landfills and methane also being the most fiscally valuable gas, many other gases can go unregulated, which can cause damage not

only to the environment, but also to human life. The significance of this study falls in the meticulous amount of detail they conducted this study in. Fresh Kills was the largest landfill in the world in its time. Not only municipal solid waste, but building debris, including asbestos and countless more compounds are held within the earth. The daily additions of residential and commercial garbage will be similar between New York and Fargo, but Fresh Kills' amount of dangerous waste is far more expansive than Fargo. By comparing the size of Fresh Kills (2,200 acres) along with the levels of key gases, with the City of Fargo Landfill along with its key gases, it can be inferred that the City of Fargo Landfill's ability to hold recreational activity safely will not be impeded.

Peter Harnik, Michael Taylor, and Ben Welle in From Dumps to Destinations: The Conversion of Landfills to Parks explained the characteristics that need to be considered when a landfill is converted into a viable destination for people. Regulations of landfills has been overseen by The Environmental Protection Agency since 1991 (Harnik, et al). The cap used to minimize water infiltration and erosion in reclaimed landfills must be a minimum of 18 inches, with an addition of 6 inches of vegetative material. Also in the article are the main technical considerations that must be made when a landfill is reformed. The production of gas and the settlement of grass are the two largest design considerations that must be

monitored. Gas production can happen well after 30 years of closure. In former landfills incompetently transitioned into parks, people have been injured because of flares and sporadic fires starting while park goers are close to methane deposits. Ground settling is also a massive issue because with the decomposition of refuse the chemical composition of the waste is being altered. As decomposition occurs in the soil, the solid and liquid state waste is going through status transition, putting the structural integrity of everything above it in question. Over the span of 15 years landfills can settle up to 20 percent (Watts, etc., 2014). Breaking of foundations, cracking of roads, and unstable buildings are just some of the potential fallouts that occur after settling of landfills. The City of Fargo Landfill is no exception to this statistic.

In June of 2009, Innovative Waste Consulting Services, LLC prepared a project document for the Florida Department of Environmental Protection (Innovative Waste Consulting Services, 2009). This document included:

- Project background
- Scope and Objectives
- Concept
- Process
- Equipment
- Past Experience of Innovative Waste Consulting Services

- Risks and Concerns of the project
- The project construction process

The compilation of these pieces of information, when applicable, increase the credibility of a project by adding depth and detail to the park design. Project background will provide insight into future trends of the new landfill across the street, which may affect the park's design. The objectives, or goals, of the project are laid out in the Results section of this document. The concept will begin and be developed through January, as the Plan for Proceedings dictates. The Process of the project has also been laid out in the Plan for Proceedings, but changes will be documented to ensure accuracy. Equipment use in the park will come from the design development which will take place after January.

Research Questions

- Will people be safe on this site?
- How many people will use the park?
- Can vegetation be grown above the capping?
- Will the park be usable year round?
- Who will manage the park after construction?
- Will the park be free for everybody or will there be a fee associated with use of it?

- Will the park be static or will it be altered throughout the year?
- Who will use the park?
 - What age ranges will use the park?
 - Will the entire park be ADA accessible?
- How often will one person come back to park?
- Will animals be encouraged to live in the park?
- Are utilities like electricity, water, and lighting able to be piped subgrade?
- How will structures be built without burrowing beneath the frost depth?
- Are there similar projects being done elsewhere?
- How will people be educated on recycling and cradle to grave waste management techniques?
- How much energy can be produced from the park?
- Is this enough energy to make the park net zero?

Research Hypothesis

Case Study

Project Name: Freshkills Park

Location: New York, NY

Opening Date: October 2012

Construction Completed: No (2032)

Construction Cost: \$14 million (thus far)

Size: 2,200 acres

Landscape Architect: James Corner

Consultants: BKS

Client: New York City Department of City Planning (NYCDP)

Managed By: NYC Parks

Context:

Fresh Kills Landfill was opened in 1947. On March 22, 2001 it was officially closed. Within its 54 years of service, Fresh Kills held the title of the largest landfill in the world, in-taking up to 13,000 tons of garbage each day (City of New York, 1951). Before Freshkills Landfill set its roots the land beneath the waste was a salt marsh with a clay sub-base and sand/silt topsoil. The landfill was specifically located on Staten Island, south west of the city, with the Hudson River bisecting the two. Trash and refuse was moved from the city to Fresh Kills by barges every day.

Project Background:

After Fresh Kills Landfill closed the New York City Department of City Planning commissioned an international design competition to compose proposals for Freshkills Park. In 2003 James Corner Field Operations was

selected as the winner of this competition (New York City Parks, 2014).

Originally only 32 percent Fresh Kills Landfill was going to be reclaimed as park land, but in November of 2013 the plan was changed to reclaim the entire 2,200 acre space.

Design

The park is being designed as five parks in one. The Point, North Park, South Park, East Park, and West Park come together to mass Freshkills Park. Each of these parks has distinct program elements differentiating it from the remaining four sub-parks.

The Point holds artwork and educational programming along with sports fields and even spaces.

North Park overlooks William T. Davis Wildlife Refuge and is itself a large expanse of meadow, wetland, and creek.

South Park has an equestrian facility and mountain biking paths. It is large enough to hold both of these amenities with room to spare for a recreational center for running and swimming.

East Park has been conceptually designed to be a nature education area. Wetlands with boardwalks and public art installations will be included to engage the public.

West Park is envisioned to hold a monument for September 11th.

Much of the rubble from the World Trade Center bombings were brought to Fresh Kills Landfill during the recovery and clean-up effort.

Design Process

Freshkills Park has been partitioned into three 10 year sections.

Section 1

- Part of South Park and North Park open
- Set one of the recreational facilities are completed
- 'Ecological transformation' progresses
- East and West Mounds are closed permanently and capped

Section 2

- East Park is opened to the public
- Extension of the paths and trails

Section 3

- West Park's natural areas are expanded
- Creation and establishing of new habitats

Role of Landscape Architect

James Corner Field Associate produced the conceptual master plan for the entire site. Some of the smaller entrances to parks were designed by other

firm. For example, Schmul Park, the entrance to North Park was designed by the architecture firm BKS&K. Owl Hollow Fields, a set of soccer fields and pedestrian paths, was designed by Sage + Coombe Architects.

Program Elements

- Playground Areas
- Handball Courts
- Basketball Courts
- Soccer Fields
- Pedestrian Paths
 - Walking Paths
 - High-speed Paths
- Parking
- Lawn Areas
- Picnic Areas
- Bird Observation
- Public Art Installations
- Scenic Overlooks
- Animal Habitats
- ADA Accessible Routes

Maintenance and Management

The New York City Parks Department (NYCPD) is responsible for the maintenance and management of Freshkills Park. This includes the processes of capping the landfill, monitoring the gas levels, collecting methane and leachate, along with treating the leachate. The NYCPD will also be responsible for facility and grounds maintenance; keeping a consistent appearance throughout the site, at all times of the year.

User/Use Analysis

The active areas of Freshkills Park have been very well received by the public. Part of this success is attributed to the public involvement of the project. Meetings and workshops were put together where New York City residents contributed to the vision of the park. Their contribution included:

- Maintaining passivity and natural state of the site along with openness
- Creating/retaining access to water
- Restricting the amount of commercial activity on site
- Incorporating sports fields and facilities
- Use of ecological techniques and renewable energy

Criticism

Before visiting the park, New Yorkers expected to be critical of the smell of the landfill, but no criticisms could be found.

Significance and Uniqueness of Project

Freshkills' diverse and extensive list of program elements make it diversely appealing to the varied people of New York. By creating an educational space that is functionally designed to allow for recreational amenities, the park is in constant use by many different people. Schools currently visit the park for guided tours which are offered with assignments for students which relate their lives to the park. These types of programs build a familiarity with the park while simultaneously educating the youth on topics like recycling and energy conservation.

During the design phase of this project it was understood that such an expansive site was home to a diverse array of animals. With this in mind habitat space has been designed and will be improved as the park progresses. The park has actually been so well incorporated into the ecological framework of New York that it saved the neighborhoods of Travis, Bulls Head, New Springville, and Arden Heights during Hurricane Sandy (Kimmelman, 2012).

Limitations

- Methane buildups
- Leachate pools
- Over budget
- The original budget for project was \$6.8 million while the cost of the project getting to 20 percent was roughly \$14 million (Freshkills Park, 2014)
- Root systems damaging the capping
- To ensure the landfill waste is secured Freshkills Park has been capped, meaning a two foot layer of clay has been layered above the waste. Above the layer of clay is another layer of soil. One of the largest restrictions that reclaimed landfills face is their dependence on shrubs and trees with shallow root systems (Marton, 2014).

Generalizable Features and Lesson

Freshkills Park's program elements which respond to New Yorkers' interests is the most brilliant feature of the park. The park is treated less like a reclaimed landfill, and more like a found treasure. It is clear that the focus when designing the park was not on what the park used to be, but rather on what it can become. If there is one thing to be taken from this project it would be to focus on the potential of a space.

Learning is a large part of the Freshkills Park. The park has also done a phenomenal job of gaining local support and resident involvement. Part of this is because of the attractive program elements that already fit the needs of the community, but part of this is the symbiotic curriculum that the park offers. Lesson plans, classroom resources, bus tours of the site, and also visits of park offers to schools are all provided. The willingness of the park officials to be a part of the community and the apartment ease and transparency of communicating with them is one reason for the parks' success and should be mimicked anywhere that a similar project is being done.

Bibliography and Project Citation or References

See bibliography at the end of paper

Website/Links

See bibliography at the end of paper

Future Issues/Plans

The future issues of Freshkills Park will be focused about establishment. As time goes by settling will occur moving earth up to 20 percent over the first 15 year (Watts, etc., 2014). When settling occurs paths, plantings, and the grade of fields will be distorted. It is possible that much of the park will need to be readdressed as settling issues present themselves.

Methodology

Methodology

Approach to Research:

This research concerns the transformation of the City of Fargo Landfill into Gaia Park, a recreational park for the community which offers winter sports and bike trails. Section three of this thesis intends to place the proposal within a relatable geographic location, that being Fargo, North Dakota, explain that the project will be done for the City of Fargo, with the intended users being the Fargo-Moorhead community, and explain how the collection of the data measures must be collected to successfully create a well thought-out design.

Site Introduction:

The active location for Gaia Park is the former City of Fargo Landfill. Currently on and surrounded by industrial land use, the 150-acre landfill services not only Fargo, West Fargo, and Moorhead, but also many smaller towns surrounding the Fargo-Moorhead area. The landfill is located between Twelfth Avenue and Seventh Avenue in Fargo, North Dakota. It has been opened since the 1980s, but will be closed between five to six years (Hanson, interview, 2014).

Forty-Fifth Street separates the project site from the new landfill. 45th Street is an arterial road, which not only connects north and south Fargo, but also gives access to roads leading to West Fargo. The largest attributes to having such an influential road adjacent to the site are 1) the lack of a need to develop surrounding infrastructure to allow guests to the site and 2) the ease in getting people to stop by a location they already know well.

Currently the landfill does not have definite plans post-closure. The most likely outcome is for the space to be capped, meaning it will be covered with at least two to three feet of clay, then soil atop the clay, allowing for grasses and small plants to grow over the garbage.

The current buildings on the landfill are expected to be repurposed and potentially transformed into recycling centers. The Harmful and Hazardous Waste Structure will continue collecting solid and liquid chemicals too dangerous to be deposited in the landfill.

Client/User Description:

The project client is the City of Fargo. Situated in Cass County of North Dakota, the City of Fargo sits along the Red River across from Moorhead, Minnesota. Fargo has an estimated 112,000 residents within its 48.82 square mile area.

The users of Gaia Park include the people of Fargo, North Dakota, but could include everybody in the Fargo-Moorhead area. The population of this metropolitan area stands over 223,000 people (United States Census Bureau, 2014). Roughly 17 percent of the population is younger than 15 years old. 40 percent of the population is between 15 and 35 years old. The percentage of Caucasians in the area is 95. The percentage of African Americans, American Indians, and Asian are all roughly 1 percent.

The primary users of the site will change with the seasons. During the winter months Gaia Park will be used for winter activities like downhill skiing, snowboarding, sledding, cross-country skiing and ice skating. These activities normally require travel to other regions, meaning that the short commute to the site might attract users.

During summer months Gaia Park will be used for biking. BMX and bike skill courses also tend to require participants to travel to other regions, especially if the sport is not offered nearby. There is only one BMX course in the Fargo-Moorhead area. It is in West Fargo and is not a permanent location. Because of the central location of Gaia Park, it may attract more people to use it than the West Fargo BMX location. The location of the park is outside of any school's territory meaning that children from all school systems can claim and identify with this park.

Data Measures:

The data measures, both collected and expected to be collected, are as

Data Measure	Collection Method	Design Result
1.User preferences for recreational amenities	Survey	<p>Program elements of the park</p> <ul style="list-style-type: none"> ○ Skiing ○ Snowboarding ○ Tubing ○ Bike Skills Course ○ BMX ○ Butterfly Garden ○ Art Demonstration Space
2.Reasons for avoiding the landfill	Survey	<p>Reduction/Elimination of site deterrents</p> <ul style="list-style-type: none"> ○ Eliminate Odor
3.Site accessibility and traversability for differently able individuals	Literature	<p>Accessible route locations and methods</p> <ul style="list-style-type: none"> ○ On Site - Circulation Paths ○ Off Site - Twelfth Avenue, Seventh Avenue, and Forty-Fifth Street
4.Distance site users are willing to travel for certain activities/amenities	Survey	<p>Program elements of the park and site accessibility</p> <ul style="list-style-type: none"> ○ (confirmation of the above results)
5.Number of potential site users	Literature	<p>Scope of design on the 150 acre site and percentage of park used for respective activities</p>
6.Size of ski resorts	Literature	<p>Size of ski section of park</p>
7.Size of BMX courses	Literature	<p>Size of BMX course in Gaia Park</p>
8.Safety precautions	Literature	<p>Gas Meter inclusions and compaction specifications</p>

1. I am creating a booth at Scheele's All Sports Store and West Acres Mall on December 19th and 20th to poll Fargo-Moorhead residents on whether they engage in winter activities or if they use bike skill courses.
 - If they do engage in winter activities I will pose the follow-up question of, "Would you do said activities in Fargo if it were possible?"
 - It appears as though those that ski and snowboard are willing to travel 2 hours away from Fargo which presumably means that people of the Fargo-Moorhead area would be more than willing to use a convenient location with similar services. This conclusion was drawn by looking at the closest areas to ski and snowboard.
 - If they do not engage in winter activities I will pose the follow up questions of, "Would you attempt said activity in Fargo?"
 - If they use bike skill courses I will ask them what they would like to see in new bike trails in the area.
 - If they do not use bike skill courses I will ask them what would get them to try them in Fargo.
 - I am also collecting from the City of Fargo Parks District what the most popular park amenities are.

2. From impromptu polls the dominant reason for avoiding the landfill is the smell. This is only of people who would otherwise find themselves close to the landfill. If the issue of the landfills odor is not solved Gaia Park will be a failure. No person will be willing to engage in any of the program elements with the smell of refuse surrounding them.

3. Because of the active nature of the majority of park program elements (i.e.: the winter sports and bike trails) it must be understood that these spaces will not be accessible to all persons, especially those with physical disabilities. All passive areas in Gaia Park will be ADA accessible. These regulations will fall in line with the United States Access Board

4. By looking at the nearest bike skills courses and the nearest winter sports hills, I will put a hard number on how far people are willing to engage in these activities

5. According to the National Ski Areas Association there are 9.6 million skiers and snowboarders in the United States. This equates to three percent of the population. Using the same ratio in the Fargo-Moorhead area 6,704 people ski, snowboard, or both ski and snowboard. This number helps clarify the scale of the final design

8. The Environmental Protection Agency and the Agency for Toxic Substances & Disease Registry have created guidelines and regulations to protect against potential landfill dangers. The two clearest dangers are landfill gas and soil settling.

When materials in landfill decompose they release a combination of gases, which in concentrated levels are hazardous to humans. These gases, in the correct compression, are explosive.

Landfills will also shift in form. Over 30 years landfills settle roughly 20 percent after closure.

Results

Results

Research Findings

The results of the following data measures will

Data Measure	Collection Method	Design Result
User preferences of recreational amenities	Survey	Program elements of the park
Reasons for avoiding the landfill	Survey	Reduction/Illumination of site deterrents
Site accessibility and traversability for differently able individuals	Literature	Accessible route locations and methods
Distance site users are willing to travel for certain activities/amenities	Survey	Program elements of the park and site accessibility
Number of potential site users	Literature	Scope of design on the 150 acre site and percentage of park used for respective activities
Size of ski resorts	Literature	Size of ski section of park
Size of BMX courses	Literature	Size of BMX course in Gaia Park
Safety precautions	Literature	Gas Meter inclusions and compaction specifications

Applicable Site Values

Gaia Park offers a uniqueness that isn't yet represented in the area. Fargo-Moorhead has existing bike trails and also has a sledding hill, but neither of these park amenities go beyond the most basic of forms. The most popular sledding hill is the protection from flood waters and those interested in mountain biking have to leave the eastern side of the state to find worthy hills. With the topography provided with the landfill and a compelling design, the site can draw use during all seasons and give the Fargo-Moorhead area some depth.

The biggest appeal to using the landfill for the program elements of winter sports is the topography. As it is the landfill exceeds heights of 70 feet, meaning it is the tallest point in the Fargo-Moorhead area. Winter sports are very popular and are only growing in popularity, meaning that the use of the elevation would be well received.

Unlike many other landfills, the City of Fargo Landfill is located within the city limits. Through personal observation it has been clear that one can get to the landfill from most places in the Fargo-Moorhead within 20 minutes, if they drive. The location of Gaia Park is relatively centrally located and is not a burden for those that live in Moorhead or West Fargo.

Like all other closed landfills, Gaia Park will experience settling. 20 percent is expected within 15 years (Watts, et al, 2014). This must be considered with the design of everything from fields to sidewalks. When sidewalks are being designed and detailed control joints will need to be used far more extensively than in a regular project. The control joints will keep the sidewalks useable after settling occurs.

The largest negative site value is the use of the adjacent land. Directly east of Gaia Park's location is the new City of Fargo Landfill. From an interview with Wenck Associates, without a gas collection system the new landfill would begin to smell somewhere between 10 – 20 years, meaning that Gaia Park attendance would plummet (Hanson, Randy, 2014). The use of the gas collection system will reduce the smell that Gaia Park attendees would notice.

Plan for Proceeding

Below is a timetable that explains what I am expecting of myself for every week beginning December 15th and ending on spring semester's dead week.

- 12/15/2014 | Submit Final Booklet
 - West Acres Poll Day
 - Scheel's Poll Day
- 12/21/2014 | Data Compilation and Analysis
 - Synthesize poll data
 - Begin analysis of inventory
 - Set design goals
- 12/28/2014 | Analysis (cont.)
 - Specify program elements
 - Make sure they are still feasible
- 01/04/2015 || Review
 - Review analysis work
 - Is the information still a means toward the design goals?
 - Is the booklet up to date?
 - Are materials ready for studio
 - Research model construction options

- 01/11/2015 | Concepts
 - Begin brainstorming concepts
 - "Design from the wrist down."
 - Begin with trace paper then layer it to add complexity to the design
 - Begin considering material options for the final physical model
- 01/18/2015 | Concept Mapping Begins
 - Begin applying concepts to the site
 - Create three concept ideas
- 01/25/2015 | Concept Development and Elimination
 - Keep working through concept ideas
 - Eliminate one of the three concepts
- 02/01/2015 | Concept Development and Elimination (cont.)
 - Eliminate another concept
 - Think about planting forms and locations
 - Specific plants do not need to be considered yet
 - Think about feel of the space
 - Have a rough idea of materials in mind
- 02/08/2015 | Master Planning Begins
 - Apply the final concept to the site
 - Think in large and medium scale.
- Be thinking of materials
 - Keep in mind how materials will relate with other site elements
- "Design from how wrist down."
 - Hand render a partially conceptual master plan
- Begin creating physical topography model
- 02/15/2015 | Master Planning (cont.)
 - Think in small scale.
 - Transition the master plan into AutoCAD
 - Finish physical topography model
- 02/22/2015 | Review
 - Decide which site elements need construction details
 - Does the master plan meet the design goals?
 - Does the master plan have all of the program elements?
 - If not, why?
 - Is the AutoCAD plan ready to be transitioned into Sketch Up?
- 03/01/2015 | Design Detailing
 - Begin construction detail packet
 - Grading Plan (in progress)
 - Layout Sheet (in progress)
 - Planting Plan

- Details (in progress)
 - Gas Collection System/Utilities
- Begin construction of SketchUp model
 - As SketchUp model is progressing, also create pieces of the physical model
 - Begin creating viewports for possible perspective renderings
- Begin thinking about the best locations for elevations
- Begin Rendering Master Plan
- 03/08/2015 | Design Detailing (cont.)
 - Continue construction detailing packet
 - Grading Plan (completed)
 - Layout Sheet (completed)
 - Planting Plan (in progress)
 - Details (in progress)
 - Gas Collection System/Utilities
 - Continue SketchUp model
 - Add material details
- 03/15/2015 | Design Detailing (cont.)
 - Finish construction detailing packet
 - Grading Plan (completed)
 - Layout Sheet (completed)
- Planting Plan (completed)
 - Details (completed)
 - Gas Collection System/Utilities (in progress)
- Begin 2D Renderings
- 03/22/2015 | Review
 - Make sure construction detailing packet is complete
 - Finalize views from SketchUp and continue renderings
 - Request Equipment from Ben for boards and presentation
 - Possible equipment:
 - Table
 - Computer
 - Monitor
 - Projector
- 03/29/2015 | Model Construction
 - Begin constructing model elements
 - Move SketchUp model into rendering programs

- 04/05/2015 | Model Construction
 - Finish 2D Renderings
 - Finish Digital Model
 - Begin video renderings
 - Finish Physical Model
 - Implement augmented reality programs (if time permits)
- 04/12/2015 | Presentation Preparation
 - Begin formatting presentation
 - Begin completion of booklet
 - Compile master plan and renderings
- 04/19/2015 | Presentation Preparation
 - Continue board production
 - Be thinking of how the boards and stand-alone

presentation will be

- 04/26/2015 | Review
 - Finish stand-alone presentation
 - Install presentation
 - Edit video rendering
 - Make sure book is complete
- 05/01/2015 | Present Thesis

Design Goals

Theoretical

- To create a precedent of seeing potential of an underutilized space and producing a valuable asset for the community from that space, through the transformation and development of the City of Fargo Landfill into Gaia Park

Personal

- To educate the people of the Fargo-Moorhead community of better ways to manage waste like, recycling, reuse, and minimization of use
- To produce a complete project that far exceeds any of my prior landscape architectural work in creativity and professionalism
- To create professional quality work samples which will be used in a portfolio
- To expose myself to groundbreaking work in the field of landscape architecture
- To use new technology, specifically augmented reality, in my model and presentation to set my presentation apart from my peers

Professional

- To provide the City of Fargo with a feasible program and plan for the landfill including construction documents and renderings.
- To begin the conversation about what will happen to the landfill after it closes, and place myself in the middle of the conversation
- As stated before, to prepare myself for the profession through the completion of a well thought-out project

Academic

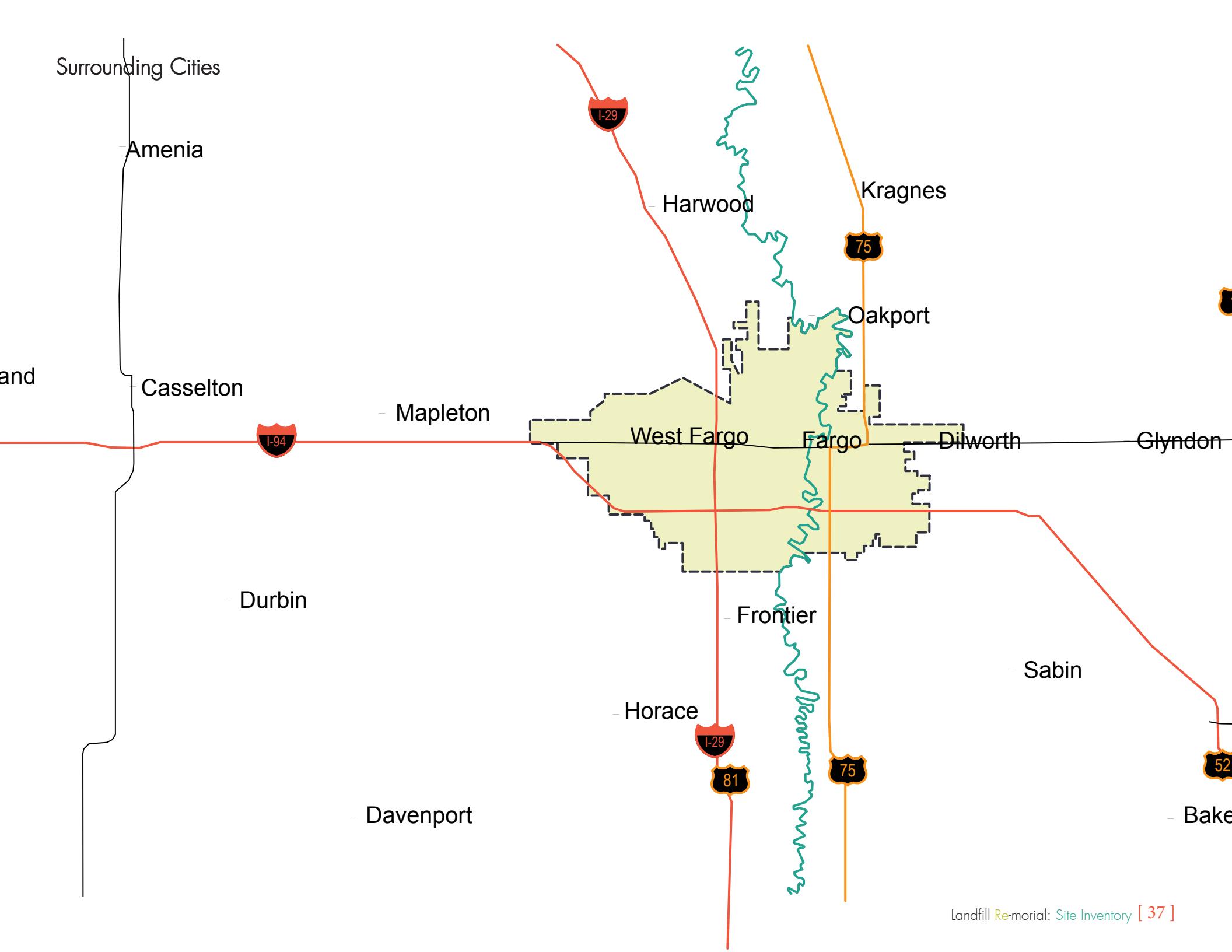
- To show future students to look, at the issues staring us in the face for examples of potential landscape architecture work
- To better my understanding of the design process from concept creation through detailing
- To leave an easy-to-understand step by step thesis process, which can be used as an aid of the thesis manual
- To develop a riveting concept and design which will set my project apart from my peers

Site Inventory

Site Inventory

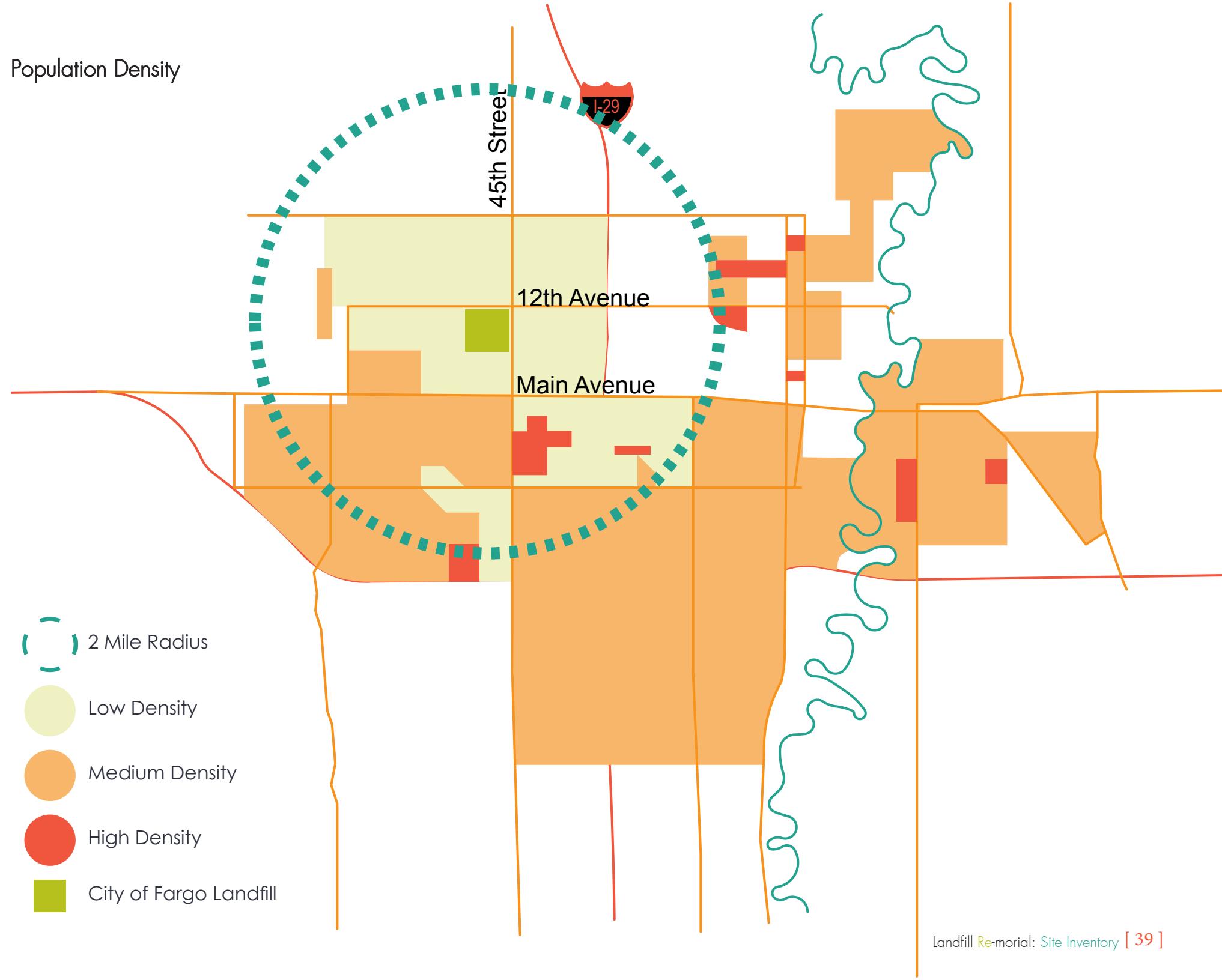
Site Elements

- Soils
 - Brenna Formation slickensided clay
- Climate
 - Plant Hardiness Zone 4
 - Snowfall average of 52 inches per season
 - Temperature disparity between -20 degrees Fahrenheit and 90 degrees Fahrenheit
- Hydrology
 - All the water that lands on the active landfill is kept from seeping into soil by the impermeable membrane
- Vegetation
 - The site has minimal plants. Grass is kept to reduce erosion of the mounds
- Wildlife
 - Seagulls are abundant on the site
- Land Use
 - The land use on the site and in the surrounding area is "Industrial"
- Neighborhoods
 - There are no residential areas close by. The land use is "Industrial"
- Transportation
 - The most common form of transportation is through automobile
 - Sidewalks are adjacent to the site
- History
 - The site has been the landfill for the City of Fargo since the 1980s.

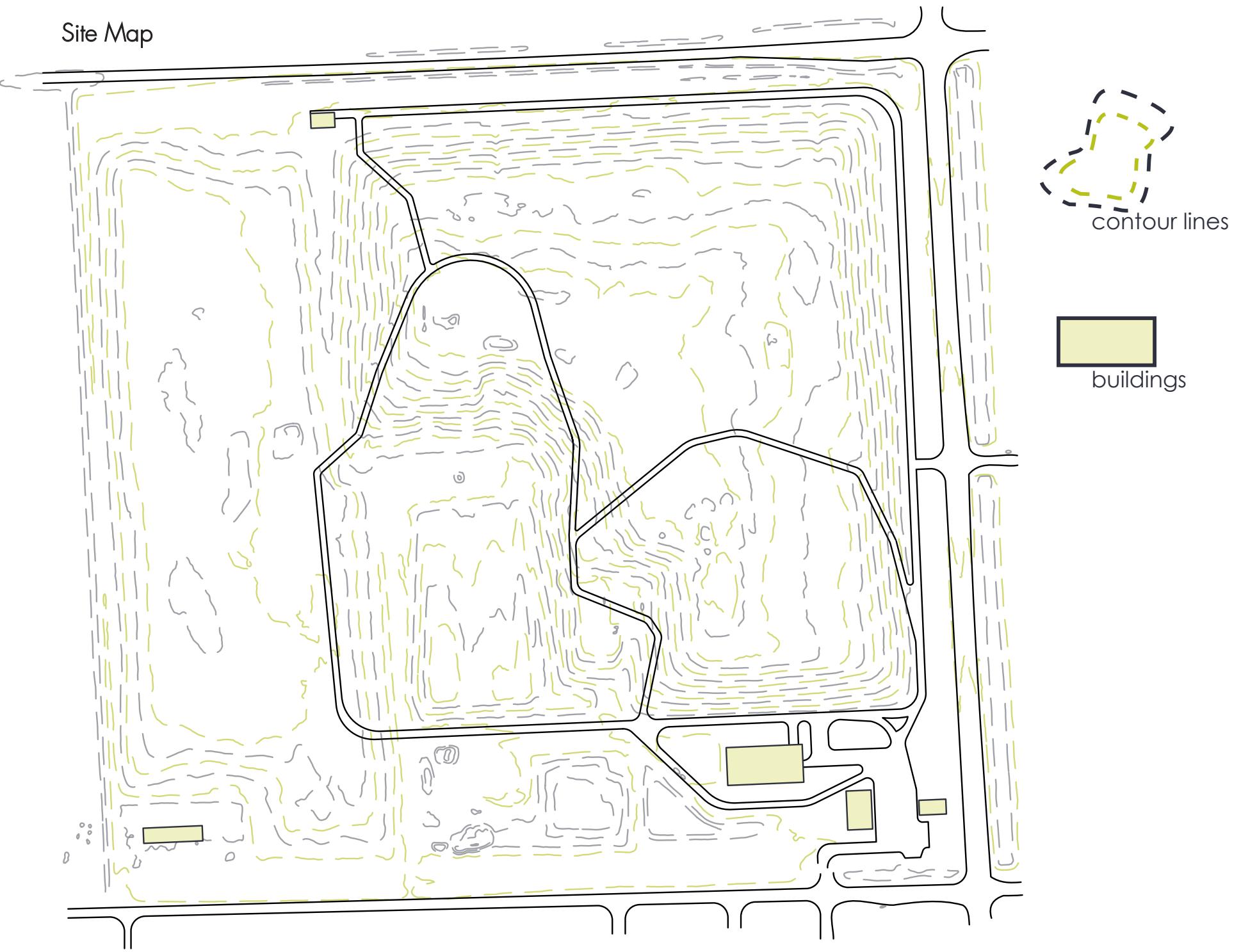


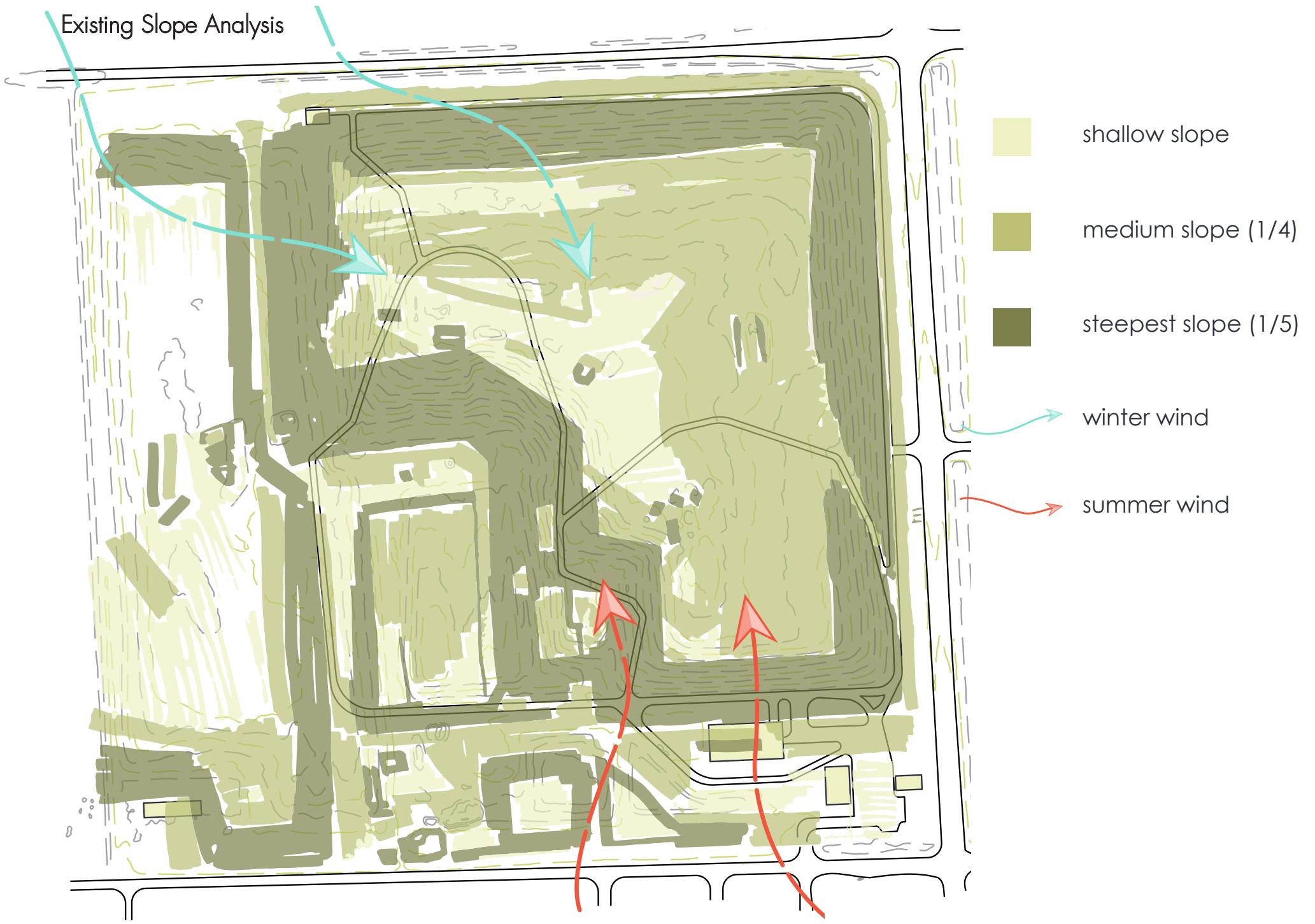


Population Density



Site Map

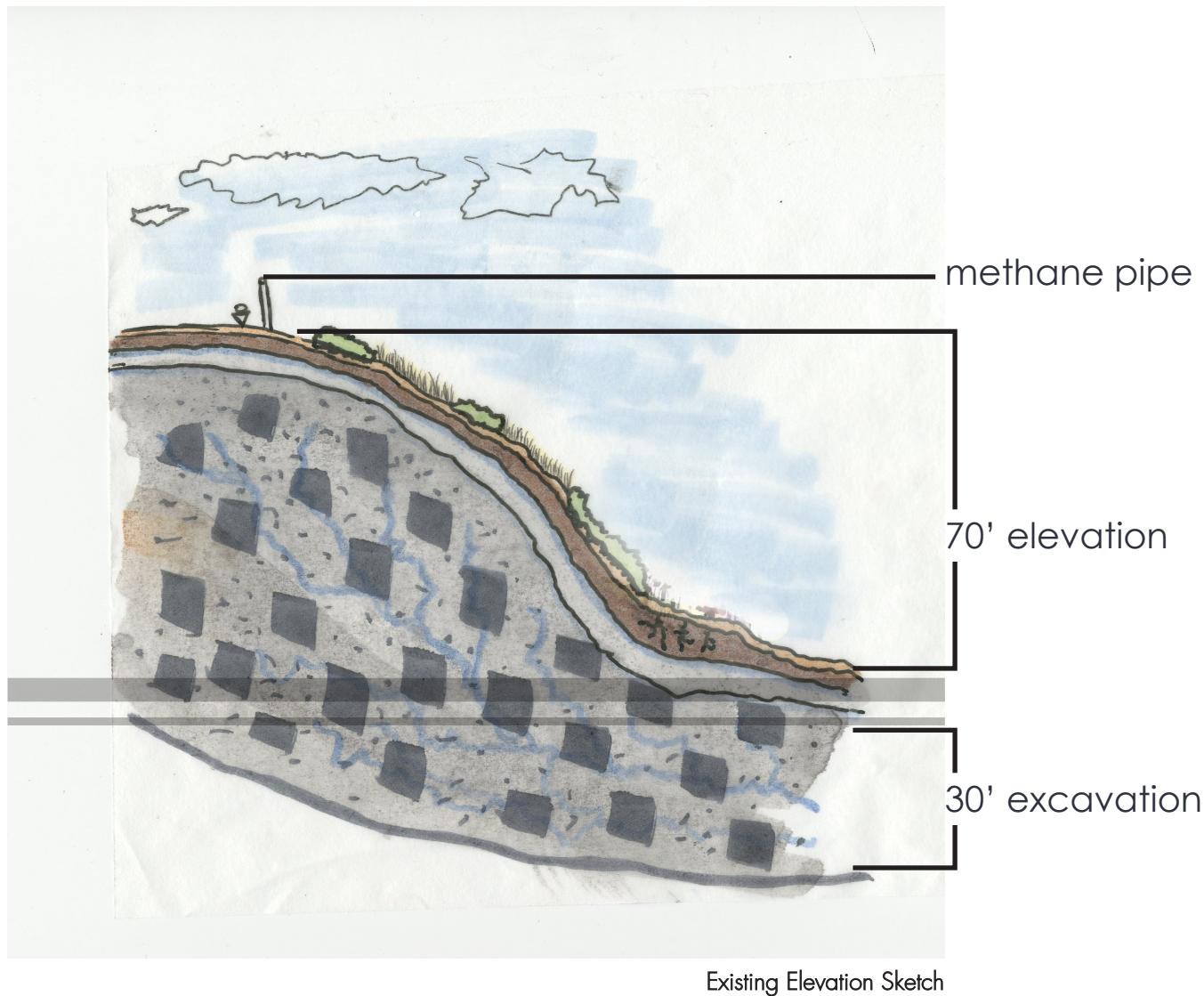




Site Infrastructure



- methane pipes
- pump stations



Cell Activity

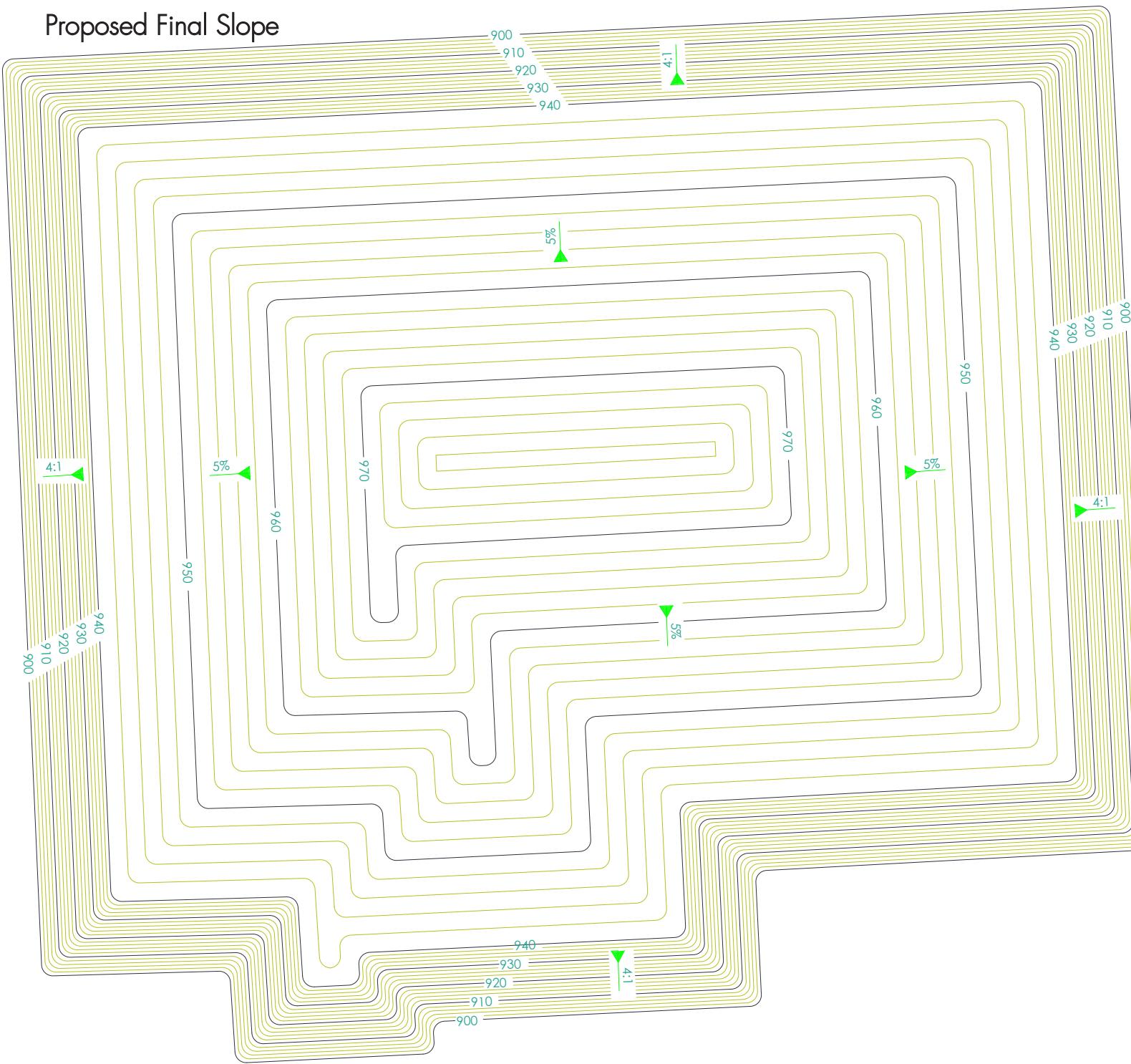


inactive cells



active cells

Proposed Final Slope

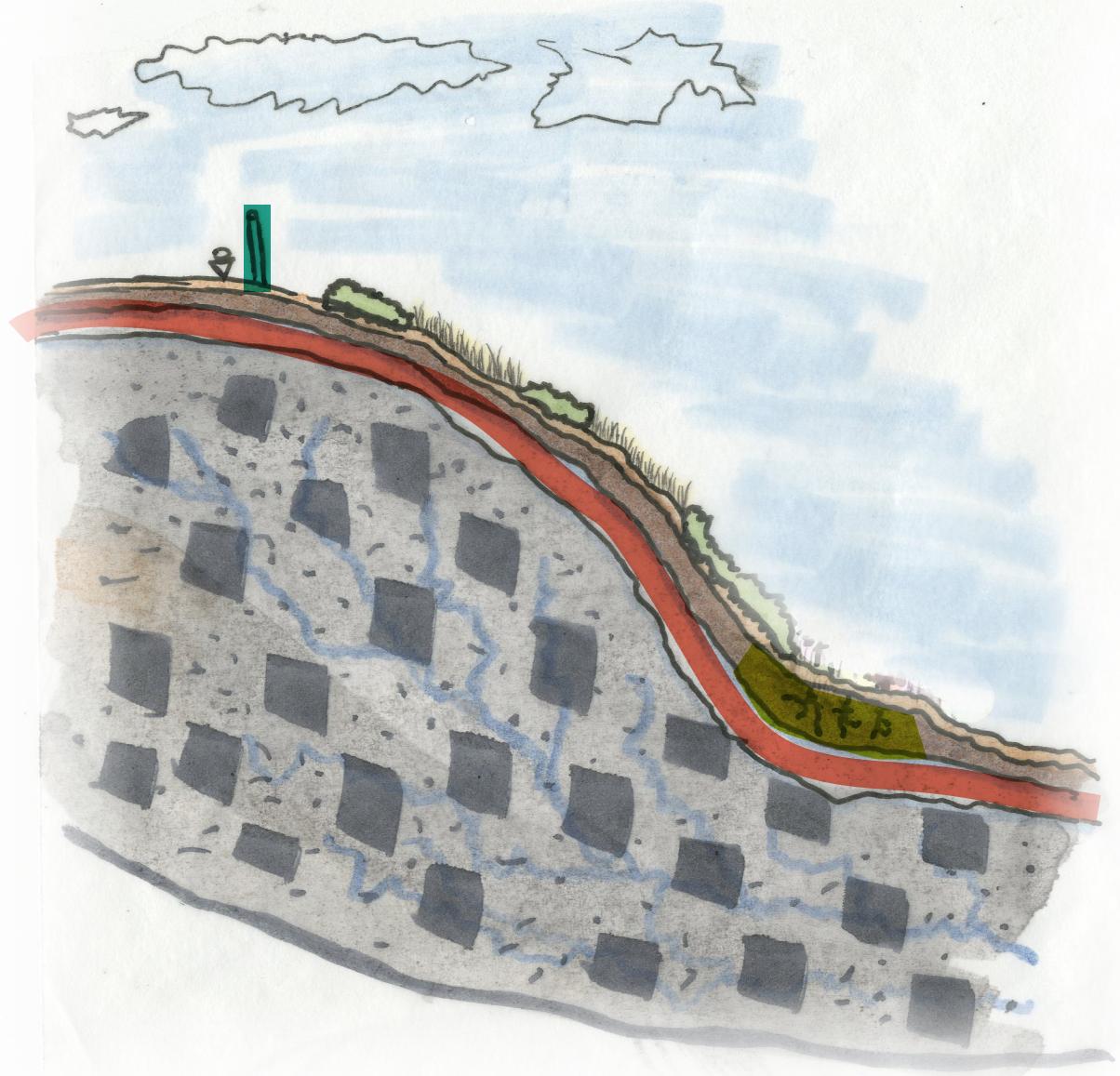


Site Concerns

Landfill Smell

Site Safety

Vegetation Planting



Site Concerns

The largest concerns that my research made clear about the landfill were the odor, the public's perception of safety, and the potential to make vegetative additions to the site. All of these site issues boil down to the release of methane from the landfill. As methane is produced and released from the garbage it diffuses through the air causing the smell which people want to avoid. To battle this I am proposing that the landfill use a methane collection system which would take advantage of the current methane pipes on site. The system works by placing clay above the final graded waste. This membrane of clay would be supplemented with soil to keep the methane inside of the closed system. The depth of the soil is completely determined by the vegetation being planted within close proximity. An excess of four feet of soil should be planted in addition to the root depth of vegetation.

Theoretical Premise

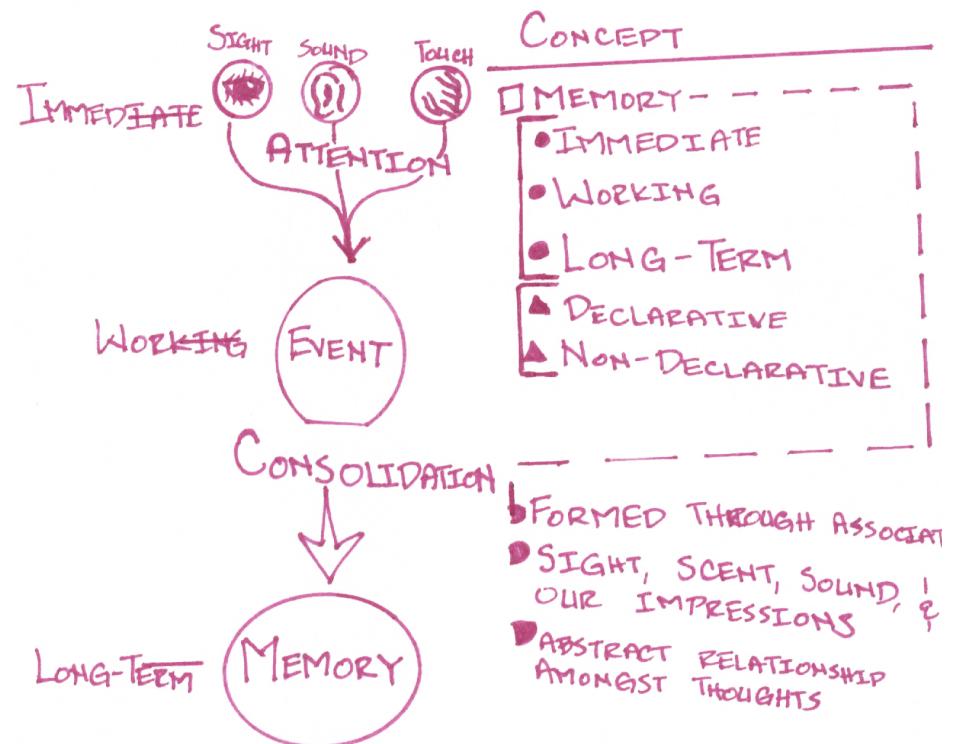
Theoretical Premise

The theoretical premise that the design is based on stems from the concept of a landfill re-morial. But before defining a re-morial, it is pertinent to state that a memorial is an "object that serves as a focus for memory of something or someone (Webster, 2015)."

A 're-morial' takes a present inconvenient truth and dramatizes it, allowing one to commit it to memory.

Following the concept further, for one to remember something, they follow the same process that one uses to learn. Because of this I researched the process that one follows to learn. This is addressed in the graphic to the right.

Information is first intaken through the five senses. Another way of saying this is that we give our attention to an item. That immediate information is held only for a number of seconds until it becomes an even in our memory. At that point the 'immediate memory' becomes 'working memory.' When the even is mentally consolidated and held for over one hours it officially become a 'long-term memory.'



The purpose of this theoretical premise is to transform the linear mentality of "Garbage to Ground" into a cyclical mindset of "Garbage to Ground to Good."



The concept elements tie back to the project theoretical premise. Each concept element refers to a program element, which are the site features the park will include.

Concept Elements

Spectacle
(Immediate)

Current Issue
(Working)

Commit To
Memory
(Long Term)

Program Elements

- Memory Forming Outdoor Room
- Sculpture Exhibits
- Trail Circulation System
- Carrion Insect Habitat
- Bird Habitiat
- Winter Sports Hill
- Leachate Pump System
- Methane Pump System

Design Development

Design Development

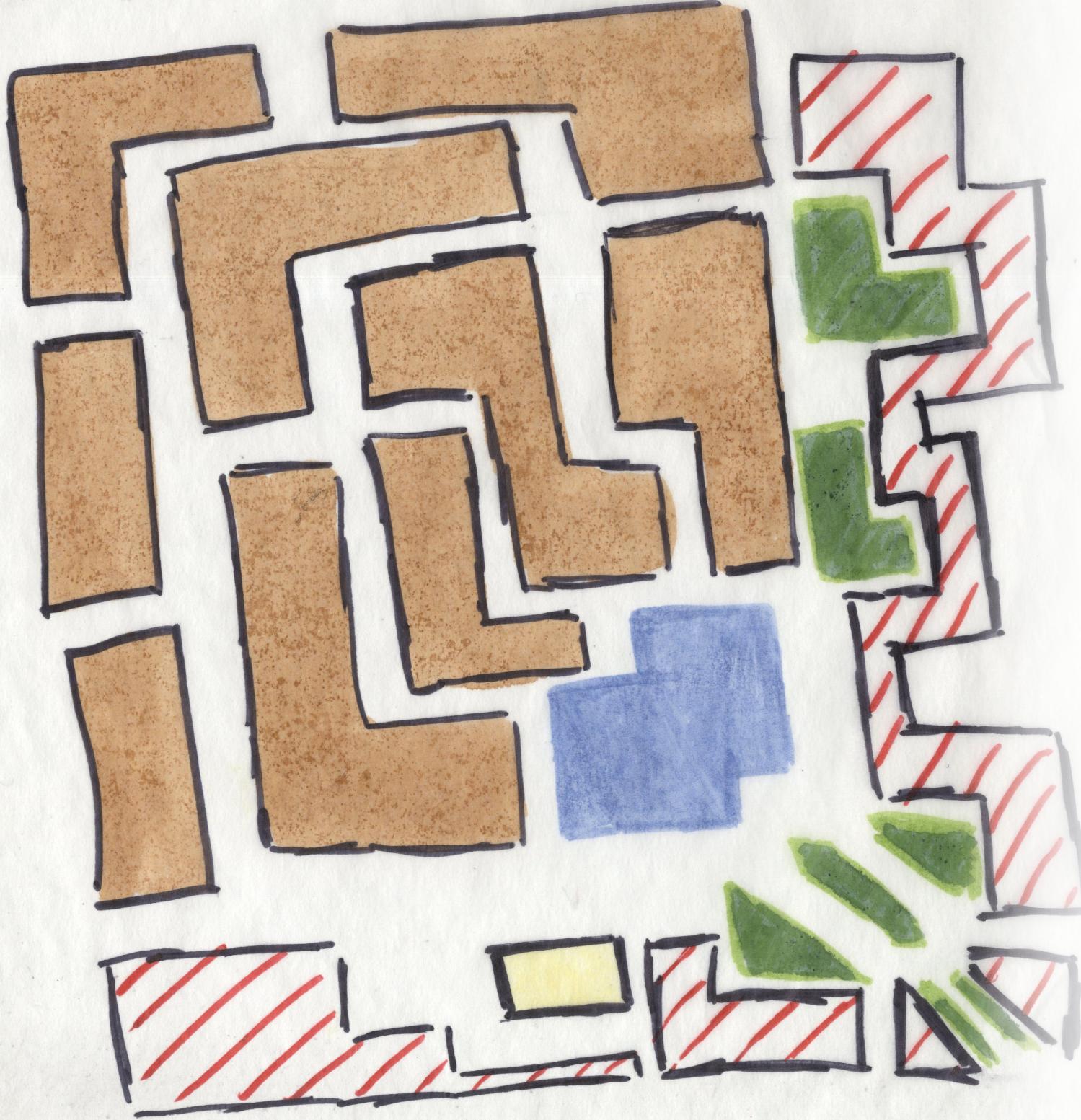
This chapter explains the design process that I went through before creating my final design and graphics. It begins by showing how conceptual forms and functions influenced the programming of the site.

Then it continues to show how the programming of the site influenced the conceptual master plan.

Then after master planning site planning took place. Within site planning detailing of certain site features was possible. By zooming into the site scale the design of potential monuments and sculptures, which would be experienced by park users, was possible.

Only after conceptual master planning, site planning, and detail creation; did we begin creating the final graphics which can be seen in the 'Thesis-Board' and 'Thesis-Presentation' documents.

Master Planning



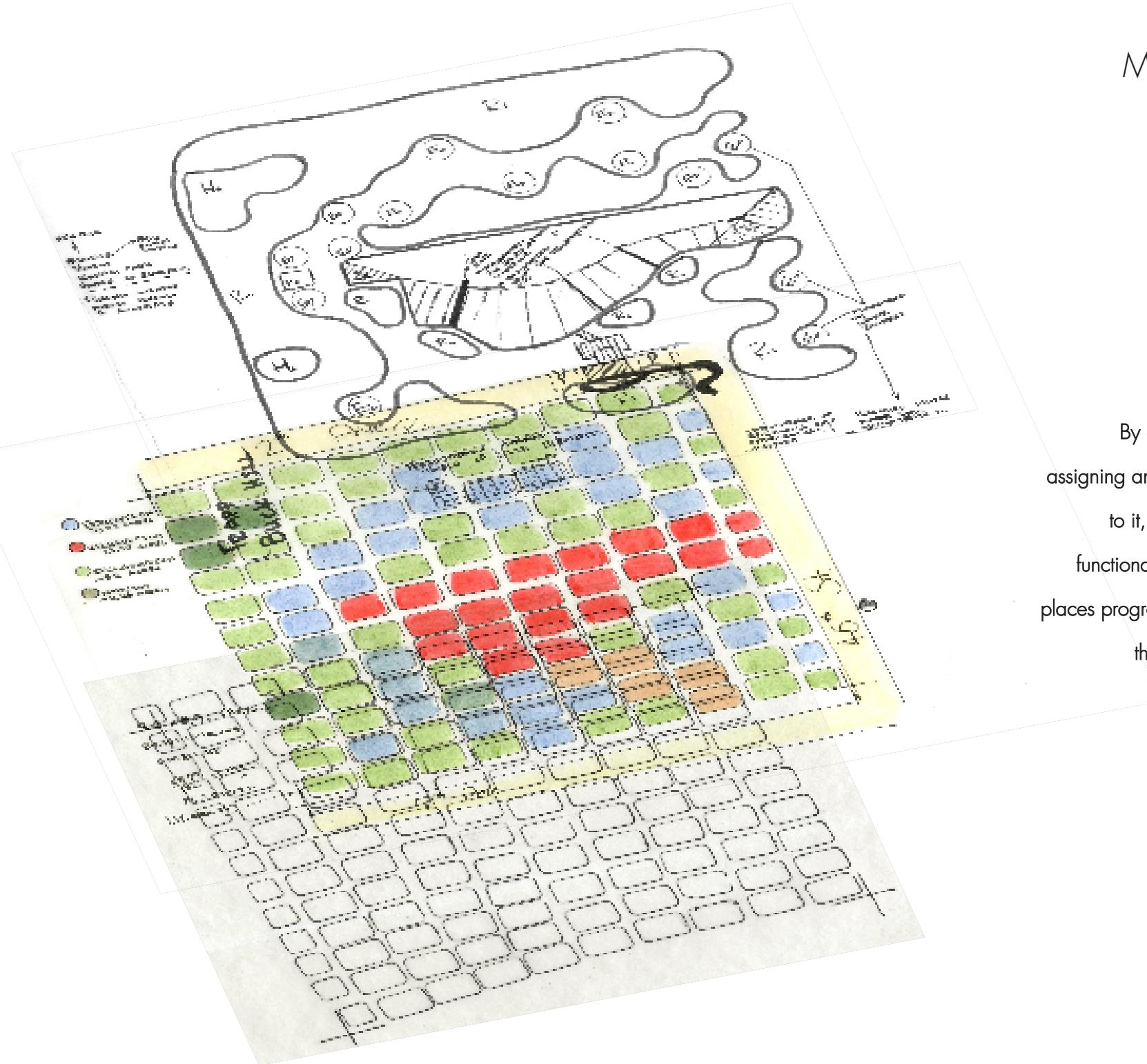
This graphic is a depiction of potential spacial relationships inside of the park. The red lined area is intended as an attraction zone to intice passers-by to enter the park. The rectinlear forms inside the park were meant to represent the rectilinear forms that are the surrounding city blocks. This concept was never developed because of the weaknesses in form, function, and relation to the theoretical premise.

Master Planning

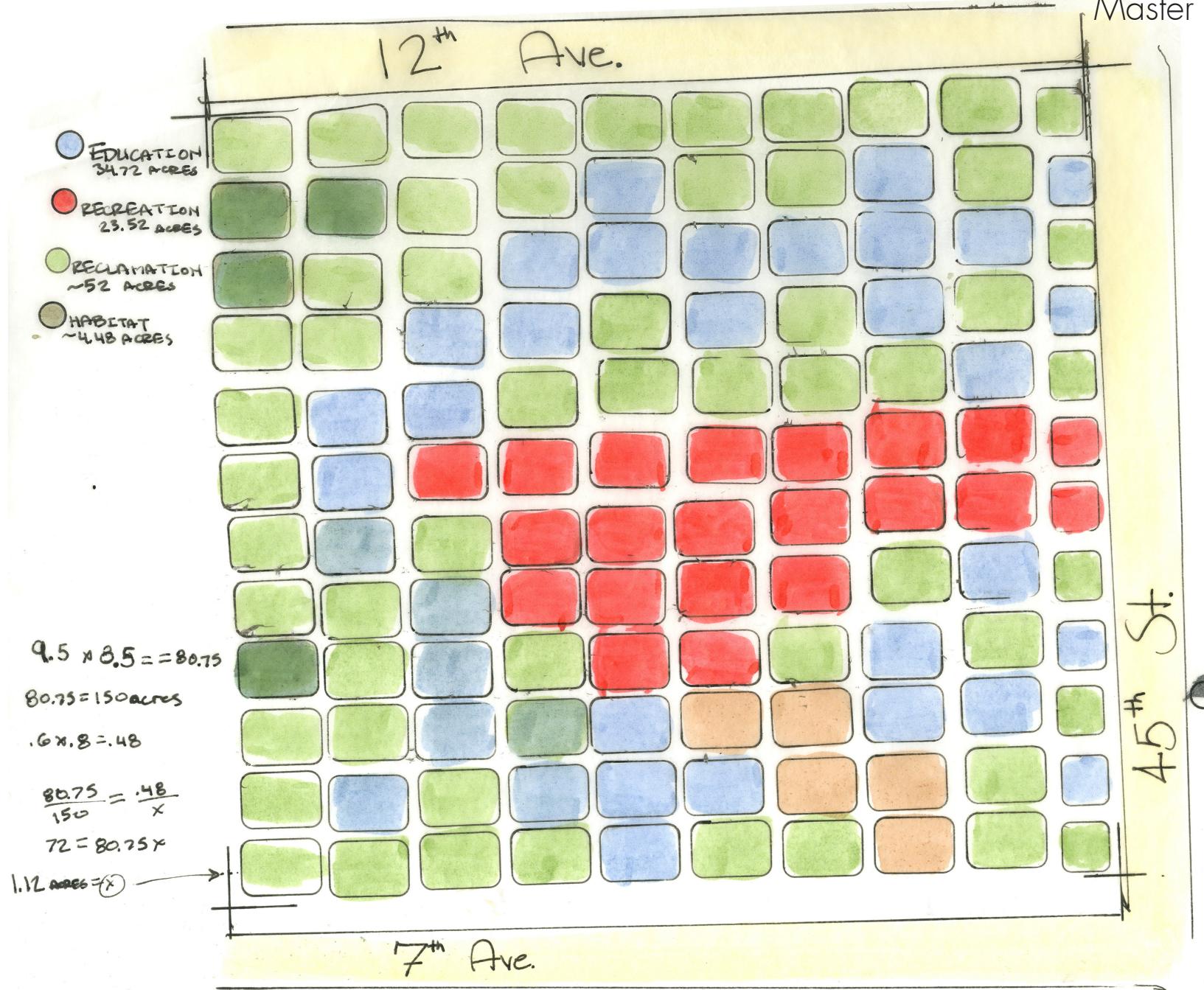


The graphic to the left is one of the original program plans. An attention area is designated to entice those driving parallel to the park to enter the site. The most remote space on site is designated as "habitat" because wildlife will be most comfortable away from human intervention and activity. The elevation of the landfill allows the already cold wind to affect park users without a natural buffer to lessen to the cut of the wind.

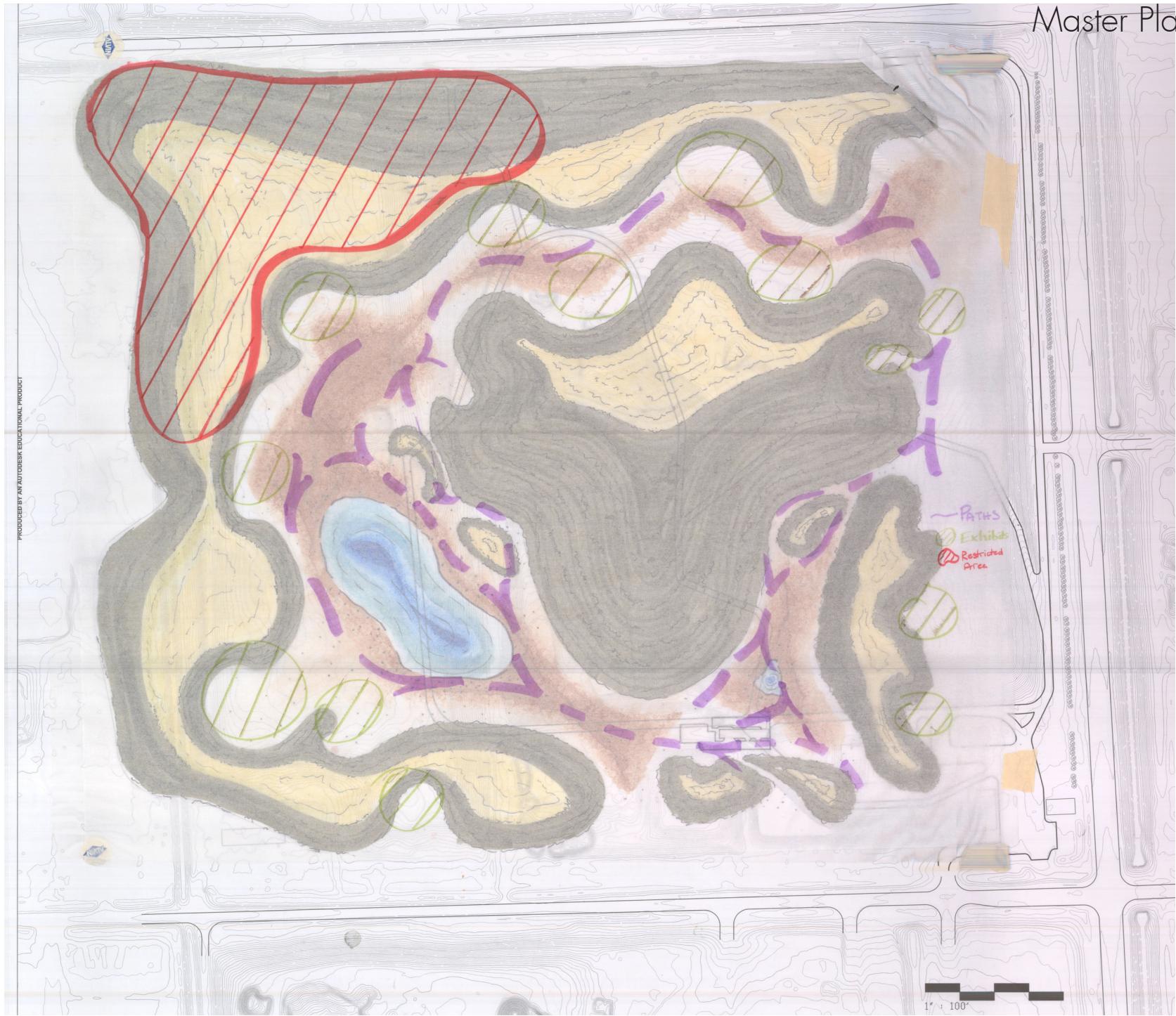
Master Planning



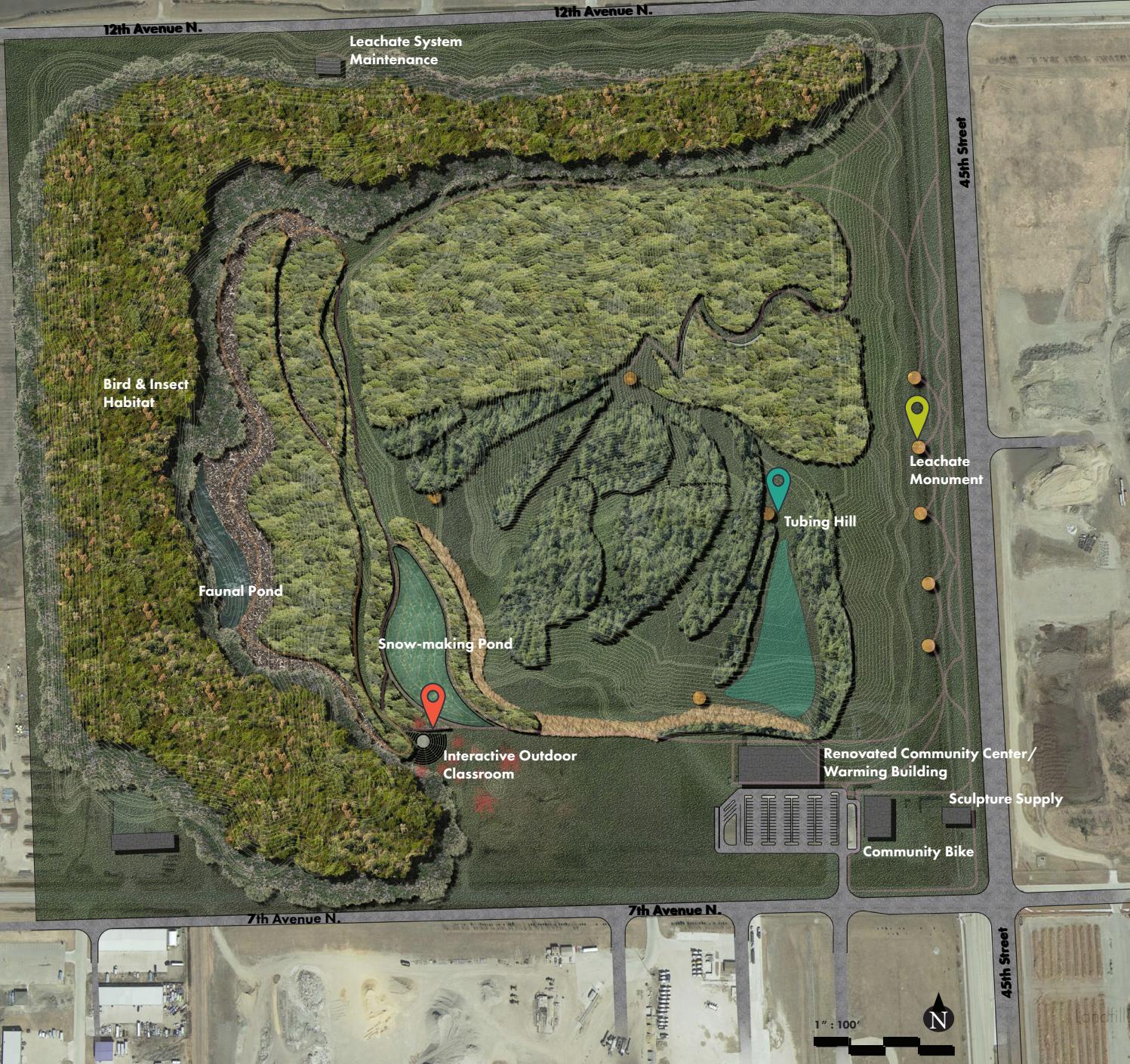
By creating a grid and then assigning an initial program element to it, I was able to create the functional diagram to the left that places program elements on site with the best location for them.



Master Planning



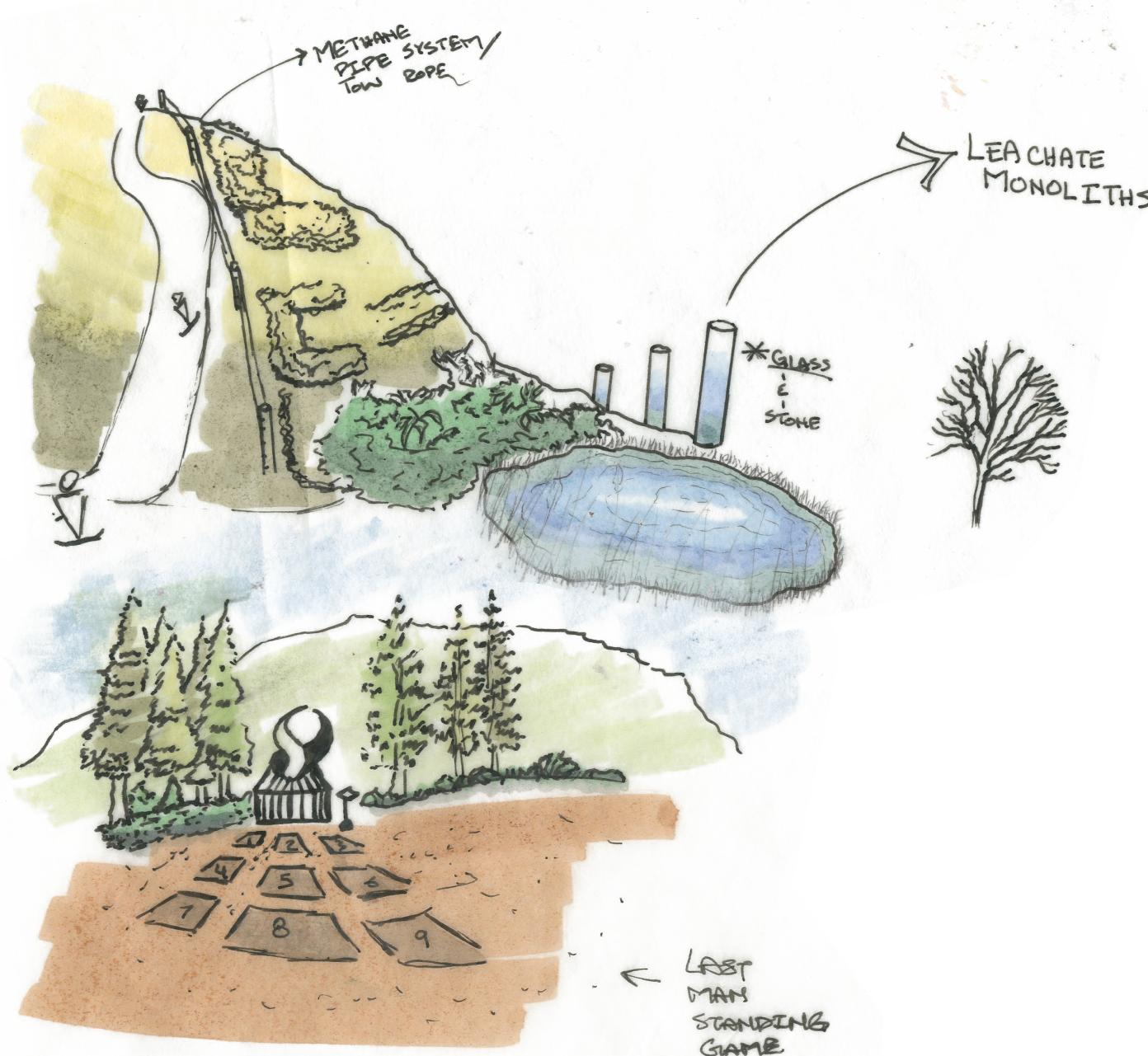
Master Planning



Many of the forms which were in the conceptual master plan can be seen incorporated in the final park master plan.

The forms have been developed to fit the program elements and include more circulation paths than the concept provided.

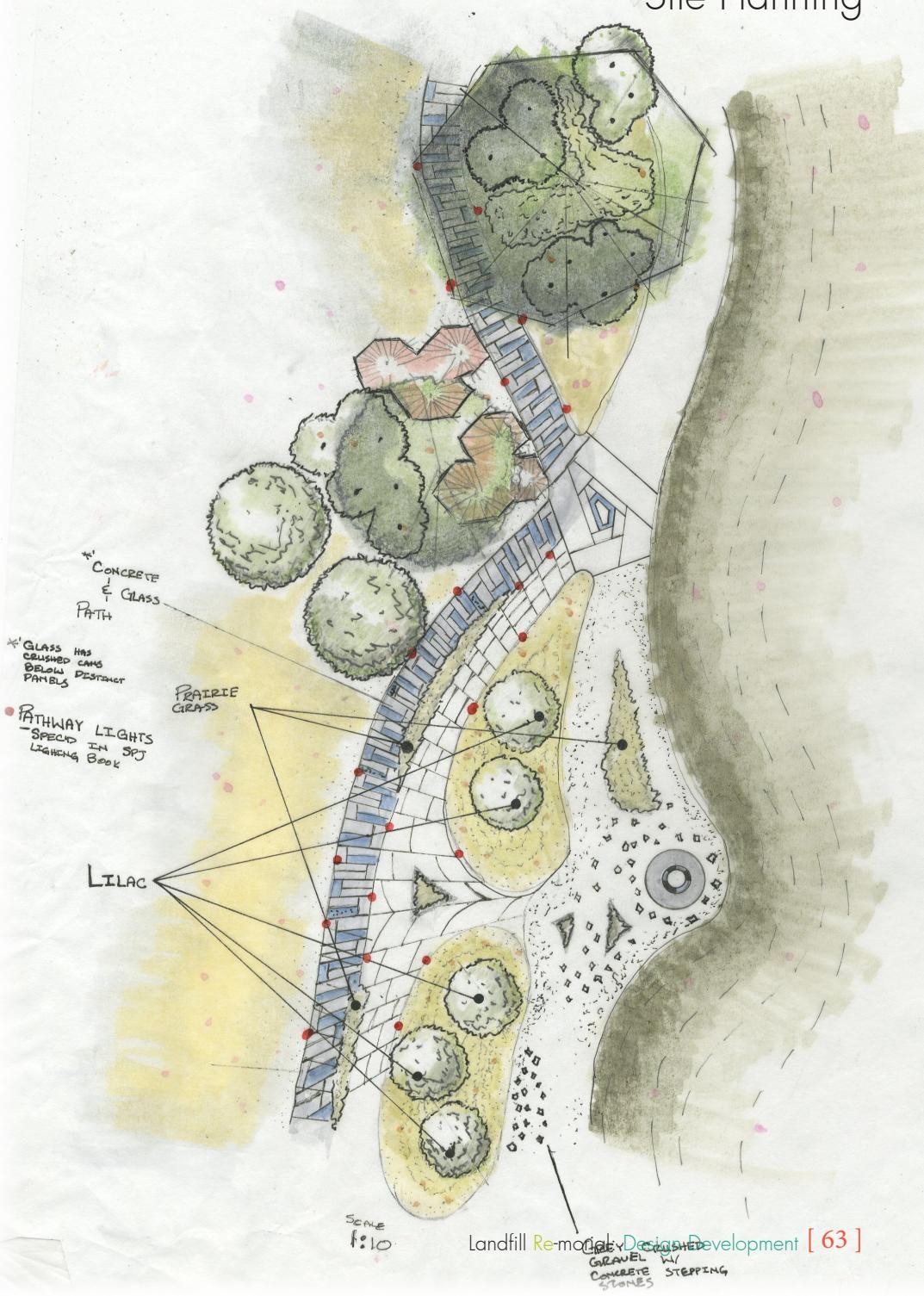
Site Planning

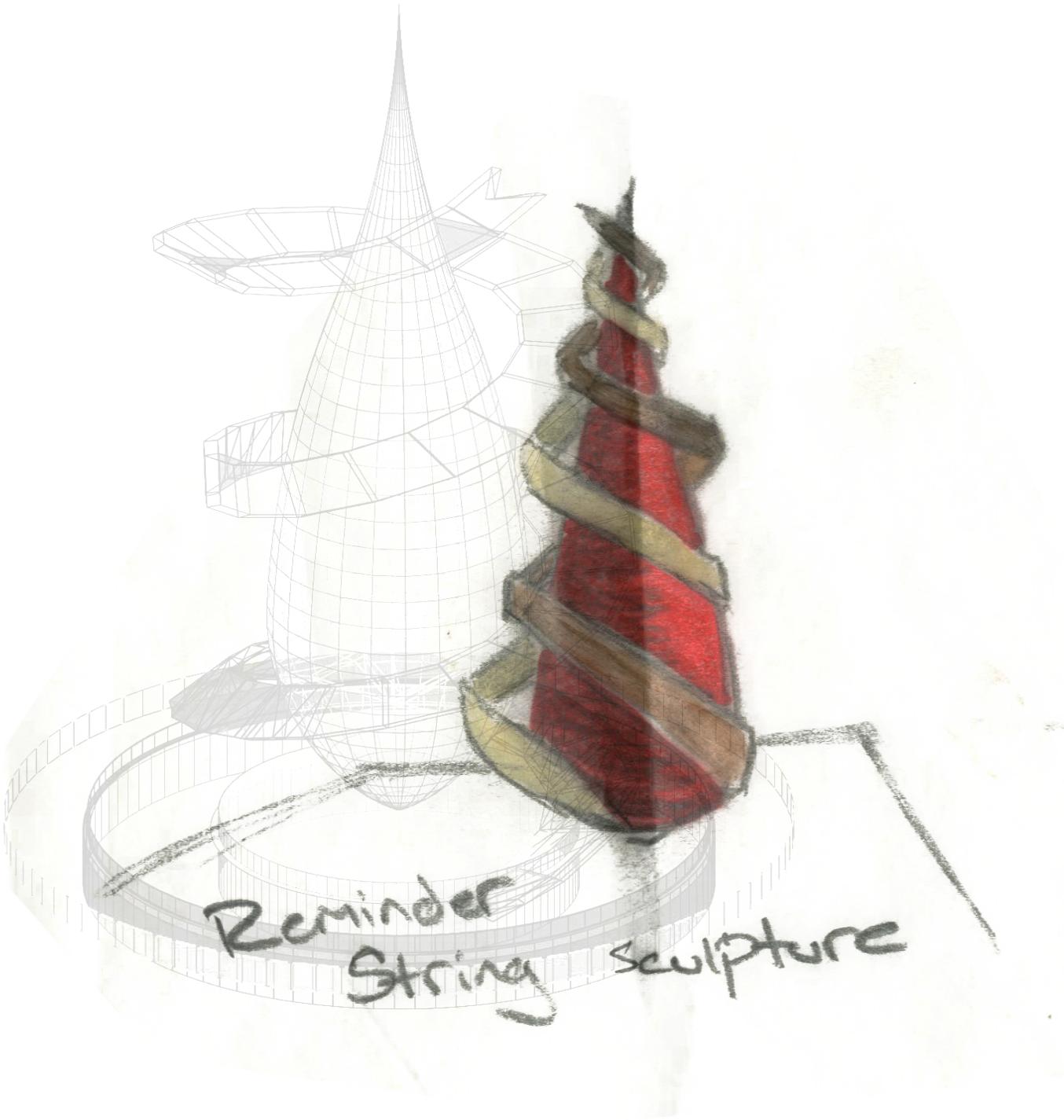


These sketches are the inspiration that influenced the design of the winter sports hills and the interactive outdoor classrooms.

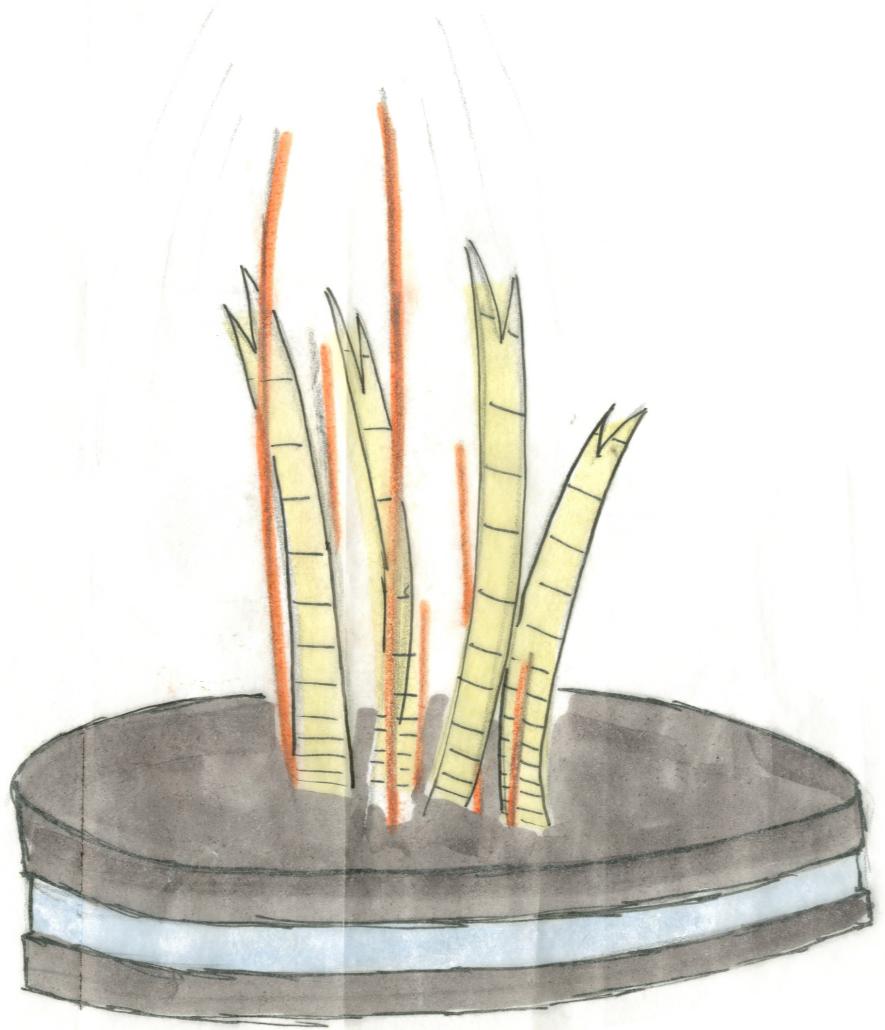
Site Planning

This conceptual site plan is the first attempt at the spatial relationship between the landfill eastern hill and the proposed adjacent sidewalk.





The concept behind this sculpture design ties back to the theoretical premise and the formation of memories. The driving force behind the forms of this sculpture was the idea of tying a string around one's finger.



This conceptual sculpture was brought conceived to create sound, therefore stimulating another sense and assisting in the memory forming process.



By emmitting light through the pink area on this sculpture, it's conceptual design intends to capture the attention of site visitors and also create interest for those visiting at night.

Results

Results

Discussion

Research Summary

As stated previously in this thesis, the City of Fargo Landfill will be closing within the next six years. Though there is currently no plan for the landfill post-closure I have provided a feasible solution for the city.

The park, through its bike and winter sport recreation opportunities will provide the Fargo-Moorhead community with a new amenity that people would have to otherwise travel hours away to use.

Over 6.5 thousand people in Fargo-Moorhead area would potentially use the winter activities. Nationally, over 10,000 people participated in some sort of BMX or mountain biking. This a net increase of 8.3% over the last three years. If these trends continue it is clear that the use of Gaia Park would only increase.

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