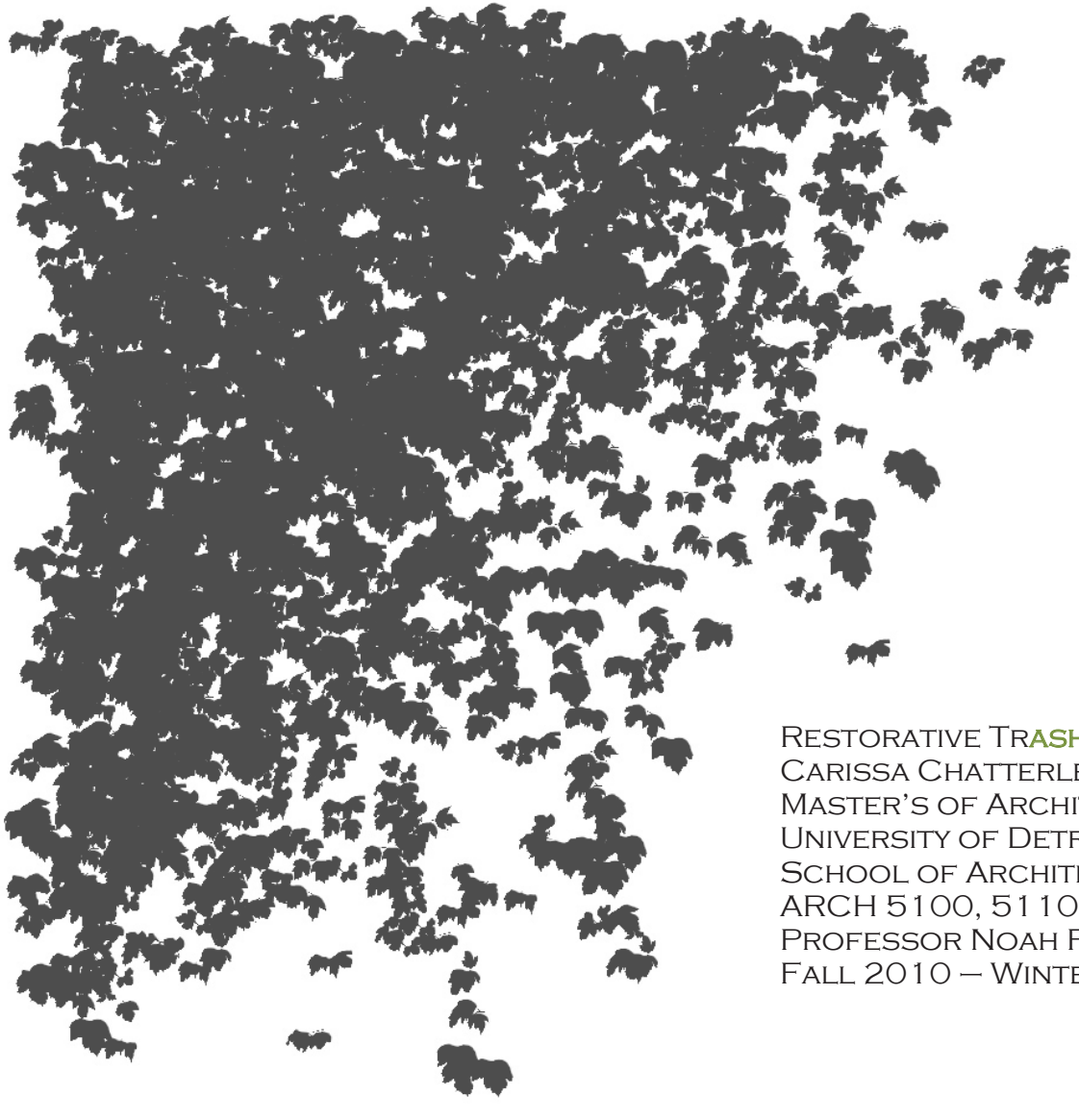

Restorative TrASH

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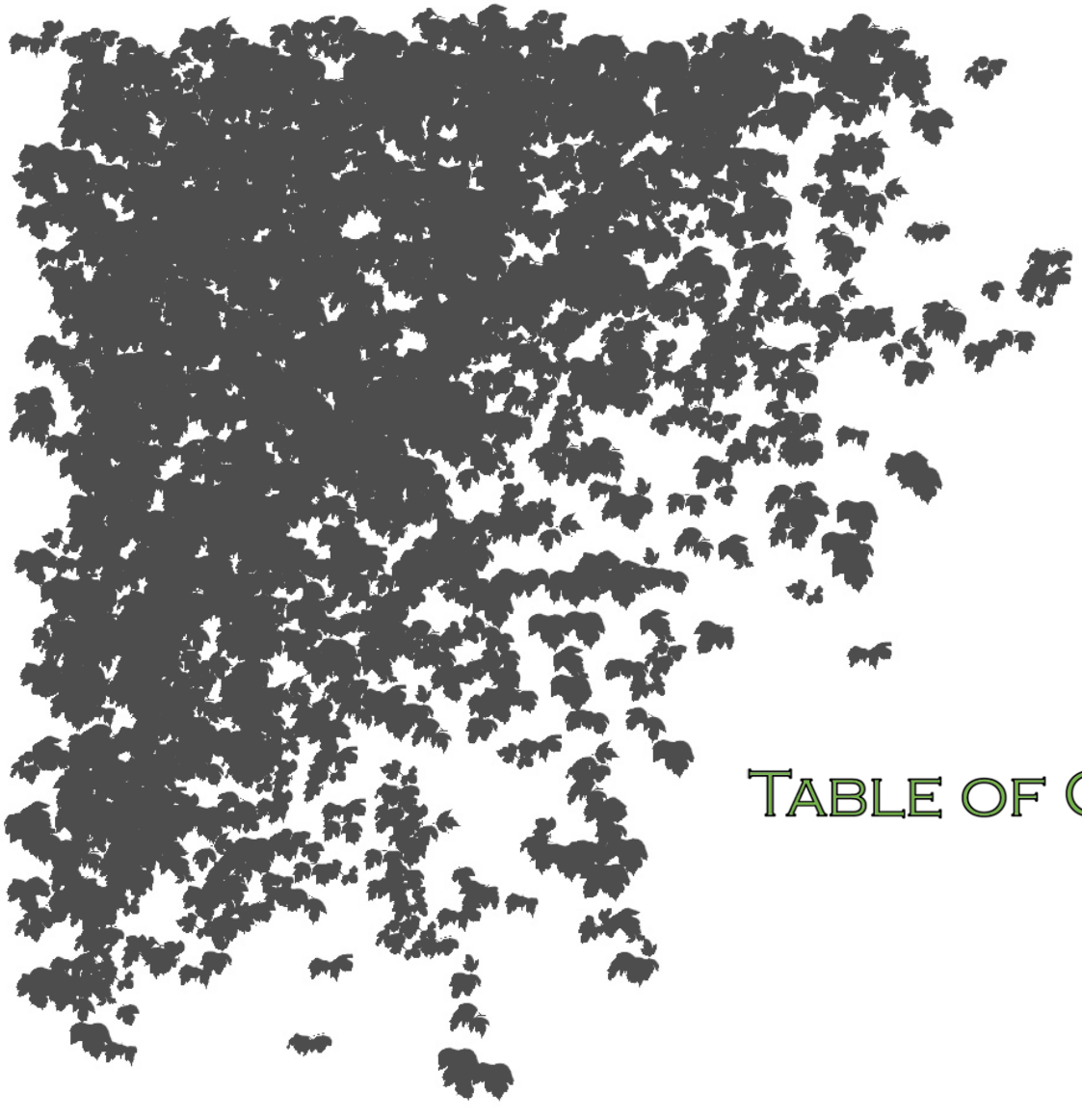

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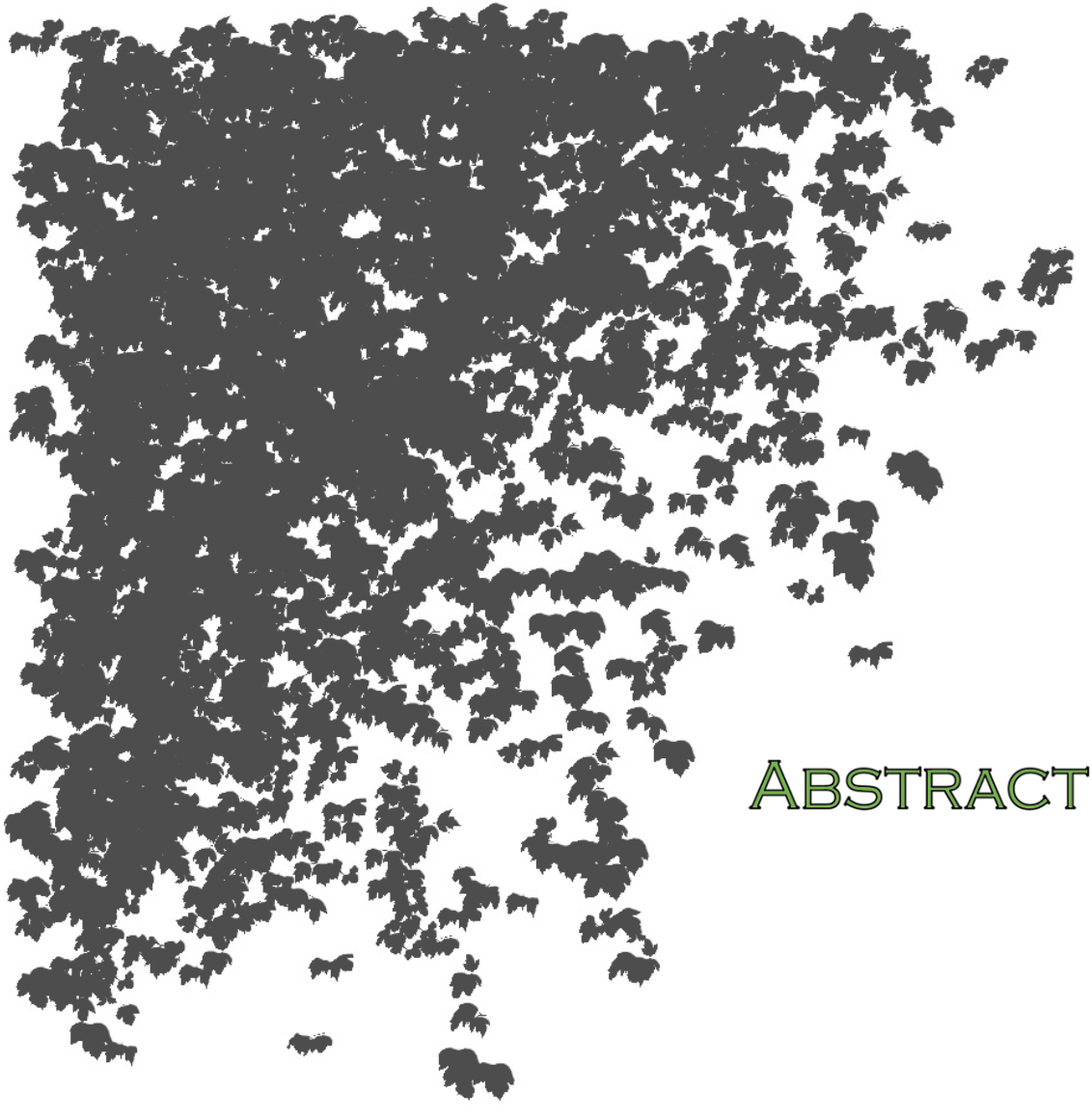
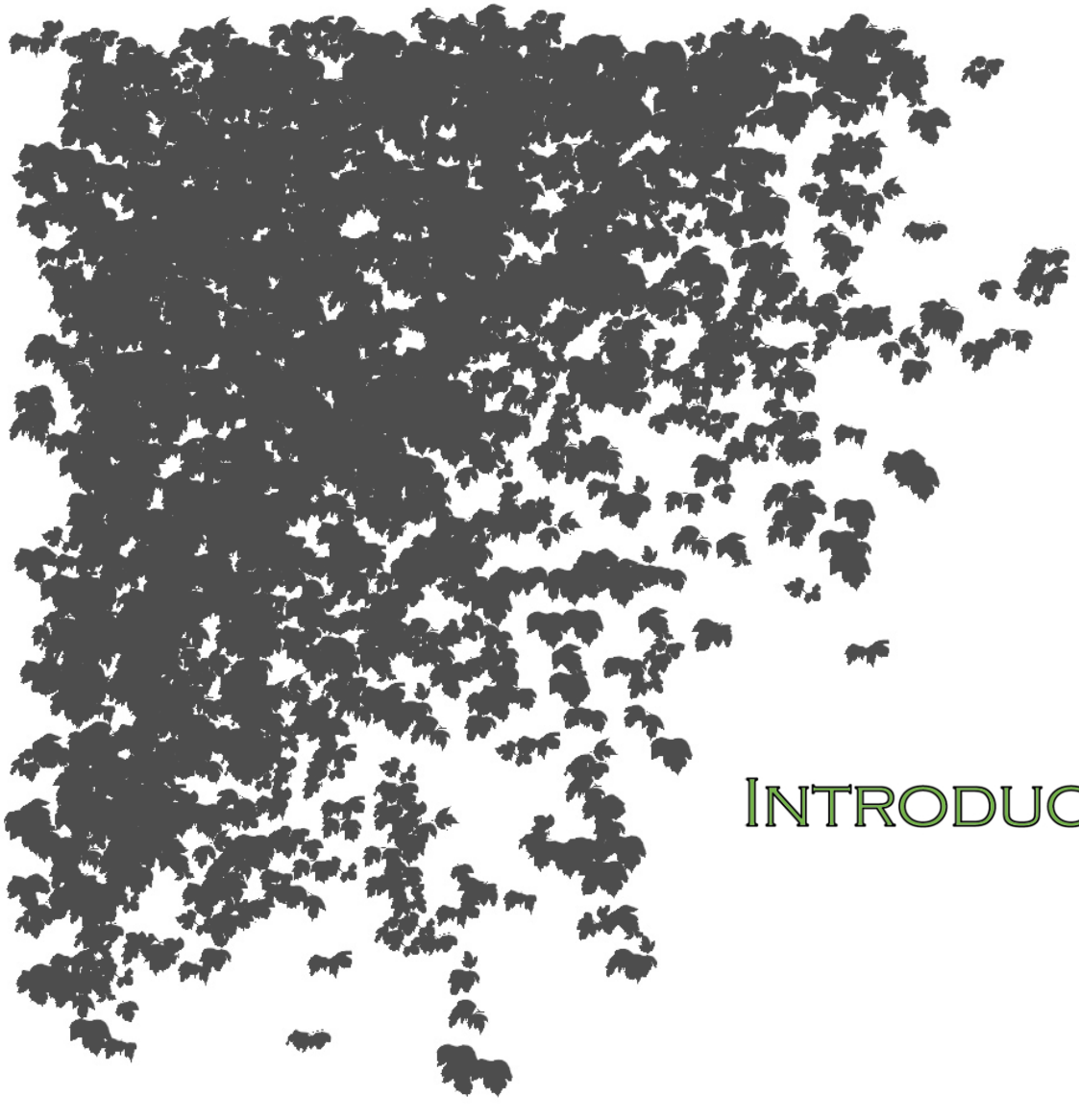


Abstract

America has a problem with its health. It has an unhealthy environment and unhealthy minds. The need for a change is long overdue. But there may be a way to restore both with one single solution. Our trash. In the past, our waste has been one of our greatest downfalls, our greatest shames. But it could become a valuable asset. It could be a way to restore our environment and minds.

Detroit is one such city, with both unhealthy minds and unhealthy environments. Detroit is well known for its abandoned homes and its rising levels of depressed individuals. It is a city that is falling apart at the seams; each stitch, each home, falling into disrepair. There may not be a way to recover the structures or lives that were lost, but there may be ways to create new life from the ashes. Literally.

Detroit has the largest trash incinerator in the world. It spits out 385,621 cubic yard of ash every year. But all this ash is dumped into a giant landfill, never to be thought of again. What if it had a different purpose? What if it could be used again as a way to restore the city? With small, miniature landfills this ash could be used to create topography and landscapes all over a city that is remarkably flat. It could change the everyday life into something to celebrate, rather than the continual depression Detroit suffers from. It would change the idea of what a landfill is so that walking through this city, this trash heap, had the same restorative, restful effects as walking through a forest. This landfill would become a positive force in the everyday life of the people of the community. A landfill does not have to be a smelly, rodent infested mountain that taints our earth and our lives. It does not have to take away from the earth but can give back. With a little rethinking, it could become a miraculous place to immerse ourselves into.



Introduction

America has a problem with its health. It has an unhealthy environment and unhealthy minds, making the need for a change long overdue. But there may be a way to restore both with one single solution. Our trash. In the past, our waste has been one of our greatest downfalls, our greatest shames. But it could become a valuable asset. It could be a way to restore our environment and minds.

Detroit is one such city that has both unhealthy minds and unhealthy environments. Detroit is well known for its abandoned homes and its rising levels of depressed individuals. It is a city that is falling apart at the seams; each stitch, each home, falling into disrepair. There may not be a way to recover the structures or lives that were lost, but there may be ways to create new life from the ashes. Literally.

Detroit has the largest garbage incinerator in the world, burning all of its trash and dumping the ash into a giant landfill, never to be thought of again. What if it had a different purpose? What if it could be used again as a way to restore the city? What if trash could change the everyday life into something to celebrate, rather than the continual depression Detroit, and much of America, suffers from? It could change the negative image of trash, making our waste into something positive, something restorative. Trash does not have to take away from the earth but can give back. With a little rethinking, it could become a miraculous place to immerse ourselves into.

There are places in the world that have started to do just that. They have begun to use their trash to create beautiful places and new land. One such place is Semakau Island in Singapore. Being a small island country, all of their land is taken up by their citizens. There was no place to put the rising amounts of trash that were threatening to engulf them. In 2008, Singapore had 4.7 million people crammed into 269 square miles. Their volume of solid waste had reached 5.97 million tons per year. 2.24 million tons of that waste was recycled, but the rest was sent to Singapore's four incineration plants[1]. It was in the early 1990's that Singapore developed the idea to create an island just for their incinerated trash.

In 1995, eight kilometers off the southern coast of Singapore, construction began on the Semakau Island Landfill. It opened in 1999, each day receiving about 1,400 tons of incineration ash[2]. The development of the island was broken up into two phases. Phase I is to fill each of the eleven cells of the island with ash while Phase II is to divide the island into even smaller

Semakau Island, Singapore. Image courtesy of Google Earth.

[1] Chris Tobias. "Habitats in Harmony: The Semakau Island Landfill." Celsias. 2009

[2] Catherine Ong. "Semakau Landfill." Waste Management World.

Proposed Fresh Kills Park. Image courtesy of nyc.gov

cells. The island should be able to store Singapore's trash until at least 2045, which is when Phase II will begin. Each cell is monitored carefully to make sure that the surrounding environment is not being affected. The cells are lined with concrete, sand, clay and a geomembrane to prevent any toxic matterfrom leaking into the water around the island.

The landfill and natural environment have been able to coincide very well. A mangrove forest grows close to the shores of Semakau, while many other endangered species of plants and birds have made the island their home. Trees are naturally occurring on the island itself, growing up from the ash. The worlds first off shore landfill seems to be a success. As each cell is filled, the island is being converted into an eco-park, drawing in many tourists and locals, many of who do not realize that underneath the grass below their feet are tons of garbage. A trip to the local landfill has become a day surrounded by nature.

Semakau Island is not the only landfill turned eco-park. Fresh Kills Park in New York was once Fresh Kills Landfill, the largest landfill in the United States. It was originally opened in 1948, and covers 2,200 acres. At a height of 225 feet, it is taller than the Statue of Liberty and can be seen with the naked eye from space[3]. It was an unlined landfill, leaking thousands of pounds of toxic chemicals and heavy metals into the waterways nearby. The odor from the decaying trash caused many of the residents in nearby neighborhoods to relocate. The landfill was finally closed in late 2001, but was temporarily opened again later that year to bring in debris from the September 11th World Trade Center terrorist attack.

Years later, a competition was held to redesign this landfill. The competition winner proposed a park that will be about three times the size of Central Park. The park will take thirty years to complete, planning to be done by 2035[4]. The construction is broken up into three phases. In Phase I, portions of the park are to be opened to the public, while other parts of the landfill are still to be capped, let settle, and seed. Phase II includes more parts of the park opening, as well as recreational facilities. There will be paths, trails and boat ways extending from the original ones built in Phase I. Phase III is more expansion and the emergence of new habitats. A memorial site is planned to commemorate the attacks of September 11th. The landfill is changing into something that is almost completely unrecognizable.

Fresh Kills Park is using each of the mounds of from the landfill

[3] Brooklyn College. "Staten Island Landfill: Fresh Kills." Brooklyn Honors College.

[4]NYC Department of City Planning. "Fresh Kills Park Project." nyc.gov. 2010.

to create topography, rather than the relatively flat landscape that it was originally. These four landfill mounds range from 90 feet to 225 feet, giving a base for many of the paths and recreational areas that are in development[3]. These mounds change the topography and landscape into something far more pleasing than it would have been before the landfill.

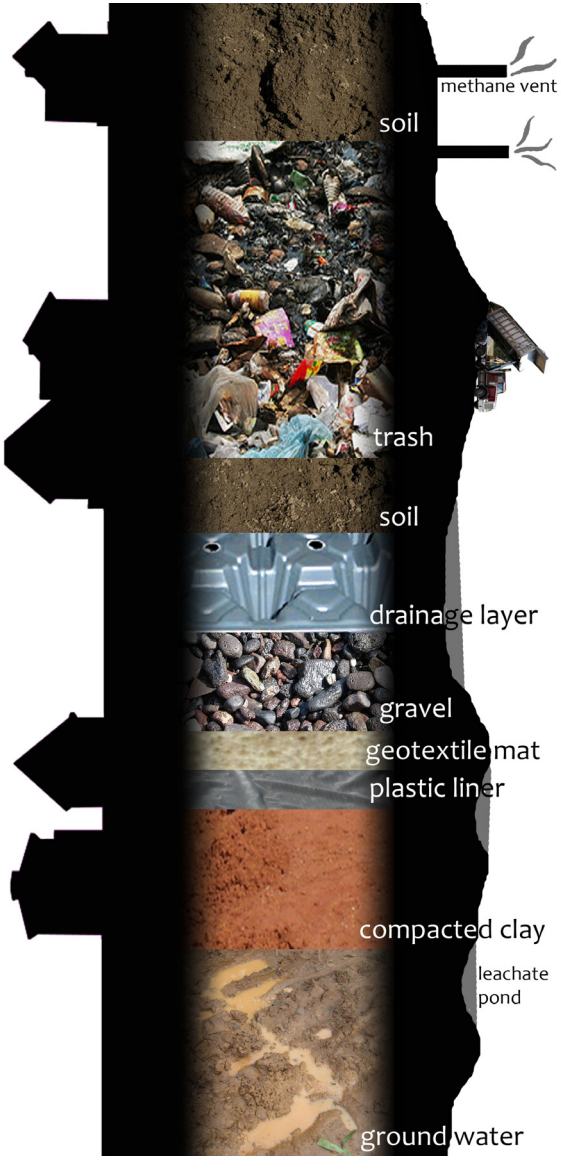
These landfills are working to immerse people into a more natural environment, combining recreational and structured areas with natural ones. It creates a balance in the environment and in the mind. The trash is being used in a way that restores the city instead of being a burden to it. It changes the idea of what a landfill is, redefining it as a positive.

However, there are some places that have had to incorporate a different kind of system to have that restorative connection with nature. Central Park, for example, has a complete separation of the natural and built environments. While this works for a dense city like New York, this type of park may not be appropriate for post-industrial cities like Detroit. There is a line between the two kinds of environments, causing them to not work together at all. The separation can be seen in different ways, though. Some believe that New York needs such a park, completely separated from the city, so that the people have a place to escape to. On the other hand, if the natural and built were designed together and made a part of the city, such an escape might not be necessary. The people of the city would be constantly surrounded by nature, having it designed into their everyday life. Walking through such a city could be as restorative as walking through a forest. It is a balance between the modern world we have grown accustomed to and the natural world that we were meant to live in.

Central Park, New York City. Image courtesy of Google.

Designing landfills into our lives and cities might give us that balance between modern and natural. But in order to do this, we have to figure out exactly how landfills work. We have to know their faults and how to fix them. After all, a landfill is no longer just a dump where trash is buried and rodents swarm around the decay. It is carefully designed and built into the ground in a way that isolates it from the earth. There are different kinds of landfills, too. There are ash landfills, sometimes known as ashfills. There are sanitary landfills, where clay is used as a liner to protect the earth from the trash. Then there are municipal solid waste landfills. They use a synthetic plastic liner to separate the earth from the garbage[6]. The main objective in all of these, though, is to keep the trash from coming in contact with ground water or

[6] Maria B. Pellerano. "The Basics of Landfills." Action Center. 1995



[5]*Craig Freudenrich, Ph. D. "How Landfills Work." Discovery Channel. 2000.*

rain. If this were to happen, a highly toxic black sludge, called leachate, would be produced. Because of this, where to place a landfill has to be carefully selected.

The first step in proposing a site for a new landfill is to determine if there is enough land to place a landfill on. Not all of the area a landfill uses is just for placing the trash. There has to be space for runoff collection ponds, leachate collection ponds, drop-off stations, buffer areas and extra soil to place on the landfill each day. Next, the composition of the soil needs to be determined. It needs to be watertight and the bedrock has to be sturdy or else it cannot be predicted where the trash will flow and settle. After that, the flow of water over the land has to be figured out. Where water collects and flows has to be studied to help prevent leachate from occurring. Fourth, what would be the environment effects if a landfill were placed in the proposed area? How would wildlife react to it? Endangered species and fisheries have to be avoided. Lastly, the proposed site cannot contain any historical or archeological artifacts. After that, permits have to be obtained and local governments have to approve the raising of taxes to pay for the construction of the landfill[5]. After all this is completed, construction can begin.

The construction of a landfill has to be very carefully handled. If not properly constructed, toxins will leak into the environment, defeating the purpose of having a landfill that is restorative. Most landfills today are municipal solid waste landfills. The bottom layer of these types of landfills, the basis on which it is built, is groundwater and earth. A layer of compacted clay is placed over the earth, and then a layer of plastic liner. Over that geotextile mat and gravel is laid. After that comes a drainage layer and soil. Then come the alternating layers of trash and soil. Every day, after the

trash has been dumped, it is covered over with another layer of soil to prevent exposure to rainwater and animals. Also, between geotextile mat and the gravel, tubes are placed to collect leachate, taking it to the leachate pond to be aerated until it is no longer toxic and can be returned to the environment. Eventually, the landfill is capped and vents are put in place to contain or burn all the methane that is released from the decaying trash. To cap the landfill, a layer of polyethylene is placed over the garbage, along with two feet of compacted soil. Grass and other vegetation are planted to keep the soil from eroding and exposing the landfill[5].

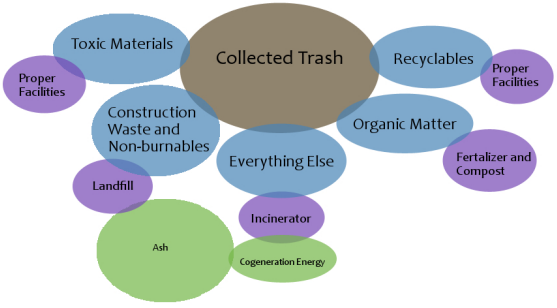
Unfortunately, many things can go wrong in this system. The layer of clay can often crack and organic chemicals like benzene can move through or decay the clay in as little as five years. Plastic liners can also fail. Household chemicals, such as moth balls, margarine, vinegar and alcohol can degrade the plastic, causing it to lose its strength, softening it, or causing it to become brittle and crack. Composite liners, a single liner of plastic and compacted soil that is sometimes used, often have holes and cracks, causing leaks. The leachate collection systems also have issues. They clog up from silt or mud, the growth of microorganisms in pipes, or from a chemical reaction between the minerals in the pipes. Sometimes the pipes are weakened from the chemicals and are crushed by the tons of garbage that are placed on them. Even the caps on landfills have problems. They can be eroded by the weather, the roots of vegetation will break through the cover, burrowing animals will destroy the integrity of it, and even sunlight will weaken it through ultraviolet radiation. Sometimes the trash will settle or cave in, causing the membrane to tear[6]. So many things can cause a landfill to fail and, unfortunately, the consequences of that can be very harmful.

Leachate, the byproduct of landfills, is the most toxic and harmful part of a landfill. This black sludge is produced whenever water mixes with the trash, collecting all the toxins and particles from the decaying garbage. The leachate consists of many kinds of organic and inorganic compounds. Some can argue that the leachate in landfills is worse when compared to ashfills because many of the toxins have been burned out already in ashfills. Also, because of a smaller surface area, leachate is produced more slowly and for a lot longer than it would be for ashfills. However, some argue that ashfills are worse when it comes to leachate because of the higher surface area. Each particle of the ash is able to leachate faster, making a much more potent and

[5]Craig Freudenrich, Ph. D. "How Landfills Work." Discovery Channel. 2000.

Leachate. Image courtesy of Google.

[6] Maria B. Pellerano. "The Basics of Landfills." Action Center. 1995



Hyper Recycling

toxic sludge.

Leachate is inevitable, but it can be cleaned in a couple of different ways. There are facilities that it can be sent to for cleaning. There are also newer technologies that filter the water out quickly, producing a more tar-like, heavily concentrated sludge. The most common way of dealing with leachate today is to build a leachate pond on the site of the landfill. Leachate is directed toward this pond that is divided up into at least four different sections. In the first section, leachate is aerated, producing a bubbling froth. As it begins to settle, it is sent to the second section where it is aerated more. The froth begins to reduce so that by the time it is moved to the third section, it is no longer bubbling and is lighter in color. Looking more brown instead of black now, it is sent to the fourth section, still being stirred and aerated until it is clean enough to be released back into the environment or sent to be cleaned even more by the local water treatment facilities. The composition of the trash is what really determines the toxicity of the leachate[5].

For the most part, our trash is composed of paper. 40.4% or 71.6 million tons of garbage per year is paper products. 17.6% or 31.6 million tons is yard trimmings. 8.5%, 15.3 million tons are metals. Plastics are 8% of our trash, coming in at 14.4 million tons. Food scraps are 7.4% or 13.2 million tons. Glass is 7% at 12.5 million tons. Then there is the 'other' category, making up 11.6% or 20.8 million tons[7]. This category includes things like rubber, leather, textiles and various inorganic wastes. Many of these categories, such as the metals, plastics, glass and papers can be recycled. Others, like yard trimmings and food wastes, can be composted. The 11.6% of the 'other' category could then be sent off to landfills or incinerators.

But there is a lot of debate around which is better, landfills or incinerators. There are a lot of bad things about both, but one seems to have more good than the other. The bad thing about landfills, to start off with, is their constant odor. The smell never stops because the trash is continually decomposing. There is also the problem of methane emissions, which can be either burned or collected and cleaned to be used for energy. Landfills also have problems with rodents and birds and therefore, disease. There is also the issue of the volume of trash when compared to ashfills. Everything is at its original size, perhaps crushed, but not nearly as small as in an ashfill. And it is because of the amount of empty spaces in the pile that the uneven sized trash takes up that causes a landfill to take at least thirty years to settle. They

[5]Craig Freudenrich, Ph. D. "How Landfills Work." Discovery Channel. 2000.

[7] EPA. "What's In Our Trash." United States Environmental Protection Agency. 2010.

have to be carefully watched and maintained for those thirty years, even after it has stopped accepting trash. Because of the lack of oxygen in a landfill, the trash decays extremely slowly. It can take years for a banana peel to decay[6]. Unfortunately, both landfills and ashfills have the problem of leachate.

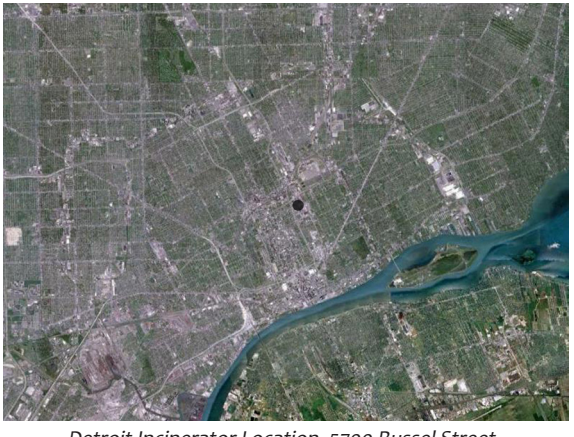
Besides being a place to store trash, landfills don't have very many good points about them. The methane they emit can be harnessed and used for energy, but a lot of times it is just burned as soon as it is released from the landfills.

There are some good points for incinerators, though. The volume of trash is reduced by 90% compared to landfills, which means prolonged life for ashfills. Also, the ash doesn't have an odor. Living next to an ashfill wouldn't be as bothersome as living next to a landfill would be. During the incineration process, we are able to get co-generative energy, meaning natural gases don't have to be burned to heat and power our buildings. On top of that, it only takes, at most, ten years for an ashfill to settle, compared to landfills thirty. Those ten years can even be shortened by compacting the ash with machinery[6].

Of course there are cons for incinerators, too. Incinerators do have an odor when burning the trash. Sometimes there is a problem with fly ash when transporting the ash, but that can be fixed by simply covering it. The real downfall of incinerators is that they produce so much CO_2 every year. The Detroit incinerator, for example, produces six hundred thousand tons of CO_2 every year[9]. And, as always, there is still the problem of leachate with ashfills. But all these problems with incinerators do not outweigh the problems with landfills. In fact, ashfills and the incineration process are still more beneficial than landfills.

Since incineration seems to be the better choice of the two, it would probably be best to take a better look at incinerators. The largest incinerator in the world is located in Detroit at 5700 Russel Street. It is capable of burning four thousand tons of garbage every day, but usually averages around 2,800 tons[9]. There is a lot of controversy around this incinerator. Organizations like Zero Waste Detroit and Greenpeace regularly protest the incinerator, claiming it is the reason for so many cases of asthma and other respiratory problems. However, none of the ten worse cities in the United States for asthma have incinerators[9]. Detroit is not even among them. These organizations are failing to remember that Detroit is the motor city and has little in the way of

[6] Maria B. Pellerano. "The Basics of Landfills." Action Center. 1995



Detroit Incinerator Location, 5700 Russel Street

[9] Detroit Incinerator. Detroit Free Press. 2008.

Carleton Farms Ashfill, Carleton, Michigan

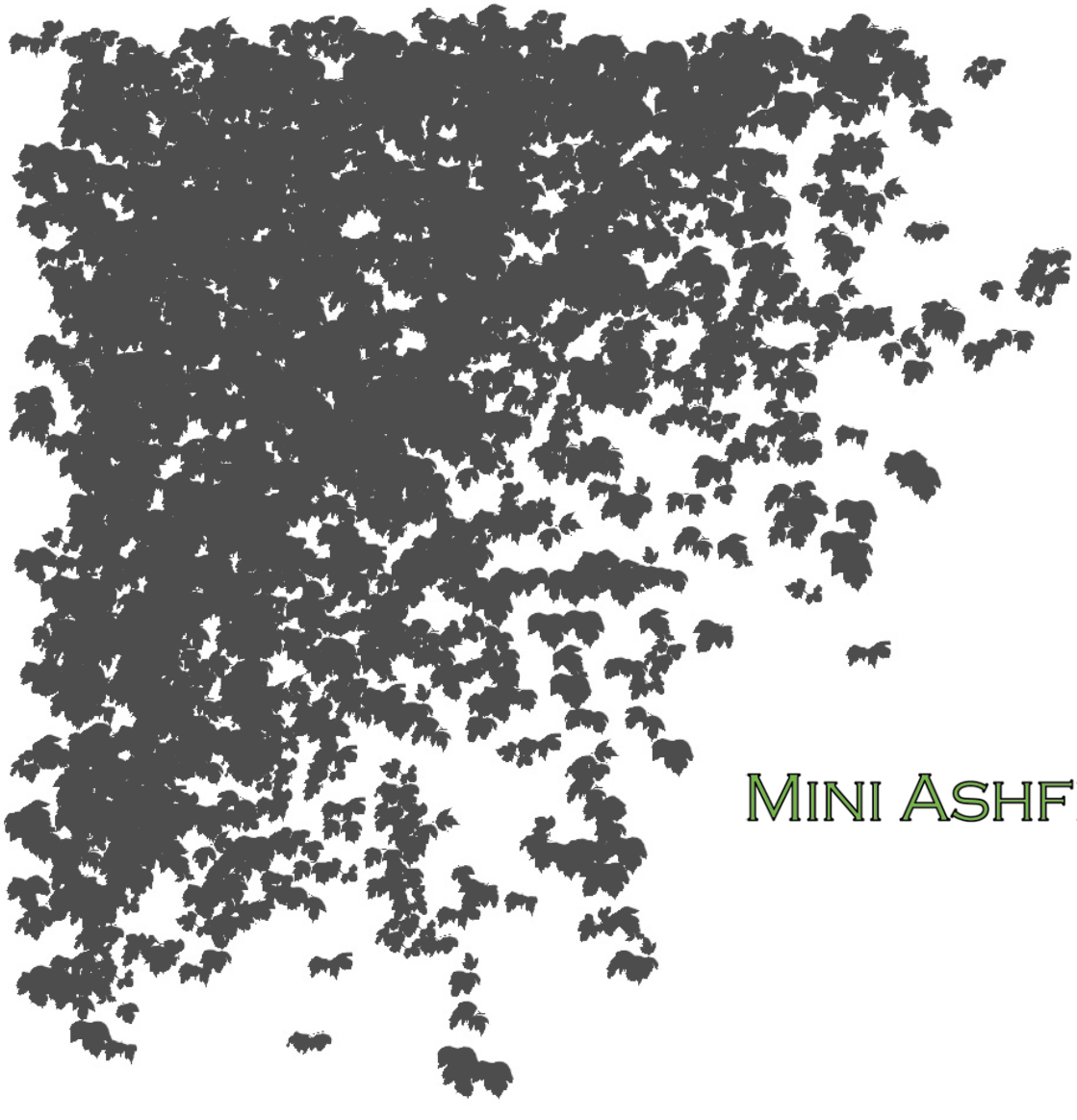
public transportation, meaning there are a lot more cars on the streets in a relatively small area. There is not any statistical information to prove that the incinerator directly causes asthma attacks in individuals of the city. It certainly is not helping respiratory problems, but it cannot be blamed for all of it until there is sufficient evidence to prove just how much the incinerator contributes to the issue. For now, the incinerator is very helpful in providing energy for the city. The more trash is burned, the more energy we can harness.

Detroit's incinerator is responsible for much of the countries trash. It not only processes Detroit's trash, but receives waste from New York, Canada and Florida. Even accepting all of this trash, Detroit is still under the 4,000 tons of waste it is capable of incinerating every day[9]. Because of this, it does have a financial drain on the city. It has ended up being more costly than anticipated, and has actually put the city into debt. Other than that, information on Detroit's incinerator is rather scarce. The owners of the incinerator like to keep information private because of the controversy around the business.

Knowing all this information, we can take the next steps to improving on the current system. We can figure out ways to use this incinerated trash to improve our lives. We can create topography, even mountains, from this ash. We could create new earth from it. By combining it with the composed waste, the ash's high levels of nitrogen would be perfect for growing new vegetation. It could transform a flat, depressed city, like Detroit, and give it new life.

Using ash in a different way could give the city the healthy boost it needs. Creating mini landfills as a way of changing the ways we go about our daily lives could restore us mentally and environmentally. Detroit could bring back the life that it has been steadily losing for decades. It could be the starting ground for a landfill system that would one day be used all over the world. It might even make a business out of trash, turning it into something valuable instead of shameful. It could give us the healthy minds and environments that we have been searching for for so long. We could create new life from the ashes. Literally.

[9] *Detroit Incinerator. Detroit Free Press. 2008.*



Mini Ashfill

To test the feasibility of such a project, an experimental miniature ashfill has been made. It was constructed in a way that would push the limits of an ashfills faults. First, a layer of earth was used as the basis of the ashfill, representing the foundation of every landfill. Then a layer of incinerated trash was placed. Without any type of leachate protection or removal system, the effects of the leachate and toxins can be seen at its worst. After this, a layer of compost and topsoil was used, representing the recycled yard waste, food scraps and other organic matter usually thrown away. Instead, it was added to the ashfill for nutrients. Then grass seed was planted and watered. It was left to grow for two weeks and the results were astounding. Within a week, the grass sprouted and grew at an impressive rate. The extra nitrogen from the ash appears to have helped it grow. Also, the grass has no trouble taking root in the ash. Three months after the original construction of the mini ashfill, the grass still thrives and looks as if it is outgrowing its box. Though is watered regularly, there is no evidence of leachate or other toxic substances leaking from the incinerated trash.

Mini Ashfill Box

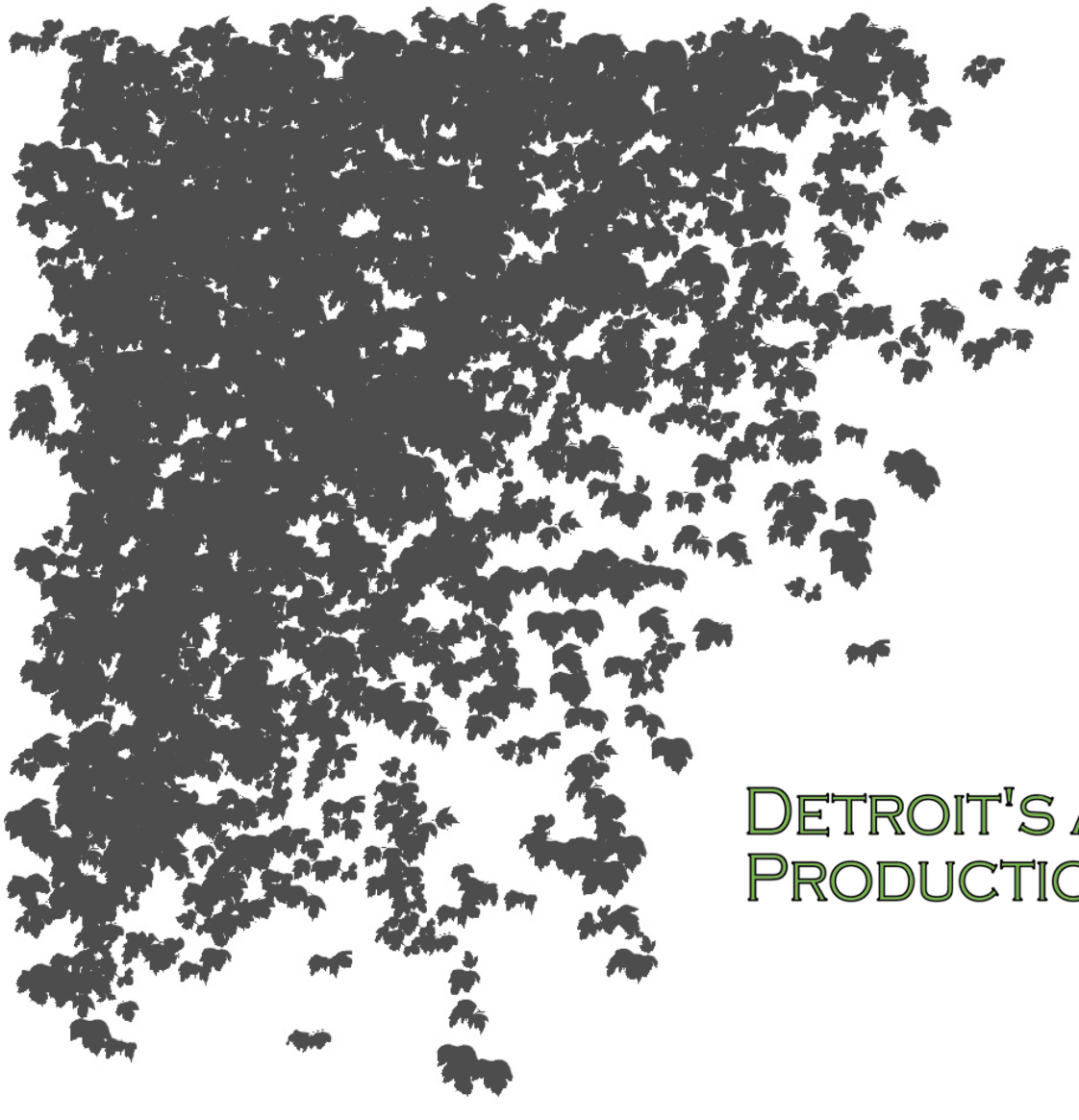
Mini Ashfill Box after four months

Grass

Topsoil and compost

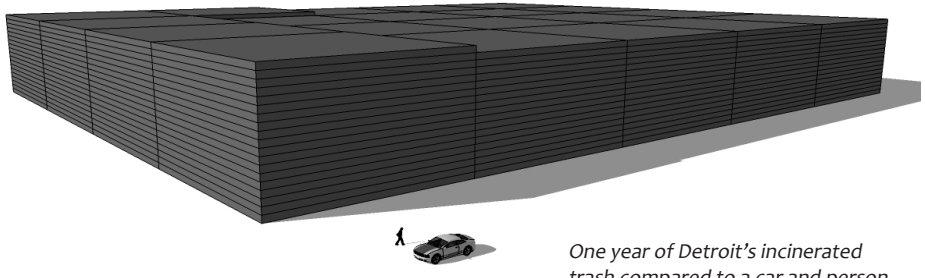
Incinerated Trash

Earth

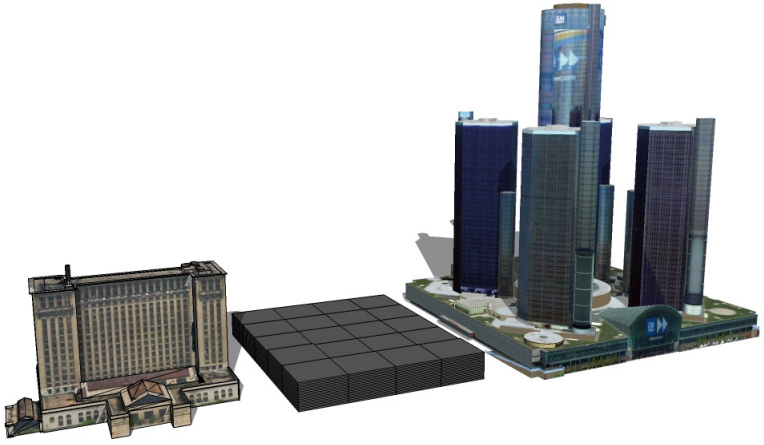


Detroit's Ash Production

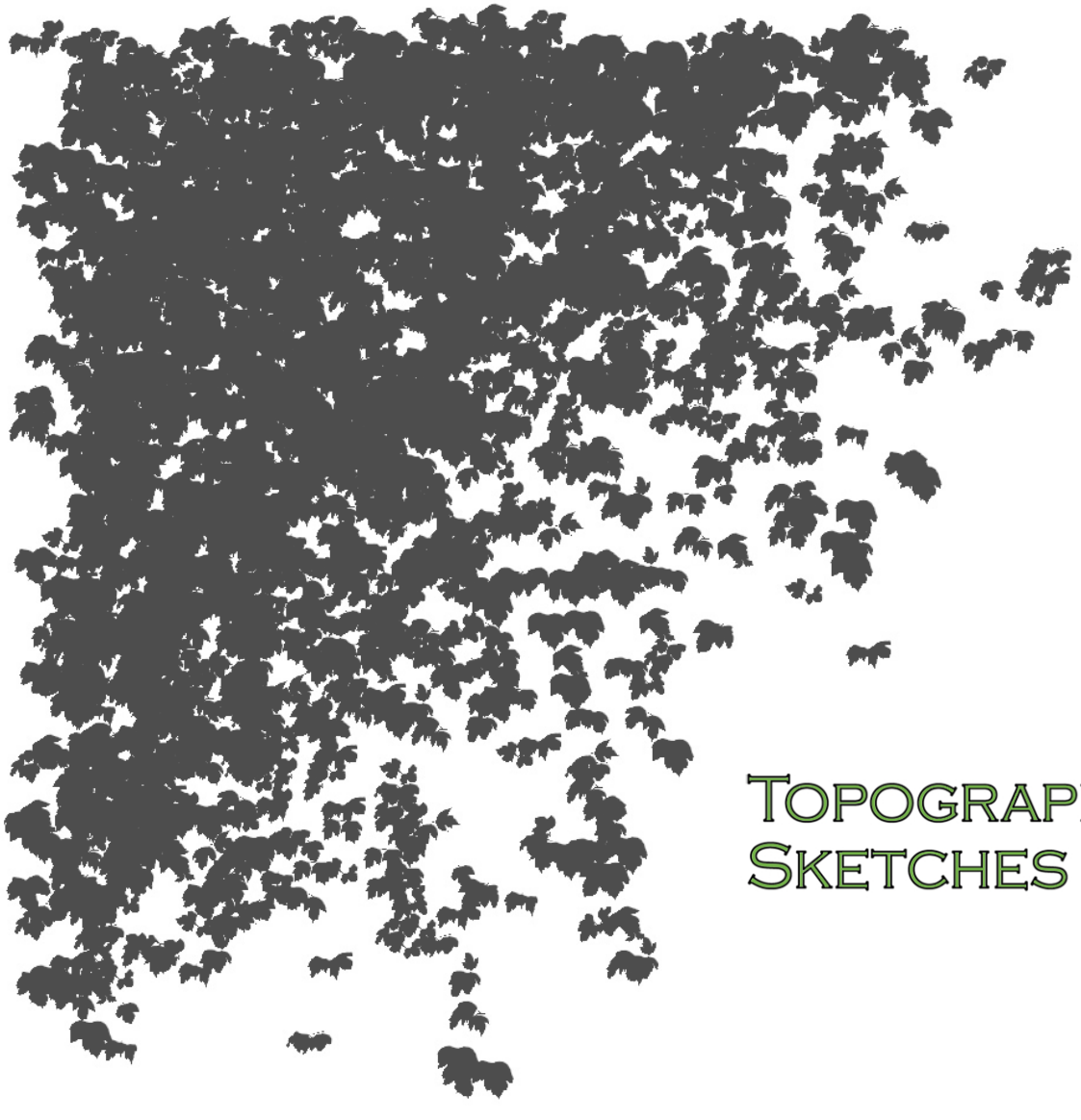
Each day, the Detroit incinerator processes 2,800 tons of trash. That is 4,760,237 cubic yards of ash every year. This information is important to figuring out how quickly the topography will grow over the years and how long the ashfill will able to be added to before it becomes too large. In these diagrams, each thin square layer represents a day of Detroit's ash production. Placed together, they show the accumulation of all 365 days of the year.



One year of Detroit's incinerated trash compared to a car and person.



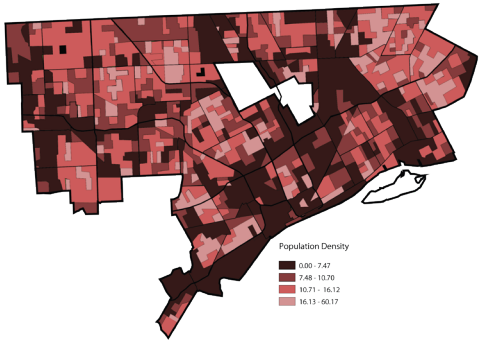
Detroit's ash production in one year compared to the Detroit Train Station and Renaissance Center.



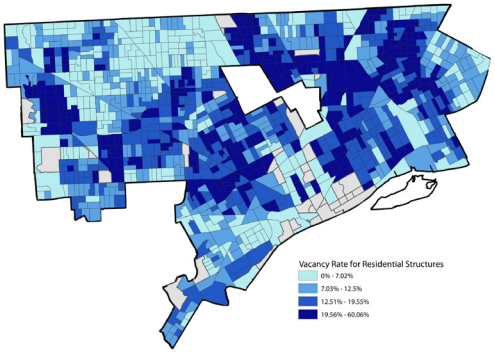
Topography Sketches

Since Detroit has the largest incinerator in the world and already produces amazing amounts of ash every day, Detroit becomes a great place to experiment with placing ashfill topography in a city. But the exact placement of the ash must also be considered. These maps, courtesy of Data Driven Detroit, show population density, vacant lots and vacant residential structures. They have been adjusted so that the darkest areas show the vacancies and low population.

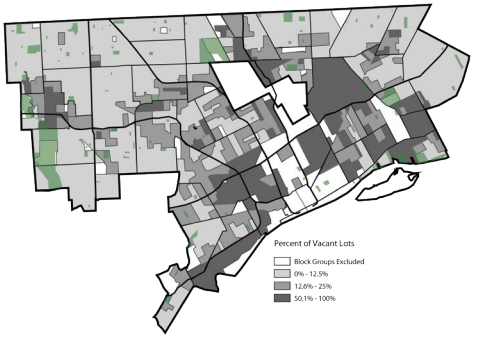
Next, all three maps are placed over one other so that the most abandoned areas of the city can be seen. This map can be seen on the following page. By possibly placing the ashfills in these abandoned areas, there will be the least amount of interference with the areas of the city that are still functioning well. The least amount of people would have to make way for the land to be prepared and used to create topography.



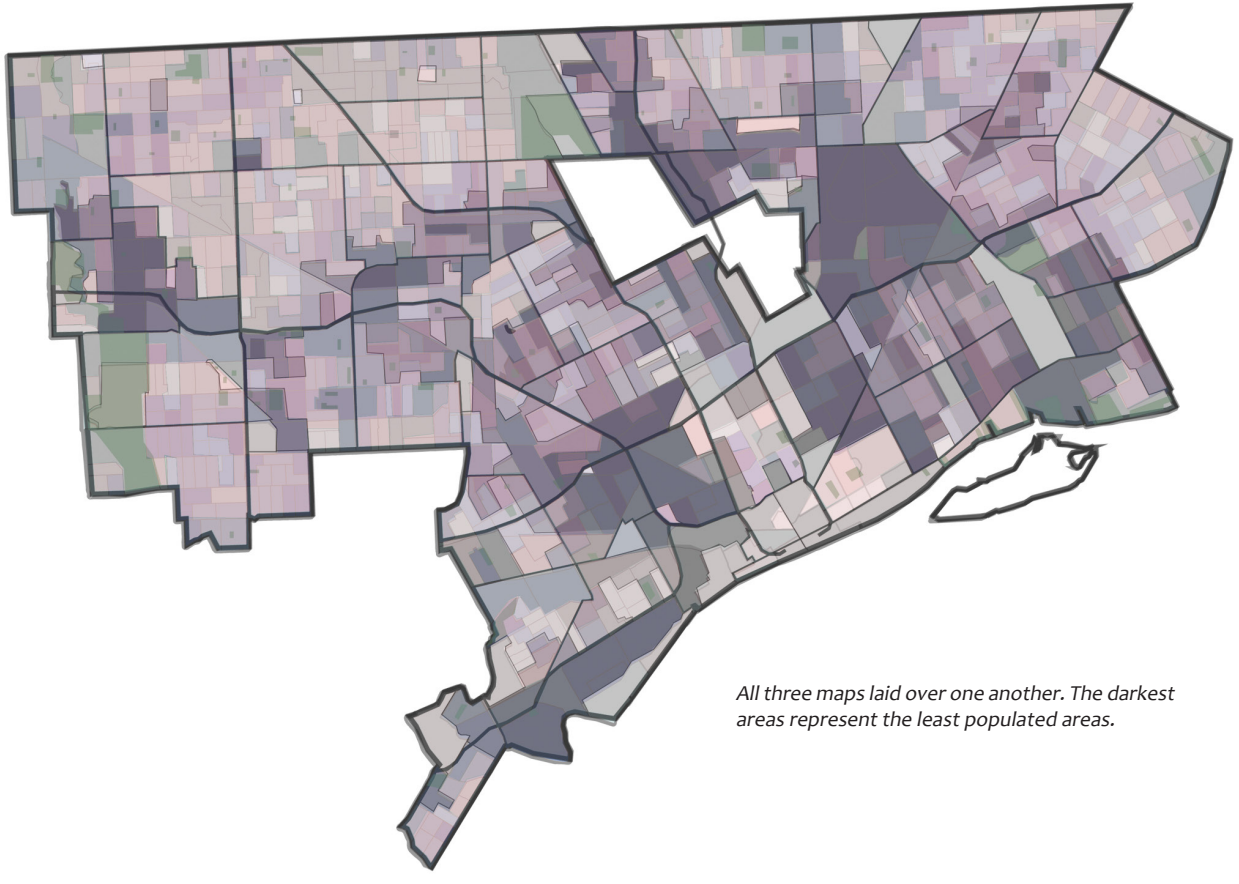
(10) *Kurt Metzger. "Data & Mapping - Population Density." Data Driven Detroit. 2010.*



(10) *Kurt Metzger. "Data & Mapping - Vacancy Rate." Data Driven Detroit. 2010.*

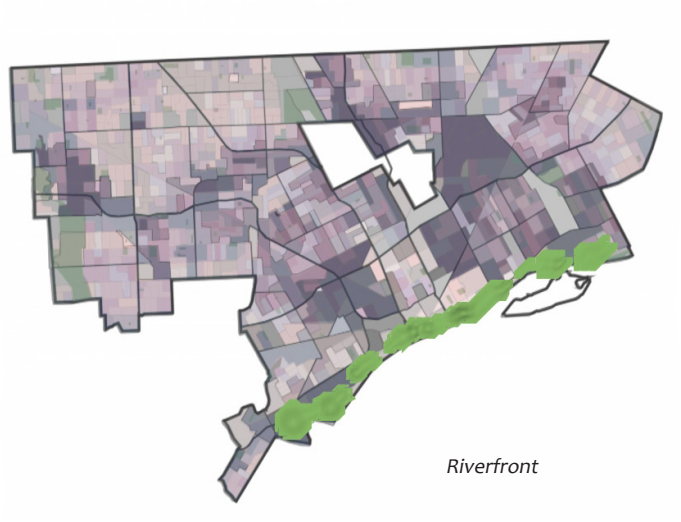


(10) *Kurt Metzger. "Data & Mapping - Vacant Lots." Data Driven Detroit. 2010.*



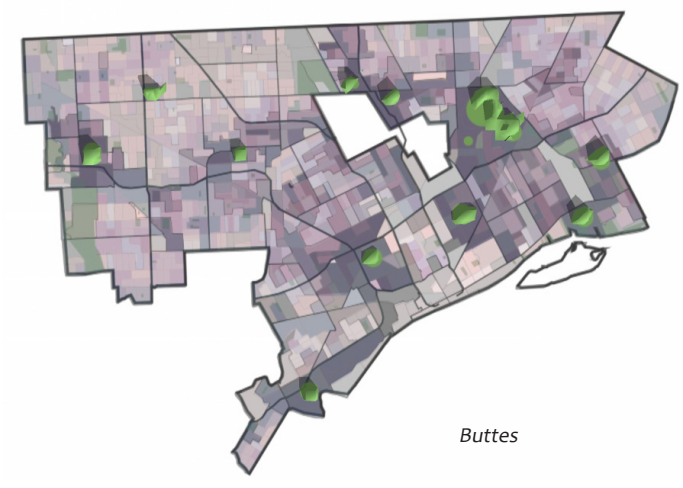
All three maps laid over one another. The darkest areas represent the least populated areas.

Using the combined map, different types of topography are tested in the vacant areas of the city. In this test, the ashfills are concentrated along the riverfront. It highlights the view from the Canadian side of the Detroit River.

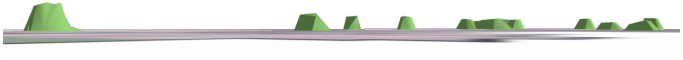


Riverfront

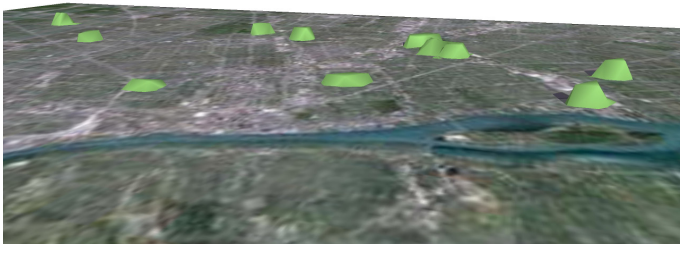
Riverfront Elevation



Buttes

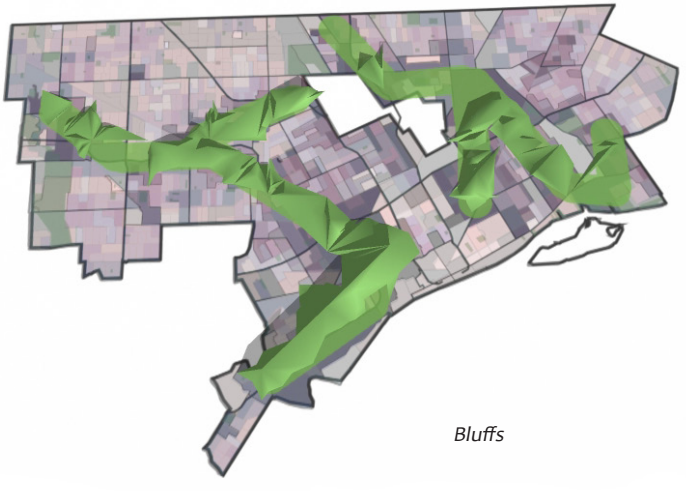


Buttes Elevation

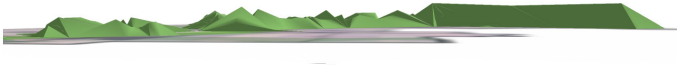


Buttes were then tested, covering a wider part of the city. They stick up with a very straight and rigid profile, making it less likely of a solution because of the structure of a landfill and erosion.

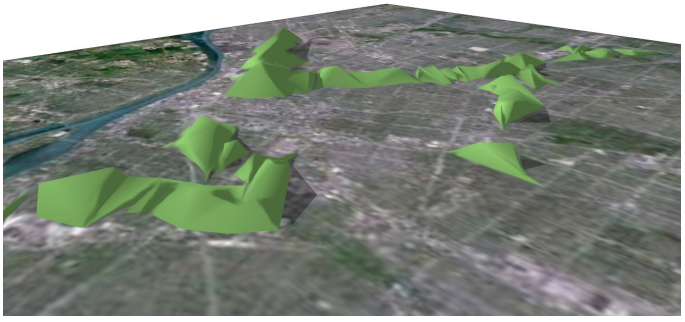
After buttes, bluffs cover the abandoned parts of the city. They cover a much larger area, making an ashfill that would last for hundreds if not thousands of years. However, due to time, erosion and structure, this solution is also unlikely. Cliffs, while interesting, create walls in the city. Instead of connecting a city, it splits it into separate parts.

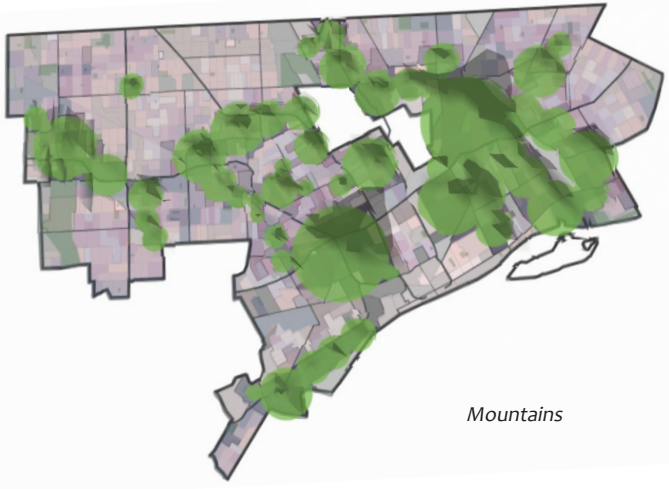


Bluffs

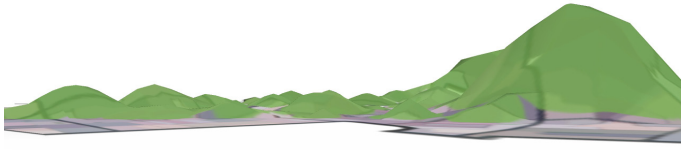


Bluffs Elevation



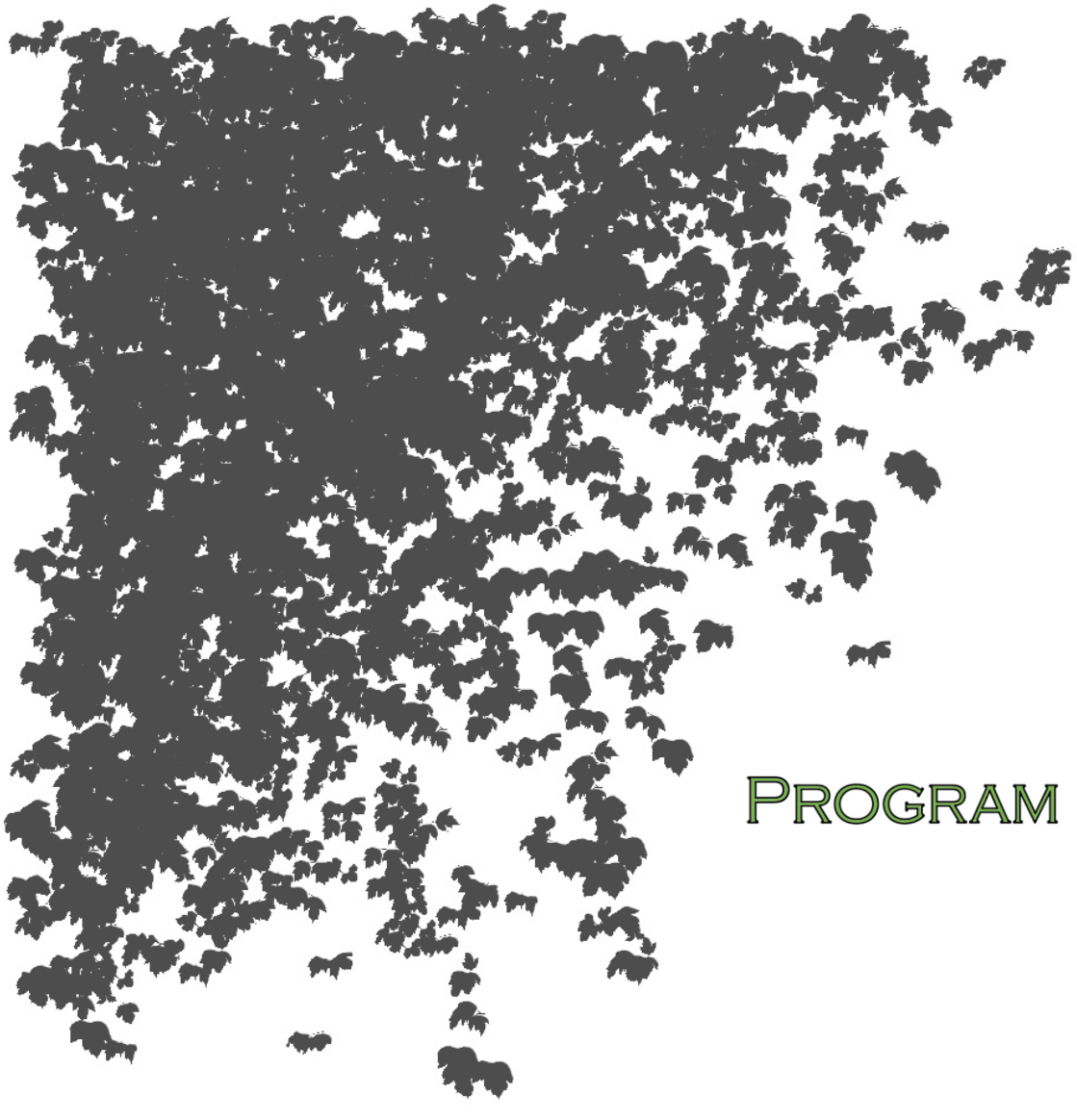


Mountains



Mountains Elevation

Hills and mountains seem to be the most likely solution. Though they could cover most of the city, they can be built up slowly and be capped whenever the desired height is reached or whenever trash production is no longer an environmental concern. The largest mountain is in one of the most abandoned parts of the city, which also happens to be the location of Detroit's incinerator.



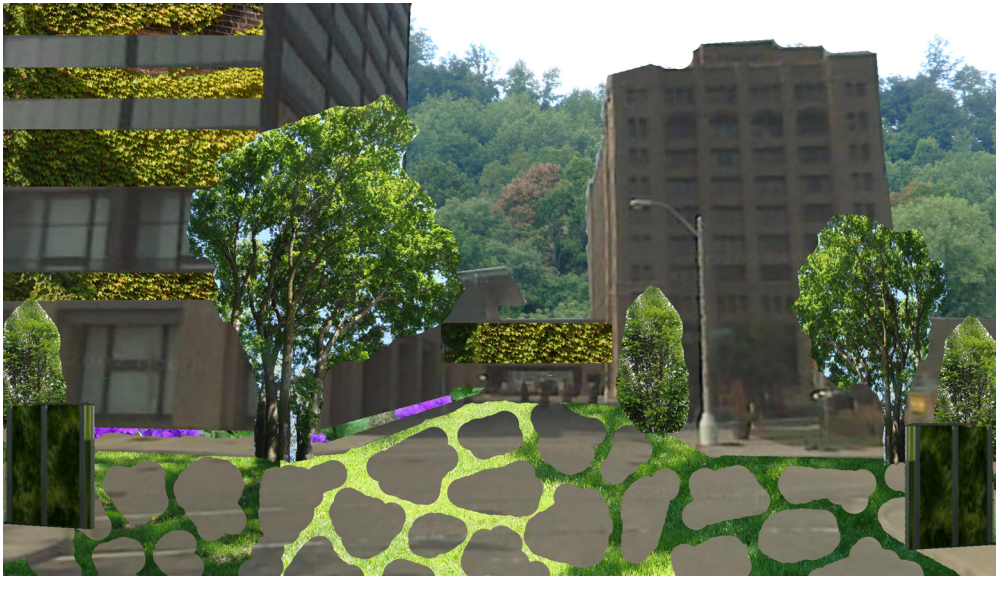
Program Sketches

When building up topography in a city, its interaction with the surrounding communities becomes very important. It must blend in with the urban environment, creating spaces and transitions into the topography. In the following sketches, the landscape changes. Parts of the city are redone, creating transitions.

There are green spaces and large ivy covered walls lining the sidewalk. These ivy walls create habitats for wildlife, reduce noise pollution and create privacy. Grass is used on the roads to help reduce toxic emissions and heat caused by cement.

Michigan Ave. and 17th Street, Detroit

Grand River Ave. and
1st Street, Detroit

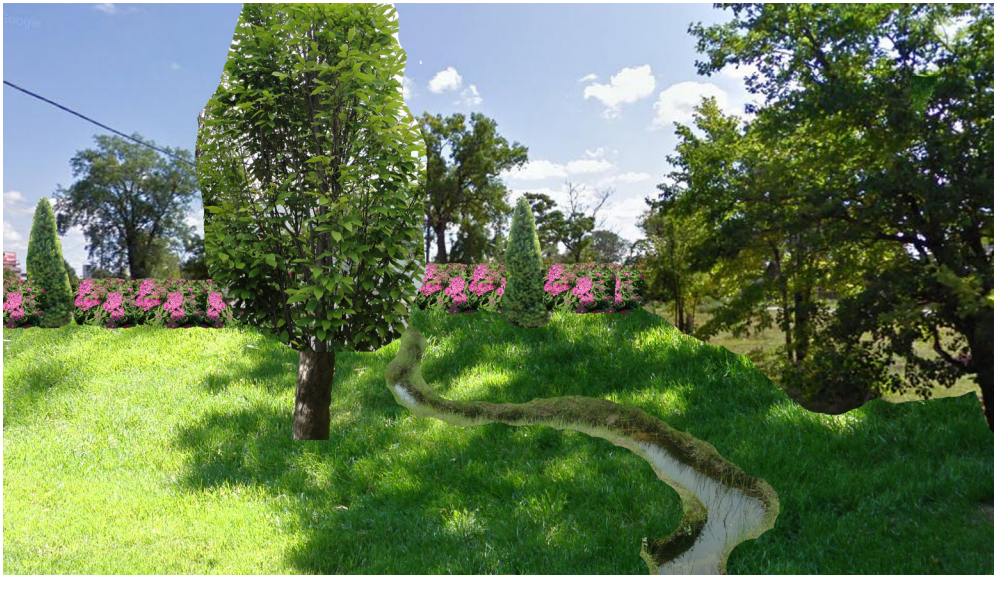


Plum Street and 3rd Street, Detroit

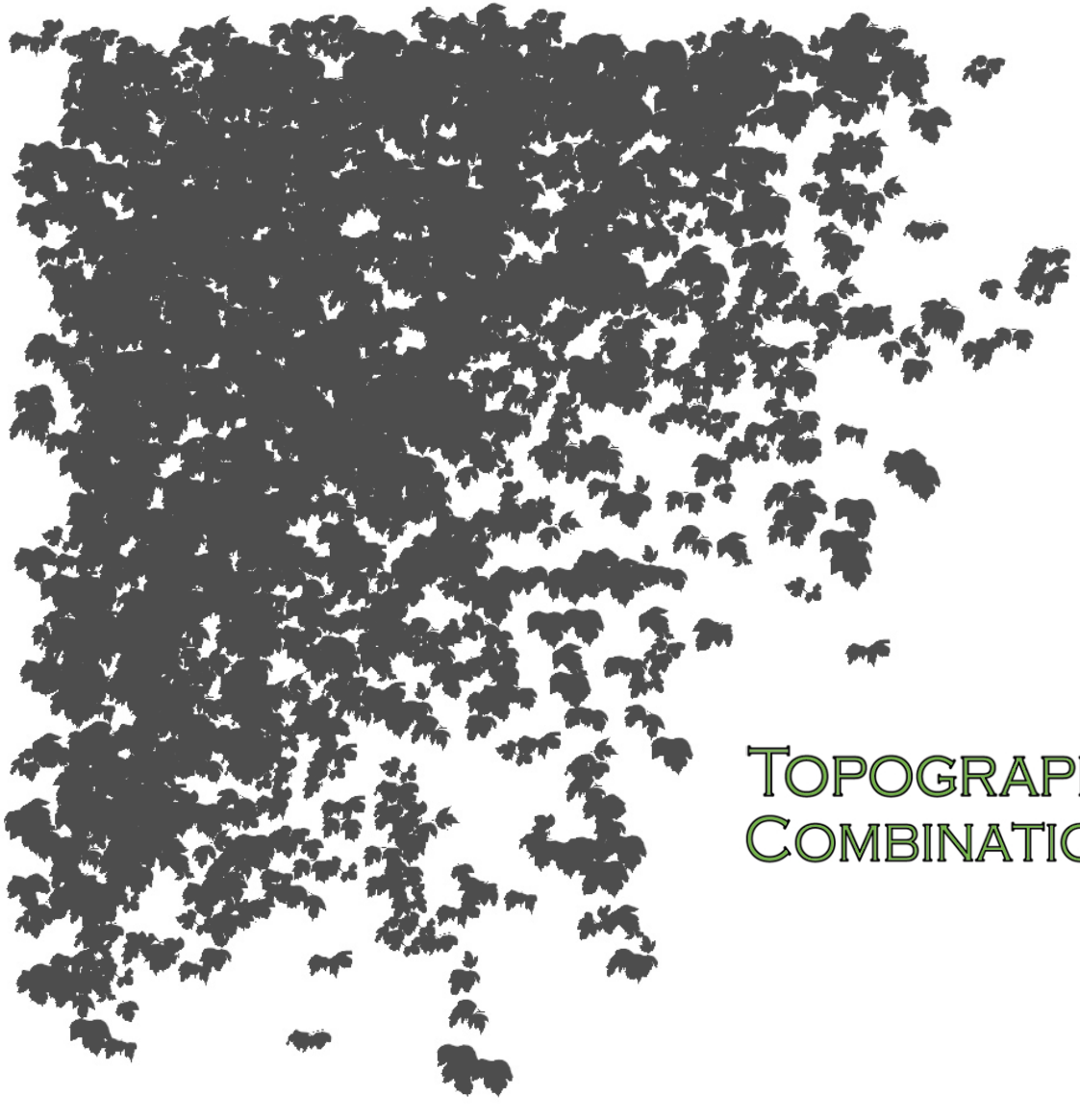
2nd Ave. and Columbia Street, Detroit

17th Street and Butternut Street, Detroit

Elm Street and Vermont Street, Detroit

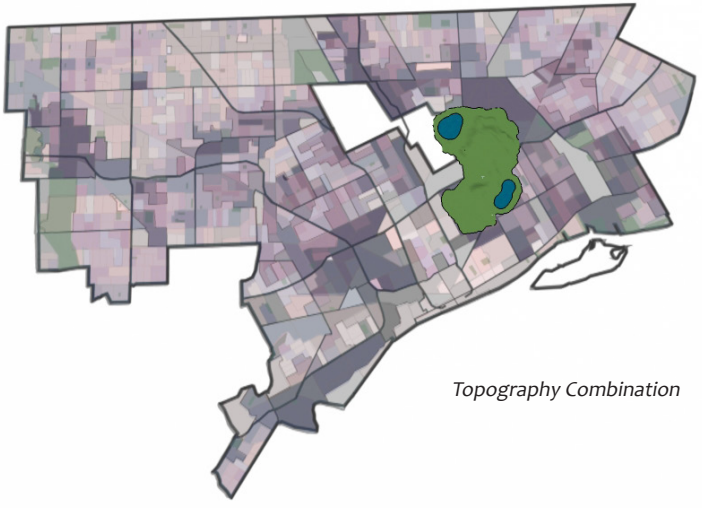


Temple Street and
Huron Street, Detroit



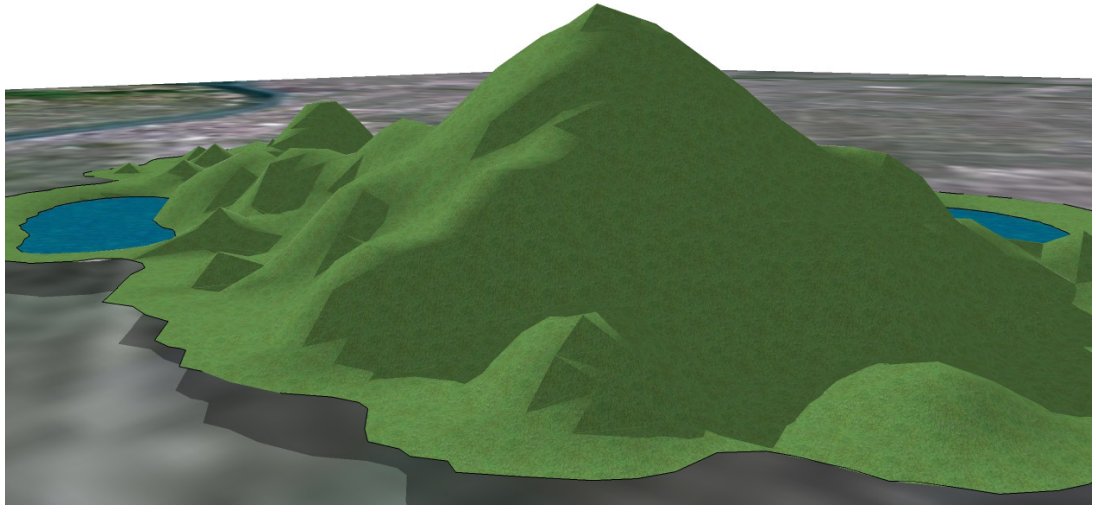
Topography
Combination Sketch

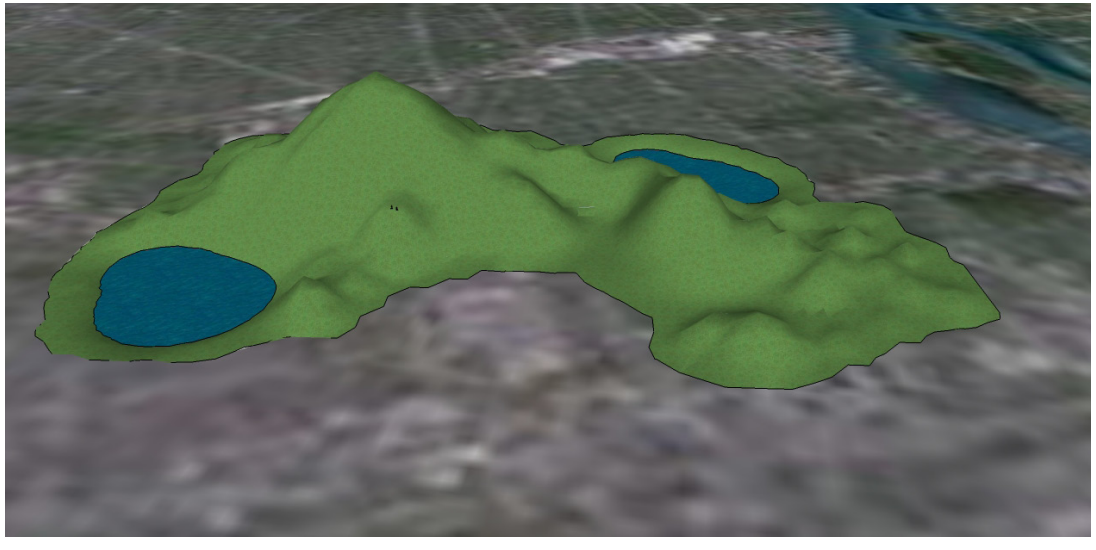
The least populated area of Detroit is the same location as Detroit's incinerator. Because so many of the topography sketches center on this area, a single topography sketch, using a combination of topography types, was developed to see its interaction with the incinerator. Leachate pond placement has begun to be considered as well as human habitation and program on the hills and mountains themselves.



Topography Combination

Topography Combination Elevation

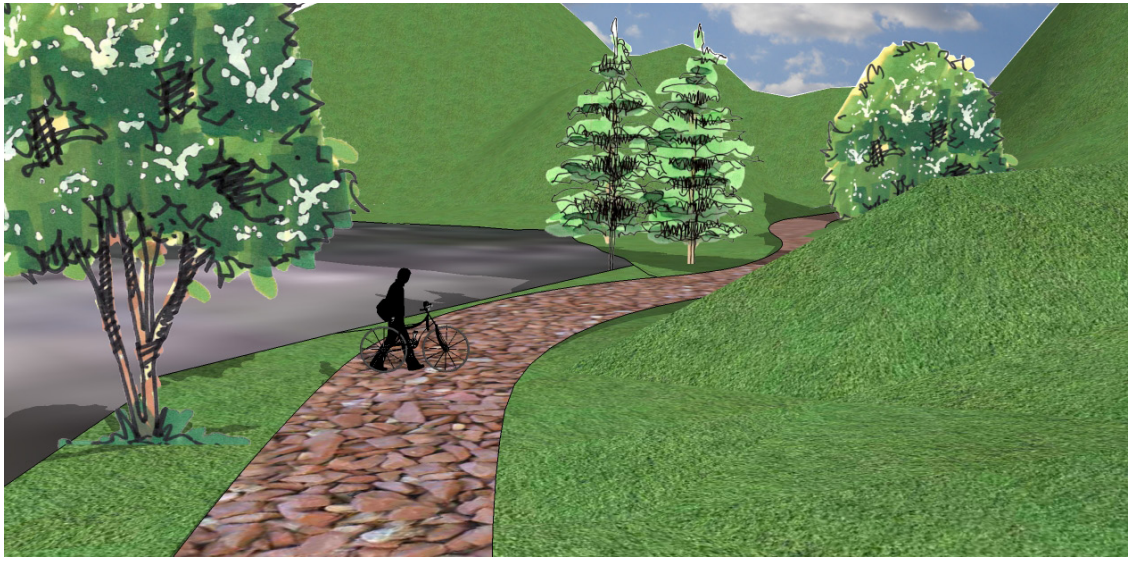




Topography Combination Perspectives

Topography Combination View from Windsor, Ontario

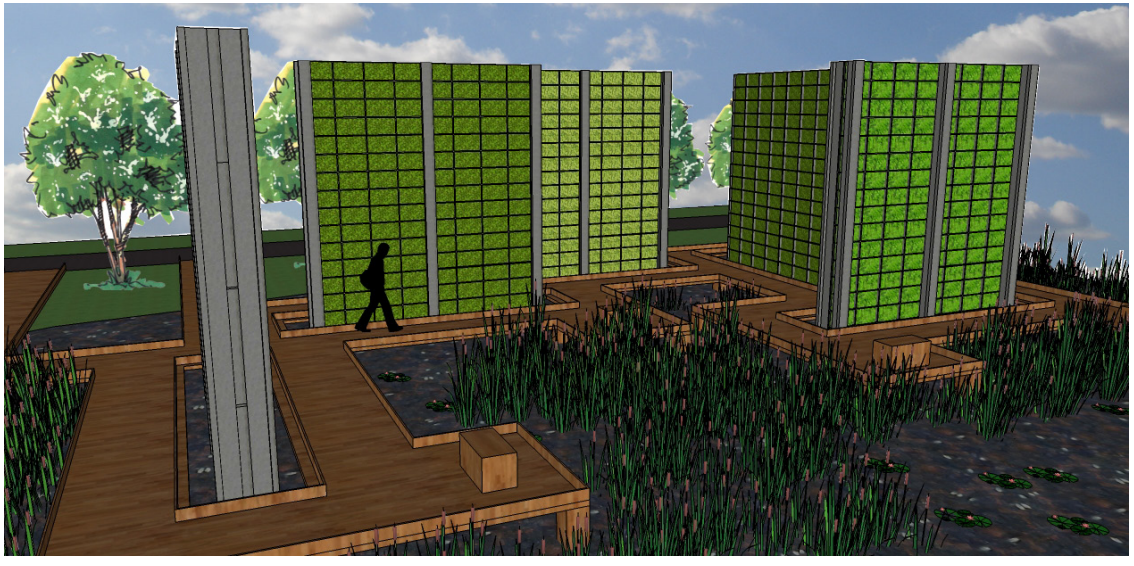
Topography Combination Plan



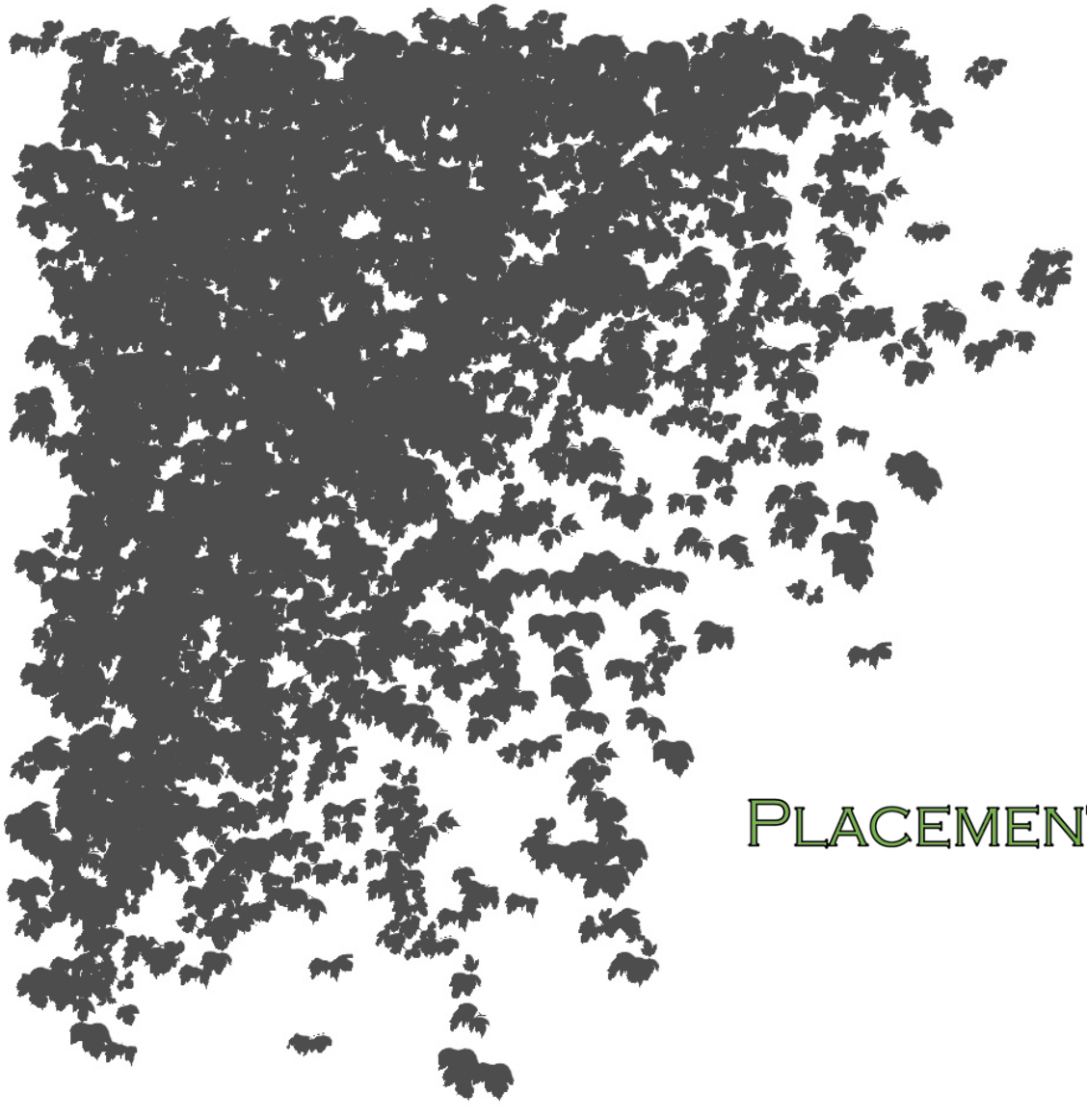
Hiking and Biking Paths

Sledding Hills

Viewing Areas



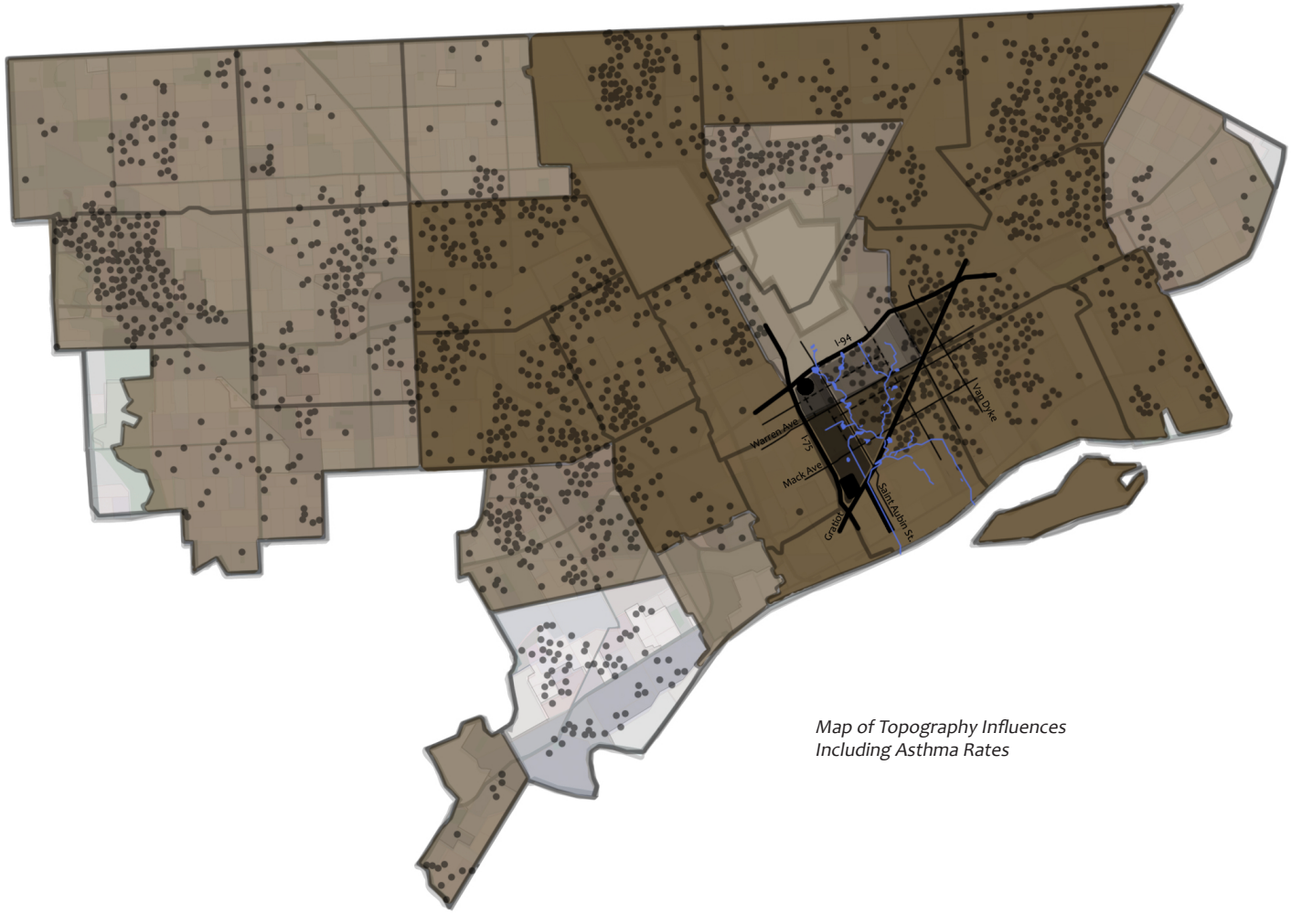
Leachate Ponds,
Wetlands and Ivy Walls



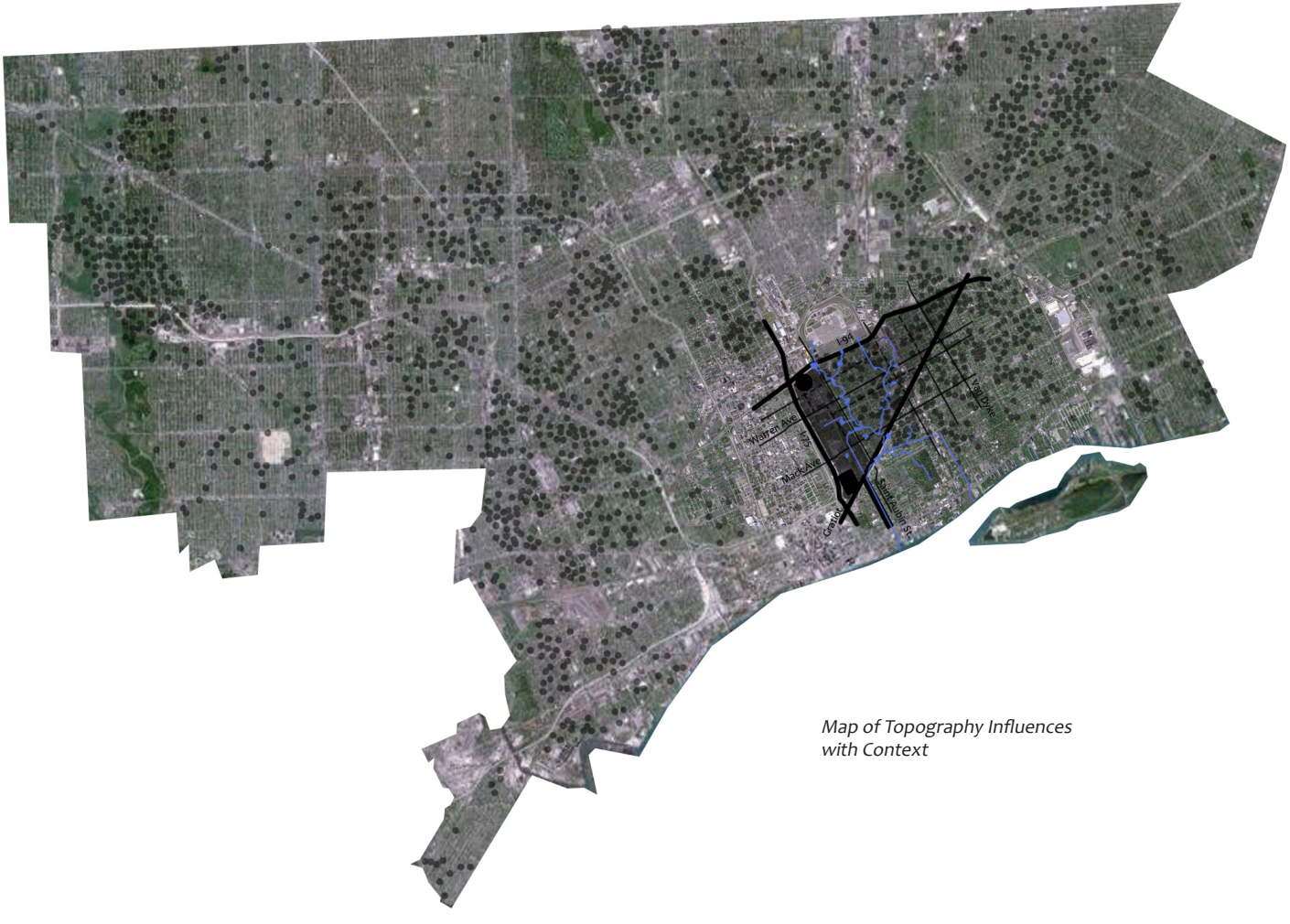
Placement

Taking a closer look at this unpopulated part of the city, other communities and landmarks that are important to the area can be found. Not only is the incinerator located in this part of town, but the Eastern Market and Dequindre Cut are just a mile away. Also, many of the houses that have been destined for demolition because of the Bing 3000 demolition program are found in the area between I-75, I-94 and Gratiot Avenue. Though the district directly surrounding the incinerator does not have particularly high asthma rates, some of the surrounding neighborhoods do. That can be seen on the map on the following page. The darkest brown areas have the worst asthma rates. Furthermore, the Detroit Collaborative Design Center[10] is currently working on a daylighting project of the historical Bloody Run Creek. Over the years, the creek has been buried and converted into sewer systems, but the Detroit Collaborative Design Center is developing work to resurface the creek. Maps showing the all of these influences and context can be seen on the following pages.

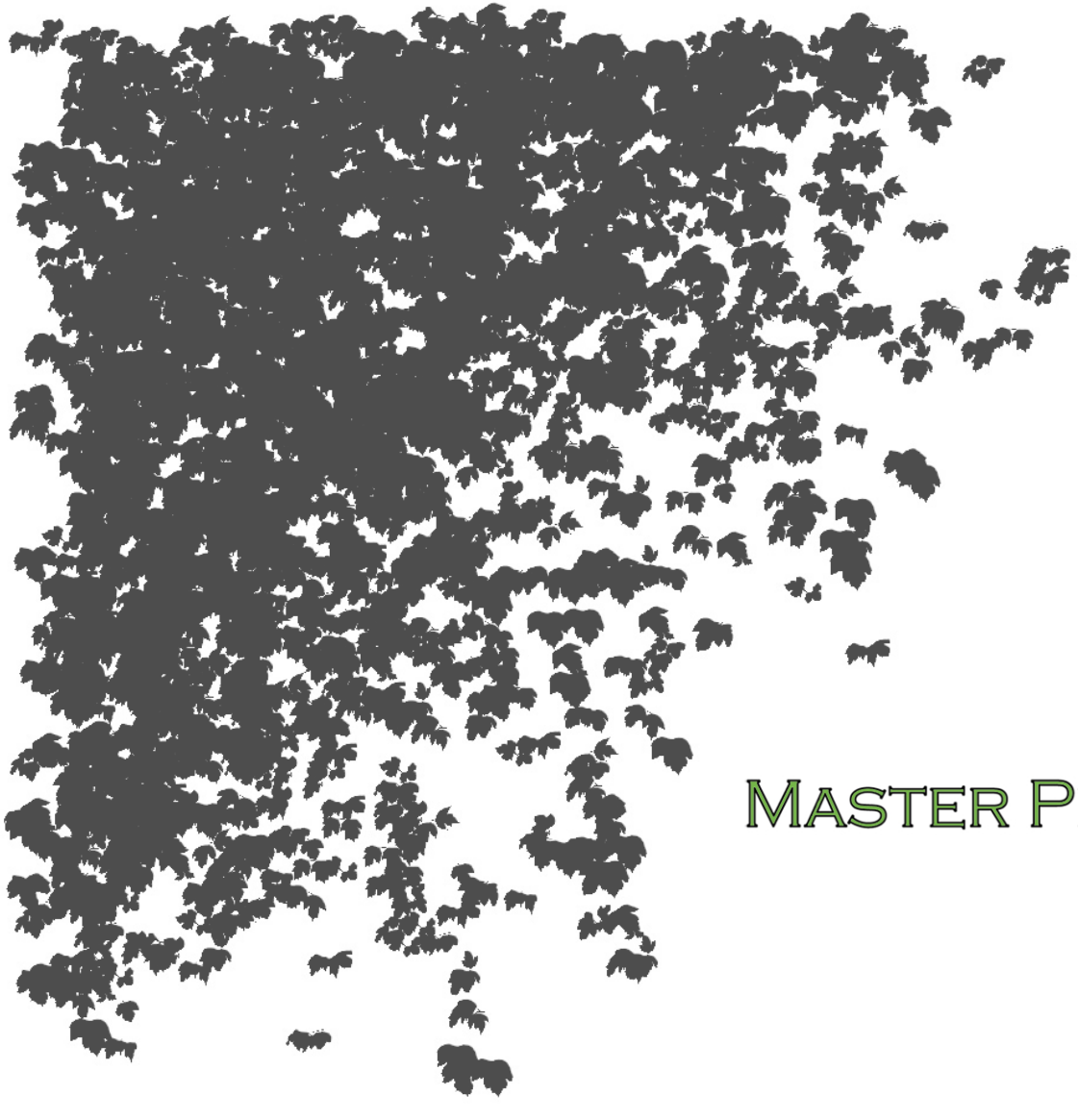
[10] *Stanard, Virginia. Detroit Collaborative Design Center. Personal Interview by Carissa Chatterley. 14-02-011.*



Map of Topography Influences
Including Asthma Rates



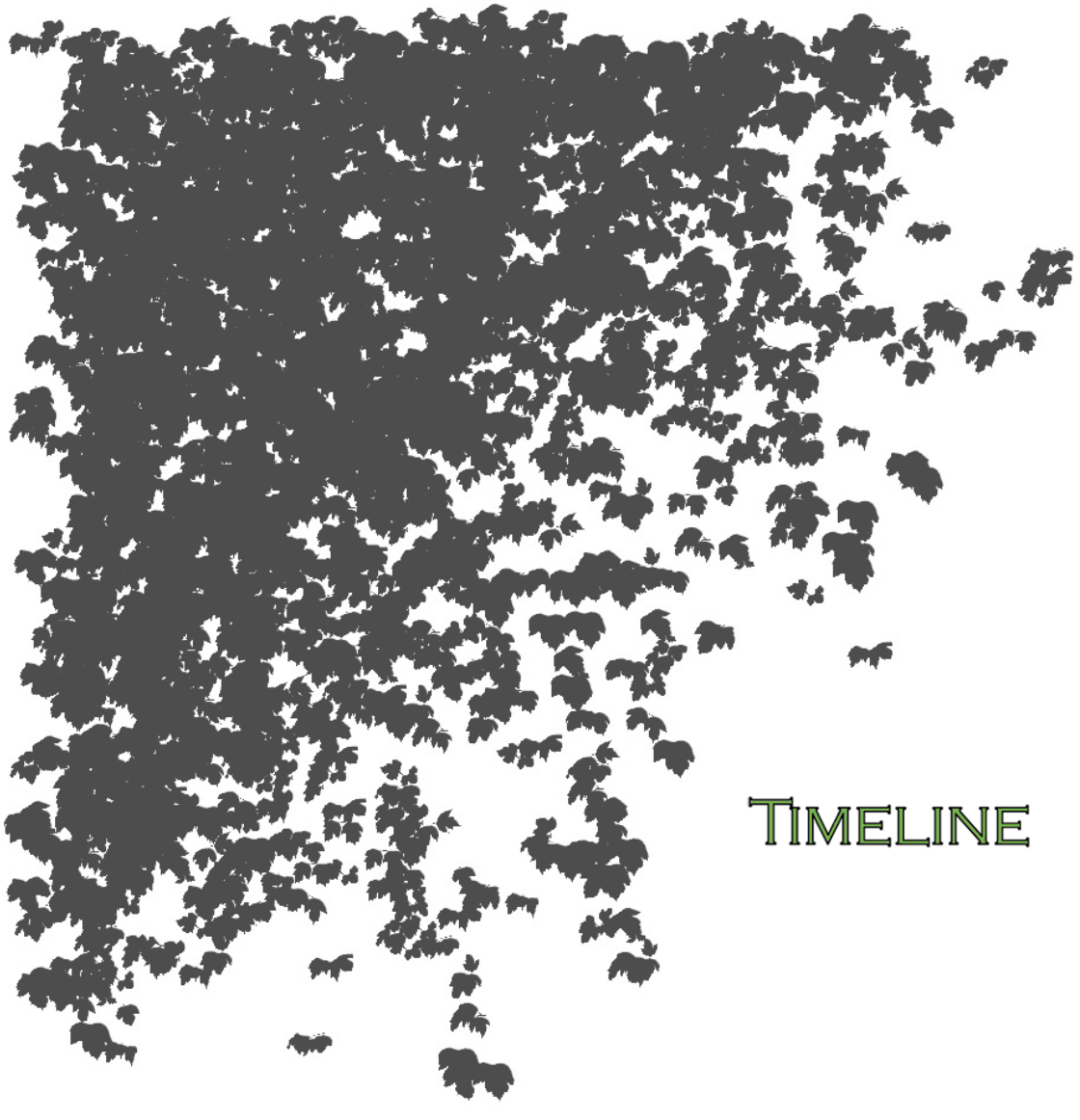
Map of Topography Influences with Context



Master Plan

Using the influences shown in the maps, topography is placed around the incinerator. Having the incinerator located to close to the ashfills makes delivery of the incinerated trash easier and more efficient. The Eastern Market and Dequindre Cut lead into the hills and mountains, drawing larger crowds to the area. Paths for hiking and biking trace around the hills, while neighborhoods can develop in the pockets around the ashfills. Some of the ponds and lakes that were once a part of the Bloody Run are converted into leachate ponds and wetlands to clean the leachate water. The master plan can be seen on the following page.

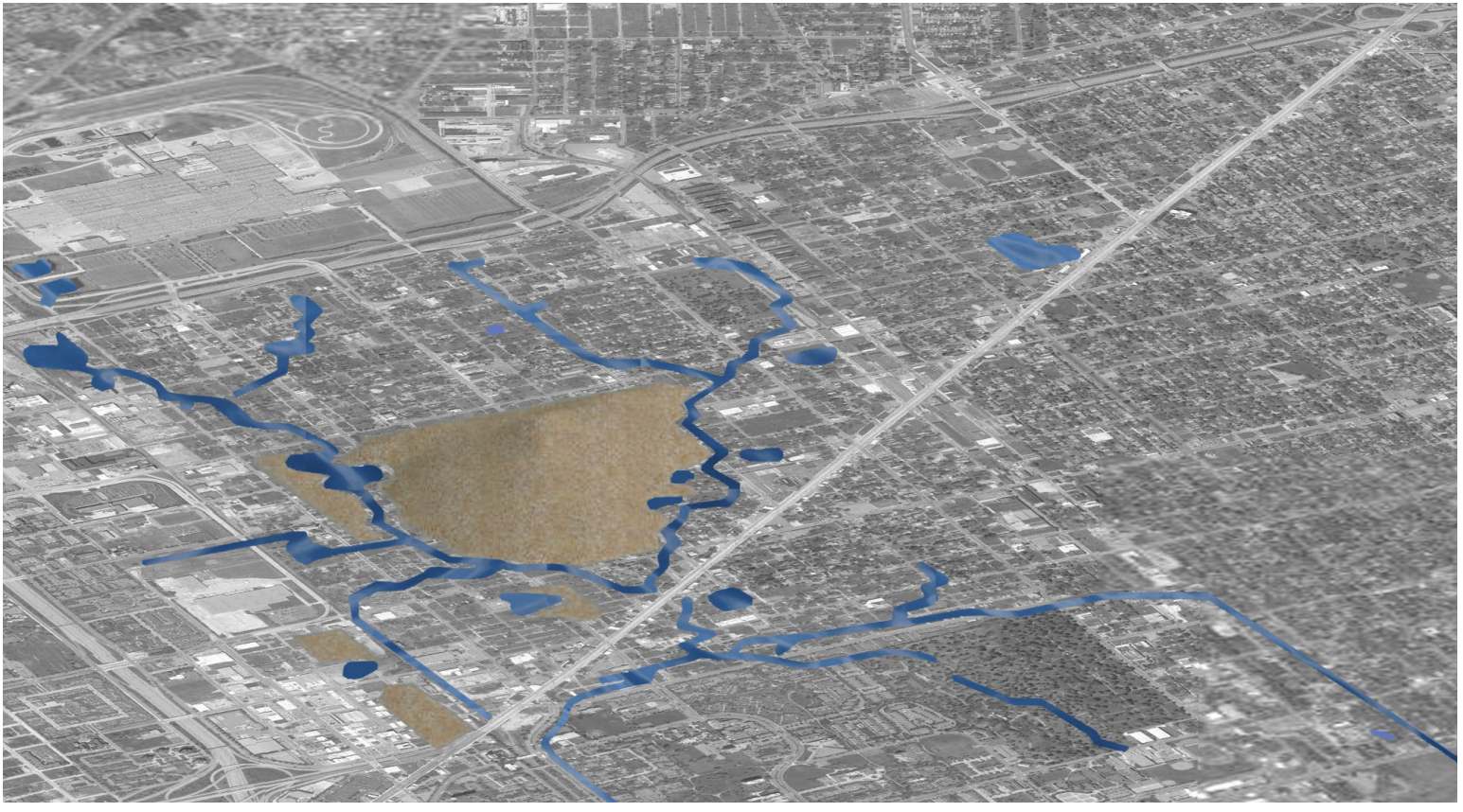

I-94
Gratiot Ave.
East Forest Ave.
Van Dyke Ave.
East Grand Blvd.
Mt. Elliott St.
St. Aubin St.
Warren Ave.
East Ferry Ave.
I-75
Mack Ave.
Incinerator
Parking
Eastern Market
Dequindre Cut
A
A
B
C
C
D
D



Timeline

To complete the covering of such a large area with these hills and mountains, it would take around two hundred and eighty years. The development, though, would be broken up into stages. The first stage would begin with the completion of the mountain closest to Eastern Market and the Dequindre Cut so that visitors of those areas could be drawn out to the hills, creating a use for them as soon as possible. This first mountain would take about fifty years to fill to its full height of one thousand feet.

Year Fifty - Mountain of 1,000 feet

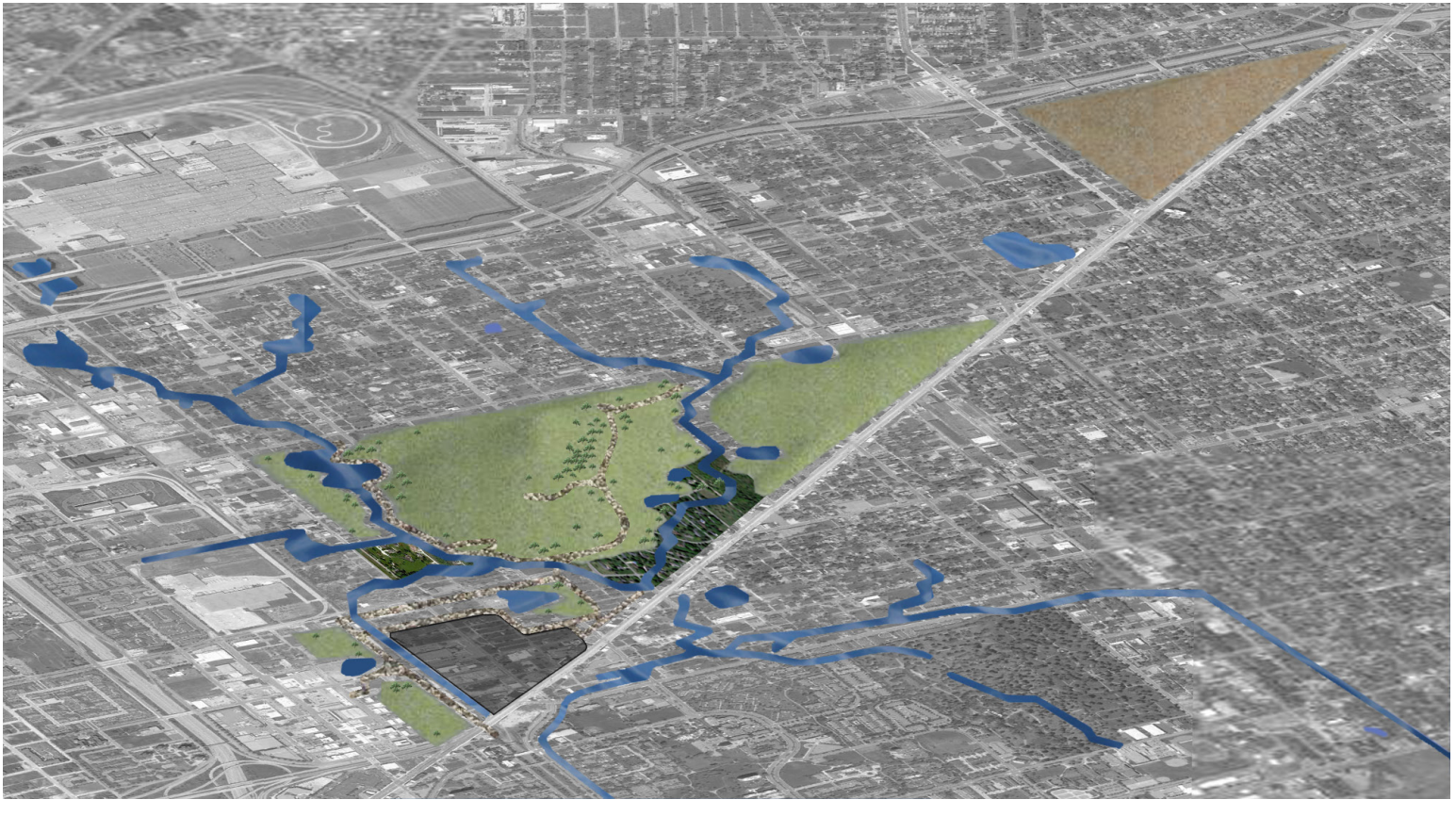


After the initial mountain reaches its full height the next hill can begin to be filled. While this is done, the first mountain is allowed to settle, seed and the leachate to be drained out.

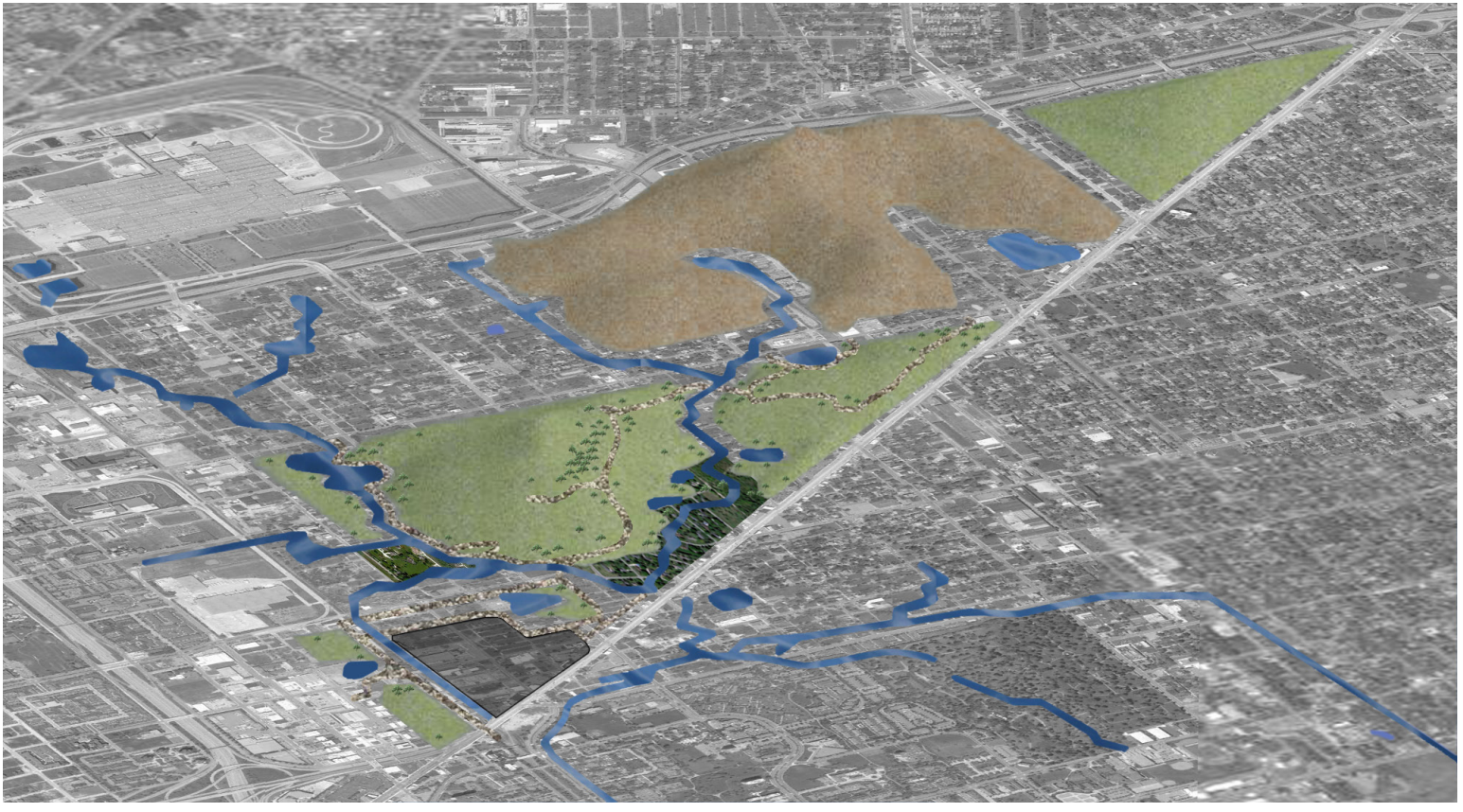
Year Eighty - Hill of 200 feet

Next, the third hill farthest from the incinerator is started. During its completion, the first mountain can be built on. It is covered with paths, trees begin to grow and neighborhoods can begin to develop around it. The second hill then begins to settle and seed while its leachate is drained out. This process continues until all of the topography is complete.

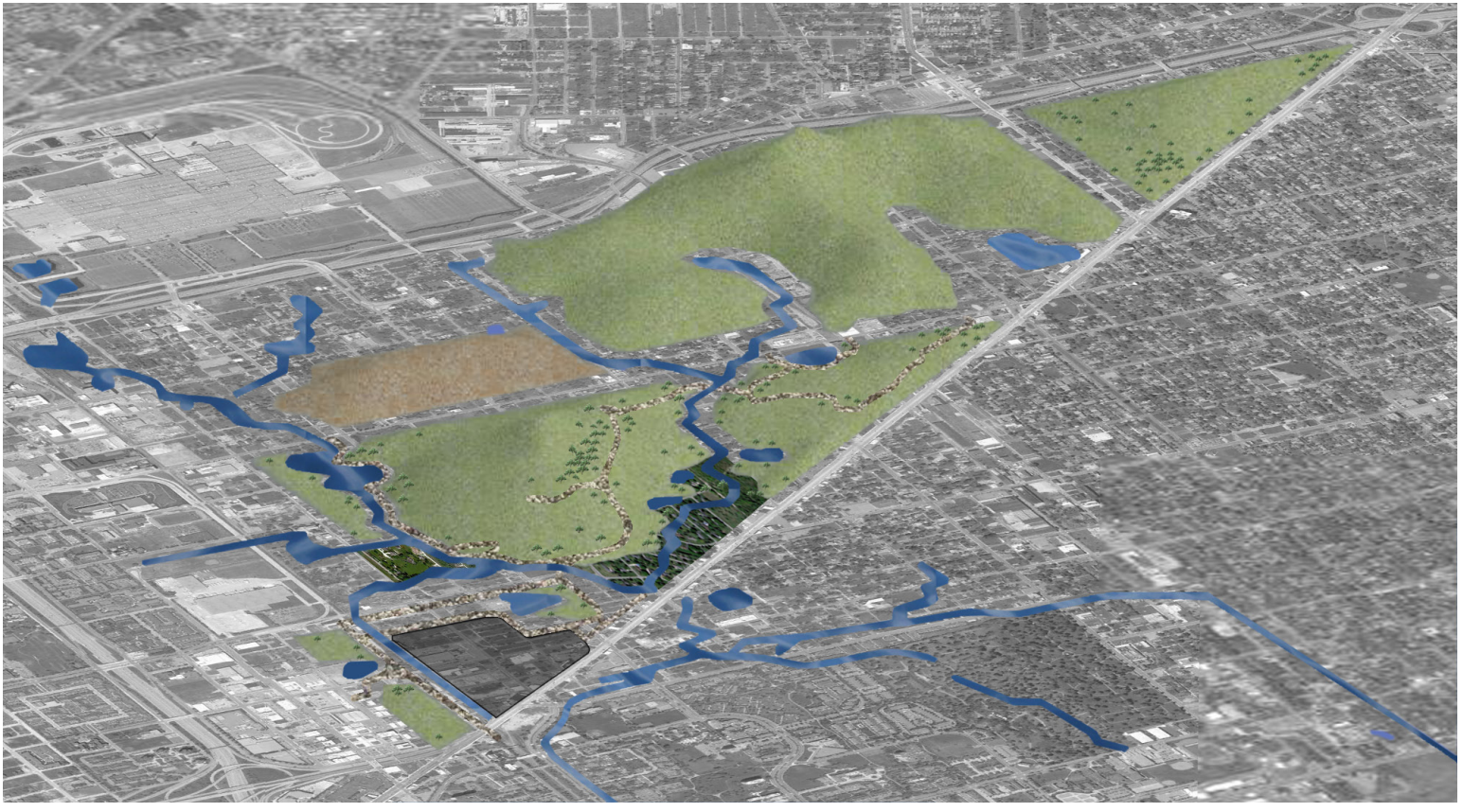
Year One Hundred Ten - Hill of 400 feet



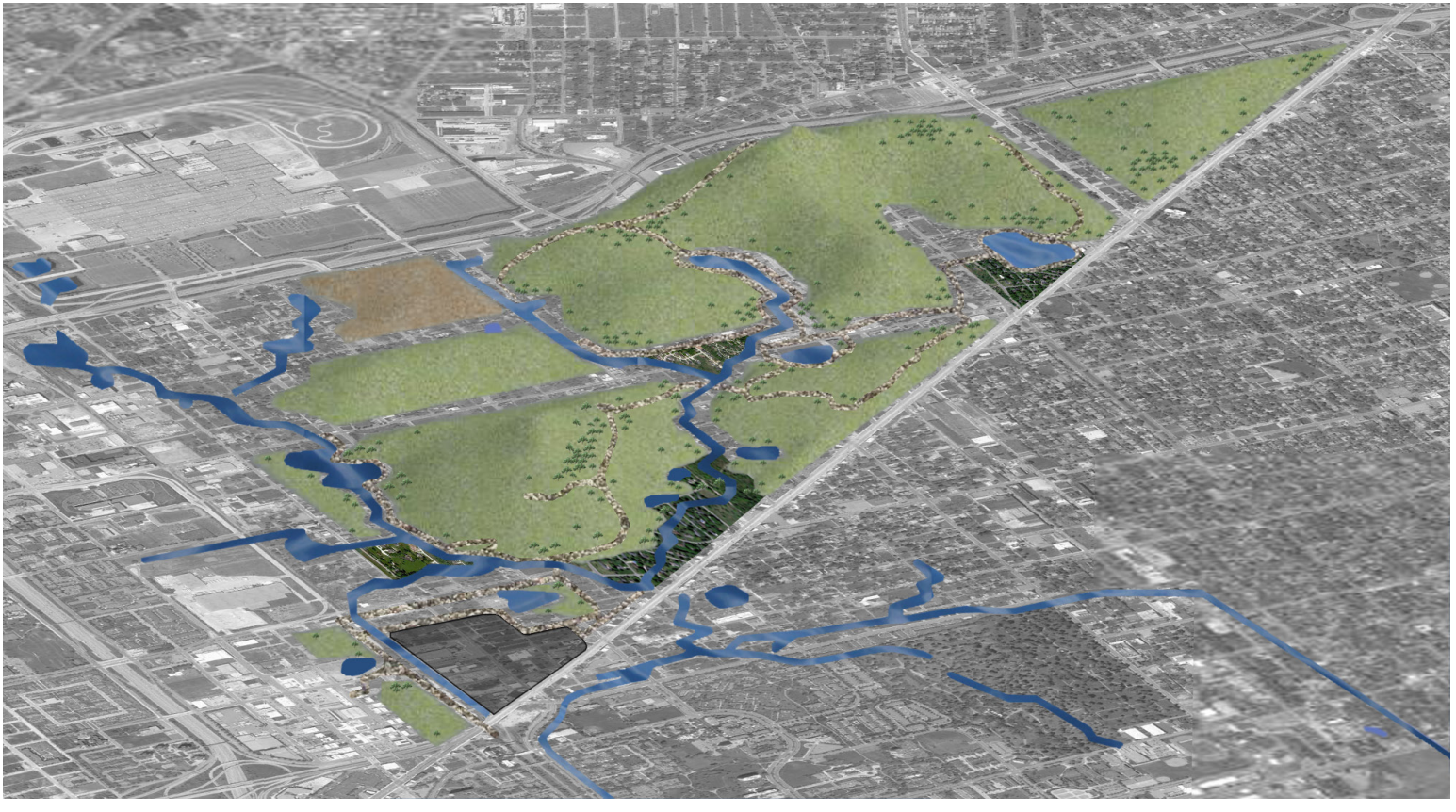
Year Two Hundred - Mountains of 1,000 feet



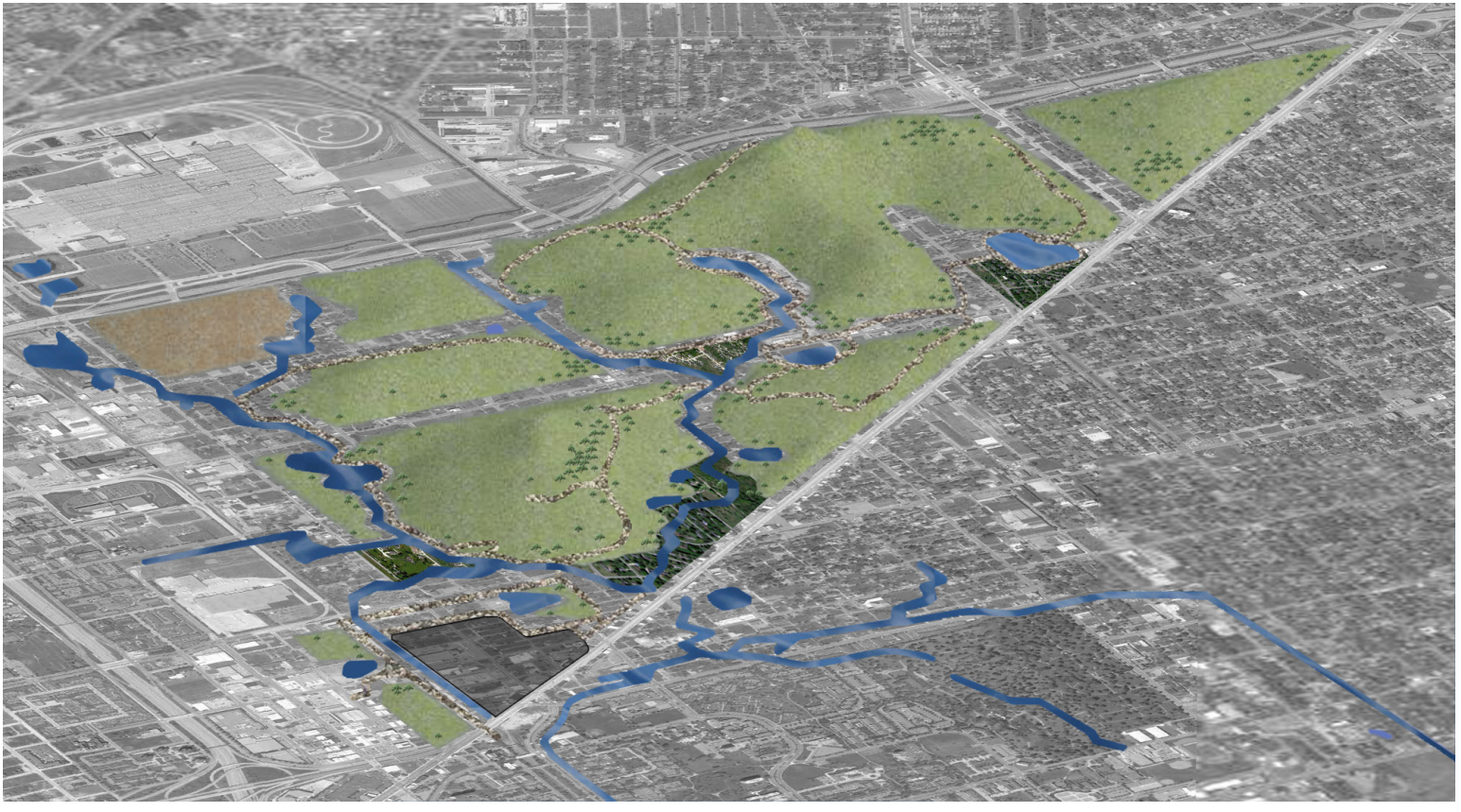
Year Two Hundred Thirty - Hill of 400 feet



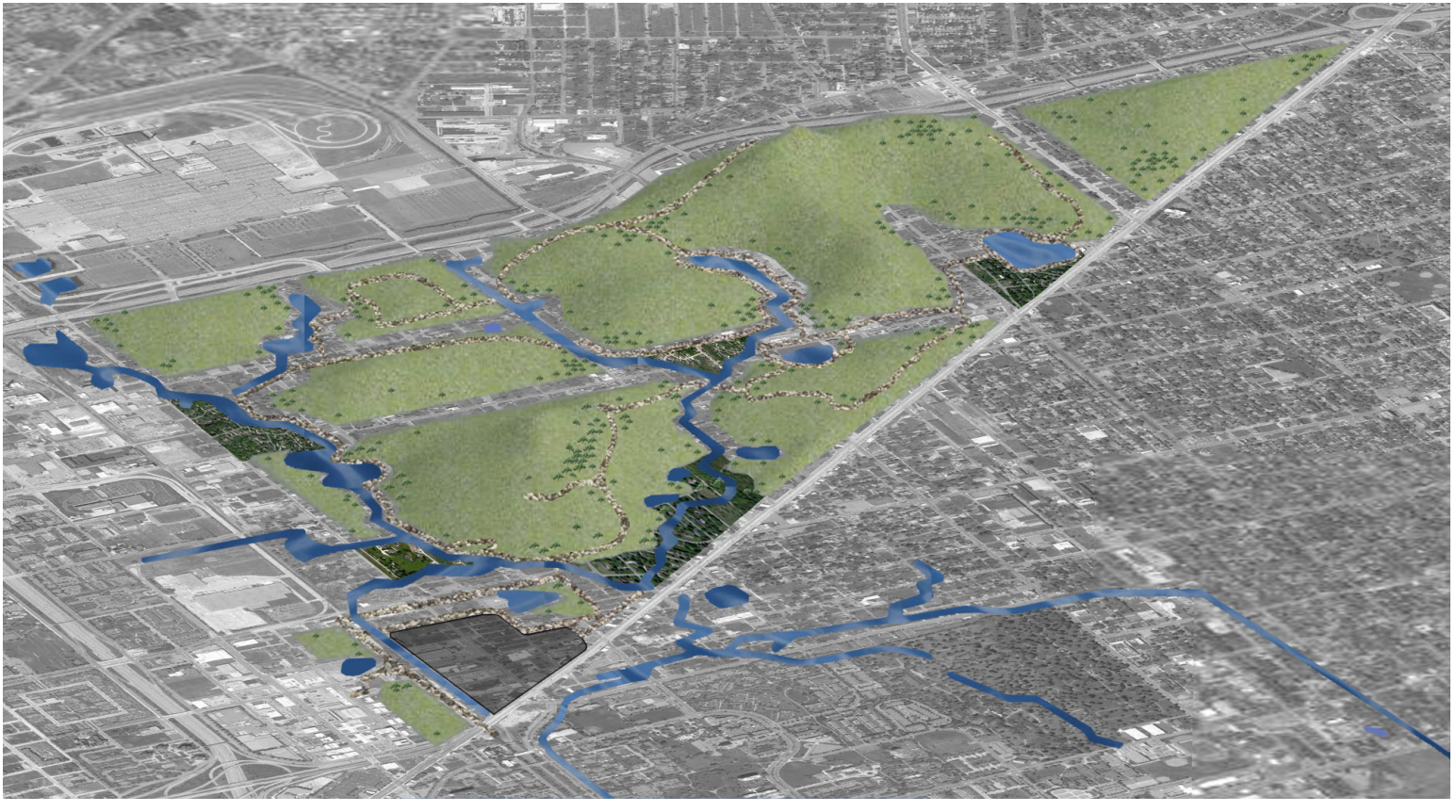
Year Two Hundred Fifty - Hill of 200 feet

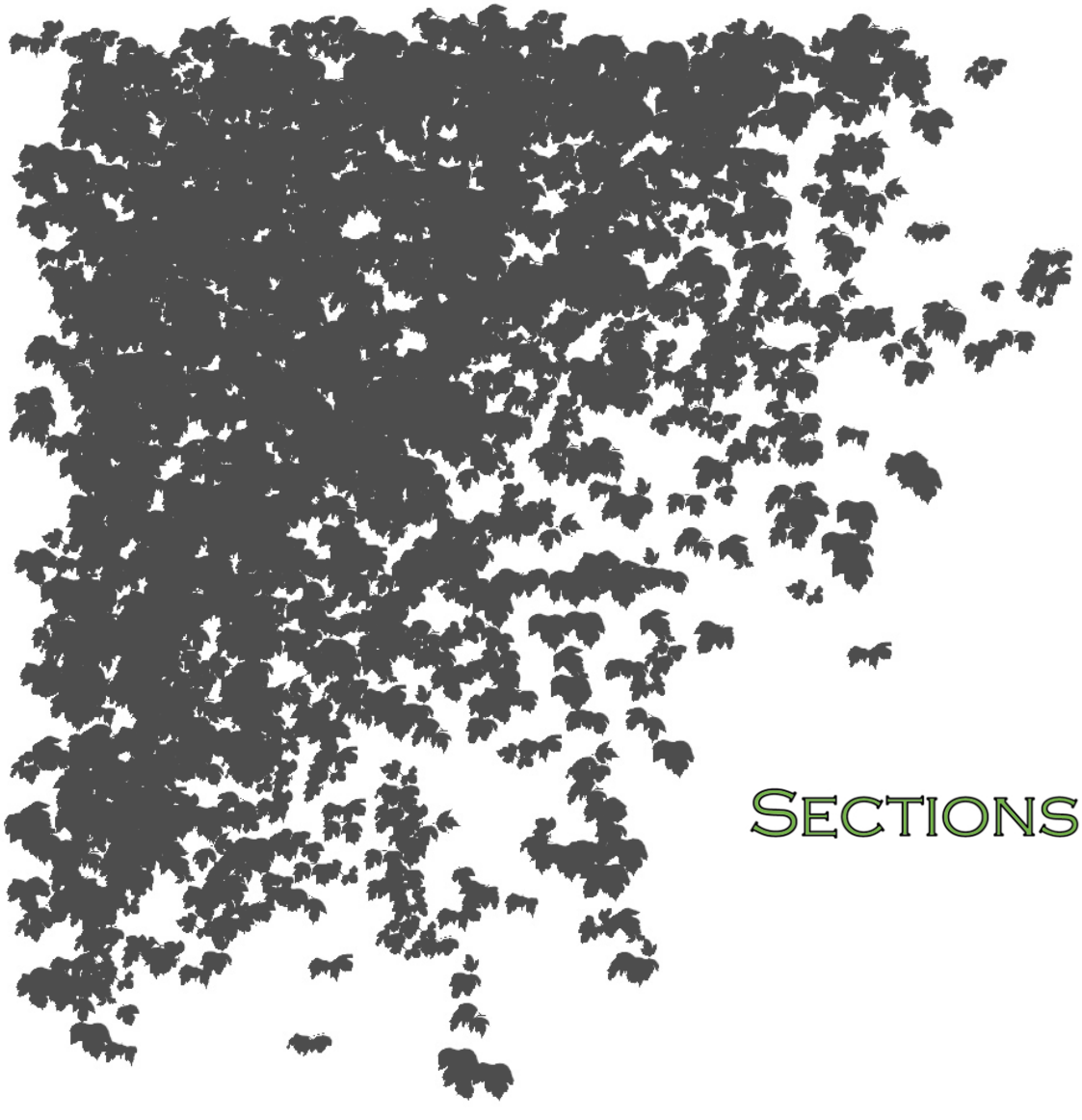


Year Two Hundred Seventy - Hill of 200 feet



Year Two Hundred Eighty- Final Completion

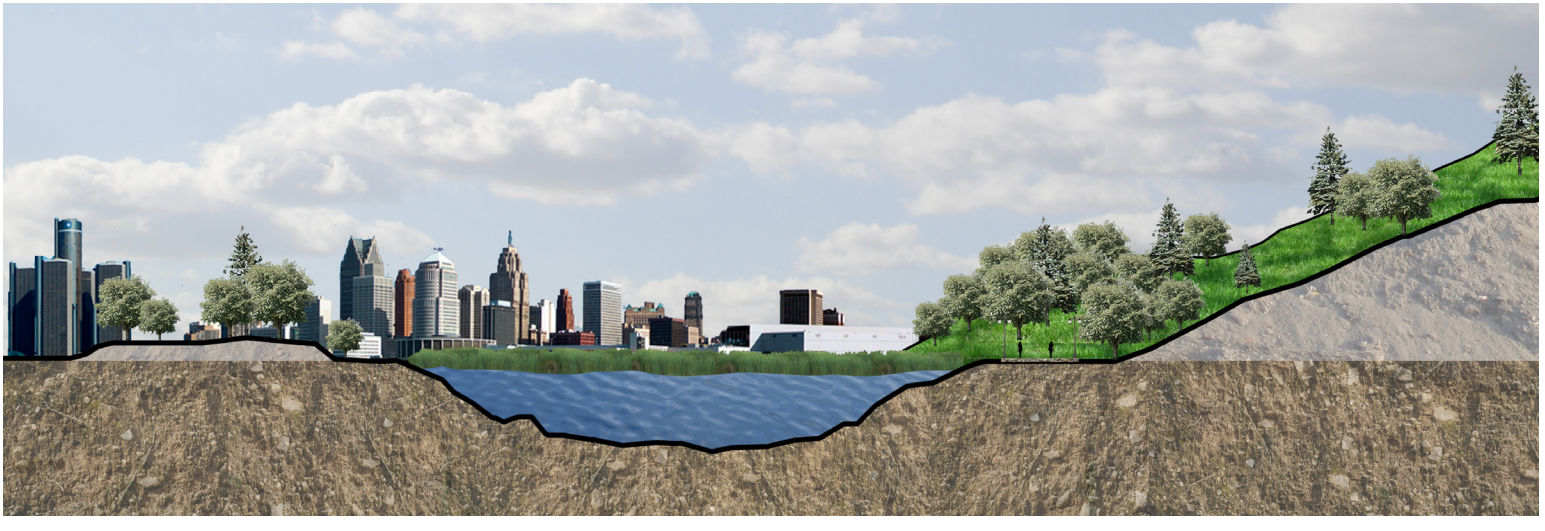




Sections

In the following sections, the interaction of these hills and mountains with the leachate ponds and neighborhoods begin to be revealed. The height of these hills can also be seen, ranging from casual hills to stroll along on to mountains for hiking. Detroit can be seen in the skyline, producing a scene for the viewing areas at the top of these hiking paths.

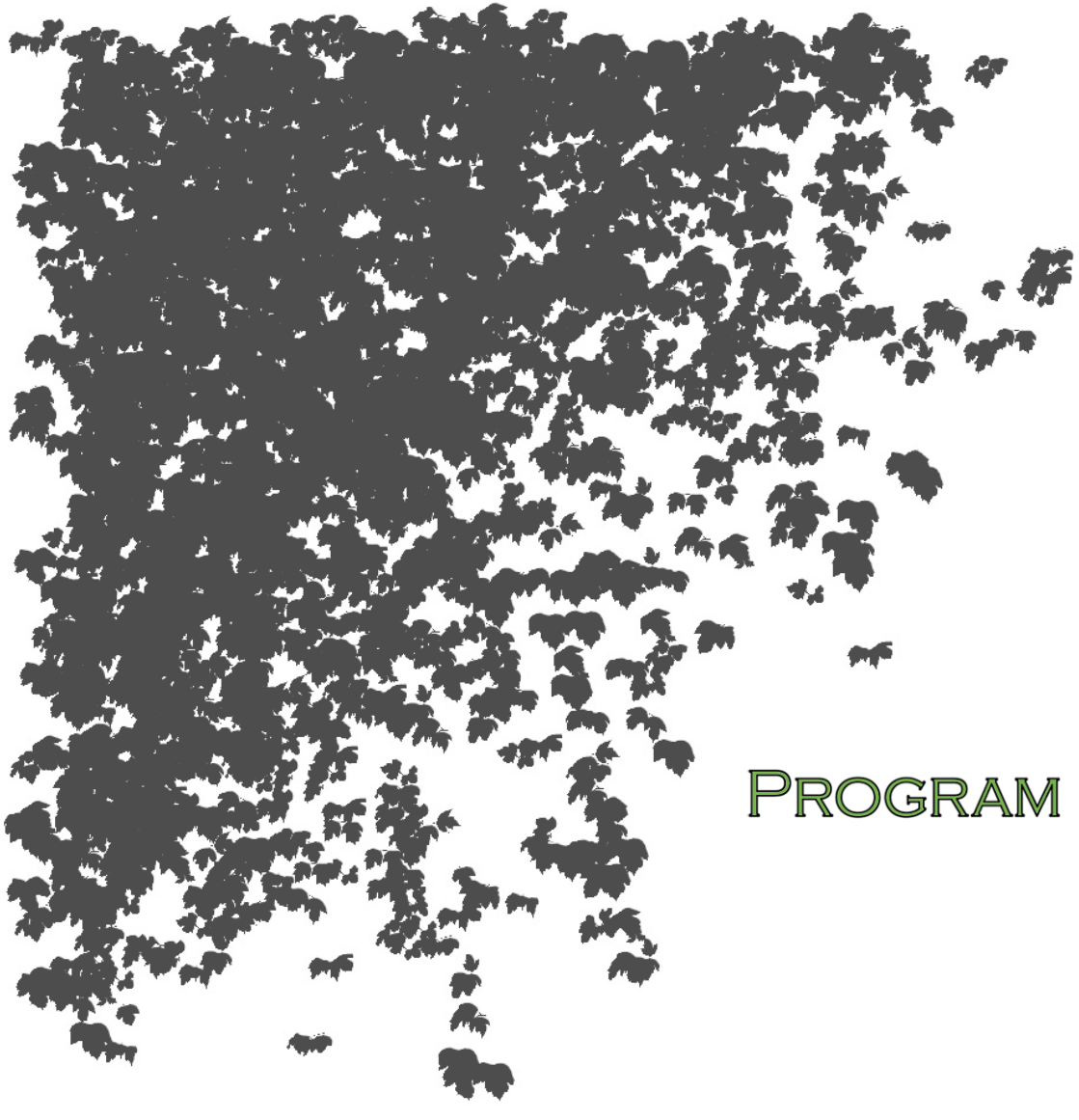
Section A - A



Section B - B

Section C - C

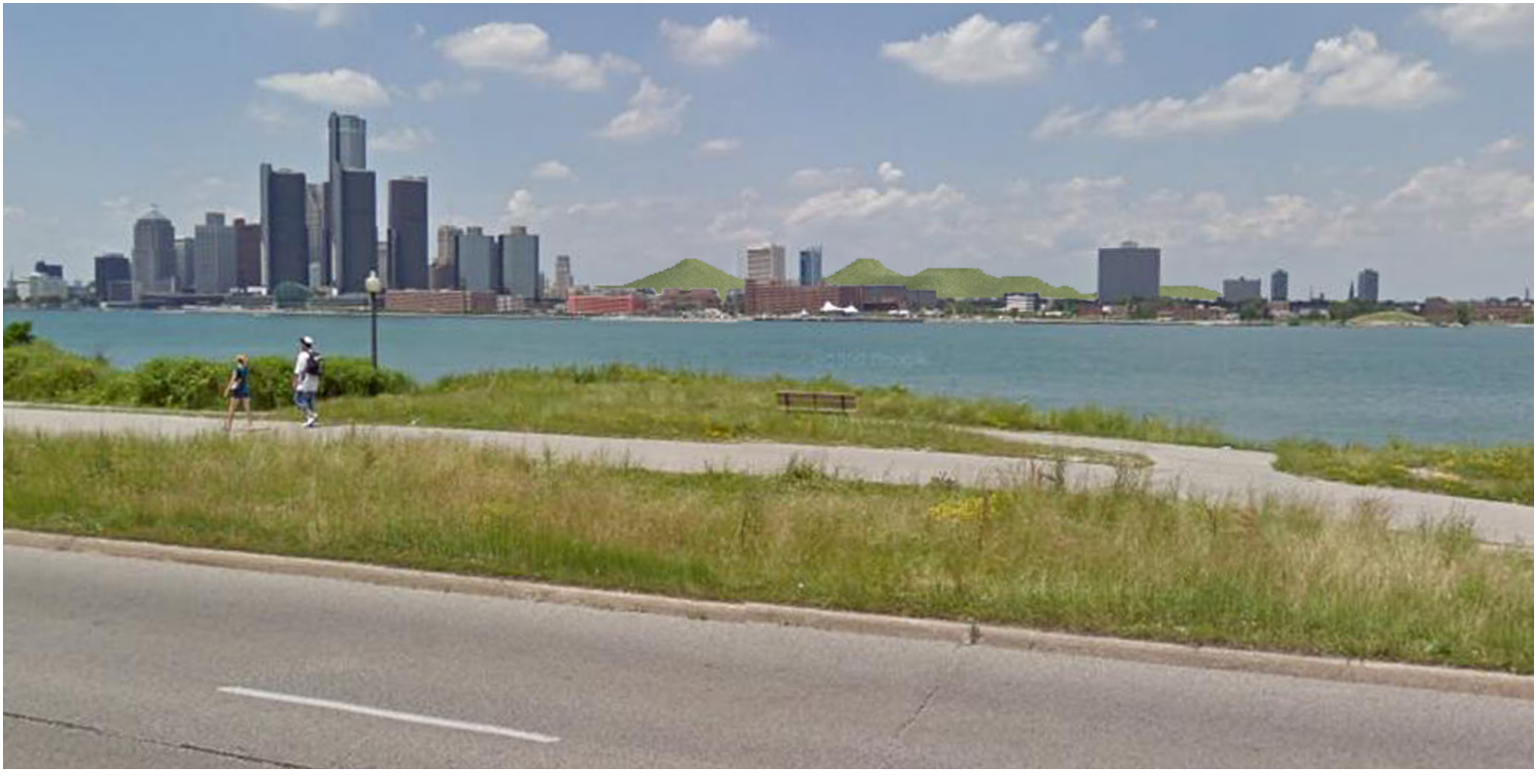
Section D - D



Program

The program of these ashfills becomes more detailed as they develop. In the rendering below, the topography can be seen in the view from Windsor, Ontario. On these hills, the hiking paths wrap around connecting wetlands, sledding hills, viewing areas and various recreation areas.

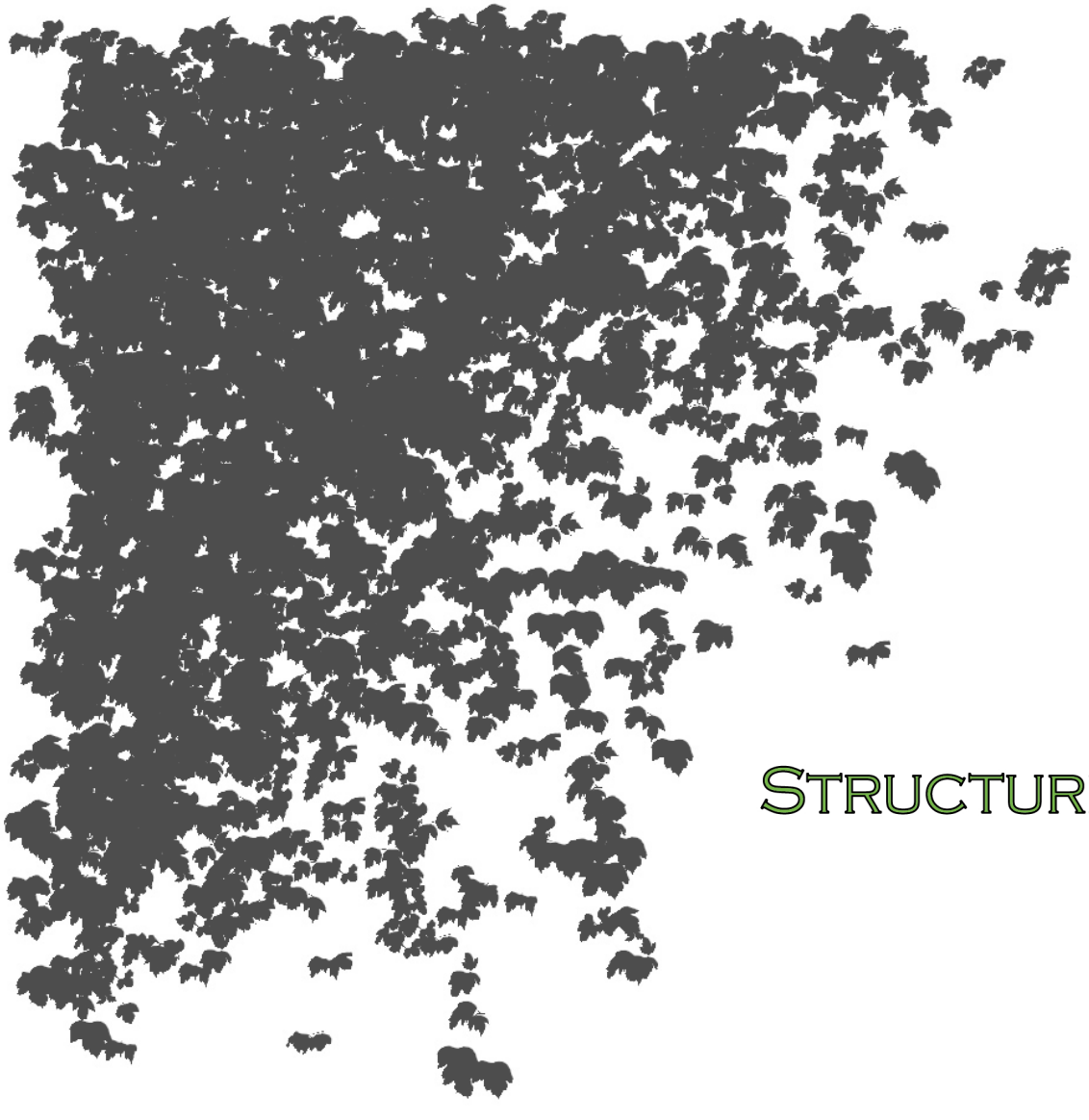
View of Topography from Windsor, Ontario



Wetland and Leachate Pond

Sledding Hills

Viewing Areas



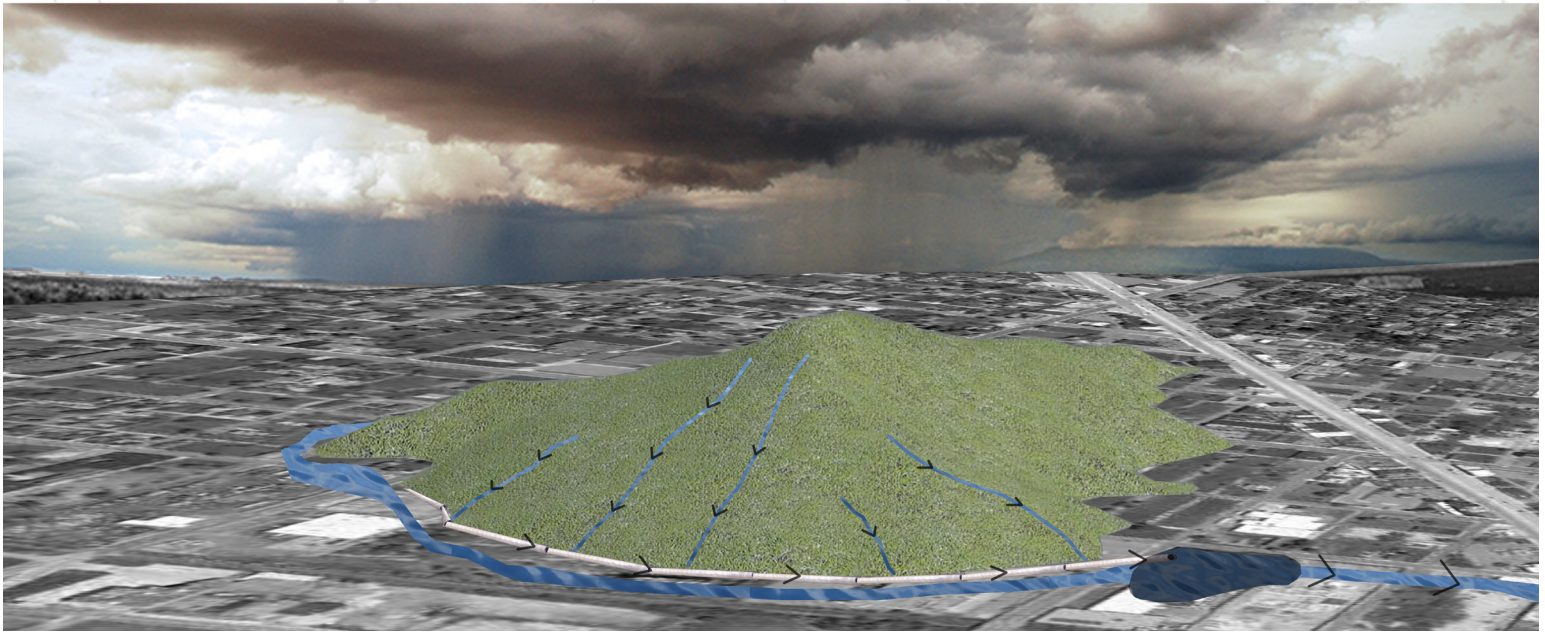
Structure

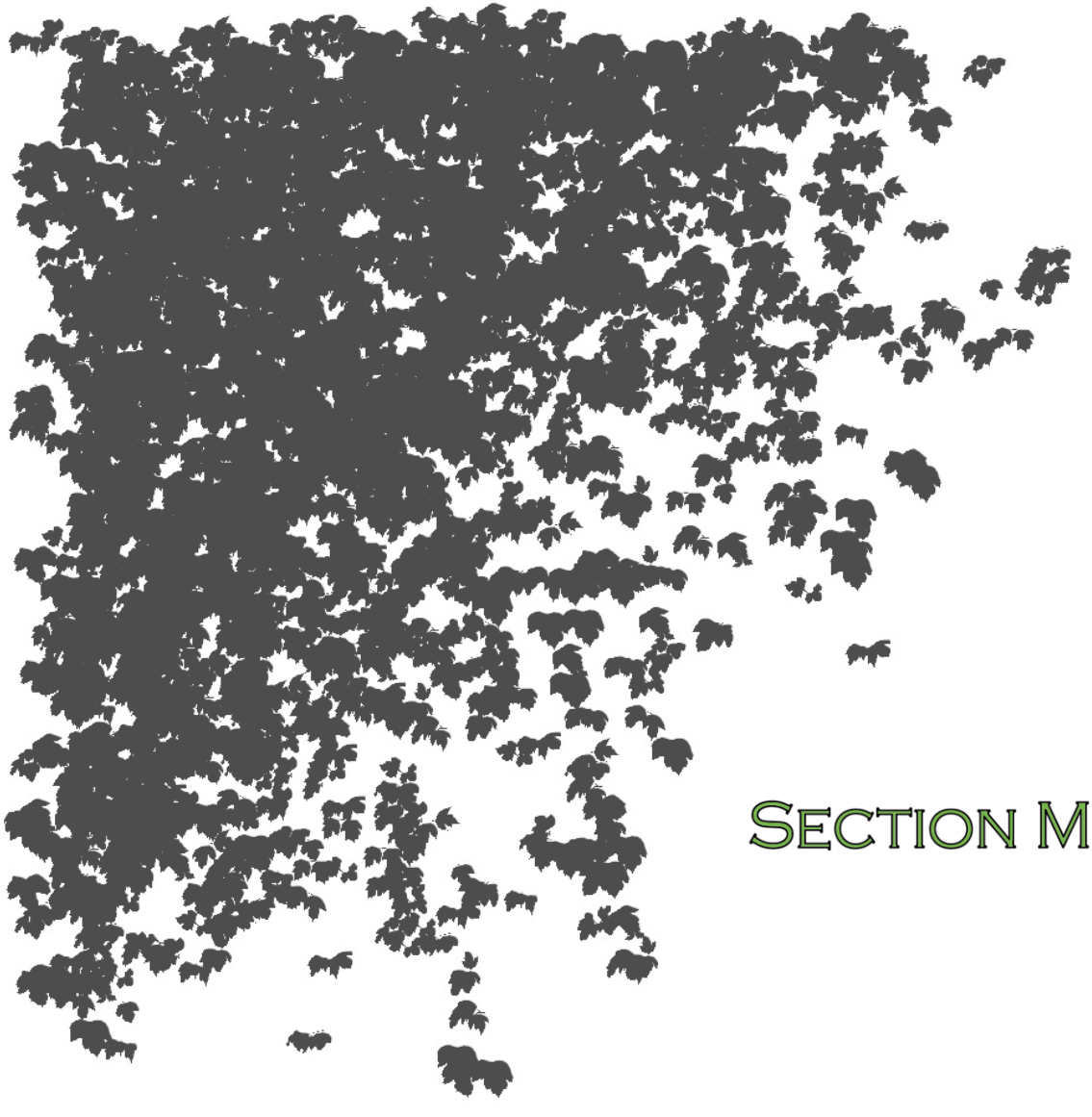
Since this is not a typical ashfill or hill being developed and especially since it is surrounded by homes and communities, the structure of such topography has to be developed. Firstly, the construction of the hills has to be considered. The ash is delivered from the incinerator through a pipe delivery system. The ash is mixed with water and pumped through the underground pipes to the base of the hill being constructed. As the hill grows and expands, pipes are added to the top to continue the growth of the ashfill. To support the growth of the hills, pilings and nets are placed so the shape of the hill is maintained and to prevent erosion. A retaining wall is positioned around the perimeter of the hills to help contain it.

Structure and Ash Delivery System

Second, the leachate has to be dealt with. When it rains, water runs down the ashfills, collecting toxins and creating leachate. As it gathers at the bottom of the ashfills, piping at the base collects the leachate and filters out the water from the concentrated sludge. The water then flows into a leachate pond, where it is left to aerate and be further cleaned by wetland systems. As the clean water rises to the top of the ponds, it overflows into the Bloody Run creek which brings it down to the Detroit River.

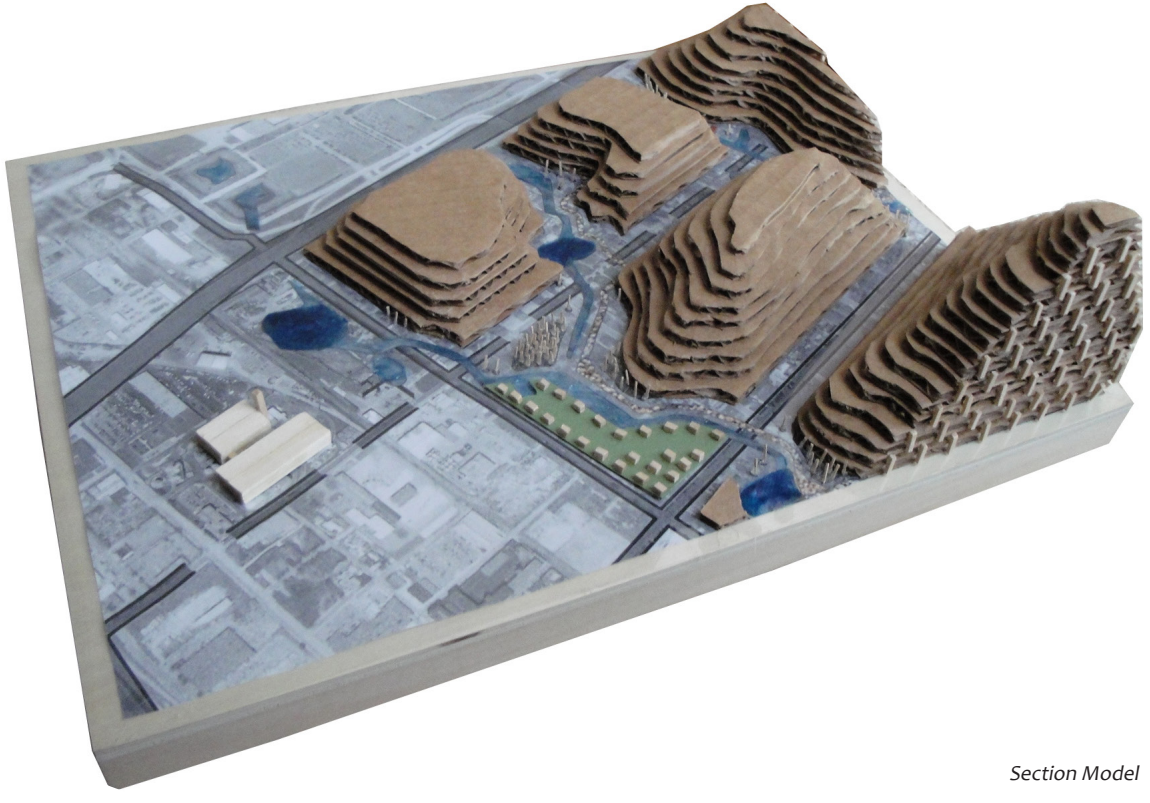
Leachate System



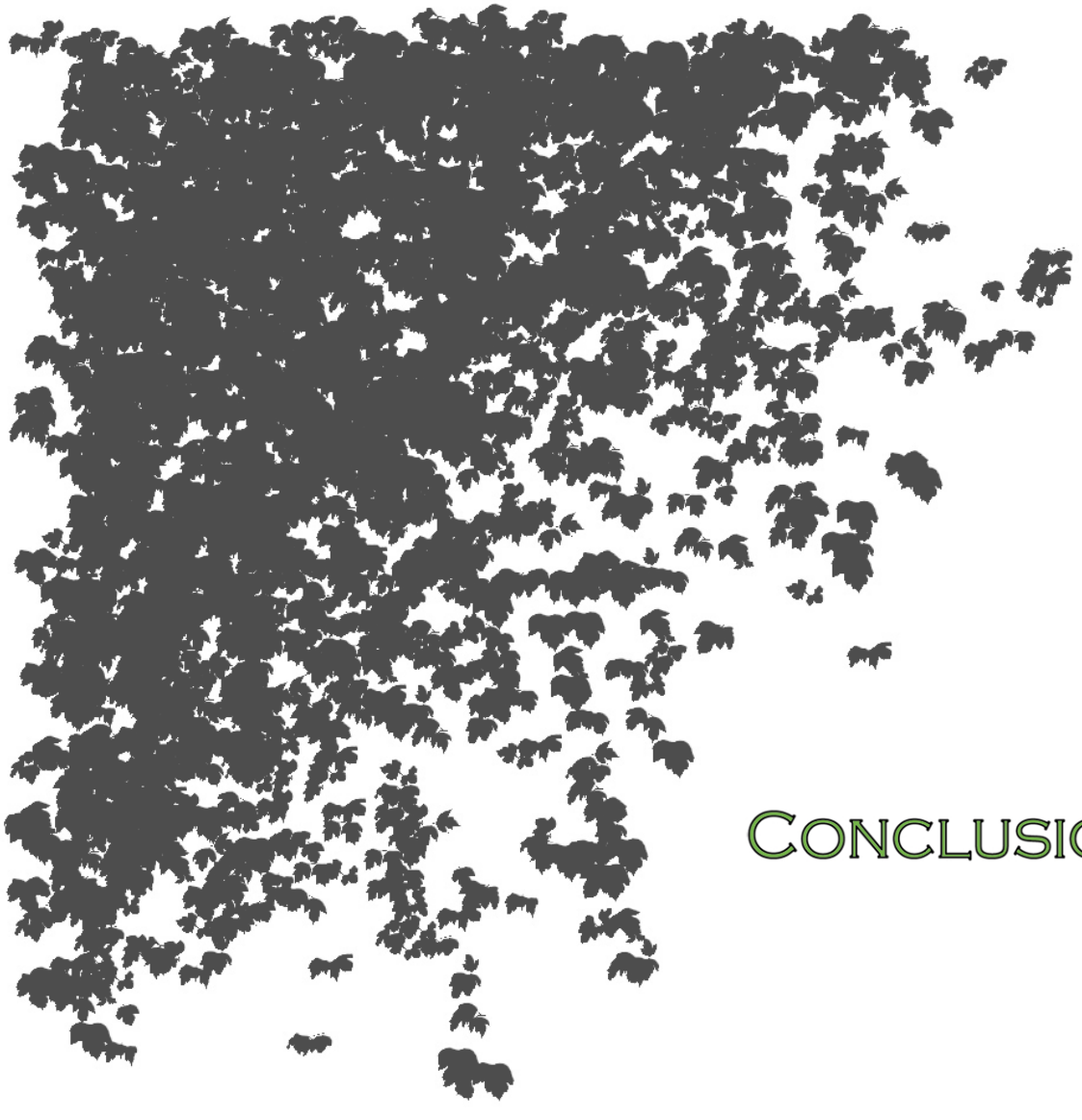


Section Model

In order to better understand the scale of the hills, a small section model was built. It shows the incinerator as well as one of the neighborhoods that would be developed close to the base of the hills.

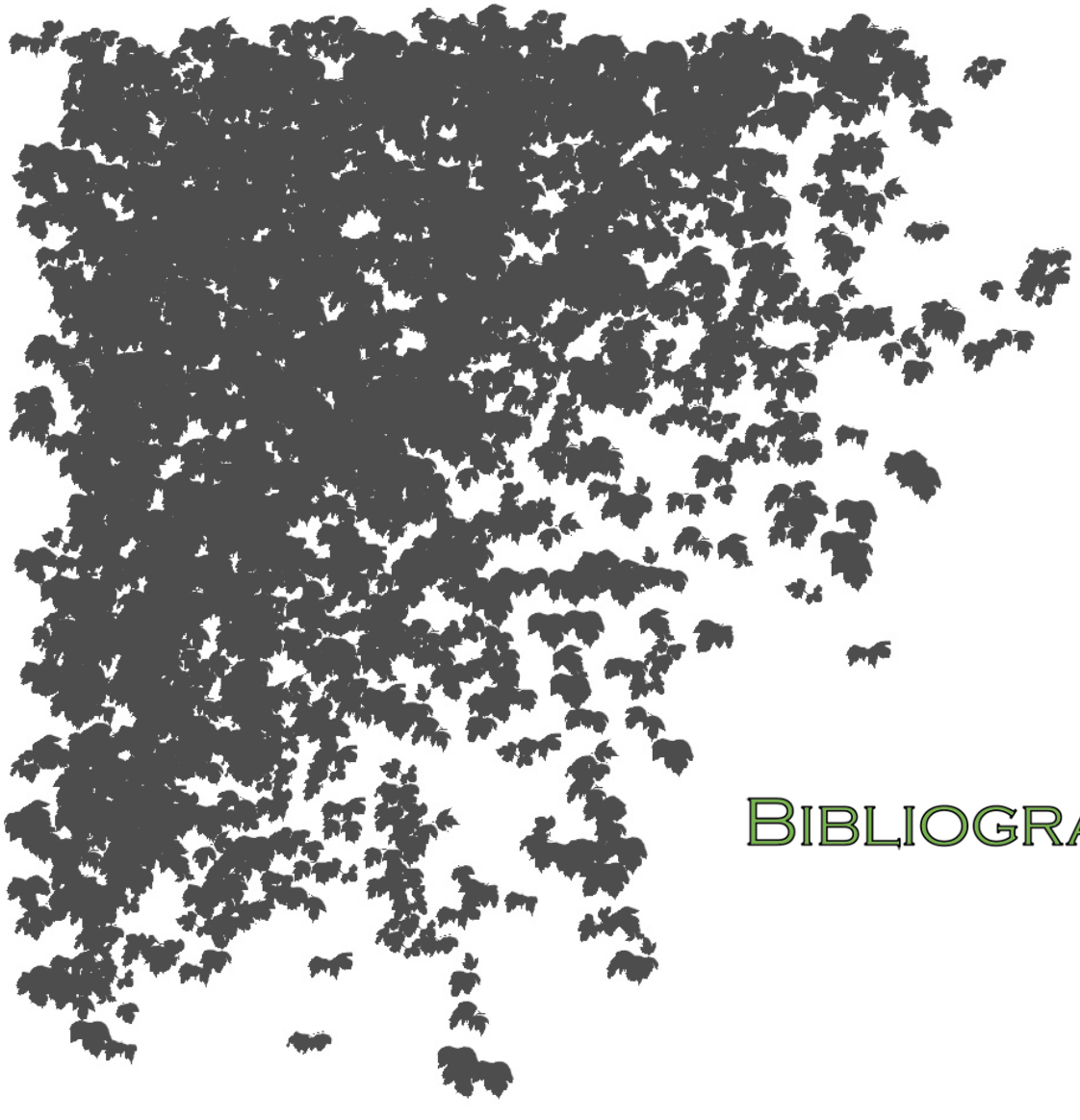


Section Model



Conclusion

This thesis is meant to restore our minds and our environment by reusing our waste to create a seemingly natural environment in an urban context. Creating landfills as a way of changing the ways we go about our daily lives could restore us mentally and environmentally. Detroit could bring back the life that it has been steadily losing for decades. It could be the starting ground for a landfill system that would one day be used all over the world. The scale of these ashfills can be altered so that they could be designed into everyday life or into entire communities. They could be used in the yard of every home, steadily changing communities over time, or it could be piled high, creating large mountains. At a small scale, it could create awareness of just how much waste every home produces. At a large scale, it changes the face of a city. It could change the way we interact with our surroundings and the way we design our cities. These seemingly natural landscapes would be considered when designing any urban environment. We would be engaged with nature at all times since our waste would not be far away. It could give us the healthy minds and environments that Detroit has been searching for for so long. After so many years of depression, we could create new life from the ashes. Literally.



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