PHOSPHATE MINING

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PHOSPHATE MINING

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Maritime sediments
Spatial correlation of mining and urbanisation
Strategic ressource
Simultaneity of land transformation processes

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THE BONE VALLEY TERRITORY

The Bone Valley is situated in the larger area around Bartow, the Capital of Polk County. Its name was given by the findings of archeological bones which is directly linked to the vast phosphate rock deposits. Mining of phosphate happens in surface-strip mining, resulting in visible and permanent modifications to the landscape.

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Features along Highway 60
Highwyway 60 leads from Bartow to Mulberry, defining the core of historical mining.

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South Fort Meade

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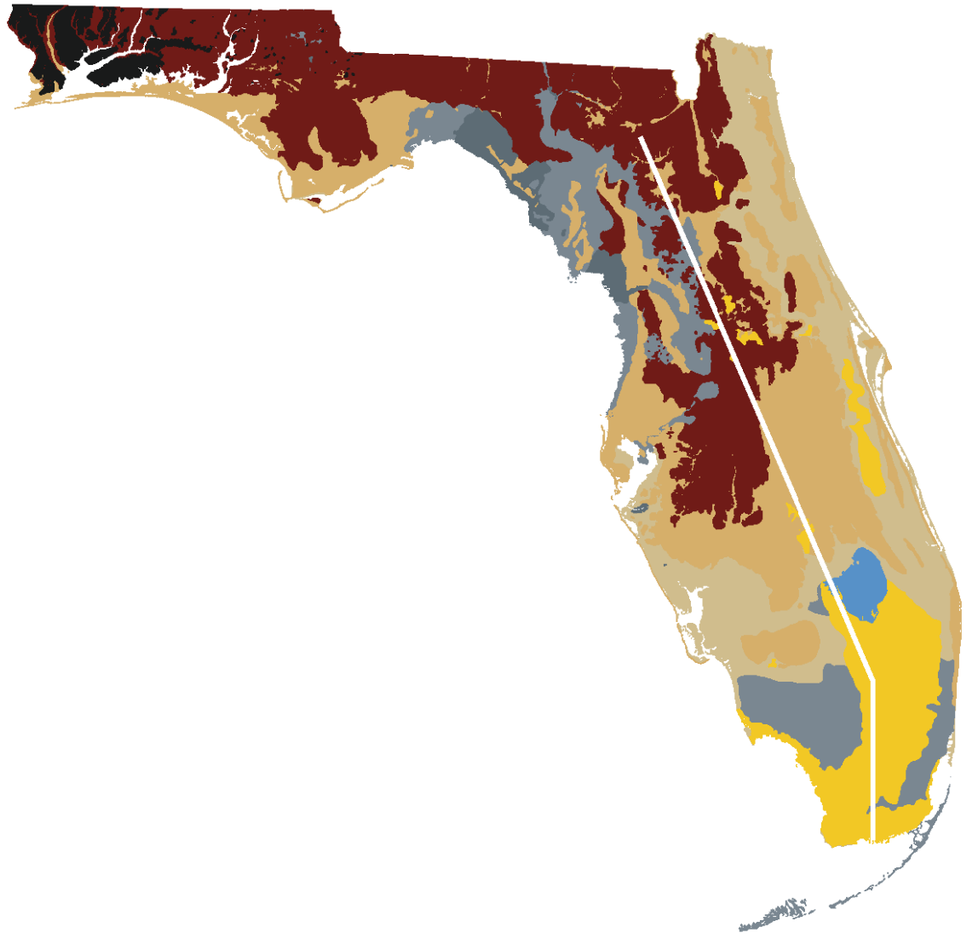

Clayey Sand
Sand, silt
Shelly sand, clay
Peat
Limestone
Limestone-dolomite
Gravel, sand
Water

Maritime sediments

Florida's westcoast shoreline used to be 60km further inland. The phosphate concentration has accumulated through excrements and cadavres washing up and desintegrating on the shores.

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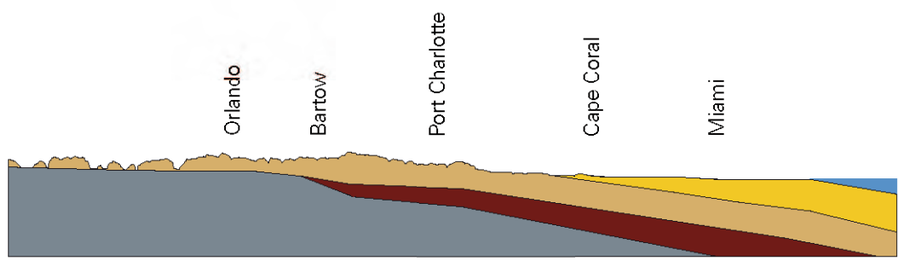
Soil composition

Overburden: 80% sand, 20% clay
Matrix: 33% sand, 33% clay, 33% phosphate rock
Bedrock: limestone



Strip-mineability

Bone Valley is the most profitable area. Although the layer gets thicker towards the South, the masses of overburden that need to be moved make it economically less sensible.

Spatial correlation of mining and urbanisation

Most of the historical mining has taken place in Polk County, a inland county with yet close proximity to Tampa and St. Petersburg. While most of Florida's population and wealth is accumulated on both coasts, mining has been of great importance for Polk's budget. Future mining will move to Hardee County and possibly De Soto County, two more remote counties further South.

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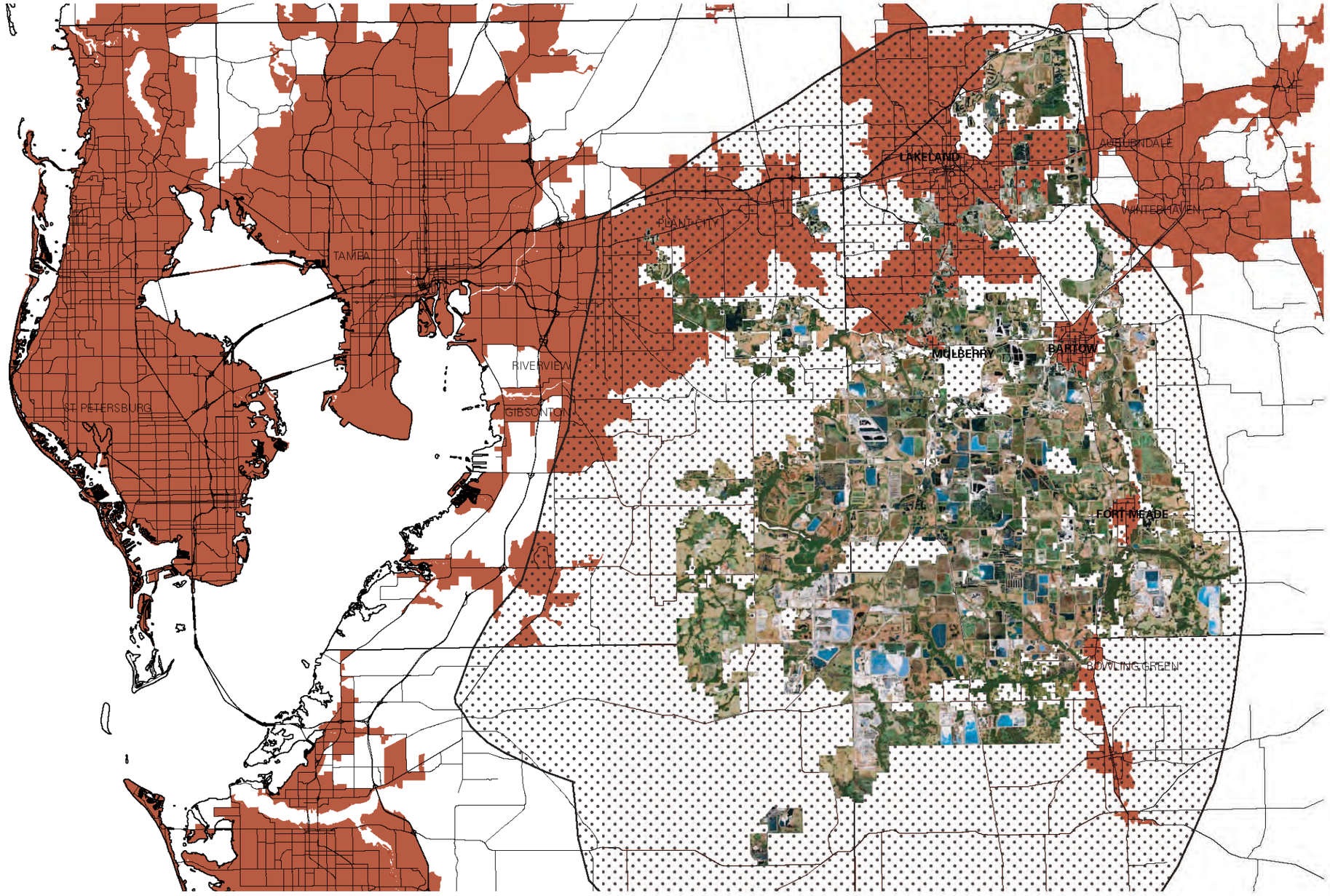

Growth on and around mined lands

In the last 20-30 years, the urban network on Interstate-4 - Plant City - Lakeland - Bartow has undergone a rapid growth, just where the mining industry has transformed.

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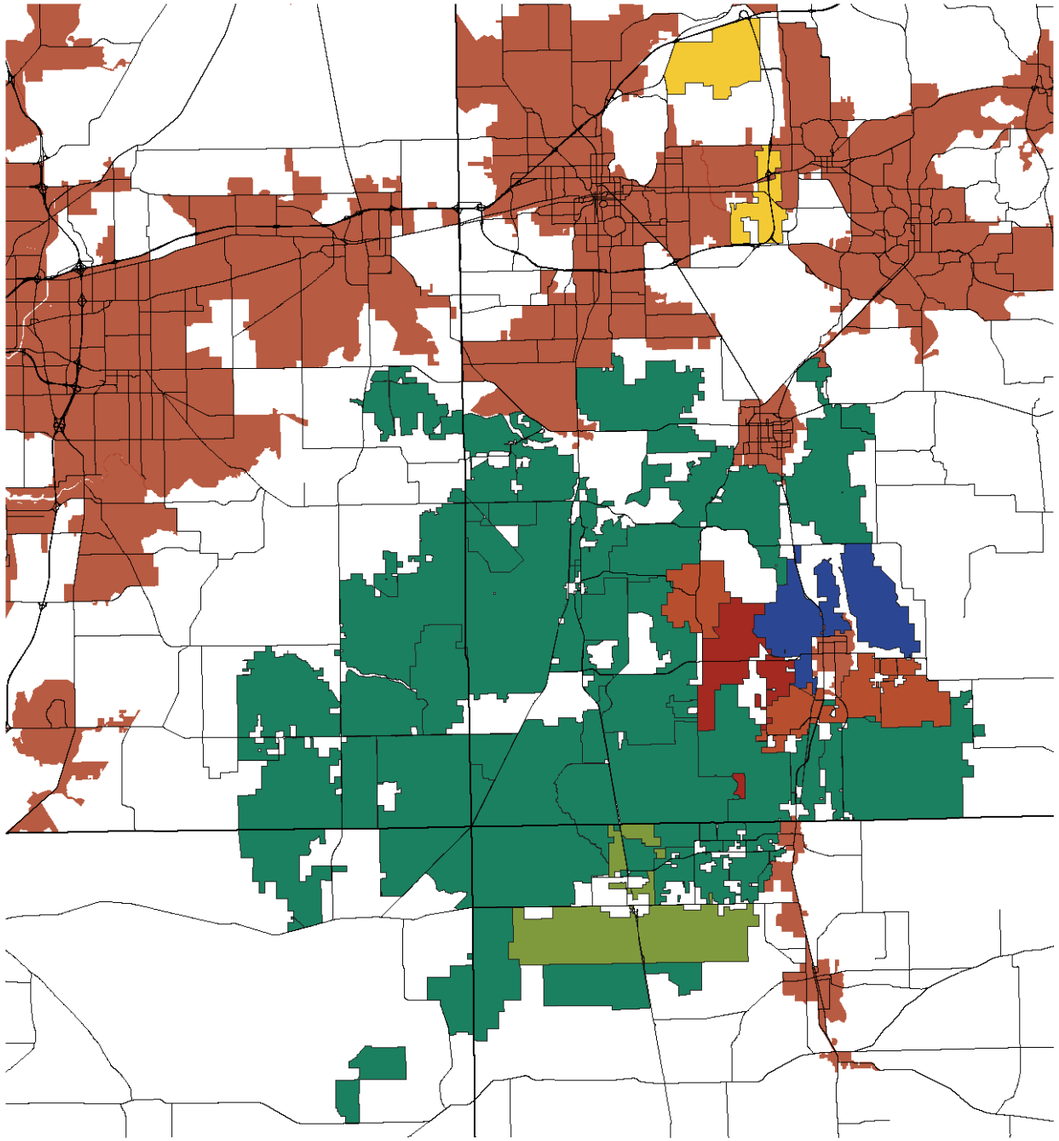

Mosaic Co.
CF Industries
Williams Co. Inc.
Estech Inc.
US Agri Chemicals
Mobil Exxon

Acquisition of huge territories

Financial and operational reasons have lead to an incorporation of lots into extensive properties belonging to only a few land owners.

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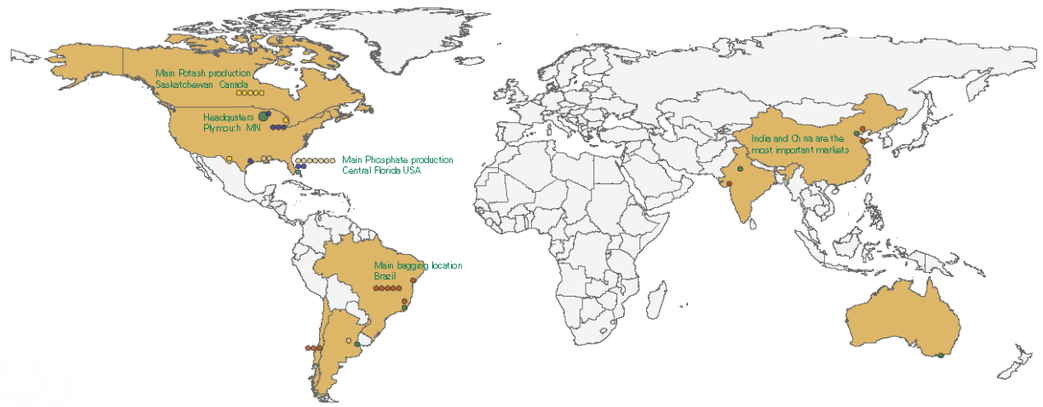


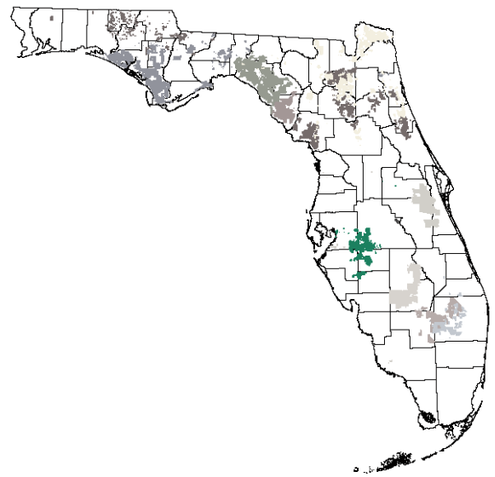
No.1 Phosphate Company

With headquarters in Plymouth, Minnesota, Mosaic operates in ten countries, employing 7500 people worldwide and 3500 in Florida. With their phosphate production in Central Florida and potash mines in Canada they are the world's biggest and second-biggest producers respectively.

Mosaic®

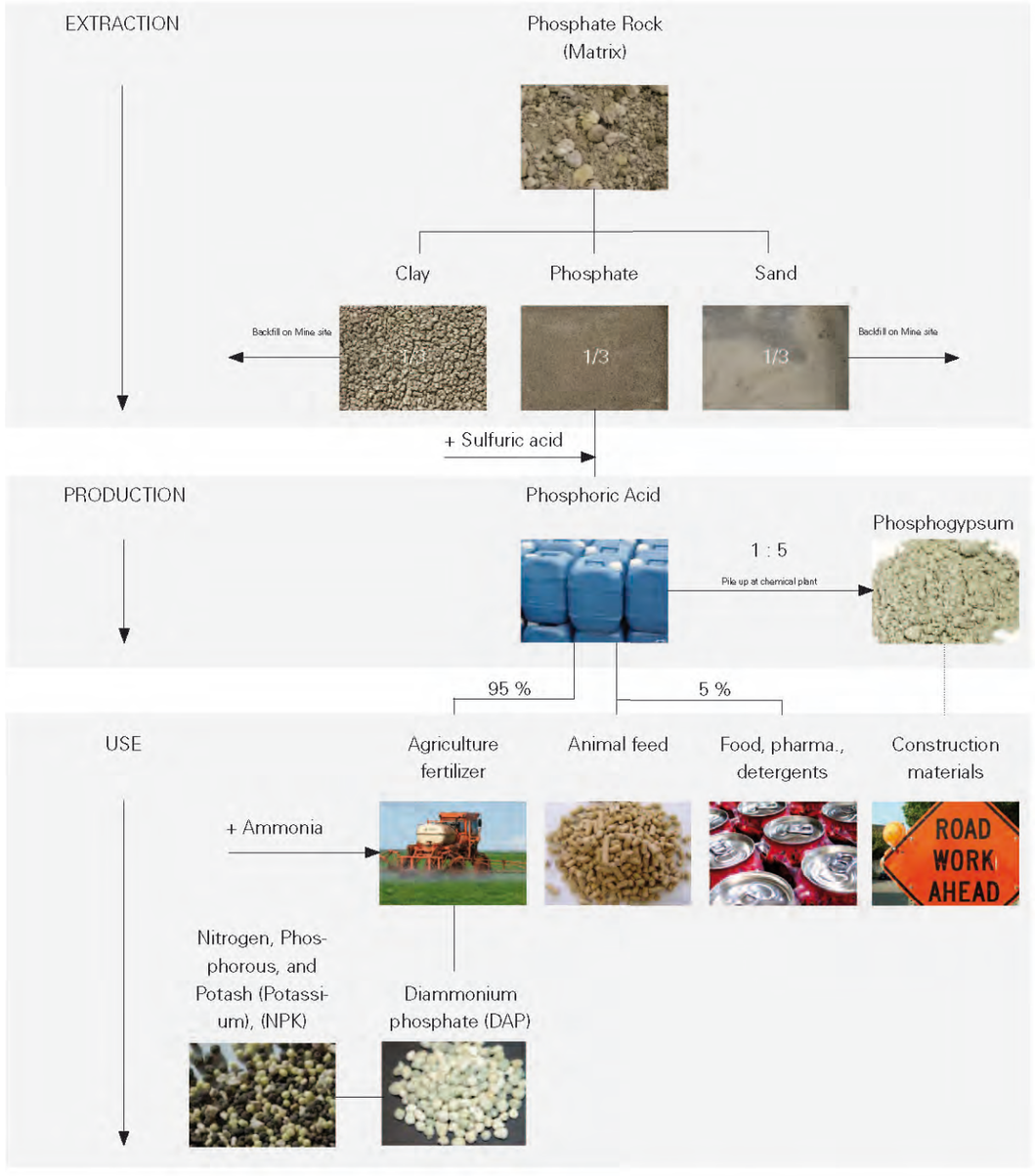
"Feeding the world"

Formed by a merger of Cargill and IMC Global in 2004, the Mosaic Company is a global player in the nutrition business.



7th largest landowner in Florida

More than 100'000 km² of land have gone into Mosaic's hands and are kept there.



Strategic ressource

Phosphorus, the element in phosphate is vital for plant and animal growth. Being a fossil ressource, its availabilty is crucial for any autonomous agricultural economy in the future. With current technology, future availabilty is estimated for the next 60-100 years.

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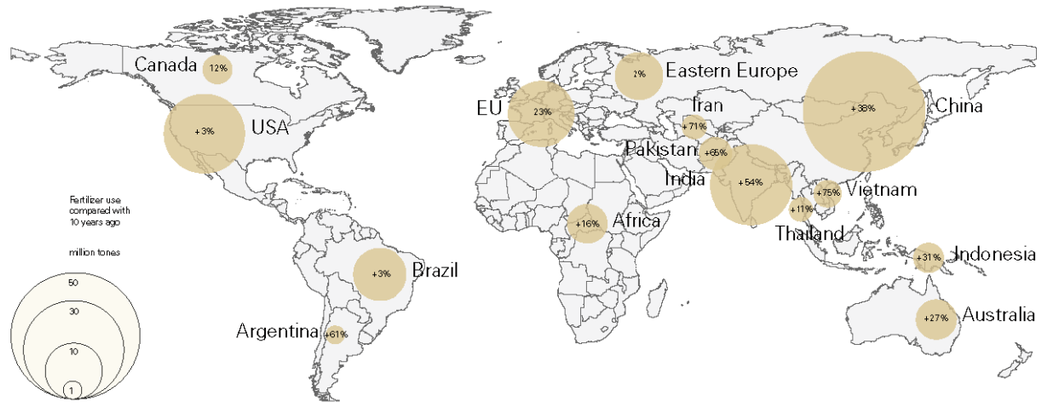
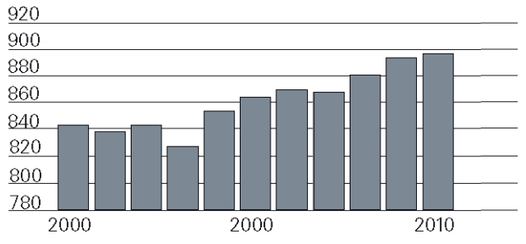


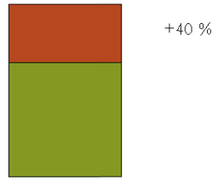
World fertilizer consumption

China and India together utilize 50% of world fertilizers.



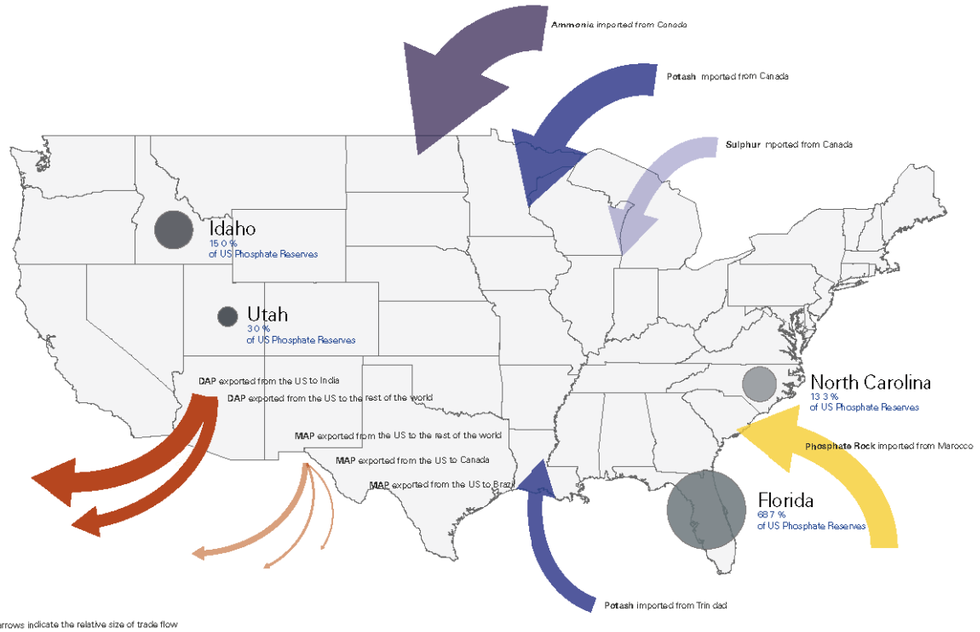
Harvesting acreage

World grain and oilseed harvest area increases.



Effectivity of fertilizer

Fertilizer increases crop harvest by 40-60%, therefore reduces



The US dependence on imports

US fertilizer exports are worth 3.7 billions of which Monoammonium - and Diammoniumphosphate are 2.7 billions. Most of this goes to India and Brazil.
For the processing of phosphate the US rely on additional imports form Canada and Trinidad.

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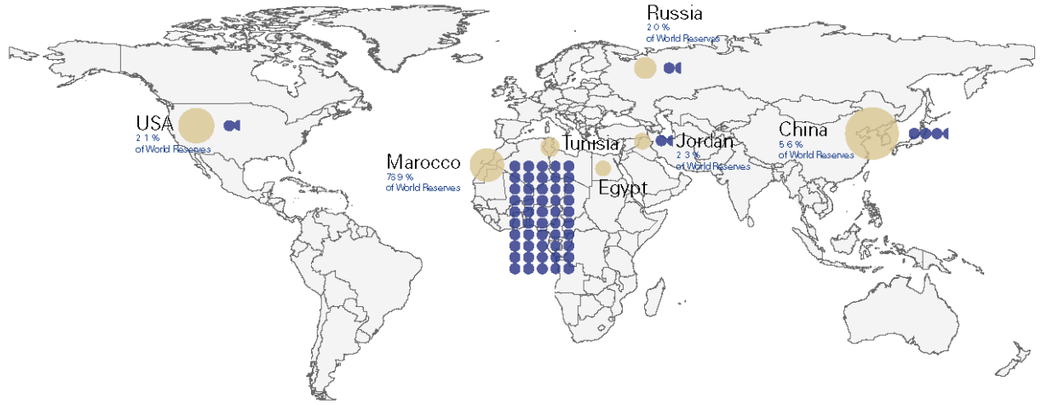
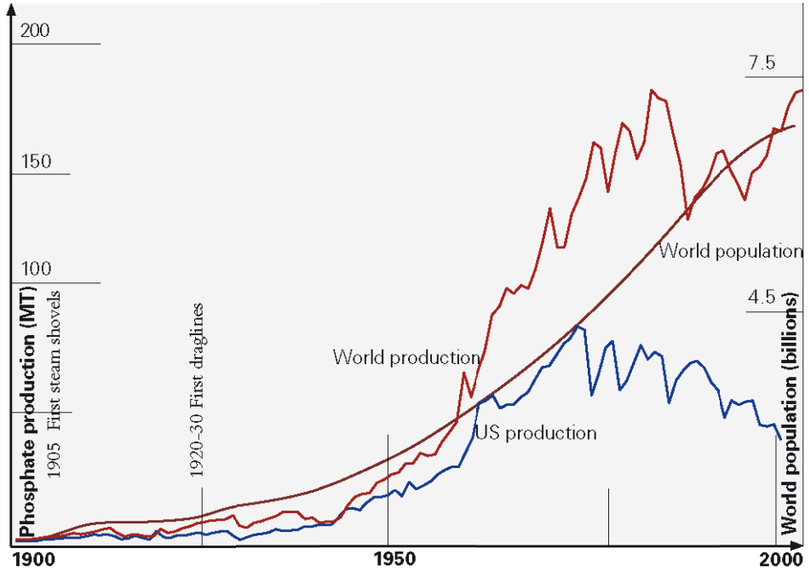


Distribution of phosphate reserves

China, the US and Morocco make up 66% of the world market. But only in Morocco there are extensive ressources for the future.



Shift of markets

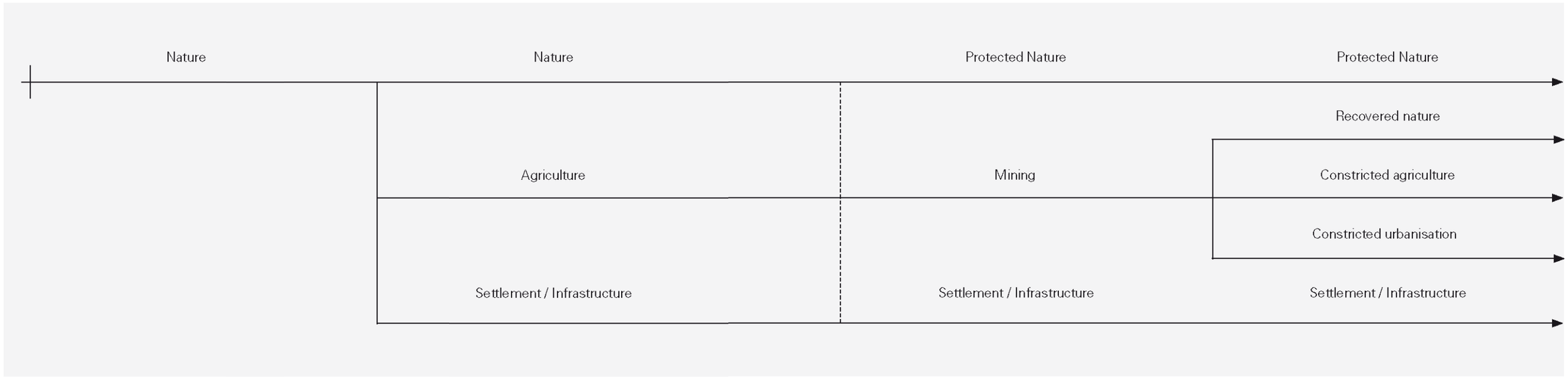
US phosphate used to be as much as 80% of the world production. With its ressources drying up, its share of the global market is shrinking.

Wauchula, Hardee County

North Pasture, Hardee County

South Fort Meade mine, Polk County

Mulberry, Polk County



Simultaneity of land transformation processes

In the process of surface mining, functioning soils are restructured. What is left are pile-ups of soils of separated particles which can only partly ensure stability and funcionality. Therefore their use becomes limited in possible land uses.

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LANDSCAPE OF PRODUCTION

Florida's phosphate is mined in a land-extensive strip-mining method. In order to get to the precious matrix, about six times as many tons of earth have to be moved and later filled back into the excavated pits. The physical separation of phosphate rock from sand and clay is achieved in the cheap wet process, using vast amount of water which is flushed into large ponds where the materials settle out.

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Pit Mining

Early mining was done with wheelbarrows, picks and shovels. Next came mule-drawn scrapers. The dragline significantly changed the mining operation. In 1900 it took a year to mine a 15-acre mine site with picks and shovels. Today, a dragline mines 15 acres in a month.

Hydraulic Mining

Around 1908 river pebble mining could not compete with land pebble and hard rock. As a result, river pebble production, which peaked in 1893, ceased entirely.

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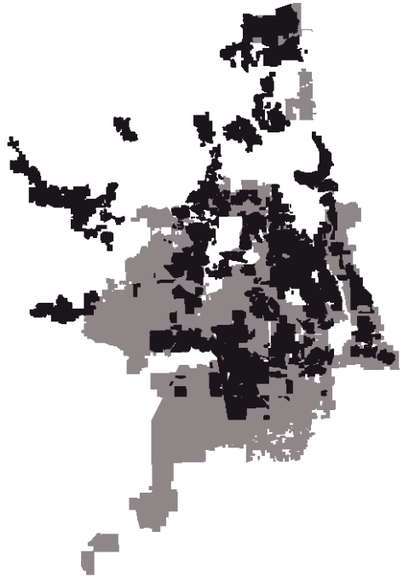
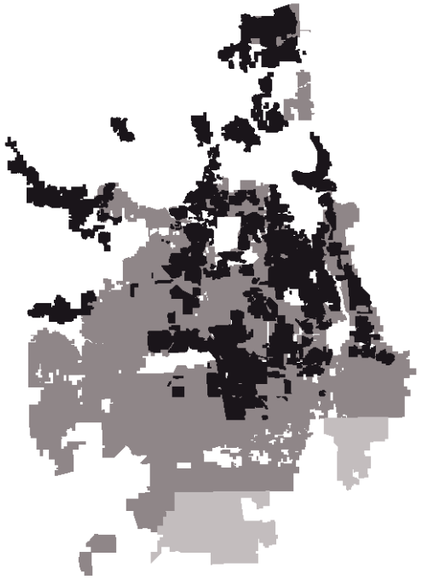


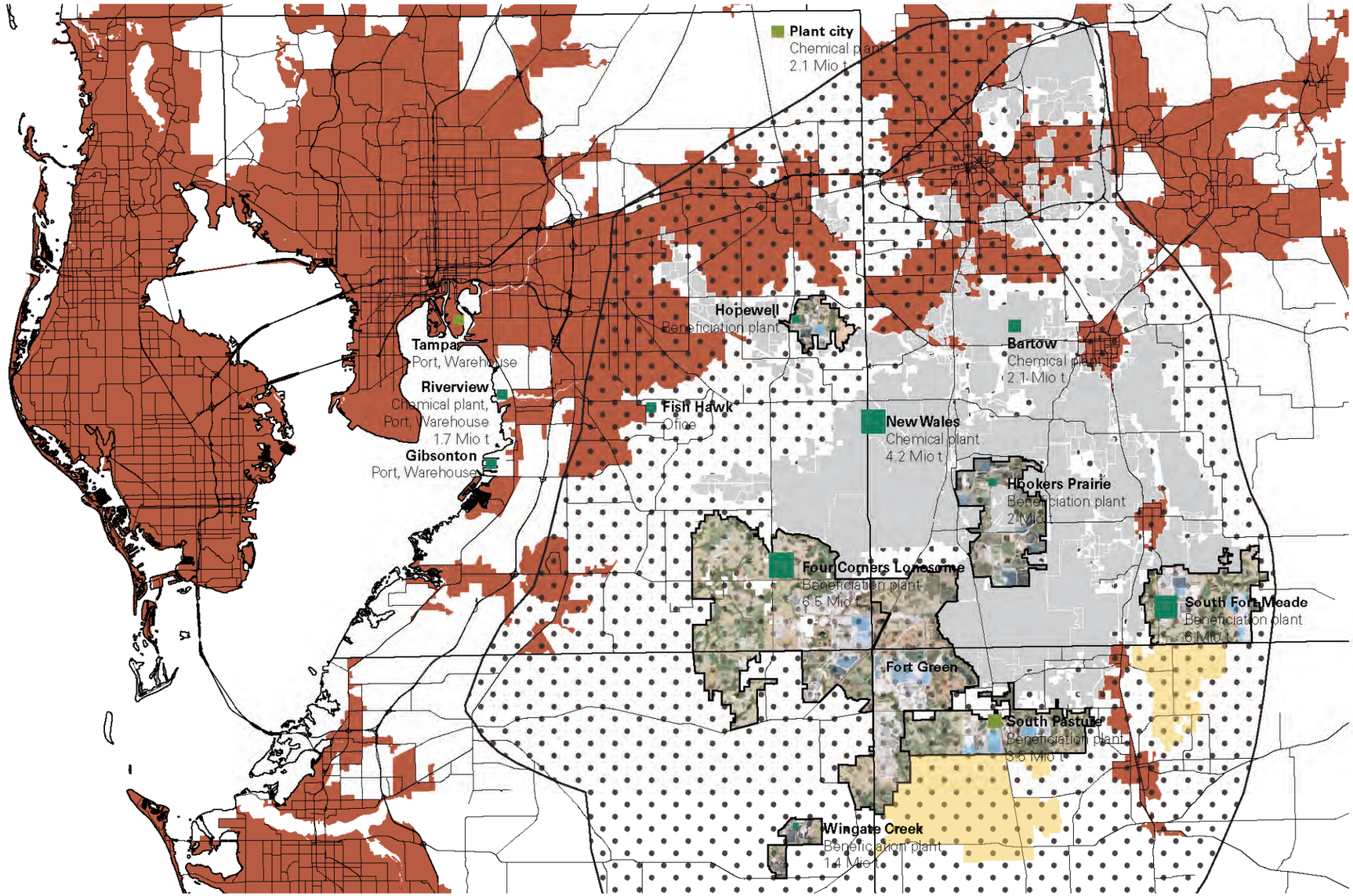


Steam Draglines

Mechanized excavation began between 1900 and 1905 with steam shovels. Early steam shovels held only one cubic yard of earth, but one steam shovel operated by three men did the work 80 men could do by hand.

Electric Draglines

Draglines, the current mining tool, came into use with the dawn of electricity and diesel power in the 1920's and 1930's.



Mosaic
CF Industries
Former mines
Future mines

Territorial Expansion

Higher standards and increased economic pressure have reduced the number of companies in the mining business to only two, while in earlier days there were up to twelve major companies operating in the Bone Valley area. Their production cycles are loosely connected and spread out, in Mosaic's case into several locations. There are basically three locations to be differentiated. The mining site and physical processing, the chemical plant and the warehouse and port.

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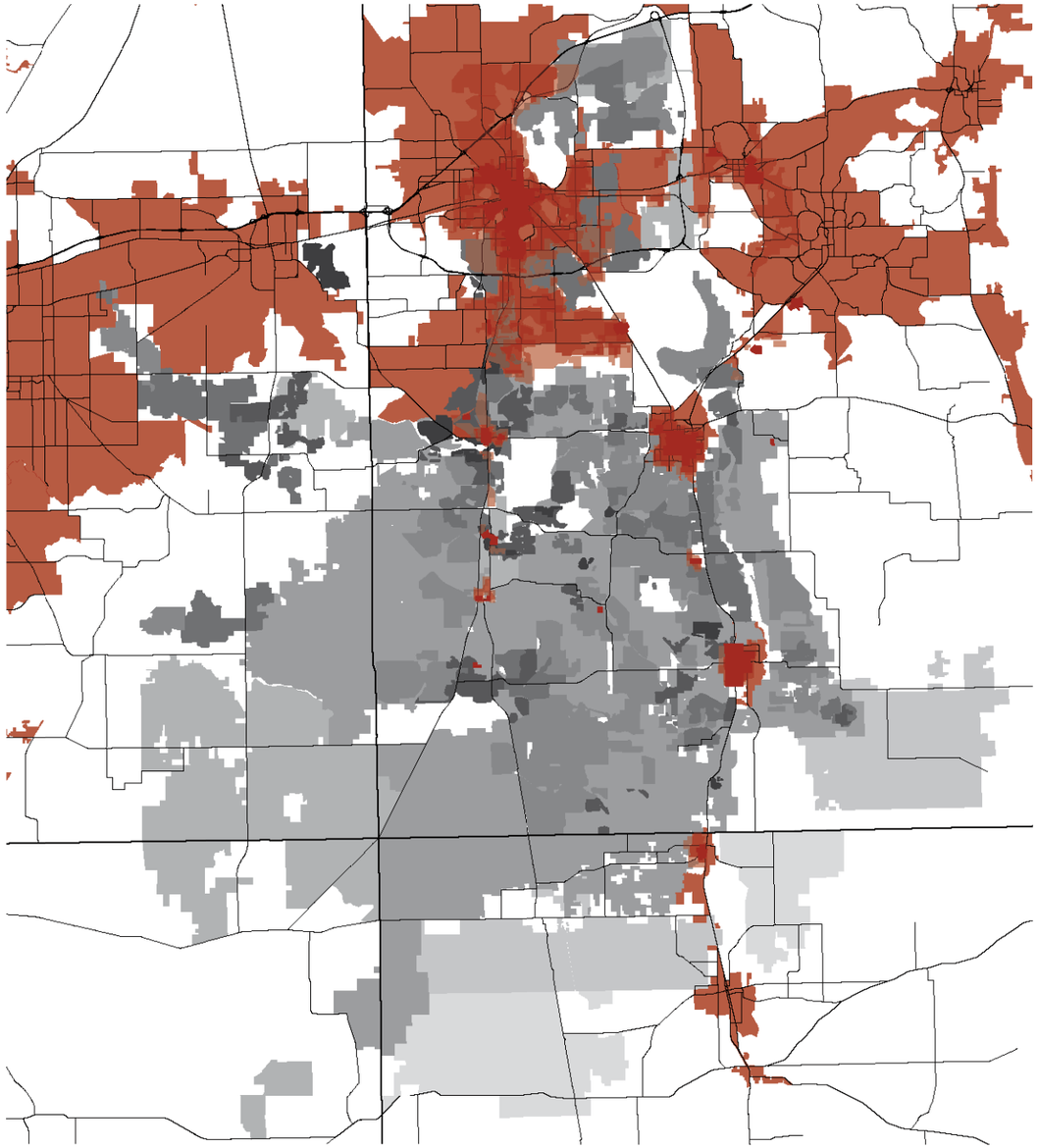

Moving southwards

In the early days, mining was dependent on proximal towns. As mobility and efficiency increased over time, the mining industry has moved southwards, the only direction where mineable phosphate is found. With increasing industrialisation, demand and reclamation requirements, properties have become disproportionally bigger.

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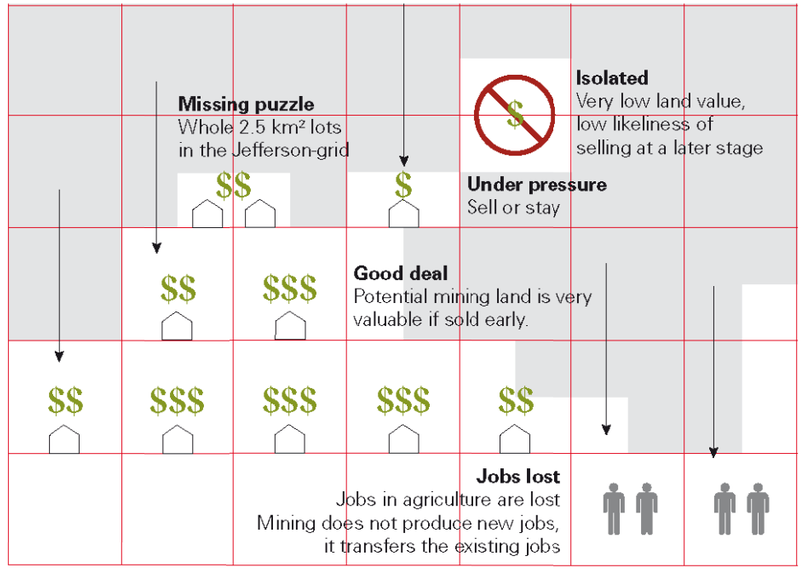
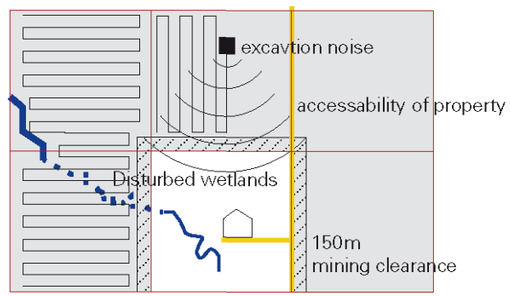


Usurpating land buy

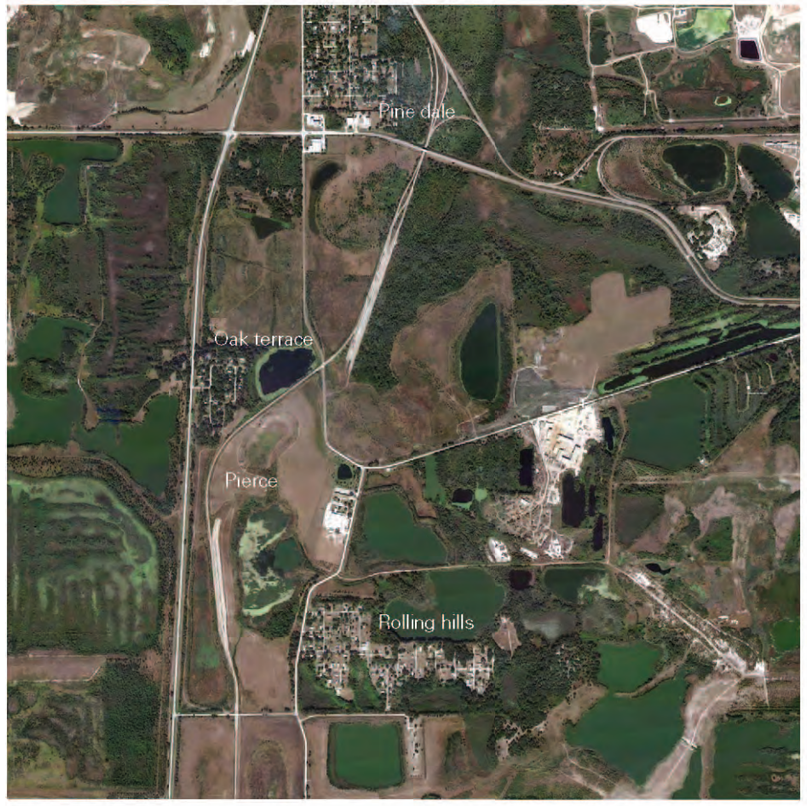
Money and the impacts mining brings with it are very convincing tools in getting people to sell their land.
The Jefferson grid is the basis on which parcels are divided up. The grid dimensions measure 1mile by 1mile



Mining area
Jefferson Grid
Street
Wetlands

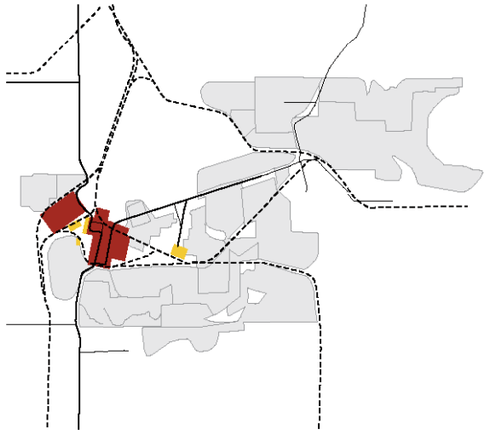
A Mining Company as neighbour

Physical and visual emmisions and restrictions in functionality compromise the use of a property next to mining.



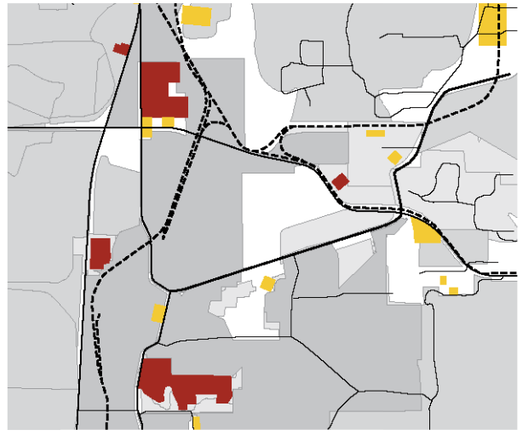
Mining can move towns

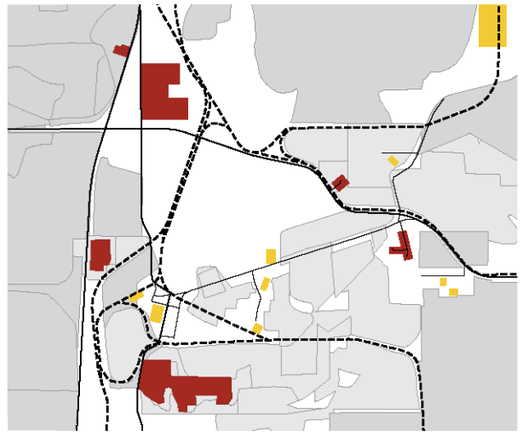
Pierce was a company town founded by the American Agricultural Chemical Company for their workers in 1906. Those days, proximity to the otherwise remote locations was crucial to the companies. When sewage became a problem, it was decided to split the town and move the houses into three separate locations, two of them on previously mined land.



The original town

Pierce was still strongly connected to the industry, although most company towns were closed in the 30s when unions started to negotiate contracts. The railroad and highway 37 had passed through it.





Dispersed settlements

No new town was founded, but the houses dislocated to three small, but already existing villages. With the split came also social segregation. While poorer families tended to stay in the area, wealthier moved to Oak terrace or could afford to commute from nearby cities.

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White collar

Oak terrace is the settlement where the wealthier employees of the mining company has moved. It is rather small and there are mostly two-storey houses. It is situated on a ridge on mined land with a view on mining north of Pierce that had happened at the time.

Blue collar

The poorer employees moved to Rolling hills (or Pine Dale). It is situated within the woods and does not have much to offer, except for reasonably large lots around one-storey houses.

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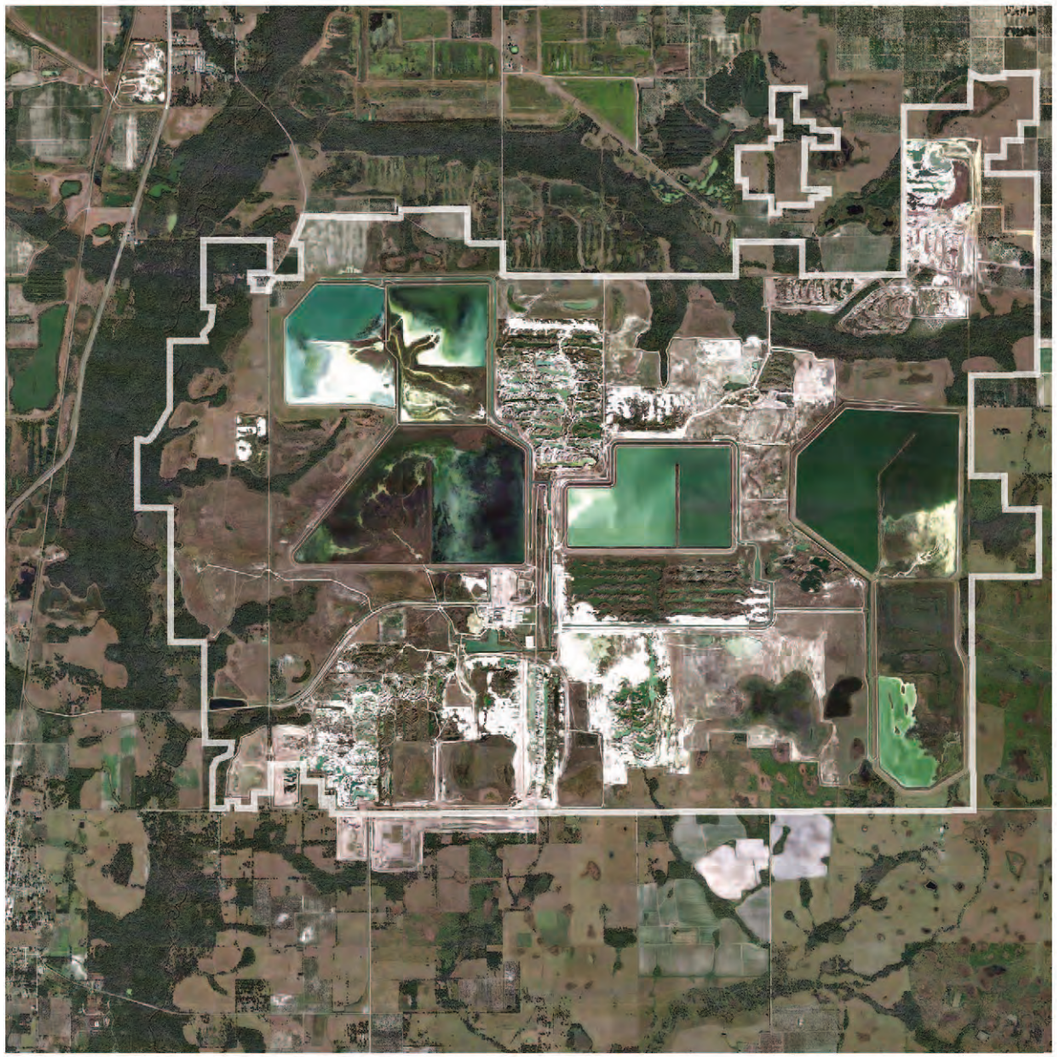
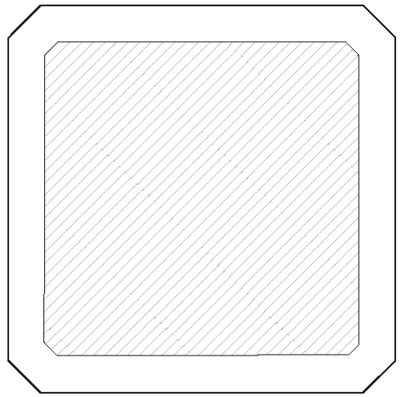


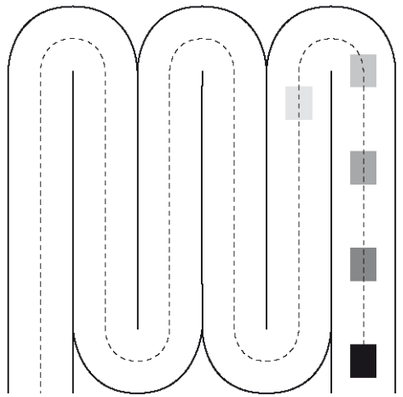
Systematic contouring

The mining of the land happens in a system based firstly on process efficiency and low cost and secondly on environmental concerns. Due to the huge masses and long distances of the operation, proximity and effectivity is extraordinarily important. The dimensions of how the landscape is shaped visually in its consistency are epic. For financial and other reasons, the resulting landscape is unlikely to be altered as significantly again.



Clay settling pond

10m high dams built on stripped land close to the beneficiation plant. A clay-tailings-slurry from beneficiation is gradually poured into the pond, the clay particles settle out, cleared out water is recycled.



Strip mining

The land is mined in slopes, covering the landscape with the same pattern.

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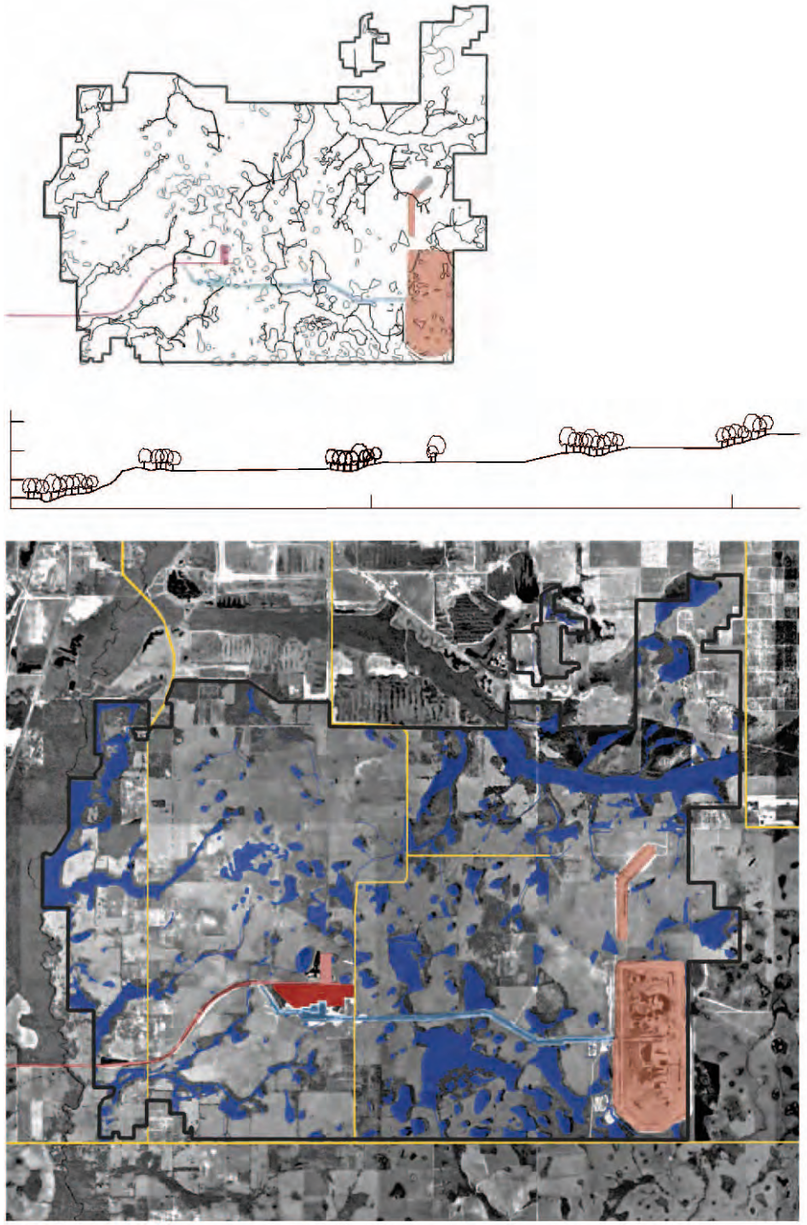

1995

Wetlands
Beneficiation plant
Strip mining
Clay settling area
Roads
Backfill reclamation
Infrastructural canal

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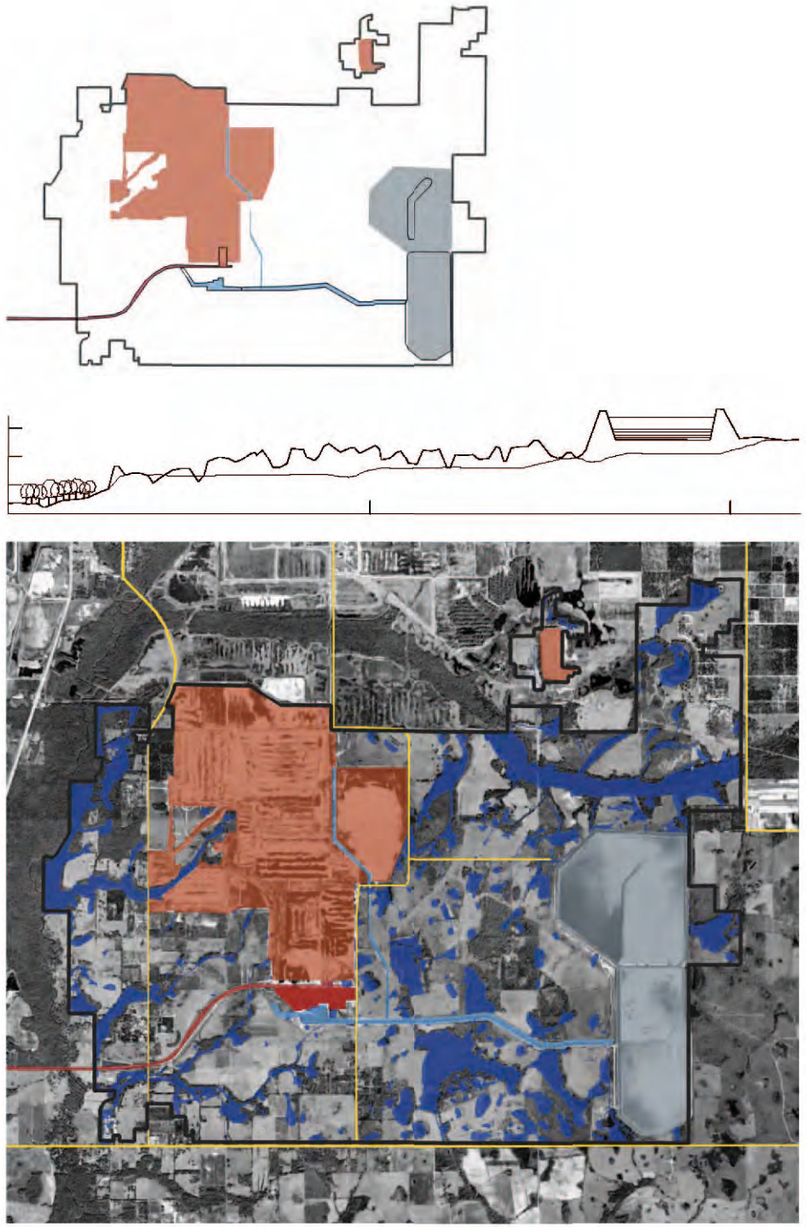

1999

2004

Wetlands
Beneficiation plant
Strip mining
Clay settling area
Roads
Backfill reclamation
Infrastructural canal

2010

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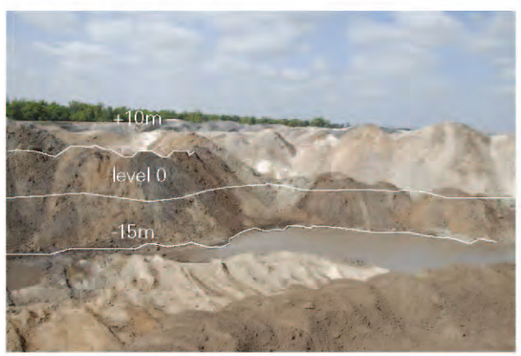
Extraction of matrix

The Bucket is placed on the spot and pulled back, scraping off up to 60m³ of matrix in one cycle.



Removal of overburden

First the overburden needs to be removed. By dragline it is stripped off and piled up in the recently mined pits to the side of the actual pit.

Pipeline

The matrix-slurry is transported up to 10km to the beneficiation plant.

Slurrying of Matrix

The Matrix discharged into a small pit where it is slurried by a low-pressure water gun.

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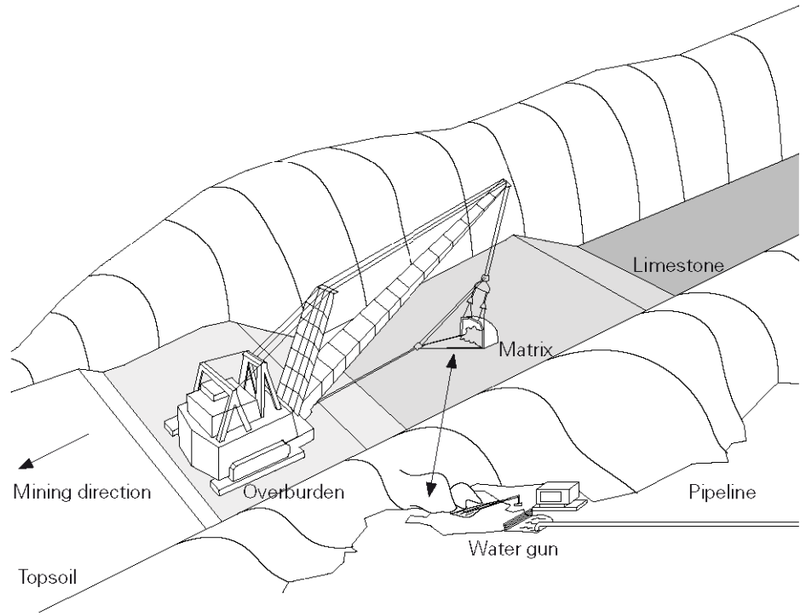

Mining direction

The dragline moves backwards, leaving a mined dregde.
Overburden is piled up to one side and matrix to the other.

Production landscape

Sand out of the benification process is being pilled up temporarily, to be filled back on the mine site.

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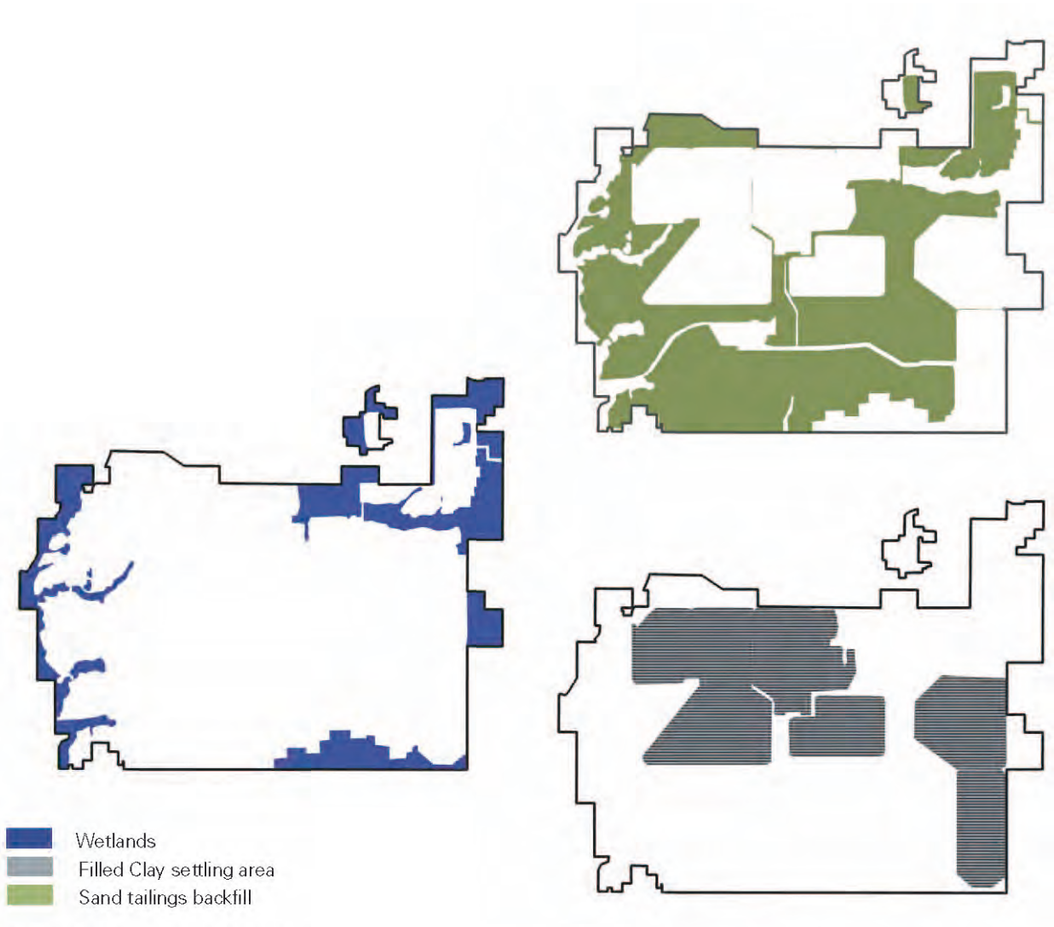
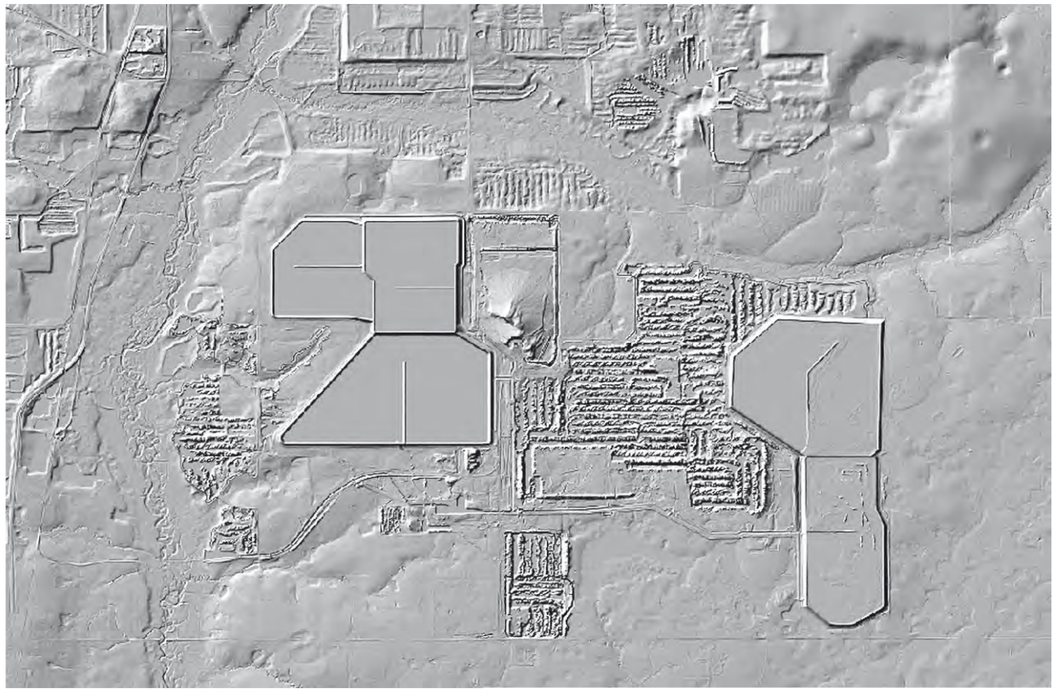


Permanent land elements

Wetlands and conservation areas are highly protected zones, if wetlands are disturbed 1/4 more area have to be replaced on a site.

Backfill and change of elevation

The Matrix discharged into a small pit where it is slurried by a low-pressure water gun.



Amplified scale

The most significant transformation is the much larger scale of the transformed landscape. A clay settling pond, basically a 10m high dam can reach dimensions of 2km by 2km, creating almost arena-like sceneries.

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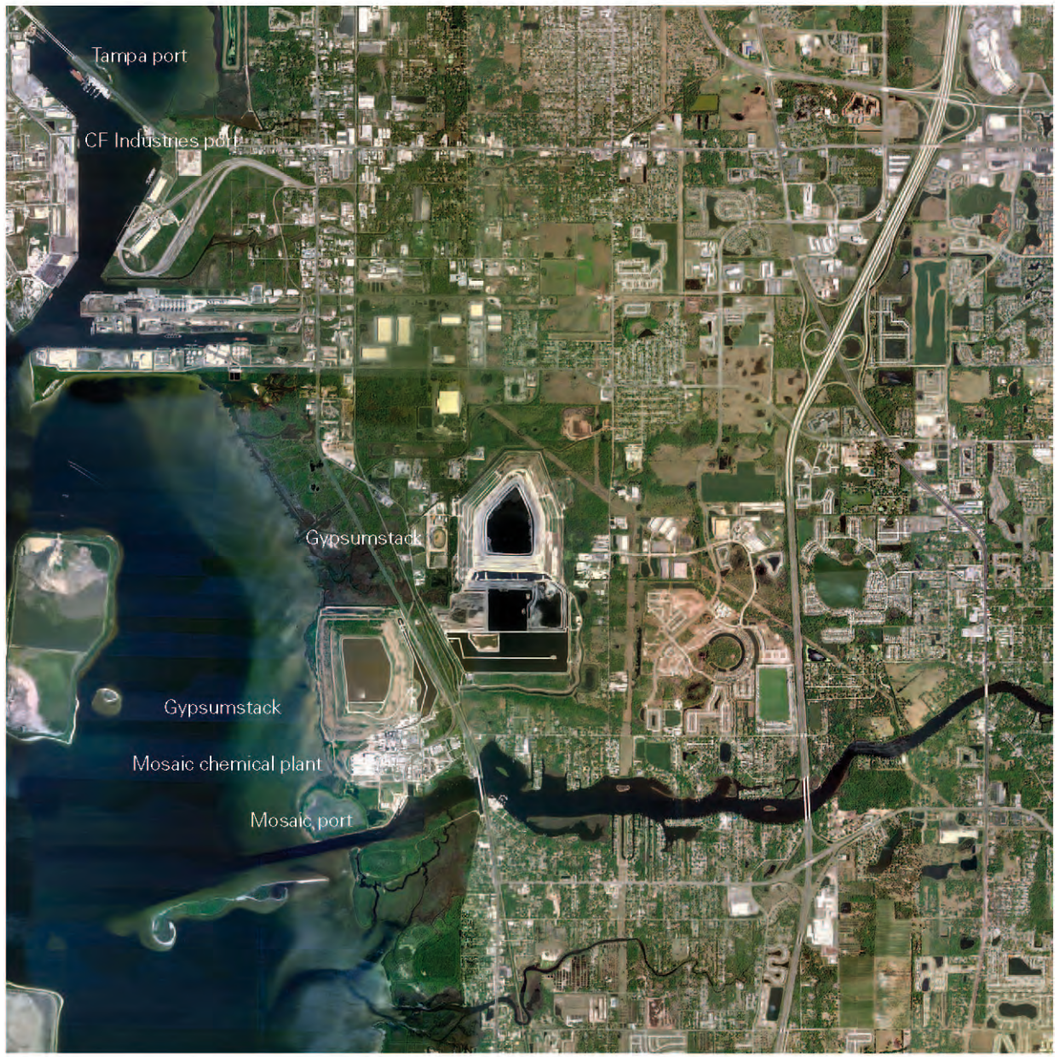

Phosphate landmarks

Gypsumstacks are needed for the long term storage of the slightly radioactive phosphogypsum which is a byproduct of the chemical process of phosphate. The areas around the stacks are highly protected to prevent the public from encountering the hazardous materials. The stacks are always next to the chemical plants where phosphate rock is processed into phosphoric acid and then into fertilizer products Monoammoniumphosphate and Diammoniumphosphate.

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Geometrical mountain

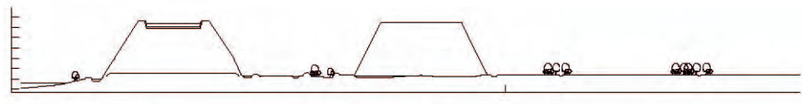
Visible elevation curves.

Marking of the production sites

The stacks mark the landscape and indicate the associated chemical plants. The areas are strictly shielded from the ambient environment.

Closure of stacks

The Gypsum stack is covered up with a fabric and later covered with topsoil.



Long term storage

The stacks are created to store the waste gypsum over a long time. There is no intent to use it in any (touristic) way.

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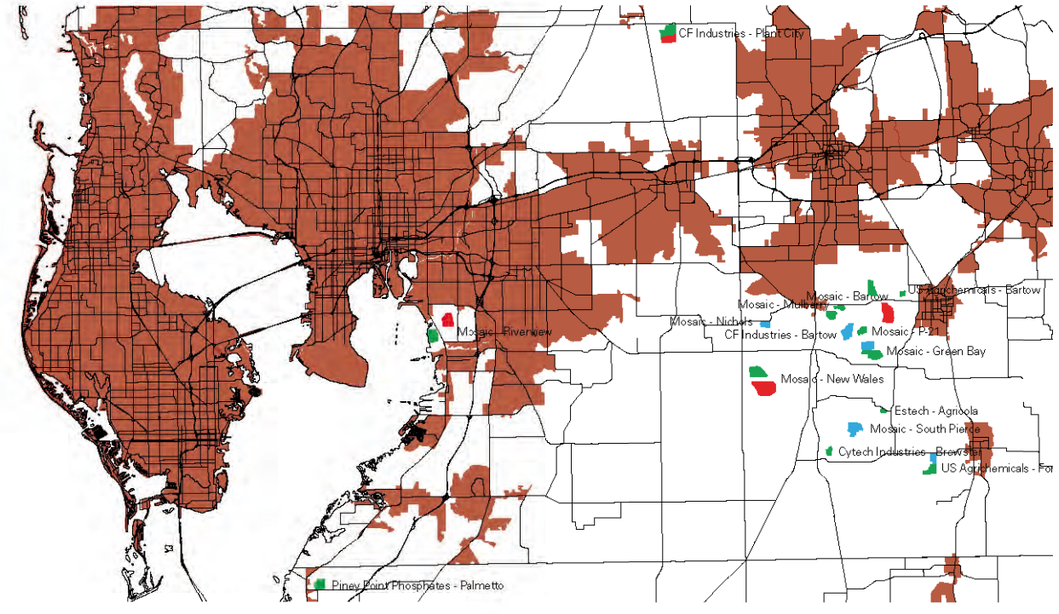
Florida's mountains

Gypsumstacks can reach heights of 10 up to 60 meters.
They are the highest elevations in Florida



Gypsum stack locations

22 Gypsumstacks are spread over the Tampa and Bone Valley region in 15 locations.

PRODUCTION OF LANDSCAPE

The landscape is a ressource and a product of the mining industry and this duality is inseparably intertwined. The landscape is a portrayal, but also a regulation. The alterations are significant, and invasive, and thus all the more interesting.

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Recreation of nature

In 1975, the Mandatory Act was introduced which obligated every company to reclaim the area they disturb with their mining activity. Reclamation means to bring back the original status as well as possible. This regulation only mentions the superficial, visible entities of the land and not its soil composition. Reclamation includes recontouring of the landscape with bulldozers, into a more flattened landscape, and its initial revegetation. Reclamation has to be started within 7 years after mining and has to fulfil successive 5-year plans. Reclaiming one hectare can cost up to 25'000$.

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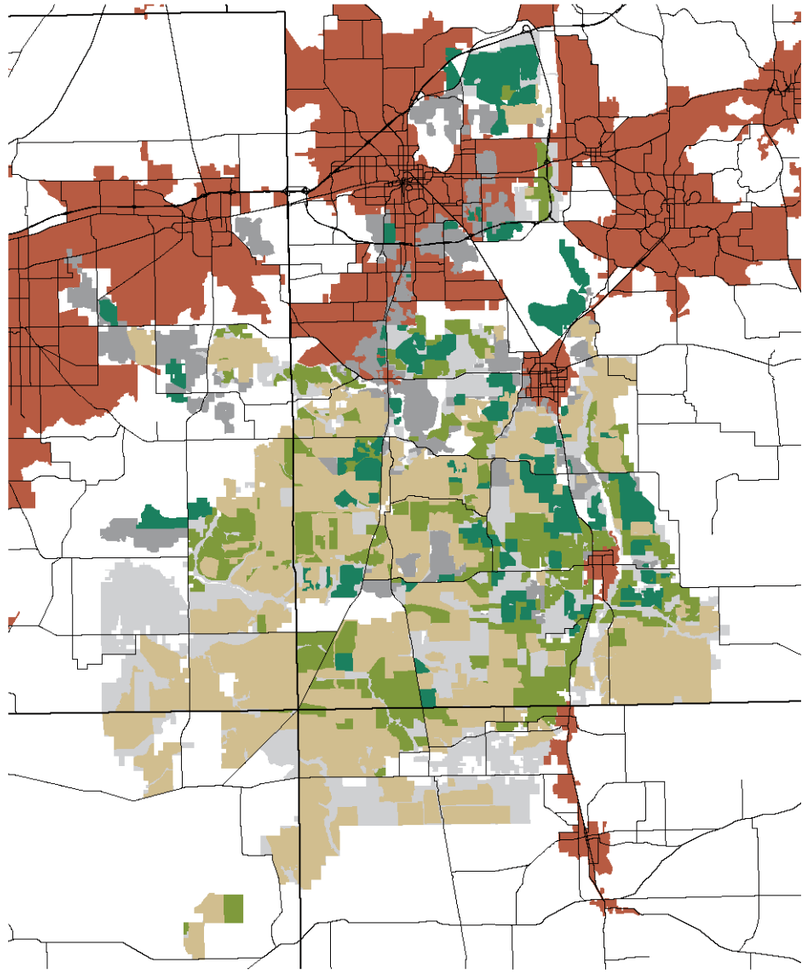
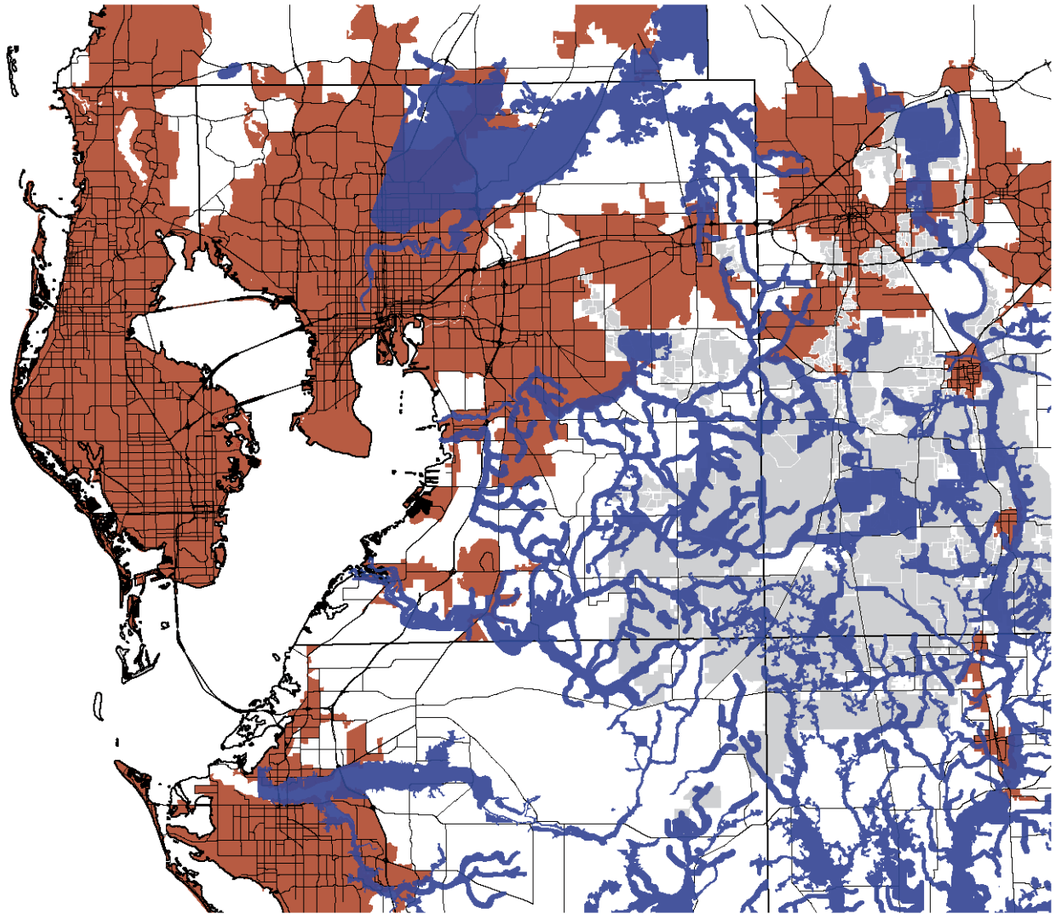


Reclamation status

Most of the areas that have not and will not be reclaimed are situated close to the urban clusters around the Interstate 4, where most of the future growth is expected to be. Non-reclaimed areas are still developable, but may seem more savage than reclaimed ones.



Wetland system
Mined lands

Integrated habitats

The Integrated Habitat Network IHN is a strategy introduced in 1992 that focuses on a sustainable network of environments that may become isolated.

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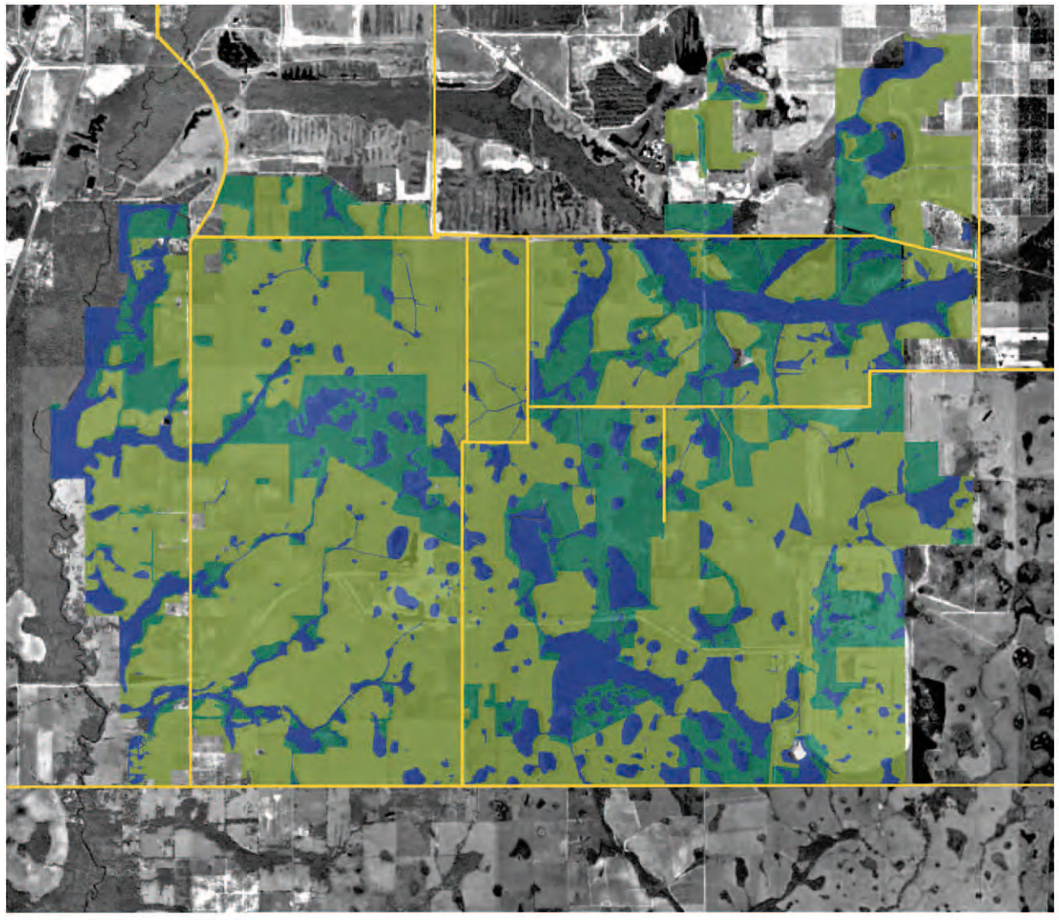
Ecological concerns

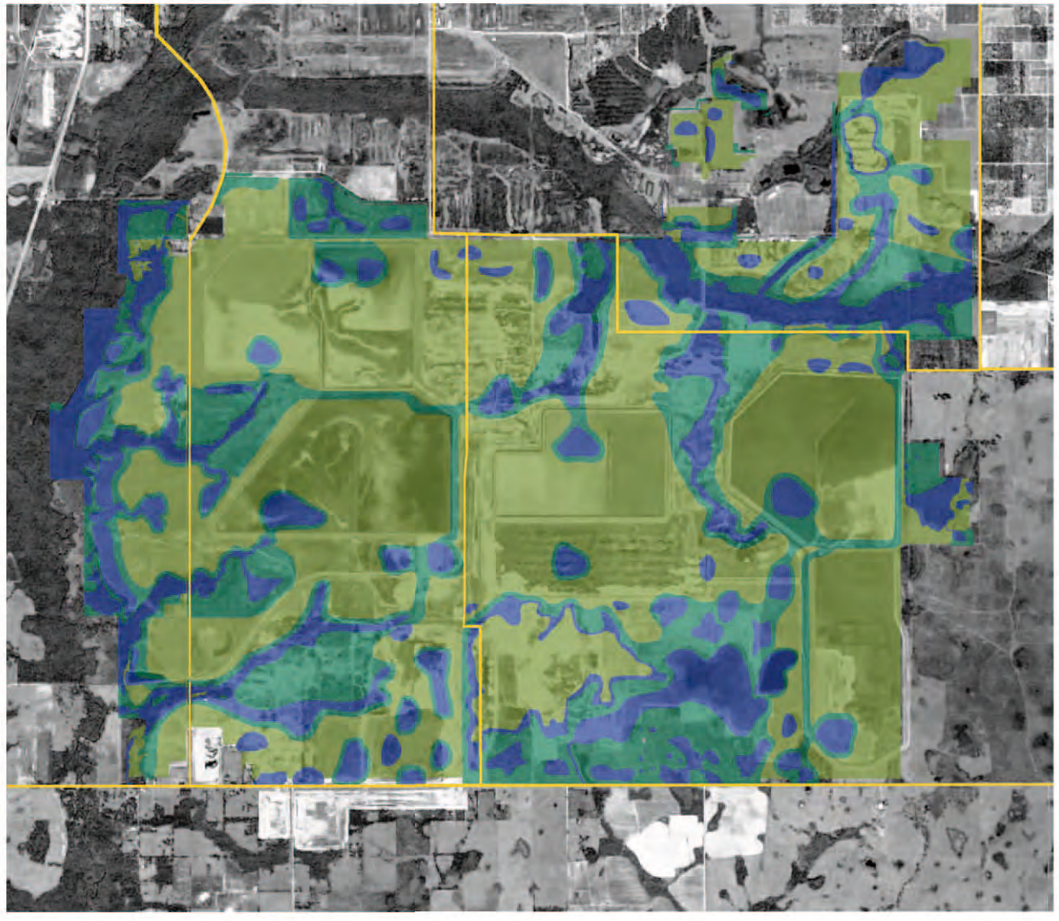
The biggest hazards that come with mining are spills of contaminated waters into the environment during thunderstroms. Water in Gypsum stacks have a verly low pH-level and water in processing are very muddy. Retention basins have been built as precaution.



Wetland
Forest
Agriculture

Wetland capillaries

Wetlands ensure the water management and habitat of a landscape and are the places with highest biodiversity.



Wetland arteries

Albeit the efforts to try and sustain the wetlands over the course of the mining of a site, the destruction of the microcosms are unavoidable. Instead, in order to achieve the number of square meters that have to be restored, the wetlands are concentrated in corridors, as a resoration of the original state is hardly possible to achieve.

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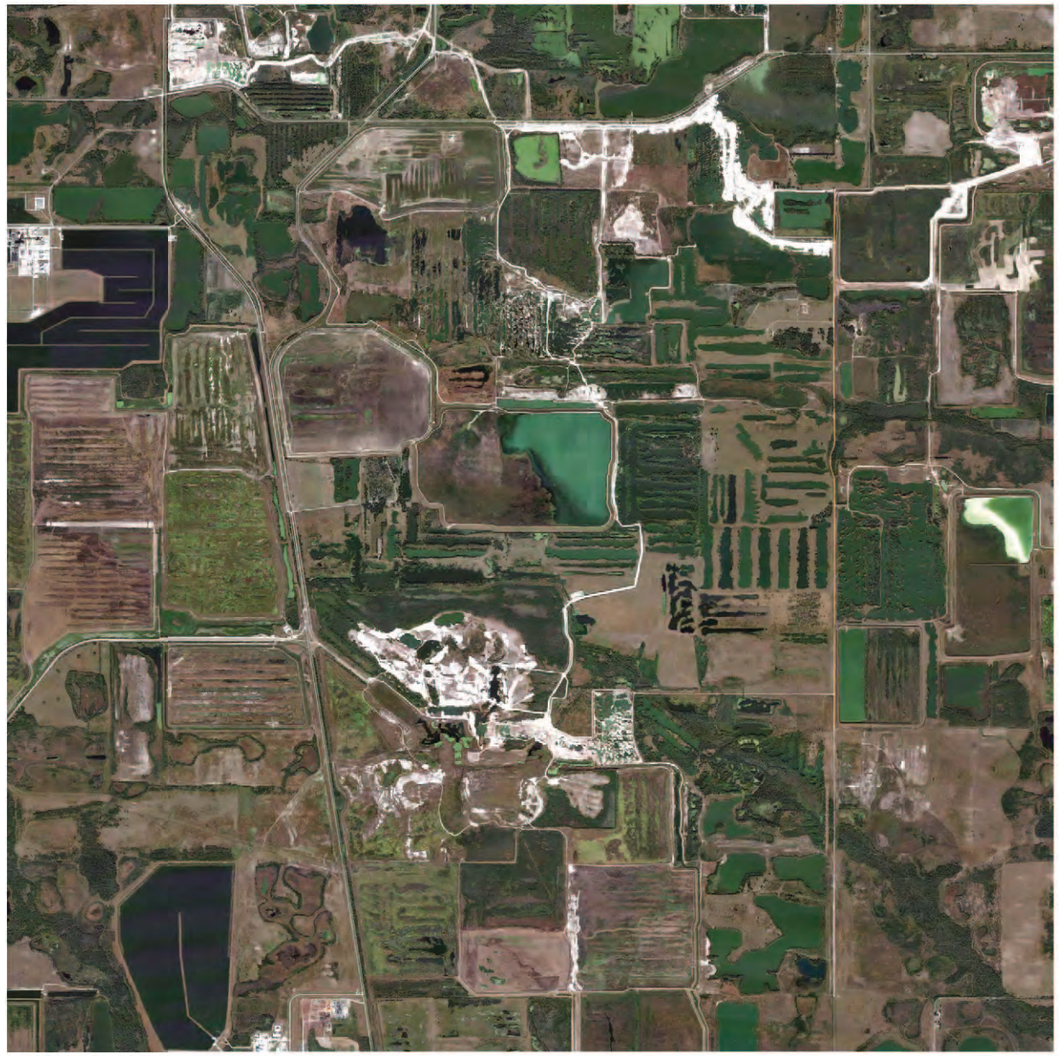

Geometricized landscape

Mining, too underlies the principles of the Jefferson grid, the basic territorial division of the US into 2.5km^2 lots and further subdivision. In the process of mining, the landscape is magnified to immense dimensions.

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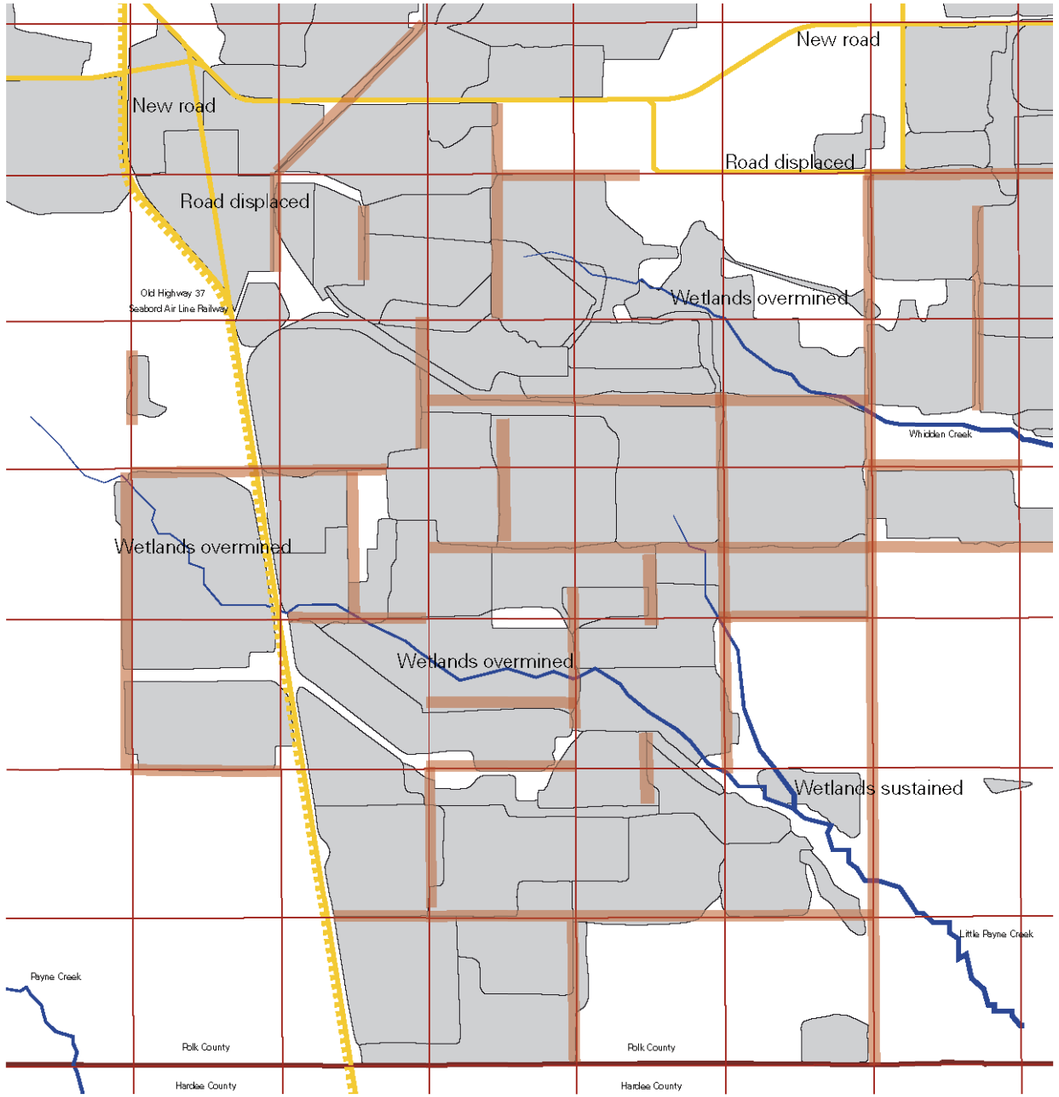
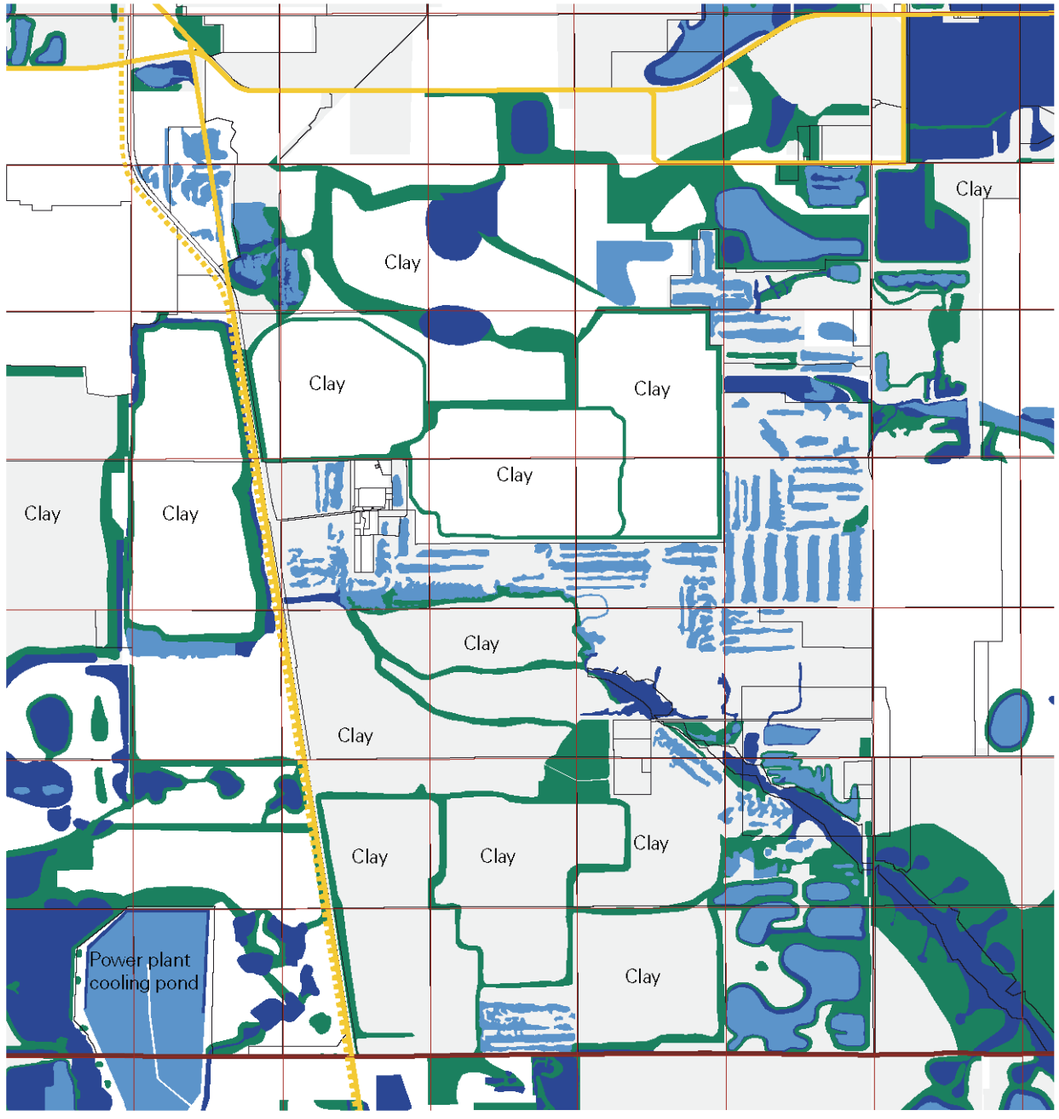


The Jefferson grid module

Almost all geometries of a current mine can be derived from the Jefferson grid in wholes, halfs or thirds.



Outlining of parcels

The outlining of the mining parcels is an easy method of hiding human impact on the landscape from view on the ground.

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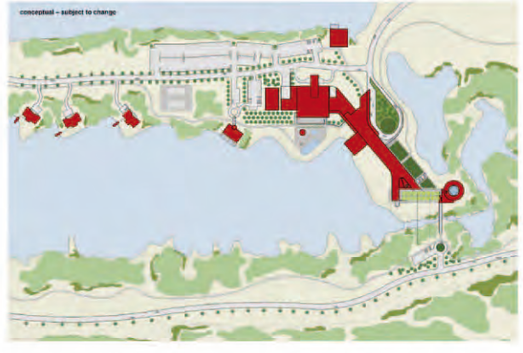
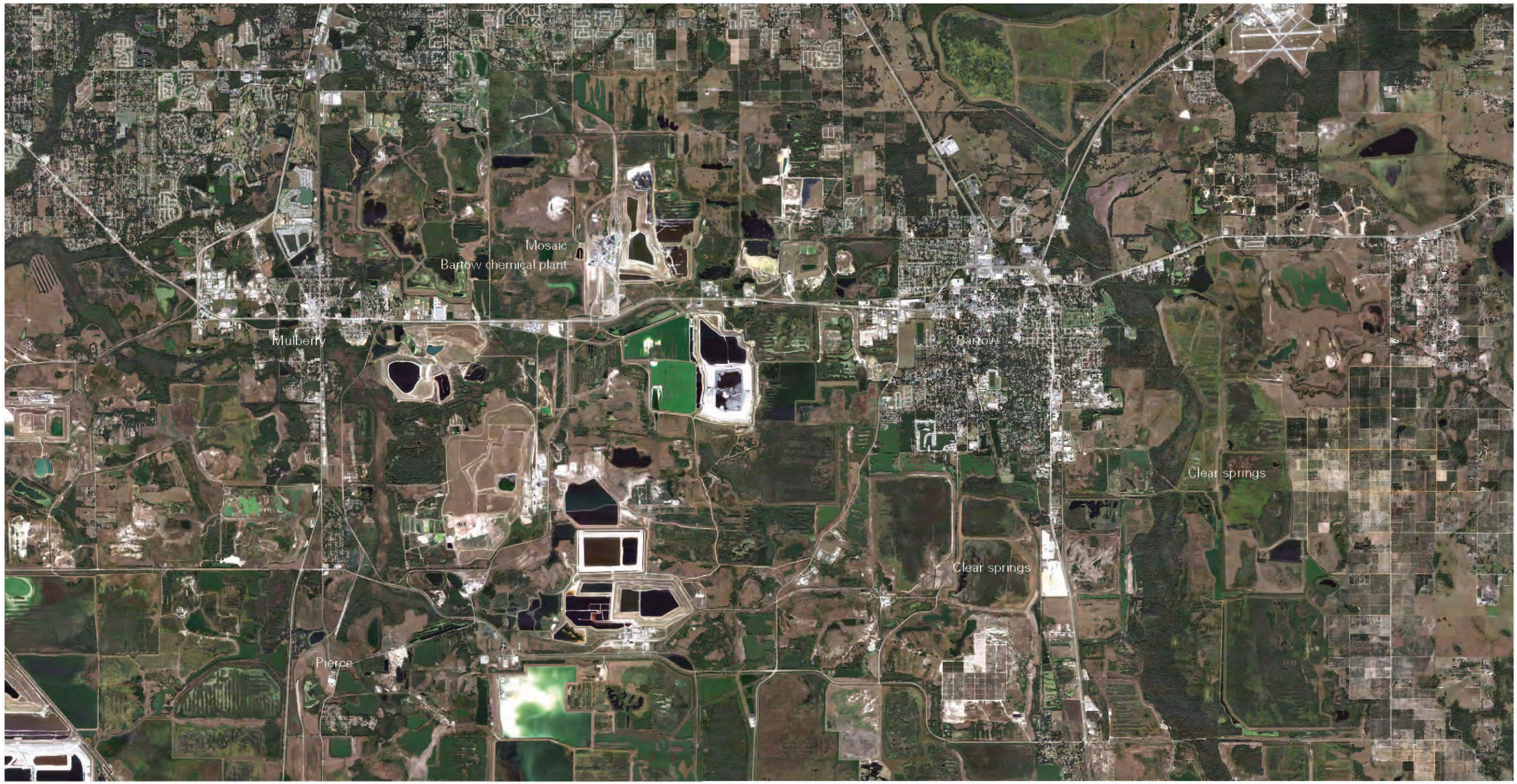
Beautiful wasteland

The spectalcle of the artificial landscape is what should make this resort special. Its remoteness should add on to the experience of going there.



Mosaic builds a resort

Thre streamsong resort is the first site that Mosaic develop themselves. So far they have kept their lands and have sold their land only in small bits.



Amalgam

The district between Mulberry and Bartow is where the history of the region is most visibly imprinted. All of this area around the capital of Polk County and the Peace River has been mined in the past.

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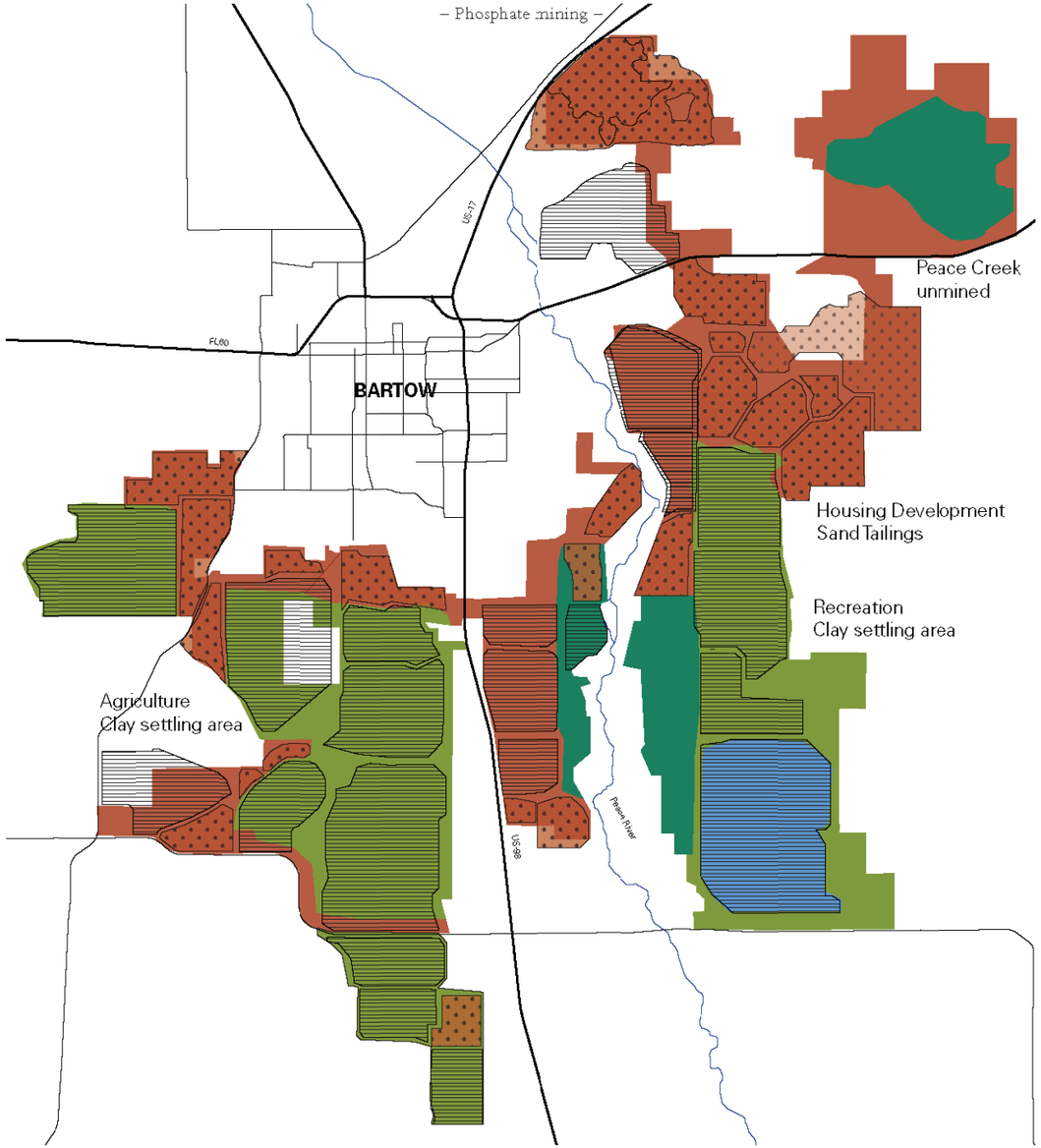

Predetermined Zoning

The zoning in the sector plan for the Clear Springs DRI (Development of Regional Impact) coheres directly with the formerly mined lots.

Visual zoning

The mining pattern remains visible if seen from a ridge.

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Categories of Palimpsests

Mining restructures the environment people live in. Humans always find ways to utilize their environment, whether it has undergone significant transformations or not. The further transformation of what mining has left behind is yet another layer of a landscape that can be read as a palimpsest of former uses. The palimpsest is in these cases a stunning oddity.

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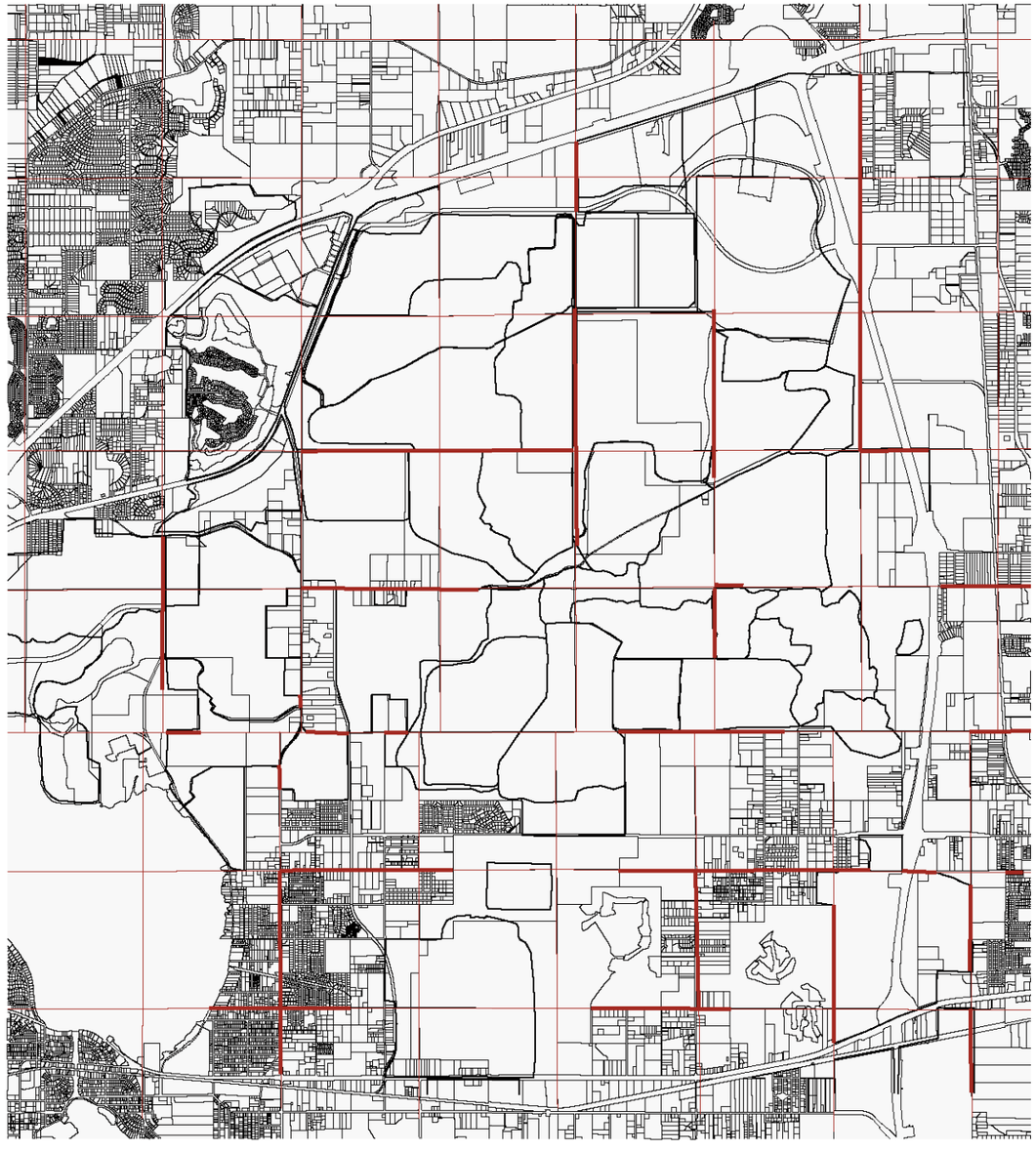

Parcels 2010
Mining parcels
Jefferson grid

Definitions of mine geometry

The restructuring of land geometry is tightly bound on street layout and property limits, while natural boundaries can be overridden more easily.

Imprints in the landscape

Government pegged fares allow for wide-ranging economic accessibility because they are often set lower than market value. The ensuing price topography shapes Assiut's reach in the region and allows for an affordable commute from regions within the 0.60 -1LE price range, around 15-20km from the city core. The ensuing price topography shapes Assiut's reach in the region and allows for an affordable commute from regions within the 0.60 -1LE price range, around 15-20km from the city core. The ensuing price topography shapes Assiut's reach in the region and allows for an affordable commute from regions within the 0.60 -1LE price range, around 15-20km from the city core.

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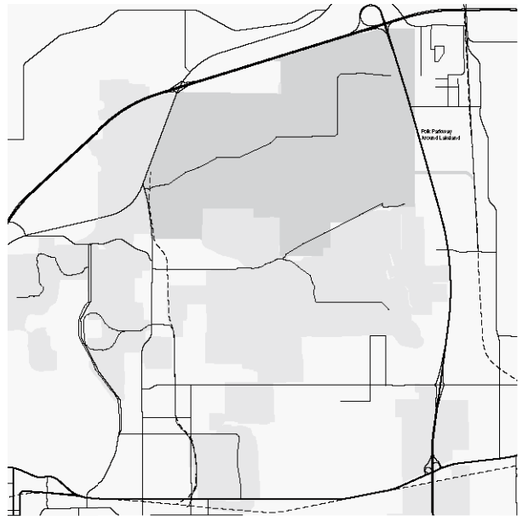
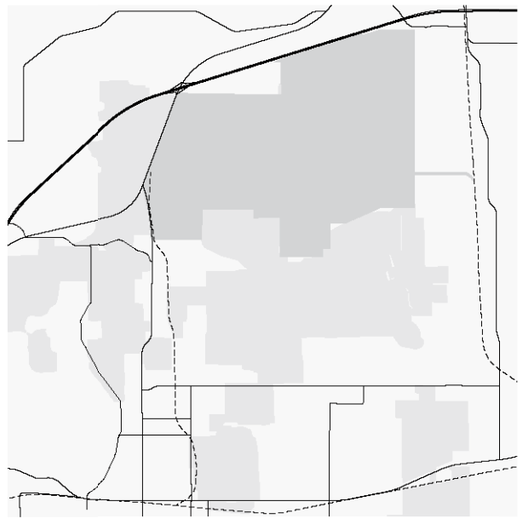
Post 1st-phase mining 1975



2010

Pre-mining 1944



Post 2nd-phase mining 1994

Major road
Minor road
Railroad
Mining 1978-94
Mining 1944-78

Ignored elements

The existing roads get "swallowed" by the mining. Part of the road around the Lake ... is dislocated.

Limiting elements

The Interstate-4 sets boundaries to the mining, Polk parkway is built just around the mining boundaries.

1958

Land and lakes reclamation

Bridgewater had been mined in 1967 and was reclaimed in the land and lakes typology, meaning, the overburden piles get flattened out and the remaining pits are filled with water. In most cases this method is applicated due to lack of backfill material.

1968

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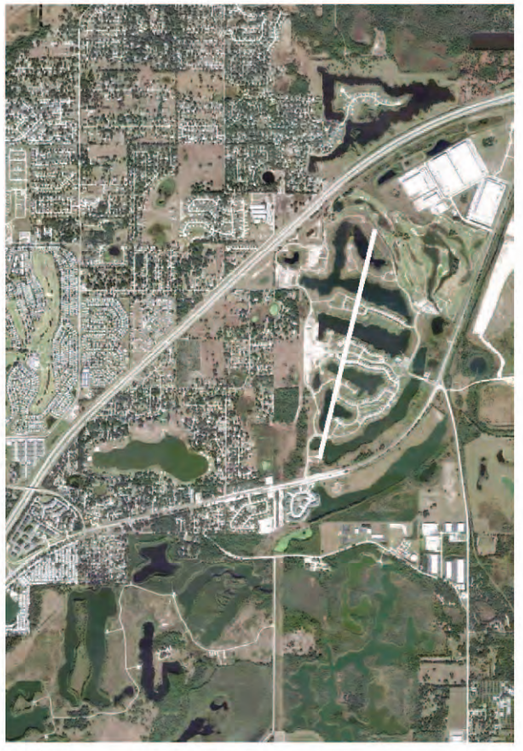
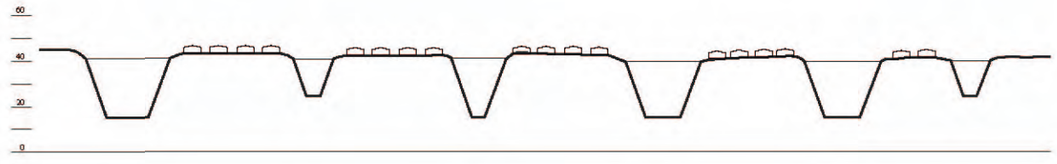
2004

Suitability for housing

The dimensions of the mining pattern are wide enough to reasonably develop the leftover land in 2 or even 3 parallel row of houses.



2010



Lake pits

The terrain drops quickly and in a very steep slope to a far greater depth than normal ponds. Additionally, Florida's rich fauna makes swimming undesirable.

Real estate dream location

The price fo reclaimed land is significantly lower than for undisturbed land. Yet for a housing-developper it is more attractive, as a shaped landscape visually has more to offer. Buy for less, sell for more.

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Catalyst projects

Owned by the Williams Company, the project still only covers part of their remaining properties. A mixed use on sand-tailings and overburden backfill are proposed, using the existing layout of lakes. Formerly the boundaries to the mining, the I-4 and Polk Parkway offer a brilliant location for accessibility

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Re-recontouring of mined land

The predominant method of using the existing, recontoured landscape is abandoned here, as Santiago Calatrava projects a lake on a previously mined and backfilled area. The mining context is ignored in favour of a landmark on I-4.

Non-reclaimed site

Saddle Creek park was mined in 1955. It has not been found eligible for reclamation in the Zeller-Williamss report, therefore it has not been reclaimed, only some contouring has taken place. Yet Florida's flora growth is strong enough to revegetate the site.

Inland motorboating

Tricky and wide-spreading, the park offers several landings to go motorboating inland.

Fishing activity

An excellent location for fishing, tackle and bait shops can be found around the park

Leisure park and natural habitat

As the area of Saddle Creek does not offer any other possibility for development, using it as a leisure park or not at all seem to be the only solutions. The park's use is quite limited to the central axis running through the park, there is plenty of room for a flourishing vfauna to coexist.

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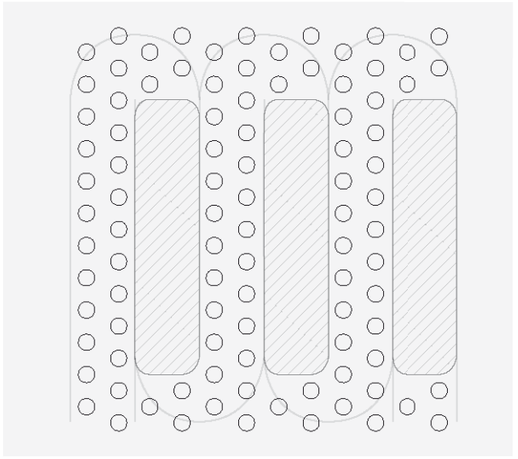
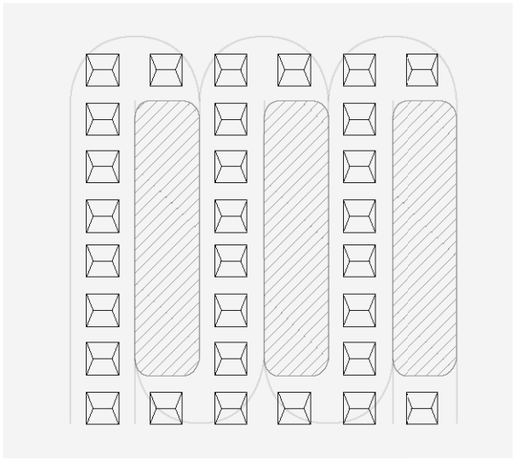
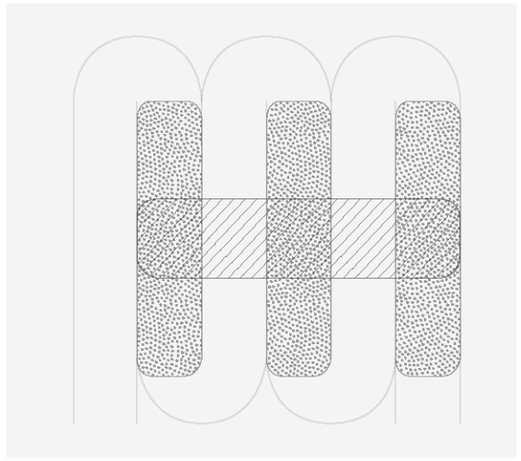


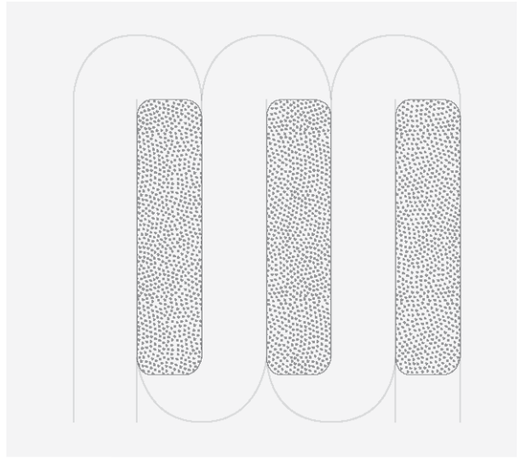
Mining - Land and Lakes - Nature



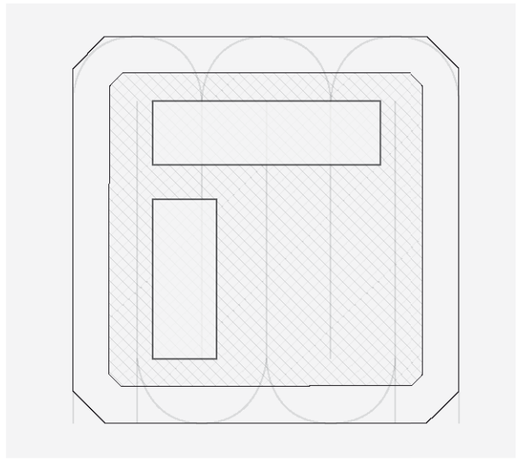
Mining - Land and Lakes - Housing



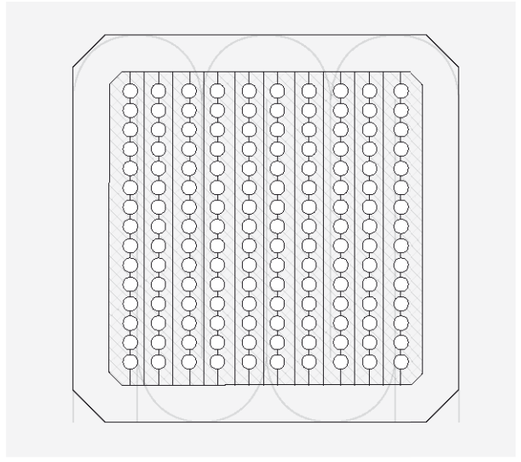
Mining - Backfill - Re-recontouring



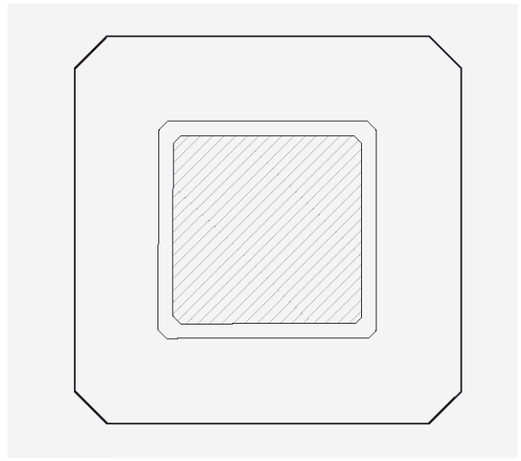
Mining - Backfill - Open use



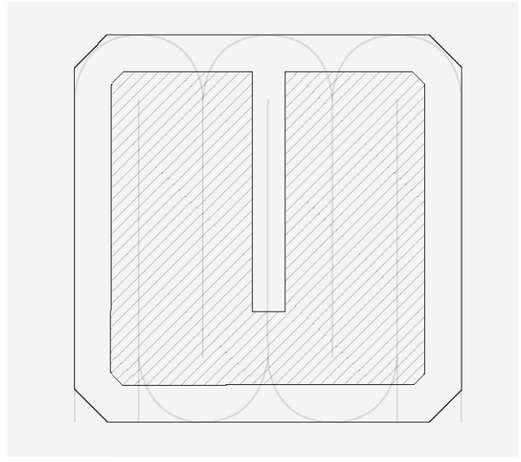
Mining - Clay settling pond - Restricted building on pillars



Mining - Clay settling area - Agriculture / pasture



Gypsum stack - no use / touristic potential



Mining - Cooling pond

Categories of palimpsest

Categories of Mining - Backfill and Reclamation - Development

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SOURCES

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http://www.cfindustries.com
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INTERVIEWS

Tracy Brown, Bridgewater office, Personal Interview (23 March 2011)

Pat Steeds, CFRPC, Collective Interview (23 March 2011)

Michael Chanen, Mosaic Co., Personal Interview (23 March 2011)

Jennifer Conolly, CFRPC, Personal Interview (24 March 2011)

Mike Lloyd, FIPR, Personal Interview (24 March 2011)

Steven Richardson, FIPR, and Ameé Bailey, Polk County Planning, Personal Interview (30 March 2011)

Clear Springs Co., Guided tour, (30 March 2011)

Miles Ballogg, Brownfields and Helen Sears, CFRPC, Personal Interview (31 March 2011)

Mr. Philips, Oldtimer, Personal Interview, (31 March 2011)

Jason Welty, Alfonso Architects, Personal Interview, (1 April 2011)

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PERSONS

Helen Sears, CFRPC
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Robert Furley, Clear Springs
David Royal, Clear Springs
Richard Fifer, Mulberry Phosphate Museum
Michael Chanen, Mosaic Co.
Jason Welty, Alfonso Architects
Michelle Sims, FDEP

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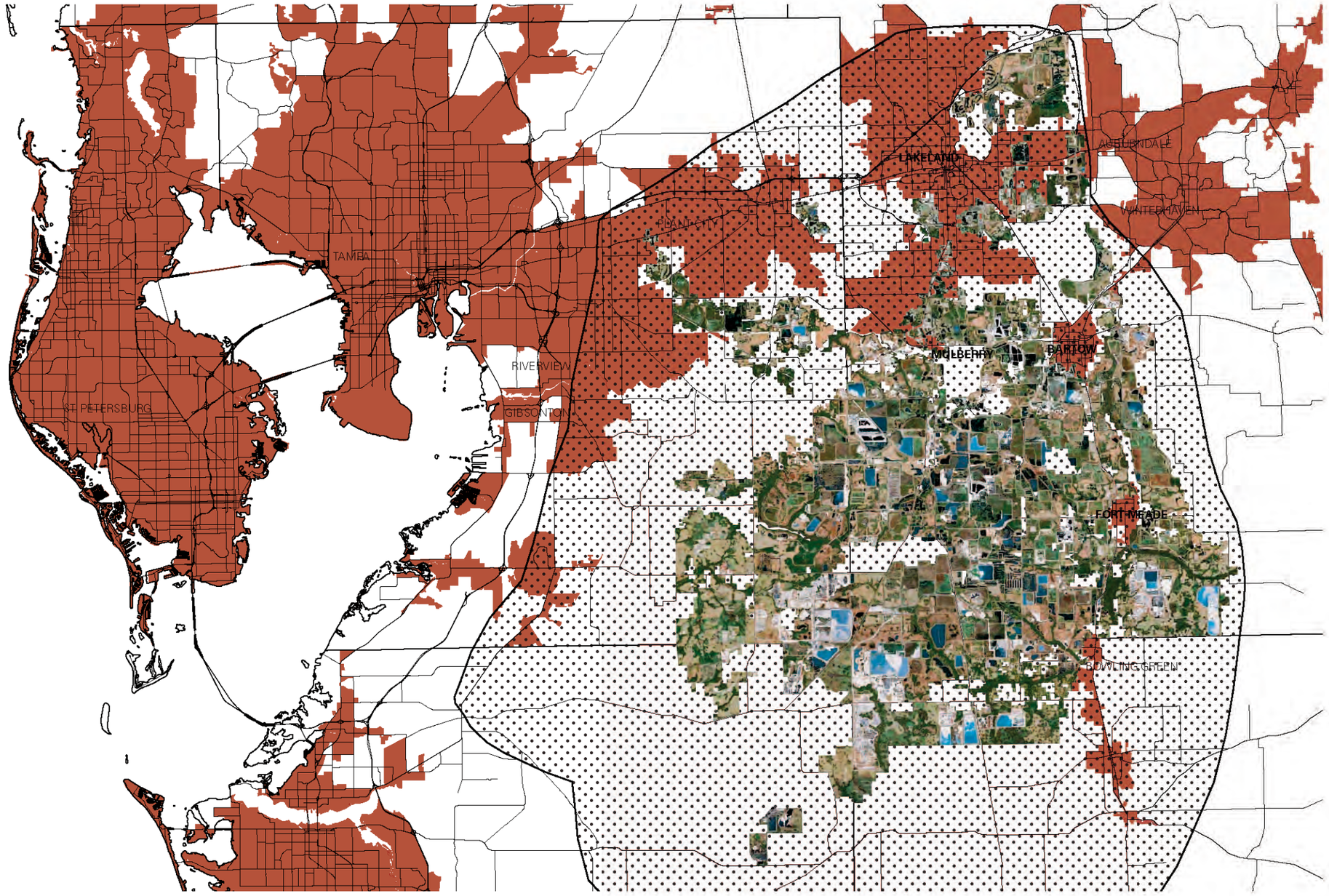
FIPR, Florida Industrial and Phosphate Research Institue, Bartow
Central Florida Regional Planning Council, CFRPC, Bartow



Growth on and around mined lands

In the last 20-30 years, the urban network on Interstate-4 - Plant City - Lakeland - Bartow has undergone a rapid growth, just where the mining industry has transformed.

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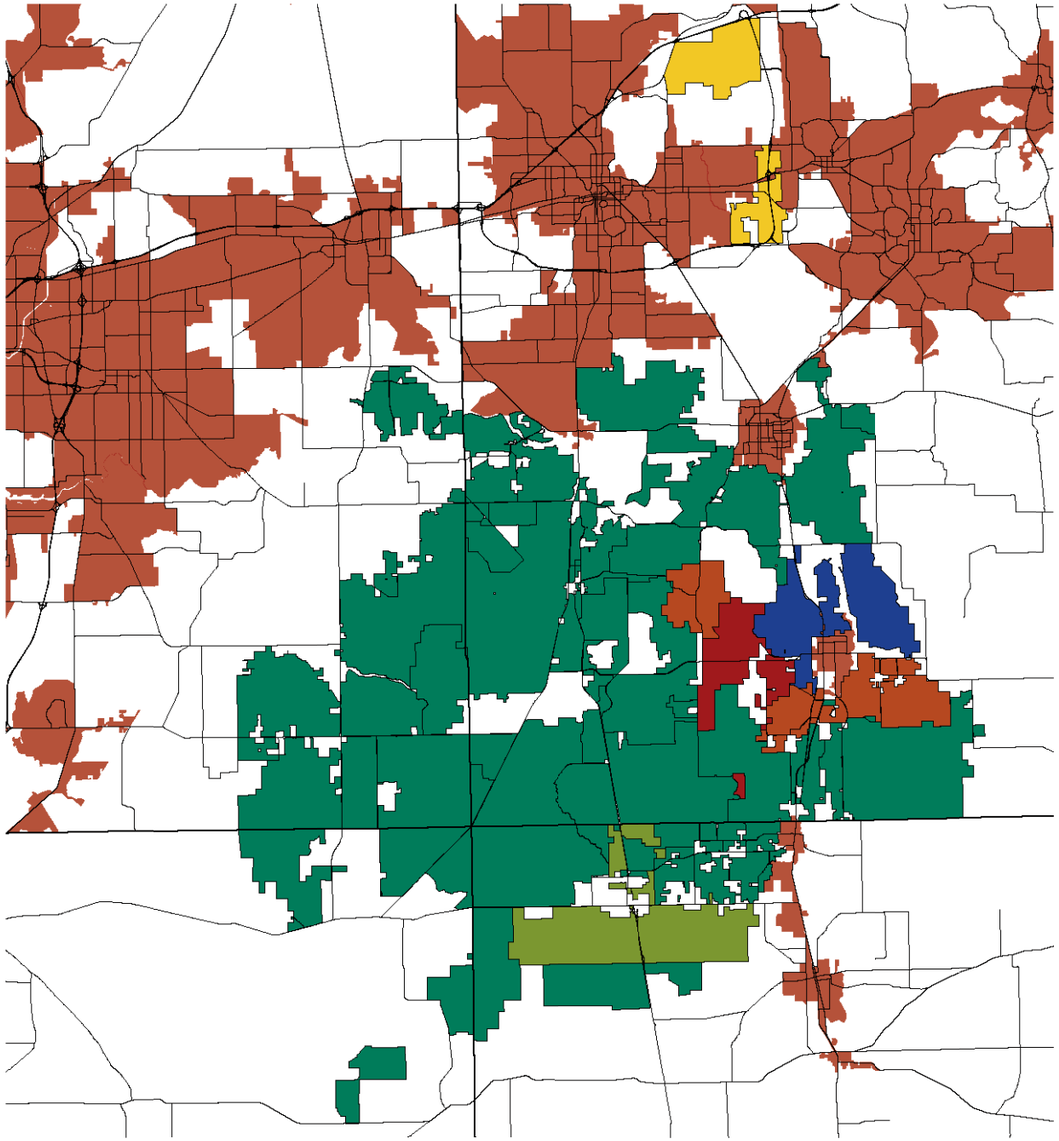

Mosaic Co.
CF Industries
Williams Co. Inc.
Estech Inc.
US Agri Chemicals
Mobil Exxon

Acquisition of huge territories

Financial and operational reasons have lead to an incorporation of lots into extensive properties belonging to only a few land owners.

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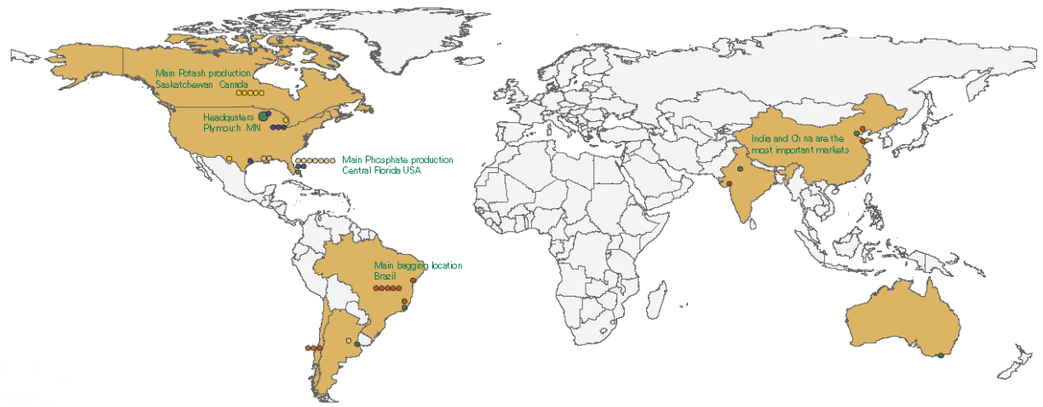


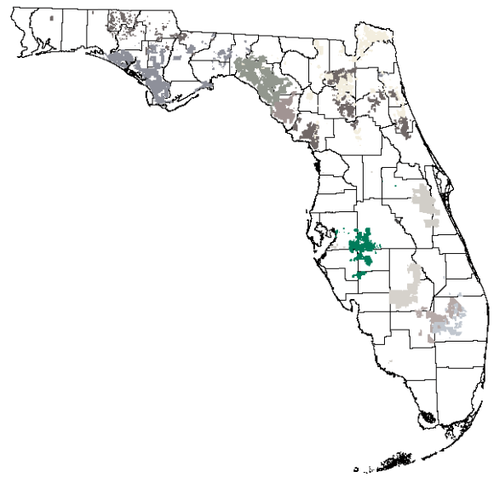
No.1 Phosphate Company

With headquarters in Plymouth, Minnesota, Mosaic operates in ten countries, employing 7500 people worldwide and 3500 in Florida. With their phosphate production in Central Florida and potash mines in Canada they are the world's biggest and second-biggest producers respectively.

Mosaic®

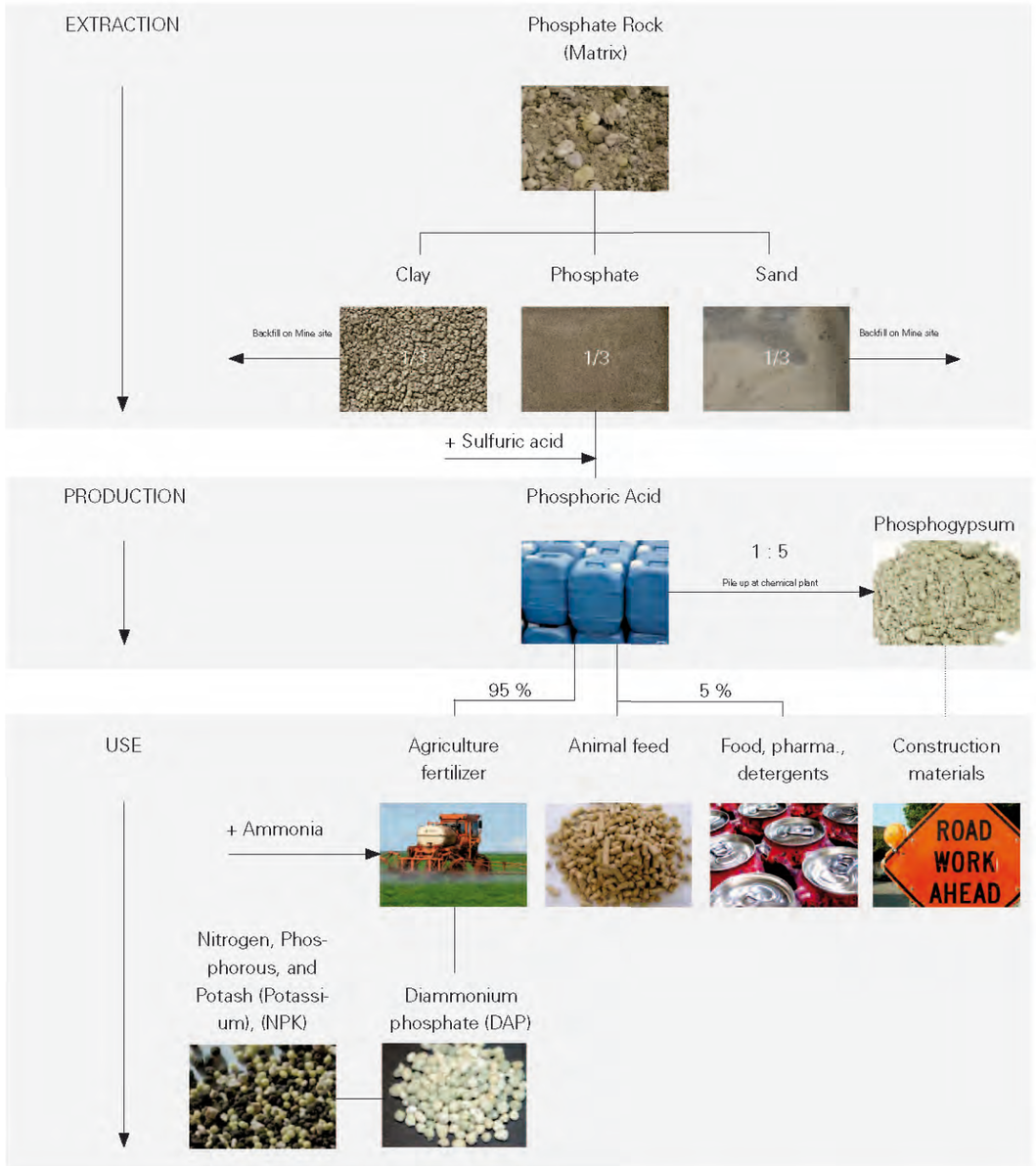
"Feeding the world"

Formed by a merger of Cargill and IMC Global in 2004, the Mosaic Company is a global player in the nutrition business.



7th largest landowner in Florida

More than 100'000 km² of land have gone into Mosaic's hands and are kept there.



Strategic ressource

Phosphorus, the element in phosphate is vital for plant and animal growth. Being a fossil ressource, its availabilty is crucial for any autonomous agricultural economy in the future. With current technology, future availabilty is estimated for the next 60-100 years.

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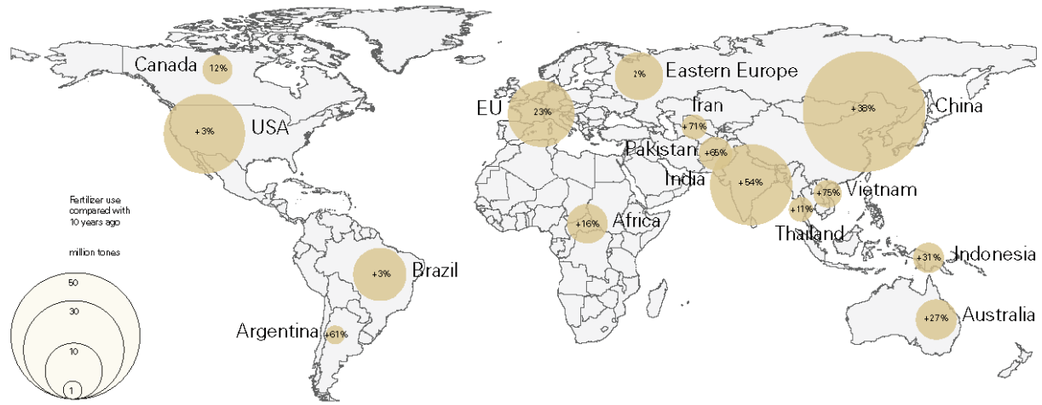
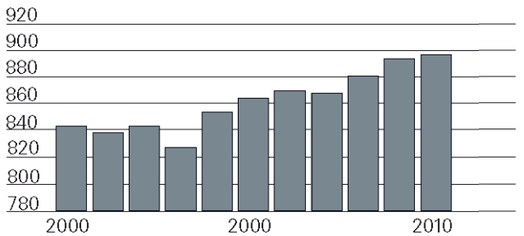


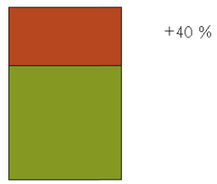
World fertilizer consumption

China and India together utilize 50% of world fertilizers.



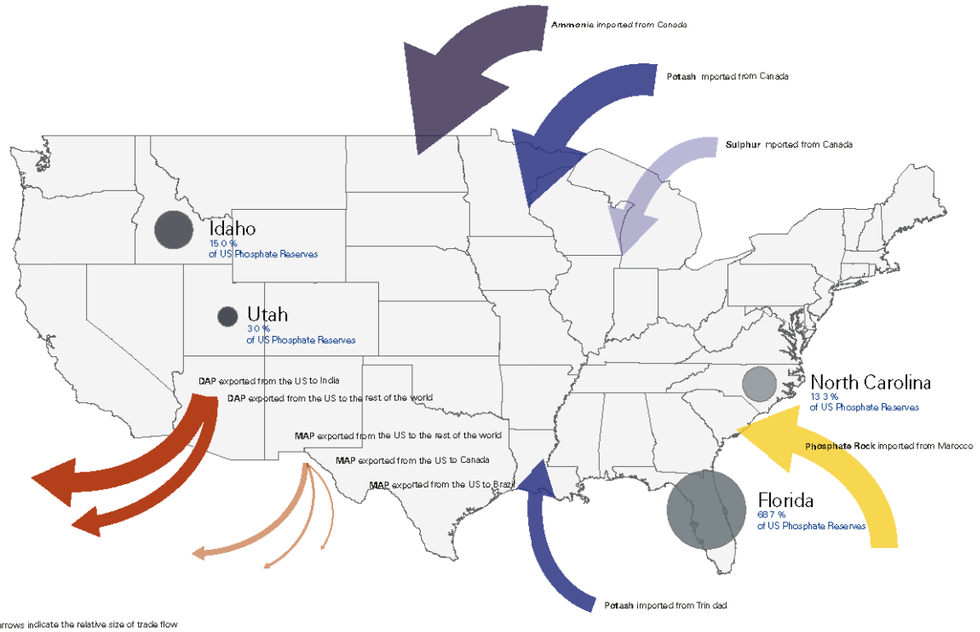
Harvesting acreage

World grain and oilseed harvest area increases.



Effectivity of fertilizer

Fertilizer increases crop harvest by 40-60%, therefore reduces



The US dependence on imports

US fertilizer exports are worth 3.7 billions of which Monoammonium - and Diammoniumphosphate are 2.7 billions. Most of this goes to India and Brazil.
For the processing of phosphate the US rely on additional imports form Canada and Trinidad.

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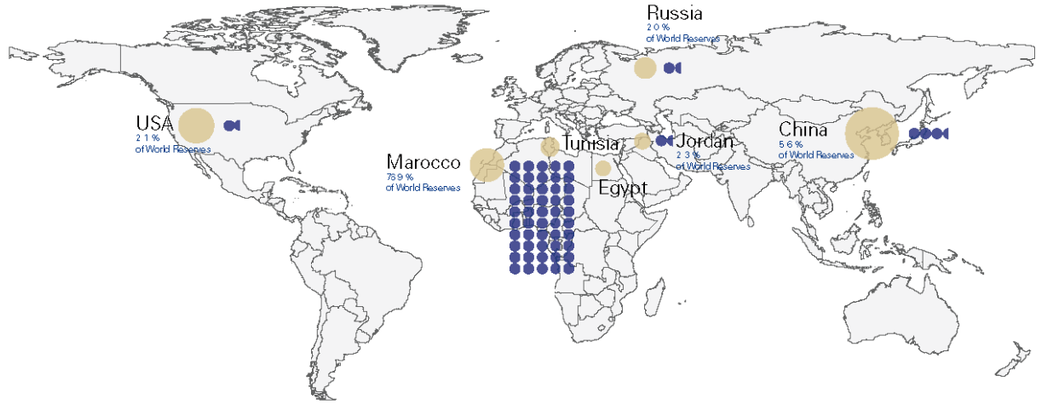
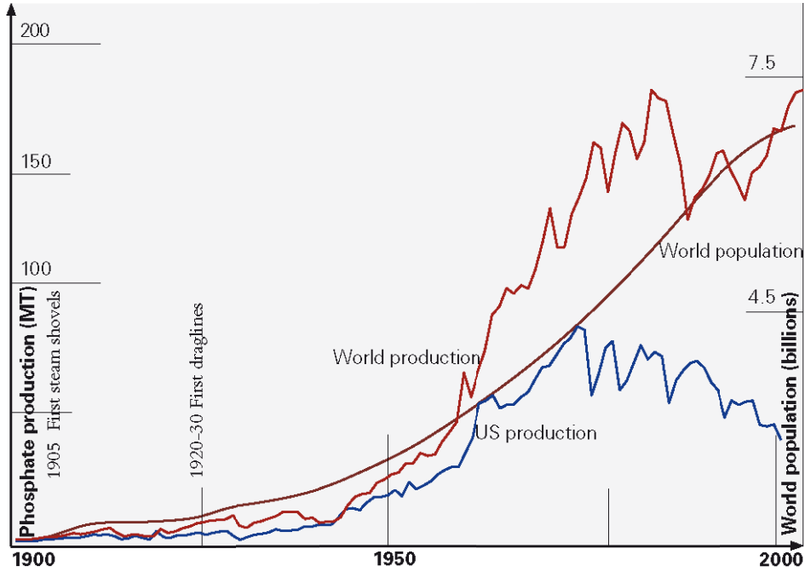


Distribution of phosphate reserves

China, the US and Morocco make up 66% of the world market. But only in Morocco there are extensive ressources for the future.



Shift of markets

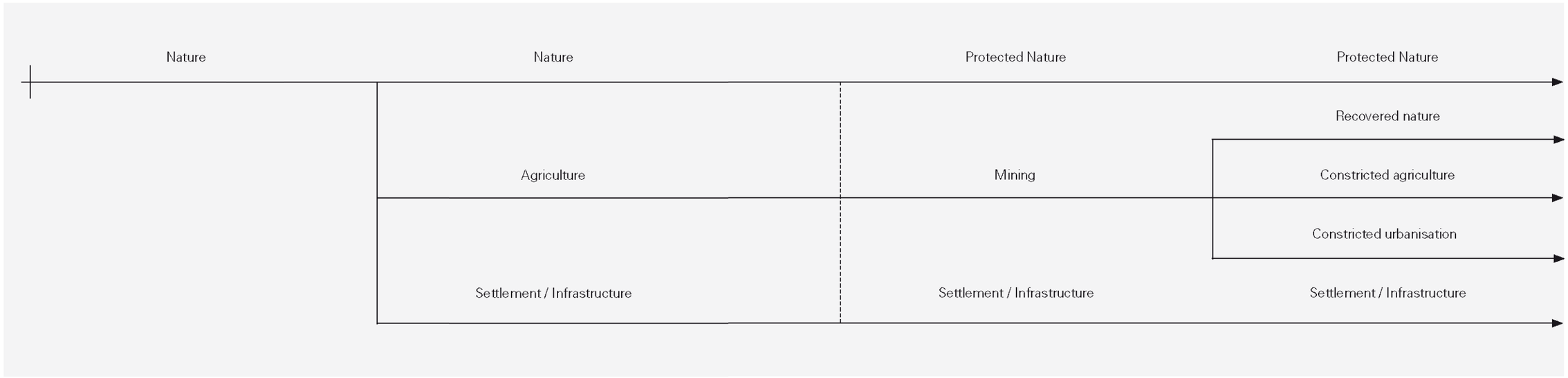
US phosphate used to be as much as 80% of the world production. With its ressources drying up, its share of the global market is shrinking.

Wauchula, Hardee County

North Pasture, Hardee County

South Fort Meade mine, Polk County

Mulberry, Polk County



Simultaneity of land transformation processes

In the process of surface mining, functioning soils are restructured. What is left are pile-ups of soils of separated particles which can only partly ensure stability and funcionality. Therefore their use becomes limited in possible land uses.

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LANDSCAPE OF PRODUCTION

Florida's phosphate is mined in a land-extensive strip-mining method. In order to get to the precious matrix, about six times as many tons of earth have to be moved and later filled back into the excavated pits. The physical separation of phosphate rock from sand and clay is achieved in the cheap wet process, using vast amount of water which is flushed into large ponds where the materials settle out.

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Pit Mining

Early mining was done with wheelbarrows, picks and shovels. Next came mule-drawn scrapers. The dragline significantly changed the mining operation. In 1900 it took a year to mine a 15-acre mine site with picks and shovels. Today, a dragline mines 15 acres in a month.

Hydraulic Mining

Around 1908 river pebble mining could not compete with land pebble and hard rock. As a result, river pebble production, which peaked in 1893, ceased entirely.

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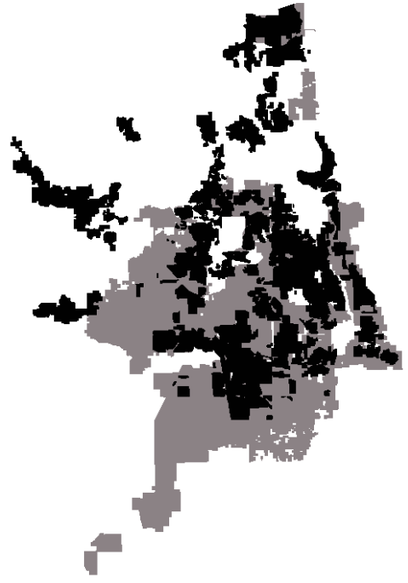
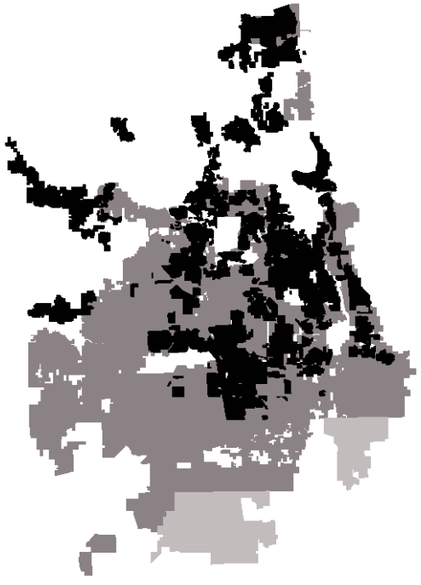


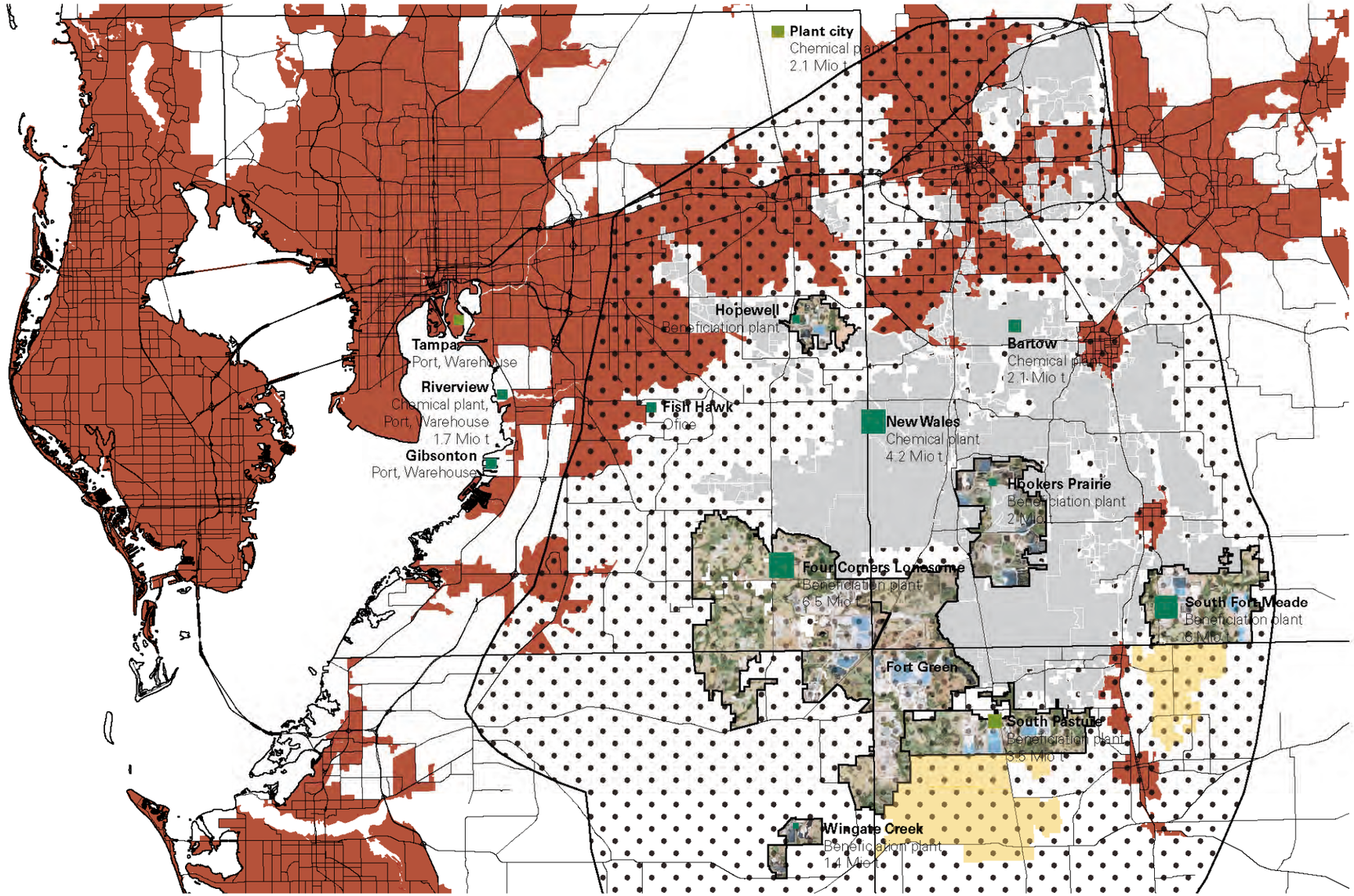


Steam Draglines

Mechanized excavation began between 1900 and 1905 with steam shovels. Early steam shovels held only one cubic yard of earth, but one steam shovel operated by three men did the work 80 men could do by hand.

Electric Draglines

Draglines, the current mining tool, came into use with the dawn of electricity and diesel power in the 1920's and 1930's.



Mosaic
CF Industries
Former mines
Future mines

Territorial Expansion

Higher standards and increased economic pressure have reduced the number of companies in the mining business to only two, while in earlier days there were up to twelve major companies operating in the Bone Valley area. Their production cycles are loosely connected and spread out, in Mosaic's case into several locations. There are basically three locations to be differentiated. The mining site and physical processing, the chemical plant and the warehouse and port.

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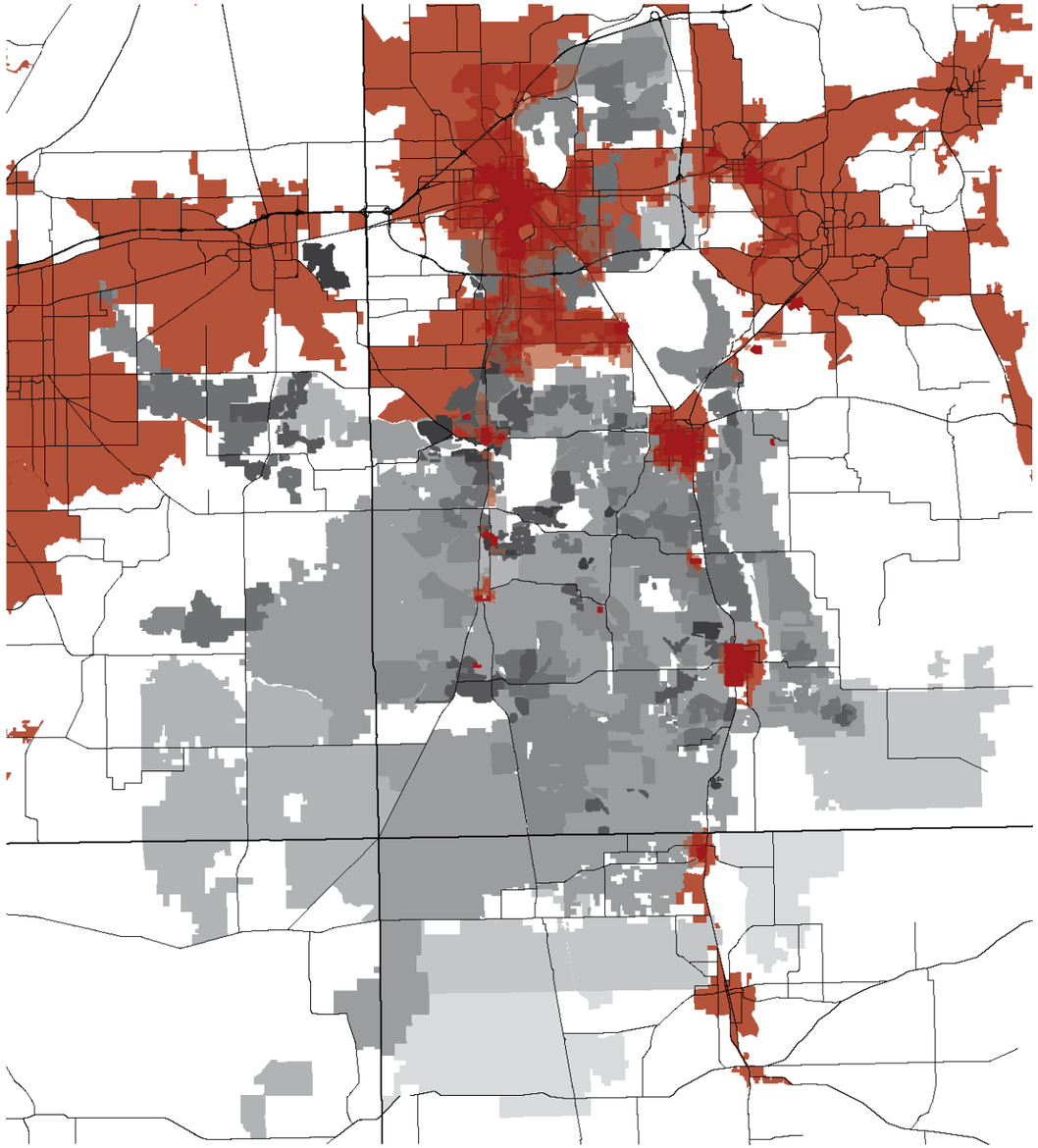

Moving southwards

In the early days, mining was dependent on proximal towns. As mobility and efficiency increased over time, the mining industry has moved southwards, the only direction where mineable phosphate is found. With increasing industrialisation, demand and reclamation requirements, properties have become disproportionally bigger.

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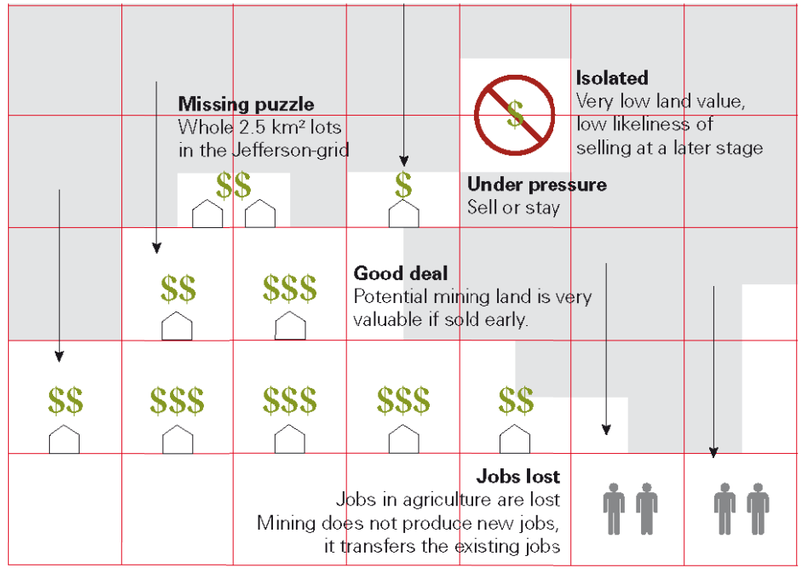
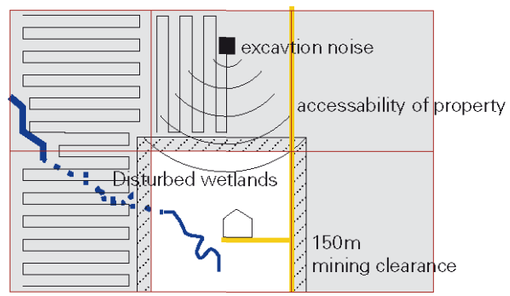


Usurpating land buy

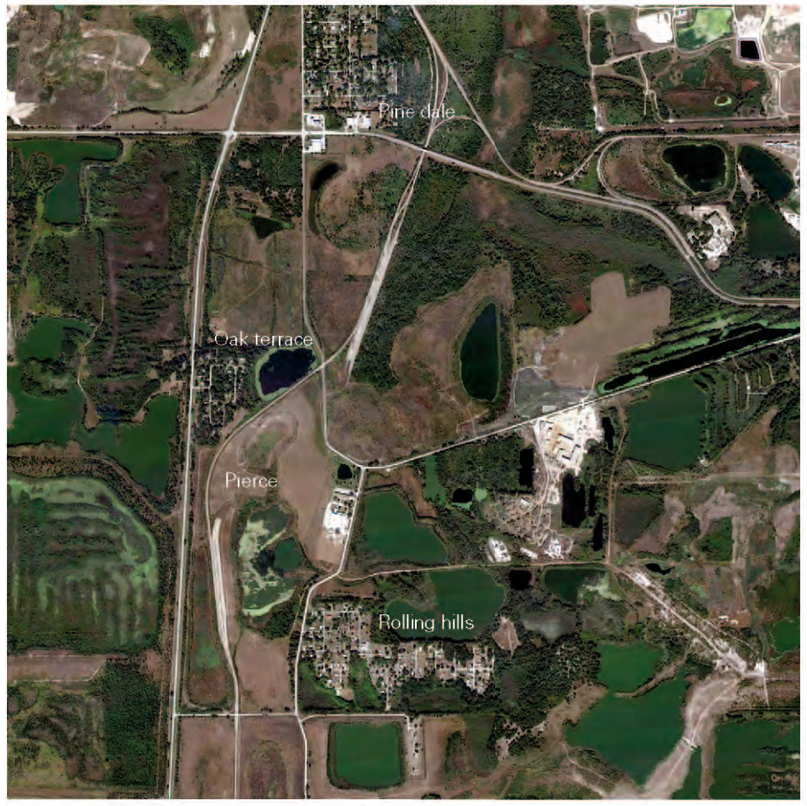
Money and the impacts mining brings with it are very convincing tools in getting people to sell their land.
The Jefferson grid is the basis on which parcels are divided up. The grid dimensions measure 1mile by 1mile



Mining area
Jefferson Grid
Street
Wetlands

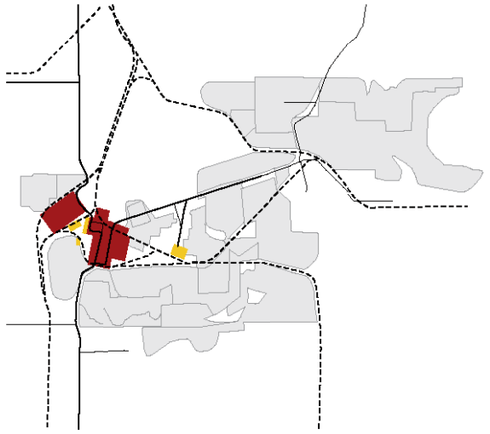
A Mining Company as neighbour

Physical and visual emmisions and restrictions in functionality compromise the use of a property next to mining.

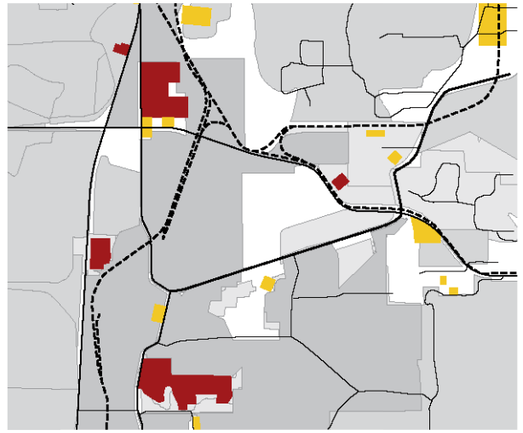


Mining can move towns

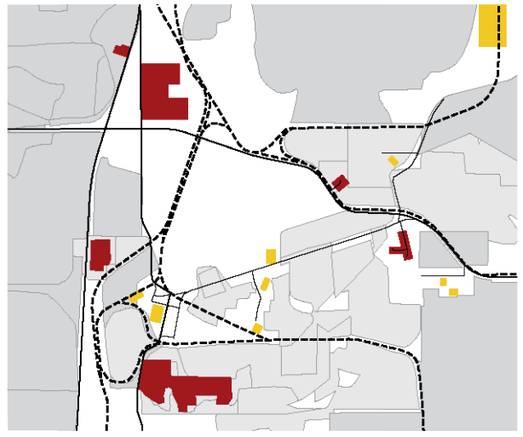
Pierce was a company town founded by the American Agricultural Chemical Company for their workers in 1906. Those days, proximity to the otherwise remote locations was crucial to the companies. When sewage became a problem, it was decided to split the town and move the houses into three separate locations, two of them on previously mined land.



1950



2010



1987

Major road
Minor road
Railroad
Infrastructure
Town
Mining 1987 - 2010
Mining 1950 - 87
Mining - 1950

The original town

Pierce was still strongly connected to the industry, although most company towns were closed in the 30s when unions started to negotiate contracts. The railroad and highway 37 had passed through it.

Dispersed settlements

No new town was founded, but the houses dislocated to three small, but already existing villages. With the split came also social segregation. While poorer families tended to stay in the area, wealthier moved to Oak terrace or could afford to commute from nearby cities.

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White collar

Oak terrace is the settlement where the wealthier employees of the mining company has moved. It is rather small and there are mostly two-storey houses. It is situated on a ridge on mined land with a view on mining north of Pierce that had happened at the time.

Blue collar

The poorer employees moved to Rolling hills (or Pine Dale). It is situated within the woods and does not have much to offer, except for reasonably large lots around one-storey houses.

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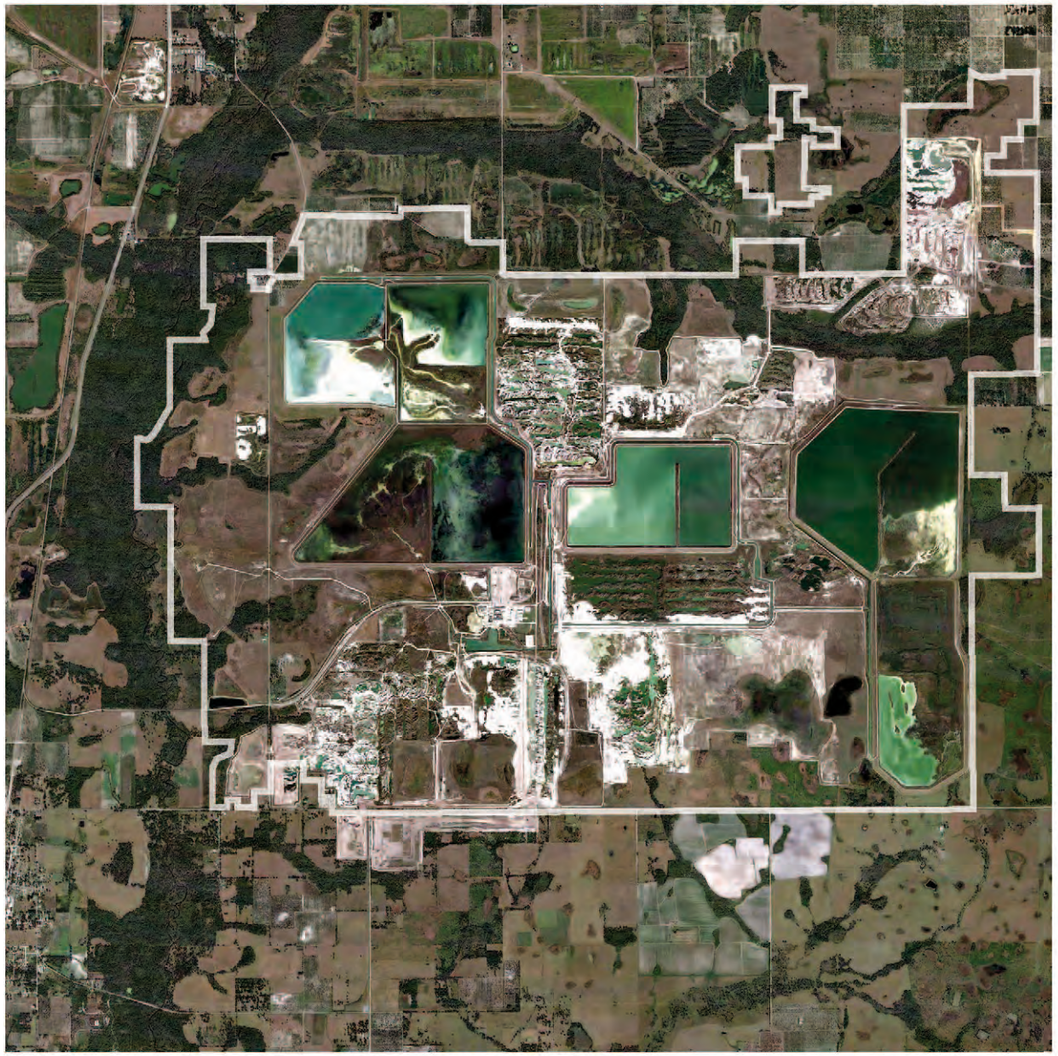
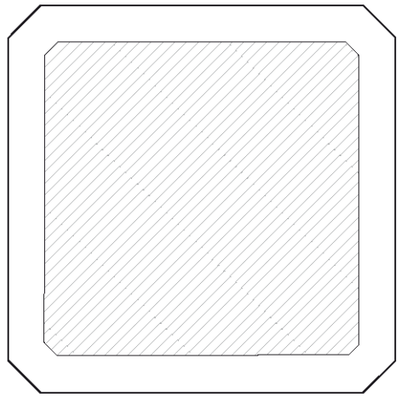


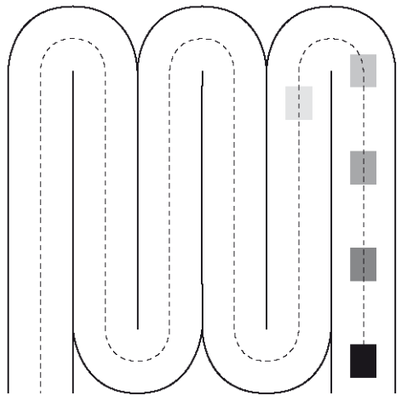
Systematic contouring

The mining of the land happens in a system based firstly on process efficiency and low cost and secondly on environmental concerns. Due to the huge masses and long distances of the operation, proximity and effectivity is extraordinarily important. The dimensions of how the landscape is shaped visually in its consistency are epic. For financial and other reasons, the resulting landscape is unlikely to be altered as significantly again.



Clay settling pond

10m high dams built on stripped land close to the beneficiation plant. A clay-tailings-slurry from beneficiation is gradually poured into the pond, the clay particles settle out, cleared out water is recycled.



Strip mining

The land is mined in slopes, covering the landscape with the same pattern.

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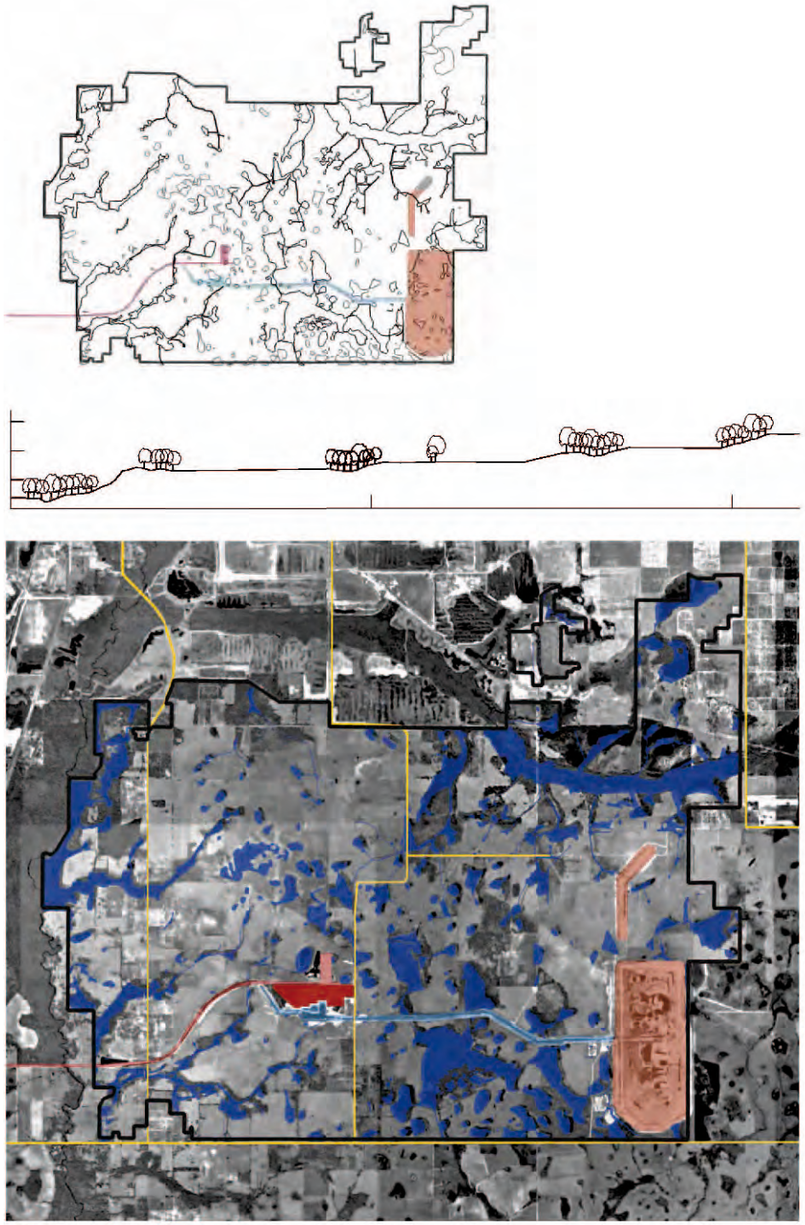

1995

Wetlands
Beneficiation plant
Strip mining
Clay settling area
Roads
Backfill reclamation
Infrastructural canal

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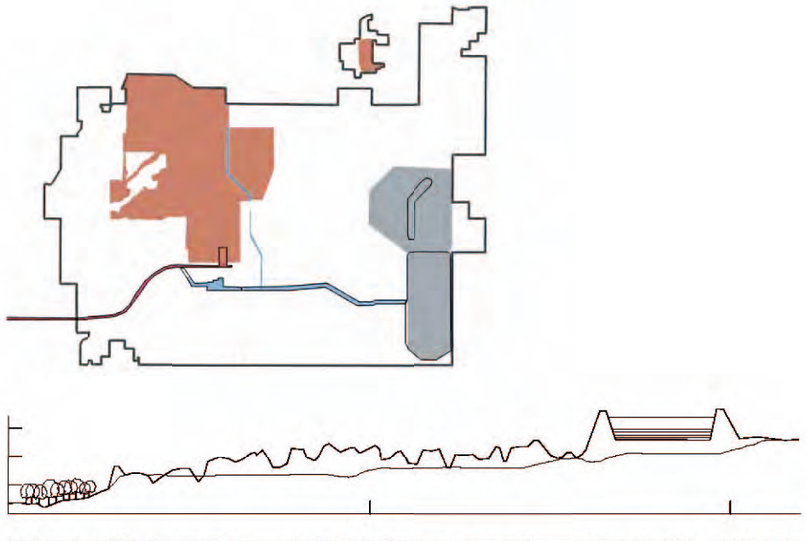
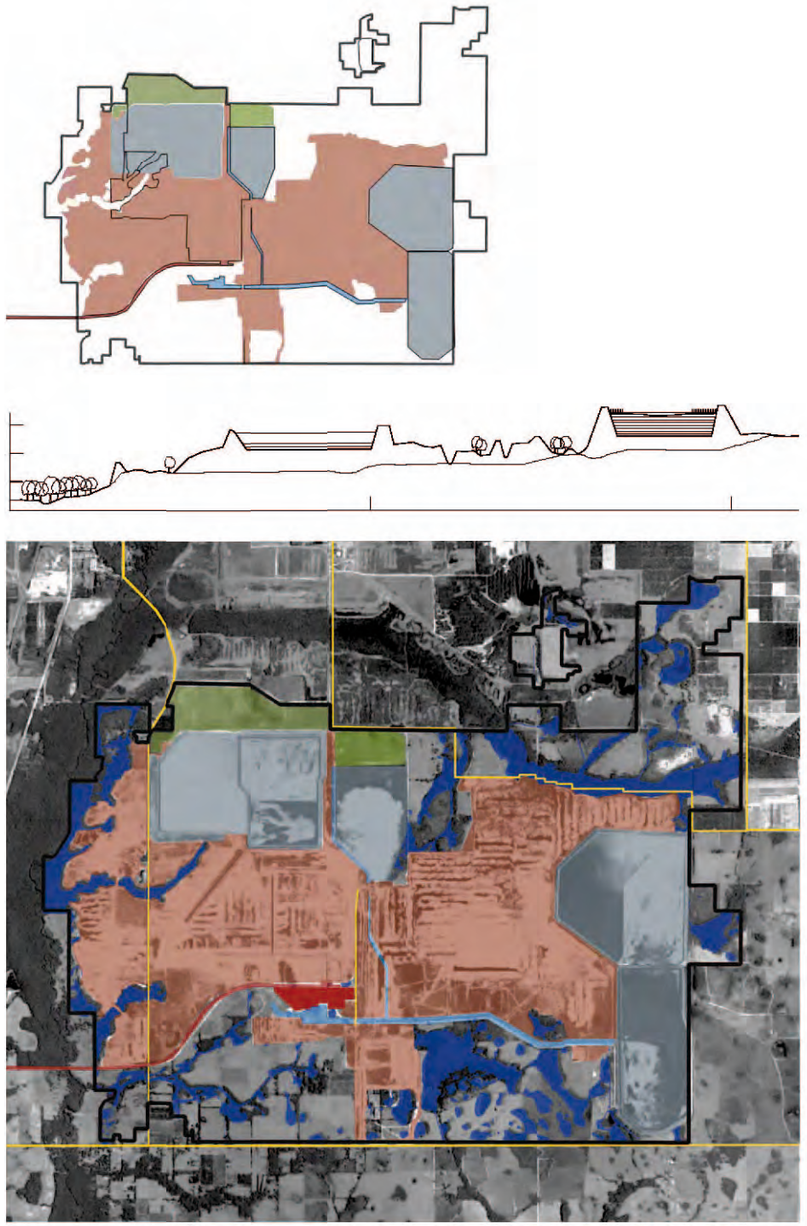
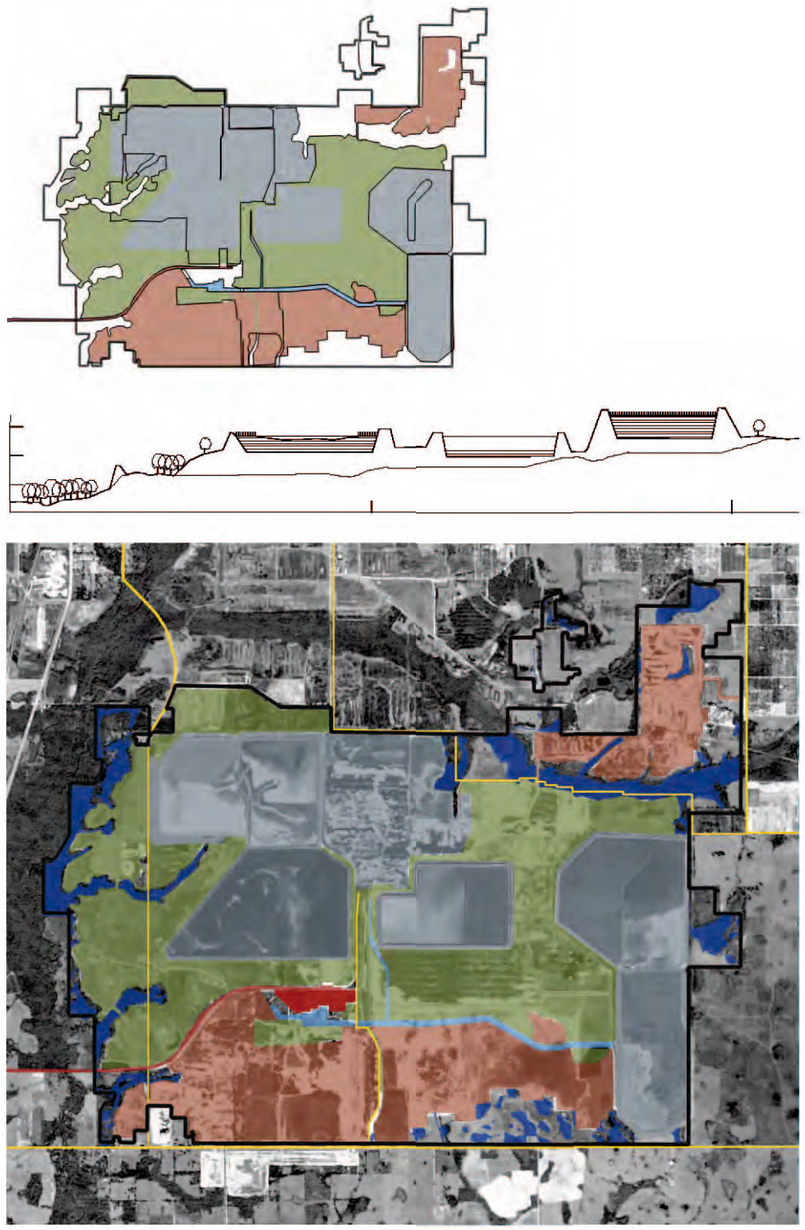


1999



2004

Wetlands
Beneficiation plant
Strip mining
Clay settling area
Roads
Backfill reclamation
Infrastructural canal



2010

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Extraction of matrix

The Bucket is placed on the spot and pulled back, scraping off up to 60m³ of matrix in one cycle.

Removal of overburden

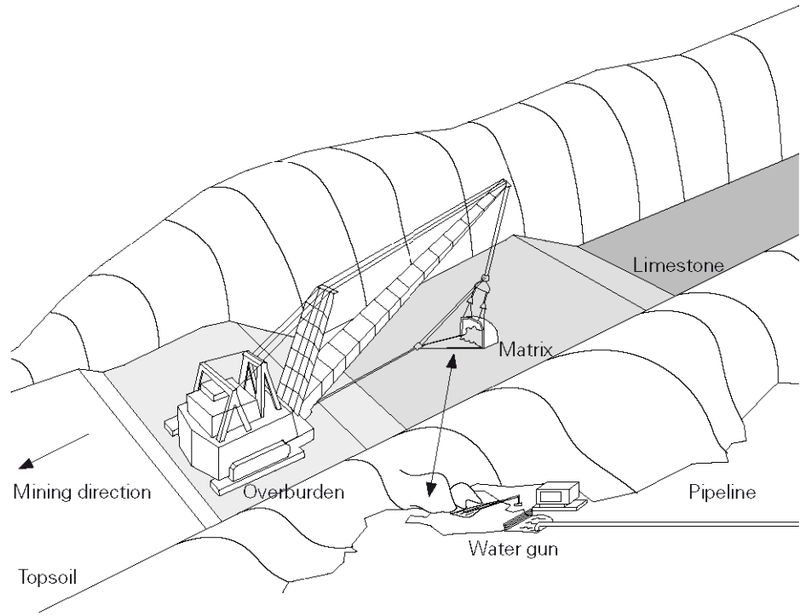
First the overburden needs to be removed. By dragline it is stripped off and piled up in the recently mined pits to the side of the actual pit.

Pipeline

The matrix-slurry is transported up to 10km to the beneficiation plant.

Slurrying of Matrix

The Matrix discharged into a small pit where it is slurried by a low-pressure water gun.



Mining direction

The dragline moves backwards, leaving a mined dregde.
Overburden is piled up to one side and matrix to the other.

Production landscape

Sand out of the benification process is being pilled up temporarily, to be filled back on the mine site.

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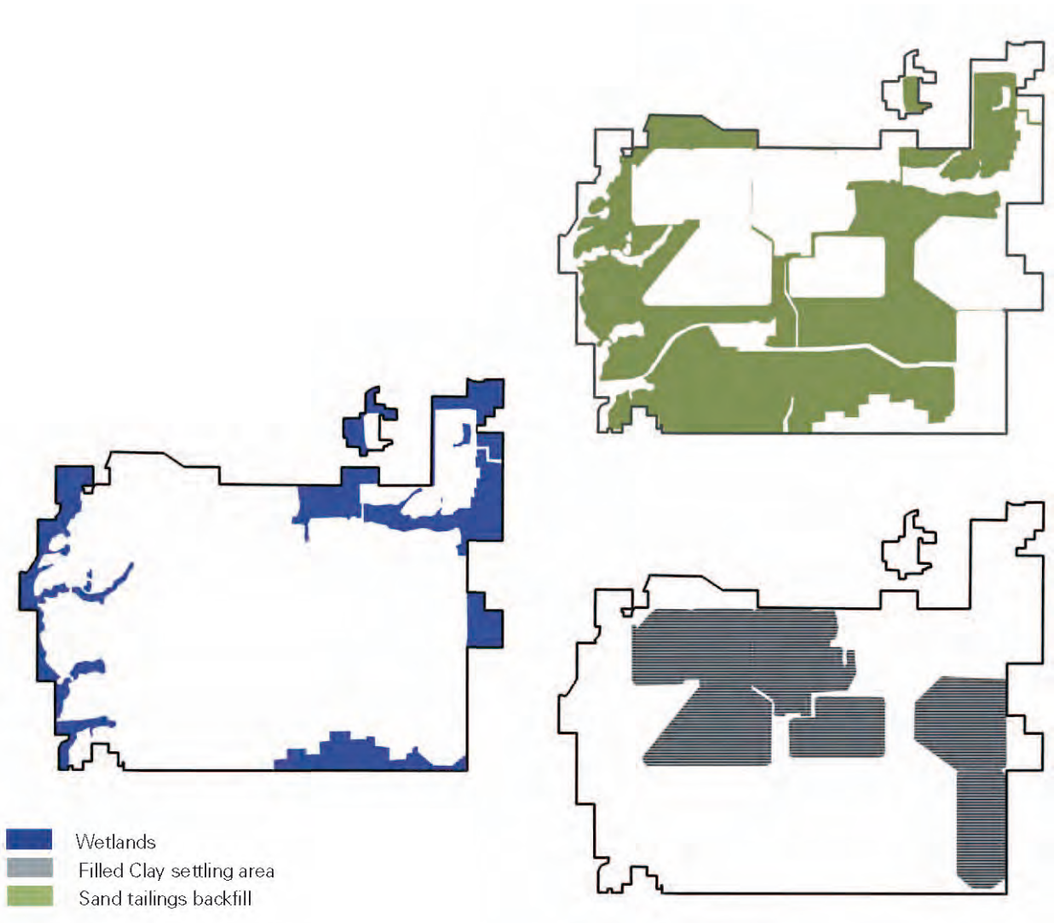
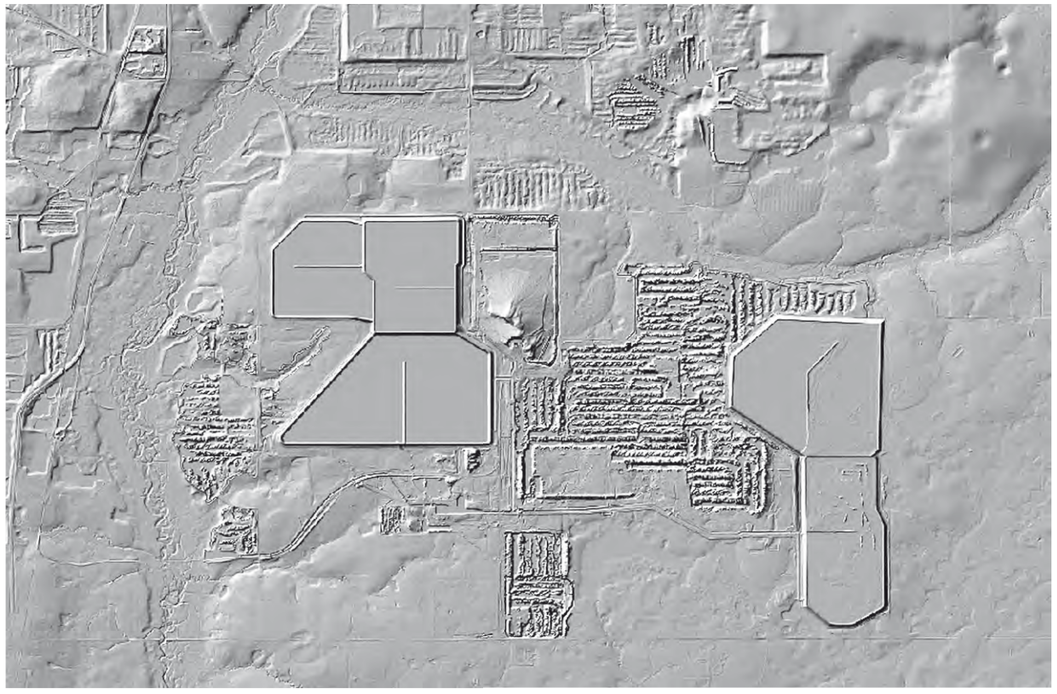


Permanent land elements

Wetlands and conservation areas are highly protected zones, if wetlands are disturbed 1/4 more area have to be replaced on a site.

Backfill and change of elevation

The Matrix discharged into a small pit where it is slurried by a low-pressure water gun.



Amplified scale

The most significant transformation is the much larger scale of the transformed landscape. A clay settling pond, basically a 10m high dam can reach dimensions of 2km by 2km, creating almost arena-like sceneries.

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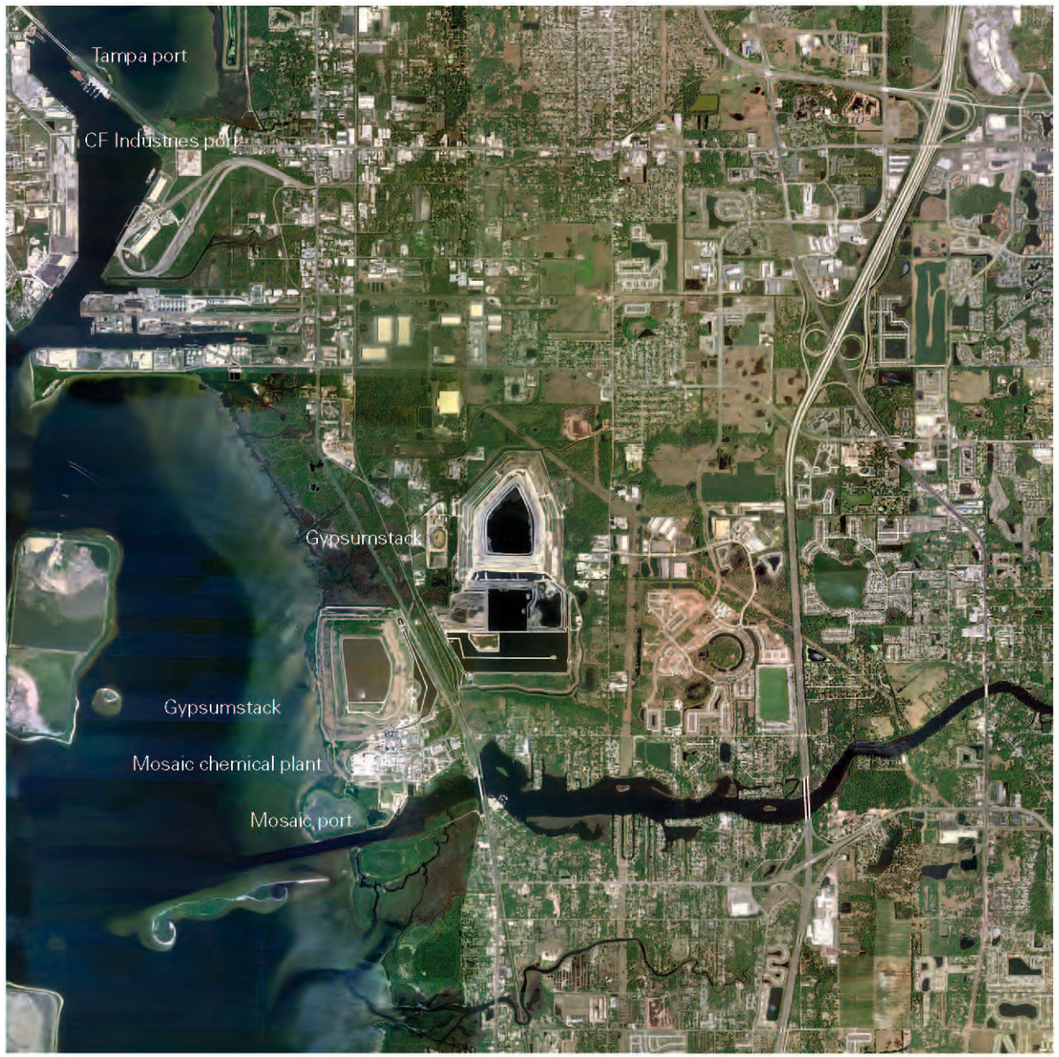

Phosphate landmarks

Gypsumstacks are needed for the long term storage of the slightly radioactive phosphogypsum which is a byproduct of the chemical process of phosphate. The areas around the stacks are highly protected to prevent the public from encountering the hazardous materials. The stacks are always next to the chemical plants where phosphate rock is processed into phosphoric acid and then into fertilizer products Monoammoniumphosphate and Diammoniumphosphate.

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Geometrical mountain

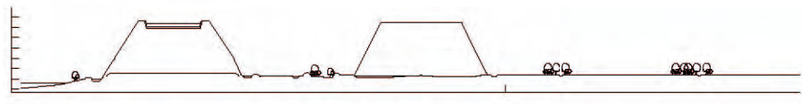
Visible elevation curves.

Marking of the production sites

The stacks mark the landscape and indicate the associated chemical plants. The areas are strictly shielded from the ambient environment.

Closure of stacks

The Gypsum stack is covered up with a fabric and later covered with topsoil.



Long term storage

The stacks are created to store the waste gypsum over a long time. There is no intent to use it in any (touristic) way.

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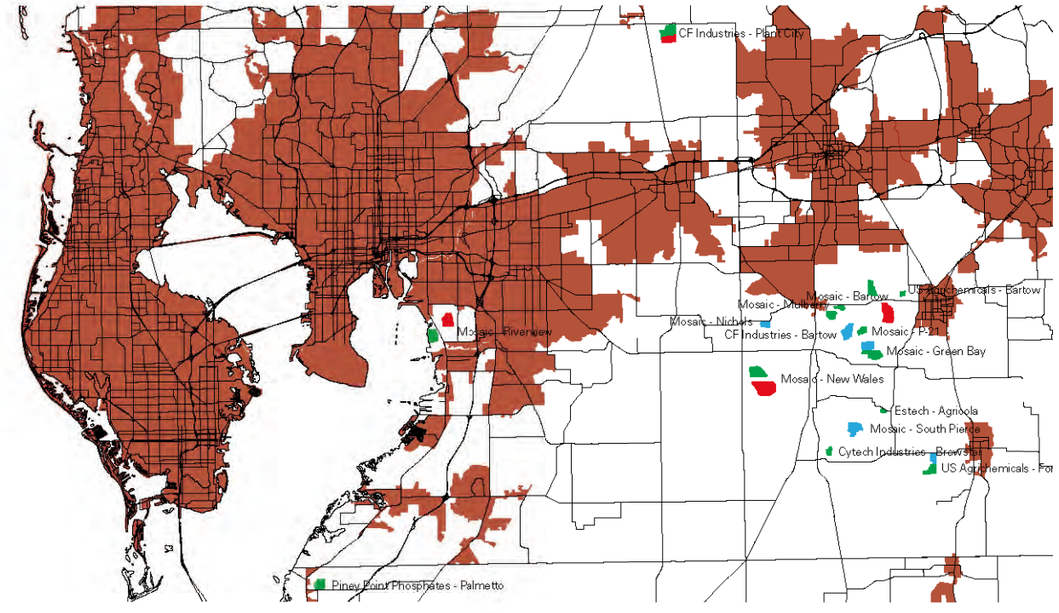
Florida's mountains

Gypsumstacks can reach heights of 10 up to 60 meters.
They are the highest elevations in Florida



Gypsum stack locations

22 Gypsumstacks are spread over the Tampa and Bone Valley region in 15 locations.

PRODUCTION OF LANDSCAPE

The landscape is a ressource and a product of the mining industry and this duality is inseparably intertwined. The landscape is a portrayal, but also a regulation. The alterations are significant, and invasive, and thus all the more interesting.

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Recreation of nature

In 1975, the Mandatory Act was introduced which obligated every company to reclaim the area they disturb with their mining activity. Reclamation means to bring back the original status as well as possible. This regulation only mentions the superficial, visible entities of the land and not its soil composition. Reclamation includes recontouring of the landscape with bulldozers, into a more flattened landscape, and its initial revegetation. Reclamation has to be started within 7 years after mining and has to fulfil successive 5-year plans. Reclaiming one hectare can cost up to 25'000$.

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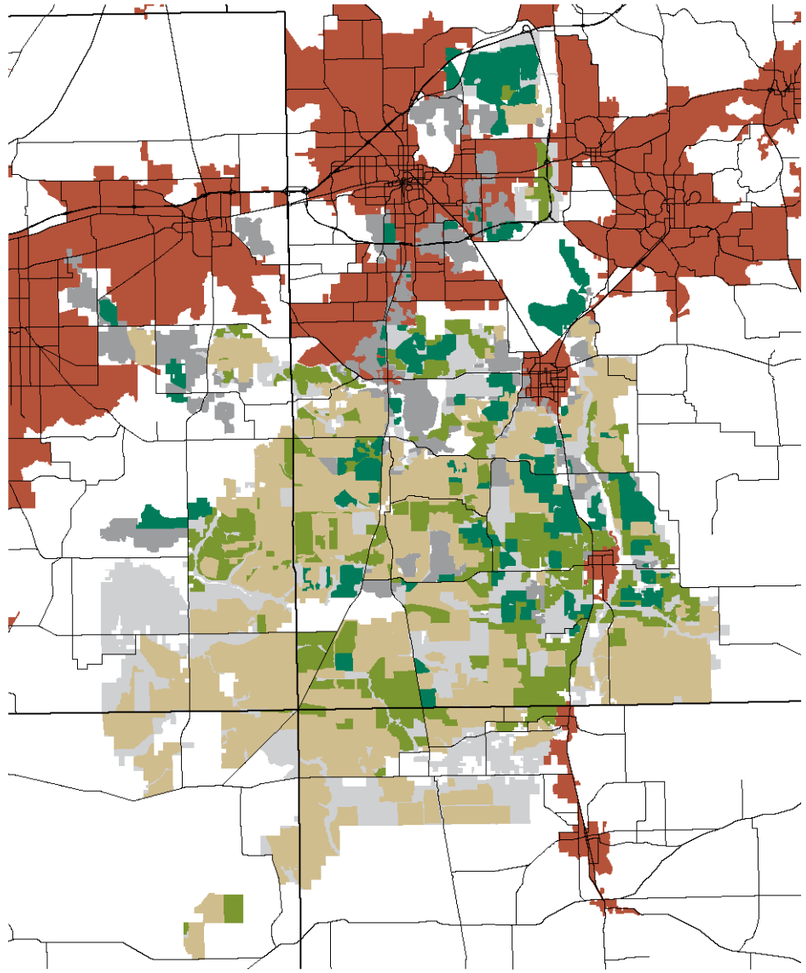
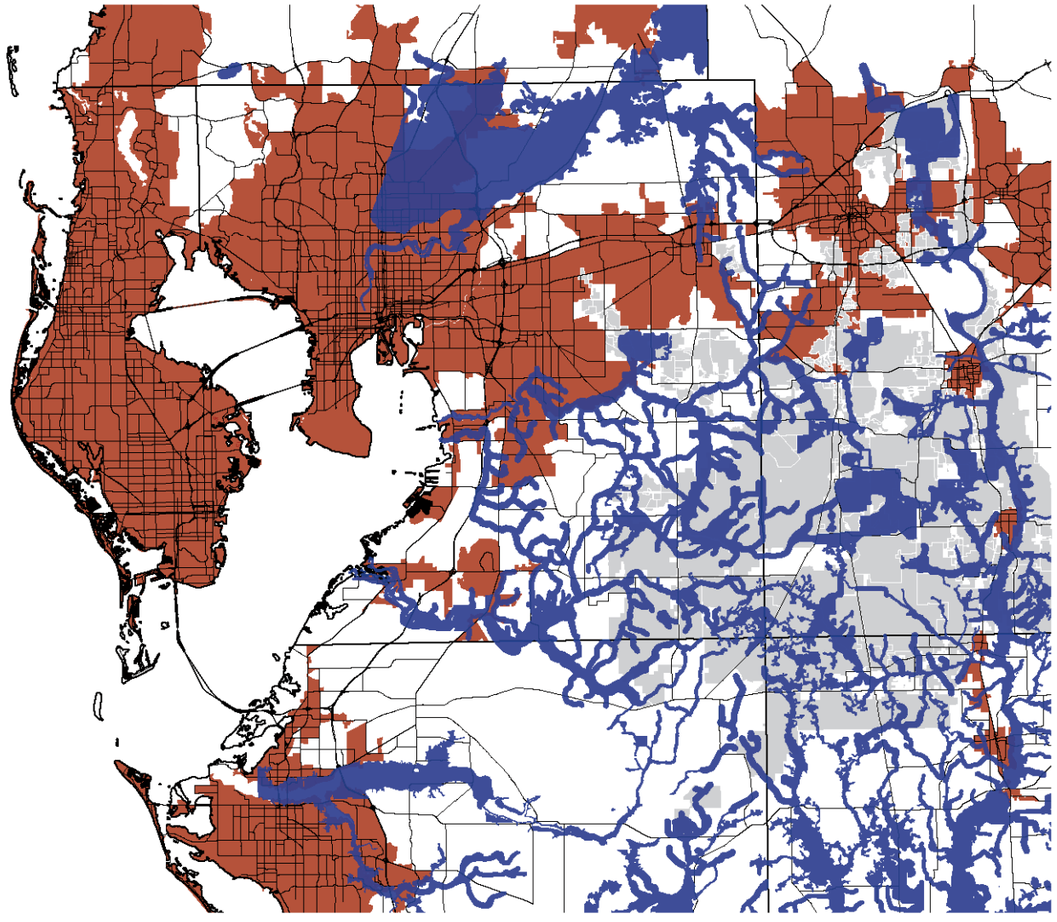


Reclamation status

Most of the areas that have not and will not be reclaimed are situated close to the urban clusters around the Interstate 4, where most of the future growth is expected to be. Non-reclaimed areas are still developable, but may seem more savage than reclaimed ones.



Wetland system
Mined lands

Integrated habitats

The Integrated Habitat Network IHN is a strategy introduced in 1992 that focuses on a sustainable network of environments that may become isolated.

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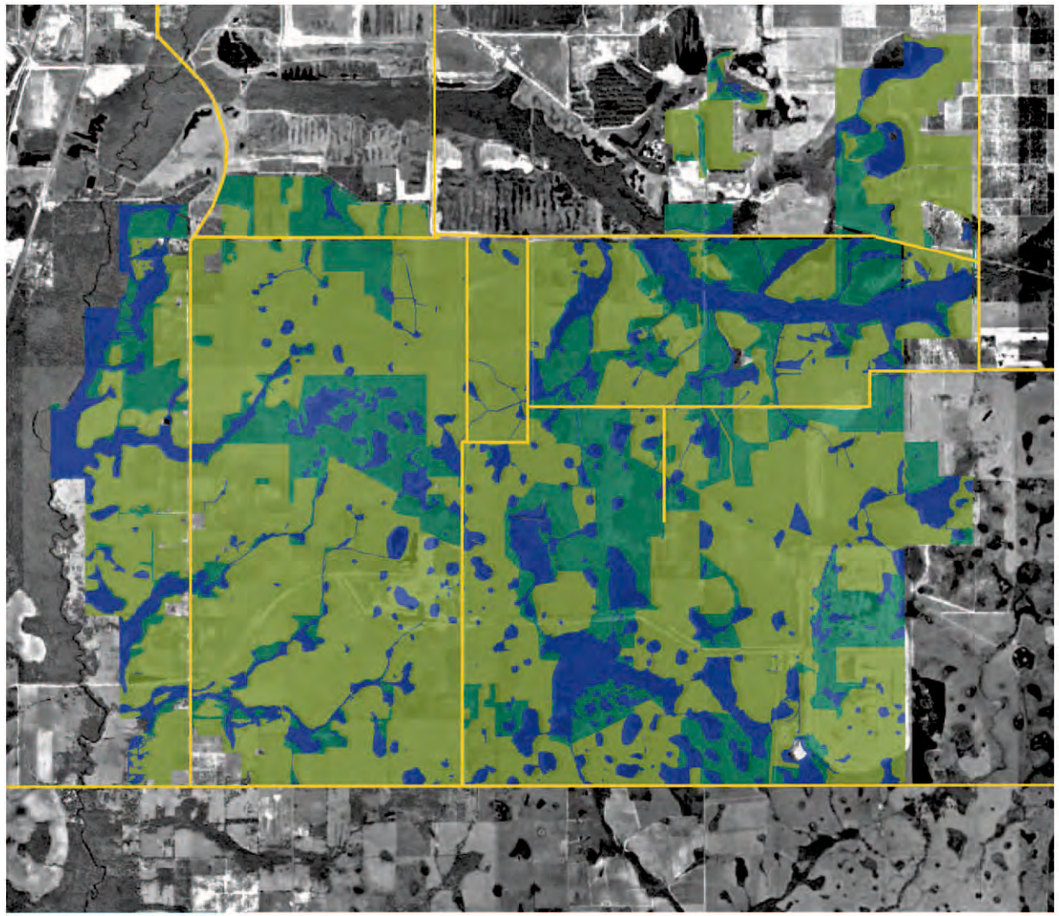
Ecological concerns

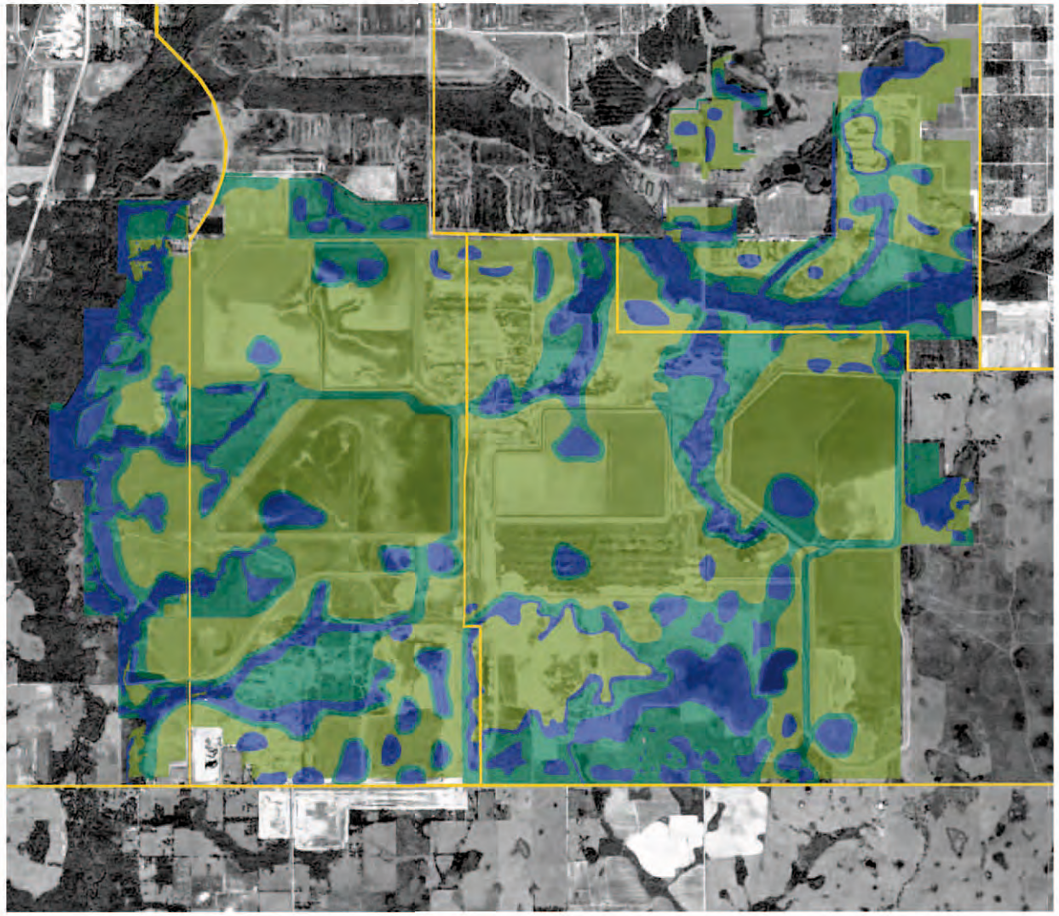
The biggest hazards that come with mining are spills of contaminated waters into the environment during thunderstroms. Water in Gypsum stacks have a verly low pH-level and water in processing are very muddy. Retention basins have been built as precaution.



Wetland
Forest
Agriculture

Wetland capillaries

Wetlands ensure the water management and habitat of a landscape and are the places with highest biodiversity.



Wetland arteries

Albeit the efforts to try and sustain the wetlands over the course of the mining of a site, the destruction of the microcosms are unavoidable. Instead, in order to achieve the number of square meters that have to be restored, the wetlands are concentrated in corridors, as a resoration of the original state is hardly possible to achieve.

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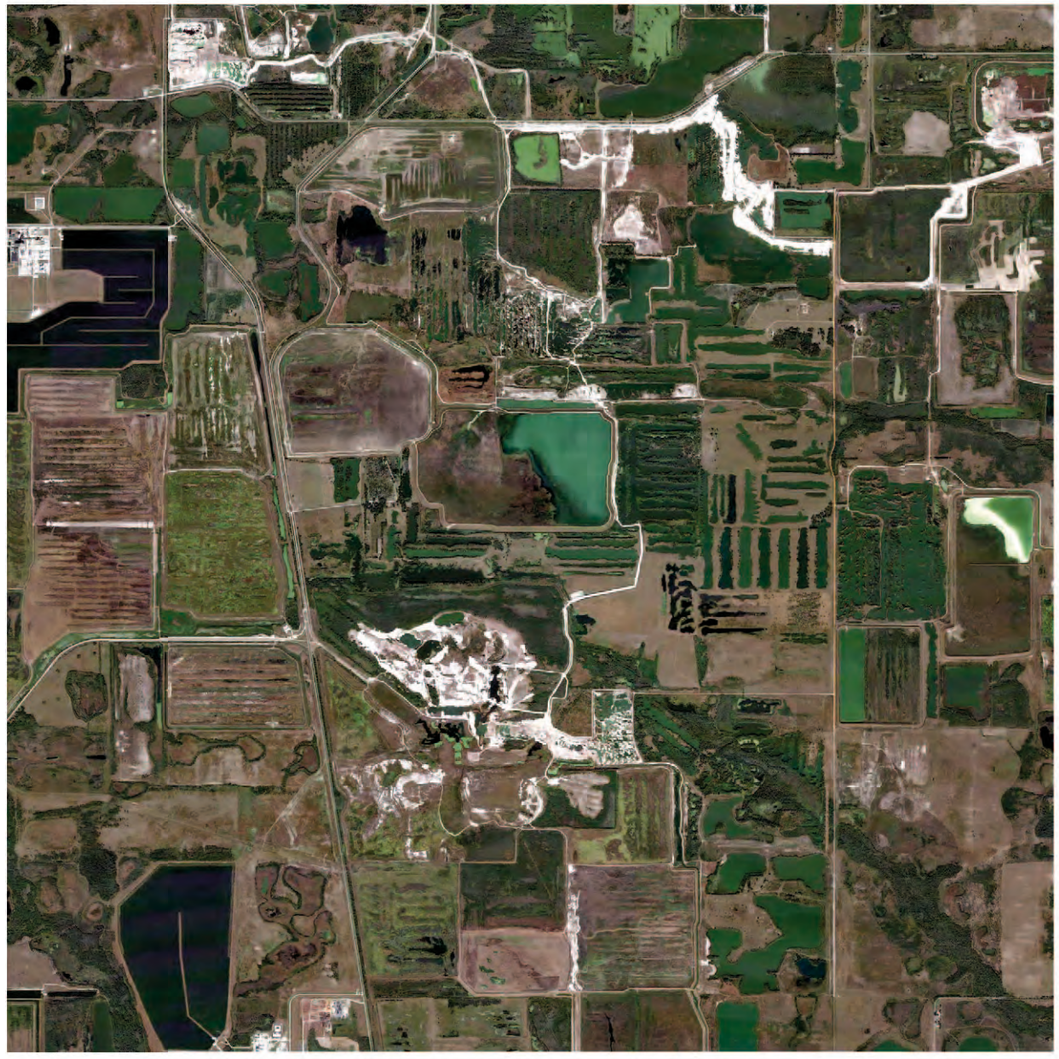

Geometricized landscape

Mining, too underlies the principles of the Jefferson grid, the basic territorial division of the US into 2.5km² lots and further subdivision. In the process of mining, the landscape is magnified to immense dimensions.

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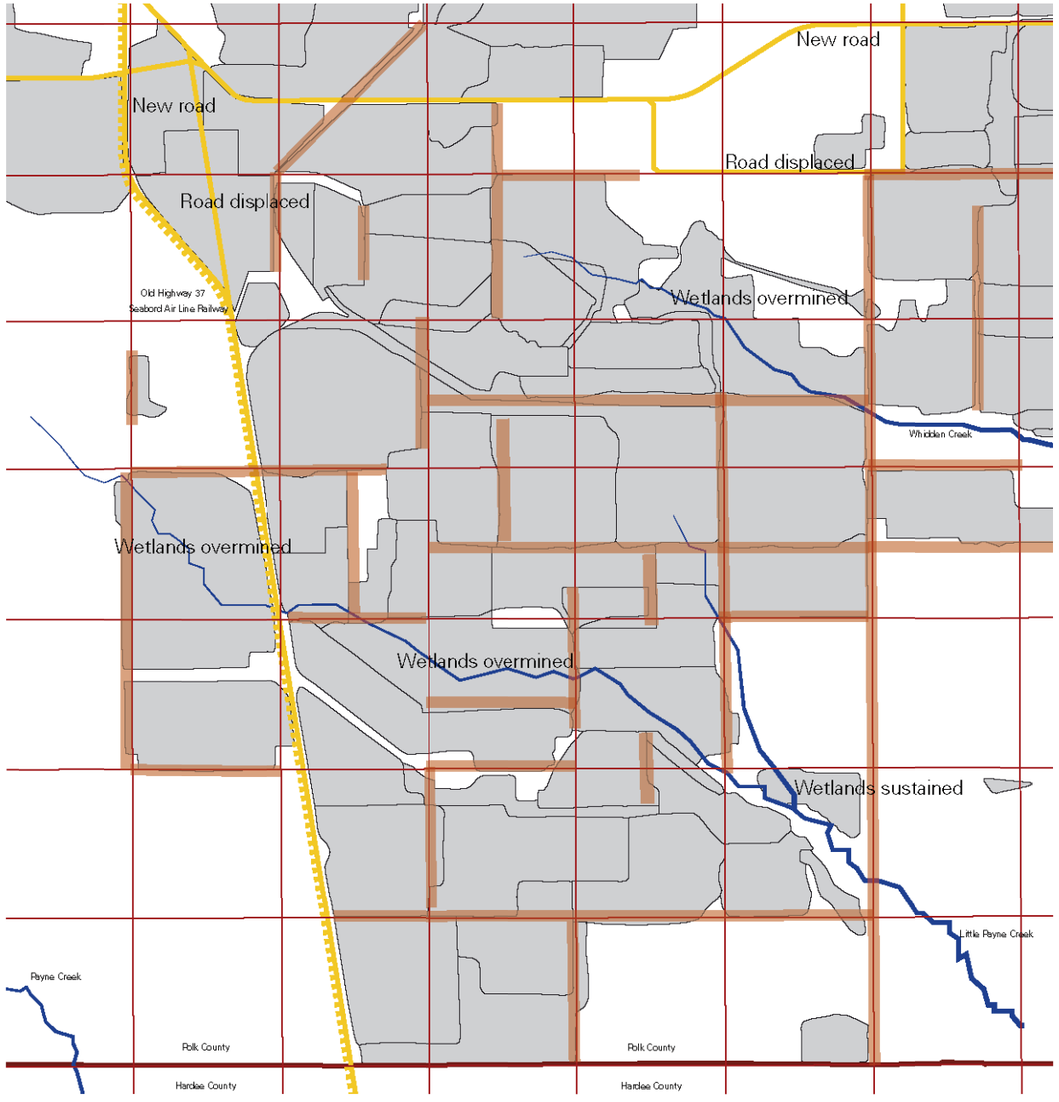
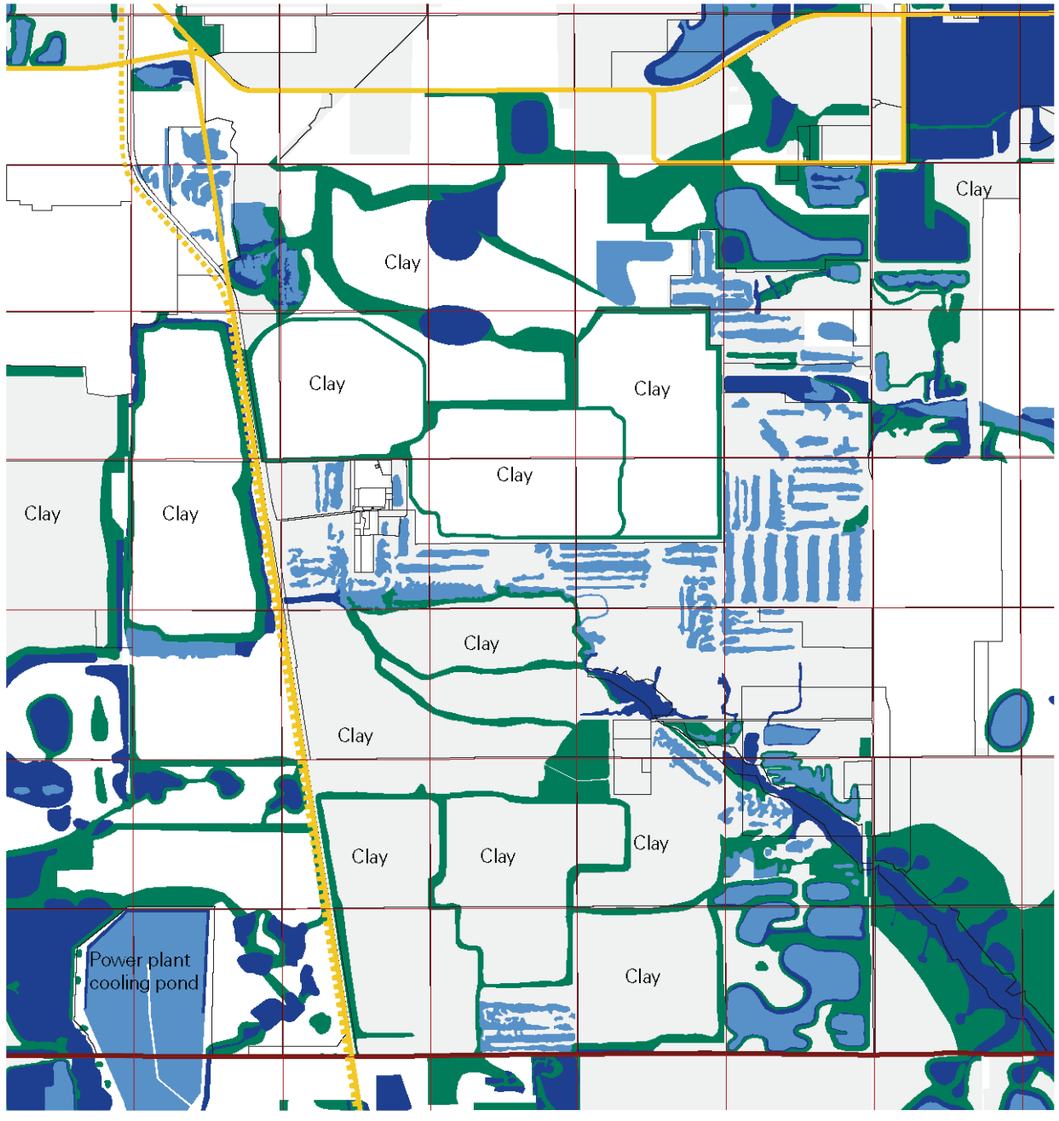


Mine parcel
Jefferson grid
County boundary
Road and railroad
Wetland

The Jefferson grid module

Almost all geometries of a current mine can be derived from the Jefferson grid in wholes, halfs or thirds.



Outlining of parcels

The outlining of the mining parcels is an easy method of hiding human impact on the landscape from view on the ground.

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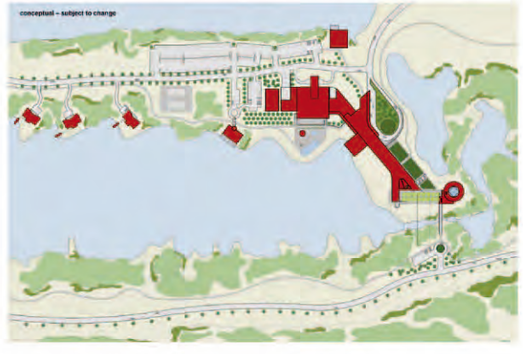
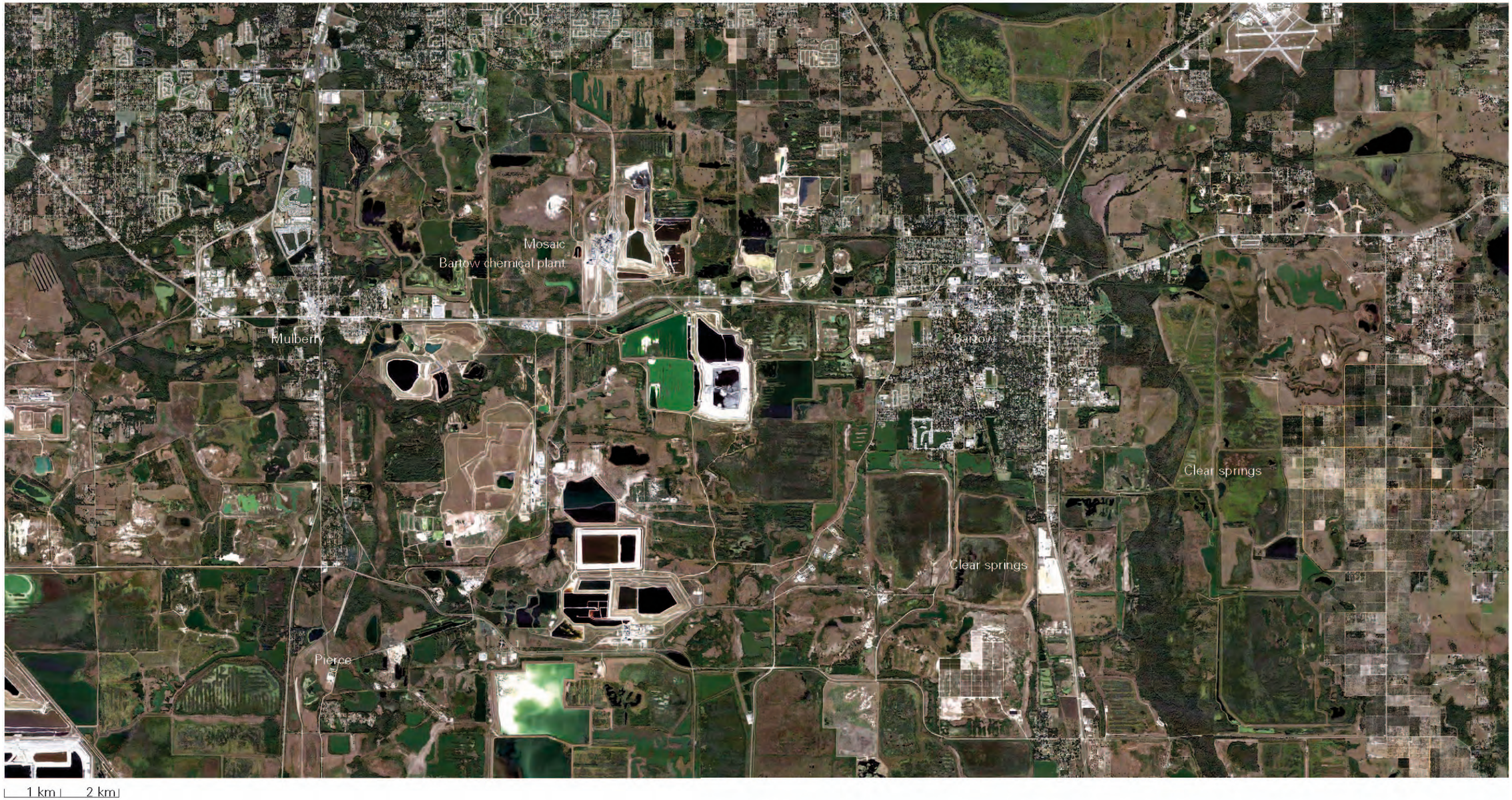
Beautiful wasteland

The spectalcle of the artificial landscape is what should make this resort special. Its remoteness should add on to the experience of going there.



Mosaic builds a resort

Thre streamsong resort is the first site that Mosaic develop themselves. So far they have kept their lands and have sold their land only in small bits.



Amalgam

The district between Mulberry and Bartow is where the history of the region is most visibly imprinted. All of this area around the capital of Polk County and the Peace River has been mined in the past.

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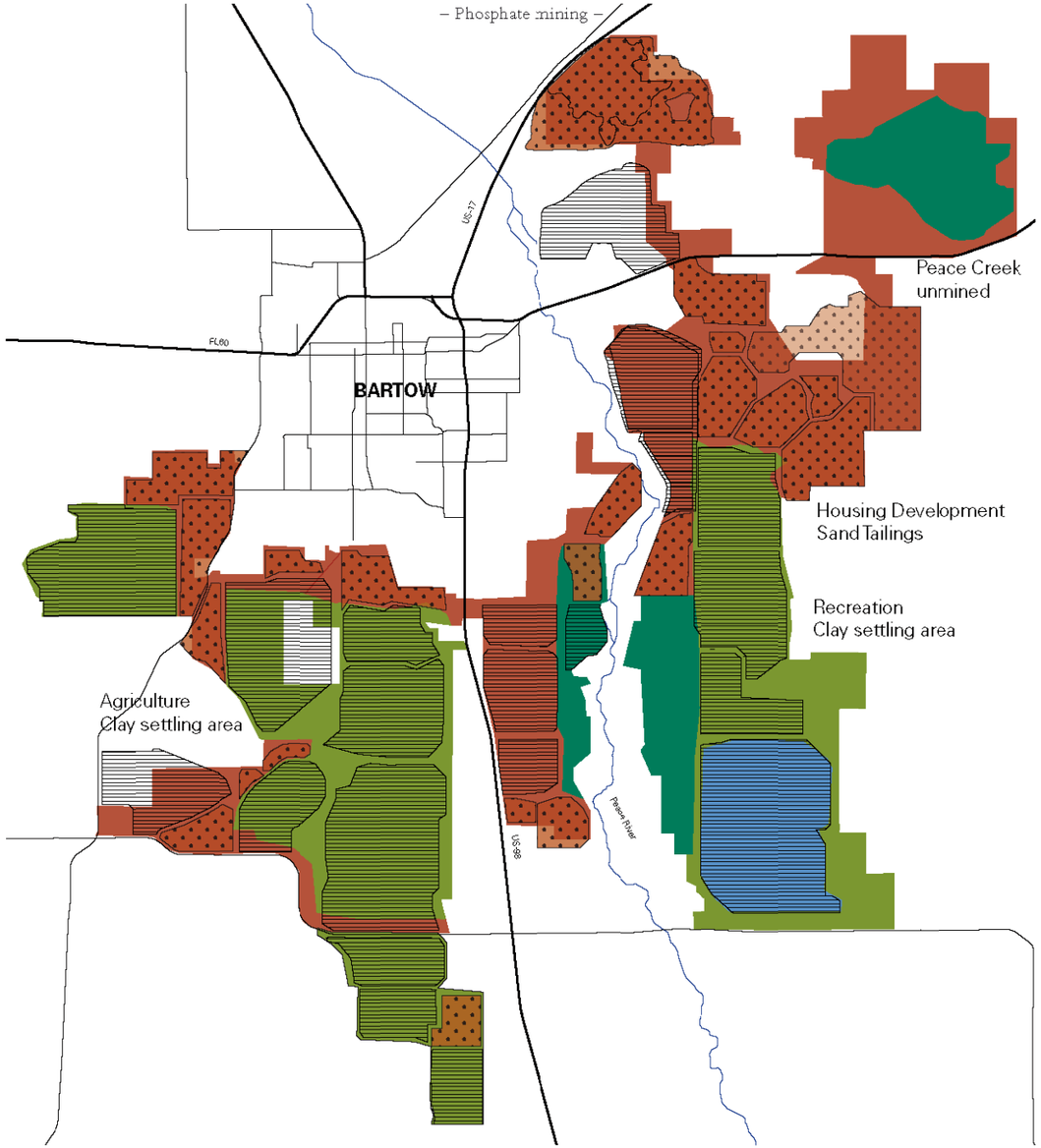

Predetermined Zoning

The zoning in the sector plan for the Clear Springs DRI (Development of Regional Impact) coheres directly with the formerly mined lots.

Visual zoning

The mining pattern remains visible if seen from a ridge.

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Categories of Palimpsests

Mining restructures the environment people live in. Humans always find ways to utilize their environment, whether it has undergone significant transformations or not. The further transformation of what mining has left behind is yet another layer of a landscape that can be read as a palimpsest of former uses. The palimpsest is in these cases a stunning oddity.

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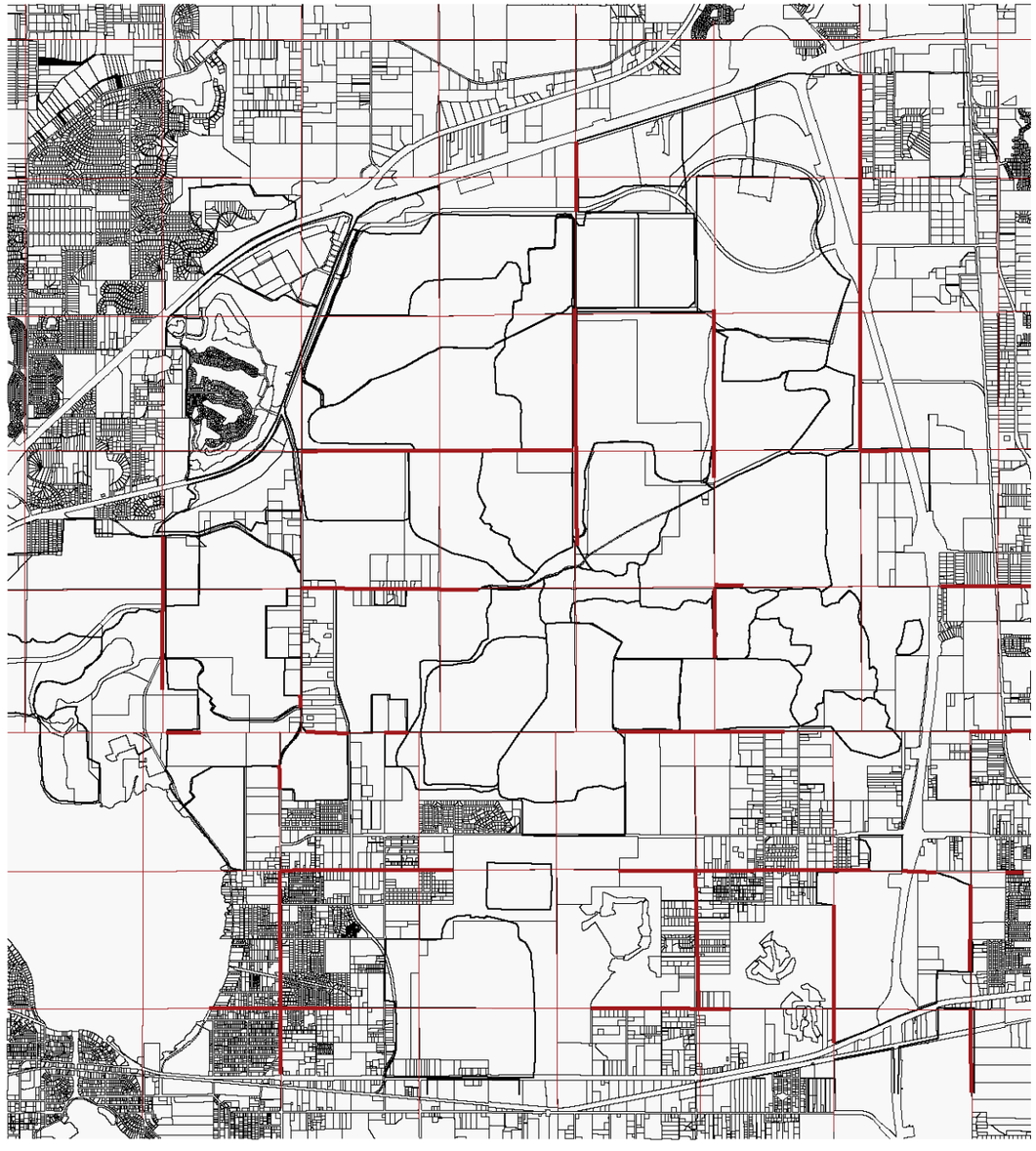

Parcels 2010
Mining parcels
Jefferson grid

Definitions of mine geometry

The restructuring of land geometry is tightly bound on street layout and property limits, while natural boundaries can be overridden more easily.

Imprints in the landscape

Government pegged fares allow for wide-ranging economic accessibility because they are often set lower than market value. The ensuing price topography shapes Assiut's reach in the region and allows for an affordable commute from regions within the 0.60 -1LE price range, around 15-20km from the city core. The ensuing price topography shapes Assiut's reach in the region and allows for an affordable commute from regions within the 0.60 -1LE price range, around 15-20km from the city core. The ensuing price topography shapes Assiut's reach in the region and allows for an affordable commute from regions within the 0.60 -1LE price range, around 15-20km from the city core.

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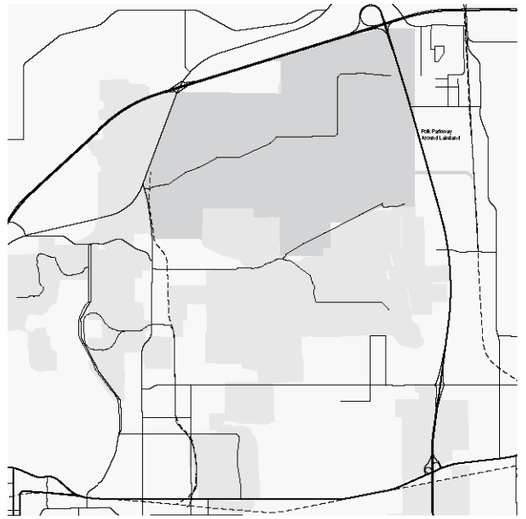
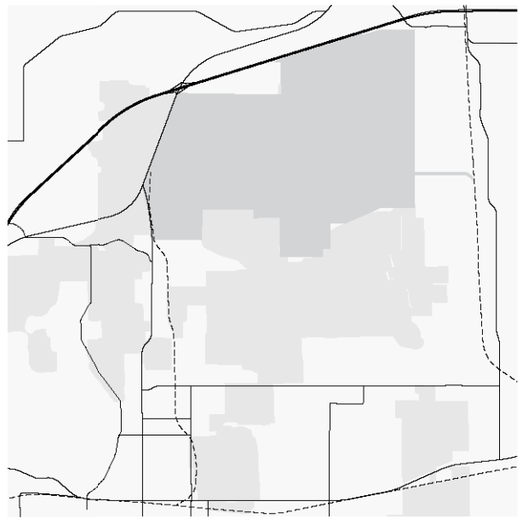
Post 1st-phase mining 1975



2010

Pre-mining 1944



Post 2nd-phase mining 1994

Major road
Minor road
Railroad
Mining 1978-94
Mining 1944-78

Ignored elements

The existing roads get "swallowed" by the mining. Part of the road around the Lake ... is dislocated.

Limiting elements

The Interstate-4 sets boundaries to the mining, Polk parkway is built just around the mining boundaries.

1958

Land and lakes reclamation

Bridgewater had been mined in 1967 and was reclaimed in the land and lakes typology, meaning, the overburden piles get flattened out and the remaining pits are filled with water. In most cases this method is applicated due to lack of backfill material.

1968

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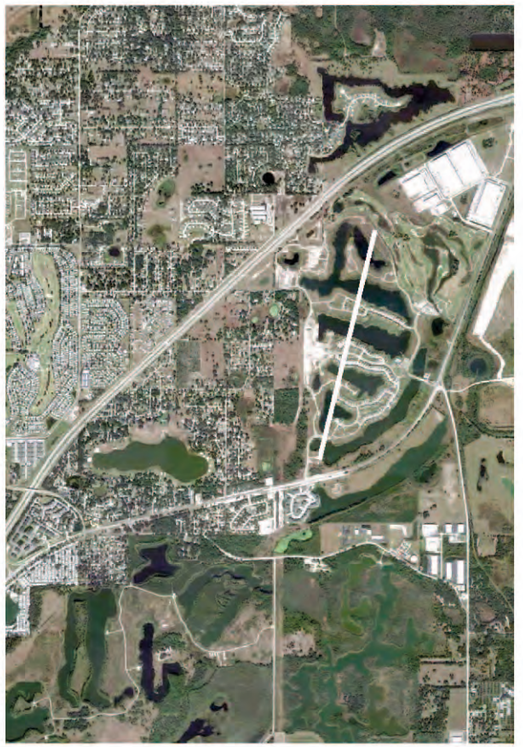
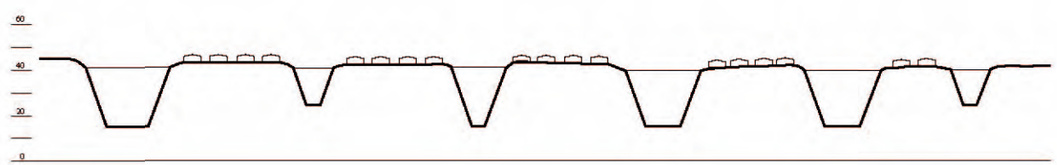
2004

Suitability for housing

The dimensions of the mining pattern are wide enough to reasonably develop the leftover land in 2 or even 3 parallel row of houses.



2010



Lake pits

The terrain drops quickly and in a very steep slope to a far greater depth than normal ponds. Additionally, Florida's rich fauna makes swimming undesirable.

Real estate dream location

The price fo reclaimed land is significantly lower than for undisturbed land. Yet for a housing-developper it is more attractive, as a shaped landscape visually has more to offer. Buy for less, sell for more.

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Catalyst projects

Owned by the Williams Company, the project still only covers part of their remaining properties. A mixed use on sand-tailings and overburden backfill are proposed, using the existing layout of lakes. Formerly the boundaries to the mining, the I-4 and Polk Parkway offer a brilliant location for accessibility

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Re-recontouring of mined land

The predominant method of using the existing, recontoured landscape is abandoned here, as Santiago Calatrava projects a lake on a previously mined and backfilled area. The mining context is ignored in favour of a landmark on I-4.

Non-reclaimed site

Saddle Creek park was mined in 1955. It has not been found eligible for reclamation in the Zeller-Williamss report, therefore it has not been reclaimed, only some contouring has taken place. Yet Florida's flora growth is strong enough to revegetate the site.

Inland motorboating

Tricky and wide-spreading, the park offers several landings to go motorboating inland.

Fishing activity

An excellent location for fishing, tackle and bait shops can be found around the park

Leisure park and natural habitat

As the area of Saddle Creek does not offer any other possibility for development, using it as a leisure park or not at all seem to be the only solutions. The park's use is quite limited to the central axis running through the park, there is plenty of room for a flourishing vfauna to coexist.

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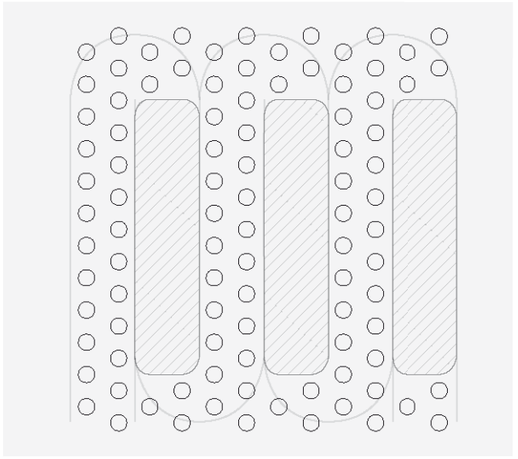
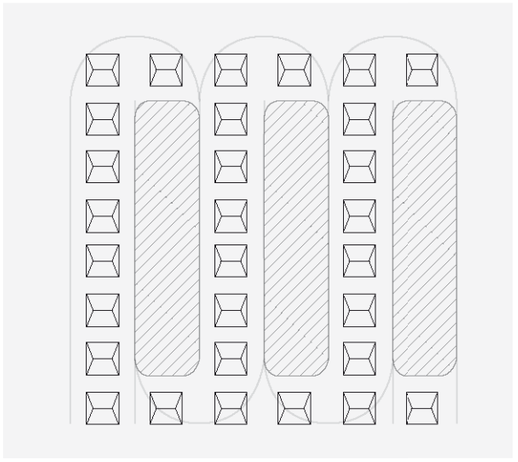
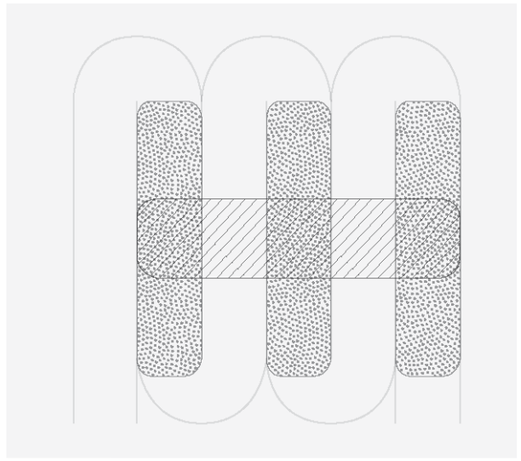


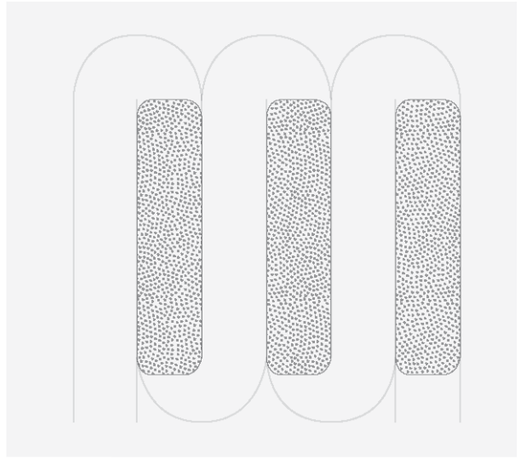
Mining - Land and Lakes - Nature



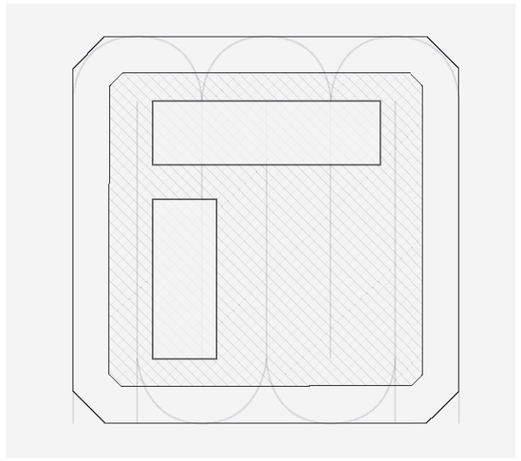
Mining - Land and Lakes - Housing



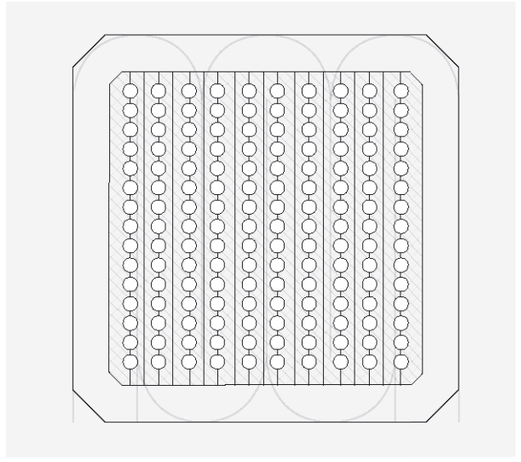
Mining - Backfill - Re-recontouring



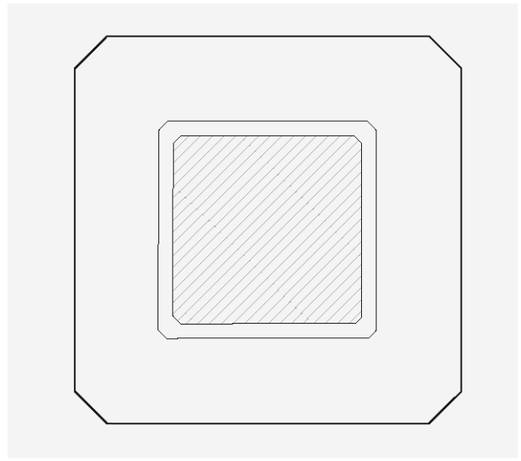
Mining - Backfill - Open use



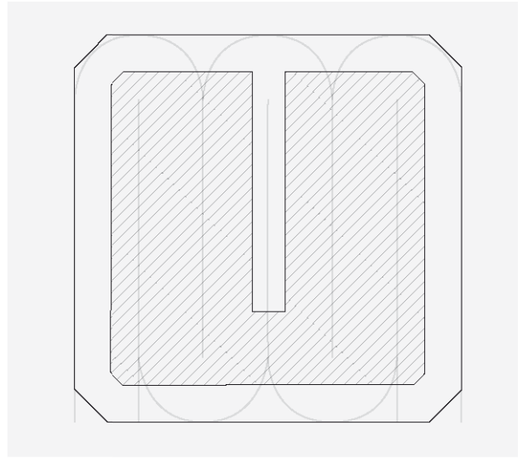
Mining - Clay settling pond - Restricted building on pillars



Mining - Clay settling area - Agriculture / pasture



Gypsum stack - no use / touristic potential



Mining - Cooling pond

Categories of palimpsest

Categories of Mining - Backfill and Reclamation - Development

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INTERVIEWS

Tracy Brown, Bridgewater office, Personal Interview (23 March 2011)

Pat Steeds, CFRPC, Collective Interview (23 March 2011)

Michael Chanen, Mosaic Co., Personal Interview (23 March 2011)

Jennifer Conolly, CFRPC, Personal Interview (24 March 2011)

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Clear Springs Co., Guided tour, (30 March 2011)

Miles Ballogg, Brownfields and Helen Sears, CFRPC, Personal Interview (31 March 2011)

Mr. Philips, Oldtimer, Personal Interview, (31 March 2011)

Jason Welty, Alfonso Architects, Personal Interview, (1 April 2011)

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