The Transformation of Matter and Place

By Darren Monahan
Table of Contents
Acknowledgements
Abstract
Introduction
An Understanding of Matter
Deposition of matter and energy
Contain and Scatter
The Transformation of Landscape
Non Site Experiments
Entropy and the Irreversible process
Testing Form–work
Sedimentation of the Past
An exploration with John and Johnny at the quarry
Endnotes and Bibliography
Site Description
Final Thesis Drawings

Acknowledgments

I would like to take this chance to thank the people who have helped me throughout my time at SAUL. Firstly, I would like to thank my mom and dad. A special thank you to Linda, John and Anthony who were waiting by the phone for many late nights. I would like to thank Colin, all my classmates, and friends who without your support, fun times and shoulders to cry on, I wouldn’t have made it through the year.

Secondly, I would like to thank the 4th year staff; Elizabeth, Ger and Morgan, for without their passion and enthusiasm I would not have found my love for architecture. I would like to thank the 5th year staff; Anna, Peter and Merritt, who have pushed me to my limits all year to get the best result. I will always remember our time in Vico Morcote.

Finally, I would like to thank Fran, Noel and Sylvia who are the heart and soul of SAUL. Fran I think I still owe you some shop money!

Below are the three people who have supported me through thick and thin. They deserve an ownership of this document as much as I do. Thank you guys!
Introduction

Limerick was originally referred to as the area along the banks of the Shannon Estuary, known as Loch Luimnigh. This old Gaelic name translates as “a bare or barren spot of land.” The city rests on a Waulsortian Limestone terrain which was formed over millions of years through constant sedimentation of mud, sand and animal remains. It is because of this rock formation that the city gets its name “barren.”

The abundance of this mineral created a cultural and architectural association with quarrying in the city. Until the 20th Century, it was not uncommon to see the opening of quarries in close proximity to where a building was being constructed. However, Limerick’s long tradition of quarrying, cutting and building of stone was altered with the opening of Castlemungret Cementworks in 1938. The quarries of Hall’s, Gough’s, Mullins’s, Ballysimon, Lansdowne, Rhebogue, Southill, Garryowen have since been closed. The craft of stonemasons and stone cutters slowly died out. All limestone extraction became focused to one site.

In 1945, my grandfather, aged 18, began working at the cement factory. He was involved in the extraction of mud clay from Bunlicky, which has since been transformed into an artificial lake. In 1970, my father also began work in the quarrying of this land. He, along with 550 other workers were involved in the transformation of limestone rock into cement. This landscape is so significant to me. It has been blasted and carved out by generations of my family.

My father left the factory in 1980. Since then, the factory and quarry have experienced radical transformations. With the increase in technology and efficiency, the mineral wealth on site has been exploited. Capitalism grew in Ireland and so did the exporting of this mineral. With the enormous, extractive force of the past ten years, the landscape has reached a point of exhaustion.

Abstract

This thesis studies the transformation of matter through a kinetic force. Matter and energy are critical in this discourse, as a means of empirical evidence, where the acquisition of knowledge is gained through experimentation and observation. A series of experiments were conducted which studied matter and its motions through time, space and scale.

The project is based in a cement factory and adjacent quarry. As my father and father’s father have worked here, a temporal dimension exists in this project which speculates the next cycle of this site. The aim is to establish a forum space that gains momentum and growth over time - a place that is constantly adapting and evolving. The programme I have chosen to engage with in this is a trade school.

The site is connected by a disused train line and the River Shannon. The project builds on the process of subtraction and addition throughout the site. It is a place that is never ceased from disruption. Over time, the school will become a political and cosmological centre for others to build from.

I want to restore the quality of experimentation. “Make as if you had a thousand years and if you were to die tomorrow.”

“Architects don’t invent anything, they transform reality.”

-Alvaro Siza

The quarry has become a by-product of the city. There are currently 2 workers on site. Now it is a time to look past capitalism and what could substitute it. It is from this that leaps my thesis intention which is, the transformation of matter through a kinetic energy over a period of time. I am closely dealing with the cement factory and quarry as precedent for my investigations into transformation of materials. In this instance limestone. The quarry has become the by-product of the city, a place of reduction that now reawakens America’s “barren” past.

The essay is divided into 3 sections:

1) Theoretical body - understanding matter in relation to the city and quarry
2) Experiments and Theory
3) Account of Exploration at Quarry with my dad

The essay is divided into 3 sections:

1) Theoretical body - understanding matter in relation to the city and quarry
2) Experiments and Theory
3) Account of Exploration at Quarry with my dad

Over Consumption
Over Production
Over Accumulation

Alvaro Siza

Architects don’t invent anything, they transform reality.

—Alvaro Siza
An Understanding of Matter

The human composition in terms of mass is on average: 43kg of oxygen (65%), 16kg of carbon (18%), 7kg of hydrogen (10%)—totaling to 93% of the overall composition of the human body. The body is made up of over 65% water, and the rest made of substances that provide matter and energy throughout the world today. Indeed, all organic life is a living form of matter and is part of an overall ordering under the thin spherical shell that is ‘Gaia.’ According to James Lovelock, “Gaia is a thin spherical shell of matter that surrounds the incandescent interior; it begins where the crustal rocks meet the magma of the Earth’s hot interior, about 100 miles below the surface, and proceeds another 100 miles out-wards through the ocean and air to the even hotter thermosphere at the edge of space.”

All organic life is a mass that will eventually decompose and begin a very long process of sedimentation into the Earth’s crustal rock. The decomposition of some organisms result in a mineral of hydrocarbon. Hydrocarbon is the organic compound consisting of hydrogen and carbon. The remains of small animals and plant life compressed by billions of tons of silt and sand over several million years form the substance. It is found naturally as crude oil or petroleum. This natural substance can change its state into a gas, like methane and propane; into a liquid, like hexane (creates glue and ad); into a low melting solid, like paraffin wax and naphthalene (used as a plasticizer in concrete and plasterboards or in some rubbers), or into polymers, like polyethylene and polystyrene. The interesting aspect to these transformations is that organic life has an irreversible state under energies such as pressure, gravity and thermodynamics. It is an aspect that Fuller realizes when explaining that: “The Earth, however, is a celestial center where energies from the stars are being collected and photosynthetically combined in an orderly molecular assembly as hydrocarbons, which are consumed by orderly designed species, and eventually decomposed under energies that can give, undergo transformations, and even lead to burial beneath the Earth’s surface.”

These elements undergo transformations by a natural or accidental nature. They have a geologic cycle that creates some form of balance with the earth’s crustal surface. One could relate these transformations to entropy. Robert Smithson describes entropy as “a closed system which eventually deteriorates and starts to break apart and there’s no way that you can really piece it back together again.” It is the second law of thermodynamics and is considered to be the “energy drain” in physics. Smithson disagrees with the idealism of most architects who have “final solutions to all possible situations” but his rather deal with the unexpected, the accidents, and “incorporate that into the community.” Smithson thinks of time as geological time, as layer upon layer of strata, and the geologic having entropy also, as everything is graduated wearing down. As a result, he enjoys examining “wastelands” as they are “voids” in this geological time.
The city is in constant state of change. Machines have created an accelerated momentum in production. Perhaps now, is the point of slowing down, to slowly move through time and space. A point where an artefact would develop over time so that the richness of its own history is evident. A point in which time is considered as stratification of heritage where the building up of layers retain a tension with the landscape. The machine has created a metamorphosis in the landscape that has stripped away its layers. The scale of this landscape is difficult to sense or perceive as the machine and the human do not share the same level of awareness. In order to sense scale again, the human must exert its mediating function, the moving body. The human must experience matter as "ready-to-hand" once more; to gain knowledge in the density of matter. Aldo Rossi describes an urban artefact as something of "profound value as a human thing that shapes reality and adapts material according to an aesthetic conception."

"...every region is distinguished from the wilderness in this respect: that it is an immense repository of labour... This land is thus not a work of nature; it is the work of our hands, our artificial homeland."

A quarry is a landscape that has matter crumbling around it. With constant excavations, the quarry has sediments, moulds and boulders scattered across the landscape. The information could be read as disordered. In this scenario, the human would calculate and build from its observations of the dense environment. Matter is collected and contained within these closed limits. It is transformed into a building through the energy exerted by the human. With limited tools at disposal, the human adopts a similar methodology from the artefacts in Stonehenge. It is as if the act of destruction reduces the human condition and forces it to engage with the physical world. The new city becomes a dialectic between two models of the city; between solid and void, subtraction and addition, set-piece and accident, contain and scatter, tool and machine, heavy and light. Emphasis should not only be placed on Colin Rowe's Collage city; the building up of layers within the city, but also, on the Décollage city - a city removes pieces of its fabric, to reveal hidden layers. This struggle for totality and 'final solution' within the city has sterilized vast amounts of social experience! The natural wearing down of landscape and building is only an inevitability. Robin Evans describes a reduction in daily life from "the suppression of smells, cutting down accumulation of dirt, vivid embodiment, clearing the indcracy and abolishing the unnecessary." He strives for an architecture that strips out of a deep fascination, that draws people towards others. An architecture that is a meeting point of people. The least complex example of great assembly is the Tower of Babel. It is the meeting point of people. They said to each other, "Come, let’s make bricks and bake them together." They used brick instead of stone, and tar for mortar. Then they said, "Come, let us build ourselves a city, with a tower that reaches to the heavens, so that we may make a name for ourselves; otherwise we will be scattered over the face of the whole earth.”

From Genesis 11: 5-7, the Tower of Babel. However, the tower was never fully realized because of God’s disapproval with its ideological form. So, it remained incomplete. In some respects, a quarry is an inversion of this tale. It is a landscape that never really completes. The landscape is a place of the past and the present, of separating Baroque architecture, realizes the earth’s "not a sphere but on oblate spheroid – a squashed sphere. And the very word "spheroid" implies something that has degenerated from an earlier perfection. A spheroid is like a humanist of or a factoid – not the real thing, not effable." It is a transition between a perfect or idealized form, the circle, to a sphere, and then to something that is not perfect, the spheroid. This less idealized approach to the way we perceive our environment rose above the linear to what Dennis Oppenheim describes as "less graphic, more subterranean –" Oppenheim perceives the world as a "nuclear" while being on the ground. It is sculptured with crevices that form streams and motorways. Our perception of the landscape and the built environment is quite different to how we experience the world from above as a linear "graphic" form.
Deposition of matter and energy

The earth’s surface is a landscape that is in a constant state of change and erosion. Over geological time, matter has been crystallized and broken apart through sedimentation and deposition. Deposition occurs when slow-moving water, wind, or ice can no longer control the velocity of matter due to opposing forces of weight and fiction. This matter settles out fluidly with the momentum and comes to rest. These heavy deposits retain this kinetic energy of deposition when displaced on the landscape. The stored energy of this matter on the land is power evident in tension with the landscape.

These limestone deposits were gathered and constructed into artefacts by man. This being is an animal that reasons, calculates and builds from its observations of the physical world, and forms an artificial one. Its attempts at becoming ‘the master and possessor of nature’ originated from its fear of time - the fear of organic destruction that will leave no trace of history or existence. This fear exerted the being to construct matter with its spatial abstractions. Its instruments of power and refinement were closed and limited to whatever was at hand, as materials were scattered and heterogeneous.

The force applied in shifting these deposits, in turn, provided an embodied affiliation with the constructed artefact. As if the being, through its applied force, was creating deposition of its own making.

“When Heidegger claims in the Being and Time that first of all and most of the time we experience things as ‘ready-to-hand’, this technical term recognizes the importance of the hand, that is, the mediating function of not just the eye but the body. The moving body. I reach for something - if it is too high I try to pick something up - if it is too heavy I want to walk somewhere - if its too far.”

Stonehenge was a ceremonial place that would take the energy from the sun and spiritually heal the worshipper. Massive rocks were inserted mathematically along a northeast axis of the cosmos so that the sun would rise above a ‘heal-stone’ and in return regenerate the worshipper. With the knowledge that the energy exerted to move these rocks is contained within the artefact, the perceived release of this energy is experienced from the worshipper.
The ‘egg’ has served as “the primary symbol for the cosmization of chaos” - that is, the world came into existence through, firstly, the production of an egg from a maternal power, and “secondly the self-liberation of the living being from its initial capsule or shell.” (18) The egg, as this ‘singularity’, stands for the origin of being. However, for it to be an origin, the contents of this egg had to free itself from the ordered structure, and in return, created disorder and chaos.

A similar scenario is staged in Schrödinger’s thought experiment involving a cat sealed in a box with a poisonous flask. Until such a time where the box is unsealed, the cat is thought of neither dead nor alive. (19) The cat is concealed within this ‘void’ and is considered to be both alive and dead to the universe outside the box. With this dual state of being, Schrödinger said that the more unpredictable the message i.e. the cat alive or dead, the more information the box contains within.

Since entropy increases the level of disorder (or in this case the unpredictable message) within a system, then the level of order in that system could be thought of as the amount of information contained within. The ancient Egyptians realized this thought in their plan for the pyramids. The Pharaohs, like the cat, would be considered neither dead nor alive to the universe outside, but be contained within this void in the ever present – ‘The After-Life.’ This containment of information brings to question that, if the egg had not broken, what would exist?

According to Vitruvius, the origins of building, in terms of man, began with a state of need. He locates the origin of community, language, art and building, with the gift of fire. “The fire generated the energy that triggered man to build shelter around this energy, to conceal and shelter it from the external environment. This artificial climate can only be thought of as a highly selective communication between inside and outside.” (20)

Sloterdijk says there is a ‘boundary principle’ between the egg and its external environment. These shells or membranes act “in accordance with specific needs of the inner world,” only permit an extremely reduced amount of external information and substances through primarily gas, warmth and liquids. (21) This reduced communication of moisture and ventilation is important when thinking of this ‘artificial climate’ being contained within something from the outside. The inner world is a destruction of the outer.
The transformation of a landscape

The Irish Cement factory in Castlemungret, Co. Limerick produces an essential material for modern construction. Limestone is blasted in a rubble stone quarry, and transported by dumpers, which can carry a load up to 40 tons, to crushers. The crushed limestone is fed to a pre-homogenization pile used to blend limestone and shale through a stacked piling system. Raw mill hoppers have weigh feeders that blend the correct mixture for raw meal production. The mixture is preheated while circulating down 6 cyclones to the rotary kiln. The kiln burns the raw meal at 1250°C to form cement clinker which is stored in a silo to cool down. After a few days, the clinker is mixed with 5% gypsum to control setting time when finally, after a series of pressured and heated processes, the limestone is converted into cement.

With this excessive extraction of limestone, the quarry begins to resemble a landscape in the Burren, which is full of karst limestone rock that is stripped of topsoil and contains walls of ‘excavated’ rock in the landscape. Here, an obscurity emerges between the man-made and nature. Whether natural or utilitarian, the being and nature share a common level of entropy; that is, as both move through time erosion and metamorphosis increases around them. Both are trying to move towards a state of equilibrium where an equal action from opposing forces exists. The void created in the quarry becomes a solid in the city fabric (with the addition of sand, gravel and water). While the quarry begins to be filled with rainwater.

“The act of destruction places everything in new juxtapositions, shatters old relationships, and sets up for examination, making it accessible.” (16) Destruction frees the past from tradition and mythology, and “provides the basis for further examination of the interrelations between aesthetics and politics, allegory and symbol, monument and ruin, criticism and myth.” (17) The aesthetics of former politics is lost and its foundations revealed – a new condition is formed in the quarry, one that reveals its hidden layers.

The quarry as it appears now is a result of capital gain and extraction minerals. These excavations could become planned, like a city is planned. These planned excavations would in turn provide matter for the infill or insertion of voids within the peripheral of the city. Here an interesting dialect emerges where matter is extracted from the site and abstracted into building material. It’s idea that the site is a by-product of the city’s infrastructural needs and not the reverse. Matter from site and non-site. Concrete acts as this material for the non-site while scattered sediments act as the materials for the site.
Cementworks Castlemungret

Density of limestone: 2,610 kg/m$^3$

Volume of extraction: $879.4 \times 1352.1 \times 25 \text{m}^3$

Weight of limestone extracted: $66,108,477,285 \text{ kg}$

= 72,871,374.5 tons

---

Site

Open limits
A series of Points
Outer Coordinates
Subtraction
Certainty
Scattered Information
Edge

Robert Smithson

Sensation
Kinetic Energy
Empirical Knowledge

Nonsite

Closed limits
An array of Matter
Inner Coordinates
Addition
Uncertainty
Contained Information
Center

Perception
Potential Energy
Theoretical Knowledge
**Method**
Gather granulated wax and place within melting container
Heat wax at a temperature of 230°C for 36 minutes until it becomes a consistent liquid
Dip balloon into melted wax and take out for wax to cool around the balloon
Mold the wax with hands to create an even surface around the balloon
Continue process with desired thickness in container

**Conclusion**
The disordered sediments are gathered and structured within this container to form a origami. This reduces the amount of information by containing it within the energy of this form.
When the form is cut open, it contains dense structure but the information is released in the form of water.

*b*Shape, Mass, Motion and Impact*
A boundary is set up that forms a closed system. Some strain is released around it to hold the structure down. The building up of potential energy.

"If we in our thoughts attempt to divest matter of its powers of resisting and moving, it ceases to be matter, according to our conceptions, and we can no longer reason upon it with any distinctness."

*Nonite* Experiment
The displacement of matter from a site, its transformation and distribution back onto its origin is depicted between site and nonite. A site is located in the external environment while the nonite is contained in an abstraction of this environment. Information from the external environment is gathered and stored within this nonite, almost like an exhibition.

It should be noted that this experiment is the result of trials and tested attempts at setting up limits to achieve the right conditions for the outcome. The wax had to be contained within a closed system, and the sediments were gathered in a closed container in the external environment to prevent the formation of voids due to any matter. As a result, the wax changed its state of matter from solid to liquid. The tools involved were limited as to what was at hand.

**Tools**
- 2 kg of granular paraffin wax
- 1 latex balloon filled with 200ml of cold water
- 1 pot filled with roughly 250ml of water
- 1 melting container
- 1 electronic heater with max temperature of 240°C
- 1 Moving body or apparatus
- 1 pin or pointed object
- Closed environment or container

**Conclusion**
The disordered sediments are gathered and structured within this container to form a origami. This reduces the amount of information by containing it within the energy of this form.
When the form is cut open, it contains dense structure but the information is released in the form of water.

*Shape, Mass, Motion and Impact*
A boundary is set up that forms a closed system. Some strain is released around it to hold the structure down. The building up of potential energy.
Entropy and the irreversible process

Within the closed system, an exchange of energy, not matter, will cause the material and form to change in the system, thereby causing a decrease in the level of entropy. A reversal of this force will not revert the system to its initial state but will only increase the level of entropy.

Photography creates a false immortalization in this system because the images can appear to reverse the form to its initial state. Even the way in which the architect draws architecture has a false conception of construction or destruction in this case. He/she never takes into account the decay in architecture.

The rational architect does not want to imagine the angles, the horizontal and vertical lines, crumble into irregular and “redundant” forms. These ideals in the perception of our physical world cannot remain observations, we participate with the physical world to, or take part in the world, so that the rational architect who wants to imagine the physical world and its current state may then be mouseClicked and not concealed within its own artificial environment.

Date paper was printed on 30th April 2013

Expected date of decomposition: 15th February 2014*

*Subject to shredding and decomposition beginning 6 weeks prior to the expected date.
Testing form-work and concrete mixtures.

This form was achieved by stretching canvas over a timber frame. The stretched material provided and tensile base from which concrete was layered onto. The result coated a thin shell-like structure on the top and a dense foundation.

Cement mixture:

6:2:1

6 Part Vermiculite
2 Part Fibreglass
1 Part Cement
Sedimentation of the past

(Right) Axonometric of Old Irishtown in Limerick City centre. The site is situated on an old quarry that was used to construct the city in local limestone.

The layers of Irishtown are built up from the ground with remnants of the old city wall remaining. The new city or current city rests on top of the foundations of the old Irishtown.

(Lef + Top) The proposal was looking at expanding the process of extraction and addition into the heart city. The city quarry would reveal hidden layers and open them up to critical analysis and interpretation.
Sketch of Imperial Forum in Rome. Interest in its monumental squares and how the buildings seem naturally embedded into the ground.

“What I take out, I use.”

These two images are investigating the removal of limestone to form monumental insertions into the planning of the factory. The bold move was based strongly on the Imperial Forum in Rome (left). These monumental squares were to become both the source of material and the orientation to which the buildings form around.
An exploration with John and Johnny at the quarry

On the 16th November 2012, my father and I went to Castlemungret Cement factory, Co. Limerick. The exercise was for me to gain more knowledge about the quarry and the cement production, however, it also resulted in my dad recapturing a new perspective on this once familiar landscape. John O’Connell, the production manager of the factory, agreed to bring us around on a safari-like expedition of this vast ‘barren’ landmass. The journey opened a conversation between three different points of view:

1) My dad, who experienced the landscape over 30 years ago and arriving with a perceived knowledge of it
2) John, who is experiencing this landscape on a daily basis and observing its constant state of change
3) Me, who is foreign to the landscape, having just a camera and voice-recorder to document the experience

When my father worked there, the factory had 5 kilns and over 660 people working. Now, only 25 people run the entire site and factory.

Scattered references of the past

John – That’s where you were at now! That’s kiln number 11!
Darren – That’s kiln 1! I’ll look at the side of the kilns that time… oh Jesus Christ [laughs] look at it!

John – No I stand in the old, old type. See the face, that’s the firing action. That’s how it was riveted together!
Darren – That’s right yeah [laughs] Jesus Christ, holy!

John – That’s for sentimental reasons, that’s there!
Darren – I’d say that!

Sharing of Knowledge

Darren – Jesus… the noise out of that f****** crusher and I tell you one more thing… and it breaks the rock on… Darren?
Darren – Yeah!
John – Yeah! Oh Jesus well you had to have ear muff-lined everything!

Darren – There’s two types of crushers in there. There’s the… what you call it Darren… there’s a jaw crusher which was two big massive jaw going in like that… (hand gestures of jaw movement)
John – (interrupts with hand gestures) going in like that yeah!

Darren – …crushing the stone and then that would be fed on then, to what we call the hammer mill. You have… there’d be four rows of 16… and there’d be 32, 44, 50 kg hammers and now when I say hammer, it’s a big lump of metal with a big hole in the middle… spinning around and it’s just crushing the stone into dust!
Changing landscape and changing usage

Dad – Jesus John will you ever see it back in production again thought? As as it was like?
John – no, no, no, no, no!

A Rational Assumption

Darren – (pointing at a lake) So ye had to fill that up, was it?
John – No this is the quarry! That's just water filling from all the springs!

Dad – (points to quarry face) Natural springs in there like!

Darren – Alright!

John – There's natural springs... so they're... we're to keep them pumped out... because as I said its like... natural springs they're filling up all the time! But we've to constantly pump it out! So, we pump it out into the Shannon and then that... it comes back! And there's nothing! You can do [pointed broken pipe]

John – Along that top face there and that goes... and that goes onto any road that was on the project. So you have different tracks and whatever else! But then, you could be driving along and next thing they could be driving down... and they could have gone a different route!

Dad – Is this not the half of it, isn't it?

John – no, no, no! (pointing beyond what appears to be a cut through a mountain) There's... as I said this... we'll go... as we go around the corner now, we'll go up a ramp and go back out!

Dad – How far... can they go back a good distance there now because of the Shannon?

John – No, no, no, no! We're heading for Mungret now!

Dad – Oh right that's it yeah! Heading for Mungret now!

John – And as you can see there's water leaking in...

Dad – There is!

John – You can see a stream of water flowing out. So... there's a leak in somewhere or else we've hit another spring again!

Dad – Possibly hit a spring John I'd say!
the cementworks continued this process but to a point when the land was given time to replenish the land with its mineral resources. The West Limerick River. Mud clay was extracted seasonally and the river was experiencing this working land.

In the 1800’s, numerous brickfields existed along the Limerick River. Castlemungret has always been a place of extraction. The site is gathered limestone sediments. A loading shovel tips the gathered rubble into a 130m long earth mound. A large heap of stones are gathering limestone sediments. Of these 2.7 ton limestone sediments. A figure controls the process. A volcanic cone which is formed from a limestone heap. It is eroded away to form a 0.02 m3 per loading and only burn 75 watts of energy. The cementworks continued this process but to a point when the land was given time to replenish the land with its mineral resources. The West Limerick River. Mud clay was extracted seasonally and the river was experiencing this working land.


description of site

Carraroe has always been a place of extraction. In the 1800’s, numerous brickfields existed along the River Avon and clay was extracted seasonally and the river was given time to replenish the land with its mineral resources. The cementworks continued this process but to a point when the land was given time to replenish the land with its mineral resources. The site is gathering limestone sediments. A loading shovel tips the gathered rubble into a 130m long earth mound. A large heap of stones are gathering limestone sediments. Of these 2.7 ton limestone sediments. A figure controls the process. A volcanic cone which is formed from a limestone heap. It is eroded away to form a 0.02 m3 per loading and only burn 75 watts of energy. The cementworks continued this process but to a point when the land was given time to replenish the land with its mineral resources. The West Limerick River. Mud clay was extracted seasonally and the river was experiencing this working land.
Year 2019

Excavation 1

Cut to measurements of 60m x 22m with a depth of 3m

Limestone rubble transformed into cement through factory

Cement admixture used to create Silo 1

Silo 1

Formwork is built in 3m stages to 21m

Concrete mix is then shot onto canvas wrapped formwork

Used to store aggregate of grinded limestone

Maximum capacity of 10,000 tons

Silo 2

Laboratory to test concrete mixtures

Linked to Silo 1 by conveyor truss and walkway

Silo 3

Lecture hall with access to upper level

Old Quarry

Grinder

Feeder

Raw Mill

Hopper

Preheater

Tower

Rotatory Kiln

Clinker Silo

Clinker Mill

Cement Silo
Year 2038

Excavation 3

Layer cut down to 4m level with volume of 29,274 tons

Volume is split into two stockpiles cement and aggregate

Silo 6

Set up origin point

Formwork recycled from Silos 2 and 4

Construct formwork in 3m layers rising to 15m

Spaces used for new exhibition space and library

Silo 7 and 8

Workshop area to educate public

Old Quarry

Surface water beginning to fill pit

Construction of a reed bed system to filter water

Year 2028

Excavation 2

Layer cut down to 2m level with volume of 22,444 tons

Volume is split into two stockpiles cement and aggregate

Silo 4

Set up origin point

Construct formwork in 3m layers rising to 24m

Construct formwork in 3m layers rising to 24m

Spaces used for additional laboratories and lecture rooms

Silo 5

Used as storage for wet clay in cement process

Linked to silo 4 by steel truss

Old Quarry

Surface water continues to fill pit