



THE THIRD RETORT | JAN DIEDELEFF VAN ASWEGEN 2017

The Third Retort

**Didacticism, an expressive architecture that can deal with
the spatial legacy of a post-industrial site.**

By
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RESEARCH FIELD:
Heritage and Cultural Landscapes
& Environmental Potential

SITE LOCATION:
Address 1 Annet Road, Cottlesloe Johannesburg, 2092

GPS COORDINATES:
26°11'20"20 S 28°01'10"E

PROGRAMME :
Energy Research Station

THEORETICAL PREMISE:
Using didacticism as a driver with the use
of a contextual regenerative theory to deal
with the spacial legacy of a Post-Industrial site

ARCHITECTURAL APPROACH
Creating an approach to a post industrial site, where
process and architecture coincide in the urban context to
deal with immediate environmental issues in spaces where
constructive engagement with the public is encouraged.

CLIENTS:
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DECLARATION

In accordance with the regulation 4(c) of
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I declare that this thesis,
which I hereby submit for the degree
Master of Architecture (Professional)
at the University of Pretoria, is my own work
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I further state that no part of my thesis has already been,
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I further declare that this thesis is substantially my own work.
Where reference is made to the works of others,
the extent to which that work has been used
is indicated and fully acknowledged
in the text and list of references.

Jan Diederik van Aswegen
12027198

Thank you **Heavenly father**
the ultimate designer

"He is the image of the invisible God, the firstborn over all creation. For by him all things were created: things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things were created by him and for him. He is before all things, and in him all things hold together. And he is the head of the body, the church; he is the beginning and the firstborn from among the dead, so that in everything he might have the supremacy. For God was pleased to have all his fullness dwell in him, and through him to reconcile to himself all things, whether things on earth or things in heaven, by making peace through his blood, shed on the cross"

(Colossians 1:15–19)

KINGS OF KINGS
PRINCE OF PEACE
EVERLASTING FATHER
MIGHTY GOD

τετέλεσται

Sonder julle was dit nie moontlik nie:

Dad en mams- "die laaste brander is verby"- "boetietjie"

Vir al julle liefde, gebede en ondersteuning vir 24 jaar, julle het nooit ophou glo in my nie

Tannie Marié - "chopper hoe ganit daar?"

Vir al tannie se liefde , wereldreise en kennis

Oums

Vir elke dag se gebed

Eloïse - "dis net 'n minor setback"

*Vir al jou drukkies, liefde , glimlagte, gawe woorde
en elke deurnag wakker bly tot ek klaar is*

Mariex- "lekkerrr yster"

Vir jou gebede, jou genesing en dat jy altyd daar is om te help

Pieter- "janeee ons kan dit maak werk"

Vir al jou kennis, gesprekke en hulp met onmoontlike wiskunde

Uncle Rodger - "your help will come... "

The best site manager , engineer and model builder

Tannie Linda- "nog 'n stukkie melktert Dieds?"

Dankie vir 'n tweede huis

Buckley- "I got your back man"

For all you design advice and stepping in when most necessary

Proffe "SIR" Barker die beste in die besigheid

For all your hours of advice, humour and "koek en tee"

III./

Archangels

Egoli-Plek van goud Gas Works groep- "Its gonna be HUGE"

THE OLD JOHANNESBURG GASWORKS
POST-INDUSTRIAL SITE

We do not see, to learn effectively from our past mistakes and, similarly, we do not seem to learn from the opportunities that architecture, beyond its utility, presents.

The old Johannesburg gasworks site expresses the development of a city that originated from industrial sprawl. The massive post-industrial edifices of Johannesburg are canvases that portray years of production processes and reflect the Avant-garde of the time. However, the mono-functionality of the architecture of the Gasworks precinct, used for capital gain, has now left the site deserted after decommissioning in the late 1990's. The site is an empty frame, privately bounded with no interaction with the surrounding context, or the city beyond.

It is now a wasteland encroached by nature, infused with the remnants of human-made pollutants. But the critically located site oozes latent potential that, if managed appropriately, can transform the critical Empire Perth corridor, which stretches through the city of Johannesburg, a critical urban framework for the future development of the city.

It is time that we learn from our past mistakes, using the memories of place, to produce an expressive and didactic architecture, educating people through a non-linear non-destructive space. This expressive architecture will create new memories and ideas, through encouraged dialogue. Where this architecture and process coincide in the urban context, it will deal with immediate environmental issues in spaces where constructive engagement with the public is encouraged.

iii-Research Questions

Main Questions

Can a new architecture typology be created through the lens of didacticism, that deals with spacial legacy of a heritage site and the scars of its processes?

Can architecture and process coincide in the urban context to deal with immediate environmental issues in spaces where constructive engagement with the public is encouraged?

How can architecture as didactic device influence the people using the space?

Sub-questions

Can dis-programming of architecture lengthen its lifespan in the architectural continuum?

iv-Research Methodology

Mapping

Analysis of the site, closer proximity and the greater area around the site is needed to understand the current importance of the site and how it functions in the urban context.

Historical Research

Because the site is a heritage site an extensive research of the site is needed to understand how a rezoning can lead to a sensitive approach to the site

Precedents

Precedents will be used to understand the site as a larger precinct as well as this projects architectural intentions.

Literature reviews

By looking through papers on architecture theories, heritage approaches and the application of it will help to justify the work that will be produced and to have a framework to reflect ideas off.

Qualitative research

This research will be done in the form of various site visits throughout the year to meet up with the design development, as well as photography, sketches and dialogue with site workers.

Evaluative Research

This will be done through the help of Tsica heritage consultants, that will aid in the understanding of the heritage value of the built structures on site and to help with the sensitive approach to the heritage site.

Collaborative design

The large site will be shared by four Architects and a landscape architect, collaborative design is important to deal with all the different layers of the site.

v-Limitations and delimitation

Assumptions

Egoli Gas will be relocated to another site in Johannesburg .Although the land is owned by Egoli Gas, there is the opportunity for the city of Johannesburg to possibly give incentives due to the site's position in the Empire-Perth corridor strategy . This incentive can also be realised through Egoli Gas, as decommissioning of an industrial site requires rehabilitation of the site.

Tsica heritage consultants have stated that some buildings may be demolished on merit .(Tsica Heritage .Consultants 2011:3).

The most dangerous pollution on site has been remediated.

Limitations

As a group, we are quite limited in terms of site visits as only authorized and guided visits are allowed by Egoli Gas. Plans and sections are however available for the existing buildings on site and the group will therefore not be restricted in terms of drawing up the existing buildings or modelling the site.

Delimitations

Due to the time constraints and large site , only four architectural interventions and one landscape intervention will be developed into well-resolved architectural projects. The rest of the site will merely be programmed and zoned according to the proposed urban vision, but will not be developed in detail.

The gas production quantities are only estimates based on a proven an tested process. The upscaling and gas production estimates are done on a theoretical basis, consultations with engineers and own interpretation of the mathematics.

Project intentions

This project aims to create an architecture typology through the lens of didacticism that can deal with the spatial legacies of a post-industrial site . It will adopt the Johannesburg vision 2040 as a starting point for the redevelopment of an inoperative site, that if not reappropriated can be detrimental to the city of Johannesburg

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Didacticism, an expressive architecture that can deal with the spatial legacy of a post-industrial site.

We don't learn from architecture. Architecture should be didactic¹.

1

Architecture used as a vehicle for exploitation has always been detrimental to one or another party. It is often framed by a linear process where a "raw" material is processed, and by adding value to it, only economic gain is established, as we can see in industrial architecture. But looking to the future, we need to transcend this thinking, moving to an idea of meta capital, a capital of education. A capital where we can learn from our past mistakes, A sustainable capital, where a non-linear process will always be beneficial for the majority of the parties, it is non-destructive and expresses every part of the process or system.

Architecture provides the opportunity as a powerful communicative tool that can carry meaning through its design and spatial qualities. The educational connection is often made through the phenomenological experiences that an architectural space has the potential to provide. Expressive architecture should be used as a didactic tool that fosters an awareness of the occurrences in our environment. This tool also reflects local culture through the engagement of a contextual theory. As a sum of these two ideas, the architecture will be designed with the intent to foster meditation and create a dialogue to promote self-realizations of our relationship with the local context.

Johannesburg originated from a mining industry that was the pre-runner to all industrial activity in the city. Some of these industrial sites are no longer active, and even though they once gave "energy" to their surroundings, today they are dead nodes in the urban fabric that leave

¹ Intended to teach, particularly in having moral instruction as ulterior motive

2

The Post-Industrial Legacy

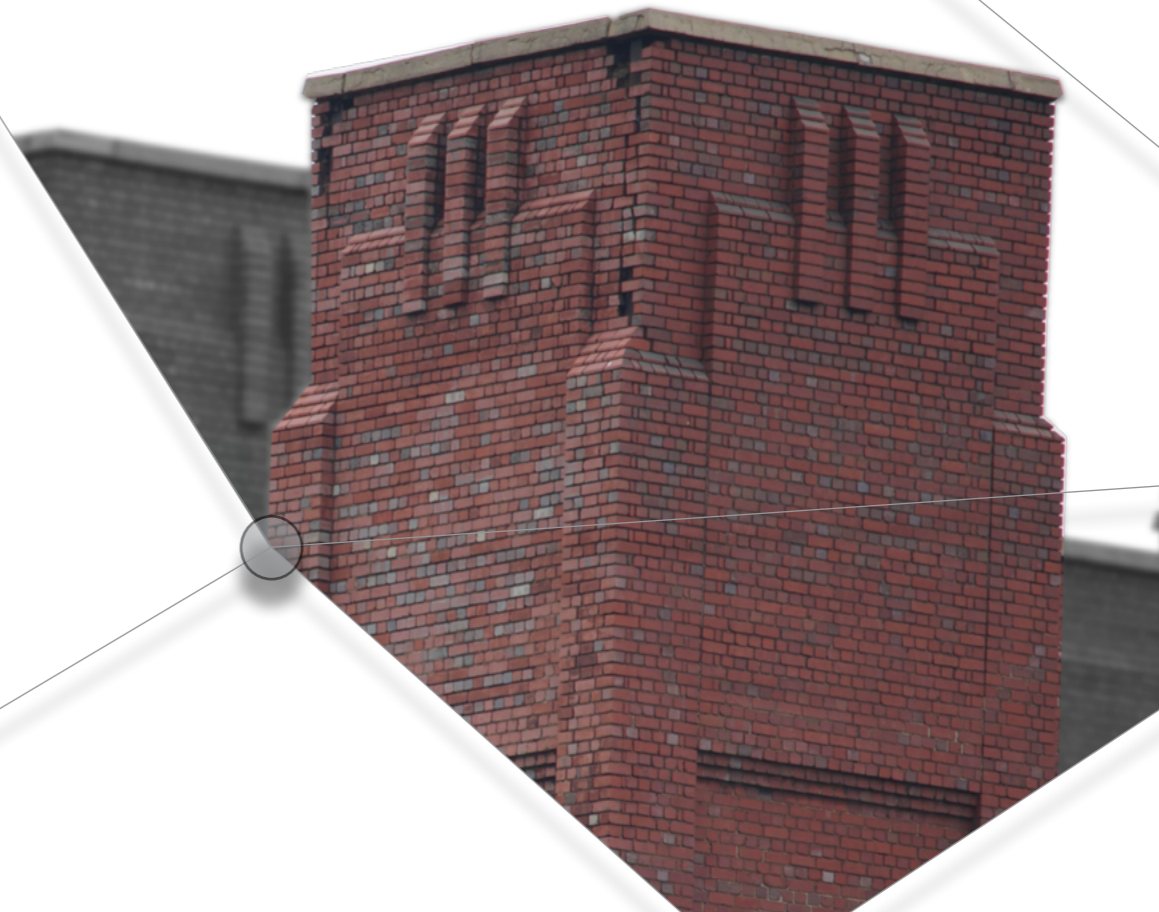
Due to the size and the abandonment of decaying Post-industrial sites, new questions can be asked about the future state of the decaying industrial landscapes and their heritage value for a city, which stretches into adjacent regions. It signifies a story of a time of prosperity. The importance of the social, economic, political and cultural conditions from the past of the cities are defined and valued through their productive nature. Many industrial sites are now post-industrial sites and are inactive. These factories and their inevitable decaying process give an account and are powerful reminders of an industrial age that once was so dominant.

voids in critical areas. At the time these sites were often on the outskirts of the city, but due to the rapid expansion of this industrial city, they have become interwoven into the central business district and the residential areas. The Old Johannesburg Gasworks, the selected site of this dissertation, is one of these desolate sites, a victim of the outdated production processes in the urban landscape. However, it is only our perception that leads us to believe that this is the case. There is life and interaction through the decay of a post-industrial site (Nesbit, 2012, p.40). In the City of Johannesburg, there is already an architectural narrative where post-industrial sites are being redeveloped to act as critical cultural nodes. In the Newtown precinct, the turbine hall built in the 1920s has been transformed into a contemporary function venue, the redevelopment preserved the historical architecture but equipped it with modern conveniences.

The future of these forceful post-industrial sites needs to be addressed appropriately. As we are in the beginning of the 21st century, many of the cities around the world are dealing with similar issues. Many examples show communities are destroying the dormant industrial landscapes by completely erasing them; therefore, clearing its significance concerning historical context (Nesbit, 2012, p. 8). According to Schumacher (1989:14), one of our biggest shortcomings in the 21st century is the belief that the production problem has been rectified. According to Schumacher in the last few centuries human attitude towards nature has changed, as we do not experience ourselves as part of the bigger system in nature but as an outside force destined to dominate and conquer it (Schumacher, 1989, p. 14)!

Didactic architecture is an architecture which carries meaning, a space that intends to teach, particularly having moral instruction as an ulterior motive. Didactic architecture provides opportunities to address post-industrial sites. It can aid and allow process and architecture to coincide in an urban context to deal with immediate environmental issues in spaces where constructive engagement with the public is encouraged. "An Architectural application of this close relationship between built and natural, inside and outside, and self and the world, in conjunction with contemporary psychology, gives credence to the profound influence of architectures' didactic potential (Claudio, 2008, p. 18)".

Fig 3: Photograph (Retort 2-Built in 1950's)-(Author, 2017)



3

The vision of Johannesburg 2040 provides a framework for the development of the city that supports the complexity of our local and global context and guides the way we design as a collective whole. It structures business, communities and labour as part of a collective common objective, a better Johannesburg for all (Joburg 2040 is here, 2011). The 2040 Spatial development framework for the city of Johannesburg is a 'dynamic model of strategic planning' (Spatial Development Framework 2040, 2016, p. 18) that strives toward spatial transformation through the use of the following principles: Justice, Equity, Urban efficiency, Resilience and Sustainability.

Well, functioning cities do not come about by accident. Sustainable energy development at municipal level was explored in South Africa in the late 1990's for the first time (Mercer, 2008, p. 55). Sustainable energy developments are challenging as they are not instantaneous, the transition to sustainable developments require innovation and partnerships between the local municipality and the private sector. Non-profit organisations and universities are also valuable stakeholders in this process (Mercer, 2008, p. 56). The next frontier for this work will be to move it to the heart of the cities as a planning engine. By placing it at the best place, it will promote a local "green" urban infrastructure economy while ensuring sustainability. In support of this, the sustainable energy goals need to be translated (and continually communicated) into what matters for people (Mercer, 2008, p. 62).

...that strives toward spatial transformation through the use of the following principles; Justice, Equity, Urban Efficiency, Resilience and Sustainability.

Three development scenarios were tested to find a solution to best fit Johannesburg: The first is 'Business-as-usual' scenario which led to dispersed growth and sprawl. The second scenario was 'linear development' which directed its focus along corridors of public transport. The final scenario is based on the polycentric model. This model rests on the idea of concentrating growth in the compacted core of urban areas, and other vital transit orientated nodes. The polycentric model out-performed the other two scenarios and was identified as the most appropriate scenario for the City of Johannesburg (Spatial Development Framework 2040, 2016). "Therefore, the spatial vision envisaged by the SDF 2040 for Johannesburg is a compact polycentric city with a dense urban core linked by efficient public transport networks to dense, mixed use, complimentary sub-centres, situated within a protected and integrated natural environment." (Spatial Development Framework 2040, 2016, p. 18) Creating these corridors within the city could allow for Joburgers to stay and play in the city without having to make use of privatised motor transport, to break away from the entrenched settlement patterns and allow for high-density accommodation along the main arterial routes, and to draw residents back to the economic opportunities within the city. (Spatial Development Framework, 2016).



Fig 4: Macro Site (Restitution Park Group, 2017)

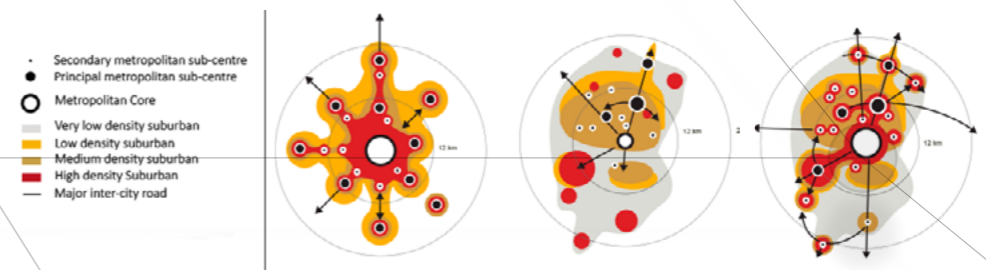
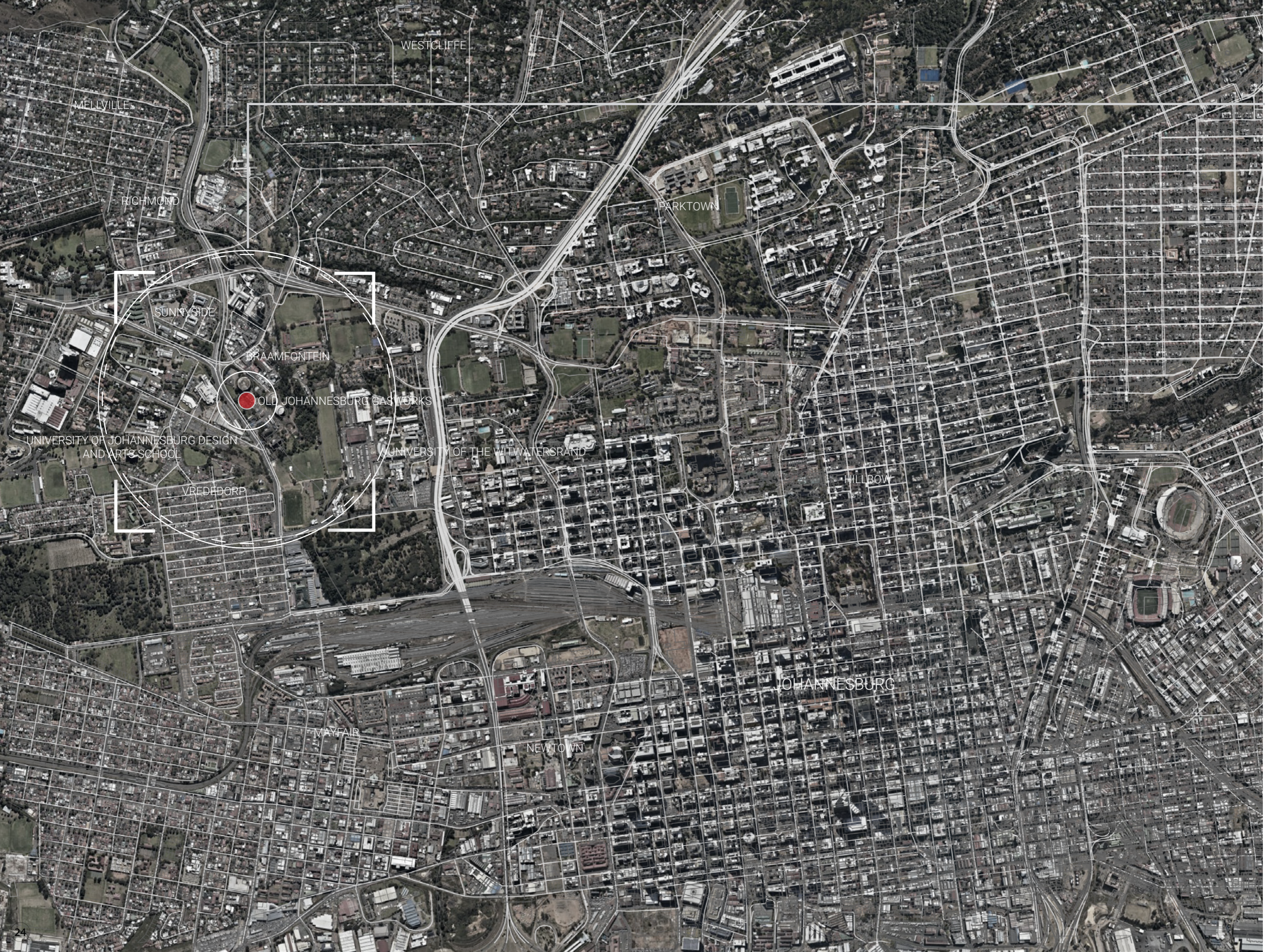


Fig 5: Business-as per-usual scenario (Joburg 2040 is here, 2011,p.18)

Fig 6: Linear development scenario (Joburg 2040 is here, 2011,p.19)

Fig 7: Polycentric scenario (Joburg 2040 is here, 2011,p.19)



500M

MilPark Area: A Potential Future Regional Node as a possible Polycentric model in the Empire Perth Corridor

Fig 8: Aerial site photo (inc. 2017)

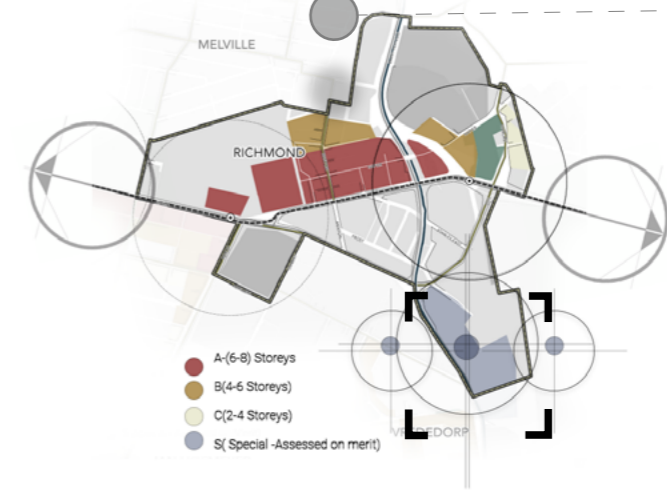
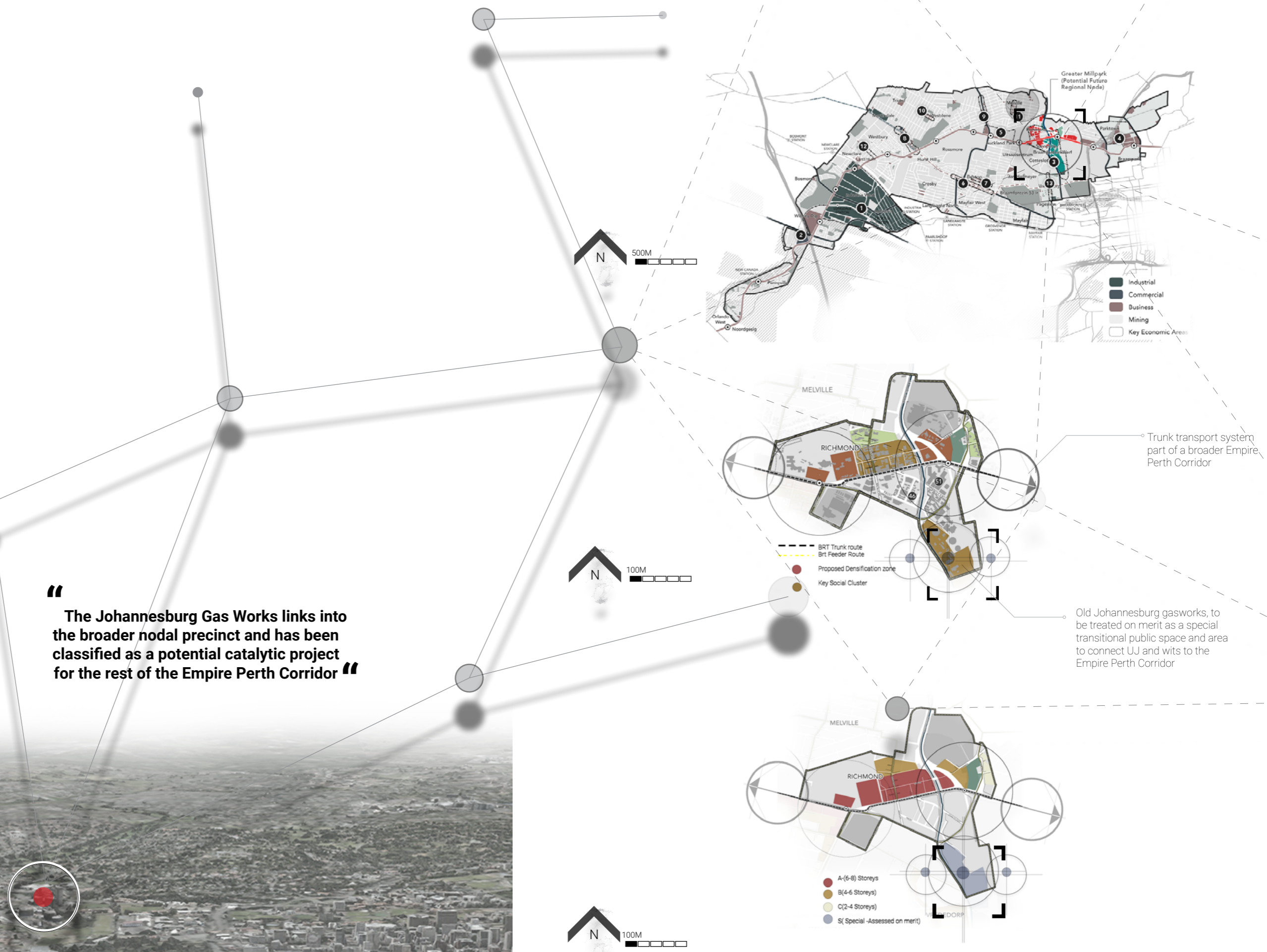


Potential Future Regional Node

The Johannesburg Gas Works falls under the Millpark area, which is proposed to be a potential future regional node. The area has the potential to be a major mixed-use node brimming with activity. The Johannesburg Gas Works links into the broader nodal precinct and has been classified as a potential catalytic project for the rest of the Empire-Perth Corridor (Johannesburg Development Agency, n.d: 86). The Proposed interventions for the Millpark Area consists of the implementation of a cycle lane and a walkway link in Owl Street, to connect the BRT station in Empire Road to 44 Stanley Road and eventually to create a link to the proposed mix-use development on the Egoli Gas site/Old Johannesburg Gas Works. The design of innovative traffic solutions will enable the development of 'mixed use Regional Economic' Facilities (Empire Perth Development corridor-Strategic Area Framework, p. 87)

Fig 9: Old Johannesburg Gaswork cylinder(Author ,2017)

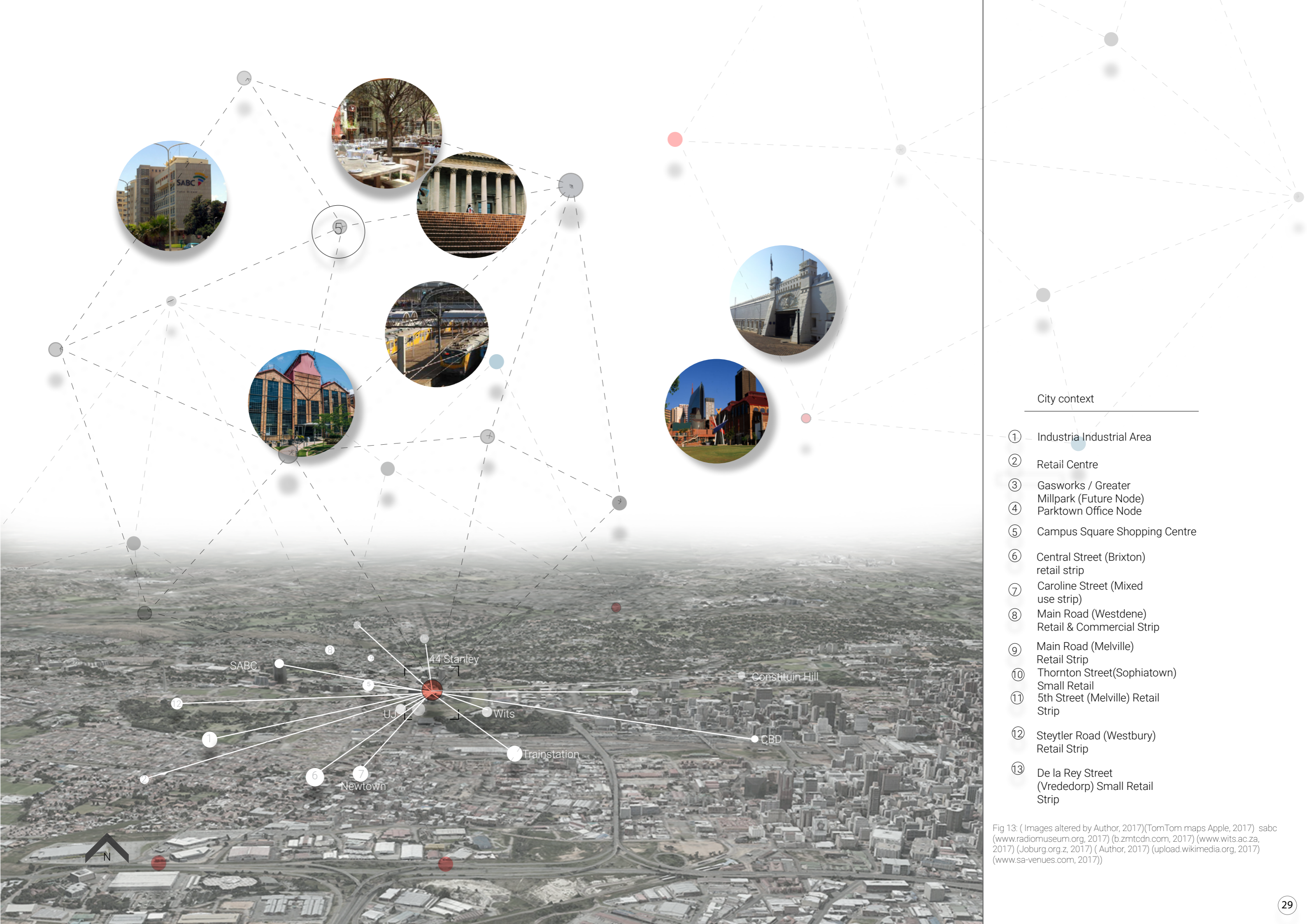
“ The Johannesburg Gas Works links into the broader nodal precinct and has been classified as a potential catalytic project for the rest of the Empire Perth Corridor ”



Trunk transport system part of a broader Empire Perth Corridor

Old Johannesburg gasworks, to be treated on merit as a special transitional public space and area to connect UJ and wits to the Empire Perth Corridor

Fig 10: Top (Key Economic areas and Millpark as potential Future Regional Node)--(Johannesburg Development Agency, n.d: 87)
 Fig 11: Middle (Key Economic areas and Millpark as potential Future Regional Node)--(Johannesburg Development Agency, n.d: 87)
 Fig 12: Bottom (Key Economic areas and Millpark as potential Future Regional Node)--(Johannesburg Development Agency, n.d: 87)



City context

- ① Industria Industrial Area
- ② Retail Centre
- ③ Gasworks / Greater Millpark (Future Node)
- ④ Parktown Office Node
- ⑤ Campus Square Shopping Centre
- ⑥ Central Street (Brixton) retail strip
- ⑦ Caroline Street (Mixed use strip)
- ⑧ Main Road (Westdene) Retail & Commercial Strip
- ⑨ Main Road (Melville) Retail Strip
- ⑩ Thornton Street (Sophiatown) Small Retail
- ⑪ 5th Street (Melville) Retail Strip
- ⑫ Steytler Road (Westbury) Retail Strip
- ⑬ De la Rey Street (Vrededorp) Small Retail Strip

Fig 13: (Images altered by Author, 2017)(TomTom maps Apple, 2017) sabc (www.radiomuseum.org, 2017) (b.zmtcdn.com, 2017) (www.wits.ac.za, 2017) (Joburg.org.z, 2017) (Author, 2017) (upload.wikimedia.org, 2017) (www.sa-venues.com, 2017))

The provision of gas was one of the first services that were part of the development of Johannesburg from a mining town. Paul Kruger, president of Transvaal at the time gave exclusive rights to produce and distribute gas for the next 50 years, and President Street Gas Works, located on President Street was opened in 1892. As the population grew and development expanded, the need for gas as an energy source also did. A larger plant was constructed in Cottesloe as the Egoli Gasworks (Old Johannesburg Gasworks) (Tsica, 2011, p. 1). The gasworks stopped operating in 1992 and since the change to natural gas, the site has become an isolated space in the urban landscape. The Old Gasworks site is crucial to tying in with the Johannesburg vision as it situated in a future mixed-use regional belt.

Although the Gasworks used to provide energy through means of gas to the city, it also resulted in pollution. Now being a derelict station stripped of its purpose to provide, it is time to bring energy and life back onto the site.

Johannesburg is just one of many cities enveloped by industrial sprawl. These industrial landscapes are viewed as an affliction that must be eradicated in efforts to create a pseudo picturesque view not reminiscent of the site's actual past. However, therein lies the problem; the attempt to create or recreate, what was, is an attempt to manufacture a picturesque landscape. When, in reality, embracing the sublime organises a post-industrial site that truly promotes the history and culture of the site's past, present, and future (Nesbit, 2012, p.40). Once, these central manufacturing facilities were forerunners in innovation and leaders in turning raw materials into completed products, but they are ghosts of a time where Johannesburg had a rapid exponential growth. Hollow traces of the past, covered by encroaching nature, weakened by rust and decaying from nature's mercilessness. We will choose the new and updated over the old and withered. Therefore, we allow the potential for facilities like this to be wiped from the face of the earth and forever sever the connection between our culture and important industrial past. One must recognise the common questions associated with this sites such as. What is the significance of the old Johannesburg gasworks landscape? How can Architects orchestrate the appropriate question that leads to logical conclusions for the site's new event or redevelopment? (Nesbit, 2012, p. 40). How will the public interact with this new event and develop their understanding of the site's past through realisation's of their memories? Industrial sites of significant impact should be rehabilitated through a process of new events that are unique to each landscape.

The building that is a part of this landscape is worn by years of decay looking for shelter from the cold or a safe hiding place for unlawful activities. Currently, it is derelict on and neglected, abused by time and weathered by nature; to most, it is an eyesore. To the public the buildings might represents a detriment to progress and a constant reminder of men's power over all things. However, this is an opportunity, a chance to create a connection to the past through a new experience now and give hope to tomorrow.

A study of the current Old Johannesburg Gasworks landscape's conditions, the plant's coal-to-energy processes and information on the surrounding areas led to an understanding of how to suggest these new events within the landscape. However, it is not just the process inside the factory that is important to us. Rather, the focus should be on the main ideology behind this facility, an ideology that links all industrial sites together. As Elizabeth Meyer states "They are mnemonic devices that bring to mind changes in used by humans' need to harness nature for power produced on and building materials."(Saunders, 8)






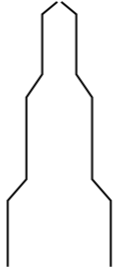
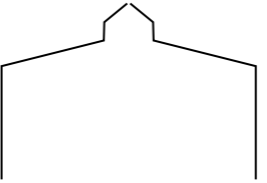
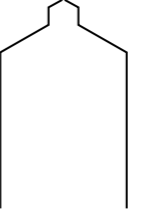
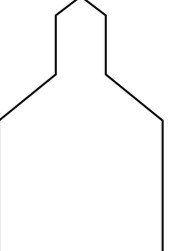
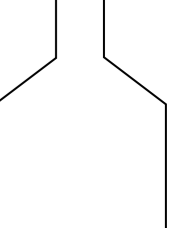
The conflict lies between the physical interaction of man and the naturally existing landscape that is boundless without man's persistent maintenance. Therefore, as Nesbit would state it, the landscape has now become a wild escape. (Nesbit, 2012, p. 42).

Adapt and change by nature's will; this is how the industrial site must progress. Just as you cannot restore the building to its original design and form, you cannot restore the building to its natural landscape. You can recreate it; you cannot return a building to its initial state in a given time frame any more than you can raise the dead. (Nesbit, 2012, p. 43) It has reached a new state, one that requires a new interpretation from the viewer. The preservation of a post-industrial site is seen in Peter Latz's Landschaftspark in Germany (1990-2002) and Richard Haag's Gas Works Park in Seattle(1975). Peter refers to this amalgamation of domesticated landscape and facility as "Memory". This 'memory' design is realised through minimal intervention by selectively editing and modifying the site (Saunders, 8). The 'memory design' lies in dedicating structure to play host to a new series of events that hold a sublime significance. between the mind and the event. Peter Latz would state: this is the act of memory. Memory, in the sense of landscapes, has a temporary quality. Memory does not align itself fully with the ideologies of preservation rather it suggests an implementation of one's own experiences to understand a representation of the past (Nesbit, 2012, p. 44).

This is the creation of the new event, the experience. Our interaction is necessary to hold significance to these industrial complexes. We must experience them and supply our interaction derived from our past to envelope ourselves into a greater experience and transcend our current culture. With this interaction, we blur the lines between the events of the past and the newly found events experienced by our interaction. Saving these structures is vital to the growth of our culture, and these are necessary experiences that can greatly impact our future. Thus the key to our future lies in the culture of our past (Nesbit, 2012, p. 44). These are designated links that tell us how we got to where we are and contain insight to where we have yet to be. The didactic potential of architecture can encompass all of this.

In the 1980's public concern became more prevalent after consecutive environmental disasters(nuclear waste leaks, flooded cities and crop failures) occurred (Claudio, 2008, p. 1). In the year 2017 the word sustainability has become conventional. However, overwhelmed by marketing ploys and "greenwashing", the public is confused. The definition of sustainability is ambiguous and has resulted in making sustainability a fad and sustainable architecture a passing style. In architecture we sometimes classify completed buildings as being green or sustainable, but sustainability is more encompassing than that. To protect ourselves from the negative long-term impacts of the built environment on future generations, we need to use an all-inclusive approach in the inspection of relationships between ecology, economics and social good being (Alison Kwok, 2007, p. 15).

COMPARISON BETWEEN ENERGY PLANTS IN SOUTH AFRICA

				
<p>Fig 14: The Johannesburg Gas works () (TSICA,2017)</p>	<p>Fig 15: Rosherville Power Station (Eskom, n.d)</p>	<p>Fig 16: Congella Power Station (Eskom, n.d)</p>	<p>Fig 17: Witbank Power Station (Eskom, n.d)</p>	<p>Fig 18: Cape Town Gas Works</p>
<p>YEAR BUILT: 28</p>	<p>YEAR BUILT: 1911- 1966</p>	<p>YEAR COMMISSIONED: 1928</p>	<p>YEAR BUILT: 1927</p>	<p>YEAR BUILT: 1888</p>
<p>ENERGY PRODUCTION METHOD: COAL TO GAS</p>	<p>ENERGY PRODUCTION METHOD: Coal-fired</p>	<p>ENERGY PRODUCTION METHOD: Coal fired</p>	<p>ENERGY PRODUCTION METHOD: Coal powder</p>	<p>ENERGY PRODUCTION METHOD: Coal to Gas</p>
<p>AREA SERVED: JOHANNESBURG</p>	<p>AREA SERVED: Primarily the gold mines of the Witwatersrand</p>	<p>AREA SERVED: Durban and Pietermaritzburg</p>	<p>AREA SERVED: Primarily the Witwatersrand gold fields</p>	<p>AREA SERVED: First street lights in the city centre and later supplied the Southern suburbs with gas</p>
<p>BUILDING SILHOUETTE:</p> 	<p>BUILDING SILHOUETTE:</p> 	<p>BUILDING SILHOUETTE:</p> 	<p>BUILDING SILHOUETTE:</p> 	<p>BUILDING SILHOUETTE:</p> 

Form follows function

Sir John Barrow indicates on a map that gold is to be found in the approximate vicinity of either the Witwatersrand or the Magaliesberge. (South Africa profile - Timeline - BBC News, 2017)

1892

The Gas Works was completed. The most significant factor affecting the new, instant, upper-class suburb of Park was that, "It turned its back on the whole structure of 19th century industrialisation that had been thrown up the veld to the South". This set the precedent. (Läuferts and Mavunganidze,17.)

1928

Closure of the President Street Gas Works

The gas works became operative in 1928, the first part of the large expansion programme that took three decades to accomplish (Läuferts and Mavunganidze, 20.)

1931

21 September-Britain abandons the gold standard, leading to a rise in the gold price. (South Africa profile Timeline BBC News, 2017)

1928-31

Retort House No. 1 (Läuferts and Mavunganidze,1.)

1933

South African economy was entering a period of uneven recovery with dramatic growth occurring in the Witwatersrand. (South Africa profile - Timeline - BBC News, 2017)

1935-1936

Phase 2 of the expansion programme was under way in 1935, closely followed by phase 3,1936 when production capacity was troubled. (Läuferts and Mavunganidze, 9,6. (South Africa profile - Timeline -BBC News, 2017)

1959

The addition of the Tully Plant to the second retort completed to the extension period and made the gasworks a fully functional industrial site (Läuferts and Mavunganidze,33.)

2001-2013

Sold from one company to another: finally the company was sold to Reatile Energy Läuferts and Mavunganidze,33.)

1988

Decision was made to close down the Gas Works (Läuferts and Mavunganidze,5.)

1946

Circular holders were built in 1946 (Läuferts and Mavunganidze, 6.)

1948

Apartheid set in law (South Africa profile - Timeline - BBC News, 2017)

1980

Eastern Corners of stores and Offices built (Läuferts and Mavunganidze, 62.)

MID 1800's

Gold is discovered in the Transvaal, triggering the gold rush. (South Africa profile - Timeline - BBC News, 2017)

1919

South African Economy one of the most buoyant in the world, largely due to the massive industrialisation. (Läuferts and Mavunganidze,2.)

1929

Original plant consisted out of 18 vertical retorts Expansion halted due to perilous economic crises n 1929 (Läuferts and Mavunganidze, 6.)

1927

More than 20 buildings were proposed in the 1927 site plan (Läuferts and Mavunganidze, 19.)

1933

Mr Thern introduced to the British public (Läuferts and Mavunganidze, 6.)

1939-1945

Retort House 2 was built during World War 2 (South Africa profile - Timeline - BBC News, 2017)

1949

19 September, The gold price rises by 44%. (Johannesburg Timeline 1800-1991 |South African HistoryOnline,2017)

1950

Large scale gasification building completed during the postwar (Läuferts and Mavunganidze, 11.)

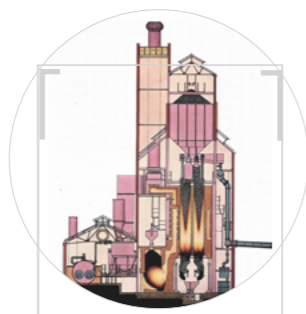
1992

Closing down of the works and partial demolition of the buildings (Läuferts and Mavunganidze, 18.)



19₂₀

Fig 19: Site photo taken in 1920 (TSICA, 2017)



19₃₀

Fig 20: Section Illustration of retort 1 (TSICA, 2017)



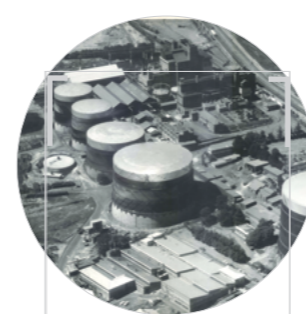
19₄₀

Fig 21: Retort 1 in the 1940's (TSICA, 2017)



19₅₀

Fig 22: Aerial photo of gas cylinders (TSICA, 2017)



19₆₀

Fig 23: Aerial photo of gas cylinders in 1960's (TSICA, 2017)



19₉₀

Fig 24: Retort 1 in the 1990's (TSICA, 2017)



20₀₀

Fig 25: Aerial photo of Old Johannesburg gasworks (TSICA, 2017)



20₁₀

Fig 26: coal bunker (TSICA, 2017)

The Regenerative Architecture model of thinking moves beyond the linear throughput model of inputs-consumption-waste that characterise our current production thinking. To go beyond being just zero energy or being carbon neutral, it is a fundamental repositioning of the question if whether something is sustainable or not. Regenerative theory in architecture seeks to not only be sustainable but to go further- it is the symbiotic evolution of human and natural systems, designed to heal the environment actively.

The industrial development model that we are used to is a linear throughput process. This process generates more waste than the capacity can carry and results in environmental pollution and degradation. This model has been the way human consumption patterns functioned, but waste from our current consumption patterns are now breaching Earth's capacity to absorb. The result is a habitat destruction, resource depletion and watershed degradation.

In contrast to this, nature presents a unique model of production and consumption. It is a closed loop model where the effluents of one organism serve as the raw material of another organism. This is a cycle continuously exchanging and renewing.

The primary difference between these two models lies in their end goals. The main objective has been efficiency as the ultimate goal. Even in the current sustainability drive, efficiency has very much been the primary focus. Regenerative thinking seeks to overturn the concept of effectiveness. In contrast, regenerative systems have a unique view. It's not as much about being efficient as being effective.

Effectiveness is not defined as for the sole benefit of the human species, but effective for the benefit of all species. We are not separate from ecosystem, and we need to start to recognise what we think is right for us may not be good at all for the ecosystem. Our production processes need to form an industrial ecology, a closed loop process where material flows are recycled and removes the concept of waste. An industry ecosystem is a system in which the consumption of energy and materials is optimised, waste generation is minimised, and the effluents of one process serve as the raw material for another process - this also needs to be integrated with both human and natural processes. Plants convert

carbon dioxide into the oxygen that we breathe. The hydrological cycle continuously replenishes our freshwater supply; we need redesign our processes to align with natural processes. We need to think of more efficient ways to aid, protect and reinforce natural processes where possible. Using symbioses, we need to design our systems to take advantage of share linkages that would provide mutual benefit. Our systems should have multiple means to the same end goal. This can make the system resilient. If we then use the efficiency theory, only one method should be the best, but viewing from the lenses of effectiveness and regenerative, it creates a dynamic web of flexible, mutually supporting

relationships. With the ideas of industrial ecology, the process should also function within the carrying capacity (Akhin, 2013).

According to Lyle, a regenerative approach is based on ecological theory (Lyle, 1994), to which the fundamental order does not entirely lie at the molecular level but lies at every level, in other words, everything is linked to everything. The ecological theory states that the ecosystem has three orders namely structural, functional, and locational. The structural order specifies the ongoing interaction of each specie with other species. The functional order explains the flow of energy and material, while the locational order determines the topography, soil and climatology. These elements are all linked to one another. Thus the premise of integration help to identify the urban parameters, while regenerative approach underlines the importance of interdependence. (Emmanuel, 2016)

Continuum of Architectural Thinking

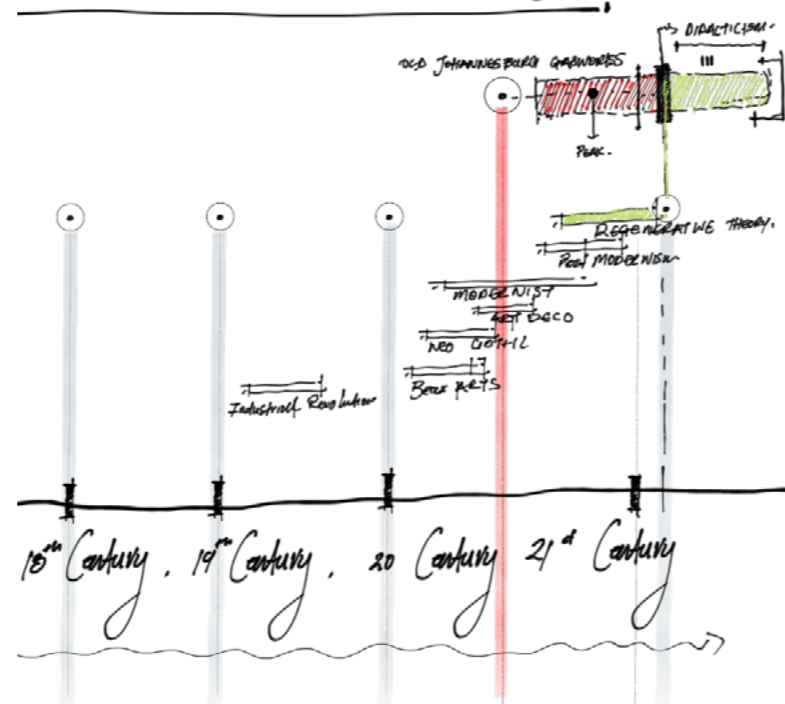


Fig 27: Architectural continuum of thinking (author, 2017)

● LINEAR THROUGHPUT MODEL

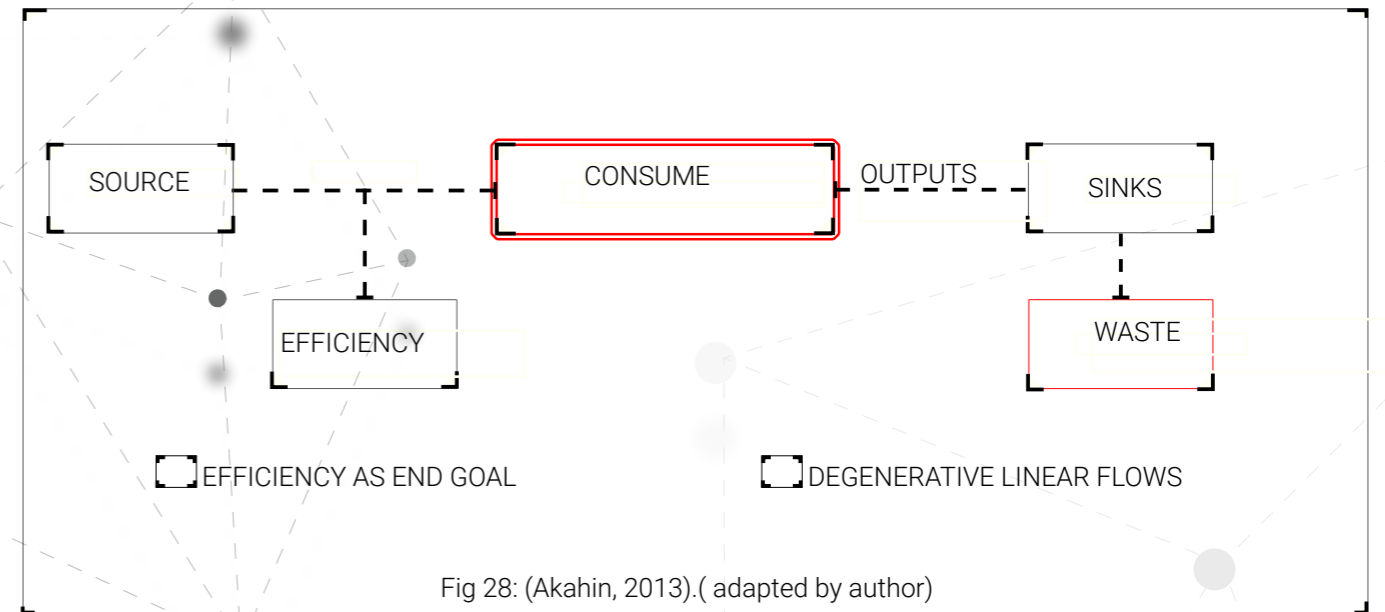


Fig 28: (Akhin, 2013).(adapted by author)

● CLOSED LOOP SYSTEM

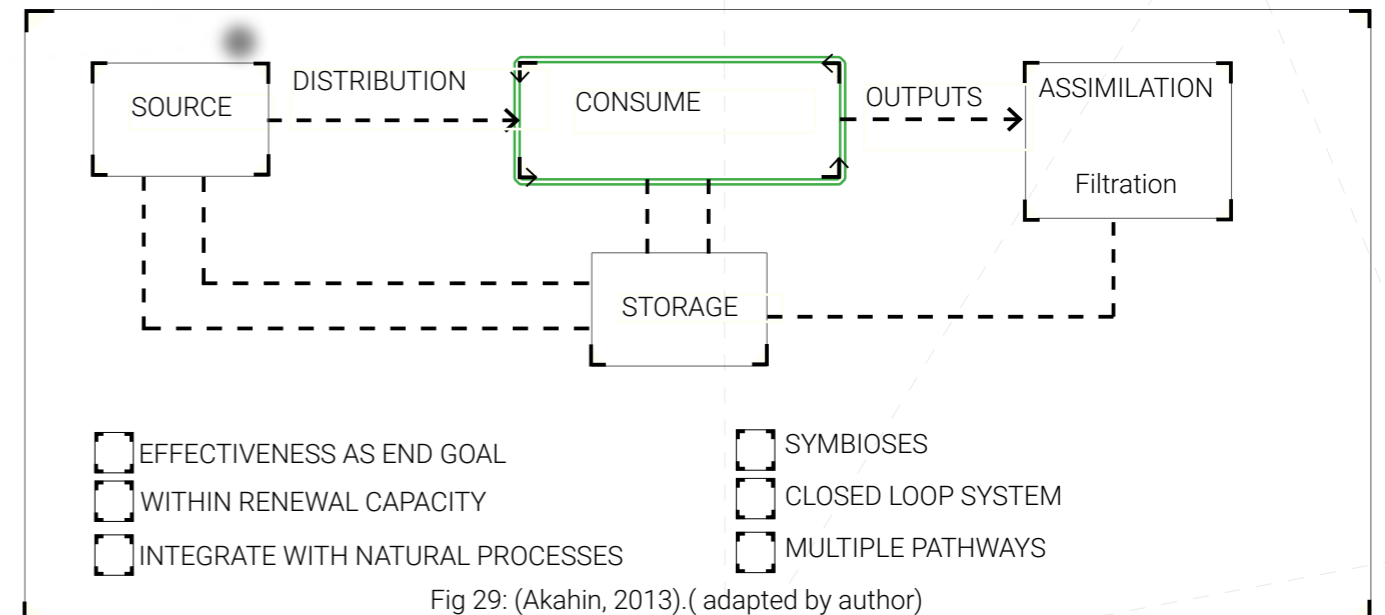


Fig 29: (Akhin, 2013).(adapted by author)

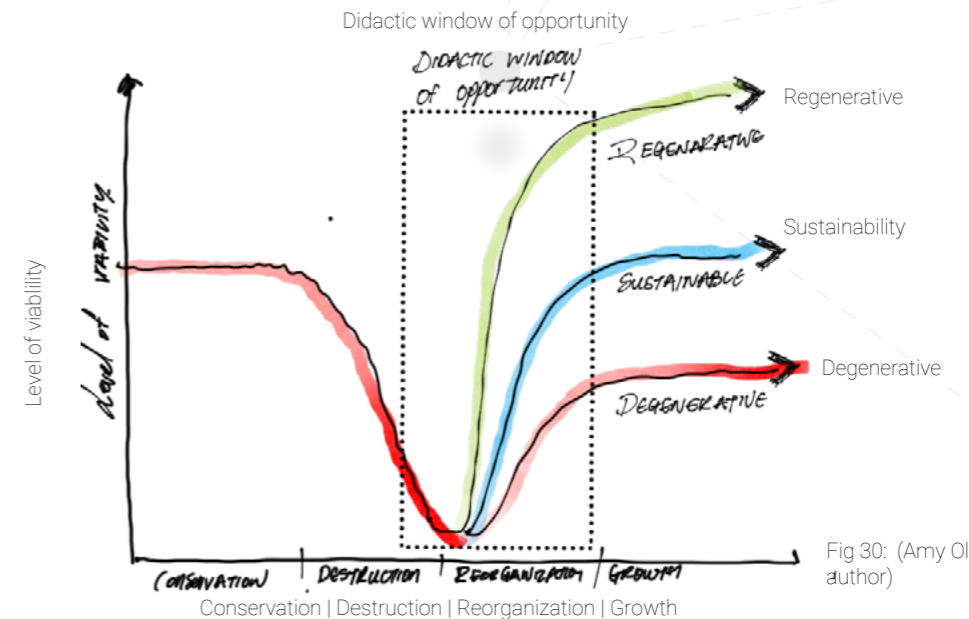


Fig 30: (Amy Oliver, 2013)(adapted by author)

Using the principles of Regenerative theory, Johannesburg Gas Works is envisioned as a new typology as a restitutive public park in the series of green spaces in Johannesburg. The vision for the Johannesburg Gas Works is that it becomes a restitutive productive park that commemorates the unique heritage of the Old Johannesburg Gas Works. This park will serve as a new typology of public urban spaces which extracts the latent productive potential that a site with this unique productive legacy (identity) brings about. The productive potential of the natural landscape will serve as a remediation device which deals with the tar pollution from the coal to gas process. The idea is to attract people from the immediate surroundings which entail university students, creatives and city slickers seeking refuge from the fast-paced city life. The cohesion of various proposed schemes and their variety and co-dependence will provide the location with a resilience – the ability to survive the evolving urban environment. The schemes (student projects) will serve as the nucleus of the project while secondary programmes will be introduced such as retail, “Kickstarter hubs” and residential components.

The site vision identified individual relationships that were destroyed while the coal to gas factory was still active. These relationships are envisioned to be restored and implement a continuous regenerative synergy between the industrial landscape and the architectural interventions.

HERITAGE AS MEANING-SIGNIFICANCE

The Johannesburg Gas Works has become a monument to the city. For some it may have a negative connotation for some an icon of progression, and for some then there is that select few who do not care. To contextualise ourselves in a historical narrative, a necessity to introduce a new didactic architecture as a continuum onto a heritage post-industrial landscape, it is important to understand the heritage place and space of the Gasworks. This is important so that any redevelopment, alterations or interventions are done on merit.

Historical Significance

There have been some developments in the pipeline for the redevelopment of the of the Gasworks site. The project is currently in the hands of GAPP Architects. There are a few processes that are running parallel to the conservation management plan (CMP). These assessments include traffic patterns, environmental impact assessments and rezoning of the site. Even though there is a planned conceptual layout of the site, the drawings are not detailed enough to warrant a Heritage Impact Assessment (HIA) according to the National Heritage Resource Act 25 of 1999. However, the current heritage consultants Tsica have

an agreement with the owners of Egoli Gas to develop a conceptual Conservation Management Plan (CMP) for the site that will guide future development, and make future decisions easier. This will ensure that the most important buildings on site are safeguarded and re-used in a manner that will celebrate these industrial buildings. The CMP will map out the buildings and the history of the site, and will also identify the strengths and weaknesses of redeveloping the site and opening it up as a public space. It will form part of the precinct plan, but it has no legal standing as sites that are declared as National Heritage Sites and are part of the National Estate can have this status. The law requires all the heritage authorities to adopt a CMP for, “....any place that is owned or controlled or has vested in it a plan for the management of such a place in accordance with the best environmental, heritage, conservation, scientific, and educational principles, that can reasonably be applied taking into account the location, size and nature of the place and the resources of the authority concerned and may from time to time review such a plan” (National Heritage Resources Act 25 of 1999).

Because of this the sites that are not declared National Heritage sites are only subject to a Heritage Impact Assessment (HIA) and a formal CMP is not required before any development begins. The HIA is more a reactive process where a CMP is more proactive and it sets out guidelines and policies Tsica Heritage Consultants have been contracted to hold a CMP that will not only lessen the amount of time that is needed for research for an HIA but will also document and inform the general public and future developers of the importance of the buildings and the most important values of the site. (Tsica, 2011, p. 3).

Urban Significance

The Gasworks is an integral part of the city fabric. It was known by the smell of gas and smoke. It has significance not only because it partly contributed to creating an identity in which Johannesburg was at the Avant Garde of its time but also how this site gave to the people in the form of gas that can be used in many ways. The Gasworks also gave free ammonia and coal to the public for free as this was an excessive byproduct of coal to gas. This site, due to its location in the urban context as well as the heritage value that area represents can have an immense impact on the various institutions in the vicinity. It has the potential to link with the spatial development of Johannesburg to become an extending of the Milpark



Fig 31: Retort 1 (Photograph by Author, 2017)



Architectural Significance

As the site was first built on in 1927, it consists of many buildings that are older than 60 years and therefore protected provisionally according to the National Heritage Resources Act of 1999 (NHRA) Section 34. Apart from just the age of the buildings, they are also significant regarding their prominence as part of the cityscape. They are an excellent example of industrial architecture in Johannesburg of the late 1920s and early 1930s. Their preservation and their reuse would, therefore, be an example of how industrial buildings that have become icons in Johannesburg can be reappropriated. (Tsica, 2011, p. 6).

According to the GAPP framework, The Gas Works buildings are intended for reuse as a mixed-used development, The CMP which has been developed by Gapp Architects shows the mixed-used development at its conceptual stage. This will work for hand in hand with the precinct plan as a blueprint for future developers on what should be preserved as heritage on the site and of the possible uses of the buildings on the site. (Tsica, 2011)

Materials Significance

The primary material used on the Gas Works site is red face brick. The high-quality brick clays available in the Highveld interior of South Africa contributed to the face brick building traditions of these areas. It can be traced back to various local sources. Some of the bricks contain the manufacturer's names pressed into the bricks. The red bricks in the north walling of Retort House No. 1 (Phases 2 and 3 of 1935/36) are from B & T Vereeniging (Brick & Tile Vereeniging works) (Mavunganidze, 2015, p. 9). The retort houses are majestic and authoritative in their brick massing and proportions, like monuments from the ancient world. The brick enclosures shows the precisely gauged beautiful red face brick in English bond (with tonal variations and mineral tints derived from our veld landscape), horizontal shadow line corbel courses, attached structural piers and magnificently defined brick panels all with splayed brick copings where projections occur. Even the diagonal steel lattice structures are echoed in the diagonal brick projections with their articulated header courses. "The detailing is simply a tour-de-force (Mavunganidze, 2015, p. 8)." Three projecting vertical brick dentils on each significant elevation acknowledge the civic importance of the towers pointing to external influences. The material used also reflects how the local economy benefitted through local constructions. This is also seen as the gas cylinder steel was at first imported but later on, it has been locally made and constructed by local steel company ISCOR (Mavunganidze, 2015, p. 6).

Environmental Impact

The coal, to gas process, had a significant impact on the site at the time in the form of pollution. Gas was released in the air, the tar byproduct was pushed into the ground, and the ammoniac was pumped into the sewer system. Much work has been done by GeoRem international over the past few years on the contamination of the site because of the production of gas. This not only helps in the identifying of contaminated areas but also the depth and the quantity of the pollution. There has also been a constant monitoring of the water onto and from the site. Most of the contaminated areas are in the valley, near the stream, but there is also contamination around the existing building however this is not so severe. It is very expensive the rehabilitate the soil, but an alternative cheaper option is to simply just cap the ground to keep it from human contact. (Designers, 2010, pp. 27,28)

Function and Technologies

The Gas Works is one of only three coal to gas plants in South Africa. The process was the primary driver of the architecture, and the technology that was used was state of the art, and it placed Johannesburg's industrial processes on par with world standards. The Gas Works was very successful. As the demand arose after more or less 60 years of production cheaper and more environmentally friendly methods of gas usage and production became more feasible.

PROGRAM AS FUNCTION

The retorts:

A retort is a vessel in which large quantities of material may be heated, primarily utilised in the production of metals or heating coal to produce gas. On a large scale, these structures in their peak dominated the cities in the 1940s

The coal to gas process, situated a linear system, this process was an energy source that could keep up with the high demand of the ever increasing population. However due to the mono-functionality of the process, once alternatives were found for this process it became redundant leaving its surrounding areas of the process derelict. Damaging the natural landscape and polluting the soil, water and the air.

When Industrial heritage meets didacticism as an architectural driver, with the aid of a regenerative contextual theory, can a program be hosted in an energy efficient architecture that has an educational element to it? (This will not only respond to our necessity to be sustainable but will reflect the dichotomy of a previous non-environmental friendly architecture that teaches the surrounding areas about their industrial heritage in the form of the productive energy research station.)

Fig 32: Lancashire chimneys (Photograph by Author, 2017)

This question translates into a convincing argument for the sensitive urban integration of this historical site with the adjacent areas. The city-making advantages of a public Restitutive Park, would lend credence to the 'Cultural Arc'² the city invented years ago. Secondly, a public and pedestrian-friendly linkage between the neighbouring yet currently separate University of the Witwatersrand (Wits) and University of Johannesburg (UJ) could be realised. The contextual integration of the Old Gas Works complex would result in an unprecedented inversion of the private-to-public hierarchies Johannesburg is infamous for. Such a gesture would widen the current line of cultural, educational and recreational possibilities- an inclusive field that the city desperately needs (Mavunganidze, 2015, p. 79).

9

The client is the University of Johannesburg their energy research becomes contextual on the site due to the historical significance.

By creating the connection between private and public sector as mentioned before it becomes a stronger force to be reckoned with. It is placed in the public realm for people to listen to and partake in research.

The proposed program is the Third retort , a research station with the aim of improving the level of information, knowledge, participation, transparency, the legitimacy of energy technology and process. It is placed in the same geometry of the first retorts creating a strong didactic contrast to the old-projecting the ideas and values of the future onto the third retort. (Bruno Monardo, 2007, p. 2). In Germany the, Universität Stuttgart built a structure that is required to house two institutes. One researched solar cells, the other techniques for separating the elements of water. The project offered a few opportunities for original architecture: offices, some laboratories, a storehouse, and service rooms. These contrasts in use gave way to the loose envelope of the building volume and freed the programme to discover a form. A free equilibrium of same priorities resulted, much like a collage. Designed and constructed in a brief period, the idea of free stability provided an uninhibited source of freshness and directness for the architecture (Anon., n.d.).

Because of the relational and the aesthetic value of physical space, a place for research should be conceived neither fully public nor private place. Rather, the two spheres should be in close relation as already occurred in the Greek Agora (Bruno Monardo, 2007, p. 7). This station can also be described as incubators of initiatives of knowledge of the local area regarding the thoughts, living research laboratories, and their think tanks.

² The notion of a Cultural Arc was first articulated by Caroline Hamilton of Wits University in the early 2000s. She imagined the Johannesburg Art Gallery-east of the Central Business District, the Wits campus in Braamfontein and Museum Africa, to the west in Newtown as a strengthening cultural narrative through the city.

The physical building hosts a research station, its site, Image recognisability, identity, symbolic value and architectural quality; all assume a fundamental significance in the characterisations of the structure. It may become an interpretive key as a spectacular or discrete communicative vector. Through the structure and its contents and the involving nature of its activities, it makes itself more credible as a meeting place as a privileged recognisable and accessibility as it may be characterised by a didactic function (Bruno Monardo, 2007, p. 6).

The research fields of the stations are categorised under two headings: energy and environment and subdivided into solar and Bio-energy, building systems, waste water, clean water, air and soil pollution, as well as waste management. The research fields are then didactically exposed through a systems design building. The didactic narrative becomes stronger in the way that it uses algae in a farming type where the polluted soil is not touched, any water, whether polluted or not can be cleaned. It uses Carbon dioxide which once was a major gas-works polluting exhaust together with sunlight to create wet biomass the feeder to create natural gas, this time in a clean closed loop system.

Dis-programming³ |

Architecture has always been as much about the event that takes place in space as about the space itself. The Columbia University Rotunda has changed use from a library to banquet hall; it is often the site of university lectures. Someday it might fulfil the needs of an athletic facility at the University. "In today's world where railway stations become museums and churches become nightclubs, a point is being made: the complete interchangeability of form and function" (Tschumi). The function does not follow form; form does not support function for that matter. However, they certainly interact. If didactic architecture uses a sub theory of dis-programming, it may well be used to one's advantage in the way that we future proof our spaces so that they do not become monofunctional like the first two retorts and when the functions stops the architecture becomes an unusable space. (other theories of Tschumi: "Crossprogramming"⁴, "trans programming"⁵ (Tschumi).

In Paris in 1989 the National Library of France proposed a new type of library. A library that encapsulates two very different programs, for the knowledge seeker and the athlete. The program was about circuits and movement-movement for students,

3 Placing two programs together with the possibility that one might indo/induce the other

4 Gives an old building a new a program not intended for it.

5 Places two programs that are not normally associated with each other next to each other

books and visitors, and the entire architectural scheme was designed around a constant dynamic. The architecture was intended to act as an urban generator for a new part of the city. The idea was also based on the assumption that in the 21st century the athlete is just as intellectual as the intellectual is athletic. It challenged to the norm of library culture. The site was also proposed away from the historical centre of Paris as a decision was made, to encourage the breakaway from earlier static concepts of books. The fact that the library was not to be located in the historical centre of Paris was considered a decisive factor since it encouraged a break-away from earlier static concepts of books. The library designed as an "event" rather than a frozen monument (Tshumi, n.d.).

Conclusion

Didactic architecture together with the use of a Regenerative contextual theory, a "dis-programming" programmatic theory creates an architectural opportunity to deal with a decaying post-Industrial site. The site is sensitively reintroduced into the public realm in the form of a Restitutive park; the newly introduced interventions start to blur the lines between public and private, to restore the relationships that were once destroyed by the coal to gas works in a monofunctional architecture. The Third Retort creates a didactic narrative and reveals the layers of heritage, energy, production, pollution and restitution.



Fig 33: Retort 2 (Photograph by Author, 2017)