The Purification Works
Architecture as a restitutor of Industrial heritage and Ecology

Submitted in fulfillment of part of the requirements for the degree in Magister in Architecture (Professional) at the Department of Architecture in the Faculty of Engineering, Built Environment and Information Technology

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Abstract

This dissertation aims to propose an appropriate architectural intervention within a site that requires both ecological restitution and the commemoration of industrial heritage. The Johannesburg Gasworks site serves as a clear example of how the Industrial Revolution and subsequent industrial technologies have both damaged the natural environment and left blighted legacies within ever developing urban conditions.

The project aims to uphold the general significance of industrial heritage as proposed by charters such as the Nizhny Tagil charter prepared by The International Council for the Commemoration of Industrial Heritage as well as the unique heritage significance of the Gasworks site. An appropriate theoretical framework and precedents are explored that reconcile the two seemingly opposing requirements of post-industrial sites - that of commemoration and ecological restitution. In post-industrial sites scarred by water, soil and air pollution, as well as dangerous or inaccessible places, maintaining an appreciation of heritage whilst employing the various rehabilitative actions required need to be balanced to ensure both.

The project undertaken forms part of four schemes proposed for the site that aim to maintain the iconic identity of the Johannesburg Gasworks by proposing ecologically sensitive industries. These industries and interventions within the site aim to bring about urban resilience, site specific environmental rehabilitation as well as integration with the surrounding urban context. The proposed project for the site draws its program from global ecological issues as well as site specific heritage factors. The aim of scripting a new layer of intervention onto the Gas Works site is to make a legible reading between the site’s history and its ecologically resilient future legacy.

Project Summary

Site description: The Johannesburg Gasworks also known as Egoli Gas
Site location: Corner of Barry Hertzog Street and Annet Road
               Cottesloe, Johannesburg
               26°11'23.34" S 28°01'15.10" E
Programme: Aquaculture & Fish feed production facility
Research Field: Heritage and Cultural Landscapes
Keywords: Aquaculture, Post-industrial, Site remediation

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Special thanks

First and foremost, the living Christ for making me alive.
My mother and father for continuous support
John Mayer, King’s Kaleidoscope, Skurwe abrahams rusks and the entire Egoli Gas Works team
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Introduction
Industry and Ecology have mostly had a mutually exclusive relationship for the last 250 years. The development of the steam engine in 1769 served as the trigger for industrialization (Krinke, 2001) and the mechanization of production processes whilst the perception of unobstructed progress was propelled by a willful ignorance of the legacy left on the natural environment. Although planet Earth and its resident ecology has since revealed its own limits on resource provision and pollution tolerance, the decades of unawareness on this issue have caused the “inexhaustible earth” mindset to gain tremendous momentum - a momentum proving difficult to halt and reverse. The need for this reversal is made prevalent by witnessing the legacy of Industrialization whether it is acidified streams, airborne toxins or soil pollution. Of course, industrialization has made major advances possible for society in terms of goods production and many other sectors and therefore it is not suggested that industrialization is inherently bad but rather that a certain callousness towards ecological matters have necessitated steering industry in a more sustainable direction.

However, by the term “Industrialization” much broader associations must be drawn than the extraction and processing of raw natural materials for the mechanized production of products. In fact, since the pre-industrial society was an agricultural society, it follows that the rapid growth in technology has led to the industrialization of agricultural and food systems as well (Millstone, et al., 2003). Although the advantages of mechanizing the agricultural and food systems have appealed to the human desire for convenience, efficiency and replicable standards, these very advantages often necessitate the monopolization of the agricultural and food industries. This separation between the producer and the consumer has never been farther although there has been a recent shift to bridge this divide as people realize the insensitive and dominating approach towards ecology (Crawford, 2012). The legacy also entails physical remains in our built environments that serve as a plethora of earlier built interventions around which, through which and in which design practitioners must work. Polluted natural resources such as water bodies and soil are also tangible remnants that require various remedial actions. Whether the legacy of industrialization is “tangible”, referring to artifacts and blighted landscapes in our cities or “intangible” referring to consumerist mindsets, the relationship between industry and ecology has traditionally been at odds and in need of restitution.
The general issue addressed in this dissertation is the relationship between ecology and the legacy of industry. More specifically, it deals with the necessary restitution on a site where the processing of raw materials into a product has left a damaging legacy on the indigenous ecology. This issue can be witnessed in the old Johannesburg Gas Works site in Cottesloe, Johannesburg. The Gas Works epitomizes dominion over the natural environment and the persuasion that the Earth is limitlessly resilient in handling pollution brought about by industry. Since gas production at the plant had started in 1928, the Gas Work's impact on the natural environment has been pervasive and it's shutdown in 1988 is partly owing to concerns regarding its ecological impact that includes severe tar pollution within the soil (International, 2006).

The shutdown of the Gas Works was also owing to the inherent brevity and contingency of any particular industry. This dissertation investigates and understands ecology in reaches that extend to global issues and not merely to the immediate ecological issues of this site. On a global scale, the issue that pertains to industry and ecology that will be localized to this site is the manner in which the industrialized agriculture and food industry has put enormous pressure on ecology (especially oceanic fish stocks) to supply the demand of the world’s growing population.

In terms of water demand, Africa uses more than 80% of its freshwater supply for agricultural purposes, more than the Americas and Asia (Agriculture, 2017). Furthermore, 2016 has been South Africa’s driest year ever recorded and the country is yet to recover (Live, 2016). The urbanization rate and population growth rate of 2% per year of Johannesburg (City of Johannesburg 2016) as well as the depletion of freshwater and ecological resources places the pressure on industry in South Africa and the world to progress in a manner that illustrates the possibilities of a restituted mutually beneficial relationship between industry and ecology.
The placement of the Johannesburg Gas Works may seem arbitrary considering its dense urban surroundings, but in the 1920s the site was chosen for its favourable topography that would render the site invisible from the affluent neighbourhoods of Parktown and Westcliff but visible from the poorer neighbourhoods of Cottesloe and Vrededorp (Lauferts le Roux & Mavunganiidze, 2015). The Gasworks ceased gas production in 1988 and because of the rapid growth of Johannesburg to the North, this 14 hectare site sits isolated within the dense urban fabric surrounding it. Since the site is privately owned and hazardous to the public it is completely shut off from it’s surroundings.

Considering the large open space that the site currently occupies as well as its potential in terms of biodiversity (stemming from its location within the Braamfontein Spruit basin), the Gas Works site has tremendous potential to serve as an open green space within a dense urban environment where open spaces are typically fragmented, privatized or dangerous. However, its scale and location also make it a prime development opportunity and thus there is a tension regarding the site’s next stage of development.

The pressure on the Gas Works site to be developed stems from its location within the future regional node of Milpark as part of a East-West business corridor. The potential of the site as a recreational open space stems from it’s location between Wits University, the University of Johannesburg and John Orr Technical school. Therefore, the urban issue deals with the pressure to meet the demand of development as well as open ecological space in such a way that the Johannesburg Gas Works site serves as a catalytic precedent in showcasing the harmony between these two necessities that are typically at odds in Johannesburg. If this can be done in a way that celebrates the unique heritage of this particular site, the people of Johannesburg can take recognition of the unique industrial inception of their city.
“Architecture is the instrument for manipulating our perception of the world in this way. It is by means of architecture that an architect mediates between the person and their surroundings...” (Unwin, 2015:108-109). Every work of architecture communicates it’s attitude towards it’s natural environment and this is especially the case in the Johannesburg Gas Works. Since the Gas Works employed advanced technology for its day, the architecture is a proud authoritative showcasing of it’s identity as a pioneer of industry in South Africa.

The proud showcasing of progress and industry makes the architecture Futurist in its inception and rhetoric. The rhetoric of futurism in architecture is to illustrate a vision - a vision of a modernized, industrial future where the innovation of man has conquered his environment. This, of course has been found to be unsustainable. Inevitably, the vision of smoke-filled skies as depicted in Art-Deco futurist reliefs are no longer a desirable vision for the future (Lauferts le Roux & Mavunganidze, 2015). The mono-functional purpose of the Gas Works and the redundancy of the coal to gas process has given the buildings on site the inevitable destiny of becoming historical artifacts.

The architectural issue is thus two-fold. Firstly, these artifacts and remnants of the industrial Revolution in South Africa have to be understood for their heritage significance and appropriately commemorated and secondly, the architecture must communicate a more resilient and responsible industry in line with the illustration of a future vision.

The architectural issue has become a new “futurism” - the new vision for the future. A future vision informed by a much more wholesome view of the planet we build on and the sustainability of mankind’s residence here.
The question that the research will aim to answer is: Can architecture, through both its programmatic and spatial realization, sustain and illustrate the restituted relationship between ecology and industry? The sub-question to this will be: Can this be done in such a way that the architecture becomes didactic - forming a connection in the mind of the public between the heritage of industry and the new industry? Can new architectural interventions assist in binding spaces disrupted by demolition to restore order and meaning to post-industrial places?

The question more specific to this dissertation is site specific. The most ecologically sensitive location on the Gas Works site are the holes where the first two gas tanks were located. These holes symbolize the damaging legacy of industry on the ecology of the site and it therefore has the potential to narrate a restored relationship as a powerful statement of restitution. Can architecture and appropriate programmes make this restitution possible within the location where the holes are located? The sub-question to this is: can this be done in such a way that the industrial heritage of the site as well as the ecological history of the site is overlaid as a palimpsest through which memory of damage and industry is displayed?
1.4.1 ASSUMPTIONS
The scheme will work with two basic assumptions: architectural and operational. The architectural assumption will be that the gas storage tanks on site can be re-appropriated and are no longer vital for storing gas. Also, it is assumed that the gas distribution pipeline can be moved to a different location on the site and that the only buildings worth keeping based on a heritage assessment are the two red brick retort buildings, the coal bunkers, Carburetted Water Gas plants and the foundations of the three tanks. The operational assumption is that Egoli Gas can move offices to another location on the site and that the company has made the site available for development.

1.4.2 RESEARCH METHODOLOGY
The research will be conducted through visits to the site and documenting the condition of the footprints of the No.1 and No.2 gas tanks. Theory will be sourced that pertains to the ecological restoration of post-industrial landscapes. This will be sourced by desktop research and literature regarding post-industrial natural spaces. Appropriate theories will be sourced that pertain to industrial heritage, restoration and commemoration in architecture and the recall of memory of place in new architectural or landscape interventions. Design research will then subsequently involve architectural model explorations on the site to represent the conclusions found in the theory.

1.4.3 DELIMITATIONS & LIMITATIONS
This architectural proposal is delimited to a specific zone within the entire Egoli Gas site. Similar issues in other locations on the site are not addressed since the project in this dissertation is one of four architectural proposals and one landscape architecture proposal that specifically deals with the remediation of a large portion of the site. The chosen site has the potential to communicate the relationship between ecology and the heritage of industry most clearly. Although the scheme incorporates the gas distribution plant as a museum, other buildings of significant heritage value are not addressed since they fall within the territory of other proposals.

Other limitations within this scheme deal with the rehabilitation of the natural environment. Since the site of intervention is affected by tar pollution there are certain areas in which architectural interventions are not possible or where the interventions will be strictly guided by the remediative processes of tar pollution.