

THE ADAPTIVE REUSE OF THE FORMER THESEN ISLAND POWER STATION: A CASE STUDY

by

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DECLARATION

I, Rhys Edwards, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously, in its entirety or in part, submitted it at any other university for a degree.

Further, I declare that all sources of information have been acknowledged appropriately.

Rhys Edwards

Date:

DEDICATION

In loving memory of my wonderful father, Martin Edwards, who gave me my love of design and architecture but did not live to see me complete this work, and to my wonderful UK 'parents', Chris and Lina Fair who have always watched over me and given me so much inspiration, as well as being so generous with me – I love you both.

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ABSTRACT

In the developed Western world, the need to preserve buildings, including industrial buildings, is well established, and the many charters that exist for guidance for preservation of the built environment point to the necessity of preservation.

It can be posited that many of South Africa buildings with industrial architectural heritage are being lost either through neglect, obsolescence, demolition or vandalism. At an international conference, David Worth, the sole South African representative for the International Committee for the Conservation of the Industrial Heritage (TICCIH), stated that South Africa's industrial heritage has been neglected by the public, by professionals and academics, and by commercial and political interests. Läufer and Mavunganidze make the point that South Africa continues to lag behind other countries in the preservation of and declaration of its industrial heritage.

The purpose of this research was to investigate if adaptive reuse is a successful strategy to preserve industrial architectural heritage in South Africa. A further aim was to investigate whether adaptive reuse can be considered sustainable or 'green' (in terms of the UN's sustainable development goals).¹

The research was qualitative in nature, in the form of a case study comprising the 10-year journey by architects CMAI to adapt for reuse the old Thesen Island power station in Knysna to the Turbine Hotel & Spa. As the power station formed part of a new precinct development on Thesen Island, some of the other buildings in close proximity which were adapted for reuse were also interrogated.

Primary findings were collated from semi-structured interviews with a range of pertinent individuals as well as the lead architect for the project, along with own observations and an examination of documents and artefacts. Secondary findings comprised an extensive literature review on the importance of heritage and the adaptive reuse of industrial heritage buildings, particularly power stations.

Power stations that generate electricity have been a feature of the urban landscape since the late 19th century. However, worldwide they have been decommissioned in the pursuit of

¹ SDG no 9: Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation, and SDG no 11: Make cities and human settlements inclusive, safe, resilient and sustainable (United Nations, 2015).

a cleaner, low-carbon environment and changes in both power generation and consumption. These places are unique for their ability to foster an appreciation of history, an understanding of the present, and a vision for the future. From powerhouses of power generation, they can become powerhouses of social, economic and environmental revitalisation.

It can be concluded that the adaptive reuse of the old Thesen Island power station in Knysna to the Turbine Hotel & Spa project was successful, and this study illustrates how adaptive reuse can be used as a strategy to preserve industrial architectural heritage. This adaptive reuse project has also had further sustainability (and socio-economic) benefits; now some 10 years old, it has preserved industrial heritage and continues to create and sustain jobs, attract tourists, and contributes significantly to the economy of Knysna and surrounding towns.

As various municipalities in South Africa are currently wrestling with what to do with a decommissioned power station (Athlone power station in Cape Town) and those not functioning optimally, requiring refurbishing and currently available for sale or lease as at the time of writing (2014), viz. Rooiwal and Pretoria West power stations in Pretoria, as well as the announcement by Eskom (March 2017) that four power stations in Mpumalanga are to be closed, this research may contribute to furthering the argument for adaptive reuse as a successful strategy to preserve industrial architectural heritage as opposed to demolition.

Key words: Adaptive reuse, heritage, preservation, industrial, power station.

LIST OF ACRONYMS

LEGISLATION

	Country	
NEMA	SA	National Environmental Management Act, No. 107 of 1998.

ENTITIES, GUIDES AND CHARTERS

AIC-ASG	USA	American Institute for Conservation – Architectural Special Group
ACSF	USA	American Clean Skies Foundation
AHS	SA	The Africa Heritage Society
APT	International, origin USA	Association for Preservation Technology International
BREEAM	International, origin UK	Building Research Establishment Environmental Assessment Methodology
ICOMOS	International, founded in 1965 in Warsaw as a result of the Venice Charter of 1964	International Council on Monuments and Sites
GBCSA	SA	Green Building Council of South Africa
LEED	USA	Leadership in Energy & Environmental Design
TICCIH	International - founded after the First International Conference for the Conservation of the Industrial Heritage in Ironbridge, England, in 1973.	International Committee for the Conservation of the Industrial Heritage
UNESCO	International, based in Paris	United Nations Educational, Scientific and Cultural Organization
WCED	International	World Commission on Environment and Development
WGBC	International	World Green Building Council

GENERAL

AIA	USA	American Institute of Architects
ANC	SA	African National Congress
CBD	International	Central Business District
CBE	SA	Council for the Built Environment
CFLs	International	Compact Fluorescent Lights
CMAI	SA	Chris Mulder & Associates Inc.
CPUT	SA	Cape Peninsula University of Technology

CSIR	SA	Council for Scientific and Industrial Research
EIA	SA	Environmental Impact Assessment
HIA	SA	Heritage Impact Assessment
IDP	SA	Integrated Development Plan
IMF	International, origin USA	International Monetary Fund
JDA	SA	Johannesburg Development Agency
JPC	SA	Jo'burg Property Company
LEAD	New Zealand	Legal Education and Development
LED	International	Light emitting diodes
LED	SA	Local economic development
N2	SA	National Highway No 2
NDP	SA	National Development Plan
NHT	SA	Newtown Heritage Trail
NMC	SA	National Monuments Council
NRCS	USA	National Regulator for Compulsory Specifications
PHRA	SA	Provincial Heritage Resources Agency
PHRAG	SA	Provincial Heritage Resources Authority Gauteng
PPP	SA	Public-Private Partnership
RDP	SA	Reconstruction and Development Programme
ROI	International	Return on investment
SACAP	SA	South African Council for Architectural Profession
SAHRA	SA	South African Heritage Resources Agency
SAIA	SA	South African Institute of Architects
SANParks	SA	South African National Parks
TIDC	SA	Thesen Island Development Company
UCT	SA	University of Cape Town
UIA	International	Union of International Architects
UK	UK	United Kingdom
UNCED	Rio de Janeiro, 1992	United Nations Conference on Environment and Development
USA	USA	United States of America
VOC	International	Volatile Organic Compounds
WWF	International, founded in Switzerland in 1961	World Wildlife Fund

DEFINITION OF KEY TERMS

The following important terms are used in this research:

Adaptive reuse:

The term 'adaptive reuse' is often used interchangeably with words such as remodelling, refurbishing, retrofitting or adaptation (Plevoets & Cleempoel, 2011:1). Adaptive reuse refers to the process of reusing an old site or building for a purpose other than which it was built or designed, according to Joachim (2002).

Architectural conservation/preservation:

Some authors in the literature regarding adaptive reuse use the terms 'conservation' and 'preservation' interchangeably. The National Heritage Resources Act, 1999, defines 'conservation', in relation to heritage resources, to include 'protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance'. Thus preservation is part of conservation. In South Africa, the SAHRA, as the implementing body for the Act, uses the term 'conservation' to mean '...all the processes of looking after a place so as to retain its cultural significance' (SAHRA Conservation Principles, no date).

According to the US Department of Interior (<https://www.nps.gov/tps/standards/four-treatments/treatment-preservation.htm>, no date), 'conservation is generally associated with the protection of natural resources, while preservation is associated with the protection of buildings, objects, and landscapes.' They further state that preservation, 'places a high premium on the retention of all historic fabric through conservation, maintenance and repair. It reflects a building's continuum over time, through successive occupancies, and the respectful changes and alterations that are made.' Therefore this study uses the term 'preservation.'

Other terms used interchangeably are rehabilitation, restoration and reconstruction. The Department of the Interior of the United States notes that rehabilitation 'emphasizes the retention and repair of historic materials, but more latitude is provided for replacement because it is assumed the property is more deteriorated prior to work. Both preservation and rehabilitation standards focus attention on the preservation of those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character'.

According to the US Department of Interior (no date), restoration ‘focuses on the retention of materials from the most significant time in a property's history, while permitting the removal of materials from other periods’, while reconstruction ‘establishes limited opportunities to re-create a non-surviving site, landscape, building, structure, or object in all new materials.’

Various countries recognise some or all of these as potential treatments for historic structures. Of importance to this study is the ICOMOS Australian Burra Charter, accepted by South Africa as best practice for guidance in preserving heritage, which provides definitions for preservation, restoration, and reconstruction.

Cultural significance:

According to the National Heritage Resources (Act 25 of 1999) ‘cultural significance’ means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Heritage:

Heritage is defined as,

‘.. that which we inherit: the sum total of wild life and scenic parks, sites of scientific or historical importance, national monuments, historic buildings, works of art, literature and music, oral traditions and museum collections together with their documentation’ (The Africa Heritage Society (AHS), no date)

The National Heritage Resources Act, Act no 25, 1999, is aimed at protecting the heritage resources of South Africa which are of cultural significance or other special value and thus form part of the ‘national estate’. The agency charged with implementing the Act is the SAHRA – the South African Heritage Resources Association and its provincial arms, the various PHRAs (Provincial Heritage Resources Agencies).

Heritage buildings:

Heritage buildings, for the purposes of this study, are buildings older than 60 years old, which may be registered as national heritage sites, and are part of the South African historical landscape (National Heritage Resources Act, 1999). The integrity of heritage places and the authenticity of the features that demonstrate their values are crucial to their conservation (Balderstone, 2012).

Industrial building:

An industrial building is one which is designed to house industrial operations and provide the necessary conditions for workers and the operation of industrial equipment. Examples are factories, warehouses, mills and power stations.

Industrial heritage:

The Nizhny Tagil Charter for Industrial Heritage (2003) provides the following definition:

'Industrial heritage consists of the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education' (TICCIH, 2003).

This charter was originated by TICCIH, for presentation to ICOMOS for ratification and for eventual approval by UNESCO (<http://ticcih.org/about/charter/>).

Power station:

A power station (also known as a generating station, power plant, powerhouse or generating plant) is an industrial facility for the generation of electric power, according to British Electricity International (1991), British Electricity International (1991), and Babcock & Wilcox Co (2005). The fuel used could be steam (hydro-electric), coal, gas etc. The Thesen Island power station was fuelled by wood chips, a by-product of timber milling operations on the island.

Sustainable development:

Sustainable development, according to the Brundtland Report (1978) is, 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

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CHAPTER 1: INTRODUCTION TO THE RESEARCH

'An historic building is one that gives us a sense of wonder and makes us want to know more about the people and culture that produced it. It has architectural, aesthetic, historic, documentary, archaeological, economic, social and even political and spiritual or symbolic values; but the first impact is always emotional, for it is a symbol of our cultural identity and continuity, part of our heritage' (Fielden, 1982:1).

1.1. Introduction

Legacy industrial buildings are a link between the modern world and the world of the past. It is in these industrial heritage buildings that one can 'read' the significant architectural, technical, social and economic achievements of those who built them and worked in them. They index the ambition, rise and decline of industries, places and culture over time, but unlike commercial or residential buildings, changes in products and technology makes these purpose-built structures difficult, and often impossible, to keep in operation for their original purpose. Often they are merely abandoned and left to decay, or demolished.

The 2003 Nizhny Tagil Charter for the Industrial Heritage, The International Committee for the Conservation of the Industrial Heritage (TICCIH) defines industrial heritage as follows:

.... Consist[ing] of the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education.'

As far back as the late 1980s, Picton-Seymour (1989) notes an 'uncountable number of obsolete industrial buildings' that have been demolished indiscriminately in urban (and rural) areas over the years in South Africa, where often just photographs remain as the only tangible link to the past. Hart and Halkett (1998) note the following:

' both statutory conservation bodies and large industry in South Africa have an extremely poor record in terms of conservation of the country's industrial heritage' (Hart & Halkett, 1998).

Worth (1998) notes that South Africa's industrial heritage has been neglected by the public; by professionals and academics; and by commercial and political interests. Läufer and

Mavunganidze (2009:1) concur, noting that 'South Africa and indeed many other developing countries have fallen behind the rest of the world in recognising, declaring and protecting their industrial heritage'. Krige (2010) notes that in South Africa there has been a consistent undervaluing of industrial architecture and heritage, to what they call 'the point of malicious neglect'. Charlton (2015), writing specifically about industrial areas in Johannesburg, posits that both under colonial rule and apartheid rule, the government of the day sought to deny the traces of its own 'geopolitical' development, eschewing and neglecting to preserve historical culture in favour of 'the latest in western metropolitan design'. Thus industrial areas remain as spaces of heterodoxy on the margins of the metropolises in South Africa. The fact that South Africa is losing its industrial architectural heritage is further substantiated by South African authors over the past 15 years, *inter alia* Quaghebeur (2000) Falser (2001), Nomico and Sanders, (2003), Fraser (2007), Brink (2008), Taitz (2008), Krige (2010), Moolman (2010), Visagie and Fourie (2011), Coetzer (2011), Louw and Fisher (2011), Mare (2012), McCulloch (2012) and Jacobs (2015).

In South Africa we have inherited a vast mining and railways legacy of industrial buildings; not only in cities but also in rural areas. Louw and Fisher (2011) note 'the loss of what is possibly South Africa's most vast and least protected heritage resource – the residue structures and infrastructure of a mining and industrial past'. This sentiment could be extended to include all industrial buildings in South Africa.

Even a cursory glance at the Heritage Portal's (a news and information platform for the South African heritage sector) list of endangered buildings or sites threatened with decay or demolition, will yield the fact that South Africa is losing much of its industrial architectural heritage. Further, this portal keeps track of the many applications to demolish various structures, as well as publishing notices of intent to demolish various structures, often of historical or architectural heritage. The Heritage Portal (2015) notes that there have been more than 300 demolitions of significant buildings since January 2013, and various historical buildings have been downgraded; i.e. lost their status as heritage buildings. A list of the published top 10 threatened sites in 2016 reveals that six of these sites have industrial buildings on them. As Stoltz (2016) notes,

'Most of the sites are threatened by a combination of poor heritage law enforcement, mining licences being issued in complete disregard of our heritage, urbanisation, under investment, poor state asset management and the seemingly endless delays in resolving land claims and the limbo that many communities still find themselves in in the shadow of apartheid.'

In the typology of industrial buildings, one component comprises power stations. Some of these power stations have been decommissioned due to the lack of environmental and economic sustainability and have stood vacant for many years, becoming targets of vandalism and abuse. Dereliction fosters abuse, neglect and illegal inhabitation. South African communities are disconnected from industrial buildings with architectural heritage as most of these buildings are either redundant, obsolete, have not been adapted for reuse, or are left to decay through neglect (Krige, 2010).

As these buildings decay South Africa is losing valuable assets that make up an important element of the built environment and built industrial architectural heritage. These structures have had a marked and undeniable impact on many lives, driving development and change in our country. For so long they were the backbone of change and progress and now go largely unappreciated and unnoticed - unless one has had direct contact with, or lives in, the shadow of these structures. Most of these structures existed on the fringes of cities and towns, but now that they have been absorbed by urban sprawl, becoming new urban landmarks, we are forced to reconsider their future. As Glancey (2003:218) states:

'The wave of demolition of historic buildings that smashed through cities worldwide in the 1950s and '60s, and which continued to surge through the developing world (notably China) into the twenty-first century, led to the consolidation of conservation movements committed to saving our architectural heritage.'

The tendency in the 20th century has been to demolish redundant and obsolete industrial buildings and start afresh (Kariotis, 1998; Xie, 2013; Galbraith, 2014; Grant & Smith, 2014). Some posit that the industrial period is best forgotten or 'removed from view' (Visagie & Fourie, 2011). However, Glancey (2003) notes that in modern times, beginning in the 1960s, sympathetic architects realised that they could adapt old buildings for reuse and imbue them with a new and interesting character, although this practise has existed for centuries mainly due to functional and economic necessity. As Glancey (2003) states, the new use could often enhance the character of the old building, thus preserving its industrial architectural heritage, when the original use (as in the case of power stations or factories built in city centres) had become unacceptable to newer generations, mainly because they were seen as detrimental to the environment.

'Some of the grandest of all city buildings in the twentieth century were power stations' (Glancey, 2003:219).

These dormant power houses, relics of the past, lying forgotten and neglected, possess the

potential to be regenerated and reabsorbed into the urban framework; to be born again as economic contributors rather than polluters. This is already being done in other countries; power station adaptive reuse examples include the Bankside power station in London (now the Tate Modern art museum) and the Ultimo power station in Sydney, Australia (now a science and technology museum). However, obsolete power stations have been demolished in South Africa – a prime example being the Jeppe Street Power Station, built in 1927. It was the largest and last of the three steam-driven power stations in Johannesburg, and today, only the Turbine Hall remains; adapted for reuse as a functions venue and the new offices for AngloGold Ashanti (NHT, n.d.).

Why is South Africa's industrial architectural heritage being lost? Why is it important to preserve our industrial architectural heritage? And, what steps can be taken to minimise this loss in the future? The challenge is; what do we do with these significant vessels of embodied energy and heritage? The answer may lie within an architectural strategy: i.e. adaptive reuse, which falls with the broader context of industrial architectural heritage preservation. Preservation, according to Groarke (2009), is a comprehensive and integrated approach to restoring the integrity and interconnectedness of built and natural environments. In many instances, a building can no longer fulfil its original purpose and adaptive reuse provides the only alternative to demolition (Hart, 1992), but does it successfully preserve architectural heritage?

As Hart and Halkett (1998) state,

'A lack of conservation ethic in South Africa with respect to industrial structures has resulted in the loss of many buildings, often demolished without any form of record. Consequently buildings such as this are becoming scarce. The most desirable option is adaptive reuse of the structure'.

One such adaptive reuse project of a decommissioned power station in its entirety exists in South Africa; a local precedent tucked away in what was previously an industrial island enclave in Knysna; i.e. the adaptive reuse of the former Thesen Island power station which is now the Turbine Hotel & Spa by CMAI (Chris Mulder & Associates Incorporated). This project, as the research aims to explore, could prove to be an example of how a building, forming part of South Africa's industrial architectural heritage, can be successfully adapted for reuse, thus preserving industrial architectural heritage for future generations to enjoy. It is a unique project, as discussed further in this research document.

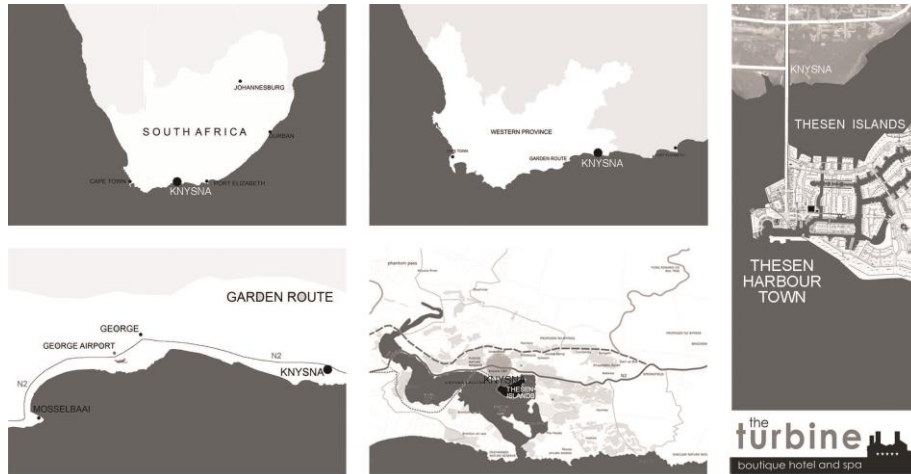


Figure 1-1: Map of South Africa showing the location of Knysna



Figure 1-2: Thesen Island, Knysna (Mulder & Aupais, 2013)

However, it is not possible to fully appreciate this project without examining its context. This context comprises both the history of the power station, Thesen Island, and the greater Knysna community. As the power station had been a landmark in Knysna since circa 1940, it was of significant socioeconomic importance for the community. Thus the history of the island, and its cultural, architectural and geographic contexts and significance are discussed in Chapter 4 as these impacted many decisions made by the architectural team.

1.2. Rationale for the research

As noted in the introduction, many industrial buildings in South Africa with significant architectural heritage, not only power stations, are being lost for various reasons, *inter alia*, economic viability, social and environmental constraints, pollution, cost of repairs and maintenance, etc. Of particular note is that post-Apartheid, the meaning of culture and heritage has changed significantly – often these buildings, especially industrial buildings, serve as painful, colonial reminders of deprivation and exploitation. This is further elaborated on in a section of the literature review (Chapter 2) detailing why buildings become

obsolete. Although Hart (1992) states that not all that is new is an improvement, and not all that is old is worthless, Hart and Halkett (1998) note that South Africa's built environment industry (and the allied professions) lack a conservation ethic.

'While new buildings may be a welcome sign of economic growth, old buildings are a city's memory, providing links with the past and giving it a sense of continuity' (Hart, 1992).

This research study concerns the adaptive reuse of industrial architectural heritage of a single building, i.e. the former Thesen Island power station on Thesen Island, Knysna, in the form of a case study in order to investigate if adaptive reuse is a successful strategy to preserve architectural heritage. The image below shows the northern elevation of the Thesen Island power station, prior to intervention, which had been decommissioned *circa* 2000 (Louw, 2013).



Figure 1-3: North elevation of the Former Thesen Island power station before adaptive reuse (source: Louw, n.d.)

Not only did this building have significant industrial architectural heritage, it had been a landmark in Knysna for many decades, representing the socioeconomic progress of the town, initially based on maritime trade and timber processing. Generations of the community had lived and worked there, fuelling the growth of subsequent allied industries and services, and also helping establish the town of Knysna as a premier tourist destination. Built in 1939/1940, the last day of operation of the Thesen Island power station was the 26th June 2001, and full operation of the Turbine Hotel & Spa commenced 12th August 2010 (Turbine

Hotel & Spa, n.d.). Thus the case study is for this period, along with an evaluation of its success since the hotel opened for business.



Figure 1-4: The completed Turbine Hotel & Spa which opened in 2010

This project could prove to be a successful example of a South African industrial building with architectural heritage that had served its purpose and was initially conserved and then adapted for reuse. Although this case study specifically concerns the adaptive reuse of the decommissioned Thesen Island power station to the Turbine Hotel & Spa, it cannot be divorced from its wider context; i.e. the entire Thesen Island redevelopment, in turn a part of the wider Knysna region.

Due to increasing environmental awareness and the need for sustainability, buildings today (both brownfield and greenfield), including those adapted for reuse, must conform to the principles of sustainable development (Bullen & Love, 2010; Plevoets & Cleempoel, 2011; Shipley *et al.*; 2006; Morandotti *et al.*, 2013; Eyuce & Eyuce; 2010). Sustainable development is the practice of increasing the efficiency with which buildings and their sites use scarce resources (such as energy, water) and materials, so as to reduce the impact on human health and the environment for the entire lifecycle of a building (Green Building Council South Africa, no date; North West Carolina Green Building Council, no date). Therefore one of the secondary aims of the research was also to examine whether this building, adapted for reuse, is sustainable, or 'green'.

1.3. Research question

The specific research question this study aims to answer is the following:

Is adaptive reuse a successful strategy to preserve industrial architectural heritage?

The following research sub-questions concern the way the architects approached this project and were devolved from the IAEA's (2011) literature on aspects (or themes) to consider when approaching a power station as an adaptive reuse project. They are further discussed in Chapter 2 – The Literature Review.

- How was architectural decision making influenced by the geographic location and concomitant climatic conditions?
- How was architectural decision making influenced by the history of the town of Knysna, the existing Thesen Island, and the Thesen family?
- Which architectural principles of sustainability and ecological design were employed in the project?
- How was architectural decision making influenced by local and international precedent studies regarding the adaptive reuse of decommissioned power stations?
- Was the history and heritage of the original structure (e.g. the former Thesen Island power station) appreciated and respected, and if so, how?
- What heritage legislation had to be considered in this adaptive reuse project?
- What characteristics and attributes of the site of the former power station influenced the decision making and final design for the Turbine Hotel & Spa?
- What characteristics, attributes and sections of the original building (i.e. the decommissioned power station) were deemed to be preservation worthy, and why?
- What challenges were encountered through the adaptive reuse of this structure, and how were they overcome?
- What role did the community play, and to what degree were they involved in the adaptive reuse process?
- Is this project unique, and if so, in what way?

These questions fall broadly in the four categories of themes identified by the IAEA (2011) as pertinent aspects of adaptive reuse of power stations; viz. socioeconomic impact, decommissioning impact, environmental impact, and stakeholder impact (see Chapter 2).

1.4. Research methodology

The research is in the form of a bounded single case study (i.e. qualitative in nature) that concentrates on only one South African project: the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa, Knysna as a strategy to preserve industrial architectural heritage. In order to obtain information which could provide answers to the research questions, both primary and secondary research were conducted in accordance with the research assumptions, delimitations, and methodology which are discussed in detail in Chapter 3 – Research Methodology.

The secondary findings comprise the literature review, i.e. Chapter 2 of the thesis. The literature review guided all the research activities and gave meaning to the entire body of research. The primary findings are discussed in Chapter 4 (The Case Study), and reference to them will be made Chapters 5 and 6. A semi-structured questionnaire was used when interviewing key personnel involved in the project, and thus the research is qualitative in nature.

1.5. Research objectives

The objective of this research was to explore the architectural strategy of the adaptive reuse of the former Thesen Island power station and to examine its success. The research aimed to examine how adaptive reuse can be used as a strategy to preserve industrial architectural heritage and whether or not such a strategy is successful. Due to the imperative today, in terms of environmental awareness and building ‘green’ as far as possible, the secondary aim was to examine whether adaptive reuse conforms to the principles of sustainable development.

Further, this research aimed to add to the body of knowledge within the various spheres of the built environment discipline regarding the importance, advantages, disadvantages and challenges of adaptive reuse of industrial structures, with a specific focus on decommissioned or derelict power stations in South Africa, as a viable and necessary alternative to demolition and how such adaptive reuse is consistent with the overarching aim of architectural heritage preservation and sustainable development. This research is timely, in that various plans are being discussed for the adaptive reuse of the decommissioned Athlone power station in Cape Town (2013) and two power stations in Pretoria (Rooiwal and Pretoria West) that are currently not operating optimally as at 2014 were up for sale or lease (Venter, 2014). In March 2017, Eskom announced the closure of four more power stations.

1.6. Research delimitation

This research study is delimited to a bounded single case study regarding the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa as a strategy to preserve industrial architectural heritage. The power station was decommissioned *circa* 2000, and the Turbine Hotel & Spa was completed in 2010. The history of the island and the factors that led to the decommissioning of the power station rendering it obsolete are important as these informed and guided most of the decision making by the developers and architects in the adaptive reuse project, and therefore are discussed.

1.7. Research significance

This research aimed to explore an adaptive reuse project of a significant structure with industrial architectural heritage situated within an ecologically sensitive landscape. With few completed local examples of the adapted reuse of industrial buildings, and South Africa's industrial built heritage under constant threat from indiscriminate development, this precedent adds to the body of knowledge concerning the adaptive reuse of decommissioned power stations within the broader context of heritage conservation and sustainability.

This research aims to demonstrate the advantages and disadvantages of the adaptive reuse of derelict industrial structures, and more specifically, the adaptive reuse of decommissioned power stations with significant industrial architectural heritage that should be preserved for future generations. Why buildings (including power stations) become obsolete and often derelict in the first place is discussed in detail in Chapter 2 – The Literature Review.

This research also discusses the qualities, characteristics and attributes of this building typology (i.e. power stations) that make them such attractive candidates for adaptive reuse. Also exposed are the challenges and hazards associated with the adaptive reuse of this type of building, as well as the tactics and strategies for converting polluted and toxic industrial brownfield sites into sustainable, liveable landscapes whilst preserving industrial architectural heritage. It is hoped that an understanding of this adapted reuse project, a respect and appreciation of built heritage, and more importantly, industrial architectural heritage in South Africa, may be fostered. The research also aims to explore how restrictions and constraints imposed by heritage legislation in South Africa may be responded to.

1.8. Outline of thesis

The chapters that follow this introductory chapter are the following:

Chapter 2	The Literature Review
Chapter 3	Research Methodology
Chapter 4	The Case Study – Power station to Hotel
Chapter 5	Research Analysis
Chapter 6	Conclusion and Recommendations

1.9. Conclusion

This introductory chapter discussed the background to the research in order to provide the context for what follows. The problem was noted that South Africa is losing its industrial architectural heritage. This chapter noted this study comprises a bounded single case study regarding the adaptive reuse of the former Thesen Island power station to the Turbine Hotel and Spa, on Thesen Island, Knysna, Western Cape Province of South Africa. The research question posed is: *Is adaptive reuse a successful strategy to preserve industrial architectural heritage?*

Adaptive reuse can be viewed as a strategy, or design approach, that can be employed by the built environment to preserve industrial architectural heritage; one that fits within the broader context of sustainable design and development. The topic of sustainable design was introduced as modern times necessitate a design approach that considers and mitigates prevailing (and future) environmental, economic and social concerns.

This chapter also noted the research methodology, i.e. qualitative in nature, and the tool employed is a semi-structured questionnaire to interview key personnel involved in the project (primary findings) along with the literature review (secondary findings). Also noted were the research objectives, limitations and the significance of the research. The chapter concluded by providing an outline of the chapters to follow. The next chapter comprises the literature review.

CHAPTER 2: LITERATURE REVIEW

'Conservation and heritage is not about putting everything back into a sparkling new shell but acknowledging the layers of history that have come to define a space' (Ng Sek San, 2012).

2.1. Introduction

In Europe, the Far East and the Middle East, there are buildings which are many hundreds of years old. Elsewhere, there are buildings which are much older; the Egyptian pyramids for example. In Amsterdam, a 19th century heritage building has been meticulously adapted for reuse as a hotel (Conservatorium Hotel) preserving as many of the original features as possible. One could also point to Tel Aviv in Israel, where strict planning laws protect their 4000 or so buildings built by German Jewish architects of the Bauhaus school who fled Nazi persecution (Mann, 2006). Collectively called White City, it is recognised by UNESCO as a World Heritage site (Kaufman, no date).

The question of 'oldness' of the built environment is subjective; what one society may consider 'old' and heritage worthy may still be a fully operational and functioning building in another society. However, industrial buildings, as a specific category of the built environment, are those generally deemed to have been built during and after the time of the Industrial Revolution (commencing circa 1760 to sometime between 1820 and 1840), a phenomenon which then spread throughout the Western World.

In modern times, authors such as Goodwin (2008) and James and Szeman (2010) have proposed an end date to the industrial era of 1960, which is followed by what Goodman (2008) terms 'post-industrial' – a period in history of rapid technological change and innovation often called the 'consumer society'. To illustrate this point, Douet (2016) states that in the early '70s, a town north of Barcelona voted in a referendum to include as part of their cultural heritage a power station which Douet, as a young engineer, had been involved with – from function to obsolescence to industrial architectural heritage in the span of a lifetime.

As changes in technology and manufacturing process took place, as well as new architectural design and building methods, it is these buildings dating from the Industrial Revolution onwards (in many cases though to modern times) that often became obsolete and it is this stock of surviving buildings that generally comprises industrial heritage. South Africa was under British control for many years, and thus much influenced by the circumstances there, such as the Industrial Revolution, and the architecture reflects this.

South Africa was influenced by architectural developments in both the USA and the UK (Picton-Seymour, 1989).

However, it is important to note that industrial architectural heritage exists in all phases of human development, not only that which is found in the 19th and 20th centuries, but also in prehistoric (Stone Age, the Bronze Age, and the Iron Age – the earliest use of tools) and medieval times (extractive industries to provide raw materials for the building trades and milling, lime burning, tile making, tanning etc. (Falser, 2001).

The discipline of preservation of buildings emerged in greater force in the 1950s as a consequence of the 'green' or environmental movement and the awareness of architectural heritage, including industrial heritage (Cantell, 2005; Carroon, 2010). Other contributing factors at the time were warnings of climate change, finite resources, and the high costs of energy, leading to the concept of 'sustainability'; society had become increasingly aware of the effects of human population and activity on nature and the biosphere (Károly, 2011), that society had a heritage, and that it should be protected and preserved for future generations.

Thus the term 'heritage' became prevalent, and this definition of what heritage is, is apt:

'.. that which we inherit: the sum total of wild life and scenic parks, sites of scientific or historical importance, national monuments, historic buildings, works of art, literature and music, oral traditions and museum collections together with their documentation' (The Africa Heritage Society (AHS)), no date).

This leads to a discussion regarding the importance of industrial heritage and both arguments for its preservation and against its preservation are discussed. The pressures of the 'green movement' and increasing awareness of the importance of preserving built heritage, and building 'green' according to the principles of sustainability, eventually led to the formation of various pieces of legislation, acts, voluntary charters and principles being formalised in various parts of the world, including South Africa, which are discussed next. This is followed by a section on building obsolescence as it is the obsolescence of buildings that paves the way for adaptive reuse.

The section on adaptive reuse, as a strategy to preserve industrial architectural heritage, offers an explanation of what it means, and the historical and contemporary theories of adaptive reuse are interrogated, as is the history of adaptive reuse in South Africa. This is illustrated with various case studies. The important report on the heritage resources present on Thesen Island prepared for the developers CMAI by Hart and Halkett (1998) is also discussed, and this is followed by several precedent studies of the adaptive reuse of power

stations.

This following section offers a brief discussion on how societal concerns for the environment, along with the growing awareness of the necessity of preserving architectural heritage, coalesced into what is now known as sustainable or ecological design (Cantell, 2005).

2.2. Societal concerns leading to increased awareness of built heritage preservation

2.2.1 Pollution and natural environment concerns

Concerns about the impact on human life of such problems as air and water pollution date to at least Roman times (Hughes, 1993; Sallares, 1991). Pollution was associated with the spread of epidemic diseases in Europe between the late 14th century and the mid-16th century (Brimblecombe, 2011). In the UK, the Industrial Revolution in the 18th century brought about massive technological, socioeconomic, and cultural change; as well as mass migration to the cities. The revolution then spread within a few decades to Western Europe and South Africa. Concomitant with the rise of large factories was air, water and visual pollution; all severely affecting man's health (Brimblecombe, 2011). Pollution was a major contributing factor to the decommissioning of the Thesen Island power station, as discussed in Chapter 4 – The Case Study (Mulder & Aupais, 2008).

By the early 1960s, mass media, specifically colour TV in the USA, mainstreamed the environmental message directly in homes all over the developed world, including South Africa, as did the seminal work by Rachel Carson, *Silent Spring*, first published to global acclaim in 1962. The terms 'ecology' and 'environment' became widely used, and activist groups mobilised to pursue their environmental goals; pressing specifically for legislation (Sills, 1975). As Carroon (2010) summarises, 'green' has now become an umbrella term covering complex issues such as reducing or eliminating adverse environmental impacts. In South Africa Peden (2006) cites major environmental battles fought by over the recent past between government/multinationals and activists, *inter alia*, Thor Chemicals, Save St Lucia Campaign, toxic waste, air pollution, nuclear power, asbestos mining, whaling, and most recently, Save the Rhino. Post-1994, the Constitution of South Africa (1996) enshrined the right to a healthy environment.

As will be discussed in Chapter 4 – The Case Study, there was much environmental objection to the Thesen Island development as it was thought (erroneously, as it turned out) that a rare and endangered seahorse living in the Estuary would be wiped out.

2.2.2 Built heritage concerns

Concurrent with mainstream concern for the environment and the increase in the 'green movement', and probably as a consequence thereof, the preservation movement for the built environment was also gaining ground (Cantell, 2005). Environmentalism (i.e. the 'green' movement) became a widespread political and social movement; and this movement then spread to concerns for the built environment generally in the Western World, gathering momentum towards the latter half of the 20th century (Taylor, no date.).

Concern for the built environment and architectural conservation (specifically the preservation of ancient structures) gained momentum during the 18th and 19th centuries, with specific bodies to protect and preserve the built environment being formally established in the later half of the 20th century (Bullen & Love, 2010; Carroon, 2010; Sallares, 1991). The idea of creating an international movement for protecting the planet's heritage, comprising the natural and built environment, emerged after World War I, according to UNESCO (2012).

In a seminal work, Jane Jacobs (1961) questioned the wholesale demolition of urban buildings to make way for new construction. Cantell (2005) concurs, stating that this time produced a growing advocacy base for the preservation of vernacular buildings. As Donofrio (2007) notes, the modern history of architectural preservation legislation in the UK and USA began in the 1960s in response to large scale demolition of historic areas. Society began to realise that old buildings have significance and value for society in that they represent a link to the past, holding society's memories.

Initially industrial archaeology was concerned with the interpretation of surviving physical evidence in order to understand past human activity (Neaverson & Palmer, 1998). Gradually it was recognised as a movement concerned with preservation to ensure the survival of significant industrial monuments of the past. Thus the term 'industrial heritage' came into being (IAEA, 2011). Industrial heritage comprises buildings, ancient monuments, and areas of architectural and historic interest (Gordon & Malone, 1994). However, it can be difficult to set boundaries for what is important when a building sits in a landscape that is in turn part of a wider area. The Thesen Island power station was situated in the broader context of the entire Thesen Island, and thus cannot be seen in isolation. The idea of a 'historic environment' or precinct enables one to look at places as a whole and brings heritage preservation closer to environmental thinking, i.e. the concept of sustainability, which is discussed in the next section.

Since the turn of the millennium there has been a renewed and increased focus on the issue of industrial heritage buildings and their sustainability and preservation (Balderstone, 2012; Langston *et al.*, 2007). According to Balderstone (2012), the USA, Canada, Australia and the United Kingdom's environmental assessment systems were beginning to recognise the need to also assess social and cultural factors, specifically those embedded in historical buildings.

2.2.3 Sustainability/ecological design

The growing environmental movement, along with societal agitation for historical preservation, increasing prices for construction materials, recognition of finite resources, recognition of burgeoning population numbers, and scarcity of land in developed areas, all coalesced into what is now known as 'sustainable development' (Morandotti *et al.*, 2013; Langston *et al.*, 2007; Carroon, 2010).

As Slater (citing Maile, 2014) notes:

'Sustainable building [is] driven by environmental concerns'.

Perforce, the built environment must embrace the principles of sustainability for brownfield and greenfield builds, including extant buildings adapted for reuse (Mazmanian & Kraft, 2008; Carroon, 2010). The World Commission on Environment and Development (WCED) (1987) (now the Brundtland Commission) states that sustainable development is,

'... development that meets the needs of the present without compromising the ability of future generations to meet their own needs'

The concept of sustainable development was further entrenched globally by the United Nations Millennium Declaration (2000) which identified various principles and treaties on sustainable development, including economic development, social development, and environmental protection. The concept of sustainable development is now widely considered the 'best practise' global benchmark for development the world over. According to Beattie [no date], sustainable development seeks to minimise the negative environmental impact of buildings by using materials, energy, and development space efficiently and effectively. Jarzombek (2003) concurs, noting that it is a conscious approach to energy and environmental conservation in the design of the built environment. Beattie [no date] goes on to state that as the built environment is the main consumer of resources (materials and energy), a society in pursuit of sustainability must now, and in the future, concentrate on sustainable development.

The National Environmental Management Act (1998), in the preamble, specifically uses the term 'sustainable development', and states that,

'... sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations'.

The Green Building Council of South Africa (GBCSA) was established in 2007 to rate and reward the built environment professionals for buildings that are designed, built and operated in an environmentally sustainable way. The following year, in 2008, the government published the National Framework for Sustainable Development (People, Planet, Prosperity) (2008) as a guide to sustainable development.

Further, it should be noted that 'green' has moved beyond simplistic ideas of sustainability to the concepts of resilience and regenerative theories. 'Green building' concepts have been directed at 'doing less harm' or, 'reducing the degenerative consequences' of human activities on human health and upon the integrity of ecological systems' (Zhang *et al.*, 2011). These approaches have been criticised (Cole, 2012 as cited by Zhang, 2013; Du Plessis, 2012) as an insufficient requirement for charting an ecologically sustainable future as they are too mechanistic and prevent engagement with the dynamic world, and further, according to Zhang (2013), they are insufficient aspiration for challenging and empowering design professionals and their clients to be increasingly creative.

The regenerative sustainability paradigm (Du Plessis, 2012), has emerged from the transition from a 'mechanistic' view to an 'ecological' (living systems worldview) which aims to reconceptualise the interplay between technological, ecological, economic, social and political systems; thus the concept of regenerative design and development is situated within the broader theoretical context of sustainability. The regenerative paradigm provides an alternative that is explicitly designed to engage with a living world through its emphasis on a creative partnership with nature based on strategies of adaptation, resilience and regeneration (Du Plessis, 2012). This provides a foundation for a sustainability paradigm that is relevant to an ecological worldview.

Fiksel (2006) also notes that what he calls 'steady-state' (stability) sustainability is not enough; there is an urgent need for man to be resilient to face future disruptions and better understand the interplay between of complex social, economic, and biophysical systems. Ahern (2011) concurs, noting that disturbance, uncertainty, and adaptability are fundamental to the emerging science of resilience; i.e. the capacity of systems to reorganise and recover

from change and disturbance without changing to other states. Hence the emphasis in this study of the term 'ecological design' rather than sustainability.

According to Van der Ryn and Cowan (1996), ecological design is any form of design that minimises environmentally destructive impacts by integrating itself with living processes. Traditionally, man has sought to force natural environments to conform to human wants and needs; i.e. conformation rather than transformation; leading to inefficient energy use, pollution, etc. Ecological design seeks to conform to the environment and substantially reduce energy consumption and add to quality of life (Regenerative Leadership Institute, no date). How Louw (2013) implemented an ecological approach to the adaptive reuse of the Thesen Island power station is detailed throughout this case study.

An ecological design philosophy for an adaptive reuse project is now necessary; one that considers the social, economic and biophysical interplay, encourages decision making at each phase of the architectural design process to reduce negative impacts on the environment and the health of the occupants, without compromising the bottom line (Jarzombek, 2003; Carroon, 2010; Bullen & Love, 2010; Cantell, 2005) while being resilient and regenerative (Du Plessis, 2012; Ahern, 2011; Louw, 2013). The architect's ecological approach to the adaptive reuse of the Thesen power station is discussed in Chapter 4.

2.3. The importance of industrial heritage

2.3.1 Arguments for the preservation of industrial heritage (drivers)

Apolda, a small town in Thuringia, Germany (and formerly part of East Germany), was for centuries a centre of high-skilled manufacturing: bells, books, knitwear, clocks and, for a few years, even cars; but no longer. Industry was not only an economic resource, but was part of the community's culture and identity (Marita, 2016). The consequence of the closure of these industries (due to the economic crises of 2008) has meant a greater sense of loss: the loss of jobs, of hope for the future, and a loss of people (Marita, 2016). This is a situation echoed all across the Western world, including South Africa.

Industrial heritage not only consists of factories (buildings and machines) but also all things connected to them: techniques, knowhow, archives, documents, and also the homes of the workforce and public buildings built by the industrialists and thus should be preserved (Report of the Lyons Colloquy, 1987). This report further notes that industrial sites and workplaces, machines, artefacts, men and what they leave behind them, have over time formed a *gestalt* of the many ways in which technology has influenced production, business, the landscape, and practices of life at work. They are thus significant, not only for historians, but for the communities that worked and lived in their shadows. They represent the history

of what has gone before and it is a 'story' that should be preserved for future generations.

Visagie and Fourie (2011) note that industrial heritage is unlikely to match the current public perception that old buildings have no value without a campaign of access and education. This is needed to challenge the prevalent view in South Africa that this period of history is 'best forgotten'. It is on the premise of our industrial heritage that changes have operated to turn technology from a collection of innovations, whether fortuitous or deliberate, into *culture*, or the product of man acting on his environment (Report of the Lyons Colloquy, 1987) - exactly what such bodies as ICOMOS and the SAHRA, using the guiding principles of the Burra Charter (1999) and the Brundtland Report (1987), seek to preserve. (Both these are discussed later in this section.)

As Plevoets and Cleempoel (2011) note, as a reaction to increased demolition and new construction, there has been a growing interest in the preservation of old buildings with industrial architectural heritage worldwide. This is not really the case in South Africa where few pockets of excellence exist regarding the adaptive reuse of industrial buildings with architectural heritage (Quaghebeur, 2000; Visagie & Fourie, 2011; Krige, 2010). Rocchi (2015) states that cities need old buildings to maintain a sense of permanency and heritage for both residents and tourists and for them to absorb its aesthetic and cultural value.

However, Visagie and Fourie (2011), in their report for the IAEA (2011), state that it is difficult to overstate the negative impact of derelict and unmanaged industrial buildings on an urban area and its population as they hold down 'economic value, reduce confidence, attract antisocial behaviour and give a message of failure and a lack of care and responsibility'. Furthermore, such industrial sites may be contaminated (e.g. toxic chemicals which have leached into the ground) and this would necessitate expensive rehabilitation. Concerns over the liabilities associated with toxic and hazardous materials are especially relevant for the preservation of historic industrial buildings (Cantell, 2005).

This negative impact of derelict and unmanaged industrial buildings is particularly the case in South Africa where buildings are left to decay, along with the entire neighbourhood; particularly inner city buildings such as the Johannesburg and Durban CBD. Krige (2010) calls this 'malicious neglect'. According to Krige (2010), industrial landscapes provide a direct connection with a cultural experience common to all city dwellers. The integrity of places of industrial architectural heritage and the authenticity of the features that demonstrate their values are crucial to their conservation (Balderstone, 2012). However, if preservation of industrial heritage is seen as backward looking, and a strain on regeneration and economic development, then its future will be questioned (Visage & Visage, 2011).

Therefore the object of industrial architectural preservation must be on current regeneration efforts. This is why the Thesen Island power station had to be preserved as part of the wider Thesen Island development programme.

For the built environment in South Africa, buildings older than 60 years are protected (National Heritage Resources Act, 1999). However, this does not mean they cannot be demolished if due process has been followed. President Jacob Zuma (1999), at a speech to mark Heritage Day (a public holiday in South Africa) explains:

'In our part of the continent, we have a rich and varied past that is only now being appreciated for its complexity and diversity. Indeed, our heritage is the foundation from which we are working to rebuild our society (as cited by AHS, no date.).'

Moe (as cited by Carroon, 2010) states that preservation works to both protect and celebrate the evidence of the past. Historic buildings are physical links to the past – it is about saving the layers and layers of information about our lives and those of past generations, states Dimatteo (2012). San-Jose *et al.* (2006) state that today's generation is heir to this technological progress and advance. A space of heritage significance provides an immediate 'story or stories that build on our appreciation of our common and diverse histories and cultures' (Krige, 2010). This *genius loci* provides a unique window onto significant facets of South African history. As Krige (2010) notes, 'nothing can replace actually 'being there' and 'encountering the textures of place'.

An interesting observation about obsolete industrial buildings, according to Dimatteo (2012), is that they can be great incubators for entrepreneurship, innovation and experimentation. This has particularly been the case with the Woodstock/Salt River area in Cape Town, and the Maboneng/Newtown districts in Johannesburg – these are discussed in a later chapter. Rocchi (2015) is in agreement, and also refers to obsolete buildings as forming part of a community's tangible past, and that they can also offer opportunities for a community's future. As she states, old buildings have intrinsic value (e.g. higher quality materials), are maybe better built than a brand-new building, and that when an old building is demolished, society's collective memory is destroyed. Visagie and Fourie (2011) state that industrial buildings with architectural heritage provide a direct, tangible, link to a world that the present generation has never experienced.

Industrial buildings with architectural heritage can add significantly to the tourism potential of a town or city. In 1998, Hart and Halkett's in their report to the developers of Thesen Island had already pointed out the tourism potential of the Thesen Island power station – the

research by these authors is discussed in the next section.



Figure 2-1: Japanese industrial tourists visiting an old coal mine

Industrial tourism (visiting old or existing, working factories) is a growing trend worldwide (Otgaar, 2010; Jansirani & Mangai, 2013; European Parliament, 2013). Tourism France describes it as ‘visits to sites which showcase a particular type of expertise from the past, present or future to the general public’, and the BBC (UK) states that ‘tours around the world focus on finding grandeur and beauty in what many see as unsightly sources of pollution.’ It thus industrial tourism memorialises how our societies were run in the past.

This is especially evident in places such as Japan, Detroit’s Motor City in the USA, cigar and sugar mills in Cuba, and the former Soviet factories in Tallinn – the capital of Estonia, for example. Tallinn’s Old Town is a UNESCO World Cultural Heritage Site, where old abandoned Soviet factories (or what remains of them) sit side by side with modern architecture. The old buildings are used for craft markets, pop-up shops, art galleries, etc. Japan has transformed the industrial hub of Kawasaki into a tourist destination, for everything from its food plants to its oil refineries.

Writing about a specific region in Germany, Li (2002) stated the following:

‘With the contextual introduction of deindustrialization of Ruhr since 1970s, industrial heritage tourism has played an effective role in the process of revitalisation of Ruhr area in economic, cultural, social and environmental dimensions.’



Figure 2-2: V&A Waterfront (source <http://propertywheel.co.za>)

In South Africa, the successful adaptive reuse of the V&A Waterfront is now South Africa's most visited destination and contributes R200 billion to SA economy (Nombembe, 2015). This adaptive reuse project is discussed in more detail later in this chapter.

By seeing historic buildings, whether related to something famous or recognisably dramatic, both tourists and residents are able to witness history; thus a city needs to preserve old buildings to maintain a sense of permanency and heritage (Bullen & Love, 2009; Langston *et al.*, 2007). According to Wells (2011), people form 'emotional attachments' to buildings and places. Carroon (2010) states that the cultural and historical foundations of a community should be preserved in order to give a 'sense of orientation'; specifically with significant 'landmark' buildings.

According to Shipley *et al.* (2006), industrial buildings (including power stations) have important aesthetic, cultural and economic resources and thus should be preserved. Eyuze and Eyuze (2010) concur; noting that industrial buildings specifically, especially those built during the 19th century, possess remarkable architectural and tectonic features. Visagie and Fourie (2011) state that reconstructed surroundings of industrial spaces and the concomitant machinery allows the older generation to tell stories to the younger generation of 'the way we were'. Demolition of such buildings amounts to the eradication of layers of history (Eyuze &

Eyuce, 2010); thus a historic building can be viewed as a palimpsest. According to these authors, the built environment plays a vital role in the formation, accumulation and dissemination of the collective memory of a nation's culture, and thus the heritage value of historical buildings should prevail over arguments of functional viability (Eyuce & Eyuce, 2010).

Rocchi (2015) also notes old buildings as reminders of a city's culture and complexity. In a similar vein, Bullen and Love (2010) point out that industrial heritage preservation is a fundamentally important part of a nation's social capital. They point to a growing acceptance worldwide that the preservation of industrial heritage buildings provides economic, cultural and social benefits to a city or town; this is precisely what happened to Thesen Island after development. Visage and Fourie (2011) state that the wider values of heritage should be recognised – 'as a learning resource, a social resource that involves, as part of the environment, and as a contributor to the economy.' Bullen and Love (2010) further state that heritage buildings provide a glimpse of the past and lend character to a community (Bullen & Love, 2010). Carroon (2010) calls this 'memory of place' stating that buildings from past generations and cultures must be retained for the benefit of society. Losadab, Cuadrado and Garruchoa (2007) concur.

Cantell (2005) states that historic buildings help define the character of a community by providing a tangible link with the past and that preserving industrial buildings is an important part of maintaining the historic industrial character of a community. The Global Heritage Fund (2002) urges nations to realise the potential of their heritage in a way that is both culturally sensitive and economically sustainable. Thus old buildings have cultural, economic and societal benefits. According to Visage and Fourie (2011), the impact of successful redevelopment and reuse is experienced beyond the boundaries of the heritage asset itself and should aim at a socioeconomic boost for the community. These authors note that the preservation of industrial building has a positive socioeconomic impact on a community; property values are likely to rise with successful redevelopment, reemployment of existing workers could be a driving force for redevelopment; educational opportunities are extended; and there are sustained and perhaps increased tax revenues and municipal income could even increase (Visage & Fourie, 2011).

Although writing from an American perspective, Cantell (2005) states that historic districts are experiencing unprecedented revitalisation as cities use their cultural monuments as anchors for redevelopment. This is also the case in a few South African cities, such as the Maboneng/Newtown district in Johannesburg (Krige, 2010), Stellenbosch (Fraser, 2007) and Woodstock/Salt River in Cape Town (Quaghebeur, 2000). Historical sites of industrial

architectural significance draw large numbers of visitors to the countries that host them, providing a healthy tourism revenue (Global Heritage Fund, 2002). However, Visagie and Fourie (2011) note that it can be difficult to determine what is important in terms of industrial architectural heritage when a building is situated in an environment that is in turn part of a wider area, precinct or district., such as the Thesen Island power station situated on the Thesen Island – the whole of which was slated for redevelopment. However, these authors note that a historic precinct allows one to experience it as a ‘whole’ (Visagie & Fourie, 2011).

Writing specifically about historical preservation of buildings within the context of sustainability, Carroon (2010) states that this challenges the built environment professionals to think about what to protect and how to protect it, and the vital role that reuse of historic resources can play in reducing the impact on the environment. Moe (as cited in Carroon, 2010) states also that the practise of historic preservation has profound implications for sustainable design as this concerns the long-term survivability of buildings and how they can be maintained, innovatively reused and preserved. Bullen and Love (2010) note in this regard that preservation promotes sustainability principles because it prevents irreversible loss of heritage, protects valuable environmental resources and promotes the judicious use of natural capital, including renewable and non-renewable resources. In this way, the industrial landscape should be conceived as a living and functioning space, where preservation forms part of managing societal, environmental and economic changes affecting the site, and not as a restrictive process. This is precisely what the architects had in mind for the entire Thesen Island redevelopment.

Architecture is an aspect of one’s heritage with which we can interact and adapt; it is a representation of history and place, and preservation is the visual and tangible preservation of our society’s memories. As Morandotti *et al.* (2013) point out, social memory is less respectful than history, and that traditions are embedded in preservation-worthy buildings, thus they should be preserved for future generations. Visagie and Fourie (2011) therefore plead that the concept of heritage should move from being a narrow, specialist interest, to one that recognises that preservation of industrial architecture heritage is something of relevance to many areas of modern life.

Thus the preservation of architectural heritage has social, economic, and cultural benefits for society. As Rocchi (2015) states, the preservation of historic buildings is a one-way street; there is no second chance to save a historic site building once it is demolished. This reality shows the importance of saving buildings of historical architectural significance; once a piece of history is destroyed, it is lost forever.

2.3.2 Arguments against industrial preservation (barriers)

Having discussed the importance of industrial heritage buildings, it should be noted that preservation is not always possible or desirable. Barriers to the preservation of industrial buildings are mainly economic; such as lack of funds for preservation, questionable ROI, unclear uses for the building post completion, prohibitive clean-up costs and on-going maintenance costs etc. (Cantell, 2005). Some industrial buildings particularly present with contaminated sites, structural problems, large wasted interior voids, lack of adequate ventilation and heating, difficult design challenges etc., and in some cases the building may just be beyond repair or (Couto & Couto, 2010; Heritage Council of Victoria, 2013; Arts, Heritage and the Gaeltacht [Ireland], 2012).

There is also the argument of aesthetics – some say having old buildings next to skyscrapers ruins the aesthetic (Chen, 2015); others enjoy the diversity of architectural styles and the contrast. Tabarrod (2016) notes that historical buildings ‘are preserved by rules and regulations that are used as a pretext to slow competitors, maintain monopoly rents, and keep neighbourhoods in a kind of aesthetic stasis that benefits a small number of people at the expense of many others.’

In cases where the industrial building is situated in a high population density area, the land could be better used for needed housing. Glaeser (as cited by Doig, 2012) states that ‘density trumps preservation’. In terms of societal and cultural values, the local community may not want the building preserved, especially if it has a negative history, has a stigma associated with it, or is considered an eyesore (Varmer, 1999, Taitz, 2008). ‘Industrial heritage sites may be loved by members of the community in which they are located, or dismissed as unsightly signs of dilapidation and decay’, notes the Heritage Council of Victoria (2013). A building of historical importance for one community will be very different to that for another, notes Price (2014), arguing the case against historical districts.

Buildings with purported ‘historical importance’ are often associated only with middle-class and influential sectors of society that take an active interest in preservation (debatewise.org; Doig, 2012). Capps (2016) makes the point that when local- and state-government bodies grant preservation status to historic districts, sometimes entire neighbourhoods, they do not always simply protect culture, architecture, and history; they shore up wealth, status, and power. Some industrial buildings may be historical, but yet possess no architectural or cultural significance. When the industrial building is in a rural area, besides economic reasons, it may not be noticed or understood as preservation-worthy and may hold no value for the community. This is why so much of South Africa’s mining history has disappeared.

However, the central question arises, who decides what's worth saving?

2.4. Bodies and charters established to preserve and manage industrial heritage

Having established that the 'green' movement in modern times led to an increased appreciation of, and concern for, the built environment (including industrial buildings) in our modern times, and that all buildings now need to conform to the principles of sustainable/ecological design, this section deals with various bodies (and their charters and principles) established to further the cause of industrial architectural heritage preservation. These are voluntary, and can be viewed as a tool for impartial critical review to evaluate what is deemed correct (and in many cases legislated) practice such as the National Heritage Resources Act, 1999 (Scurr, 2011).

2.4.1 UNESCO

UNESCO (United Nations Educational, Scientific and Cultural Organisation) established the World Heritage Convention in 1972 to designate places with important cultural or natural heritage worldwide. The UNESCO World Heritage Centre was set up in 1992 to assure the day-to-day management of the Convention (Falser, 2001). South Africa accepted the convention on 10 July 1997, making its historical sites eligible for inclusion on the list, but it is important to note that these sites are of cultural or natural significance, and in UNESCO nomenclature, 'cultural' includes the built environment. The division in cultural (which includes industrial heritage sites), natural and mixed sites shows a large majority of these sites in all regions except Africa.

Table 2:1: World heritage sites (UNESCO) (Falser, 2001)

	Cultural	(Industrial Heritage Site)	Natural	Mixed	Total
Africa	21	NONE	30	2	53
Arab States	48	0	3	1	52
Asia/Pacific	90	(2)	36	9	135
Europe/North America	302	(22)	42	8	352
Latin America/ Caribbean	68	(4)	27	3	98
Total	529	(28)	138	23	690

Although this information dates back to 2001, out of the 690 UNESCO inscribed sites, there are 28 sites that are considered 'Industrial Heritage'; thus industrial heritage comprises only 5.3% of all cultural sites and 4% of all UNESCO World Heritage Sites (Falser, 2001), with none identified as significant in Africa. In 2017, the UNESCO website does not separate industrial heritage sites; they are subsumed within the cultural category. While the total number of World Heritage Sites has grown to 1052, they list only four cultural World Heritage Sites in South Africa, and none of them are industrial in nature (UNESCO, 2017).

2.4.2 Brundtland Commission

Formally known as the World Commission on Environment and Development, the mission of the Brundtland Commission was to unite countries to pursue sustainable development. Awareness of the heavy deterioration of the human environment and natural resources had gained increasing momentum at that time. The Brundtland Commission officially dissolved in December 1987 after releasing the paper, Our Common Future (also known as the Brundtland Report) in October 1987, a document which coined and defined the meaning of the term 'Sustainable Development'.

'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'

Although not a requirement of the brief, it was to this document that Louw, as project architect of the Thesen Island project deferred at the planning stage. As stated previously, the built environment today must perforce implement sustainable/ecological strategies.

2.4.3 ICOMOS

ICOMOS (International Council on Monuments and Sites) is a non-governmental professional organisation formed in 1965, 'dedicated to the conservation of the world's monuments and sites' (ICOMOS, no date). Each country, or member state, has the option to develop their own charters in this pursuit. ICOMOS fosters heritage conservation and historic preservation at the national and international levels through education and training, international exchanges of people and information, technical assistance, documentation, advocacy and other activities consistent with the goals of ICOMOS and through collaboration with other organisations.

ICOMOS South Africa is an 'affiliate of ICOMOS International, concerned with furthering the conservation, protection and rehabilitation of heritage resources in South Africa as well as liaison and co-operation between individuals and organisations working in the field both nationally and internationally' (ICOMOS SA, 2011). The organisation consists of a network

of interdisciplinary experts, amongst whom are architects, historians, archaeologists, landscape architects, art historians, geographers, anthropologists, engineers and town planners (SAIA, 2015).

ICOMOS South Africa has not developed its own ICOMOS Charter (ICOMOS SA, 2011), and generally follows the ICOMOS charter of Australia, known as the Burra Charter of 1981 (ICOMOS SA, 2011; SAIA, 2015). According to their website, ICOMOS SA, as advisors on heritage management matters, has resulted in it becoming a respected organisation within the South African heritage industry, although activities are still largely dependent on the contributions made by the individual members (ICOMOS, 2011). Members of ICOMOS SA contribute to improving the preservation of heritage, the standards and the techniques for each type of cultural heritage property: buildings, historic cities, cultural landscapes and archaeological sites (SAIA, 2015).

2.4.4 TICCIH

The International Committee for the Conservation of the Industrial Heritage (TICCIH) is the world organisation for industrial heritage. Its goals are to promote international cooperation in preserving, conserving, investigating, documenting, researching, interpreting, and advancing education of the industrial heritage. TICCIH is recognised by ICOMOS as a designated consultant in all matters related to the study and preservation of industrial heritage (TICCIH, no date). TICCIH has a sole representative in South Africa, David Worth (TICCIH, no date). Worth's personal website lists him (2016) as the Treasurer of TICCIH.

2.4.5 Legislation in South Africa

2.4.5.1 NMC and National Monuments Act of 1969

The National Monuments Council (NMC) was the national heritage conservation authority of South Africa from 1969 until 2000. It came into being through the promulgation of the National Monuments Act of 1969, which was in force during the period of the Thesen Island development. Buildings *inter alia* were protected under the 50 year clause of the National Monuments Act of 1969 (as amended). However, it is germane here to discuss the SAHRA, as the current national administrative body responsible for the protection of South Africa's cultural heritage in terms of the National Heritage Resources Act (1999) as this directly affects current and future adaptive reuse projects until legislation changes.

2.4.5.2 SAHRA and the National Heritage Resources Act of 1999

The National Monuments Council (NMC) was replaced by the South African Heritage

Resources Agency (SAHRA) in terms of the National Heritage Resources Act of 1999. The SAHRA is the national administrative body responsible for the protection of South Africa's cultural heritage. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects (National Heritage Resources Act, Act no. 25 of 1999). The preamble to the National Heritage Resources Act states:

'Our heritage is unique and precious and it cannot be renewed. It helps us to define our cultural identity and therefore lies at the heart of our spiritual wellbeing and has the power to build our nation.'

According to the National Heritage Resources Act of 1999 (Section 34):

'No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.'

'Conservation', as defined in the Act, means

'... in relation to heritage resources, [and] includes protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance' (National Heritage Resources Act, Act no. 25 of 1999).

According to the National Heritage Resources Act (NHRA) of 1999, the measures of significant historic resources are: aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance (as cited by Krige, 2010). It is important to note that the SAHRA relies on the public to identify such cultural significance and bring to its attention any potential threats. The SAHRA annual report for 2014 states the following:

'Considering the complexity of South Africa's often painful history, it is also likely that the country's collective heritage estate can be inequitably diverse and potentially divisive' (SAHRA Annual Report, 2014:19).

This has implications for heritage preservation of the built environment, specifically industrial architectural heritage, as what one cultural group may deem significant may not be viewed as such by another group. An example is the Orlando Power Station in Soweto which has now collapsed due to vandalism. This is a theme which is discussed further in this chapter.

2.4.6 The approach of SAHRA regarding adaptive reuse

According to SAHRA's conservation principles document (SAHRA, no date), adaptation is appropriate where the original use cannot be maintained, and where the adaptation does not substantially detract from its cultural significance. In an email interview with the SAHRA, whereby they provided written responses, a spokesperson stated that in the adaptive reuse of a historical building the architect should consider the 'where' and 'how' of the building, and notes that alterations to the back of a building (i.e. away from the street façade) are not as critical as those on the street front, although all 'alterations' must be done in a manner so that the new work is 'clearly distinguishable from the original', and must 'complement' the existing building' (as cited by Vackier, 2014). Thus aesthetics are clearly important.

The SAHRA spokesperson further noted that when alterations are done inside, the architect must 'try to leave traces of the building', but they acknowledge that many old buildings (such as banking halls, post offices etc.) comprise double volume entry halls where this might be difficult to implement (as cited by Vackier, 2014). However, the SAHRA does not proffer any guidelines as to whether these should be retained or if a new floor can be added (as cited by Vackier, 2014). It is their view that it is better to re-adapt the building in order to 'use' the building instead of it standing empty, stating that it is preferable if a building adapted for reuse could have a similar use as what it was originally used for, 'but this is not a requirement' (as cited by Vackier, 2014). However, it would be impossible to adapt for reuse an existing industrial building back to its original use, as changes in *inter alia* technology render these buildings obsolete in the first place.

Contemporary design for new buildings in an historical setting, and for alterations and additions to existing properties, is encouraged by SAHRA, 'if it does not disfigure valuable historical and architectural fabric, and if compatible with the existing character and scale of the environs' (SAHRA Conservation Principles, no date). According to a SAHRA spokesperson, positive factors influencing the adaptive reuse of heritage buildings are strong demand for reuse and strong financial backing, such as an insurance company, bank or hotel group (as cited by Vackier, 2014). Thus generally private money, not government money, is the driving factor, although a Public Private Partnership adapted for reuse some of the buildings of the National Institute for Higher Education for the new Sol Plaatje University in Kimberley (2014) (John, 2014). The adaptive reuse of the historic Agrivaal Building in Pretoria (2013) was entirely funded by the government (GBSA, 2013).

The major negative factor, according to SAHRA would be a project with good intentions, but which does not have a competent Heritage Architect on board (for correct advice and guidance) which could then mean damage to the heritage of the building (as cited by Vackier, 2014). What is alarming though is the absence of clearly defined published guidelines for South African projects, other than their online Conservation Principles Document (no date). The SAHRA 'considers the adoption of a set of internationally acceptable principles which relate to South Africa's social, cultural and physical situation to be essential for the development of a sound conservation ethic and practice in this country' (SAHRA Conservation Principles, no date), which include the Burra Charter as this is accepted as 'best practice' for the preservation of heritage (as cited by Vackier, 2014).

The SAHRA acknowledges that ideally adaptive reuse projects should be conducted by the private sector in partnership with local government, but in practice such projects are generally undertaken by the private sector – this could mean a lack of legal oversight in what actually happens to such buildings, although they request a Conservation Management Plan (CMP) in place to ensure regular maintenance according to heritage practices (Vackier, 2014).

2.4.7 The Burra Charter

The Burra Charter was officially adopted in 1979 at Burra, South Australia (ICOMOS Australia, 1979). It is a voluntary guide and provides a best practice standard for managing cultural heritage places in Australia (The Burra Charter, 2013). It was amended in 2013. According to the Burra Charter (1999), cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. As the latest version notes, the Burra Charter (2013) provides guidance and standards of practice for the conservation and management of places of cultural significance (cultural heritage places). The Burra Charter (2013:1) states that,

'Conservation is an integral part of the management of places of cultural significance and is an ongoing responsibility'.

More mention is made of the Burra Charter (2013) in the critical evaluation of the adaptive reuse of the Thesen Island Power Station in a later chapter as the Burra Charter (1999) informed and guided the architects in the adaptive reuse of the Thesen Island power station.

This concludes the section on the importance of preserving and managing industrial heritage and the various principles established that guide historical preservation internationally and locally. The following section details why buildings become obsolete in the first place, as it is

obsolescence that paves the way for adaptive reuse.

2.5. Building obsolescence

The obsolescence of buildings opens the door for adaptive reuse as a strategy to preserve buildings, including industrial buildings, with significant architectural and historical value (heritage). Furthermore, the type of obsolescence provides valuable clues for a conceptual framework for such redesign and adaptive reuse of industrial architectural heritage (Eyuce & Eyuce, 2010).

The negative impact of derelict and unmanaged industrial buildings has a profound effect on society - it holds down economic value, reduces confidence, may attract anti-social behaviour, and gives a message of failure and a lack of care and responsibility (IAEA, 2011; Scadden, 2001; Visage & Fourie, 2011; Cantell, 2005). Moreover, such dereliction alters the public's perception of the building and encourages society to favour demolition. The primary reasons in the developed world, *inter alia*, that buildings become obsolete are the following (Langston *et al.*, 2007):

- Physical obsolescence: Natural decay due to aging of the building.
- Economic obsolescence: Building does not meet the owner's financial objectives.
- Functional obsolescence: Functional change from the purpose the building was originally designed for.
- Technological obsolescence: Need to lower operating costs and gain greater efficiency, or new technology has been invented rendering the building obsolete.
- Social obsolescence: Behavioural changes in society (such as housing demands, urban migration, religious intolerance, war etc.).
- Legal obsolescence: The building no longer is considered safe in terms of building regulations and/or environmental controls.

Conejos and Langston (2010) add the category of politics. War (including religious intolerance, such as the Taliban destroying 1 600-year old statues in Afghanistan in 2001), neglect, ignorance, financial interests, and lack of resources are some of the many conditions that can jeopardise heritage (UNESCO, no date). Eyuce and Eyuce (2010) note only three types of obsolescence; physical, functional and economical, but state the most alarming are functional and economical obsolescence, as they often occur in tandem, leading to dereliction and/or demolition. This point is particularly relevant in South Africa with urban decay and buildings neglected due to changing political regimes and changing demographics; both in apartheid days and post-1994.

These reasons for obsolescence are all inter-related, and one type of obsolescence often means other types of obsolescence. In addition to the above, environmental obsolescence is a significant factor and particularly relevant in the age of 'green' building and sustainable development; generally subsumed within the 'technological' obsolescence point (Langston *et al.*, 2007). However, according to Moe (2007) the 'greenest' building that exists is one that has already been built; hence the argument for adaptive reuse rather than demolition. The obsolescence of the Thesen Island power station is discussed in Chapter 4 – The Case Study.

One strategy that can be used to preserve obsolete heritage buildings is adaptive reuse. The following section defines and discusses the strategy of adaptive reuse.

2.6. Definitions of adaptive reuse

The term 'adaptive reuse' is often used interchangeably by authors with words such as remodelling, renovating, reusing, retrofitting or adaptation (Plevoets & Cleempoel, 2011:1). Bezuidenhout (2008) explains that adaptive reuse, as it pertains to the architectural community, is also known as reuse, and can be defined as a process or method that adapts an existing structure to serve new uses, whilst the historical and significant architectural features of the building are retained. Adaptive reuse refers to the process of reusing an old site or building for a purpose other than which it was built or designed, according to Joachim (2002) and Visagie and Fourie (2011). It is often described as a process by which structurally sound, older buildings are developed for economically viable new uses (IAEA, 2011; Visagie & Fourie, 2011).

Eyuce and Eyuce (2010:419) offer another definition: 'Adaptive reuse in architecture denotes the process of building conversion so as to accommodate new functional (and programmatic) requirements'. According to these authors, the first process is the preparation of an architectural design according to the possibilities/potentialities offered and the constraints imposed by an existing building which is often of historical importance. Secondly, the necessary alterations or conversions to take place are generally within the boundaries defined by the building envelope and in line with the new project (Eyuce & Eyuce, 2010).

However, Archinode [no date], a division of MIT, states it as the process that adapts buildings for new uses while retaining their significant historic features. It is this emphasis on 'historical significance' that is important to this study. Adaptive reuse can therefore be defined as a process, or strategy, that adapts an existing architectural structure to serve new uses, whilst the historical features and the architectural heritage of the building are preserved for future generations.

An early use of adaptive reuse is the Pantheon in Rome, originally built as a temple to Roman gods and converted into a church in the 6th century. An example of an existing building that has undergone many adaptations is the Castel Sant' Angelo, Rome, Italy (c139AD) which has been a mausoleum, a castle, fortress, prison and museum during its lifetime. One of the oldest industrial buildings in the world is the Ditherington Flax Mill in Shrewsbury, England, dating back to 1796, acknowledged as the first iron-framed building in the world but now derelict. The oldest building in South Africa is the Castle of Good Hope, built by the Dutch East India Company between 1666 and 1679 and declared a historical monument in 1936 (Gilfellan, no date). It is still in use today and has been adapted for reuse many times.

According to Cantell (2005), the term and practise of 'adaptive reuse' entered the architectural vernacular in the '60s and '70s as a consequence of the greater awareness by society in general of the 'green movement' and concern for the environment as discussed earlier in this chapter. Powell (1999) concurs, as does Feireiss and Klanten (2009) and Bollack (2013); all authors noting that previous adaptive reuse projects (something that has occurred since man first made basic structures as housing) were done for primarily economic reasons without regard for historical significance. Cantell (2005) also notes that (although from a USA perspective) fuel and construction material costs were extremely high at that time, thus forcing professionals in the built environment field to consider adaptive reuse as a viable alternative to greenfield sites. The IAEA (2011) states that the redevelopment and reuse of facilities, buildings and sites should always be considered an alternative to demolition.

Ghirardelli Square in San Francisco, Cantell (2005) considers as the first adaptive reuse project in modern times of an industrial square with architectural heritage in the USA. Previously a chocolate factory, it was bought by the Roth family in 1962 amidst a public outcry when slated for demolition, and adapted for reuse as a 16 360m² retail and restaurant centre, opening in 1964 (Cantell, 2005).



Figure 2-3: Ghirardelli Square, San Francisco

However, both the UK and Europe have a substantial history of adaptive reuse of buildings. In Paris, the famous example is the Musée du Louvre, formerly a palace constructed in the late 12th century, and after many adaptations through the ages, opened to the public as a museum in 1793. In London, the Queen's House building, built in 1614 and formerly a residence for royalty, is now part of the National Maritime Museum. And architecturally one that can be argued as one of the best adaptive reuse projects is Carlos Scarpa's Castelvecchio – a Venetian palace he completed in 1963 (Stott, 2016). Scarpa's work is again mentioned in section discussing the adaptive reuse of the Newlands Brewery (section 2.8.3). South Africa does not have a good record of such preservation, as discussed in Chapter 1.

2.7. Theories of adaptive reuse for preserving architectural heritage

2.7.1 Historical theories

The built environment has to meet contemporary needs in a changing society, but these needs have to be balanced with sustainability; functional sustainability, energy-orientated sustainability and life-cycle sustainability (Morandotti, Besana & Cinieri, 2013) whilst preserving important history and industrial architectural heritage (if applicable). Cantell (2005) concurs, stating that adaptive reuse assists in the preservation and sustainability of the historic and cultural character of a community. According to Larkham (1996), most historic buildings have an inherent character and charm, i.e. *genius loci* or the spirit of the building and it is this spirit, prominent in most buildings with historic architecture, that endear them to architects and interior architects for adaptive purposes in order to preserve this

heritage for future generations.

In this section, the theories of adaptive reuse for the purposes of architectural heritage preservation of French architect and restorer Eugène-Emmanuel Viollet-le-Duc, English art critic John Ruskin, Austrian historian Alois Riegl, and 1960s architect and architectural critic and author writer Ada Louise Huxtable are discussed. These influential people are discussed due to the importance of their theories (and/or their work) in shaping the body of knowledge regarding adaptive reuse. They greatly influenced more contemporary theories (discussed later in this chapter) and their theories are still discussed today.

2.7.1.1 *Viollet-le-Duc*

Viollet-le-Duc (1814–1879), responsible for the restoration of the Cathedral of Notre Dame (Paris) from 1845-1864, contended that the success of a reused building is based on the functionality of the adaptation whilst still maintaining the essence of the particular building. According to Reiff (1971), Viollet-le-Duc was responsible for saving many churches with significant history from destruction, either by decay or 'barbaric amateur restoration'. Although this architect stated that the form (building structure and design features) of the building was more important than its meaning or cultural impulses, he was guided in his work by the belief that restored buildings should be rational and functional, and advocated restoration of a building while maintaining its original design and features (Hearn, 1990). Concomitantly, such restoration should showcase the change and adaptation, rather than merely promoting the heritage building as a static, non-functioning monument of history (Vackier, 2014).

He was often criticized for his lack of restraint in his adaptive projects, with Burges calling him a, 'disastrous restorationist' (as cited by Banerjee, no date) but there is no doubt that his work served to set a new benchmark for the architects who succeeded him. Banerjee [no date] notes that both in Britain and France, architects involved in heritage projects proceeded with greater respect, responsiveness, and care at that time.

Plevoets and Cleempoel (2012) claim that Viollet-le-Duc's theories on the restoration of historical buildings form the foundation for adaptive reuse as Viollet-le-Duc believed that the best way to preserve the heritage, culture and essence of a building was to create a new use for it by making small changes, albeit in the original style as the adapted building (as cited by Vackier, 2014). Thus Viollet-le-Duc's theories are relevant concerning adaptive reuse to preserve heritage, as using this strategy means the core or main design features of the buildings are usually retained or enhanced to preserve heritage value, whilst new additions

and adaptations are required so that the building may serve a new functional purpose within society.

2.7.1.2 *John Ruskin*

A strong critic of Viollet-le-Duc's views of adaptive reuse to preserve heritage was John Ruskin (1819-1900), the English art critic. He was against the restoration of heritage buildings in terms of adaptive reuse, advocating instead for the regular maintenance and care of the heritage structure, thus preserving the extant architecture (Pineda & Brebbia, 2004). Ruskin was mainly concerned with the preservation of the historic and memory value of heritage buildings, stating that such buildings do not (necessarily) belong to current society, but belong to their creators and thus are the property of all generations. Thus adaptation would be deception. However, he still believed that these heritage structures were a link to the past, but that adaptive reuse and restoration was to the detriment of the original character of the building (Vackier, 2014).

2.7.1.3 *Alois Riegl*

Alois Riegl (1858-1905), an Austrian art-historian and philosopher published (in German) his seminal work, 'The Modern Cult of the Monument: Its Character and Its Origin' in 1903. In this text he outlined competing values to be considered when approaching the preservation of historic structures. Riegl posited that there are three kinds of monuments (as cited by Era Architects, 2011):

- Intentional monuments – Intentional commemorative value aims to preserve a moment in the consciousness of later generations.
- Unintentional monuments (historical monuments) – The historical value of a monument arises from the particular, individual stage it represents in the development of human activity in a certain field.
- Age-value monuments – Age-value in a monument betrays itself at once in the monument's dated appearance. Age-value makes explicit a sense of the life cycle of the artifact, and of culture as a whole.

Outwardly these three classes of monuments can be thought of as contained within one another, while the scope of their memory-value widens. Riegl's view was that history is forever shifting, since it is always filtered through the lens of the our immediate cultural belief system, which is itself constantly shifting, noting that society prioritises newness-value, as opposed to age-value which prioritises the acceptance and celebration of the signs of age and decay, yet there is a shared, intrinsic societal belief structure as it is connected to artistic

and cultural production (Era Architects, 2011).

In the context of adaptive reuse, 'historical-value' means that in order to be culturally meaningful a work must be returned to its absolute, original condition; i.e. a perfect, complete restoration. 'Age-value' embraces the indications of decay and entropic effects of natural process of destruction and argues for the protection and preservation of this patina, and the incomplete, fragmentary ruin which expresses the passage of time (Era Architects, 2011). Riegl's theory is thus that architecture can have competing values and that certain values can be used in order to create a new feel for the adapted building.

In some ways Riegl is echoing what was first stated by Viollet-le-Duc. It should be noted that 'The Modern Cult of the Monument: Its Character and Its Origin' (1903) was only translated into English in 1982, in support of the criticism of the appropriation of historical forms and motifs in what has become known as the 'postmodernist' phase of architecture (Era Architects, 2011).

2.7.1.4 *Huxtable*

Huxtable, although not an architect, was an American architecture critic for the influential New York Times and then the Wall Street Journal, as well as the author of several influential books on architectural criticism. As she wrote for the mass media she can be considered as instrumental in making architecture, and specifically the preservation of extant building stock, part of the public dialogue (Dunlap, 2013). Just as Carson's 'Silent Spring' brought environmental concerns to the public, so Huxtable brought the issues of preservation of the built environment into the homes of the masses, believing that 'the quality of the built world mattered. In turn, the public put pressure on developers not to demolish old buildings, but rather to preserve their architectural heritage and adapt them for reuse.

Huxtable believes that continuity is necessary and that the preservation of heritage architecture forms part of that necessity for psychological evolution. Noting her influence, Costonis (1989), in his writings on how public aesthetics are shaped, states that 'the continuing barrage fired from [her] Sunday column ... had New York developers, politicians, and bureaucrats, ducking for years.' Further, she posits that the preservation of old architecture would not be defined by how well society preserves old buildings as museum pieces, but by how well they are afforded the chance to be functional again (as cited by Costonis, 1989).

2.7.2 Contemporary theories

Adaptive reuse of historic buildings is now widely considered a sustainable development practice (Donofrio, 2012). The redevelopment and reuse of disused buildings, facilities and sites should be promoted as an opportunity, rather than a constraint. This concept also makes financial sense in terms of saving construction time. Langston (2008), writing specifically on the sustainability implications of adaptive reuse of buildings and citing Johnson (1996), notes that adaptive reuse typically takes half to three-quarters of the time necessary for a new build. This paper proposed that adaptive reuse, if planned at the outset, and if done wisely and routinely, is a means of realising sustainability objectives without reducing investment levels or economic viability for the construction industry. Further, today adaptive reuse is not applicable only to individual buildings, but precincts, or districts, playing an important role in urban regeneration (Taksa, 1999; Look & Spennemann, 2005; Hutton, 2006; Kiroff & Tan, 2015).

In South Africa, the National Heritage Resources Act of 1999, which only came into being after the Thesen Island development, states that the association of a person or particular community or communities with a place is a measure of cultural significance; thus it is not only about individual buildings as the Act recognises that heritage significance resides in the whole (the precinct), its landscape, as well as the parts (the buildings). The idea of a heritage precinct, like the Hillbrow Health Precinct or the V&A Waterfront in Cape Town, could retrospectively be applied to Thesen Island (or Newtown Johannesburg or Stellenbosch) and adds to how we understand and work with heritage today. With this knowledge, the Thesen Island power station must be viewed as part of the greater redevelopment of the entire Thesen Island – the power station was one of many industrial buildings with architectural heritage in close proximity that needed to be preserved.

Krige (2010) argues that heritage buildings have two lives: a 'first life' where they were built for a specific function, and a 'second life' where the original function is no longer required but as a heritage resource they can perform a different set of functions. Thus heritage practitioners in the built environment straddle the divide between these lives - they seek to give a 'second life' to buildings whilst preserving their first life and adapting the building to conform to contemporary requirements (Krige, 2010).

In 2011 Plevoets and Cleempoel conducted a meta analysis of contemporary literature on adaptive reuse as a strategy to preserve heritage in general. They identified three main approaches to this; typological, technical and architectural strategies (strategic approach). The typological approach, espoused by such authors as Cantacuzino (1971), Cunningham

(1988) and Douglas (2006), posits that building adaptation should be done according to the typology of the host space. This is an important concept for the Thesen Island project and is discussed in Chapter 4 – The Case Study. Plevoets and Cleempoel (2011) note in their work on this approach that such authors deal with only one building type, i.e. religious buildings or industrial buildings (Bordage & Faure, 2002; Statton, 2000; Henehen, Woodson & Cuthbert, 2004).

The technical approach concentrates more on improving such factors as fire resistance, thermal performance, prevention of damp etc. (Plevoets & Cleempoel, 2011). These authors tend to approach the host space as a container, and give little attention to conservation and preservation of industrial architectural heritage. However, within this approach, Plevoets and Cleempoel (2011) did find authors who stressed the importance of an interdisciplinary approach to adaptive reuse of historical buildings; i.e. the need for conservation, planning, architecture, respect for heritage etc. This would be more in line with the concepts of sustainable development, as all the above mentioned factors within this technical approach are relevant. How they were dealt with for the adaptive reuse of the Thesen Island power station is discussed in Chapter 4 – The Case Study.

Within this category of the technical approach, Plevoets and Cleempoel (2011) note the work of Brooker and Stone (2004) who define three strategies for adaptive reuse; intervention, insertion and installation. Jager's (2010) work follows a similar approach to the existing fabric, using the terms addition, transformation and conversion (as cited by Plevoets & Cleempoel, 2011). Although Brooker and Stone's (2004) approach also starts with physical intervention, for them the most important and meaningful factor in adaptive reuse is the original building itself. These theories too find resonance with the Thesen Island power station project and are discussed and referred to in a later chapter.

The third approach to adaptive reuse as a strategy to preserve industrial architectural heritage, according to Plevoets and Cleempoel (2011), is the strategic approach. Here the focus is on the process and strategies applied when adapting historical buildings for reuse. Both Mochado (1976) and Robert (1989) refer to the metaphor of a palimpsest; i.e. a 'layering' of the building in successive stages. This is precisely what CMAI did with the adaptive reuse of the Thesen Island power station and will be discussed in Chapter 4 – The Case Study.

In their meta analysis of contemporary literature on the topic of preservation of architectural heritage, Plevoets and Cleempoel (2011) found four important gaps in existing theories on the adaptive reuse of historical buildings. Here they cite 1) substantial overlap between the

categories; 2) a theoretical approach which contrasts and compares the various historic theories within the framework of adaptive reuse as a strategy to preserve heritage; and 3) insubstantial or limited importance placed on the *genius loci* of the building. The *genius loci* of the building was an important aspect of the Thesen Island development, as it informed many design approaches used by the architects and developers. This is discussed in Chapter 4 – The Case Study.

More importantly perhaps, is the gap in the literature (according to Plevoets and Cleempoel, 2011) that although many authors recognise that adaptive reuse should be an interdisciplinary task, existing studies are mainly drawn from one specific perspective, i.e. engineering, conservation etc. This is precisely what was found in the literature regarding the adaptive reuse of the Thesen Island power station. Information could be gleaned from various sources (engineering, energy saving, ecological design etc.) but there was no single body of academic work that traced the entire project which lasted for more than 10 years; precisely what this research has attempted.

This concludes the section on theories of adaptive reuse. The following section details the history of adaptive reuse in South Africa.

2.8. History of adaptive reuse in South Africa

In South Africa, according to Krige (2010), industrial architectural heritage has been neglected in terms of what is deemed to be culturally significant and few cities have actively sought to preserve their industrial heritage. Quaghebeur (2000) notes that the advent of adaptive reuse in South Africa began with the adaptive reuse of the old railway station site in the Durban CBD in the 1980s, although one could argue that one of the first examples is the Cape Town Castle - first built as a line of defence and later as an army base then in the late '60s as a museum (Worden *et al.*, 1998).

Durban, falling within the ambit of the oldest PHRA, for example, has an excellent record in promoting and preserving their historical buildings, and here two industrial buildings can be noted as examples. In 1986 architects Hallen Theron & Partners preserved the façade of the Durban Station (built in 1860 and declared a heritage site in 1974) and grafted it onto an office block (as cited by The Civil Engineer, 1986). Although this is façadism and not adaptive reuse, it is better than demolition.



Figure 2-4: Preserved façade of the old Durban Station



Figure 2-5: Durban railway sheds adapted for reuse as a shopping centre (source: The Workshop, no date)

A proper example of adaptive reuse is the Workshop in Durban – where the railway workshop sheds were adapted for reuse in 1986 into what is now known as The Workshop Shopping Centre (The Workshop Centre, no date; BAI, 2012). The development was initiated to revitalise the historic CBD of Durban, and architects Bental Associates international (BAI) sought to reflect the site’s historical background through the architecture of the centre while applying appropriate principles of retail design (BAI, no date). According to Quaghebeur (2000), this project marked the advent of industrial adaptive reuse in South Africa.

In the Civil Engineer journal for January 1986, it was clearly stated,

‘Urban design, landscape architecture and conservation have been accepted by the City Council of the integral part of the overall planning strategy.’

These projects were completed before the concepts of ‘green’ and ‘sustainability’ became the buzz words of the new millennium. The article in the *Civil Engineer* (1986) refers to this as a ‘remodelling’ opportunity – the phrase ‘adaptive reuse’ had not even come into common use amongst the built environment community in South Africa.

Another example of façadism, and thus a lost opportunity for adaptive reuse, is Cape Town’s Roeland Street Prison, a government building demolished a few decades ago, where only the outer wall and the old main entrance to the prison have been retained. The building is now the Western Cape Archives and Records Service (The Heritage Portal, 2015). However, it is acknowledged that in some cases the façade is all that can be kept – this depends on many factors such as economic viability, structural defects etc. This is in line with the SAHRA’s emphasis on adaptive reuse of the portion of the building which is street facing (as cited by Vackier, 2014) as discussed previously. Further, this building is government owned, where funds are limited, with, according to the SAHRA, most, but not all, adaptive reuse projects of historical buildings take place within the private sector (Vackier, 2014).



Figure 2-6: Preserved façade of the Roeland Street Prison (source: Google Street View)

Contrast this with a privately-owned adaptive reuse project in Cape Town; Mutual Heights, a circa 1939 Art Deco skyscraper office building which is now an apartment complex. According to Wilson (2015:172), this was the first adaptive reuse project of an office block into residences in the inner city – at a time when ‘no-one lived in the City’ – almost a decade ago.

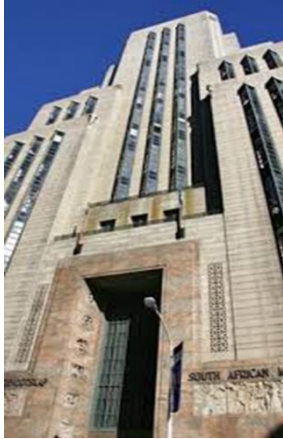


Figure 2-7: Mutual Heights, Cape Town (source: Google Images)

Regarding the adaptive reuse of many buildings in Stellenbosch, Fraser (2007) notes:

‘... the restoration and maintenance of a hundred historic buildings, some 300 years old, has transformed this town.’

Adaptive reuse of industrial buildings within a precinct is a fairly recent, but growing, trend in South Africa, but there are pockets of excellence. Here one can note the success of *inter alia* the Maboneng Districts and Newtown precincts in Johannesburg, and Woodstock/Salt River in Cape Town. It should be noted that industrial buildings are not only found in cities; an example is the old Snowflake Mill (built circa 1920) in the small town of Potchefstroom, in the North West Province.

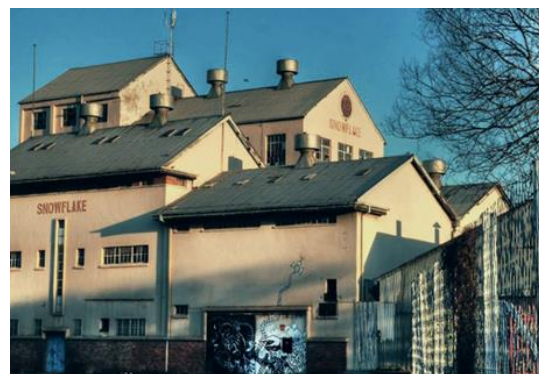
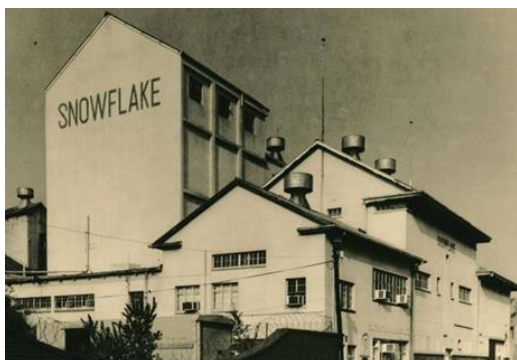


Figure 2-8: The Snowflake Mill – then and now (source: The Heritage Portal, 2014)

Adapted for reuse in 2013 by private owner Albert Bothma, it now functions as an art gallery and hosts large events such as the Aardklop Festival and The Life Market (Heritage Portal, 2014).

2.8.1 Maboneng precinct

The Maboneng Precinct is an urban mixed-use community; a cultural hub known for its mix

of galleries, artist studios, creative venues, offices, retail spaces, start-up businesses, and a hotel. This was a joint development with the Johannesburg Development Agency (JDA) and Propertuity, a private development company. As Donofrio (2007) states,

'The industrial memory that existing buildings and street patterns represent has been an important feature to include as cities redevelop these areas'.

It started with the adaptive reuse in 2008 of the old DF Corlett construction offices and warehouses by architects Daffonchio & Associates into what is now known as Arts on Main (Propertuity, no date). The Arts on Main complex comprises five separate buildings all consolidated into one new space. As founder of Propertuity Jonathan Liebmann states (Propertuity, no date):

'[We] believe strongly in sustainable environmental design and, across all developments, have retained as many existing features as possible while repurposing the buildings in this industrial area.'



Figure 2-9: Adaptive reuse project: Arts on Main (source: Propertuity, no date)

According to Daffonchio & Associates (as cited by Propertuity, no date), their architectural focus has been on sustainable design, ensuring that the original features of the buildings have been retained, whilst any new elements introduced needed to add contemporary language to the character inherent in the building's history.

2.8.2 Woodstock/Salt River

Another precinct with many buildings adapted for reuse to preserve their industrial architectural heritage is Woodstock/Salt River, Cape Town. Here old and derelict buildings (obsolete due to de-industrialisation and the demise of factories) have been privately bought and adapted for reuse as offices, shops and residential units.

'If Woodstock were a person, it would be a recovered addict full of new hope and possibilities that would once have been only a far-off fantasy, and still bearing the scars of harder times, carrying a keen awareness of darker days; mindful of slipping back into the old ways' (Collier, no date).



Figure 2-10: Rex Trueform Building

In Cape Town, the Rex Trueform city block, comprising some 12 000m², and three buildings built in the '40s to '60s had a determined modernist architectural language with clean lines and exposed structural grids. An icon of its age, the five story 50m glass facade was a first in South Africa (Frank Bohm Studio, 2014). These buildings had been lying dormant for many years due to economic obsolescence – clothing manufacture had moved from Africa to Asia. Some 4500 jobs had been lost and the buildings had become derelict. Crime increased and property prices in close proximity were significantly reduced. A four-year project for Frank Bohm Studio, these buildings were adapted for reuse as offices whilst preserving their industrial architectural heritage.

According to the architects (Frank Bohm Studio, 2014), this spurred other large and small buildings projects and property values have increased. Now that the area is properly maintained, vagrants have moved out. This adapted reuse project to preserve industrial architectural heritage has clearly been a catalyst of rejuvenation for the area, with the building once again playing a large part in the development of the community.



Figure 2-11: Castle Brewery building, Cape Town

Quaghebeur (2000) points to the success of the adaptation of the Castle Brewery in Woodstock, built in 1902. Slated for demolition in the early 1980s, the building went through various phases of industrial architectural heritage preservation into what is now commercial office space. Another success story of preservation of industrial architectural heritage is the Old Biscuit Mill in Woodstock. Built in the late 19th century, it is today a mixed-use development comprising industrial workshops, hospitality, retail and commercial sectors.



Figure 2-12: Old Biscuit Mill in Cape Town

2.8.3 Newlands Brewery

Seminal South African architect, Gabriel (Gawie) Fagan was commissioned by owners South African Brewers (SAB) in 1993 to adapt for reuse the old brewery (1859) and malt-house buildings (c.1892) on the Newlands Brewery site, Cape Town, to create a Visitor's Centre to tell the story of the history of beer-making in the Cape (Scurr, 2011). The brief also called for a redesign of the landscape and to provide unobtrusive parking for 200 cars (Scurr, 2011). These buildings were on the site of the still working brewery; a large modern complex of buildings. Fagan, in his submission 1997 submission for the SAIA Conservation Awards and Award of Excellence Programme (as cited by Scurr, 2011:86) states that these buildings were

'... restored with retention of their original structure and strengthening only where necessary. A circulation pattern was designed so that visitors would move from the lower floor of the malt-house to its top floor and from there via a new staircase to a walkway to the brewery building. Along this walkway a water feature was created to symbolise the waters of Newlands which have been used for beer-making for over 300 years.

The walkway slopes down to an underground tunnel where artefacts of a previous furnace, excavated by archaeologists, are displayed. From this subterranean area a hydraulic glass lift takes visitors up through the three floors of the brewery and through the roof to its topmost tower.'



Figure 2-13: Fagan's 1993 glazed insertions at the Newlands Brewery in Cape Town and the reconstructed chimney (source: Barker, 2009)

It is the reconstruction of the chimney, and the addition of the glass lift (for functional requirements) that stirred most of the controversy surrounding this project. Pretorius and Raman (2006:53) state the following:

'His rehabilitation and extension of the brewery at Newlands may not have satisfied the purists in conservation or, for that matter, radical interventionists of (the) Scarpa school, but then its remarkable success in ensuring the survival of the old must have calmed down both camps.

De Beer (1995:13), in a commentary about the project in *Architecture SA*, also uses the

Scarpa analogy, noting the following:

‘This approach of re-use and allowing the historic fabric to acquire a new use, a new life, is not dissimilar to that of Carlo Scarpa, the Veneto architect who meshed historic layers together revealing by contrast rather than restoring to original form.

Scurr (2011) however, points out that while Scarpa removes layers in order to make spaces read, at this project Fagan ‘added layers in order to order to render [the] place legible’, and states that the project is a ‘creative adaptation of buildings for new uses together with bold, contemporary interventions’. He further states that this project ‘transcended the traditionally separate genres of ‘restoration’ and ‘new build’ with an ease that is certainly without parallel in South Africa’ (Scurr, 2011:xvi).

As Barker (2015) notes,

‘Architectural heritage is not only about protecting extant artefacts. It is also about how we respond with new interventions in existing cultural landscapes.’



Figure 2-14: Old still preserved (source: Newlands Brewery, no date)

The building won the SAIA Conservation Award in 1997, as well as the SAIA Award for Excellence in 1998. It is interesting to note that the Letterstedt Building, and the Malt House were gazetted as a National Monument on September 22, 1995 (Scurr, 2011); i.e. they post date the work done by Fagan. As Fagan himself said in 2001,

‘The greatest value of old buildings for all of us is that we can identify ourselves through the continuous thread of our communal culture with previous generations and so by better understanding them, reaffirm our own values (as cited by Barker,

2014).

It is perhaps this project, more than any other, which brought adaptive reuse into the limelight of architectural practice in South Africa and has had a seminal and lasting memory.

2.8.4 Victoria & Albert Waterfront



Figure 2-15: V&A Waterfront, Cape Town

In Cape Town, probably the best known adaptive reuse project is the Victoria and Albert Waterfront which is internationally recognised. Initially the centre of the shipping and fishing industries, land reclamation to build a deep water harbour had effectively cut off this area from the public, and in the 1970s it had become derelict and underutilised. When the V&A Waterfront Company was formed and work started in 1989 to adapt for reuse the many industrial buildings there, no bank would finance its redevelopment, and money from Transnet (a government SOE) provided the necessary funding (van Zyl, 2005). Redeveloped as a mixed-use area focusing on retail, tourism and residential development, along with the continuing operation of a working harbour, it is now South Africa's most visited destination and contributes R200 billion to SA economy (Nombembe, 2015). Breen and Rigby (1996) consider the preservation movement as a contributor to the modern waterfront movement in general, as discussed earlier in this chapter.

Adjacent to the V&A Waterfront is the current redevelopment of the Silo district, where the old grain silos are being adapted for reuse as the Zeitz Museum of Contemporary Art Africa. Explaining their visionary design for what must be one of South Africa's largest adaptive reuse projects, Heatherwick (as cited by V&A Waterfront, 2014) said,

'How do you turn forty-two vertical concrete tubes into a place to experience contemporary culture? Our thoughts wrestled with the extraordinary physical facts of the building. There is no large open space within the densely packed tubes and it is not possible to experience these volumes from inside. Rather than strip out the evidence of the building's industrial heritage, we wanted to find a way to enjoy and

celebrate it. We could either fight a building made of concrete tubes or enjoy its tube-iness’.



Figure 2-16: Adaptive reuse of the grain silo at the V&A (source: Heatherwick, 2014)

Hart and Halkett (1998), Quaghebeur (2000), Fraser (2007) and Krige (2010) all exhort the built environment professionals in South Africa to preserve the rich resources of our industrial landscapes which are ‘peppered with buildings’, containing not only the remains of machinery but the ‘invisible lives’ those who have gone before us.

The following section deals with power stations as a sub-category within the typology of industrial buildings.

2.9. Power stations as adaptive reuse projects

All cities are unique from their geographic layout to their architecture. They do, however, have common objectives such as the safety and security of their citizenry, and the provision of services in the form of utilities (such as power) and transportation networks (Deloitte, 2014). Power stations for the generation of electricity have been a feature of the urban landscape since the late 19th century (Murray, 2010). However, worldwide they have been decommissioned in the pursuit of a cleaner, low-carbon environment and changes in both

power generation and consumption (Slavin & Brown, 2011).

Adapting these plants and their sites for reuse is aimed at capitalising on the opportunities to preserve industrial architectural heritage, create healthier environments, foster new business activity, and aid job development (Slavin & Brown, 2011). The IAEA (2011) concurs, noting that the redevelopment and reuse of disused and decommissioned buildings, facilities and sites should be promoted as an opportunity rather than viewed as a constraint, limited by the developer's initiative, finances and long term vision. Visagie and Fourie (2011) note that are numerous reuse options available for industrial facilities and sites, such as museums, art studios, offices, residential units, schools, and industrial parks etc. One could also add cultural centres to this list (Quaghebeur, 2000), as with Newtown and the V&A Waterfront, as previously discussed.

Various aspects have a major impact on the choice of the final redevelopment and reuse options, and some of the factors that should be taken into account when considering the adaptive reuse of a power station as a strategy to preserve industrial architectural heritage are:

- Socioeconomic impact (job retention or creation, financial benefits, etc.).
- Decommissioning impact (scope of decommissioning work, waste generation, timing, regulatory issues, etc.).
- Environmental impact (conservation of greenfields, level of contamination).
- Stakeholder impact (public needs and demands and regulatory framework) (IAEA, 2011).

'If the facility [power station] has the right combination of location, architectural scale, and aesthetic and historic appeal, it can be an extremely attractive prospect for adaptive reuses that are oriented towards the general public'.(Scadden, 2011).

Power stations thus present significant adaptive reuse opportunities to preserve industrial architectural heritage due to their impressive scale, and often being situated on large bodies of water, although waterfront access is not the case in South Africa. According to Slavin and Brown (2001), adaptive reuse of these power stations can help regenerate whole precincts of a city. Wiener (2013) cites Gang (of Studio Gang & Adjaye Associates) as saying the opportunities for creative reuse of power stations are almost limitless;

'I can imagine transforming a power plant into just about anything—a station for green power, museum, recreation centre, hotel, or even a concert hall'.

As Woodyard [no date] vice president of Weston Solutions (a major USA-based property

development company) states, they represent ‘tons of institutional pride’. These places are unique for their ability to foster an appreciation of history, an understanding of the present, and a vision for the future. From powerhouses of power generation, they can become powerhouses of socioeconomic development (Visagie & Fourie, 2011). This is line with South Africa’s Local Economic Development policy as well the overarching paradigm of industrial architectural heritage preservation and sustainability.

The following section describes some well known power stations internationally that have been adapted for reuse, along with the adaptive reuse project of the Jeppe Street power station and the fate of the Soweto power stations in South Africa. These are then related back to the literature and the various theories of adaptive reuse.

2.9.1 Bankside power station (now the Tate Modern)

Bankside Power Station, on the Thames River, was the last power station to be built in central London and involved the interplay of social, political, economic, technological and environmental factors (Murray, 2010). As is usual with such a large construction, the entire planning process echoed the conflicting needs of electrical power and amenity, but final approval for the power station was precipitated by the post-war national fuel supply problems of 1947 (Hannah, 1979).



Figure 2-17: The old Bankside power station, circa 1956 (source: Getty Images)

The Bankside Power Station was designed by Sir Giles Gilbert Scott (1880-1960) and was built in two stages, starting in 1947 and completed in 1963 (Glancey, 2006). Bruttomesso (1999) notes that Bankside power station was given an ‘impressive profile and heroic façade’ by Scott. This is clearly apparent in the image above; however one cannot fully appreciate the power and impact of the massive scale of these structures until one physically stands in

their presence.

The original structure comprised essentially three components: the impressive turbine hall (35m high and 152m long) with the attached boiler house and the monolithic 99m tall chimney (Tate, no date). The height of the chimney was restricted to 99m so as not to detract from St Paul's Cathedral across the river (Glancey, 2003).

Economic factors were the primary reason for the obsolescence of Bankside power station (viz. the increase in oil prices in 1973-74), as were pollution and other environmental concerns (Murray, 2010; Hannah, 1079) and it closed in 1981. The future of the redundant power station was uncertain, and as Murray (2010) notes, it was too new for official listing as a building of architectural or historical importance. However, Scott's cathedral of power was seen as being of major architectural importance, and once what was so fought against on visual grounds was now regarded as something to be preserved and appreciated (Murray, 2010).

In 1994 the trustees of the existing Tate Gallery (Milbank, London) announced that they had acquired the defunct Bankside Power Station and planned to reuse the building as a separate gallery for international and contemporary art, now known as the Tate Modern (Lister, 1994; Irving. 2012). In 1995 the responsibility of remodelling the former Bankside Power station from 'temple of power to cathedral of art' was awarded to the Swiss architects Jacques Herzog and Pierre de Meuron (Glancey, 2006). The decision to select the proposal by Herzog and de Meuron was largely influenced by the fact they had chosen to respect the history and heritage of the building initially by 'retaining [as] much of the original character of the building' (Tate, no date)

With a 12 million pound grant from the English Partnerships Regeneration Agency, and with site and structure purchased, adaptive reuse began in earnest in 1996 (Tate, no date). Although the architects decided to keep as much of the built structure as possible, all the existing machinery was disposed of and the structure was 'stripped back to its original steel structure and brickwork' (Tate, no date).

The urban context was one of the components that Herzog and de Meuron drew on in their design for the Tate Modern museum. They saw the relationship between the building and its context as vital to the success of the project. The architects sought to bring the context into the building by using the Turbine Hall as a sort of 'covered street' where people could walk without necessarily visiting the museum. This strategy allows for, and encourages, pedestrian flow through the structure; perhaps enticing passers-by to investigate the

museum and its many gallery spaces (Ong-Yan & Peltason, 2010). By 2000 the 'remodelling' by Herzog and de Meuron was completed (Glancey, 2003) in what Irving (2012) refers to as a 'minimalist style', with materials comprising concrete, timber, steel and glass - all combining to make a gigantic art gallery (Glancey, 2006; Murray, 2010).

Interior interventions made by the architects comprised the installation of five floors of galleries on the river side of the building, and the conversion of the former turbine hall into a massive lobby and gallery for giant sculpture and events (Glancey, 2006) producing a result that is both powerful and effective.

The exterior of the structure retains much of its original appearance (Glancey, 2006), with its monumental brick façade and horizontal strips of windows, as well as the landmark chimney which was capped with a light box bearing the gallery name (Irving, 2012). Recently in 2009, Herzog and de Meuron were again approached by the gallery to design an extension, making use of the adjacent redundant oil tanks to increase gallery and exhibition space (Tate, no date). The new galleries of the £215 million extension are connected via a bridge to the original building and are expected to open to the public in 2016 (Ravenscroft, 2014).

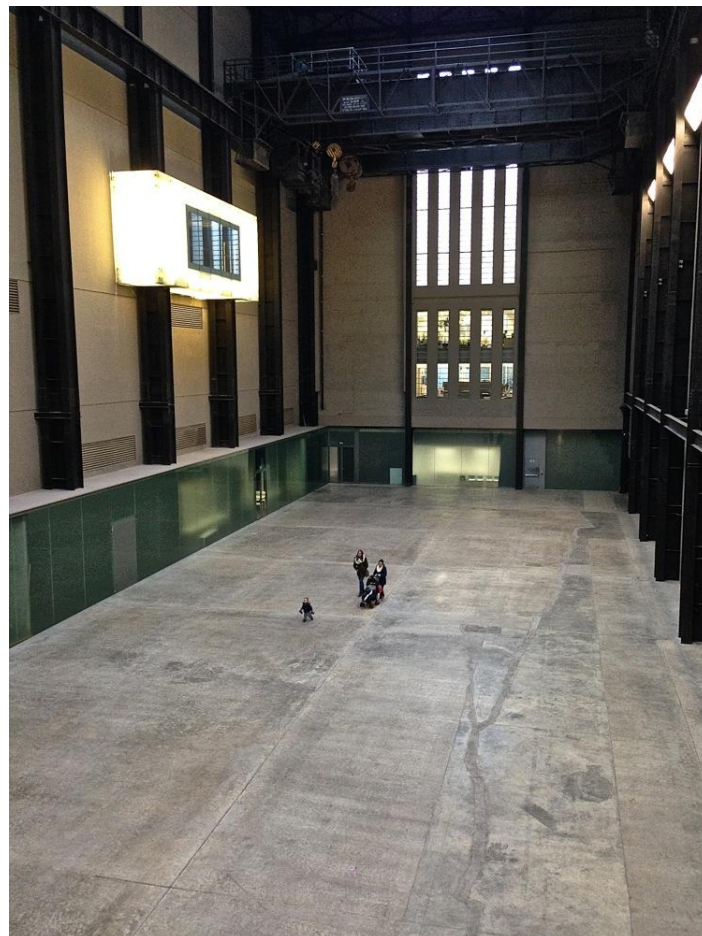


Figure 2-18: The Turbine Hall of the Tate Modern (source: researcher's own)



Figure 2-19: Interior of the Tate Modern's Turbine Hall showing exposed original steel framing (source: researcher's own)

Riegl would have viewed this building as an 'unintentional monument'. The adaptive reuse of the Bankside power station was in line with the theory of Viollet-le-Duc in that the core or main design features of the buildings were retained and enhanced to preserve heritage value, whilst the interior of the building was adapted to serve a new functional purpose for society as an art gallery (Reiff, 1971; Hearn, 1990; Plevoets & Cleempoel, 2011). This project echoes Brooker and Stone's (2004) approach where the most important and meaningful factor in adaptive reuse is the original building itself. Furthermore, the *genius loci* of the building is preserved for future generations (Larkham, 1996).

It is probably the vast interior spaces for artworks, allowing public interaction and appreciation of the space that has changed people's perceptions of art, which is no doubt so much more than the architects were hoping for in this adaptive reuse project.

2.9.2 Ultimo power station (now the Sydney Powerhouse Museum)

The Ultimo power station in the Ultimo suburb of Sydney, Australia, was an electricity generating plant commissioned in 1899 (Gregory, 2008). It was the first major power station in Sydney and was originally built to supply power for the electric tram network, thus of

immense industrial architectural and historical significance. With the closure of the Sydney tram network in 1961, Ultimo Power Station was decommissioned in 1963 (Thorton & Fetscher, 2015).



Figure 2-20: Ultimo Power Station, built in 1899 (source: nsw.gov.au)

Adapted for reuse, the Ultimo Power Station became the Sydney Powerhouse Museum in 1988 (Fitzgerald, 2014). Developers created the Powerhouse Museum from the plant's old shell and an additional new building.

It should be noted that the Australian Government's Better Cities Program of the early 1990s was responsible for providing cities with the financial stimulus that facilitated the nation's economic growth through the 1990s and 2000s. This state funding was further supplemented by federal funding, and this joint funding provided the catalyst to unlock the economic growth potential of Australian cities and regions – thus government money at work. Without this, derelict buildings with industrial architectural heritage would have probably fallen prey to the demolisher's hammer (Thorton & Fetscher, 2015).



Figure 2-21: Sydney Powerhouse Museum

In the image above, the remnants of the original building can still be seen, although dwarfed by the new exhibition spaces (Slavin & Brown, 2011) thus losing what Viollet-le-Duc called the ‘essence’ of the building, or what Larkham (1996) calls the *genius loci*. It is ironic that it is marketed as a technology museum, yet it showcases nothing of the original power station machinery, other than the station’s engine hall which is now part of the museum’s ‘Steaming’ exhibition. Sadly, in 2016 it was announced that the entire museum would be relocated to western Sydney to make way for high-density housing. It is unclear at this stage if the original portion of the Ultimo power station will be removed and rebuilt, or demolished (Munroe & Taylor, 2016).

This is a sad reflection on the city of Sydney, as Huxtable (as cited by Costonis, 1989) states that the preservation of historical architecture is not defined by how well society preserves old buildings as museum pieces, but by how well they are afforded the chance to be functional again.

2.9.3 Wapping power station, UK (adapted for reuse as an art centre and restaurant)

The Wapping Hydraulic Power Station in UK (built in 1890) originally operated using steam, but was later converted to use electricity. In terms of scale, it was much smaller than the behemoths of other power stations like Bankside. It was used to power machinery, including lifts, across London (Morgan, 1977). As can be seen from the image below, the building possessed much industrial architectural heritage and was typical of the Victorian period with red brick and slated and glazed roofs. It is a Grade 11 listed building (National Heritage List), listed in 1973. At the time of listing, Historic England declared that the buildings had

landmark and group value, but more important was the historic and technological interest of the machinery still in situ and working order (Historic England, no date). The photograph below shows the Station Superintendent's house (street facing) with the power station buildings behind it.



Figure 2-22: Wapping Power Station, UK (source: Monk, no date)

In terms of adaptive reuse, the situation for the preservation of Wapping Project was initially more encouraging in terms of the original machinery as opposed to Ultimo and Bankside. It came close to falling down, but was adapted for reuse as an arts centre and restaurant in 1977 by a developer – private money at work. Plevoets and Cleempoel (2011), deem this the ‘strategic approach’, whereby the focus is on the process and strategies applied when adapting historical buildings for reuse. This is similar to Mochado (1976) and Robert (1989) who refer to the metaphor of a palimpsest; i.e. a ‘layering’ of the building in successive stages where the previous history of the building can clearly be seen, although the building may have taken on a different function.

Some of the original equipment remained in this power station, as can be seen in the image below, but as the restaurant and art centre closed and the building was sold at the end of 2013, its future is now unclear. In a similar vein to Ultimo, Wapping appears to more useful to private developers for housing. Moore (2013), lamenting its closure noted that ‘obsession with house prices will turn our cities into cultural deserts’. Clearly both these power stations have been at the mercy of economic factors which have over-ridden all other arguments for industrial architectural preservation.



Figure 2-23: View of retained power station machinery at the Wapping Project (source: www.bluebadgestyle.com)

2.9.4 Newtown precinct and Jeppe Street power station

What is now The Forum/Turbine Hall and the new offices for AngloGold Ashanti were once part of the Johannesburg Jeppe Street power station, the last (and largest) of three coal-powered, steam-driven power stations built in Newtown (The Forum Company, no date; Viviers, 2009). By 1958 the Jeppe Street Power Station could no longer produce the amount of power needed at an economical rate, even as a back-up supplier in times of increased demand, and the station was subsequently decommissioned in 1961 (Viviers, 2009), although re-opened and re-equipped in the early '70s to be used as a backup during peak power loading periods (Krige, 2010, Gaul, 2005).

In the 1970s, the City Council of Johannesburg was undecided about the future of the Newtown area, which led to the unmitigated decline of the inner city area. This fine example of early 20th century industrial architecture was left derelict, according to Viviers (2009). Newtown was previously a racially mixed working class district (Krige, 2010) where brick-making took place, as well as functioning as an agricultural trade hub, railway marshalling yard, and where the majority of Johannesburg's power was produced (Viviers, 2009).

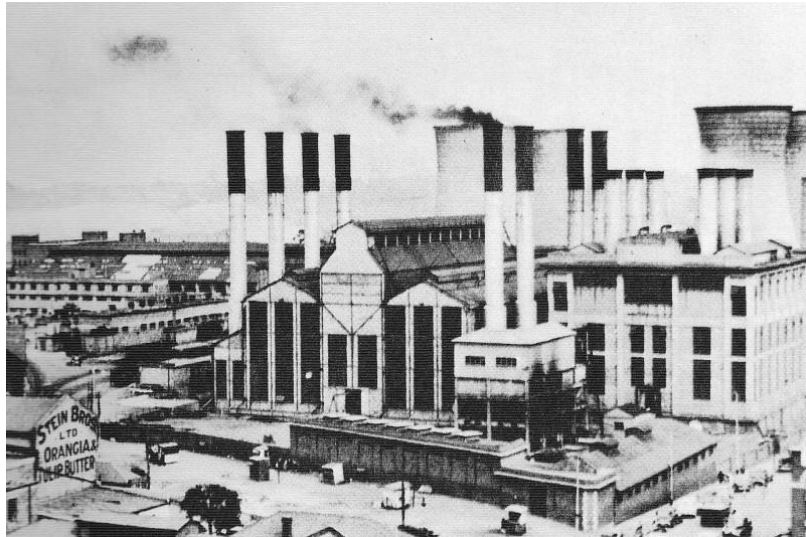


Figure 2-24: The original Jeppe Street Power Station (source: NHT, no date)

By the year 2000 the building had endured around 25 years of degradation and dereliction and was illegally inhabited by around 300 squatters and vandals who by various means had degraded the structure even further (The Forum Company, no date). In early 2002 some initial preservation work was conducted, namely the replacement of the roof and cleaning out of any rubble and leftovers from the previous illegal inhabitants (Johannesburg Development Agency, 2009).

Towards the end of 2004 the decision was made by AngloGold Ashanti to develop the Turbine Hall as the new home for its global headquarters (Taitz, 2008). The project was completed by June 2009 (Johannesburg Development Agency, no date; New Town Heritage Trail, no date). AngloGold Ashanti planned to occupy a portion of the Turbine Hall, but very early on in the design development process it was decided that more space would be required and new structures would have to be built to accommodate the new programme envisioned for the ageing and neglected relic (Taitz, 2008; Digest of South African Architecture, 2008).

According to (Taitz, 2008), a number of factors influenced this decision; namely, AngloGold Ashanti's commitment to the City of Johannesburg's inner city renewal programme (Johannesburg Development Agency, no date), and the fact that the City intended to construct an art gallery in a portion of the Turbine Hall (Newtown Heritage Trail, no date). The Newtown precinct is also home to the Sci-Bono Discovery Centre, and various markets and theatres, making it the cultural hub of Johannesburg.



Figure 2-25: Turbine Hall and the north boiler house before redevelopment (source: Gallo images)



Figure 2-26: The front façade of the Turbine Hall before redevelopment (source: Schoemaker, no date)

The new development and programme for the site would accommodate, in addition to the offices of AngloGold, conference rooms and function venues. Sadly, the Northern Boiler Hall was demolished to make way for the new 13000m² AngloGold Ashanti building (Hill, 2005). The demolition was approved by the South African Heritage Resources Agency (Hill, 2005). The Turbine Hall now accommodates an art gallery (Taitz, 2008) and the Southern Boiler Hall has been redeveloped and provides covered public space, along with retail and hospitality in various forms, and also functions as a temporary exhibition space.



Figure 2-27: Façade of the completed Turbine Hall (source: Gauteng Tourism Authority)

The new AngloGold building expresses a modest but powerful exterior and shares a palate of materials similar to that of the existing structures; namely, concrete, steel and glass. Internally, large volumes are expressed as homage to the original Turbine Hall (Hall, 2005). When discussing the design approach for the Turbine Hall, principal architect Guy Steenkamp of TPSP Architects explains that they adopted a ‘conversationalist approach’ stating ‘it would have been criminally irresponsible not to take this view’ (as cited by Viviers, 2009). The architects were clearly aware of the building’s importance, significance and heritage status. However they were also aware that to accommodate the new programme envisioned for the site some elements had to be sacrificed; ‘we had to sacrifice the North Boiler House, dismantle and reassemble part of the South Boiler house, and literally create a new building within a building’ (Steenkamp, as cited by Viviers, 2009).

Another important aspect of this building, as with most power stations, is the massive internal volumes. Steenkamp (as cited by Viviers, 2009) elaborates on this: ‘although we celebrated the internal volume [of the Turbine Hall], it is not only about creating large open spaces ... big spaces can be boring’. In London’s Tate Modern (originally the Bankside power station), many visitors state that the undifferentiated volume can be disorientating, as noted in the previous section on the Tate Modern adaptive reuse.

However, the large, vacant volumes and spaces afford anyone entering the building with a sense of power, grandeur and gravity of the structure. The emptiness of the space is not ‘boring’ or undifferentiated, but rather invigorating and encourages the mind to explore the cavernous volumes, as well as inducing retrospection, imagination and possibly even

nostalgia.

The retention of the patina of the existing fabric bolsters the authenticity of the adaptive reuse project; a tangible avenue or conduit to the past is intentionally left exposed whilst new interventions are clearly visible. This creates an interesting dialogue and contrast between old and new, the past and the present, the adorned and unadorned, and an honesty of representing the past.

Furthermore this honest representation and presentation of materiality speaks for the *genius loci* of the region and adds to the built fabric and form of the area of Newtown. Steenkamp (as cited by Viviers, 2009) elaborates on this by stating,

'This is a unique part of town. It is essentially an industrial precinct, which means that the architecture is not homogeneous, industrial precincts are about layering and buildings that grow organically over time. We thought it was important to retain this feeling'

This is patently in line with Viollet-le-Duc and Riegl's (1858-1905) theories on adaptive reuse. In terms of Riegl's typology of 'monuments', theory, this building can be viewed as both an unintentional monument and an age-value monument – making explicit sense of the lifecycle of building, and of culture as a whole (as cited by Era Architects, 2011).

The history of the structure is further evident in huge photographs of the temporary denizens of the Turbine Hall – vagrants, homeless and hungry people, which are exhibited in the main dining hall (Taitz, 2008). The basement is another area where this period in the building's life is evident. Graffiti from the former occupants was retained as a tangible reminder of turmoil and dereliction (Taitz, 2008) and the various stages of the building's life, thus preserving what Larkham (1996) notes about a historic building's inherent character and charm.

In terms of adaptive reuse, although some existing structures were demolished, the majority of built structures were retained which 'exemplifies the potential benefits of adopting a conversationalist approach to development in the city' (Digest of South African Architecture, 2008: 82). As Steenkamp (as cited by Viviers, 2009) states:

'Working on this project brought home the benefits of reusing existing structures and urban fabric. We do ourselves [and our cities] a major disservice when we do not recognise the value of our [built] heritage'

This view concurs with Krige (2010) when he notes that architects seek to give a 'second life' to buildings whilst preserving their first life and adapting the building to conform to contemporary requirements.

Now, however, Newtown has been regenerated and functions as Johannesburg's cultural district (The Forum Company, no date) boasting various museums, craft markets, galleries and performance spaces coupled with large public piazzas and restaurants (Gauteng Tourism Authority, no date). The Turbine Hall has now been reinstated as a landmark, albeit in a very different landscape, and a very different South Africa. The site is now an important component and contributor to the greater Newtown precinct as a whole as well as the city of Johannesburg, and worthy of its heritage status. This area has been reinvigorated and reinstated; one that now contributes not only economically through retail and offices but also culturally through art and public spaces. This is in line with the literature regarding adaptive reuse as contributing to inner city revitalisation (Slavin & Brown, 2011; IAEA, 2011; Plevoets & Cleempoel, 2011; Morandotti *et al.*, 2013). The celebration and appreciation of these spaces are tantamount to this successful adaptive reuse of a power station.

2.9.5 Orlando power station (Soweto)

The Orlando power station was constructed between 1939 and 1955 and decommissioned in 1998 (Krige, 2010). The buildings were left to decline and due to vandalism and illegal squatting are now beyond repair. In fact, most of the building came crashing down in 2014, killing and injuring people inside who were inside stripping out metal parts (Sethusa, 2014). Krige (2010) refers to this as 'criminal neglect'. Yet another industrial building with architectural heritage has been lost forever.



Figure 2-28: The ruins of the Orlando power station (source: The Citizen, 2014)

However, the 33-storey cooling towers were repaired, cleaned and painted (one comprising corporate branding) in 2008 by local company Skyriders – an extreme sports company. Besides being landmarks, they are also something of a tourist attraction, attracting local and international enthusiasts for extreme sports such as bungee jumping, rap jumping, abseiling etc. The towers were also the site of the world’s first bungee jump between two cooling towers (Gauteng.net, no date). The cooling towers form part of the Orlando Ekhaya Precinct, which will in future include a shopping centre, hotel, business nodes, conference facility, waterfront development and upmarket town-houses, in terms of Johannesburg’s Growth & Development Strategy 2040. Like Ultimo and Wapping, will these iconic towers be demolished to make way for much needed housing in the area? Only time will tell. It remains to be seen as to whether this precinct development will take place, as there is not much published information available.



Figure 2-29: Orlando cooling towers (source: Gauteng.net)

This concludes the section on power stations as adaptive reuse projects. Some of these international precedent studies are examined in relation to the Thesen Island development in the Chapter 5 in the critical analysis, as are other power stations in South Africa, specifically the Jeppe Street power station in Newtown, Johannesburg, adapted for reuse as the Turbine Hall, and the Soweto Power Station in Orlando, Johannesburg.

2.10. Hart & Halkett’s (1998) research for Thesen Island with specific reference to the power station

In 1998 Timothy Hart and David Halkett of the Archaeology Contracts Office (ACO) of the University of Cape Town’s Department of Archaeology were commissioned by Dr Chris Mulder of CMAI (Chris Mulder & Associates Incorporated) architects to assess the industrial

architectural heritage resources on Thesen Island, Knysna, prior to redevelopment. David Halkett is a long standing member of the Association of Professional Archaeologists (ASAPA) and an accredited Principal Investigator of the Cultural Resource Management (CRM) section. Tim Hart is a professional archaeologist registered with ASAPA (Association of Southern African Professional Archaeologists) and its CRM section.

Their 1998 report, entitled, 'An Assessment of Heritage Resources on Thesen Island Knysna', deals with aspects such as history, heritage, architecture, legislation, archaeology, geography and context, palaeontology, and the built environment assets on the island. These authors investigated the history of the island from its geological development through its role in the 19th and 20th century history of the area, involving a literature review, an archival study, as well as consultations with local organisations/individuals that had valuable local knowledge of the area (Hart & Halkett, 1998).

The document provided a historical summary (and archival photographic images) of all activities in the region and on the island from circa 1804 up until 1998 when the report was published. Hart and Halkett (1998) identified and described all the industrial architectural structures on the island, assessed their heritage potential, their current heritage status, and any interesting intrinsic characteristics of these structures. Each individual structure was carefully assessed and then commented on in terms of its importance, significance, and architectural heritage value. Suggestions were then made as to whether the structure should be kept, or had to be kept, depending on the structure's heritage status, in line with South African legislation and the requirements of the National Monuments Council of the time (now replaced by the National Heritage Resources Act, No. 25 of 1999).

Hart and Halkett (1998) identified the former Thesen Island Power Station as the most preservation-worthy of the industrial architectural structures on the island: 'the building along with its machinery is the finest industrial structure on the Island, if not the region'. The power station was protected in terms of legislation (National Monuments Act), but surprisingly the machinery it contained was not. This document provided the starting point for the development of Thesen Island, and gave the project architects not only a comprehensive history of the island to inform design decisions, but the identification of which buildings had to be kept (in terms of the prevailing legislation) and which should be kept (if possible) for their industrial architectural heritage value.

Hart and Halkett (1998) noted the following:

' both statutory conservation bodies and large industry in South Africa have an

extremely poor record in terms of conservation of the country's industrial heritage' (Hart & Halkett, 1998).

The literature review in this chapter has led now to the main research question posed for this study.

2.11. Main research question

If the project architects for the Thesen Island development had to protect industrial architectural heritage (in terms of the then law, i.e. National Monuments Act of 1969) and wanted to keep as many of the industrial buildings as possible (in terms of their historical importance and cultural significance), and with few international precedents of power stations to refer to (none in South Africa in 1998), how could they accomplish this and was it successful? The main research question now posed is the following:

Is adaptive reuse a successful strategy for preserving industrial architecture heritage?

2.12. Conclusion

This chapter noted that the 'green' movement led in turn to an increasing awareness and concern for the architectural heritage of built environment and concomitantly the necessity for sustainability. This led to a discussion of the importance of preserving industrial architectural heritage, and both arguments for and against preservation were espoused. The next section comprised a discussion of the various bodies established that provide guiding principals and charters to promote the concept of industrial architectural heritage. A discussion next on building obsolescence was given as it is obsolescence that paves the way for adaptive reuse. Adaptive reuse was defined, and various historical and contemporary theories were discussed, leading to brief history of adaptive reuse in South Africa, illustrated with various precedents of the preservation of industrial architectural heritage. Power stations, as a component of the typology of industrial buildings, and why they make such good candidates for adaptive reuse, were discussed and this section was illustrated with various international and South African precedents. After a discussion of Hart and Halkett's (1998) research for the developers of Thesen Island, the main research question was posed:

Is adaptive reuse a successful strategy for preserving industrial architecture heritage?

Chapter 3 details the research methodology used to answer the research question.

CHAPTER 3: RESEARCH METHODOLOGY

'While new buildings may be a welcome sign of economic growth, old buildings are a city's memory, providing links with the past and giving it a sense of continuity' (Hart, 1992).

3.1. Introduction

Chapter 1 noted that South Africa is losing much of its industrial architectural heritage and why this is happening. Chapter 2 discussed the fact that many industrial buildings with architectural heritage are becoming obsolete worldwide (Langston *et al.*, 2007). In South Africa particularly, many are being lost either due to neglect and lack of finance to adapt them for reuse, or they remain obsolete. When buildings decay, with this goes the building's history and heritage. The literature review also discussed that the built environment has to meet contemporary needs in a changing society, but these needs have to be balanced with environmental sustainability; functional sustainability, energy-orientated sustainability and life-cycle sustainability (Morandotti *et al.*, 2013).

Chapter 2 posed the research question: *Is adaptive reuse a successful strategy for preserving industrial architectural heritage?*

This chapter explains the rationale for the research and the research methodology, i.e. qualitative, in the form of a bounded case study, to answer the research question – *Is adaptive reuse a successful strategy to preserve industrial architectural heritage?* Both the data collection and data analysis are explained, as are the validity and reliability of this research study. The importance of ethics is also noted.

3.2. Rationale for the research

3.2.1 *Typology of industrial structures*

According to TICCIH (2003), industrial buildings comprise the following:

'...buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education.'

Examples are warehouses, factories, breweries, mills and power stations. In South Africa, Athlone power station has had its cooling towers demolished, and the rest of the building stands vacant, awaiting redevelopment. In Soweto, the cooling towers of the Soweto power

station remain and are used for recreational events, but the buildings were neglected and vandalised, and eventually the entire structure collapsed. The Jeppe Street power station, now the Turbine Hall, has also had its cooling towers demolished and the turbine hall adapted for reuse as a functions facility, but all machinery has been lost.

At the time of writing (2014), the fate of Pretoria West and Rooiwal power stations is uncertain as they are not operating at full capacity, having been designed to burn an expensive grade of coal which can be exported, and further, they require expensive maintenance to their aging infrastructure which the city cannot afford (Venter, 2014; Rekord North, 2015). According to Eksteen (2015, as cited by Engineering News) spokesperson for the company supplying the coal to Pretoria West, 'the power station in question has been out of operation for a very long time and is being brought back into operation.' It is not clear whether this has happened, but the City of Tshwane now wants to sell or lease them to the private sector and there is the threat that they could be decommissioned as they are too expensive to operate. It has also just been announced by Eskom (March 2017) that four more power stations will be closed (viz. Kriel, Komati, Hendrina and Camden). It is not clear when this will happen and what their fate is. These power stations may stand empty and disused, and without intervention could most probably be demolished or just left *in situ* to decay to a stage where there will be nothing salvageable, like the Soweto power station.

The literature review discussed the argument for the preservation of industrial buildings with architectural heritage, and that these buildings, including power stations, are important and significant for their ability to foster an appreciation of history, an understanding of the present, and a vision for the future (Morandotti *et al.*, 2013; Balderstone, 2012; Cantell, 2005; Carroon, 2010; Plevoets & Cleempoel, 2011; Bullen & Love, 2009; Hart, 1992).

Due to their size, power stations are significant landmarks, visible for miles, and represent both the cultural and socioeconomic changes and progress of society. They have much cultural and socioeconomic significance for those generations who toiled there, lived and played in their shadows. This heritage and history should be preserved as it tells a 'story'; it is a vital link with the past and serves as a reminder of significant bygone days for future generations. From powerhouses of power generation power stations can become powerhouses of social, economic and environmental revitalisation (Slavin & Brown, 2011; IAEA, 2011; Plevoets & Cleempoel, 2011). This is line with South Africa's Local Economic Development policy as well as the SAHRA's overarching paradigm of heritage protection, as discussed in Chapter 2.

As noted in the literature review, power stations thus present significant adaptive reuse opportunities due to their impressive scale, and can help revitalise whole neighbourhoods and regions (Slavin & Brown, 2001; Morandotti *et al.*, 2013). But does this adaptive reuse successfully preserve industrial architectural heritage? This question was of importance for the Thesen Island power station and the many other industrial buildings on the island - previously the 'engine' of trade and development for the town of Knysna. Although CMAI planned the entire island development to once again revitalise trade and industry in the town of Knysna, thus rightly contributing to the town's socioeconomic progress, was this significant industrial architectural heritage preserved? Was the strategy of adaptive reuse for the power station and the other buildings on the island preserve its industrial architectural heritage successful?

3.2.2 Why Thesen Island power station?

The Thesen Island power station adaptive reuse project was selected as a case study due to the history and industrial architectural heritage of the building, and the nearly 10-year journey CMAI travelled to complete the project in order to preserve industrial architectural heritage. It was one of the few power stations that was still standing and was still intact in South Africa; not only the entire building structure (and all the peripheral industrial buildings) but also all the machinery representing the history of technological change. Further, much archival documentation was still there on site. This was not the case with other obsolete power stations in South Africa, where all machinery has been lost, along with much, if not all, of the documents and photographs (Taitz, 2008). For decades it had been a beacon of the cultural landscape of Knysna for workers, traders, residents and tourists.

As noted, the Thesen Company (owners of the power station) was the single largest employer in the town of Knysna and in the region (Mulder & Aupais, 2008). The power station possessed not only the memories of generations of residents and workers, but tangible reminders of the significant maritime and timber industries owned by the Thesen family for over 100 which had been responsible for the socioeconomic growth of the town. This was a treasure trove of history and heritage of a small residential community in a town far from the nearest metropolis.

The Thesen Island power station also had various unique features. It was privately owned, whereas most power stations are state-owned or municipal enterprises. It was also the only wood-fired power station in South Africa, thus its internal machinery and processes were very different to the usual coal-fired power stations in South Africa. The Thesen Island power station was a micro-scale power station compared to the usual behemoths such as

Athlone and Orlando etc. Although power stations are normally situated inland, and often on rivers, the Thesen Island power station was situated on a island in the middle of a sensitive marine environment. The power station was on the island so as to capitalise on woodchips as a fuel source – a by-product of the Thesen family's timber milling industry on the island.

The literature review in Chapter 2 noted that the National Heritage Resources Act (1999) specifically orders the safeguarding of places (and objects) with cultural significance – it is a legal imperative that they be protected. However, this does not mean that they cannot be demolished after due process has been followed. How to go about preserving this heritage is moot, but the literature review noted that internationally there is a large body of theoretical and practical knowledge on adaptive reuse as a strategy to protect industrial architectural heritage (Plevoets & Cleempoel, 2011; Bullen & Love, 2009; Joachim, 2002; Cantell, 2005; Feireiss & Klanten, 2009; Bollack, 2013).

However, there is little academic work in South Africa on adaptive reuse as a strategy to preserve industrial architectural heritage. Most academic work focuses only on a single perspective, such as engineering, energy saving, sustainability etc. Regarding the Thesen Island Power Station, information could be gleaned from various sources but there was no single body of academic work that traced the entire 10-year project. There is thus a gap in the body of knowledge in South Africa regarding adaptive reuse as a strategy to specifically preserve industrial architectural heritage. Therefore, this project could prove to be a good example of how a power station, forming part of South Africa's industrial architectural heritage, can be successfully and sympathetically adapted for reuse to preserve its industrial architectural heritage and conform to the principles of sustainability. It thus could serve as an important local precedent for using the strategy of adaptive reuse to preserve industrial architectural heritage.

3.3. Research objective

The objective of this research was therefore to critically evaluate the extent of the adaptive reuse of former Thesen Island power station into the Turbine Hotel & Spa (within the broader context of sustainability) and to determine if adaptive reuse is a successful strategy for the preservation of industrial architectural heritage.

3.4. Research method

Henning (2004) states that researchers select a research 'method' and then a research 'genre' within that research method that will not only suit the research question optimally, but will indicate knowledge, interpretation and understanding of the subject. Thus to investigate

the adapted reuse of the Thesen Island power station as a strategy to preserve industrial architectural heritage, a qualitative method was chosen, rather than a quantitative method. Statistics Canada (2003:14) states that qualitative research requires respondents to provide detailed explanations of the nature of the problem being researched. This is important for the Thesen Island adaptive reuse project where relevant information was sought directly from those involved in the project; i.e. the developers, the project architects, owner of the power station, residents, local community representatives, tourists, etc. Qualitative research, however, is subjective, and although the findings cannot be generalised, it yields a depth, or richness, of information (Henning, 2004). It is this richness of information on a myriad of factors pertaining to the preservation of industrial architectural heritage that was sought in this case study

Both Stake (2000) and Henning (2004) state that qualitative research uses methods such as case study, observation, site visits, structured and unstructured interviews, and focus groups. In order to do justice to the 10-year journey of this adaptive re-use project, the case study method was thus deemed suitable, using a literature review, observation, site visits and an unstructured questionnaire to elicit as much important information as possible to determine how industrial architectural heritage was preserved through the process of adaptive reuse.

3.5. Case study research

A case study is a detailed account and analysis of one or more 'cases'; i.e. a bounded system (e.g. a person, a group, an activity, a process) (Tinkler, 2004; Creswell, 2002). Creswell (2002:496) describes a case study as a process of investigation, and recommends case study as a methodology if the problem to be studied 'relates to developing an in-depth understanding of a case or bounded system' and if the purpose is to understand an event, activity, process, or one or more individuals. A case study is an empirical enquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident, according to Yin (1994), while Bromley (1990, as cited by Zucker, 2009) states that it is a systematic inquiry into an event or a set of related events which aims to describe and explain the phenomenon of interest.

The purpose of a case study is to provide quality of information (i.e. rich, vivid, holistic and detailed description) rather than quantity (Henning, 2004). Both Merriam (1998) and Patton (1990) explain that case study research is valuable because it creates an in-depth understanding of particular people, problems or situations (or in this case, projects) in a

comprehensive, holistic way. Merriam (1998:19) points out further that a case study provides context and meaning for the reader, and that the 'interest is in the process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation'. Multiple methods of data collection can be used in case study research, such as interviews, observation, documents and questionnaires (Tinkler, 2004) to yield this 'richness' of information. Using a case study approach in research has several strengths including the ability to use a variety of research methods (Davies, 2007), the ability to establish rapport with research subjects (Mouton, 2001), to obtain sufficiently rich description that can be transferred to similar situations (Merriam, 2009) and, ultimately, in-depth insight (as cited by Ponelis, 2015).

According to Sarvimaeki (2013), from the School of Architecture, Honolulu, Hawaii, writing specifically about case study research in architecture, two types of case study can be identified; the embedded case study and the holistic case study. The embedded case study combines quantitative and qualitative data, and the holistic case study is based on a qualitative approach that relies on a narrative, phenomenological description and understanding of a case. The type of case study used in this research is the holistic case study.

Further, context is very important in a case study. As Merriam (1998) states, in a case study one focuses on a particular phenomenon, but it is impossible to separate the phenomenon from its context. Although the case study in this thesis is on the adaptive reuse of the former Thesen Island power station to the new Turbine Hotel & Spa as a strategy to preserve industrial architectural heritage, it is impossible to discuss this adequately without taking the context into account; i.e. the built and natural environment of Thesen Island in its entirety as well as being a part of the greater Knysna community. Thus it is extremely important to understand the context as part of the adaptive reuse process. As Yin (2003:13) states,

'You would use the case study method because you deliberately wanted to cover contextual conditions, believing that they might be highly pertinent to your phenomenon of study'.

Thus the case study method allowed the researcher to gain significant knowledge about the adaptive reuse of the Thesen Island power station. Sanders (1981:44) points out that 'case studies help us to 'discover context characteristics that will shed light on an issue or object'. Further validation for the case study method comes from Flyvbjerg (2006) who states that social science may be strengthened by the execution of a greater number of good case studies.

Thus a case study design was chosen because the topic, an adapted reuse project as a possible strategy to preserve industrial architectural heritage, involves 'detailed, in-depth data collection involving multiple sources of information rich in context' (Creswell, 1998: 61). In this thesis the case study is a holistic single 'bounded' project under investigation, within the important context of the greater Thesen Island. This research is an intrinsic case study as it is delimited to the adaptive reuse as a strategy to preserve industrial architectural heritage of the former Thesen Island power station to the Turbine Hotel & Spa.

3.6. Research question

As discussed in Chapter 1, South Africa is losing much of its industrial heritage (Brink 2008; Coetzer, 2011; Fraser, 2007; Jacobs, 2015; Krige, 2010; Lipman, 2006; Louw & Fisher, 2011; Mare, 2012; McCulloch, 2012; Moolman, 2010; Nomico & Sanders, 2003; Picton-Seymour, 1977; Taitz, 2008; Quaghebeur, 2000; Charlton, 2015; Visagie & Fourie, 2011; Läufer & Mavunganidze, 2009). A component of this industrial heritage comprises power stations.

Chapter 2 showed the value of industrial heritage preservation, and posed the research question: *Is adaptive reuse a successful strategy for preserving industrial architectural heritage?*

3.7. Research sub-questions

However, although this case study specifically concerns the adaptive reuse of the decommissioned Thesen Island power station, it cannot be divorced from its wider context; i.e. the entire Thesen Island redevelopment. As noted in Chapter 2, section 2.9, the specific aspects, or themes, to be considered when considering a power station for adaptive re-use are the following.

- Socioeconomic impact (job retention or creation, financial benefits, etc.).
- Decommissioning impact (scope of decommissioning work, waste generation, timing, regulatory issues, etc.).
- Environmental impact (conservation of greenfields, level of contamination).
- Stakeholder impact (public needs and demands and regulatory framework) (IAEA, 2011).

These themes loosely guided the formulation of the research questions and the thematic analysis of the data (Chapter 4 – The Case Study). While keeping in mind that the Turbine Hotel & Spa is part of a greater 'whole', and therefore not neglecting to examine its broader context, the following sub-questions, which encompass the four themes above, were posed

with specific reference to the adaptive reuse of the decommissioned power station to the Turbine Hotel & Spa:

- How was architectural decision making influenced by the geographic location and concomitant climatic conditions?
- How was architectural decision making influenced by the history of the town of Knysna, the existing Thesen Island, and the Thesen family?
- Which architectural principles of sustainability and ecological design were employed in the project?
- How was architectural decision making influenced by local and international precedent studies regarding the adaptive reuse of decommissioned power stations?
- Was the history and heritage of the original structure (e.g. the former Thesen Island power station) appreciated and respected, and if so, how?
- What heritage legislation had to be considered in this adaptive reuse project?
- What characteristics and attributes of the site of the former power station influenced the decision making and final design for the Turbine Hotel & Spa?
- What characteristics, attributes and sections of the original building (i.e. the decommissioned power station) were deemed to be preservation worthy, and why?
- What challenges were encountered through the adaptive reuse of this structure, and how were they overcome?
- What role did the community play, and to what degree were they involved in the adaptive reuse process?
- Is this project unique, and if so, in what way?

In order to obtain information which could provide answers to these research questions, both primary and secondary research were conducted in accordance with the research assumptions, delimitations, and methodology which are discussed in the following sections of this chapter. The secondary findings comprise the literature review, i.e. Chapter 2. The literature review guided all the research activities and gave meaning to the research concepts. After research into both the historical and contemporary theories of adaptive reuse, and using these as guiding tools to understand the various principles of adaptive reuse, various books, journals and dissertations were examined to gradually gain insight into the phenomenon. This then prompted an investigation into where and how the process of adaptive reuse had been used, both in South Africa and internationally, with the focus mainly on western architecture, as discussed in Chapter 2.

I also travelled to the United Kingdom and Europe on a few occasions to see as many

buildings as possible that had been adapted for reuse; my interest in the subject having been raised on many other previous trips to Europe, the UK and the UAE. I also used these trips to talk informally to many contacts in the built environment profession to further my knowledge of the subject. Many hours were gratefully spent with architects, specifically with Mike Louw from CMAI, who has a passion for adaptive reuse, having been involved with Thesen Island for some 10 years. During this process, the more questions were asked, the more other questions were raised, prompting further research. Often I was referred by interviewees to other documents or information not previously identified by me for inclusion in this study. Thus the secondary data collection, and also to an extent the primary data collection, and the writing of the literature review were an iterative process. As the primary data were written up, it necessitated an almost simultaneous reworking of the literature review, constantly amending and enlarging it as further information came to light.

I also stayed on Thesen Island, both in the hotel on a few occasions in a rented residential villa, as well as kayaking around the entire island and through the man-made canals to fully appreciate the Thesen Island experience.

The primary findings are discussed in Chapters 4, and Chapter 5 presents a critical analysis of the findings. Chapter 6 summarises the research, draws some conclusions on adaptive reuse, and provides recommendations for further research.

3.8. Research assumptions

In limiting this research study to a case study regarding the preservation of the industrial architectural heritage of the Thesen Island power station to the Turbine Hotel & Spa, certain assumptions had to be made. Dusick (2011) states that assumptions are those things one takes for granted in the study; i.e. statements made that certain elements of the research are understood to be true.

The research proceeds from the point of view that South Africa's industrial architectural heritage *is* being lost (through demolition, neglect etc.), and that this industrial heritage *is* very definitely worth respecting, retaining and preserving, as shown in Chapter 2. It is further assumed that the reader is familiar with architectural and built environment terminology as well as the concept of adaptive reuse although, as mentioned earlier, there is limited information/discussion on adaptive reuse in this country.

3.9. Delimitations of the study (scope)

Because the research questions encompass the vast areas of industrial architectural

heritage preservation (within the broader context of sustainability), and because the research is limited to a specific project, i.e. a bounded case study of the journey from power station to hotel, it is necessary to state the delimitations, or scope, of the study. The research study is delimited to the adaptive reuse as a strategy to preserve the industrial architectural heritage of the former Thesen Island power station to the Turbine Hotel & Spa in the form of a case study. The power station was decommissioned circa 2000, and the Turbine Hotel & Spa was completed in 2010. The history of the island and the factors that led to the decommissioning of the power station rendering it obsolete are important as this information informed and guided most of the decision making by the architects in the adaptive reuse project, and therefore are discussed. As the new Turbine Hotel and Spa would sit amongst various other industrial buildings, also possessing industrial architectural heritage, in the enclave called Harbour Town, some of the other buildings adapted for reuse can be found in Appendix C.

3.10. Target population

According to Hussey and Hussey (1997) and Bryman and Bell (2007), the target population refers to the total collection of all units of analysis about which one seeks to make specific conclusions regarding issues raised in the research objective, questions and sub-questions. Welman, Kruger and Mitchell (2005) note that the target population of a study can include individuals, groups, organisations, products and events. The target population for this case study would mean any person or company involved in the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa. However, Bryman and Bell (2006) state that it is usually not reasonably feasible (in terms of time, money and magnitude of target population) to include all the units during a particular study due to costs and time constraints, and thus a sample is used. A sample is a sub-set, or portion of the population actually studied in the research which is representative of the larger population. This leads to sampling.

3.11. Population sampling process

Sampling means the process whereby the research participants are selected, using proven, scientific methods, ensuring that such sample is representative of the population. Sampling affects the external validity of research (Mouton & Marais, 1990); this is discussed in a later sub-section of this chapter.

The method of non-probability sampling was used in this research study, which is a method suitable for qualitative research (Terreblanche *et al.*, 2006; Henning, 2004). Specifically, judgmental, snowball and critical case sampling techniques were used. First judgmental

sampling was used; i.e. own personal judgment to determine the most appropriate sampling units; i.e. the people the researcher wanted to interview. Here the elements (people) who fit the criteria of 'desirable participants' are selected (Henning, 2004:71) in terms of the investigation. In other words, the sample of people is deliberately chosen, and this method was used in ascertaining who should be interviewed for this case study.

During the interviews, snowball sampling was used, in that the interviewees were asked to recommend important people and documents that should be accessed in order to obtain comprehensive information for the project. Further, the critical case sampling method was used, according to Terreblanche *et al.*'s (2005) interpretation, whereby data was sought that was particularly information-rich and enlightening, specifically from the developer, owner and architects for the project.

3.12. Data collection

According to Merriam (1998), the data collection in a case study usually emanates from three sources: observations, interviews, and documents (or artefacts). One has to decide not only what type of information is needed for the case study, but from whom (and where) it was going to be collected and collated. All three sources of data were used in this research (Merriam, 1998); at all times was guided by the research questions to ensure that the findings of the research would contain adequate information to answer the research questions. These sources of primary data collection served to complement the secondary data source; i.e. the literature review, which is in Chapter 2, and are interwoven into the case study material in subsequent chapters. The data collection methods were as follows:

3.12.1 Observation

Extended on-site visits were made on three occasions to directly observe the Turbine Hotel & Spa, as well as the entire Thesen Island and the surrounding greater Knysna area. Each on-site visit lasted a couple of days, including staying in the Turbine Hotel & Spa on two occasions to gain the experience of *genius loci*. Further, by staying in the area, it enabled the interviews to be conducted, as discussed in the next sub-section.

On one visit, a unit in the adjacent residential area was rented (Dry Mill Apartments), which has restricted access for non-residents. This visit enabled a view of the Turbine Hotel & Spa from a unique angle, not normally afforded the hotel visitors. This particular visit also afforded an opportunity to interview a long-term resident *in situ* – providing an alternative, non-professional opinion about the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa, and this data served to complement the interview data from the

professionals. Further, kayaking around the entire Thesen Island, and through all the internal canals, afforded an opportunity to view the infrastructure, as well as the ecologically-sensitive marine environment, and thus gain a first-hand macro view of the Island in its entirety.

3.12.2 Interviews (with semi-structured questionnaire)

An interview is defined by Kahn and Cannell (as cited by Saunders *et al.*, 2000:264) as a 'purposeful discussion between two or more people.' A semi-structured questionnaire was prepared to guide the interviews. It must be noted that the interviewees were professionals in their field, and it was expected that in-depth information would be obtained. The interviews were informal, and more in the form of a conversation, or discussion, as the interviewees had direct involvement in the project. Therefore these interviews provided valuable information not previously discovered during the literature review.

Thus the objective of the interviews was four-fold:

- To uncover, first hand, the relevant information for the case study to answer the research questions.
- To gain an extensive, in-depth understanding of the project in order to discuss it in the form of a case study, and draw meaningful insight and conclusions.
- To ask the interviewees for published or unpublished material that may have been neglected during the literature survey.
- To ask the interviewees for the names of other important people that should be interviewed for this case study (snowball sampling).

The following people were interviewed:

- Mike Louw (Project Architect for the Turbine Hotel & Spa, and lecturer at UCT).
- John Samuel (Architect and lecturer at CPUT).
- Phillip Caverney (Head of Knysna Historical Society and a Thesen Island resident).
- Ernst Ludick (General Manager, Turbine Hotel & Spa, circa 2012/2013).
- Thesen Island residents and hotel visitors.
- One of the two owners of the Turbine Hotel & Spa (Dandre Lerm).

Extensive notes were made during the interviews, and then directly written up, and synthesised with the findings of the literature review (Chapter 2) to form the content of Chapter 4 – The Case Study – see the section on data analysis in this chapter. When subsequent face-to-face interviews were not possible, telephone and email correspondence

with the relevant parties where necessary was established. Copies of the semi-structured questionnaires can be found in Appendix B.

3.12.3 Documents

The third source of data for a case study, according to Merriam (1998), is documentary evidence. Thus a thorough literature review was conducted, i.e. Chapter 2. The literature review provided background information regarding historical preservation, theories of adaptive reuse as a strategy for industrial architectural preservation and sustainability, as well as the required terminology. The precedent studies regarding power stations that had been adapted for reuse (both worldwide and in South Africa) enabled a critical evaluation of the new Turbine Hotel & Spa, specifically regarding its heritage preservation and sustainability. These are discussed and contrasted with the Thesen Island power station in the next chapter.

Further, the literature review revealed many articles and books published about the actual project, not all from an architectural point of view. No comprehensive academic work was found which detailed the entire project, the objective of this research study. During the interviews, some participants provided important documents or articles that were not uncovered in the literature review; some were personal papers and unpublished information, and greatly added to the comprehensiveness of the information uncovered.

3.13. Data analysis (thematic analysis)

The primary data collection (i.e. the interviews) phase was concomitant with the literature review, in that the more information discovered, the more there was to research. Realising that one thesis could not do justice to all aspects of the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa as a project (as mentioned earlier in this chapter), a vast volume of information and data was condensed in order to timeously complete the case study.

This condensing of information took the form of an in-depth assessment and analysis of the information order to determine which elements, or themes, of the adaptive reuse of the former Thesen Island power station would form the bulk of the case study in line with the research sub-questions; i.e. a thematic analysis.

The University of Auckland (no date) states that the purpose of thematic analysis is to identify patterns of meaning across a dataset that provide an answer to the research question being addressed. Thematic analysis is used as a means to gain insight and knowledge from data gathered (Kimori, no date). Boyatzis (1998) states that thematic

analysis is a process of 'encoding' qualitative information, and that a theme is considered a 'code'. A theme is a pattern found in the information collected that at the minimum describes and organises possible observations, or at the maximum interprets aspects of the phenomenon; in this case adaptive reuse of a power station. According to Boyatzis (1998) a thematic analysis can be approached deductively or inductively.

The thematic analysis (guided by the research sub-questions) primarily centred on the main research question posed in Chapter 2: Is adapted reuse a successful strategy to preserve industrial architectural heritage? The themes identified by the IAEA (2011) as pertinent to discuss when approaching the adaptive reuse of a power station are socioeconomic impact, decommissioning impact, environmental impact, and stakeholder impact. These themes were used to analyse the data in a deductive manner, but as other important information arose during the writing up of the case study, thematic analysis was also used in an inductive manner.

3.14. Validity, reliability and trustworthiness

Henning (2004) refers to validity, reliability and trustworthiness as the 'holy trinity' of research, although she prefers the term 'trustworthiness' as, in her opinion, this implies validity and reliability in qualitative research. Validity refers to the extent to which an instrument measures what it is intended to measure (Ary *et al.*, 1996). Internal validity refers to the extent to which causal conclusions can be drawn from the research; while external validity concerns the generalisability of the findings to the broader population or setting (Terreblanche *et al.*, 2006).

Reliability, on the other hand, is the extent to which a measuring device is consistent in measuring whatever it measures (Ary *et al.*, 1996). By its nature therefore, reliability is not an issue in qualitative research, especially for a case study such as this research as the findings are *not* intended to be generalisable. As Marshall and Rossman (as cited by Saunders *et al.*, 2000:250) state, reliability is not an issue with respect to interviews in qualitative research, since qualitative research methods are not necessarily intended to be repeatable – they reflect only reality at the time the data are collected.

With respect to interviews, Sykes (as cited by Saunders *et al.*, 2000) argues that validity is possible; brought about by the flexible and responsive interaction between interviewer and respondent during which questions can be made clear to respondents, meanings can be probed, and various topics can be covered from a variety of angles. This is more in line with Henning's (2004) view of the term 'trustworthiness'. Concurring, Roller (2015) states that data from alternative sources of information serve to verify the study data while giving the

researcher a different, more enriched perspective on study outcomes; and it is these divergent points of view that can contribute to a more balanced, robust and meaningful analysis of the data.

Roller (2015) notes three approaches to data verification in qualitative research:

- Triangulation (use of multiple sources to contrast and compare study data): Data gathered for example from the architects was checked against plans and other forms of documentation.
- Negative case analysis (Instances in the study data that contradict or otherwise conflict): The interviews did produce some conflicting information, for example regarding the inclusiveness or exclusiveness of the project, but this was due to subjective opinions.
- Reflexive journal (a diary kept by the researcher to provide personal thoughts and insights on what happened during the study): Extensive notes were made during all field trips and interviews so that fact-checking or further research could be conducted. Interview notes also prompted the search for other documents or sources of information as new aspects and concepts arose.

It must be noted that own views and opinions have influenced this research study. It is not possible to be completely objective in qualitative research, and although endeavouring at all times to 'keep an open mind', it is inevitable that subjectivity crept in. This then leads to the issue of ethics, discussed in the next sub-section.

3.15. Ethics

Research ethics, according to Neuman (2003), refer to a set of acceptable norms, regulations, rules and codes which prescribe and govern what is acceptable or unacceptable during a research process. The researcher attempted at all times to act as ethically as possible in conducting this research. The ethical clearance certificate to from CPUT to conducts the research can be found in Appendix A.

3.16. Conclusion

This chapter discussed the typology of industrial buildings and why power stations are good candidates for successful adaptive reuse to preserve industrial architectural heritage. This was followed by a discussion of the unique features of the former Thesen Island power station and why it was chosen as a case study.

The research methodology was explained as qualitative in nature, in the form of a bounded case study limited to the adaptive reuse of the Thesen Island power station to the Turbine

Hotel & Spa (within the broader context of sustainability) in order to preserve its considerable industrial architectural heritage. The research problem was stated that South Africa is losing its industrial heritage, and the research question posed is; Is adaptive reuse a successful strategy to preserve industrial architectural heritage? The various sub-research questions were then formulated.

The delimitations, or scope, of the study were noted, and the target population and sampling process (non-probability judgemental and snowball methods) was outlined. The data collection methods were stated as observation, interviews (with a semi-structured questionnaire), and documentary evidence. The data analysis method, i.e. thematic analysis, was explained. The main themes investigated are adaptive reuse as a strategy for industrial architectural heritage preservation (within the broader context of sustainability). Themes comprise the project's architectural heritage, site, building typology, energy management, and community.

Validity, reliability and trustworthiness were then elaborated on. The important concept of ethics was discussed. The following chapter presents the case study; viz. the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa.

CHAPTER 4: THE CASE STUDY- POWER STATION TO HOTEL

'This complex of buildings and the machinery contained within is without doubt, the gem of Thesen Island' (Hart & Halkett, 1998).

4.1. Introduction

As discussed in Chapters 1 and 2, South Africa is losing its industrial heritage. These chapters noted the reasons why this is happening, yet noting that in terms of South African law, buildings, and thus their concomitant industrial architectural heritage, older than 60 years are protected. However, this does not mean that they cannot be demolished after due process has been followed. The literature review in Chapter 2 provided the theory of adapted reuse as a possible strategy to preserve industrial architectural heritage, and guided the formulation and writing of the case study, as an iterative process, to ensure all the important and relevant aspects were covered in order to answer the research question:

Is adaptive reuse a successful strategy to preserve industrial architectural heritage?

Chapter 3 noted the typology of industrial buildings, and why power stations present as significant buildings that ought to have their industrial architectural heritage preserved. Further, Chapter 3 detailed the research methodology used to examine the adaptive reuse of the Thesen Island power station and why the case study method was deemed appropriate to answer the research question. Thus this case study represents a synthesis of the primary data (interviewees), secondary data (the literature reviewed), and own observations.

This chapter examines and details all the significant events leading up to the day that the Turbine Hotel & Spa opened for business as a heritage ambassador for the entire island's mixed issue redevelopment. As discussed in Chapter 1, the entire island was redeveloped as a precinct, comprising residential, commercial, retail and hospitality components. The last day of operation of the old power station was 26 June 2001, with the site being sold to the current hotel owners in 2007 (Louw, 2013). Rezoning, approvals and building of the site took almost three years, and eventually the Turbine Hotel & Spa hotel commenced trading on 12 August 2010 (Lerm, 2013) as an integral part of the new commercial/retail/hospitality district of the island, i.e. Harbour Town.

This chapter commences with a brief recent history of the Thesen Island redevelopment and why the buildings on the island became obsolete. Although the bulk of this chapter comprises the case study – viz. the adaptive reuse of the old Thesen Island Power Station to the new Turbine Hotel & Spa, this adaptive reuse project cannot be seen in isolation from

the greater Thesen Island mixed-use redevelopment. The island must be seen as an entire precinct, i.e. a whole, and the separate buildings (of which there are many, the power station being just one) cannot be divorced from the greater master plan and industrial architectural heritage paradigm of the island's redevelopment. Further, these buildings are in close proximity on the island, and the architects chose to adapt them and reuse them in a way that was aesthetically (amongst other concerns, i.e. legislation) pleasing as a cohesive whole in the new Harbour Town commercial district of the island.



Figure 4-1: Northern elevation of the Thesen Island power station before adaptive reuse (source: Louw, no date)

The industrial buildings on Thesen Island were of significant industrial architectural heritage as will be evident when the history of the island is discussed. Each component building contributed in a slightly different way to the 100-year history of the island, representing different periods of industry, operations, and way of life on Thesen Island. This case study primarily concerns the adaptive reuse of the power station, a significant landmark and beacon of prosperity for the entire town and surrounding areas for over 100 years; indeed as a heritage ambassador due to its uniqueness (Hart & Halkett, 1998). For the sake of completeness, some of the other industrial buildings in Harbour Town which were also adapted for reuse can be found in Appendix C.

Why the old power station was unique in terms of industrial architectural heritage, and thus worth preserving, was discussed in the previous chapter.



Figure 4-2: Western elevation of the Thesen Island Power Station before reuse (source: Louw, no date)



Figure 4-3: Western elevation of the Thesen Island power station before reuse (source: Louw, no date)



Figure 4-4: Southern elevation of the Thesen Island Power Station before reuse (source: Louw, no date)

The work of CMAI is detailed from inception to completion of the island redevelopment – a journey which took some 10 years. It is a journey that took a dilapidated and toxic industrial enclave to a thriving, sustainable community in the midst of ‘one of the richest biologically and ecologically productive estuaries in South Africa’, the Knysna Lagoon and estuary (Mulder & Aupais, 2008).

The case study details how CMAI adapted the power station for re-use, including their initial preservatory work along with some of the other significant buildings in close proximity, in order to preserve their industrial architectural heritage and conform to the principles of sustainable design. All these buildings formed integral parts of the envisaged new commercial hub of the island, dubbed Harbour Town by CMAI. Such factors discussed include the desire and legal imperative to protect the history and heritage embodied in the buildings; their design approach and principles, the architectural fabric (materials), and construction methods employed. A semi-structured questionnaire was used as the tool to collect the primary data. These questionnaires can be found in Appendix B. The other methods of data collection were observation and documentary evidence.

Interviews with various individuals ranging from the principal architect to overseas tourists, and many personal visits to the island, enabled a comprehensive discussion of the adaptive reuse of the power station as a strategy to preserve industrial architectural heritage within the broader context of the entire Thesen Island development and to determine the success thereof. The critical analysis of the research findings are presented in the next chapter, i.e. Chapter 5.

4.2. Background to Knysna and Thesen Island

4.2.1 Knysna context

According to Mason (2010), Knysna’s estuary has the largest tidal volume in South Africa (measured in relation to volume of water between low and high Spring tides). The physical and geographic characteristics and inherent qualities of the area afford an understanding of the *genius loci* of the region, as well as substantiating certain design decisions made by the architect in the adaptive reuse of this power station.

Knysna is a small, coastal town located in the Garden Route, close to the border of the Western and Eastern Cape, situated on the Knysna lagoon and estuary. Knysna is flanked by forested areas to the north, east and west, and by the Indian Ocean to the south. In the middle of the lagoon are situated two islands, namely Leisure Island and Thesen Island (formerly Paarden Eiland or Horse Island) (Hart & Halkett, 1998).

With a relatively small population of 70 444 (according to Western Cape Government, Provincial Treasury, 2013) and numbers swelling dramatically during vacation periods, Knysna is bisected by a major national road, the N2, and lies between the towns of Sedgefield and Plettenberg Bay (Statistics South Africa, 2001). The N2 is the lifeline to many coastal towns and cities like Knysna and is the spine of The Garden Route (Marker, 2003; Carr & Boom, 2010). The closest airport is in the town of George.

The climate of Knysna is important as it affected many decisions the architects made in their adaptive reuse of the Thesen Island power station, especially sustainability issues. The Garden Route has the second mildest climate in the world, after Hawaii, and the mildest climate in South Africa (Holm, 1996), making Knysna especially popular with European tourists and expatriates (Caveney, 2013). Knysna falls within the 'Garden Route Climatic Zone' (Holm, 1996). Towns in this zone experience high levels of relative humidity (72%), mild to warm summers with comfortable cool evenings and a minimal diurnal temperature shift (Holm, 1996), while winters are cold but not as harsh as areas further inland. In winter temperatures rarely fall below 10°C and in summer they do not often exceed 28°C (Holm, 1996). Knysna receives rainfall throughout all seasons; however a noticeable peak is experienced during the spring months (Holm, 1996).

The lifeblood of the town is tourism. Knysna is widely regarded as a tourist and retirement town (Caveney, 2013), and as a result the town is subjected to, and endures periods of sporadic hyper activity and periods of very low activity, as opposed to sustained, constant, year round economic activity. The geographical location of the town of Knysna, as well its local populace and surrounding communities, the climate, and the reliance on tourism to the area affected the design decisions taken by the architects in their redevelopment of Thesen Island, which included the adaptive reuse of many of the extant buildings.

4.2.2 *Thesen family history*

The Thesen family arrived from Norway in 1870, when the population of Knysna was 200 with 25 settler dwellings (Caveney, 2014). The Thesen family expanded into ship-building, coastal trade, oyster farming, whaling, gold prospecting, mining, railway construction, timber and saw-milling and the shipping of timber (Caverney, 2014; Ancestry.com, no date).

According to Hart and Halkett (1998), true industrialisation of the island started circa 1920 with the Thesen & Co sawmill operations on Thesen Island. The completion of the 'Sawtooth' building (the adapted reuse of this building can be found in Appendix C), which housed all hardwood milling operations, was then supplemented with a small power station building, built in 1939, which powered all operations on the island using waste from the

milling operations. This became the Thesen Island power station. In the photo below, the power station is clearly visible in the centre of the image behind the Sawtooth building.

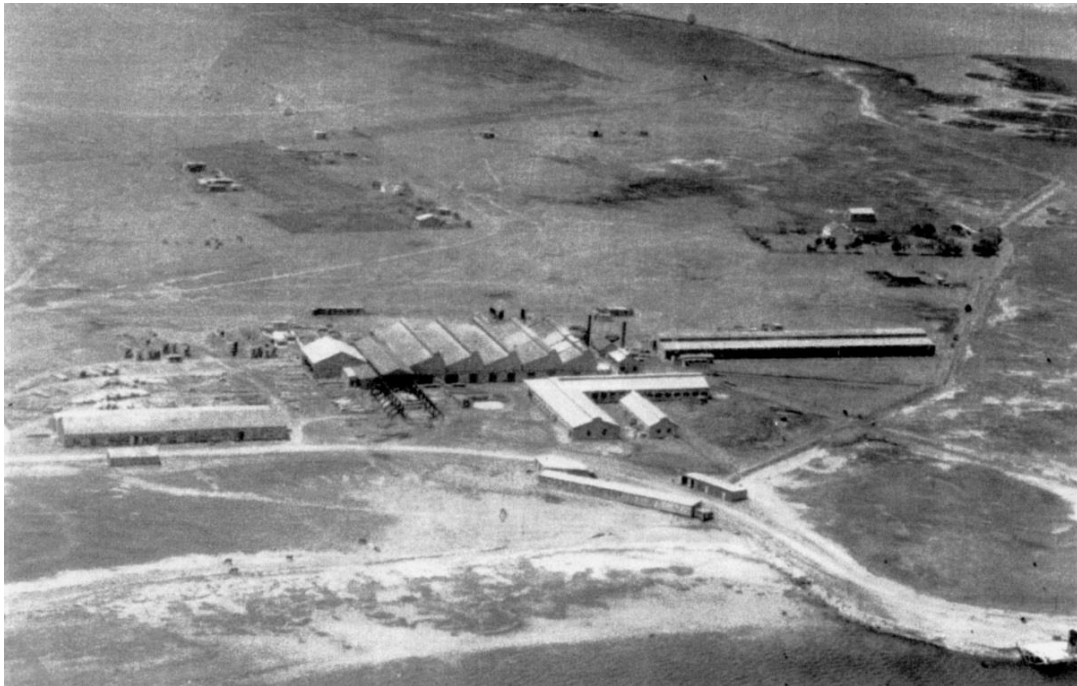


Figure 4-5 Aerial photograph of Thesen Island 1933, showing the Sawtooth building and the power station along with other ancillary mill structures (source: Hart & Halkett, 1998)

Thesen Island was used for ship building, timber milling and treatment, and power generation for over 100 years. The Thesen family had been responsible for the substantial development of Knysna and the surrounding towns through trade, industry and politics. The growth and prosperity of Knysna was almost entirely due to the Thesen family's activities in terms of providing employment and the concomitant peripheral trade and services development (Hart & Halkett, 1998). In 1974, the entire island was purchased by the Barlows Group of companies (Hart & Halkett, 1998) who continued timber and milling operations until 1998 (Hart & Halkett, 1998).

However, the decision was made during the 1980s to close the various plants and to stop all milling operations (Hart & Halkett, 1998) as the business was no longer financially viable. The industrial enclave began to decay and the buildings, along with the equipment contained, fell into disrepair and dereliction. Machinery and waste dumps were neglected and left unattended on the island, generating an 'industrial wasteland', and posing a massive eyesore and a multitude of health risks for residents and the immediate environment alike (Hart & Halkett, 1998).



Figure 4-6: Aerial photograph 1977 showing the extent of expansion of the Thesen island milling operations (source: Hart & Halkett, 1998)

4.3. Obsolescence of Thesen Island buildings

The reasons why buildings become obsolete were discussed in the literature review – Chapter 2. Using Langston *et al.*'s (2007) taxonomy of obsolescence, it can be noted that the old Thesen Island power station, along with all the other industrial buildings on the island, had become obsolete for the following reasons:

- Physical obsolescence: Natural decay due to aging of the building, as shipping and power generation had been in existence for nearly 100 years.
- Economic obsolescence: The buildings did not meet Barlows' (the last owners of the power station) financial objectives and it was uneconomical to continue to generate power from the wood-chip fired power station.

- Functional obsolescence: The power station was functionally obsolete – a power station was no longer needed on the island as Eskom was supplying power to the town.
- Technological obsolescence: Environmental concerns and the need to have a more energy efficient building in line with the principles of sustainable development rendered the building obsolete. Even if a power station was still needed, changes in technology had rendered the wood-fired boiler obsolete.
- Social obsolescence: Ship building, timber processing and power generation were no longer practised at Thesen Island as there was no demand for it.
- Legal obsolescence: The building was no longer considered safe in terms of environmental controls and the site, which was polluted due to chemical leachment, needed to be rehabilitated. However, in terms of the prevailing legislation (The National Monuments Act) buildings over 50 years were protected.

4.4. Appointment of CMAI

The architects, Chris Mulder & Associates (CMAI), were tasked with investigating development possibilities for Thesen Island (Mulder & Aupais, 2008; Urban Futures, 2006). CMAI were now were charged with generating a solution for the 90ha island that would preserve its industrial architectural heritage and was both economically and environmentally sustainable (Mulder & Aupais, 2008; Caverney, 2013; Louw, 2013). In 1991 Dr Chris Mulder of CMAI proposed a mixed-use redevelopment of the island, having established the TIDC (Thesen Island Development Company) and having bought the island from Barloworld (Mulder & Aupais, 2008). The power station building was then sold privately to Dendre Lerm, a South African hotelier (Louw, 2013).

As noted in Chapter 2, rapid global urbanisation has placed pressure on the natural environment to accommodate human needs for housing, food, work, and recreation, but in modern times this must be sustainable and environment-friendly. Furthermore, many of the building were protected in terms of the then National Monuments Act (now replaced by the National Heritage Resources Act of 1999, as discussed in Chapter 2). These developers set out preserve the maritime and shipping history and heritage, and adapt for reuse the many extant buildings; one of which was the power station.

The literature review in Chapter 2 noted the Australian Burra Charter is considered 'best practise' (ICOMOS SA, 2011) for guidance on the adaptive reuse of heritage buildings, and it was to this document that CMAI deferred in developing their mixed-use proposals for the island. According to Louw (2013), CMAI were pioneers of 'green' and sustainable building long before the establishment of the GBCSA in 2007. The GBCSA, and the Brundtland

Report (1987) were discussed in Chapter 2. Further, CMAI's proposals for the island were fully 10 years before the promulgation of The Municipals Systems Act (2000). The Municipals Systems Act (2000), discussed in Chapter 2, now requires municipalities to produce IDPs – Integrated Development Plans - which address the planning inefficiencies of the past, and the focus is now more on the social and economic dimensions of development.

4.5. Heritage Impact Assessment

CMAI then commissioned Hart and Halkett, of the Department of Archaeology, University of Cape Town to assess and report on the island in terms of history, heritage, legislation, archaeology, geography and context, palaeontology, and the built structures on the island (Hart & Halkett, 1998). CMAI's design decisions for the island's redevelopment were based on this important report. In this Heritage Impact Assessment (HIA) Hart and Halkett (1998) identified and described all the structures on the island, assessed their heritage potential, their current heritage status, and any interesting characteristics and qualities of these structures. Each individual structure was carefully examined and then commented on in terms of its importance, significance, and value.

Suggestions were then made as to whether the structure should be kept, or had to be kept, depending on the structure's heritage status, in line with South African legislation and the requirements of the then National Monuments Act of 1969 (now replaced by the National Heritage Resources Act, No. 25 of 1999). Hart and Halkett (1998) pleaded the case for various industrial buildings of historical architectural significance to be kept, and identified the former Thesen Island Power Station as 'the gem of Thesen Island', deeming it as one of the most preservation worthy of all the industrial structures on the island: stating,

'... in the case of the power station, demolition and scrapping of this structure with the unique machinery within cannot be adequately mitigated as this represents an excellent education and tourism opportunity'.

Here Hart and Halkett (1988) hint at a typology and this is later discussed in the typological debate section of this chapter.

It should be noted that at the time when the power station was built, it was a totally utilitarian structure, built purely for function; i.e. to house the machinery and generate maximum power using factory waste as its fuel source. It was not originally built according to any discernable architectural style or influence. As Louw (2015) points out, in terms of structures built for a specific engineering or industrial purpose, many people (including developers and architects) do not see the heritage value or the potential for redevelopment or adaptive reuse. While

many older buildings are being more appreciated and are protected by heritage legislation in most countries, industrial buildings are generally discounted of having any inherent value or potential for reuse. This was discussed in Chapter 1. It was only decades later that the unique properties of the building became apparent; it was a micro facility compared to most power stations, it was fired by waste wood chips from the lumber processing plant, and it was situated on an island. Further, all the original machinery was intact.

4.6. Significance of extant buildings on Thesen Island

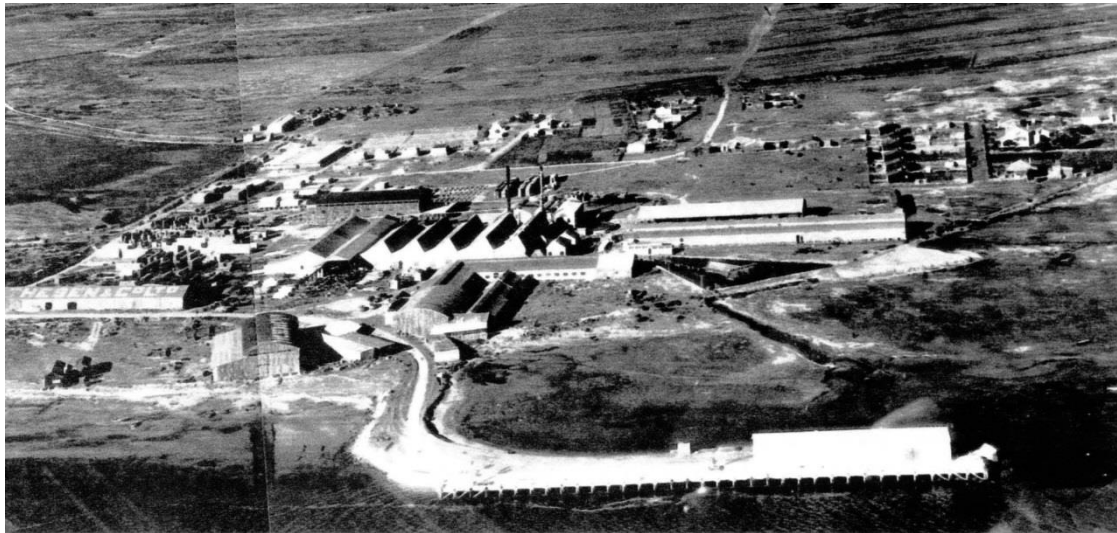


Figure 4-7: Aerial photograph of Thesen Island 1947 (source: Hart & Halkett, 1998)

In this 1947 aerial photograph of Thesen Island most of the buildings were already over 50 years old, comprising structures of brick, wood and iron, with wooden frame windows and large masonry hearths and chimneys. Hart and Halkett (1998) point out that in recent history in South Africa, many buildings these have been thoughtlessly demolished, and subsequently examples of industrial architectural heritage are becoming increasingly rare, and thus industrial architectural heritage is being lost.

The unique aspects of this project comprised the building typology (the only wood-fired power station in South Africa), scale, location, heritage and the degree to which the original structure and its contents were deemed significant in terms of heritage conservation, respected and retained by the owners, developers and project architect. Unlike most power station facilities, which are huge structures, such as London's Tate Modern by architects Herzog and de Meuron (as cited by Glancey, 2006) and cover vast tracts of land, the Thesen Island power station by comparison was a 'micro' scale facility, covering approximately 2000m² (Louw, 2012). However, despite the size of the power station, this significant structure had a remarkable impact, in terms of socioeconomic development and industrialisation, on the town of Knysna and the surrounding areas (Hart & Halkett, 1998).

The main portion of the building was built in the early 1920s, and factory workers added portions as needed for many years after that; thus the building had grown organically, according to needs (Louw, 2016). Power stations, generally large and imposing structures on public view, possess significant architectural merit; 'cathedrals of power' in very sense of the word. Examples in this study are Bankside Power station designed by Sir Giles Gilbert Scott acknowledged as 'Scott's finest statement about an architecture of power' (Stamp & Harte, 1979), and the much smaller Wapping power station, built in the traditional Victorian architectural style of the era. One could also point to the Art-Deco style of the Seaholm Power Plant complex in Austin, Texas, and the Kelenföld Power Plant in Budapest, Hungary – now both decommissioned. As Ngay (2013) notes, the grandeur of these industrial buildings reflects the optimism of the late 19th and early 20th century.

However, the old power station and the surrounding industrial buildings on Thesen Island had no such architectural glamour, and could today be viewed as examples of the 'machine aesthetic' or functionalism. Functionalism in architecture, a movement during the late 19th century and early 20th century, was a product of Louis Henri Sullivan who coined the term 'form [ever] follows function', eschewing decorative elements as superfluous in modern buildings.

In the machine aesthetic, the machine was valued for its service, and its aesthetic promoted by those who saw beauty in the machine -- a beauty in appearance and function (Lisle, no date). Indeed it was Le Corbusier (1923, 1996) who said houses are 'machines for living in'. As Louw (2015) points out, well known late 20th century architects such as Piano, Foster, Rogers, Grimshaw and Calvatrado have also used the machine aesthetic in their work, with a number of these being adaptive reuse projects, with controversial results. One could posit that the old Thesen Island power station was merely a 'machine' for generating power, although ironically the very machinery that it housed would prove decades later to be of such historical and heritage importance.

The architects, guided by Hart and Halkett's (1989) HIA, wanted to retain as much as possible of the original power station building and its machinery to preserve its industrial architectural heritage for the residents of the town and for surrounding communities, for whom the power station had considerable significance; thus a committed architectural team. For generations the power station had been a beacon of the socioeconomic development of the town. There was much embodied industrial architectural history and heritage in all the other extant buildings on the island; all associated with the various industries of the Thesen family spanning a century with successive generations of workers employed there; particularly in the maritime and timber operations. They also wanted to attract tourists as

these tourists boost Knysna's economy (Caverney, 2013). Legally, the structure was protected (in terms of the then National Monuments Act) as it was more than 50 years old.

4.7. Challenges presented by the island affecting proposed adaptive reuse of the industrial buildings

This section details the challenges CMAI had to overcome in their adaptive reuse project for the Thesen Island power station and the other buildings clustered together on the island in their quest to preserve industrial architectural heritage. This cluster of industrial buildings was set to become Harbour Town, the new commercial and retail district of the island.

4.7.1 Pollution and other environmental issues

The literature review in Chapter 2 noted society's increased agitation for cleaner and 'green' environments, as well as sustainability. As the IAEA (2011) explains, many disused industrial sites have historical contamination problems from decades of poorly controlled industrial activities. As noted in the literature review, South Africa's National Environmental Management Act (1998), in the preamble, specifically uses the term 'sustainable development', and states that,

'... sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations'

Barloworld, in 1988, decided that the lumber and timber milling industry could not survive indefinitely on the island in the midst of a sensitive lagoon ecology. The timber processing operations were having an adverse environmental impact on this ecologically sensitive and picturesque area (Hart & Halkett, 1998). Although the power station continued to operate until 2001, there was increased pressure from the residents, tourists and the surrounding communities regarding airborne emissions from the power station and the timber trucks passing through the town, as well as the noise pollution this caused. Mulder and Aupais (2008) explain that 'air pollution and soil contamination caused by the antiquated steam-driven boilers [in the power station] went against the contemporary movement for a cleaner environment'. The literature review noted the current emphasis on environmental problems world-wide and the need to sustain natural resources (Balderstone, 2012; Cantell, 2005; Carroon, 2010).

Mason (2010:32) notes that, 'tall stacks from their wood factory vomited sooty smoke, and the creosote and arsenic used to treat the wood had leached into the soil over a long period'. In addition, 'tens of thousands of cubic metres of wood waste had been [haphazardly]

dumped all over the island' and most notably in the pole drying yards, there were toxic pools of creosote leachate and copper-chrome-arsenic (CCA) (Mulder & Aupais, 2008). Another source of concern was the potential existence of unseen hazards and waste buried beneath the surface. In the years since the island had closed for business, the abandoned derelict buildings, machinery and waste dumps had increasingly turned into an eyesore and a health hazard (Louw, 2013).

It is interesting to note that as only workers accessed the island, the wider community was not aware of the extent of the extensive ground pollution on the island (Caverney, 2013; Louw, 2013). However, the pollution from the power house's chimneys was clearly visible to the whole of the Knysna. CMAI soon learnt that there was no specific environmental management plan for the lagoon and estuary, and neither was there any extant data concerning the impact of the pollution on Thesen Island for the town or the lagoon.

4.7.2 Traffic pollution impacting on tourism

The pollution problem, although most pronounced on Thesen Island itself, was not limited to the island. The town of Knysna and its residents and holidays makers were subjected to air pollution, visual pollution and noise pollution (as well as traffic congestion) from the lumber trucks rolling through the town to gain access to the island (Hart & Halkett, 1998; Mulder & Aupais, 2008; Caverney, 2013). These were serious threats to one of South Africa's favourite tourist towns.

4.7.3 Socio-economic issues

A socioeconomic issue arose with the decommissioning of the Thesen Company as the factory was at the time the single largest employer in the town of Knysna and in the region (Mulder & Aupais, 2008). The island and operations there were intimately linked to the town and its residents, and even the residents of neighbouring towns such as Plettenberg Bay. Circa 1990, it is estimated that more than 800 people worked at the mill each day (Mulder & Aupais, 2008), presenting a critical challenge for the developers to mitigate.

The Barlows Group had continued softwood, plywood and milling operations until 1998 and the power station continued to operate until 2001 (Hart & Halkett, 1998; Caverney, 2013; Louw 2013). Further, these industries were no longer economical and tourism had become the mainstay of the town. In terms of tourism, Caverney (2013) notes,

'The lagoon is our biggest drawcard; people come here to see the lagoon. The forests are next, and after that the holiday resort [town of Knysna]'.

Times had changed, technology had changed, and priorities had changed, as discussed in Chapter 2 regarding obsolescence of industrial buildings.

4.7.4 *Legal issues*

As the power station on Thesen Island was over 50 years old, it was protected in terms of the then National Monuments Council Act. However, the machinery was not protected.

4.7.5 *Cultural and historical significance*

As Thesen Island had been used for ship building, timber logging treatment, and power generation for over 100 years, CMAI realised that there was significant industrial architectural heritage and history in the extant buildings, and guided by Hart and Halkett's 1989 report, they sought to preserve this for future generations. The Thesen family had been responsible for the substantial development in Knysna through trade and industry, touching the lives of the surrounding community in terms of providing employment and the concomitant peripheral trade and services development in the town and surrounding areas.

The power station particularly, as a socioeconomic and cultural beacon on the landscape, was unique as it comprised the only wood-fired boiler in South Africa. It was also unique in scale when compared to usual coal-fired stations which are monolithic in structure. Further, the new owner of the hotel-to-be wanted to retain as much as possible of the original building and wanted its machinery kept intact. Legally, the structure was protected (in terms of the then National Monuments Act, 1969) as it was older than 50 years. There was much embodied history and industrial architectural heritage in the power station all the other extant industrial buildings which were in close proximity to the power station.

4.7.6 *Functional typology of the building*

As discussed, the new owner of the power station wanted to keep as much of the original building and its machinery intact. As the power station was more than 50 years old it was protected (National Monuments Act, 1969). However, it sat on prime waterfront property that was valuable to the developers. This issue is discussed further in a later section of this chapter.

4.7.7 *Topography of the island and bulk services*

In addition to environmental and socioeconomic issues, the island also had other worrying factors to consider such as its low-lying topography, being an average of only 1.3 metres above sea level (Mulder & Aupais, 2008; Hart & Halkett, 1998), global warming and concomitant rising sea levels were already a factor in the late 1990s. Further, there were no

bulk services such as sewers etc., which had also contributed to the environmental problems.

4.7.8 Financial backing

The redevelopment of the 90ha island, as well as ensuring that it remained economically sustainable into the future, would require substantial capital. 'Financial institutions were extremely wary of backing this project because of previous disasters that had plagued marinas and waterfront developments in South Africa' (Mulder & Aupais, 2008). However, if the project was to proceed, finance had to be raised.

4.7.9 Creating confidence in the development

Another area of concern was the 'issue of confidence' (Mulder & Aupais, 2008). As these authors point out, waterfront developments and marinas are almost always 'beset by environmental and monetary problems, and [negative] public sentiment' (Mulder & Aupais, 2008). As Fisher (2011) notes:

'One would think any project that ameliorated the consequences of such devastation would be welcomed. But the public reaction was not sympathetic, and of chief concern was the endemic seahorse. And the heritage sentiments around the relics of a dinosaur industrial process ran strong'.

CMAI needed to ensure that all stakeholders had full confidence in their redevelopment plans if it was to be successful.

4.7.10 Precedents

An important challenge was that CMAI had no local precedents (at that time) to refer to for redevelopment guidance, as 'there were no islands in South Africa that lent themselves to residential or resort development, much less an island in the protected waters of an estuary' (Mulder & Aupais, 2008). Specifically regarding the preservation of the industrial architectural heritage of the power station (and other buildings in close proximity), Louw (2013) states that the project architects used the Bankside Power Station, UK, (adapted for reuse as the Tate Modern Museum), the Wapping power station in the UK (adapted for reuse as a restaurant) and the Sydney Power House, Australia (adapted for reuse as the Museum of Applied Arts & Sciences) as precedents. These precedents were discussed in Chapter 2 –The Literature Review. The adapted reuse project of the Thesen Island power station as a strategy to preserve industrial architectural heritage is critically evaluated against these and other power station precedents in Chapter 5. How CMAI responded to

these challenges in also discussed in the following chapter – viz. Chapter 5 – Critical Analysis.

4.8. CMAI's Concept Design Number 26

Gradually CMAI developed concept after concept, with each being tested, evaluated and critiqued from both a practical and construction point of view, as well as in terms of marketing and finance (Urban Futures, 2006; Mulder & Aupais, 2008). As Mulder (2008, as cited by Ndubisi, 2014) states,

'The ultimate challenge was to create a viable plan for the 92 hectare factory site (the other 10 hectares, largely salt marsh was government land); one that would be environmentally acceptable and economically sustainable.'

According to Mulder (as cited by Urban Futures, 2006), the single largest component of the new Thesen Islands development was the residential component. Eventually, it was decided that the development of the island created an opportunity for prime mixed use waterfront living. This mixed-use paradigm evolved to include a residential component with 489 individual homes and 56 apartments (Dry Mill Apartments), and a commercial/retail component, called 'Harbour Town' (Urban Futures, 2007).

The island covers an area of 90ha, consisting of '19 man-made islands' which are all linked via a series and network of '21 arched bridges and surrounded by 25ha of tidal waterways' (Thesen Island, no date; Urban Futures, 2006). Roads with a combined length of 13 km were laid – constructed to allow water to run into swales and ditches, thus providing a form of natural irrigation for the landscaped parts of the islands (Urban Futures, 2006) – a simple but effective water saving strategy.

The commercial component, i.e. Harbour Town, included the old power station and other buildings of architectural heritage importance, also slated for adaptive reuse. The adaptive reuse of the old power station into the Turbine Hotel & Spa cannot be viewed in isolation as it comprises an integral component of Harbour Town, and had to sit alongside the surrounding industrial buildings, many of which were also adapted for reuse to preserve their significant industrial architectural heritage. The other buildings adapted for reuse are discussed in Appendix C.

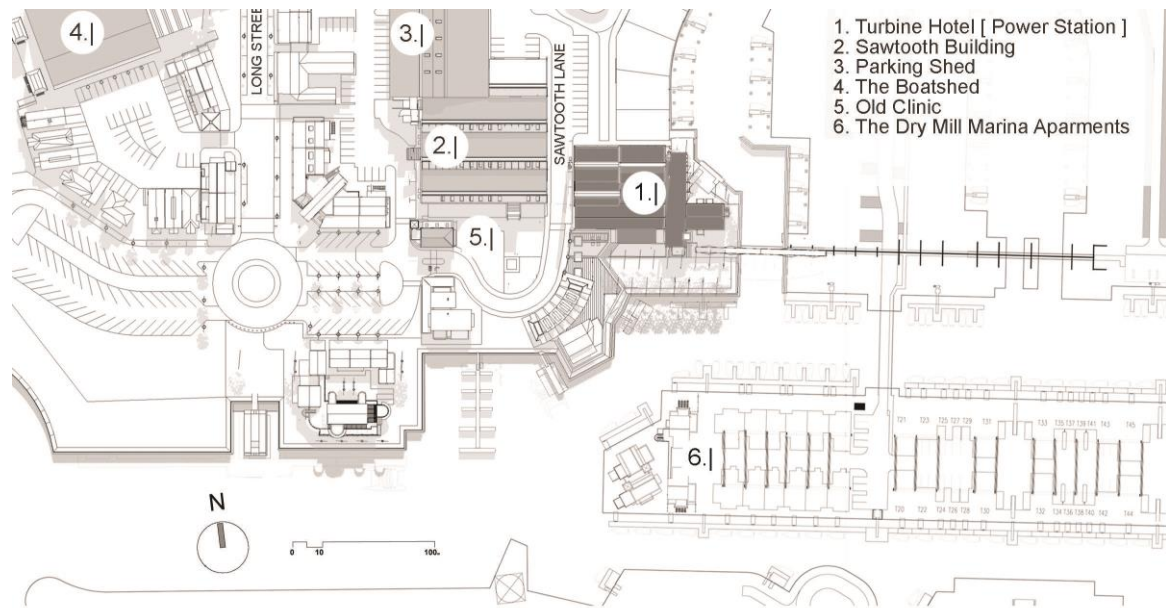
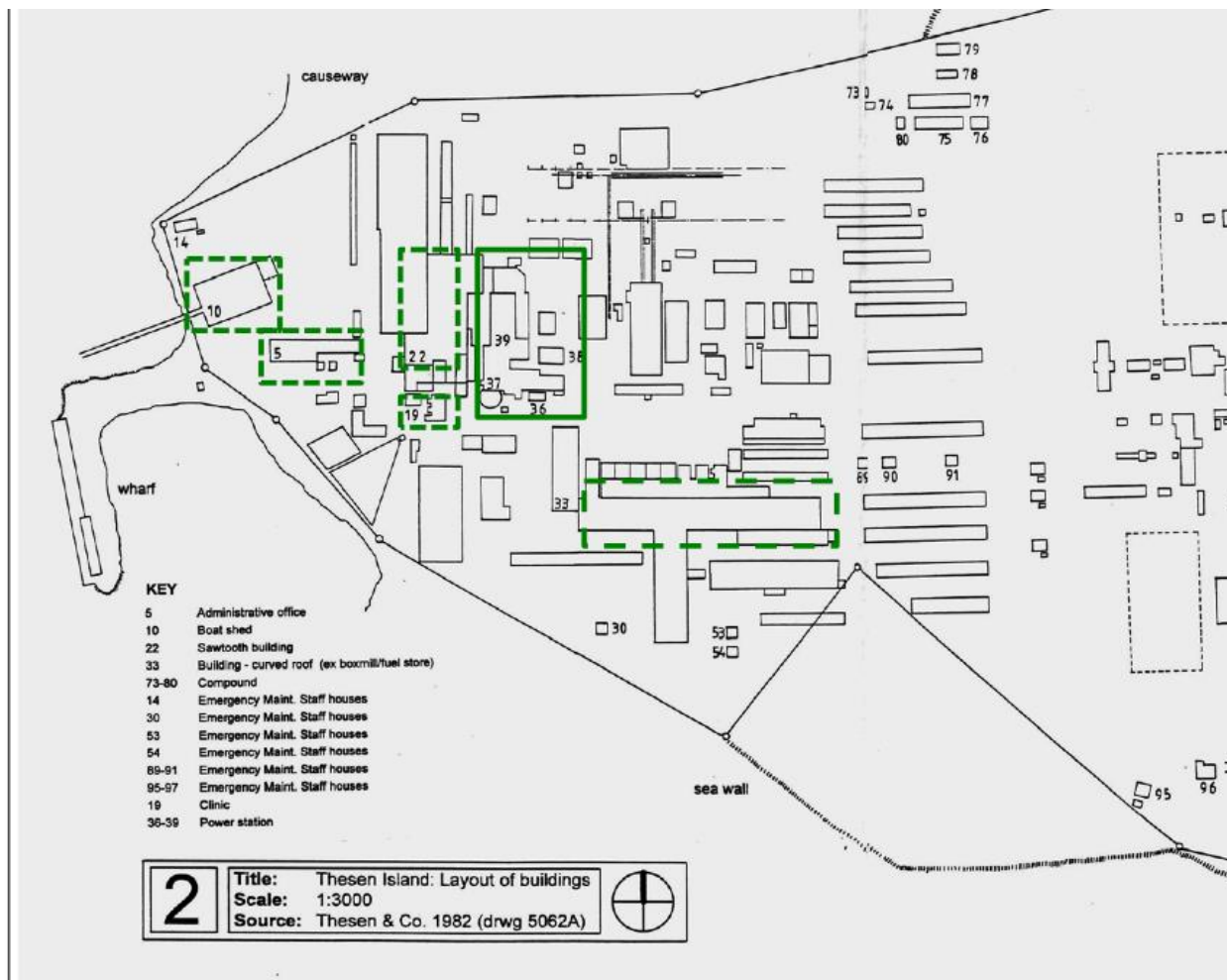


Figure 4-8: Locality plan of Harbour Town showing the buildings (including the Turbine Hotel & Spa) (source: CMAI, 2010)

The figure above shows the section of Thesen Island due to become Harbour Town (the commercial and retail district of the island) where the important buildings with industrial architectural heritage were located. The figure overleaf shows which were wholly retained and which were partially retained. In an interview regarding a mixed-use development, Louw (2013) states that this has both positive and negative considerations – it encourages exclusivity and discourages contact with the mainland of Knysna. However he agrees that mixed-use was the correct approach, as a central motive was to preserve the industrial architectural heritage of many extant buildings (including the power station) in Harbour Town. Further motivation for mixed use was in terms financial viability and the concomitant socioeconomic benefits for the town of Knysna and the surrounding communities – these are elucidated in Chapter 5 – the critical analysis.



- Wholly Retained
 - Partially retained
- List of retained and demolished structures
 - 5 – admin offices – partially retained
 - 10 – the second boat shed was retained after the initial burnt down
 - 22 – sawtooth building southern wing retained for reuse
 - 36 – 39 – the power station building and annexes
 - 19 – the old island clinic
 - Adjacent to building 33 is the dry mill which was retained

Figure 4-9: Figure showing which buildings were retained and those partially retained in Harbour Town

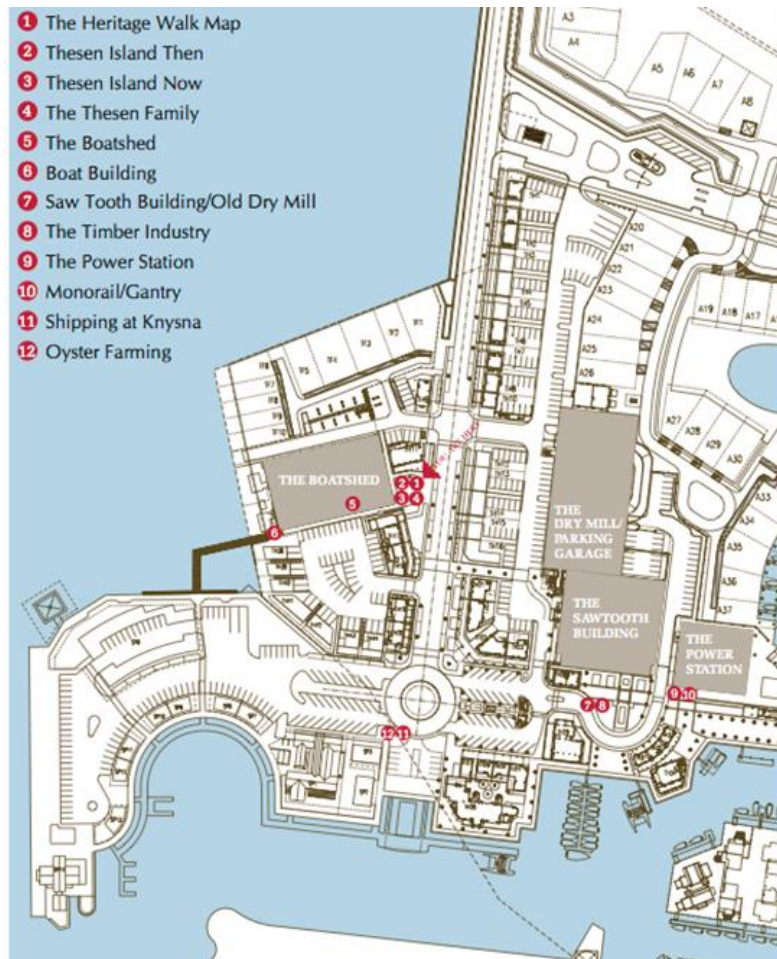


Figure 4 8: A detailed map of Harbour Town as shown on the Thesen Island heritage plaque (CMAI, 2010)

4.9. CMAI's architectural paradigm

4.9.1 Adaptive reuse

Louw (2013) states that he understands adaptive reuse as 'taking any existing structure, preserving the parts that can be reused, and adapting [them] for a new use to continue its life span'. Caverney (2013) understands the term to mean 'to adapt a building for a new use and to be sustainable in its new application'. However, Louw (2013) points out that in his opinion it also means only 'taking whatever elements are useful, and which make sense both structurally, economically and aesthetically' as 'its not always possible to reclaim the entire [structure]'. It is not always possible to preserve all structures and the decision as to what should be preserved needs to be a calculated balance between economics and the desire to preserve industrial architectural heritage and social history.

Louw (2013) further notes that the term means 'meeting the needs of the present generation without compromising future generations needs' – an important design consideration as a

section later in the chapter regarding how the hotel was planned for further adaptation and reuse in the future is detailed. As noted, Louw (2013) states that he referred to the Brundtland Commission (1987) for guidance. Thus it is clear that the design team had to be discerning and calculating in deciding what to keep. That fact that so much of the original power station does remain *in situ* is testament to the developers and owner of the hotel's desire to preserve industrial architectural heritage.

4.9.2 Ecological design

As discussed in the previous chapters, due to environmental concerns and the need for sustainability, all buildings today must conform as far as possible to the principles of sustainable design, and go further to embrace new thinking in terms of resilience and regeneration (cf Chapter 2, section 2.2.3). However, in a building adapted for reuse, they pose particular challenges as measures to limit resource consumption have to be retro-fitted.

Louw (2013) explains that his ecological design principles are based on the Brundtland Commission of 1987 which defined the meaning of the term 'sustainable' and noted the three principles of sustainable development as the environment, the economy, and society (Louw, 2013).

'... there are numerous international examples of old power stations and industrial buildings that have been adapted for reuse, but none that are particularly aimed at being ecologically designed' (Louw, 2008).

Further, Louw (2013) notes that he deferred to the Burra Charter's practice notes (1979) for the managing and preserving heritage. Whereas the Brundtland Commission's (1987) concept of sustainability supports strong economic and social development and underlines the importance of protecting the natural resource base and the environment, it offers no guidance on how to do this. Hence the importance of the Burra Charter (2013) in delivering specific guidance for the preservation and management of heritage. (This was discussed in Chapter 2 – The Literature Review).

4.9.3 New Urbanism (traditional neighbourhood design)



Figure 4-10: Master plan of the new Thesen Islands development (source: Urban Futures, 2006)

The above image illustrates the new canals (blue), Harbour Town (beige), planted, landscaped or 'green areas' (green), access roads (tan) and the residential stands (yellow). The orange section is Harbour Town on the left at the end of the access causeway. While New Urbanism does not have anything to do with adaptive reuse *per se*, the concept of New Urbanism is important as the residential component was designed first (due to financial issues as mentioned). This set the standard for the adaptive reuse of the industrial buildings in Harbour Town (including the old power station). The entire precinct of Thesen Island had to harmonise aesthetically and visually, yet be practical in terms of costs and other constraints, while serving the needs of the future island community – i.e. residents, tourists, workers etc. According to Louw (2013), New Urbanism, or 'traditional neighbourhood design' creates a 'neighbourhood where people can walk to work, walk to shops [and] walk to visit one another'. This was CMAI's vision for Thesen Islands. In September 2000 all the major civil works commenced, and were completed by 2005 (Mulder & Aupais, 2008).

The residential component was completed first in order to raise the necessary finance for the Harbour Town development. The residential component was based on Seaside, Florida USA. According to Davis (2011), the founder of Seaside, it was the first development designed on the principles of New Urbanism, and began in the late 1970s, with building

commencing in the early 1980s (Davis, 2011). According to Borson (no date), Seaside has several elements that set the vernacular; picket fences, porches, roof pitches, exterior cladding etc. The similarities are clearly evident in the photographs below.



Figure 4-11: Image showing typical Seaside residences (source: DPZ Architects, 1980)



Figure 4-12: A typical Thesen Islands residence in the 'colonial maritime style' (source: researchers own, 2013)

This 'colonial maritime style', a term which was used to promote the development, is meant to suggest a link to the history of Thesen Island, reflecting its historical maritime and timber connections, a theme carried through to the interior of the new hotel.

Adapting industrial buildings in Harbour Town, which sat right in the middle of the residential component, was never going to be easy in terms of architectural aesthetic. However, one can posit that it is the juxtaposition of the industrial buildings with all their industrial features and the surrounding residential component, rather than a harmonisation of aesthetics, that contributes so startlingly to the interesting landscape afforded the visitor and resident. Thus a new architecture was born; industrial buildings celebrated for their industrial features and not claiming to be any other than what they had already stood for, amidst a residential component of a very specific vernacular, yet both paying homage to the significant timber and maritime history of the island.

4.10. The typological debate

4.10.1 Introduction

The adaptive reuse of the power station, comprising industrial piping, existing buildings, machinery and tall stacks, which had to harmonise with the other adapted buildings in Harbour Town and posed a significant challenge for CMAI. Here, the 'typological debate' is explored. This pertains to the systematic evaluation of various potential programmes or typologies and the elimination of non-feasible typologies and programmes. As Barker (2012:131) notes, 'the importance of typology lies in its relationship to the history of architecture and architectural ideas, and to the human aspect of association providing a sense of continuity, connectedness or rootedness.'

Asiliskender (2016) notes that the industrial heritage buildings have resilient shells, as they were made of hard wearing materials to house their industrial functions and were built to last as long as possible, yet they are also flexible enough to adapt to almost any new purpose. In his opinion, however, the presence of original machinery and equipment as well as their design reduces the possibilities of adaptive re-use to a museum, where the buildings can retain the social, economic, historic and public aspects of cultural heritage as documents. But is a museum the only option?

The design team proposed several options before settling on that of a hotel and spa. It is important also, to note that 'failed' or 'non-feasible' typologies for the dilapidated power station are also discussed. This process of new typology selection and implementation is a common challenge for architects in adaptive reuse projects, especially in cases when a new

typology is not dictated from the start by an external party or cannot be easily deduced from the region's needs, character, and quality.

The power station was built in 1939/1940, and the last day of operation was 26 June 2001, when the site was sold by TIDC to the current hotel owner and operators, Geoff Engel and Dendre Lerm, in September 2007 of Next Leisure Group. In the interview with Lerm (2013), he explained that he first heard about the development by reading it in *Business Day* in 2007, and then paid R6.5 m to buy it from TDIC. He described the old power station as,

'... breath-taking in its industrial mystique' (Leading Architecture, 2011)

The importance of people who have a vision and can see through the dust, rubble and rust should not be lost. Lerm (2013) further noted that the old power station was the 'only power station in the world that we know of that has been turned into a hotel. It is also a heritage site' (2013). 'We were immediately drawn to the site's historical charm and firmly believed others would respond to this too', he noted. His brief to the architects was to save as much of the building and machinery as possible (2013), and to 'strive for both functionality and flow' (as cited by Bisseker, 2011).

As Louw (2008) explains,

'The building consists of cavernous spaces that house big dilapidated turbines, pipes, boilers, gauges and levers. It evokes a feeling of power and purpose, but it has a lived-in grace and a sense of history that few other buildings [on the island] possess'.

4.10.2 Various typologies for the building

The central problem remained of the eventual typology of the building after some initial preservatory work to preserve its industrial architectural heritage. Various typologies for the building were explored; and some uses considered were to adapt it as either a science museum, an eco-centre science education centre, or an art gallery (Louw, 2013).

Although Hart and Halkett (1998) pleaded for the power station to be adapted for reuse as a museum (as is the case with most adapted power stations), access for the public would have been difficult as Thesen Island was now privately owned. Further, due to its location, viz. in the small town of Knysna which was not near a large metropolitan area, the developers were unsure whether they would get the footfall needed to make a museum financially viable. In addition, the small island could not accommodate parking for school buses or coaches.

A further complication was that it sat amidst other industrial buildings in what was slated to become Harbour Town, the new commercial/retail part of the island. Krause (2014) notes that internationally, waterfront homes are worth more than double the value of homes overall. In addition, it sat on prime waterfront land and would be flanked on either side by the residential components of the island.

As Fisher (2011) states, 'the first call for any difficult residue heritage is a museum, in this case a science one'. This was an obvious choice given the mechanical nature of the building and all the remaining equipment. However, one could argue that a museum too is a relic of the past, and in this era of the internet connectivity and satellite TV, plus the magic of 3D animation, what adult, let alone child, is going to be excited by the prospect of staring at dead machinery? (Fisher, 2011). Caverney (2013), as Chairman of the Knysna Historical Society, also states that a museum was the society's preferred option.

4.10.3 Hybrid typology

However, the typologies of a museum or art gallery were eschewed due to *inter alia* potential transport logistics, resident objections to crowds, and uneconomical viability. A hotel was considered the best financially viable option – one that could recreate the past in an imaginative way and act as a 'living museum'. Louw (2013) was emphatic in explaining that the adaptive reuse of the power station was not limited to one typology, but rather presented itself as a challenge to incorporate a hybrid typology. 'It was a unique project since there aren't that many derelict industrial structures in the country that get adapted for reuse, especially not power stations' notes Louw (2013). '[What is now] the swimming pool structure was a structure originally designed as an underwater observatory; again cost-wise it just became not viable, notes Louw (2013).

4.11. Phase 1: Interim period of preservatory work

As Louw (as cited by Projects, 2011) states, 'the full scope of work was from concept stage through to final completion, although we've been working on the building on-and-off for 11 years'. Some initial preservation work was done by CMAI when they began the site works for Thesen Island in 2001. 'We were employed by the developers of Thesen Island to do a first round of refurbishment prior to the building being sold to a private developer in 2007' (Louw, 2014). This involved extensive restoration work to the shell and the chimneys, as is evident from the figures below. This started the second phase, which was the design and construction of the Turbine Hotel (Louw, 2011, as cited by Projects, 2011).



Figure 4-13: The Thesen Island power station before and after initial preservatory works (source: Louw, no date)

4.12. Phase 2: Adaptive reuse

With the master redevelopment plan in place, and finance organised due to the sale of the residential component, CMAI could now turn their attention to what Hart and Halkett (1998) described as the most significant building on Thesen Island, i.e. the old power station. This section investigates the journey of the adaptive reuse of this abandoned and obsolete building in order to preserve its industrial architectural heritage as part of the wider Thesen Island redevelopment master plan. Louw (2013) explains that there were quite a few industrial structures on the island, and although CMAI would have liked to have kept 90%,

‘... in terms of liabilities and clients and developers, we had to narrow the scope and once that was done we also had to decide what aspects of those structures were viable to keep’.

According to Louw (2014), the old power station was chosen for redevelopment due to its historic appeal, its central location on Thesen Islands, and its ‘immense potential for redevelopment’. However, the old power station was located in a site that comprised expensive waterfront access as it was immediately adjacent the residential component of the islands and took up valuable sea frontage. It was also in the middle of the Harbour Town, the area slated for commercial and retail redevelopment.

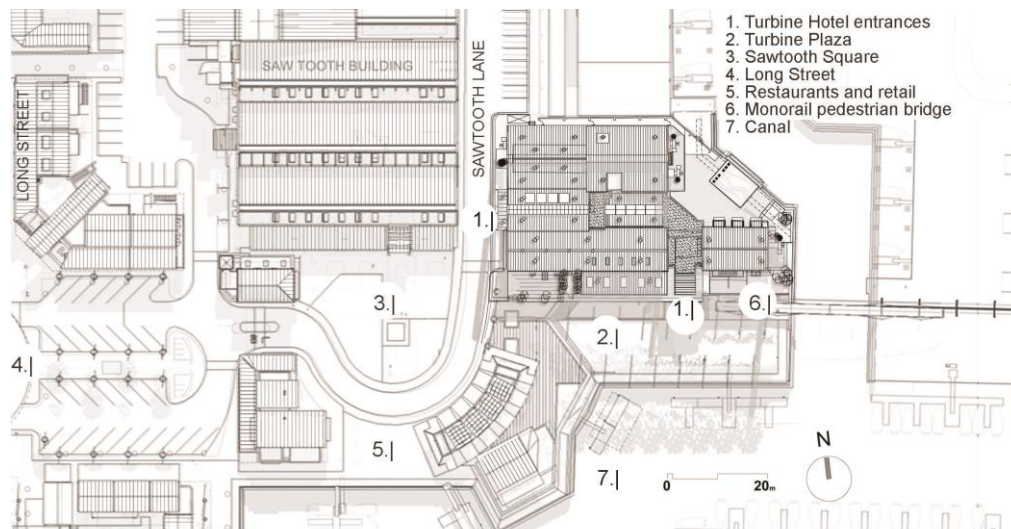


Figure 4-14: The Turbine Hotel & Spa – urban context plan (source: CMAI, 2010)

At the head of Sawtooth Lane, it had wraparound lagoon and canal views and comprised about approximately 2000 m² (Louw, 2013). As discussed, CMAI, guided by Hart and Halkett’s (1989) report, were determined to adapt for reuse this significant industrial structure on Thesen Island to preserve its industrial architectural heritage. Construction started in June 2009 and was completed at the end of June 2010 (Architecture SA, 2011).



Figure 4-15: View of the Turbine Hotel & Spa (source: Van Schalkwyk, no date)

4.13. Existing materials and structure

The planning of the hotel is a series of three-dimensionally interlocking spaces. This was made even more complex by the need to have the island raised by an additional 1.3m to deal with the projected consequences of global warming (Fisher, 2011). ‘We had to cast new concrete floors within the existing structure since the formerly single-storey building is now three storeys in places. The existing shell also posed quite a few challenges as far as waterproofing, structure and deterioration is concerned’ (Louw, as cited in Leading Architecture, 2011). As Louw (2013) explains,

‘... the refurbished factory buildings on the one side provided the public context, while the new canals on the eastern side provided a wonderful setting for the bedrooms’. As this side also faced out onto the private residential part of Thesen Island, it had to be dealt with a bit more sensitively.’

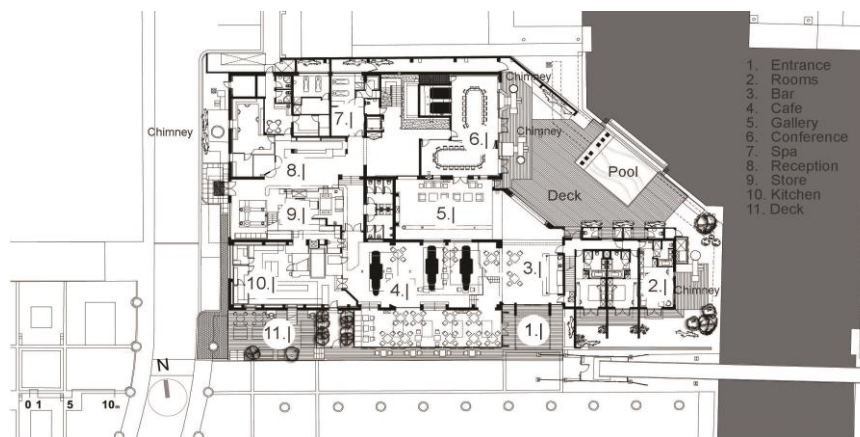


Figure 4-16: Ground floor plan of the Turbine Hotel & Spa (source: CMAI, 2010)

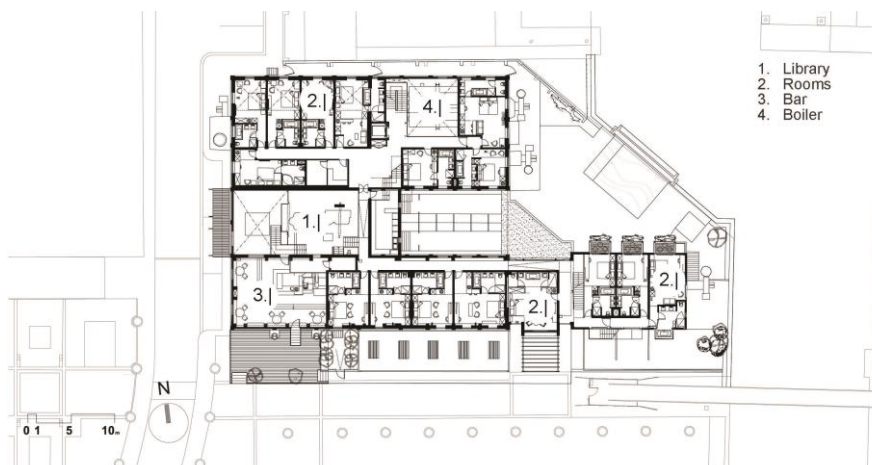


Figure 4-17: The Turbine Hotel & Spa – first floor plan (source: CMAI, 2010)

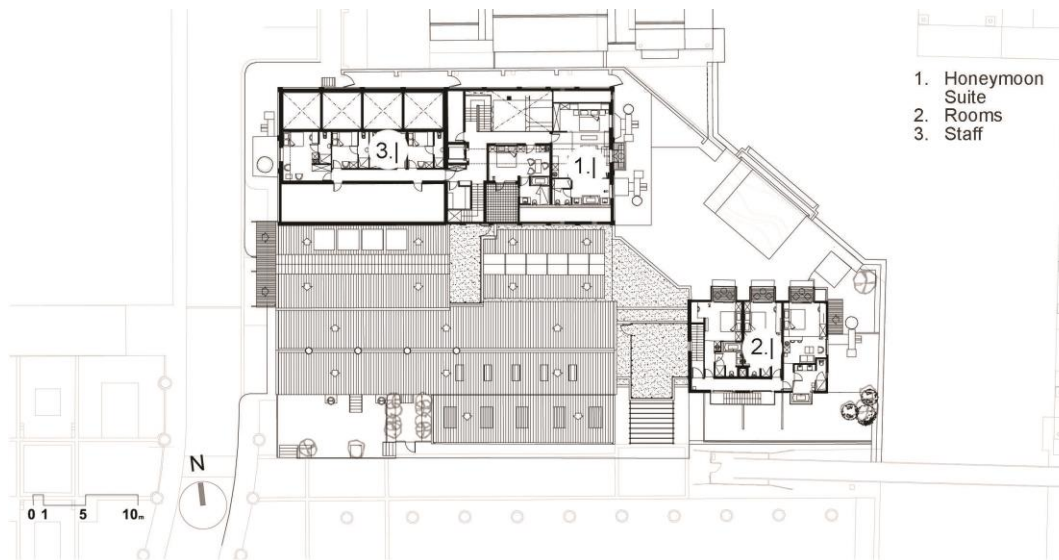


Figure 4-18: The Turbine Hotel & Spa – second floor plan (source: CMAI, 2010)

With regard to existing materials and structure of the Turbine Hotel & Spa, Roaf *et al.* (2003 (as cited by Louw, 2008) argue,

‘In most cases refurbishment would be the preferred option, provided that the core of the building can be reused without extensive demolition. Refurbishment is essentially the recycling of a building’.

This is exactly what transpired at the Turbine Hotel & Spa. The entire envelope and a significant portion of the internal structure and materials were reused. Although the old timber factory needed to be demolished, the rubble was not dumped and instead, 28 000m³ of brick and concrete was crushed and recycled for use in the road sub-bases and hidden sections of the canal gabion walls (Urban Futures, 2006).



Figure 4-19: Section through turbine hall (CMAI 2011)



Figure 4-20: The Turbine Hotel & Spa – south elevation (source: CMAI, 2010)



Figure 4-21: The Turbine Hotel & Spa – Section through library (source: CMAI, 2010)



Figure 4-22: The Turbine Hotel & Spa – Section through Turbine Hall (source: CMAI, 2010)



Figure 4-23: The Turbine Hotel & Spa –eastern elevation (source: CMAI, 2010)

This does much in the way of respecting the embodied energy of the existing architecture. Louw and his team went further than just ‘recycling’ what was already there. Any waste generated by new construction activities such as builder’s rubble was reused on site as backfill (Louw, 2008). Furthermore, ‘a few thousand firebricks left over from the demolition of one the boilers’ were used as ‘unplastered internal walls’ (Louw, 2008).

Louw (2008; 2013) then states that these liberated bricks, when reassembled as internal walls, were not plastered, but only bagged in order to 'lower the use of cement and to tie into [visually] the existing walls'. This is an interesting strategy between the classifications of passive and active energy-saving strategies because some energy is used in their liberation, i.e. some form of demolition work, but this is offset by the fact that this rubble does not have to be transported away from site, most likely to a landfill site (of which building materials contribute a massive percentage, according to GBCSA, no date) but also in the fact that they are retained and reused on site, thus contributing to the overall energy saving of the adaptive reuse of the original structure.

Other challenges Louw and his team faced were working with the existing envelope, waterproofing and structure. Difficulties arose with the existing walls, which were very brittle and fragile. Louw (2013) states they were not cavity walls, and having to put a new structure in the existing envelope and changing an essentially single story building into three stories was a challenge. Further, nothing in the existing envelope was level or square, and getting it all to flow with the addition of modern services whilst still preserving industrial architectural heritage was challenging (Louw, 2013). Louw (2013) explains that it meant 'putting new steel columns in, casting new concrete slabs in the existing shell', noting that it was a difficult task to undertake. The new concrete had to be pumped through existing window openings to get it into the building. The existing roof trusses were moved and adjusted where required to correspond to the bedroom positions and to allow for the new elevator and staircases (Professional Project Profile, no date).

According to Louw (2013), most of the new built work was done with dry walling 'which has quite a few advantages in terms of energy use'. The architect then substantiated this statement, explaining that by using this method, which is relatively quick to install compared to bricks and mortar, it is not particularly labour intensive and can be easily modified or removed if needed, which also references his statement that the Turbine Hotel & Spa was designed with future adaptation and reuse in mind – possibly into apartments. This again supports energy consciousness and efficiency (Louw, 2013).

Other existing materials used were the windows and their frames, doors and various steel beams in the building (Louw, 2013). By retaining these, not only could construction waste be mitigated along with the energy involved in removing that waste, but also the character and quality of the original structure is retained and adds to the authenticity and honesty of the completed reused building. This makes for a much more interesting building and experience, and these reminders of the past give a sense of time and place of meaning

(*genius loci*) to the building – a sentiment with which Louw (2013) concurs. Also, any waste that can be prevented from inevitably ending up in a landfill site is clearly advantageous. Another intriguing find and reuse is that of the front door for the hotel, as they were old ship's doors off one of the Thesen ships that had been taken apart (Caverney, 2013). As Louw (2013) explained,

'I'm not sure whether [the ship] was wrecked or decommissioned, so we fixed those up and built them into new frames'.

Rescued yellowwood floor boarding now serves as panelling (Fisher, 2008). Louw further detailed how any waste generated by construction was used as 'back fill' in situ (Louw 2008; 2013). Louw also took cognisance of the existence of harmful materials in the adaptive reuse of the power station, such as asbestos which was present in one of the existing wings. As this material is dangerous to remove and can not be recycled and 'would end up in a Cape Town-based landfill site', the material was retained in-situ, treated, sealed and waterproofed (Louw, 2008, 2013). The use of PVC was also mitigated by specifying exposed galvanised [mild steel] conduiting, most noticeable in the interior between the light fixtures (Louw, 2008). Almost all of the power station equipment and machinery was retained, and this is discussed in a later section - Turbine Equipment.

4.14. Sustainable strategies employed by CMAI

As noted in the Literature Review (Chapter 2), it is imperative that buildings today adhere to the principles of sustainability. It was also noted that Louw (2013) deferred to the Burra Charter (1979) for heritage management guidance and the Brundtland Commission (1987) for sustainability. Adaptive reuse of a building requires that it is sustainable into the future. It should be noted that the Thesen Island development was prior to the establishment of the Green Building Council South Africa (GBCSA), yet the lengths the architects went to in order to produce a ecologically sound building were extraordinary for those times. Further sustainable strategies used by CMAI comprise the following:

4.14.1 Using local products to minimise embodied energy

In addition to retaining, reusing and recycling a vast majority of existing materials the architect also identified another area of energy conservation: the sourcing and specifying of locally manufactured goods and materials. A significant aspect of sustainable ecological design is to use local materials and labour as far as possible, and Louw (2013) states that

this principle was embraced as far as possible in the power station's adaptive reuse. 'New materials were sourced locally as far as possible and all the structural timber was sourced from sustainably managed plantations' (Louw, 2008; 2013)

Louw (2013) describes how 'the entire building shell was recycled or adapted for reuse'. This means the overall embodied energy of the building materials and energy used during construction was kept to a minimum (Louw, 2013). Elements of the original structure that were retained for reuse consist of 'almost all of the existing building 'shell', foundations, floors, walls, the roof structure and the internal staircases' (Louw, 2013). Every step of the building process required an innovative on-site solution so the role played by the main contractors, Cape Island Construction, and TI Paint (the company responsible for refurbishing the existing equipment) was crucial (Louw, as cited by Architecture SA., 2010). Louw (2013) explains that the good relationship between the architect, contractor and refurbishment contractor was one of the factors that contributed significantly to the successful outcome of this project.

4.14.2 Passive design

The climate and use of resources also had a large influence on the design, as can be seen from the sustainable initiatives introduced into the building. When describing the spatial planning of the Turbine Hotel & Spa, Louw (2013) states that the bedrooms and public spaces were positioned in the existing shell in order to maximise natural lighting and natural ventilation, so the need for artificial lighting and ventilation could be kept to a minimum. In the image below, remaining smoke stacks from the original power station are clearly visible, and add, rather than detract, from the industrial aesthetic of the Turbine Hotel & Spa. This creates an interesting dialogue between the old and the new, and the industrial architectural heritage is immediately obvious. Note the brise soleil on the north-facing bedrooms.

One can see that the architect was concerned with designing the new structure to meet the climatic conditions of the area, and by doing so they could maximise the climatic potential of the site thereby reducing the need and demand for energy supplied by the national grid – a further principle of sustainable design. The design team was also aware that because it was an existing building, 'it does make it more challenging to implement some of the standard passive design measures' (Louw, 2008; 2014). Although these are additions to the building, they are architectural design devices that are appropriate and needed as part of changing the spaces of a building typology to suit a new building typology. Another important aspect of energy conscious design is the use of insulation. Insulation used in the Turbine Hotel & Spa comprised 'two layers of eco-friendly insulation in the roof' according to Louw (2013), as

this prevents loss of heat in winter and retains the cool in summer - a 'green' and sustainable design solution without having to revert to cooling and heating systems using power.



Figure 4-24 Brise soleil or shading devices used on the northern façade which houses the guest bedrooms (source: researchers own 2013)



Figure 4-25: The Turbine Hotel & Spa – pool deck (source: Flemming, no date)



Figure 4-26: View of the ‘courtyard before adaptive reuse showing extensive piping (source: Louw, circa 1998)



Figure 4-27: Images of skylight over the reused courtyard between the north and south wings (source: researcher’s own, 2013)

4.14.3 Thermal mass

All the walls in the Turbine Hotel & Spa are of retained, original brickwork. The concrete floor slabs that were added to the building provide another source of thermal mass. Concrete floor slabs were used ‘due to large spans and the necessity of soundproofing’ which is crucial for privacy in the hotel (Louw, 2008; 2014).

These slabs are supported by load bearing internal brick walls. And, according to Louw (2008), 'this was the best way of utilising thermal mass on this particular project, since heat that penetrates through glass onto the internal walls and floors cannot be lost to the outside'. This greatly reduced the demand for active heating systems in the Turbine Hotel & Spa. Fireplaces are used in certain areas to supplement the demand for heat, and are of the flue-less natural gas-type fire. They also help to add to the ambiance of the hotel in winter, a cosy atmosphere being rather difficult to achieve in the vast open areas.

4.14.4 Water saving strategies

Although Knysna receives its lowest rainfall (average 47 mm) in June and its highest (average 76 mm) in October (Worldweather, no date; Caverney, 2013), water efficiency is always important and so the team elected to implement various water saving strategies. Internally, these strategies consist of water-saving shower roses, dual-flush toilets and water-efficient taps in the guest rooms (Louw 2011, 2013). However, Louw (2013) explains that cost constraints prevented the team from specifying a two-pipe system to separate black-water and grey-water; otherwise the grey-water could have been used for toilet flushing and irrigation. This is an unfortunate opportunity to improve the sustainability of the Turbine Hotel & Spa that was missed, but it is to be noted that not all good ideas can be implemented within time and budget constraints.

4.14.5 Energy saving strategies

Water heating in the Turbine Hotel & Spa is either heated by solar panels (public areas) or heat pumps (bedrooms) (Louw 2008, Urban Futures, 2008). By doing this, the Turbine Hotel & Spa greatly reduces reliance on the national power grid. According to Louw (2008), in order to save energy for heating and to save water, it was decided that the Turbine Hotel & Spa would 'opt for a central boiler with a circulating water system'. This means that taps do not need to be left running while the hot water travels to the tap, and also this system makes use of only one large heating element as opposed to many if each room was fitted with its own traditional geyser. Energy efficiency is further bolstered by the fact that all appliances are 'energy-efficient' and all artificial lighting in the Hotel is done by CFL and LED lighting fixtures, and all external lighting fixtures are solar powered (Louw, 2008). CFLs (Compact Fluorescent Lights) use about 70% less energy than traditional incandescent bulbs, and LED (light emitting diodes) lighting can be more efficient, durable, versatile and longer lasting than traditional incandescent bulbs (Energy Star, no date).

4.14.6 Glazing

Another sizeable area of concern for architects when designing an energy efficient structure is the glazing component. Very early on in the design stages the architect decided retain as much of the existing fabric as possible to preserve the industrial architectural heritage of this industrial building. This meant that wherever possible the original timber window casings were retained, and where new openings were required, a similar timber frame design was implemented to match the existing window frames (Louw, 2008; 2013).



Figure 4-28: An original timber window casing retained for reuse (researcher's own, 2012)

However Louw (2008) notes that only standard single pane glazing was used, missing the opportunity to low emissivity (low-e) glass or double glazing. This would have greatly improved the thermal performance of the structure.

4.14.7 Low-VOC paint

Another aspect where the environment was kept in mind is the fact that only low-VOC and non-toxic paints were used in the building, and where old paint needed to be removed this was done by a specialist contractor using biodegradable paint removers and an

environmental wash system was used to clean the paint equipment, which meant that the water could be recycled and reused.

4.15. Turbine equipment and machinery

This section details what machinery was retained in this adaptive reuse project, the amount of equipment retained, why it was retained, and how the equipment was restored and incorporated into the design for the Turbine Hotel & Spa in an effort to preserve as much of the historical significance as possible.



Figure 4-29: The area to become the hotel lobby before reuse (source: Louw, no date)



Figure 4-30: Hotel lobby showing preservation of industrial machinery and an art display ('gallery') of local artist's work for sale (source: researcher's own, 2013)

It is because of Hart and Halkett's (1998) report to CMAI that the full extent of the rich industrial heritage of this building was made known to the architects who immediately realised its importance and took steps to preserve both building and machinery. These authors were so concerned about the preservation of the power station and its machinery that they implored the architects to appoint a 'qualified industrial archaeologist to oversee the establishment of a museum', and if in the event that any portion of the power station had to be demolished, the machinery was documented and photographed, and that 'every attempt should be made to find suitable homes for the machinery rather than scrapping it' (Hart & Halkett, 1998)

It is further interesting to note that 'the power station building [was] protected by the National Monuments Act (at the time) while the [equipment and] machinery contained within was not', but that the National Monuments Council (at that time) could 'declare any building a National Monument or any object a cultural treasure if it deems this necessary' (Hart & Halkett, 1998).

4.15.1 Generating machinery

Hart and Halkett (1998) note that at the time of their inspection of the building, circa 1998, that the power station was 'no longer operating but is well maintained and the machinery is in working order' (Hart & Halkett, 1998). This is remarkable if you consider that 'this is some of the oldest electricity-generating equipment in the country' (Louw, 2008). This is probably due to the fact that the power station was privately owned, and was a micro-facility.

As late as 1998 there were still 'three boilers still under steam providing steam pressure for wood treatment and plywood operations' (Hart & Halkett, 1998), noting that the machinery as well as the power station building had 'evolved according to the varying needs of the company over time' (Hart & Halkett, 1998). Thus the 'generating capacity was steadily increased as demand increased' (Stuart, 2011a). The power station building thus housed a 'fascinating mixture of technology from a variety of different ages, differing mechanical principles and makes' (Hart & Halkett, 1998).



Figure 4-31: The boiler after reuse (source: Flemming, no date)

An interesting point to note is that this power station was fuelled by ‘wood waste’, essentially a by-product of the milling operations on the island. This is an early example of resource efficiency by the industrious and resourceful Thesens. In one move the Thesens were able to alleviate waste removal by using this by-product as a fuel source and also were able to generate enough power, not only for their own operations on the island but even a surplus which from as early as 1929 ‘supplied power to Knysna for general use and street lighting and later also to neighbouring town Plettenberg Bay’ (Stuart, 2011a). It is interesting to note that had it been in working order, it would have generated in the region of 8.5MW - about one third of Knysna's present demand (Fisher, 2011).

The largest and most significant of all the equipment were the five boilers contained in the building which were ‘of the water-tube variety’, and according to Hart & Halkett (1998) were built by the Babcock and Wilcox. Each boiler was mechanically stoked and wood waste delivered via a conveyor system. The power station is believed to have had a ‘combined total supply of about 10MW’ (Stuart, 2011a).



Figure 4-32: The turbines in the power station before reuse (source: Louw, no date)

The age of the boilers varied greatly, with the earliest one being constructed in 1905 and the latest constructed in 1952 (Hart & Halkett, 1998). Hart and Halkett (19998) were able to determine the age of each boiler and to 'trace the history of each boiler by its registration number' which are reflected in the Babcock and Wilcox archives kept at the University of Glasgow (Hart & Halkett, 1998).



Figure 4-33: A further view of the turbine hall before reuse (source: Louw, no date)

With regard to electricity generation, the boilers provided highly pressurised steam which in turn powered ‘five turbines and other smaller auxiliary equipment’ in the building (Hart & Halkett, 1998) Three of the generators or turbines in the Thesen Island power station were of the ‘turbo-generator’ variety, produced by the Swedish firm, STAL, previously named De Laval and Ljunstrom. These turbines were unique in size and generating capacity, ‘producing 1000 to 2000 kW (kilo watts) each’ (Hart & Halkett, 1998). Stuart (2011a) believes that these ‘were assembled in Grahamstown in 1923 before being purchased by the Thesens in the 1940s’. The two remaining turbines, built between 1920 and 1930, could generate up to 2000kW each; one was built by David Brown and Company and the other by Bellis and Morcom, Birmingham in the United Kingdom (Hart & Halkett, 1998).

According to Hart and Halkett (1998), such boilers in an operating condition were rare, both in South Africa and throughout the world, and they made several recommendations, although the new programme and typology for the power station had yet to be decided by the architects (Louw, 2013). Hart and Halkett (1988) suggested that every effort should be made to find ways to conserve the power station in total working order, and recommended a working museum.



Figure 4-34: Main turbine hall showing the turbines constructed by De Laval and Ljungstrom (source: Hart & Halkett, 1998)

4.15.2 Preservation of existing machinery

The architects thus took on board Hart and Halkett’s (1998) exhortations, and realised the historical significance and importance of this rare machinery. They were determined to keep

it somehow (Louw, 2013). However, the question was what to do with this machinery, how much of it should be preserved, and if deemed to be kept in-situ, how could a maze of piping, equipment and massive machinery be incorporated into the design for the Turbine Hotel & Spa?



Figure 4-35: An old repainted turbine in the dining area (source: researcher's own, 2012)



Figure 4-36: Reception area after completion (source: Flemming, no date)



Figure 4-37: Reception area showing machinery placement, including the walkable glass floor with below surface machinery (source: Architecture SA, 2011)



Figure 4-38: The reception desk showing a reused control panel (source: researcher's own, 2012)

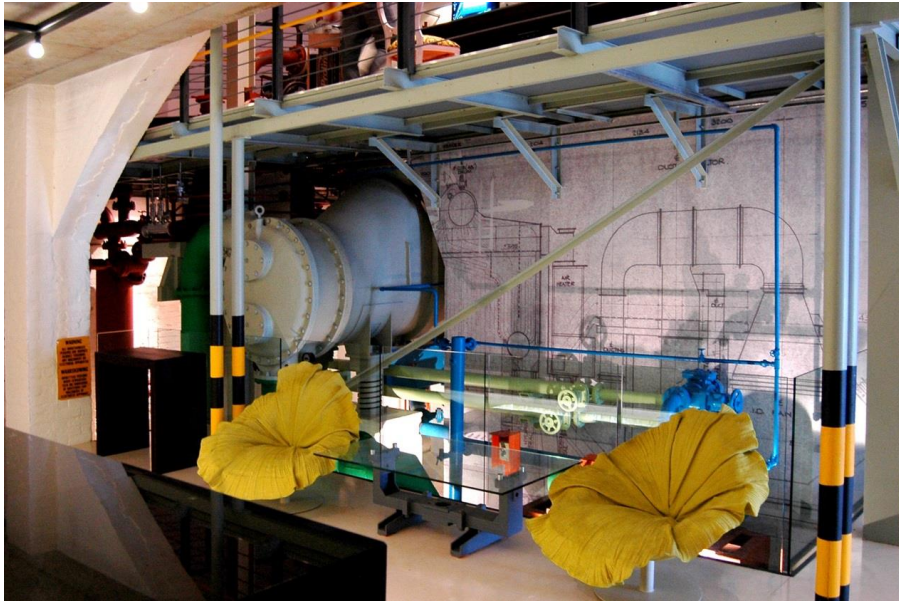


Figure 4-39: View of refurbished machinery in the hotel lobby (source: Flemming, no date)

In the image above, note the technical drawings enlarged and used as wallpaper, further illustrating the technical nature of this building, and juxtaposed with the ultra modern, chairs in the foreground. These chairs, designed to resemble sea anemones, are a further nod to the maritime heritage of the island.



Figure 4-40: The completed Island Café (source: Flemming, no date)

Although an industrial archaeologist was not appointed, great care was taken to preserve the machinery. As Low (2008) notes, 'all the equipment has been carefully catalogued;

cleaned and stored, and each individual item had been allocated to a specific room to be placed in the building once this had been completed’.

With some 300 pieces of equipment, this represented a challenge of note to be completed amidst a building site! The equipment was repainted in its original colours and each colour represents a specific function; i.e. coolant water, oil, steam etc. Many of these items were further customised to house new LED light fittings and have been linked to the hotel's lighting circuits (Fisher, 2011).

‘... [the machinery] adds to the character, honesty and authenticity of the project. And all these reminders of the past make it more for a more interesting building and experience’ (Louw, 2013).



Figure 4-41: Further view of repainted turbine in the dining area (source: researchers own, 2012)



Figure 4-42: Image of the bar with various pieces of old machinery worked into the design. Large sliding doors on either side of the café area can be opened for cooling cross ventilation (source: researcher's own, 2012)

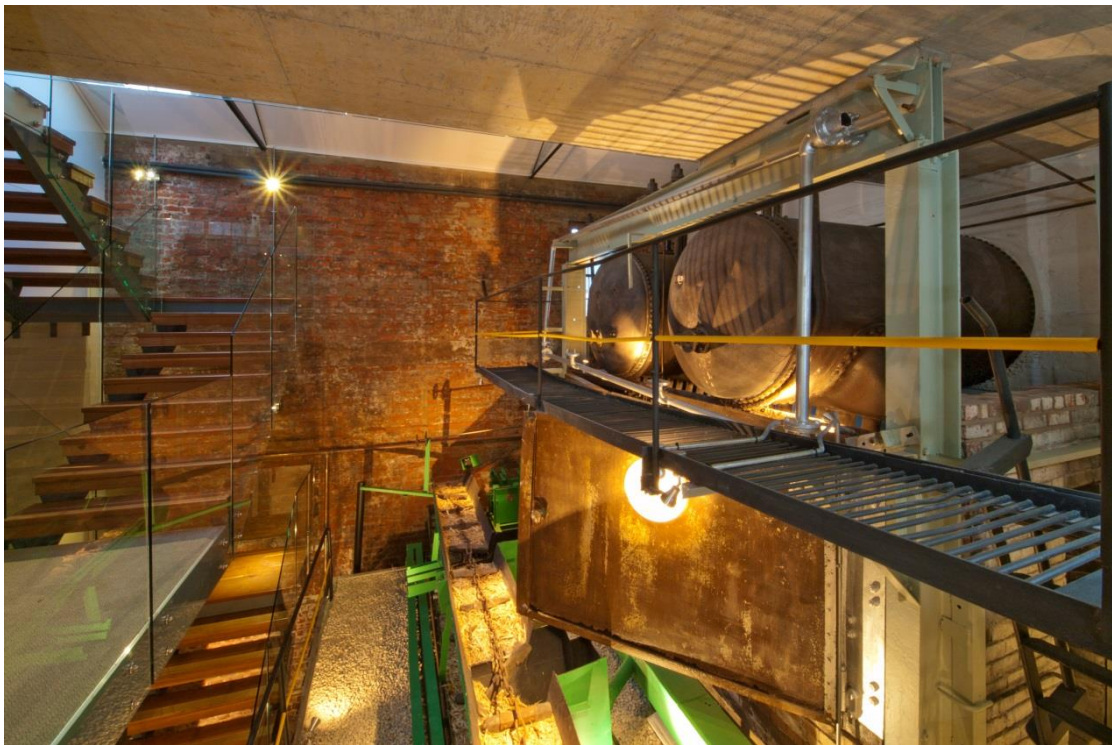


Figure 4-43: The boiler after reuse (source: Flemming, no date)



Figure 4-44: Before: the turbines in their dilapidated state before reconditioning (source: Architecture SA, 2011)



Figure 4-45: The refurbished turbines now in Turbine Hotel & Spa (source: Van Schalkwyk, no date)

Much of the ancillary equipment is scattered throughout the hotel, not only in the public areas, but in unexpected places, such as the corridors to the rooms available to residents only, as was noted during a stay over in the hotel. That fact that it is a 5-star hotel, with all the modern conveniences today's guests expect, yet incorporates so much of the industrial equipment is testament to the drive and commitment of both the owners of the hotel and a

far-sighted architectural team.

'It's an architectural masterpiece, it's something that very few other towns in South Africa have, yes there is Jo'burg with the Turbine Hall, but they're not hotels; in Europe yes, but for South Africa, it's a first' (Caverney, 2013).

Ludick (2013) noted that often hotel guests visited as they had previously worked in power stations and were impressed by the level of industrial heritage preservation.



Figure 4-46: Interesting relics such as this gas mask are scattered around the hotel in unexpected places (source: researchers own, 2012)

When asked whether Caverney (2013), in his position as chairman of the Knysna Historical Society, thought the Turbine Hotel & Spa was sensitive to, and respectful of its history and heritage, he said the following:

"Absolutely, 100%, they [CMAI] did not attempt to just refurbish and restore and present is as a restored power station, quite a lot was gutted, but the end result was pleasing. It still retains its historical and heritage attraction but ain the end it has a modern application'.

As Lerm (2013) states:

'Apart from its incredible location, what makes the hotel is the way the industrial machinery has been incorporated into the design and decor while, from the outside, the building still has all the charm of an old industrial warehouse.'



Figure 4-47: Repainted equipment in the completed Turbine Hotel & Spa (source: Louw, no date)

'What they have done there is actually amazing, being an electrical engineer I understand the equipment and the process, but the detail they went to is enormous' (Caverney, 2013).

He further notes,

“The only way we are going to retain the standard of maintenance on our [industrial] heritage buildings is by letting them become sustainably reused projects’ (Caverney, 2013).



Figure 4-48: The turbine hall after completion (source: Flemming, no date)

Caverney (2013) went on to explain that for Knysna,

‘It’s the only [example of such a reuse project] and for the Southern Cape, so it’s a special attraction also and pretty much a first. Knysna is full of hotels ... but when you stay in this hotel you can have a meal next to a massive turbine or you can sleep overlooking the boiler room, this is interesting’.

Ludick (2013) further explains that due to the hotel’s interesting location, the two conference rooms also attract different kind of business people, from smaller companies to high-level corporates on team building weekends, and also wedding groups from time to time ‘which take up the entire hotel’. It is important that they cater for many different groups because of the mainly seasonal occupancy, thus in off season, to remain financially viable, contribute to the economy of Knysna, as well as retain jobs, they must attract various specialised segments of the tourism industry, such as business people for conferences, car enthusiasts

(as mentioned by Caverney, 2013), engineers, as well as honeymooners.

Louw (2013) explains in an interview,

‘The ladies are quite taken with the whole [interior] design aspect and the fathers all like the industrial feel of the hotel, and then kids love all the little gauges and pulleys and valves and levers and loose themselves exploring the hotel’.

Louw (2013) says that he had many positive comments on the hotel and that ‘some of the nicest comments I had were from people who used to work in the building’. This is important because it confirms the authenticity and sensitivity of the adaptive reuse project.



Figure 4-49: Image of The Tapas Bar showing the repainted machinery in its original position (source: Turbine Hotel & Spa, no date)

4.16. Interior of the hotel/Artefacts

This section briefly discusses the inclusive interior design of The Turbine Hotel & Spa. Inclusive design, according to The British Standards Institute (2005) is,

‘The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible ... without the need for special adaptation or specialised design.’

The architects wanted the design of the interior to reflect the heritage of the Thesen family's maritime and timber industries, and to display the many artefacts found on site. Thus various old books, ledgers, dials, knobs, signage etc. were incorporated into the interior. New material was printed with archive photographs of the maritime history of the island (Boruvka, 2011).



Figure 4-50: An interior showing refurbished industrial machinery in the Tappas Bar (source: Thesen Island, no date)

'The fact the decor is bold and bright has generated lots of comment,' says Louw (2013). 'We could easily have gone modern and industrial but this balances and softens it a bit'.

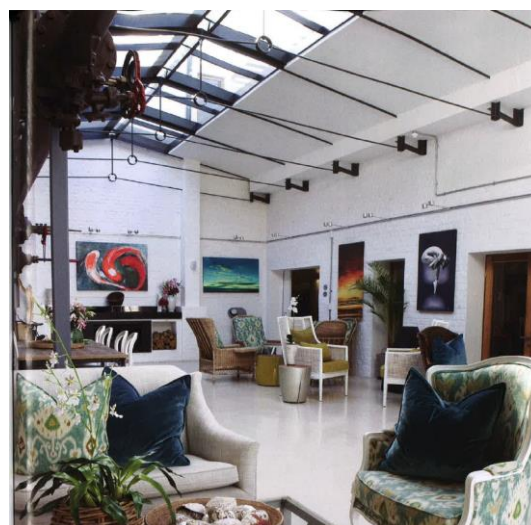


Figure 4-51: Hotel lobby showing the 'art gallery', hard and soft furnishings blending with the industrial cabling on the ceiling (source: Thesen Island, no date)

Ludick (2013) explains that every room contains at least two or three historical photographs of the building at some stage of its operation, either as a timber processing plant or as a power station, and contain a few pieces of machinery or equipment.



Figure 4-52: Original colour chart for machinery (source: Thesen Island, no date)

An original colour chart for the machinery was found in one the derelict buildings – it now hangs as a décor statement in the Turbine Hall, above the Island Café Restaurant. Louw (2013) explains that an interesting find was the rolls of plans which he found in a one of the cupboards in the building - they were the original engineering drawings of the boilers.

‘We then touched [them] up digitally in our office ... [they are] now framed and mounted in the hotel lobby. The hotel is simply littered with tangible relics and reminders of days long past’.

New material for the interiors was printed with archive photographs of the maritime history of the island (Boruvka, 2011). Thus it is clear that the owners went to great lengths to preserve the industrial heritage of the building inside and out. The most obvious architectural interior device is that of the significant quantity of retained and repainted power station equipment.

4.16.1 Tourism potential

4.17. Guest remarks

During a stay at the Turbine Hotel & Spa (2013), a few of the hotel guests were interviewed. Most, interestingly, were international guests, but some were South African. Some of the comments made are noted below:

‘Stunning.’

'Didn't know this existed.'

'The preservation of the machinery is remarkable.'

'It's a hotel, but it's also like a museum where you can stay over.'

'The most interesting hotel I have ever stayed at.'

'We love being able to examine the machinery.'

'I think the architects have done a fantastic job – it's very different to any other hotel I have stayed at, and that includes some overseas.'

'I lost my kids for almost 30 minutes and when I found them eventually they didn't want to leave; they were mesmerised by the colourful machinery, as were my husband and I.'

Whilst interviewing guests at the Turbine Hotel & Spa for the case study, it was discovered that small, but enthusiastic, groups of people visit industrial buildings like the Turbine Hotel & Spa to enjoy the history of old technology and the associated heritage. A case in point was the German engineer, who expressed a passion for engineering works and had come to South Africa specifically to stay at the Turbine Hotel & Spa.

And from an engineer from Germany,

'This is so nostalgic for me – I wish everyone knew about it.'

4.18. Resident remarks

In the interviews with a few of the Thesen Island residents, all were positive in their praise for the hotel. A few comments made are noted below:

'I love living here – we eat at the hotel often – it's wonderful.'

'My friends and family so enjoy spending time here – there is nothing like it anywhere else in South Africa.'

'It's calm and peaceful in the residential part, even when the tourists are flooding into the hotel and the shops in the season.'

'It's a wonderful place to be.'

4.19. Awards

In recognition of the efforts of the architects to retain as much of the existing equipment as possible and incorporating this into the design for the Turbine Hotel & Spa, the South African Institute of Electrical Engineers (SAIEE) acknowledged the historical significance of the Turbine Hotel & Spa when an SAIEE Historic Section Plaque was unveiled on [the] 26th of October 2011 (Stuart, 2011b). It is interesting to note that this is only the fifth of such type of plaque to be erected in this country (Stuart, 2011b).



Figure 4-53: SAIEE plaque outside the Turbine Hotel & Spa (source: researcher's own 2013)

Stuart, a member of the SAIEE Southern Cape Centre was complimentary of the Turbine Hotel & Spa owners Geoff Engle and Dendre Lerm, 'for their remarkable vision for this hotel'. Stuart also compliments the project architect Mike Louw for,

'... translating [the] vision into a reality in such a sensitive and comprehensive way, generating a result [that] is a truly unique combination of modern upmarket guest facilities, set within the boundaries of a century-old power station building, with all the furnaces, boilers, turbine and generators preserved in position' (2011b).

Some of the other buildings in close proximity to the power station which CMAI adapted for reuse in their efforts to preserve the industrial architectural heritage of the new Harbour Town can be found in Appendix C.

4.20. Chapter conclusion

This concludes the case study of the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa in order to preserve its industrial architectural heritage. This chapter comprised the primary research, i.e. the adaptive reuse of the Thesen Island power station to the Turbine Hotel & Spa. Detailed here were all the significant events from decommission in 2001 leading up to the day that the Turbine Hotel & Spa opened for business in 2010. The challenges this adaptive reuse project presented the developers were noted and discussed.

The architectural paradigm and the typological debate were discussed in some detail as this laid the ground work for not only the adaptive reuse of the power station but for the development of other buildings in close proximity to the power station in the new Harbour Town development in order to preserve industrial architectural heritage. It is important to note that the adaptive reuse of the power station to the Thesen Island Turbine Hotel & Spa cannot be divorced from the broader context of the development of the whole island; specifically Harbour Town, where most of these industrial buildings with significant industrial architectural heritage were located. Refer to Appendix C.

In its eventual reincarnation as a 5-star boutique hotel featuring all the modern conveniences, it none the less is first and foremost a hotel, and recognisably so, yet a hotel functioning as a 'living museum', paying testament to the past, while being up-to-date in terms of present hospitality form and function, and still preserving cultural and historical relics for future generations. It should be noted that the vast interior surface walls also function as art exhibition function space for local artists, thus a further example of community involvement. One could posit that this is one of the contributing factors to the Turbine Hotel's success with the residents of Thesen Island and both local and international tourists.

The following chapter will discuss whether the research questions have been answered and how the challenges for this project, as discussed in this chapter, were approached and how successful these interventions were. These challenges form the framework for a critical analysis of this adaptive reuse project that set out to preserve industrial architectural heritage. Other power station precedents that have been adapted for reuse to preserve their industrial architectural heritage (Chapter 2) are also discussed in relation to the adaptive reuse of the Thesen Island power station to evaluate whether this power station has succeeded in preserving industrial architectural heritage. The final chapter, Chapter 6, provides a summary of this research and also provides some suggestions and recommendations for adaptive reuse projects in South Africa.

CHAPTER 5: RESEARCH ANALYSIS

'In terms of structures built for a specific engineering or industrial purpose, many people (including developers and architects) do not see the heritage value or the potential for redevelopment or adaptive reuse' (Louw, 2015).

5.1. Introduction

The previous chapter presented the case study findings on the adaptive reuse of the Thesen Island power station to the Turbine Hotel & Spa as a strategy to preserve industrial architectural heritage. The aim of this chapter is to uncover whether the strategy of adaptive reuse is successful in preserving industrial architectural heritage in South Africa. The overarching research problem statement for the research was stated as South Africa is losing its industrial heritage. The main research question was, *Is adaptive reuse a successful strategy to preserve industrial architectural heritage?*

This chapter presents a critical analysis of the project by using the sub-research questions as a framework for the analysis. These research questions were informed by the literature review (Chapter 2) regarding adaptive reuse as a strategy to preserve industrial architectural heritage. The case study (Chapter 4) sought information from the semi-structured interviews with the respondents, own observations, and document examination in order to answer these questions. In this chapter, the researcher examines the extent to which the sub-research questions posed in Chapter 3 were answered, as well as discussing how the challenges to this project (as discussed in Chapter 4) were overcome. This is intended to show that adaptive reuse is a successful strategy that can be used to preserve industrial architectural heritage. In this critical analysis of the Thesen Island project, reference is made to the literature review (Chapter 2) to determine if the research findings concur with the body of knowledge regarding adaptive reuse as a strategy to preserve industrial architectural heritage.

Further, a few other adaptive reuse projects of power stations both locally and internationally are briefly discussed and compared to the Thesen Island project in order to determine the extent of the adaptive reuse and whether or not it is a successful strategy to preserve the industrial architectural heritage of power stations. Specifically, the Bankside power station (now the Tate Modern (UK), Wapping power station (UK), the old Jeppe Street power station in Newtown, and the Orlando power station in Soweto are referred to here. Although the case study specifically concerns the adaptive reuse of the decommissioned Thesen Island power station to the Turbine Hotel & Spa, it cannot be divorced from its wider context; i.e.

the entire Thesen Island redevelopment.

The final chapter, Chapter 6 provides a summary of this body of research and lessons learnt from this project, and proffers some suggestions as to how adaptive reuse as a strategy to preserve industrial architectural heritage can be fostered amongst professionals in the built environment and society as a whole so that the destruction in South Africa of preservation-worthy industrial architectural heritage can be halted.

5.2. How was decision making influenced by the history (and culture) of the town of Knysna, the existing Thesen Island, and the Thesen family?

As Thesen Island had been used for ship building, timber logging treatment, and power generation for over 100 years, CMAI realised that there was significant industrial architectural heritage and history in the extant buildings, and guided by Hart and Halkett's 1989 report, they sought to preserve this for future generations. The Thesen family had been responsible for the substantial development in Knysna through trade and industry, touching the lives of the surrounding community in terms of providing employment and the concomitant peripheral trade and services development in the town and surrounding areas.

It can be posited that the developer (TIDC) and the architects (CMAI) successfully preserved the industrial architectural heritage of the Thesen Island power station, along with the history of the town and the whole island, as well as the legacy of the maritime and timber industries. As the Thesen family had built their wealth on timber and shipping, there is much evidence of both these industries all over the hotel (including the interior), as well as in the other industrial buildings with architectural heritage in the Harbour Town area of Thesen Island. This is what Viollet-le-Duc's (1814–1879) theory of adaptive reuse advocates; the core or main design features of the buildings are usually retained or enhanced to preserve architectural heritage value, whilst new additions and adaptations are required so that the building may serve a new functional purpose within society.

As noted in the case study, the material culture of the power station, in the form of old books, ledgers, dials, knobs, signage and various other interesting artefacts collected are displayed in the Turbine Hotel & Spa (Boruvka, 2011). Even the original wood front doors were restored and reused as a further nod to the past. Every room in the hotel contains at least two or three historical photographs or maps of the building at some stage of its operation, either as a timber processing plant or as a power station, and a few pieces of restored machinery such as valves, gauges, dials and various other fittings and fixtures from the

original building.

As noted in the literature, San-Jose *et al.* (2006) propose that today's generation is heir to technological changes in history, and that the technology of the past should be preserved for later generations to view and appreciate. Rocchi (2015) notes that when artefacts of history are destroyed, so too is society's collective memory destroyed. Fourie and Visagie (2011) particularly suggest that reconstructed or preserved machinery allows the older generation to 'tell stories' to the younger generation of 'the way we were'. Krige (2010) concurs by saying that a space of heritage significance provides an immediate 'story or stories that build on our appreciation of our common and diverse histories and cultures'. Thus the narrative of this building can still be read, and both historical architecture and artefacts have been restored and preserved for future generations. Daffonchio & Associates (as cited by Propertuity, no date) state that the original industrial architectural heritage features of a building must be retained, whilst any new elements introduced need to add a contemporary language to the character inherent in the building's history. This finding concurs with Brooker and Stone (2004) in that the most important and meaningful factor in adaptive reuse is the original building itself.

This adaptive reuse project challenges what Fourie and Visage (2011) note as a prevalent view that the industrial period is best forgotten or 'removed from view'. The literature also notes that few pockets of excellent exist in South Africa regarding adaptive reuse of industrial buildings with architectural heritage (Quaghebeur, 2000; Tatz, 2008; Fourie & Visagie, 2011; Krige, 2010; Vackier, 2014). If this is the case then this project must rank as an excellent example where the developers, owner and architects worked tirelessly, over a period of some 10 years, to preserve as much of the original fabric of the building as possible, as well the significant history and culture embedded in the machinery and artefacts of the power station. This is in line with Huxtable's (1978) view that history should be preserved not only in museums, but by giving obsolete industrial buildings new uses.

Further, the literature (Chapter 2) states that preservation works to both protect and celebrate the evidence of the past (Moe, as cited by Carroon, 2010). Dimatteo (2012) finds that historic buildings are physical links to the past, and that these layers and layers of information need to be preserved. Cantell (2005) also states that historic buildings with industrial architectural heritage help define the character of a community by providing a tangible link with the past and thus preserving industrial buildings is an important part of maintaining the historic industrial character of a community; in this case the shipping and timber industries of Knysna.

The Turbine Hotel & Spa has acted as a catalyst for the rejuvenation for the whole island, and the building once again plays a large part in the development of the community, albeit it has a different function (power station to hotel). Without the adaptive reuse of the buildings in the Harbour Town area of Thesen Island, society's collective memory of the shipping, timber logging and power generation industries would have been destroyed. Thus the *genius loci* of the building has been preserved.

5.3. How was decision making influenced by the geographic location and concomitant climatic conditions?

5.3.1 Geographic location influences typology

The geographic location (and its concomitant climatic conditions) played a major role in formulating the design and typology of the final structure of the old power station, especially as it sat on what was to become expensive water front real estate adjacent to the residential component of the mixed-use area of Harbour Town on Thesen Island. Harbour Town was previously the industrial enclave of the island and many of the existing industrial buildings with architectural heritage were also adapted for reuse to preserve industrial architectural heritage. Thus the need for a typology that capitalised on the location and view, but one that would be economically sustainable. The old power station, in its new incarnation, had to add to the palette of the entire development and complement the other industrial buildings with significant architectural heritage also adapted for reuse.

As discussed, the new owner of the power station wanted to keep as much of the original building, and its machinery, intact. Although Hart and Halkett (1998) pleaded for the power station to be adapted for reuse as a museum to preserve its industrial architectural heritage, access for the public would have been difficult as Thesen Island was now privately owned. Further, due to its location, viz. in the small town of Knysna which was not near a large metropolitan area, the developers were unsure whether they would get the footfall needed to make a museum financially viable. In addition, the island could not accommodate parking for school buses or coaches. The idea of a museum was thus eschewed in favour of a hotel, thus adding a crucial hospitality component to the mixed-use Harbour Town development and substantially adding to Knysna's tourism potential, which in turns brings socioeconomic progress to the town.

5.3.2 The link between geographic location, typology and tourism

Awareness of the tourism potential of industrial sites was first aroused whilst discussing the town and surrounds of Knysna (see Chapter 1) and whilst conducting the literature review,

i.e. Chapter 2. Hart and Halkett (1998), in their report to the developers of Thesen Island had already pointed out the following:

'... in the case of the power station, demolition and scrapping of this structure [i.e. the Thesen Island Power Station] with the unique machinery within cannot be adequately mitigated as this represents an excellent education and tourism opportunity.'

As discussed in Chapter 2, historical sites of architectural significance draw large numbers of visitors to the countries that host them and provide a healthy tourism revenue (Global Heritage Fund, 2002). As Caverney (2013) notes, Knysna has become a favoured tourism destination for South Africans in the past few decades, and many retail, hospitality and commercial ventures in the town rely heavily on local seasonal tourists. However, The Turbine Hotel & Spa, as a destination on its own and a further hospitality offering in the town, has significantly added to the number of new locals and international guests who come specifically to see the building (industrial tourists and business tourists for conferences etc. (Lerm, 2013; Ludick, 2013; Caverney, 2013).

As discussed in the literature review, Li (2002) states that industrial heritage tourism can play an effective role in the process of revitalisation of industrial area. Adaptive reuse has tourism potential and industrial tourism is a growing trend worldwide (Otgaar, 2010; Jansirani & Mangai, 2013; European Parliament, 2013). Locally, this is also in line with the findings of Nombembe (2015) regarding the V&A waterfront in Cape Town, Krige's (2010) findings regarding the Newtown precinct in Johannesburg, Propertuity's [no date] findings regarding the Maboneng district, and Quaghebeur's (2000) findings on Woodstock.

As tourism contributes directly and indirectly to the economy (7.9% of GDP in 2009), and with the government aiming to increase the 2009 baseline of R189,4-billion to R499-billion by 2020 (National Department of Tourism, 2012), one could argue that greater awareness of South Africa's industrial heritage could contribute significantly to making these figures a reality.

5.3.3 Climatic conditions

These are discussed in the section that deals with sustainable and ecological design.

5.4. How was decision making influenced by local and international precedent studies regarding the adaptive reuse of decommissioned power stations?

Louw (2013) states that the architectural team turned to the adaptive reuse of the Ultimo Power House (Sydney, Australia) the Wapping Power Station, and the Bankside Power Station (London, UK) as precedents, and the adaptive reuse of these power stations was briefly discussed in Chapter 2 – The Literature Review. These industrial giants have been adapted for reuse as valuable properties and landmarks for the next generation. However, it should be noted that direct comparisons are not possible due to the size of Thesen Island power station (a micro project) and its method of power generation (i.e. wood-fired).

The Bankside power station in London is now the Tate Museum of Modern Art, and although Swiss architects Herzog and de Meuron won the design competition as their design kept as much of the built structure as possible, all the existing machinery was stripped out and the structure ‘stripped back to its original steel structure and brickwork’ (Tate, no date). It is interesting to note that this project received a 12 million pound grant from the English Partnerships Regeneration Agency; thus private money at work, rather than the local heritage agency using government funds.

However, according to the Tate itself (Tate, no date), since opening in May 2000 more than 40 million people have visited the Tate Modern, an astounding footfall, and it is one of the UK’s top tourist attractions, generating in the region of £100 million in economic benefits for London. The Tate Modern is regarded as perhaps one of the best, if not the best, example of how the economic viability of a decommissioned power station can be reinstated by being adapted for reuse, although much of its mechanical history has sadly been lost. No attempt was made to preserve any of the original interior, or the machinery, as was done with the Thesen Island power station.

The old Ultimo power station in Sydney is now the Powerhouse Museum - the flagship venue of the Australian Museum of Applied Arts and Sciences (MAAS). Although it includes displays of industrial artefacts (such as the Boulton and Watt steam engine), no machinery original to the old power station was kept; the architects merely using the shell of the building and its interior void as display space, as is the case with the Tate Modern. The original Ultimo building is completely dwarfed by the later exhibition halls which were built on the site, whereas due to its huge volume, the Tate Modern stands as a landmark building on the River Thames. As mentioned earlier, the entire Powerhouse museum is to move to another location and the fate of the original building is unclear.

The situation for the Wapping Project was initially more encouraging in terms of the original machinery. The Wapping building, a hydraulic power station that had been close to falling down, was adapted for reuse as an arts centre and restaurant in 1977, but was sold and closed down at the end of 2013. Some of the original equipment remained in this power station, like the Turbine Hotel & Spa, but its future is now unclear. Bemoaning its fate, Moore (2013) states that, 'Places such as Wapping, once mixed and vital, will become wall-to-wall flats, completely uniform, culturally a complete desert.' This points to the importance of preserving industrial architectural heritage.

In Johannesburg, the old Jeppe Street Powerhouse was adapted for reuse by AngloGold Ashanti. By the year 2000 the building had endured around 25 years of degradation and dereliction and was illegally inhabited by around 300 squatters and vandals who by various means degraded the structure even further (The Forum Company, no date). Originally planned as their corporate headquarters, the developers demolished the Northern Boiler Hall to build the new 13000m² AngloGold Ashanti offices completed in 2009; this demolition having been approved by the South African Heritage Resources Agency (Hill, 2005). The remaining Turbine Hall is now used as a functions venue. No machinery was kept, but as the building was home to illegal squatters for many years, there was probably nothing left but the shell.

After 20 years of neglect by the City, what was there to be salvaged was probably due to some initial preservatory work done on the building in early 2002, namely the replacement of the roof and cleaning out of any rubble and leftovers from the previous illegal inhabitants (JDA, 2009). The architects also had to conduct some preliminary conservation work on the old Thesen Island Power Station to stabilise the building before deciding on its eventual typology. Extensive restoration work to the shell and the chimneys was done – see Chapter 4. Compare this to the Soweto Power Station, where the city allowed the building to fall into a state of complete dereliction, to the point where the building now has collapsed (2014) in its entirety (as discussed in Chapter 2). This is 'criminal negligence', according to Krige (2010), and another building with industrial architectural heritage has been lost forever in South Africa.

Thus it can be posited that the adaptive reuse project of the Thesen Island power station went much further than any of the precedents discussed. Not only was the exterior preserved along with the original features such as windows and doors, as well as the chimneys, but a large quantity of machinery, artefacts and documents were restored and can be found all though the hotel; these are key to the building's heritage value and *genius loci*

(Louw, 2016). Even the décor of the interior reflects the historical aspects of Knysna's timber and maritime heritage. The timber industry was the largest employer in the town and drove the local economy for many years (Louw 2015). As Holbrook (2013:64), when writing about the industrial town of Gent in Belgium, states,

'When a culture ceases to operate at this grand scale, the anxiety of what replaces the lost activity of extensive industry is palpable.'

It can therefore be concluded that CMAI went to extraordinary lengths to preserve the sense of place and cultural heritage along with industrial architectural heritage.

5.5. Was the history and heritage of the original structure (e.g. the former Thesen Island power station) appreciated and respected?

In the literature review and the precedent studies (Chapter 2) no other power station that had been adapted for reuse and had kept so much of the original structure and equipment could be found. The owner (2013) states that his brief to the architects was to save as much of the building and machinery as possible, and to 'strive for both functionality and flow' (as cited by Bisseker, 2011); an objective that this research has shown was successfully achieved.

Besides restoring almost all the original machinery, carefully repainted in its original colours (according to the old colour chart discovered in a cupboard), to the interior design reflective of the maritime and shipping history and heritage of Knysna and Thesen Island, to reusing the old wooden front doors, to displaying old photographs and charts to preserve its history, to reusing the yellowwood floor boarding as wall panelling, it is clear that both hotel owner (Lerm) and the architects (CMAI) went the extra mile to respect this building's heritage and to preserve and its history for generations to come.

As the literature states, an approach to adaptive reuse as a strategy to preserve industrial architectural heritage, according to Plevoets and Cleempoel (2011), is the strategic approach. Here the focus is on the process and strategies applied when adapting historical buildings for reuse. As Brooker and Stone (2004) note, the strategic approach starts with physical intervention. CMAI had to do some initial preservatory work to stabilise the building) but the most important and meaningful factor in adaptive reuse is the original building itself to preserve industrial architectural heritage. Both Mochado (1976) and Robert (1989) refer to the metaphor of a palimpsest; i.e. a 'layering' of the building in successive stages. As Mochado (1976:27) explains, remodelling (his term) is the process of striking a 'balance between the past and the future'. In this process, the past is the material which has

to be altered, and thus it of great significance – the past provides that which already ‘written’, viz. ‘the marked canvas on which each successive remodelling will find its own place’. Thus the past becomes a ‘package of sense’ of built up meaning to be accepted (maintained), transformed or suppressed (refused).’ This concurs with the literature review, whereby Eyüce and Eyüce (2010:426), state that a building that has been adapted for reuse affords a way to experience time; ‘a layering of present experiences over a faded past’.

This is precisely what CMAI did with the adaptive reuse of the Thesen Island power station, both the exterior and the interior. The past provided the canvas in the form of the extant building – ‘the package of sense’ (accepted) and then meaning (cultural and social) was laid down by the preservation and display of machinery, artefacts and documents (transformation).

‘When the alterations in the building’s content are of such a type that the buildings original or latest function is changed; then the building is refunctionalised, a different story is born, a new plot is composed out of the old words, a new interpretation has taken place” (Machado, 1976:27).

Riegl’s (1858-1905) theory of adaptive reuse is that architecture can have competing values and that certain values can be used in order to create a new feel for the adapted building. Vackier (2014) notes that these are important as using contrasting values such as heritage-value and newness-value can create an entirely new architectural experience. These values can be seen in this adaptive reuse project which preserves industrial architectural heritage.

As noted in Chapter 2, industrial heritage not only consists of factories (buildings and machines) but also all things connected to them: techniques, knowhow, archives etc. (Report of the Lyons Colloquy, 1987). The Report of the Lyons Colloquy (1987) further notes that industrial sites and workplaces, machines, artefacts, men and what they leave behind them have over time formed a *gestalt* of the many ways in which technology has influenced production, business, the landscape, and practices of life at work. As noted in the literature review, Moe (as cited by Carroon, 2010) states that preservation works to both protect and celebrate the evidence of the past. The wholesale removal of tangible history, viz. the machinery in the Tate Modern (UK) and The Turbine Hall (in Johannesburg) is arguable (see Chapter 2).

Although it created new spaces – the Turbine Hall became a dramatic entrance and display area and the boiler house was used as further gallery space – it is therefore argued that an important link to the past has been lost. Historic buildings are physical links to the past – it is

about saving the layers and layers of information about our lives and those of past generations, states Dimatteo (2012). San-Jose *et al.* (2006) state that today's generation is heir to this technological progress and advance. A space of industrial architectural heritage significance provides an immediate 'story or stories that build on our appreciation of our common and diverse histories and cultures' (Krige, 2010).

5.6. What heritage legislation had to be considered in the adaptive reuse project?

Louw (2013) notes that surprisingly, the biggest challenge in terms of approval was from the local Knysna municipality, and took almost three years. It is interesting to note that the approvals in terms of the plans and heritage went smoothly, a process that Louw (2013) describes as 'surprisingly fluid'. The specifics of the proposal for the adaptive reuse of the power station as a hotel went before the then National Monuments Council and were approved with conditions (Fisher, 2011), calling for the appointment of specialists to the team and the preservation of large representative sections of the plant, surprisingly. This was in terms of the then National Monuments Act (28 of 1969). Hart and Halkett (1998) noted in their report for CMAI that the building fell within the jurisdiction of the (then) National Monuments Act (a building older than 50 years was protected), but interestingly, the machinery within was not protected. It is only due to the vision of owner Lerm (2013) and a committed team of architects at CMAI that so much of the machinery and other artefacts have been preserved for future generations to enjoy.

5.7. What characteristics and attributes of the site of the former power station influenced the decision making and final design for the Turbine Hotel & Spa?

According to Louw (2014), this particular site was chosen for its historic appeal (in the former industrial enclave of the island), its location on Thesen Islands (prime waterfront land), and its immense potential for redevelopment. The former Thesen Island power station was located in what is now called Harbour Town – the commercial hub of the island, comprising many buildings which were adapted for reuse (see Chapter 4).

On a small peninsula created by the Thesen Islands waterways, the site had perfect access to jetties, pedestrian pathways and bridges – all of which lead to the residential section of the islands and the concomitant parks or 'green spaces'. In an enviable location at the head of Sawtooth Lane it has wraparound lagoon and canal views, and is in close proximity to Harbour Town, with restaurants on the waterfront and a range of specialist shops and boutiques. The footprint of the structure is approximately 2000 m².

Taking Hart and Halkett's (1998) report to heart, where they highlighted the old power station as the most significant building on the island, and called for this building's industrial architectural heritage to be retained, the only problem that remained was regarding the typology of the new building, as discussed earlier. Eventually it was decided to add a hospitality mix to Harbour Town, the new hotel complementing the proposed restaurants and bars on the island, and also adding a new tourist destination.

5.8. What characteristics, attributes and/or sections of the original building (i.e. the decommissioned power station) were deemed to be preservation worthy, and why?

The entire building was deemed worthy of preservation, and the developers and owners of the hotel-to-be sought to adapt for reuse as much of the existing building as possible – an objective that was successfully achieved. The building was older than 50 years, and in terms of the then National Monuments Act, 1969, it was protected.

In this case of adapted reuse, it is clear that it is the antitheses of Sullivan's maxim that 'form (ever) follows function' – the form has remained but the building has an entirely new function.



Figure 5-1: Before and after initial preservatory work to the power station

5.9. What sections and elements of the old building were preserved and incorporated into the new building, i.e. The Turbine Hotel & Spa?

The decision was taken early on by the developer to retain and reuse, as far as possible, all existing materials. Thus all the architectural decisions taken by the architects and builders were made after discussion and approval of the owner. The entire envelope and a significant portion of the internal structure and materials were reused. More than 300m³ of

brickwork and more than 150m³ of concrete were retained (Louw, 2016).

Elements of the original structure that were retained for reuse consist of almost all of the existing building 'shell', foundations, floors, walls, the roof structure and the internal staircases (Louw, 2013). Although the existing external clay brick walls were quite porous and brittle, to retain their specific aesthetic quality, new cavities were only built in private areas, while a non-toxic, low-VOC breathable paint was used in public areas, which allowed moisture out of the existing walls without letting rain in (Louw, 2016).

In addition, all the windows and their casings, doors and steel beams in the building were reused, as was the original yellowwood flooring, reused as wall panelling. In addition, the original front doors, which were found abandoned in a nearby shed, were refurbished and reused. Decisions regarding openings were made by examining what was already there, and if it could be reused, and these were designed into the plans from the beginning (Louw, 2016). The original chimneys were also refurbished and remain intact, as well as over 300 pieces of original machinery which were restored. Although the chimneys, completely refurbished, serve no function today, they are iconic of power stations and serve as permanent and significant reminders that this hotel was once a power station.



Figure 5-2: View of the old power station post adaptive reuse as the Turbine Hotel & Spa (source: Van Schalkwyk, no date)

The integrity of heritage places of industrial architectural heritage and the authenticity of the features that demonstrate their values are crucial to their preservation (Balderstone, 2012). Other authors are in agreement, whereby it is noted that obsolete buildings form part of a community's tangible past, and that they can also offer opportunities for a community's future (Rocchi, 2015); in this instance as an employer in the hospitality and tourism

industries. As Rocchi (2015) states, old buildings have intrinsic value (e.g. higher quality materials), are maybe better built than a brand-new building, and that when an old building is demolished, society's collective memory is destroyed. Plevoets and Cleempoel (2011), Giebler *et al.* (2009) and Rabun and Kelso (2009) stress the importance of an interdisciplinary approach to the adaptive reuse of historical buildings; i.e. the need for conservation, planning, architecture, heritage awareness, specialist skills etc. This was the case with the power station building adapted for reuse as the Thesen Island Hotel & Spa.

5.10. Which principles of sustainable and ecological design were employed in the project?

Adaptive reuse is a strategy that can be used to achieve sustainability goals. As mentioned in the Literature Review (Chapter 2), sustainable or ecological design seeks to conform to the environment and substantially reduce energy consumption and add to quality of life (Brundtland Report, 1987; Regenerative Leadership Institute, no date). Louw (2013) states that as project architect, he looked to the Brundtland Commission (1987) and the Burra Charter (as 'best practise') for guidance for this project. Morandotti *et al.* (2013) note that sustainability is a necessary requirement in industrial architectural heritage preservation. As Louw (2008) states,

'... there are numerous international examples of old power stations and industrial buildings that have been adapted for reuse, but none that are particularly aimed at being ecologically designed'.

Preservation of the built heritage has to meet modern needs in a changing world, and a fundamental necessity has become its sustainability. Regarding industrial heritage architecture in South Africa, Caverney (2013) notes,

'The only way we are going to retain the standard of maintenance on our [industrial] heritage buildings is by letting them become sustainably reused projects'.

There are many strategies that the architects employed, not only the through the initial design phases but also through the construction of the Turbine Hotel & Spa and finally in the functioning of the completed project. With regard to existing materials almost the entire envelope of the building was retained for reuse in-situ (Louw, 2013). This constitutes the largest energy saving result by respecting the embodied energy of the materials and structure already on site. Further principles of sustainable and ecological design (as discussed in Chapter 4) are summarised below:

- Material liberated during and by construction was crushed and recycled for use.
- Waste generated by construction was used as 'back fill' in situ.
- Firebricks left over from the (partial) demolition of one the boilers' were used as unplastered internal walls then bagged to minimise the use of cement.
- Many original windows and their casings, doors and steel beams were retained (Louw, 2013).
- All original machinery in-situ was retained so that strip out costs and resources were saved.
- Most of the new built work was done with dry walling which is much quicker and easier to install than bricks and mortar, less labour intensive, and can easily be removed or modified to suit future needs.
- Harmful materials such as asbestos, PVC and paints containing VOCs were also considered. Asbestos was treated and sealed in-situ as opposed to removal, which carries its own risks and energy concerns and cannot be recycled. By retaining it in situ this harmful material was prevented from reaching landfills.
- The use of PVC piping (made from finite fossil fuels) was mitigated by specifying exposed, but insulated, galvanised conducting.
- Non-toxic, low-VOC paint was used.
- Washing (of site and materials) was done by means of biodegradable products.
- Local materials and labour were used as far as possible.
- New timber required was sourced from sustainably managed plantations.
- Passive design strategies were implemented by the architect, such as the optimal positioning of bedrooms and public spaces (with openable windows) in order to maximise natural lighting and ventilation; thus the need for artificial lighting and ventilation was kept to a minimum.
- Passive design is enabled by designing the structure with a form of porosity: large windows and openings coupled with roof ventilators allow cooling summer breezes to penetrate throughout.
- Unwanted solar heat gain from undesirable western isolation is shielded by brise soleil or shading devices.
- Extensive use of skylights allow the ingress of natural light which greatly reduces the need for artificial lighting.
- Where artificial lighting was necessary, efficient CFL and LED lighting fixtures were used and all external lighting fixtures are solar powered.
- All appliances in the hotel are of the 'energy-efficient' variety.

- Flue-less or non-ventilated gas fireplaces, as opposed to electric heating, provide heating in winter, and most of the cooking in the kitchen is done on gas hobs.
- To save energy for water heating and to save water, the Turbine Hotel & Spa opted for a central boiler with a circulating water system.
- No under floor heating or heated towel rails were provided to minimise the use of electricity.
- All bedrooms and connecting passageways are fitted with automatic switch-off devices.
- The principal of thermal mass was also used, which is crucial to good solar heating design, and the existing masonry walls and the concrete floor slabs that were added to the building provide a convenient source of thermal mass. These also aid in soundproofing the building.
- Various water saving strategies were employed, such as water-saving shower roses, dual-flush toilets and water-efficient taps; rainwater is harvested off the roofs and used for irrigation and as backup water for the hotel; stored in a purpose built underground reservoir.
- Artificial lawns and hardy indigenous plants were installed to minimise water use around the building and further promote water efficiency.

In terms of renewable power there exist no initiatives implemented at the Turbine Hotel & Spa such as solar or PV panels. This is unfortunate because this would greatly reduce the dependence of the hotel on the national power grid which is already under huge pressure nation-wide and is the single biggest risk factor to growth in South Africa, according to the International Monetary Fund (IMF) (as cited by Fin24, 2015). Louw (2008) states, 'the possibility of using photovoltaic panels was investigated, but due to the cost restraints no renewable energy systems will be installed at this stage'. However Louw (2013) did mention that if costs come down in the near future, these could be installed if the running budget allows for it (Louw, 2008; Ludick, 2013). This is a huge and unfortunate missed opportunity to increase the sustainability and energy independence of the structure, and one could posit that at least the wiring for PV could have been installed for future use.

The climatic conditions of Knysna also played a major role in deciding the design of the final typology in order to accommodate passive design strategies in CMAI's quest for sustainability. The architects took cognisance of the fact that according to Holm (1996), Knysna is situated within the 'Garden Route Climatic Zone'. In this macro-climatic zone, summers are hot and winters are usually wet and cold, with a high average humidity level of 72% and significant precipitation. The outside living area is situated on the north eastern

corner, which is advantageous since the winter winds are mostly south easterly, while the cooling summer breezes are mostly easterly and south easterly (Louw, 2013). 'The outside living area and most of the bedrooms can take advantage of the summer breezes while being screened from the winter winds' (Louw, 2008). One can see that the architects were immediately concerned with adapting the power station as a hotel to meet the climatic conditions of the area, and by doing this they knew that they could maximise the climatic potential of the site thereby reducing the need and demand for energy supplied by the national grid. These strategies comply with the principles of government's National Framework for Sustainable Development (People, Planet, Prosperity) (2008) - a guide to sustainable development.

Adaptive reuse, if implemented correctly, supports the concepts of sustainability and respects the built heritage (Australian Department of the Environment & Heritage, 2004). Shipley *et al.* (2006) concur, stating that industrial buildings have important aesthetic, cultural and economic resources and thus should be preserved. Eyuce and Eyuce (2010) state that industrial buildings specifically, especially those built during the 19th century, possess remarkable architectural and tectonic features. Bullen and Love (2010) note in this regard that preservation promotes sustainability principles because it prevents irreversible loss of heritage, protects valuable environmental resources and promotes the judicious use of natural capital, including renewable and non-renewable resources. This is indeed evident in the new Turbine Hotel & Spa. CMAI's approach to ecological design is in line with the literature whereby an ecological approach for an adaptive reuse project considers the social, economic and biophysical interplay, and encourages decision making at each phase of the architectural design process to reduce negative impacts on the environment and the health of the occupants, without compromising the bottom line (Jarzombek, 2003; Carroon, 2010; Bullen & Love, 2010; Cantell, 2005) while being resilient and regenerative (Du Plessis, 2012; Ahern, 2011; Louw, 2013).

5.11. What challenges were encountered through the adaptive reuse of this structure, and how were they overcome?

5.11.1 Structure

Waterproofing the existing structure posed a serious challenge, as did the original existing walls which were very brittle and fragile. As Louw (2013) states, 'they are not cavity walls, so having to put a new structure in the existing envelope and changing [an essentially] single story [building] into three stories ... that was a big challenge'. Further, putting new steel columns in and casting new concrete slabs in the existing shell also represented difficult

tasks.

5.11.2 Machinery and historical artefacts

Another challenge arose with the old boiler in the power station. Lerm (2013) notes that the biggest headache regarding the boiler was 'to get the rights to cut it in half to be able to use the space for conference facilities and also for two bedrooms'. The fact that the boiler is still there is testament to the owner and architect's dedication to preserve history for future generations. Although it can be questioned as to why Western Cape Heritage did not require curatorship or a management plan for the archival documents (including wage registers, old plans and meticulous mechanical drawings) as they represent important and interesting pieces of social history, they are now all in the possession of the new owner – the man who had the vision to keep as much of the machinery as possible in his new hotel. Safely stored, they are available to that select body of interested power station engineers and enthusiasts.

It should be noted that in the adaptive reuse of the Bankside Power Station to the Tate Modern, no internal machinery was preserved. Sydney Powerhouse Museum preserved only a few pieces of machinery and relocated them to an exhibition hall, and in the Wapping Project, the original boiler was kept in the new restaurant but as this facility has now closed, its future remains uncertain. In the Turbine Hall (adapted for reuse from the Jeppe Street Power Station) attempts were made to preserve some artefacts showing its history; photographs of the temporary denizens of the Turbine Hall – vagrants, homeless and hungry people - which are exhibited in the main dining hall (Taitz, 2008). The basement is another area where this period in the building's life is evident. Graffiti from the former occupants was retained as a tangible reminder of turmoil and dereliction (Taitz, 2008) and the various stages of the building's life.

As noted in the Literature Review, the Report of the Lyons Colloquy (1987) states that industrial sites and workplaces, machines, artefacts, men and what they leave behind them have over time formed a *gestalt* of the many ways in which technology has influenced production, business, the landscape, and practices of life at work. They are thus significant, not only for historians, but for the communities that worked and lived in their shadows. Groarke (2009) concurs, stating that adapted reuse, as a strategy to preserve industrial architectural heritage, should embrace a comprehensive and integrated approach and restore the integrity and interconnectedness of built and natural environments.

5.11.3 Pollution and other environmental issues

There existed a host of pollution and environmental concerns on Thesen Island, ranging from habitat destruction (the Knysna seahorse), and a contaminated site (ground pollution due to the chemicals used to treat wood such as creosote and asbestos in one wing). In the years since the island had closed for business, the abandoned derelict buildings, machinery and waste dumps increasingly turned into an eyesore and a health hazard due to pollution and wood treatment chemicals had been leaching into the ground for decades (Mason, 2010). Furthermore, there were toxic pools of creosote leachate and copper-chrome-arsenic (Mulder & Aupais, 2008) used in the previous timber treatment industry on the island.

It is interesting to note that as only workers accessed the island, the wider community was not aware of the extent of the extensive ground pollution on the island (Caverney, 2013; Louw, 2013) and environmentalists seemed to focus on the fate of the endangered seahorse found in the lagoon, a subject provoking a sustained and bitter controversy at the time. However, the air pollution from the power house's chimneys was clearly visible to the whole of the Knysna but this ceased on decommissioning of the power station.

It was then established that there was no specific environmental management plan for the ecologically sensitive lagoon, and neither was there any extant data concerning the impact of the pollution on Thesen Island for the town or the lagoon. CMAI therefore commissioned a scientific profile of the lagoon, establishing a 'baseline study of the status quo' for presentation to the authorities (Mulder & Aupais, 2008). As Fisher (2011) notes, the condition of the island at that time would not pass the muster of a contemporary environmental impact assessment (EIAs), in terms of the National Environmental Management Act (No, 107 of 1998).

Louw (2013) notes that there was a lot of input from the public, as well as experts in various fields, ranging from water-based plants, inter-tidal plants, land-based plants, birds, marine life, water flow, etc. However, once this baseline study had been established in the most stringent and accurate way possible, CMAI knew that there would exist no credible way to blame any new development for existing environmental or ecological impact problems created by the previous custodians of the island over approximately 100 years of development and operations.

As the IAEA (2011) notes, many disused industrial sites have historical contamination problems from decades of poorly controlled industrial activities. This is line with Slavin's (2011) remark that developers must consider the significant upfront costs of a development.

Brebbia and Pulselli (2014) point to the fact that former industrial areas are decayed or derelict and often polluted, and this influences the quality of life of the surrounding neighbourhoods. Cantell (2005) and Bullen and Love (2010) also state the costs of rehabilitating a polluted site as a barrier to the adaptive reuse of a building, while Shipley *et al.* (2006) note that site remediation is a constraint due to the uncertainty of the extent and nature of pollution problems and can result in one of the largest costs looming over any adaptive reuse project.

The literature review in Chapter 2 also noted society's increased agitation for cleaner and 'green' environments, as well as sustainability. Various authors note the current emphasis on environmental problems world-wide and the need to sustain natural resources (Balderstone, 2012; Cantell, 2005; Carroon, 2010). CMAI are members of the Green Building Council of South Africa, although development on Thesen Island had commenced prior to the establishment of the GBCSA; they were pioneers of 'green' even before the establishment of formal bodies such as GBCSA. As noted in Chapter 2, South Africa's National Environmental Management Act (1998), in the preamble, specifically uses the term 'sustainable development', and states that,

'... sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of decisions to ensure that development serves present and future generations'

Although it took some eight years, the CMAI proposals for the development were accepted in 1999, and one of the main reason for this successful outcome was the collaborative effort and constant communication CMAI put into the process of allaying both scientific experts' and the communities' fears. CMAI tenaciously pursued their vision of a development that was 'environmentally acceptable and economically sustainable' (Louw, 2013). Morandotti *et al.*, 2013; Langston *et al.*, 2007; Carroon, 2010; and Slater as cited by Maile, 2014, all concur that sustainable building is driven by environmental concerns. Louw (2013) notes that ground pollution problems were costly but necessary to rectify, and the subsequent development of the island is proof that pollution and contamination problems can be overcome provided a proper assessment of the situation is undertaken and funds for rehabilitation are anticipated and budgeted for.

One must therefore conclude that not many developers would be able to spend eight years engaging the stakeholders in such confrontational and controversial matters, and thus it is testament to CMAI that they were able to placate the various parties, as well as comply with

stringent legislation to achieve their vision and present a development that was both environmentally friendly and sustainable in the long term. These findings concur with the literature whereby Shipley *et al.* (2006:508) state that developers and architects 'have to have the vision, the ability to see the opportunity were others do not'; i.e. personal drive and commitment to achieve a vision trumps all other considerations.

5.11.4 Traffic congestion impacting on tourism

The pollution problem, although most pronounced on Thesen Island itself, was not limited to the island. The town of Knysna and its residents were also suffering as a result of increasing traffic congestion, including lumber trucks rolling through the town to gain access to the island, as well as the concomitant air and noise pollution (Hart & Halkett, 1998; Mulder & Aupais, 2008; Caverney, 2013). The Barlows Group had continued softwood, plywood and milling operations on the island until 1998 and the power station continued to operate until 2001 (Hart & Halkett, 1998; Caverney, 2013; Louw 2013). This was a serious threat to one of South Africa's favourite tourist towns, and was deterring visitors to the town and thus loss of revenue for the businesses situated there and the town coffers, as well as loss of jobs as tourism establishments scaled down, or closed completely. Thus pollution problems had a socioeconomic impact on the town and the surrounding communities as well as posing a health threat.

These problems were solved by the decommissioning of the power station, the cessation of timber logging activities on the island, and moving the milling factory off the island and nearer the source of the timber. Caverney (2013) notes there was an immediate reaction to this, as tourism numbers picked up, and residents remarked on the 'clean' air they were now breathing. Chapter 2 noted how society's health was affected by pollution from industrial operations in cities, leading to increased agitation for cleaner, and ultimately 'greener', environments.

5.11.5 Legal issues

As noted previously, significant legal hurdles presented themselves at the planning stage of the development. It took eight years to comply with more than 100 stringent conditions (including rezoning approval) governing the entire construction management process to ensure ecological, engineering, aesthetic, social and cultural criteria (Urban Futures, 2006). Louw (2013) points out that there were 'experts for everything you can image, from water-based plants, inter-tidal plants, land-based plants, birds, marine life, water flow etc.' The adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa could

not commence until all legalities for the whole island had been finalised. Further, as the power station on Thesen Island was over 50 years old, it was protected in terms of the prevailing legislation).

Approval was finally granted in December 1998, some eight years after initial proposals were mooted, but besides the strict and complex conditions, it also involved 25 alterations to CMAI's master plan (Louw, 2013.) Legal issues which arise when a historic industrial building is adapted for reuse are noted in the literature as a significant barrier for developers (Couto & Couto, 2010; Heritage Council of Victoria, 2013; Arts, Heritage and the Gaeltacht [Ireland], 2012). However, with tenacity and persistence, this adaptive reuse project shows that they can be overcome.

5.11.6 Topography of the building

A worrying factor on Thesen Island was its low-lying topography, being an average of only 1.3 metres above sea level (Mulder & Aupais, 2008; Hart & Halkett, 1998). Concerns about global warming and climate change were already an issue at that time. The problem was solved by creating '19 man-made islands' which are all linked via a series and network of '21 arched bridges and surrounded by 25ha of tidal waterways' (Mulder & Aupais, 2008; Urban Futures, 2006). Further, there were no bulk services such as sewers etc., which had also contributed to the environmental problems. Eventually the municipality of Knysna allowed bulk services to be put in but only after many changes to the masterplan.

5.11.7 Financial backing

The redevelopment of the 90ha island, as well as ensuring that it remained economically sustainable into the future, would require substantial capital. As noted, 'financial institutions were extremely wary of backing this project because of previous disasters that had plagued marinas and waterfront developments in South Africa' (Mulder & Aupais, 2008). However, if the project was to proceed, finance had to be raised. The problem was solved by the formation of the TIDC (Thesen Islands Development Company) with six private investors (Mulder & Aupais, 2008) who then managed to pre-sell residential units amounting to R70 million. This pre-sell enabled the TIDC to raise private finance from Investec Bank, giving the entire island development the financial green light (Mulder & Aupais, 2008).

It should be noted that there was no government sponsorship for this development. As noted in Chapter 2, the Bankside Power Station adaptive reuse project proceeded with a 12 million pound grant from the English Partnerships Regeneration Agency in 1996, and the Wapping project also was adapted for reuse with private money (Tate, no date). The turbine

hall of the Jeppe power station was adapted for reuse as Ashanti Gold's head office – again private money at work, and after 25 years of the city allowing the building to degrade and become derelict (Taitz, 2008; Krige, 2010). However, the Australian Government's Better Cities Program of the early 1990s (and matched federal funding) was the financial stimulus that facilitated the nation's economic growth through the 1990s and 2000s and thus paved the way for the development of the Ultimo power station.

In Cape Town, the various buildings mentioned in Chapter 2 in Woodstock/Salt River were adapted for reuse using private finance; however, no bank would finance the V&A waterfront redevelopment, and money from Transnet (a government SOE) provided the necessary funding (van Zyl, 2005).

5.11.8 Creating confidence in the development

Another area of concern was the 'issue of confidence' (Mulder & Aupais, 2008). As these authors point out, waterfront developments and marinas are almost always 'beset by environmental and monetary problems, and [negative] public sentiment' (Mulder & Aupais, 2008). CMAI needed to ensure that all stakeholders had full confidence in their redevelopment plans. As noted in the case study (Chapter 4) there was significant resistance to the redevelopment of the island; both the community of Knysna and its surrounds, and from conservation and environmental experts.

What can be noted is that Louw (2013) refers to all these objectors as part of the CMAI team – thus they took a collaborative and consultative approach with all the stakeholders, and systematically sought to find solutions to overcome the objections, achieve consensus, and ultimately instil confidence. Although the process was lengthy, taking some eight years of research and planning, this shows the commitment and persistence of the developers in complying with the more than 100 stringent conditions governing the entire construction management process to ensure compliance with ecological, engineering, aesthetic, social and cultural criteria (Urban Futures, 2006). There were also 25 alterations to the master plan (Louw, 2013) to ensure that all stakeholders were satisfied. An important move was to conduct a baseline study of the status quo of the island, which took four years (Urban Futures, 2006). CMAI knew that with this report, there would exist no credible way to blame any new development for existing environmental or ecological impact problems created by the previous custodians of the island over approximately 100 years of industrial operations. Today, an EIA would need to be commissioned in terms of the National Environmental Management Act (107/1998).

As noted in the literature, the negative impact of a derelict and unmanaged industrial buildings has a profound effect on society - it holds down economic value, reduces confidence, may attract anti-social behaviour, and gives a message of failure and a lack of care and responsibility (IAEA, 2011; Scadden, 2001). Moreover, such dereliction alters the public's perception of the building and encourages society to favour demolition (Fourie & Visage, 2010).

5.12. What role did the community play, and to what degree were they involved in the adaptive reuse process? (Socioeconomic issues)

Originally the community of Knysna (along with many conservationists and experts in various scientific fields) was against CMAI's proposed development plans for the island, as discussed in Chapter 4 – The Case Study. Once development was underway, the development contributed greatly in terms of job creation and temporary and permanent employment.

The Municipals Systems Act (2000) now requires municipalities to produce IDPs – Integrated Development Plans - which address the planning inefficiencies of the past, and must focus more on the social and economic dimensions of development. A full 10 years before the promulgation of this Act, in 1990, CMAI was commissioned by Barloworld to investigate sustainable development possibilities for Thesen Island (Mulder & Aupais, 2008; Urban Futures, 2006). In particular, such a development needed to mitigate the socioeconomic issue that had arisen with the closure of operations on the island. The Thesen Company was at the time the single largest employer in the town of Knysna and in the region (Mulder & Aupais, 2008). Circa 1990, it is estimated that more than 800 people worked at the timber mill each day (Mulder & Aupais, 2008), presenting a critical challenge for the developers to mitigate.

Although milling operations had ceased on the island, the factory was relocated closer to the source of timber and many factory workers chose to relocate. According to Louw (2013), the policy of CMAI from the beginning was to employ local labour, and many factory workers were retrained and reskilled to become builders, plasterers and painters etc. In the six-year construction phase, R150 million was injected into the Knysna economy per year, and 75% of the temporary jobs and 93% of the permanent jobs created were from the local community – people who lived in the area (Mulder & Aupais, 2008).

Louw (2013) notes that many small contracting businesses were established during this

phase and that many continued once the development was completed; examples are landscaping and garden services, delivery services, IT, household maintenance companies, etc.- all contributing to the local economy and in turn employing their own workers. Mulder and Aupais, in 2008, state that more than 10 000 workers had been employed on the island, thus the project was a large generator of jobs. As noted in the literature review, Bullen and Love (2011) state that a barrier to adaptive reuse is the unfamiliarity of tradespeople with older materials. CMAI chose rather to retain existing workers where possible, and in addition, they had allowed for the reskilling of jobs to meet the needs of a modern post-industrial services economy. The community thus played a pivotal role in terms of job creation and the sub-contracting of services. Louw (2013) also notes that involving the local community created an opportunity for the architects to draw on local knowledge and skills. Community commitment is cited by Johnson (2004) as a factor determining the success of an adaptive reuse project.

With the completion of the residential units came the need for domestic workers – a job category not previously needed and thus a creator of new jobs. Post adaptive reuse, the new Turbine Hotel & Spa required a large staff of locally sourced and trained hospitality workers – skills which are transferable to the hospitality and tourism industries anywhere in South Africa (Lerm, 2013). This also added an entire category of workers not previously needed on the island. As Caverney (2013) notes, tourism had become the mainstay of the town;

‘The lagoon is our biggest drawcard, people come here to see the lagoon. The forests are next, and after that the holiday resort [town of Knysna]’.

As a new and interesting tourism destination from which to explore the lagoon, forests and town, the Turbine Hotel & Spa has added greatly to the economy of Knysna and creating jobs, bringing both South African and international tourists. Tourists to Thesen Island, with its many shops and restaurants, also needed hospitality workers. Caverney (2013) also notes that shopkeepers in the town of Knysna benefitted from the increase in both residents and tourists on the island. Thus Thesen Island became the largest employer and payer of rates and taxes (Mulder & Aupais, 2008). According to Caveney (2013), Thesen Island remains the largest employer and payer of rates and taxes in the municipality of Knysna. The money received by the municipality enables them to increase their service delivery to the poorer community members, which is an imperative in terms of the current Municipals Systems Act (2000).

How CMAI overcame the socioeconomic challenges presented by the Thesen Island Power station situated with the broader context of the redevelopment of the entire island is echoed in the literature (Chapter 2). Bullen and Love (2011) declare that heritage buildings form an integral part of a nation's social capital. Similarly, Eyuce and Eyuce (2010) state that the built form is a reflection of the social and economic conditions of a culture or of an era of the physical environment. Morandotti *et al.* (2013) note that built heritage preservation has to meet the contemporary needs of a changing world, in terms of social, economic and environmental needs, and Bullen and Love (2011) state that preserving heritage buildings provides economic, cultural and social benefits. Brebbia and Pulselli (2014) point to the fact that decayed industrial buildings pose a threat to the community, not only in terms of concomitant pollution, but they have a deleterious effect on criminality and are safety and health hazards.

It can therefore be concluded that the socioeconomic issues that arose with the adaptive reuse of the Thesen Island power station, and indeed the whole island development, were not only dealt with at the commencement of the project (i.e. the 800 extant workers) but the project created a significant amount of jobs during the six-year construction phase, mainly permanent jobs and many small businesses for the community – an imperative in South Africa today with a large unemployed and unskilled population. Post-development, the island continues to create jobs in the services, hospitality and tourism industries, and transfers these skills to workers enabling them to progress economically. Furthermore, Thesen Island, with its mix of commercial, retail, residential and hospitality buildings, is the single largest employer in the area and the single largest contributor to the municipality in terms of rates and taxes. A portion of this money is ploughed back into community upliftment in terms of service delivery, in accordance with the Municipals Systems Act (2000) and LED - an approach towards economic development which allows and encourages local people to work together to achieve sustainable economic growth and development thereby bringing economic benefits and improved quality of life for all residents in a local municipal area, as discussed in Chapter 2.

5.13. Is this project unique, and if so, in what way?

The successful adaptive reuse of the Thesen Island power station is unique because of its mixed typology – it is not just a hotel, but also functions as a 'living museum' and art gallery with an ever changing display. It is a destination for steam enthusiasts, art lovers and scholars of architecture, engineering and construction (Caverney, 2013; Lerm, 2013). According to Lerm (2013), the old Thesen Island power station is the only one in the world

that has been turned into a hotel, and is also a heritage site. This adaptive reuse project of an old power station is one of the few projects that sought to preserve almost all the existing machinery *in situ* (Wapping kept only the boiler) as well as the entire building envelope. Further, it is on an island, and in terms of size was a very small power station. It is also unique because it was originally a wood-fired power station.

The entire development of Thesen Island is unique in that it created an entire mixed-use (offices, shops, hotel, restaurants) precinct on an island, adapting for reuse many old buildings and seamlessly integrating them into a new build residential area to live, work and play; attracting permanent and seasonal residents, as well as local and international tourists.

This concurs with what was found in the literature. Old buildings are good for business, especially the business of a city (Neely, 2014); thus they have economic value. The results of the preservation of industrial architectural heritage can be both financially successful and deliver attractive redevelopment opportunities (IAEA, 2011). According to Fourie and Visagie (2011) the impact of successful redevelopment and reuse is experienced beyond the boundaries of the heritage asset itself and provides a socioeconomic boost for the community. Thus the adaptive reuse of a preservation-worthy industrial building with architectural heritage has a positive socioeconomic impact on a community; property values are likely to rise with successful redevelopment, reemployment of existing workers could be a driving force for redevelopment; educational opportunities are extended; and there are significant increased tax revenues and municipal income. Thesen Island remains the single largest contributor to the municipality in terms of rates and taxes (Caverney, 2013). Costonis (1989) posits that the preservation of industrial architectural buildings is not defined by how well society preserves them as museum pieces, but by how well they are afforded the chance to be functional again.

5.14. Conclusion

The adaptive reuse of the many buildings in the Harbour Town area of Thesen Island (including the old power station) represent some of the most successful adaptive reuse projects undertaken in South Africa at the time, i.e. circa 2000.

It can be concluded that this adaptive reuse project, as a strategy to preserve industrial architectural heritage, was successful as not only was the external architecture respected, celebrated and preserved for future generations to enjoy, but much of the original machinery and various documents and artefacts were also restored and are on display in the hotel. Thus the hotel can be considered a 'living' museum. It is now a major tourist attraction for

the town, and the Thesen Island development continues to create and sustain jobs for the community and it's the largest contributor in terms of rates and taxes to the municipality of Knysna.

'The Turbine Hotel & Spa is an example of how previously derelict and obsolete structures can be sensibly adapted to house a variety of functions. It also illustrates how the adaptive reuse of existing materials and structures can preserve the sense of history associated with the building while responding to the surrounding environment in a positive manner' (Louw, 2011).

Preserving industrial architectural heritage has the potential to affirm diverse cultures and shape national character. As Fraser (2007) notes, 'Our heritage celebrates our achievements and contributes to redressing past inequities.' In every branch of industry - printing, textiles, building, smelting, engineering - development has progressed in stages and each step, however precarious, was a necessary link in the chain; an element in the community's 'collective memory' which helps one better to understand the present in order to prepare for the future (Report of the Lyon Colloquy, 1987).

Now, post intervention by CMAI, these buildings, through the process of adaptive reuse, have their industrial architectural heritage preserved, and in their new incarnations contribute to the socioeconomic development of the community, as well as attracting significant numbers of both local and international tourists. This project therefore shows that adaptive reuse is a successful strategy to preserve significant industrial architectural heritage.

The following chapter is the concluding chapter to this research. Chapter 6 provides a summary of all the chapters, details some lessons learnt from this investigation, as well as proffering some suggestions to further the cause of adaptive reuse of industrial buildings with architectural heritage in South Africa, and a few recommendations for future research.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

'Environmental benefits, combined with energy savings and the social advantage of recycling a valued heritage place make adaptive reuse of historic buildings an essential component of sustainable development' (Australian Department of the Environment and Heritage, 2004).

6.1. Introduction

This concluding chapter provides a brief summary of Chapters 1-5 of this research study, reiterating the problem statement and the main research question. This chapter then discusses some lessons learnt from this case study on the adaptive reuse of the Thesen Island power station to the Turbine Hotel & Spa to further the cause of adaptive reuse as a strategy to preserve industrial architectural heritage in South Africa and to answer the main research question: Is adaptive reuse a successful strategy to preserve industrial architectural heritage?

As this research has shown, adaptive reuse can be viewed as a successful strategy that can be employed by the built environment professionals to preserve industrial architectural heritage; one that fits within the necessary broader context of sustainable design and development. The topic of sustainable design was introduced as modern times necessitate a design approach that considers and mitigates prevailing (and future) environmental, economic and social concerns. In effect, the case for adaptive reuse here is argued; a complex, and sometimes controversial, opportunity for the built environment, rather than demolition or allowing buildings to decline into a state of total disrepair. The limitations of the research are then detailed, and the chapter concludes with recommendations for future research.

6.2. Summary of chapters

6.2.1 Chapter 1: Introduction to the research

Chapter 1 discussed the background to the Thesen Island redevelopment project on Thesen Island, Knysna, Western Cape Province of South Africa. Specifically the former toxic industrial enclave of the island with its many industrial buildings, including the wood-fired decommissioned power station, and the history of the shipping and timber industries over the past 100 years, was discussed. The rationale for the research was discussed, i.e. that many industrial buildings in South Africa with significant architectural heritage have become obsolete and are being demolished or become derelict for various reasons, *inter alia*,

economic viability, social and environmental constraints, pollution, changing technology and demographics, regime change, cost of repairs and maintenance, etc.

The research question was then noted as.

Is adaptive reuse a successful strategy to preserve industrial architectural heritage?

The objective of this research was to explore the strategy of adaptive reuse, by means of a case study – the adaptive reuse of the Thesen Island power station to the Turbine Hotel & Spa - to determine if adaptive reuse is a successful strategy to preserve industrial architectural heritage.

6.2.2 Chapter 2: Literature review

This chapter comprised the literature review. How societal concerns for the sustainability of the built environment and the concomitant need to preserve heritage arose to prominence in the 20th century, largely due to environmental concerns such as climate change, finite resources, high costs of energy etc., were discussed. Why buildings become obsolete, and the various organisations internationally and abroad that work towards preserving them were briefly discussed, including legislation in South Africa and the Burra Charter for 'best practise' guidelines on the preservation of architectural industrial heritage buildings.

Adaptive reuse was defined, and this was followed by a discussion of both historical and contemporary theories of adaptive reuse, specifically as applied to the preservation of industrial architectural heritage. This was followed by a brief history of adaptive reuse in South Africa where industrial buildings have been adapted for reuse, such as the Maboneng Newtown districts in Johannesburg, and the Woodstock/Salt River and V&A districts in Cape Town. The role of legislation in South Africa was interrogated regarding adaptive reuse of significant industrial architectural heritage, and what heritage means in South Africa. Pertinent here is the emphasis the National Heritage Resources Act (1999) places on the association of a person or particular community or communities with a place or precinct as a measure of cultural significance. Thus heritage significance resides in the whole (the precinct), its landscape, as well as the parts (the buildings).

Why decommissioned power stations, with their considerable industrial architectural heritage, make such good candidates for adaptive reuse was discussed, specifically with reference to the precedents examined by CMAI (for the adaptive reuse of the Thesen Island power station); viz. Bankside, Ultimo and Wapping. The Jeppe Street power station in

Newtown (adapted for reuse as the Turbine Hall) and the Orlando power station in Soweto (now a collapsed ruin) were also briefly discussed. The literature review was an iterative process, and as new information came to light during the interviews for the case studies, more theory was researched and added to the literature review.

6.2.3 Chapter 3: Research methodology

This chapter noted the research methodology i.e. qualitative in nature. The research method used was a case study – the adaptive reuse of the Thesen Island power station to the Turbine Hotel & Spa. After consulting the literature regarding methods of qualitative research, this method was deemed the most appropriate in order to extract a depth and richness of information. The primary research question was stated as follows:

Is adaptive reuse a successful strategy for preserving industrial architecture heritage?

The data collection methods were stated as observation, interviews and documentary evidence. The scope of the study was noted, as were the target population and sampling process (non-probability judgemental and snowball methods). The sub-research questions were then posed, and to be able to elicit information to answer the research questions, it was noted that a semi-structured questionnaire would be used for the interviews. The data analysis method, i.e. thematic analysis, was explained – the main theme being adaptive reuse as a strategy for industrial architectural heritage preservation. Sub-themes comprised the project's site, typology, sustainability, financial viability and socioeconomic impact. Validity, reliability and trustworthiness of research were then elaborated on. The important concept of ethics was discussed, noting that ethical clearance to conduct the research had been obtained from the University.

6.2.4 Chapter 4: Case study

This chapter comprises the primary findings for the case study on the adaptive reuse of the former Thesen Island power station to the Turbine Hotel & Spa in order to preserve its industrial architectural heritage. All the significant events of this project, as an integral part of the greater Thesen Island redevelopment by CMAI, i.e. from decommissioning in 2001 to the day that the Turbine Hotel & Spa opened for business in 2010 were discussed. For the interviews with key stakeholders, a semi-structured questionnaire was used in order to answer all the research questions. As information came to light, it was necessary to go back to, and add to, the literature review in Chapter 2.

The challenges this adaptive reuse project presented the developers were noted and discussed. The architectural paradigm and the typological debate were discussed in some detail as this laid the ground work for not only the adaptive reuse of the power station but for the development of other buildings in close proximity to the power station in the new Harbour Town development area of Thesen Island in order to preserve industrial architectural heritage. It is important to note that the adaptive reuse of the power station to the Thesen Island Turbine Hotel & Spa cannot be divorced from the broader context of the development of the whole island, specifically Harbour Town, and thus some of the other buildings in close proximity to the new hotel which were also adapted for reuse were also discussed (Appendix C).

6.2.5 Chapter 5: Analysis of findings

In this chapter the sub-research questions were used as a framework to examine how this project succeeded in using adaptive reuse as a strategy to preserve industrial architectural heritage. Whilst conducting the interviews for the case study (Chapter 4), further information regarding the many challenges the architects faced were revealed. In Chapter 5, how these challenges were successfully overcome formed part of the data analysis within this framework of sub-research questions.

It can be concluded that this adaptive reuse project, as a strategy to preserve industrial architectural heritage, was successful as not only was the external architecture respected, celebrated and preserved for future generations to enjoy, but much of the original machinery and various documents and artefacts were also restored and are on display in the hotel. Thus the hotel can be considered a 'living' museum. It is now a major tourist attraction for the town, and the Thesen Island development continues to create and sustain jobs for the community and it is the largest contributor in terms of rates and taxes to the municipality of Knysna.

6.3. Lessons learnt

Drawing on the findings of the case study in Chapter 4, the analysis of the findings in Chapter 5, and the literature review in Chapter 2, the case for adaptive reuse as a strategy to preserve industrial architectural heritage is argued. The following sub-sections note own views on what the drivers for adaptive reuse should be, and what lessons can be learnt from the case study regarding the adaptive reuse of the Thesen Island power station to the Turbine Hotel & Spa as a successful strategy to preserve industrial architectural heritage.

6.3.1 Strategy of choice

Adaptive reuse should be the strategy of choice for any existing building that has become obsolete, not only those with historical value or importance. Chusid (as cited by Wilkinson, Remøy & Langston, 2014) notes that obsolete buildings are a 'mine' of raw materials for new projects, referring to them as 'urban ore'. Obsolescence in fact paves the way for adaptive reuse (Langston *et al.*, 2007) requiring vision and creativity to look at the space and configure it in a new and sustainable way to suit the building's new typology and programme. This is in line with the literature on adaptive reuse, in that any demolition is tantamount to the eradication of 'collective memory' (Eyüce & Eyüce, 2010). Davey (1985b:21) notes that, 'the inherited urban fabric is our most direct and immediate contact with our history.' Older buildings represent an important aesthetic, cultural and economic resource, and they are a non-renewable resource (Morandotti, *et al.*, 2013; Larkham; 1996; Cantell, 2005).

Clearly, the CMAI team had both the vision, creativity and tenacity (through a 10-year period) needed to adapt a power station to a hotel. At no stage was demolition considered, although as Louw (2013) remarked:

'It would have been so much easier to knock it down and start all over again!'

According to Eyüce and Eyüce (2010:426), a building that has been adapted for reuse affords a way to experience time; 'a layering of present experiences over a faded past'. It is posited that this palimpsest analogy for buildings is a powerful tool to show the importance of the built past for the collection of society's memory. These authors state that one of the most important aims of adaptive reuse projects is to ensure continuity with the past, without discarding the requirements of the contemporary spatial standards, and that buildings which have been adapted for reuse can only but enhance the visual quality of the built past (Eyüce & Eyüce, 2010). However, there has been a consistent undervaluing of South Africa's industrial architecture and heritage, to the point of malicious neglect (Krige, 2010).

As Warrington (2015) notes,

'Heritage sites capture the imagination of buyers disillusioned with the cookie cutter sameness of new builds ...'

In fact, so desirable are industrial buildings adapted for reuse as residential units, that there are now examples of new builds that mimic the 'industrial look' or the New York 'loft living' vernacular. A case in point here is The Lofts in Houghton, Johannesburg, a recently completed apartment block built in the industrial aesthetic with raw timber, raw brick walls,

exposed steel beams and exposed lighting conduits (Meintjies, 2014). A downtown experience recreated in an affluent neighbourhood. Fortunately, though, authentic lofts are available as adaptive reuse projects such as the Artisan Lofts in the Maboneng District in Newtown, Johannesburg (Herimbi, 2014).

6.3.2 Preserving industrial architectural heritage and history

According to Warren Kerr, the President of the Royal Australian Institute of Architects (2014), the best way to preserve heritage structures is to give them a sympathetic new use. The preservation of these buildings is important as it maintains their intrinsic heritage and cultural values (Louw, 2013; Bullen & Love, 2009; Langston *et al.*, 2007). Adaptive reuse, if implemented correctly, supports and respects the built heritage (Australian Department of the Environment & Heritage, 2004).

'When done well, adaptive reuse can restore and maintain the heritage significance of a building and help us to ensure its survival; heritage buildings that are sympathetically recycled can continue to be used and appreciated' (Australian Government: Department of the Environment and Heritage, 2004).

The Australian Department of the Environment and Heritage (2004) notes that the adaptive reuse of a historical building should have minimal impact on the heritage status of the building and its setting. However, if the function of a building changes, e.g. from the power station to a hotel, one could question the term 'minimal impact'. This research has shown that the new Thesen Island hotel had a minimal impact on the power station's heritage, as the exterior is clearly visible as the original power station. The original chimney stacks were kept as further reminders of the building's industrial past, and the interior displays a significant quantity of the original machinery and documentation. This concurs with the literature, in that Fourie (2011) states that reconstructed surroundings of industrial spaces and the concomitant machinery allows the older generation to tell stories to the younger generation of 'the way we were'. This is also in line with Alois Riegl (1858-1905) theory in that the Thesen Island power station can be viewed as a monument – a 'monument' to an age of technology now passed, and a 'monument' to the socioeconomic prosperity of a small town far from a major metropolis.

In terms of cultural heritage, the National Heritage Resources Act (NHRA) of 1999 states that the measures of cultural significance are: aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. At least five of these measures relate to industrial buildings, depending on how beautiful you think the buildings

are (Krige, 2010), and most apply to the Thesen Island Hotel & Spa. As noted in the literature, the architecture of older buildings has a character that significantly contributes to the culture of a society, whilst conserving aspects of its history for future generations. As Falser (2001) notes, adaptive reuse is not about 'freezing' heritage, but rather integrating heritage conservation management and preservation within the overall sustainable development process, thus promoting a better understanding and tolerance of cultural diversity; a particularly relevant point for South Africa with its multicultural population and government's directive of LED. Morandotti *et al.* (2013) points out that 'social memory' is less respectful than history, and that traditions are embedded in preservation-worthy buildings; thus they should be preserved for future generations as tangible memory.

6.3.3 Teamwork

As Louw (2013) reflected on the project during the interviews, he noted that it was challenging yet rewarding. A contributor to the success of the project, Louw (2013) noted, was a committed team of professionals, contractors, sub-contractors and suppliers who 'all became somewhat precious about the building and went the extra mile wherever they could'. Louw (2013) further attributed the success of the project to 'a brave client 'who was willing to take on the challenge of adapting for reuse the Thesen Island power station and was committed to preserving its industrial architectural heritage. One must also note that the project architect (Louw) and the developer (CMAI) were completely committed to preserving industrial architectural heritage. One can posit that this is a prerequisite for a successful adaptive reuse project.

'The new building really gives one a sense of the history of the old power station and the Thesen Sawmill, and it's great to have played a part in preserving some of this heritage. More and more developers are seeing the potential (and beauty) of old industrial structures and are willing to work through the challenges of preserving them – the more examples they have to refer to, the better!' (Louw, as cited by *Leading Architecture*, 2011).

Louw (2016) cites Stratton (2000:30) as noting how important a 'vision', or 'sixth sense' is in determining the potential for adaptive reuse. In this project, a combination of far-sighted, enlightened and tenacious owners, developers and architects came together on a journey which lasted almost 10 years, and despite many objections from the public and authorities, this development was eventually realised, and now, almost 10 years after completion, it remains a successful and profitable venture, and a heritage beacon for Knysna.

6.3.4 Extending the life span of the building

Most building types are known to have a relatively shorter functional life compared to their physical properties and become obsolete for a variety of reasons, as discussed in Chapter 2. Many CBDs of large cities in South Africa and their industrial areas on the fringes are left with many prematurely vacant, obsolete, and historic buildings – with what Langston *et al.* (2007) refer to as ‘residual life’ embedded in them. But these urban areas are drivers of our economy – South Africa’s metros account for over 60% of the country’s GDP (Karolia 2015). It is thus vital that South Africa’s cities grow to meet financial, environmental and socioeconomic needs. So it no wonder that visionary developers like Liebmann of Propertuity (Arts on Main), TPS (architects for the Turbine Hall), and Mulder of CMAI (Thesen Island, Knysna) see the adaptive reuse potential of obsolete (often historic) properties, and this thus extends their life-span. Policy makers have long recognised the desirability of having more residences (and facilities – live, work, play) in the downtown areas as a catalyst for central business revitalisation (Shiple *et al.*, 2006). This is line with the literature on traditional neighbourhood design, or New Urbanism (Chapter 2), and the revitalisation of inner city precincts by authors Slavin and Brown (2011), IAEA (2011), Plevoets and Cleempoel (2011) and Morandotti *et al.* (2013).

Although no empirical research relating to the life span of buildings in South Africa could be found, various researchers (in the USA, UK, and Hong Kong) as cited by Langston *et al.* (2007) estimate that existing city buildings have at least a further 30-50 years of life (Petersdorff *et al.*, 2004; Nye & Rydin, 2006; Hakkinen, 2007). Shah and Kumar (2005) state that with adaptive reuse, the life of buildings could extend in excess of 80 years. Adaptive reuse can thus play a pivotal role in extending the life of a building, whilst still meeting the increasing demand for space. Further, as has been shown by the examples of Durban, Cape Town and Johannesburg, it leads to regeneration of the built environment; particularly inner city or fringe city precincts that in South Africa fall prey to vandalism and illegal squatting. This is line with the literature on urban decay and revitalising inner city precincts (Visagie & Fourie, 2011; Cantell, 2005; Quaghebeur, 2000).

6.3.5 Future uses/potential uses

As mentioned in the section discussing the typology of the redevelopment, and demonstrating forward thinking, Louw (2008, 2013) notes that the planning of the building allows for some flexibility in the future as all the hotel rooms have been designed with a kitchenette in place so that the hotel could be sold off as individual units in the future.

Further, Louw (2008) notes that most of the common areas are also flexible enough to be used for various purposes. Most architects would be focused only on the present project, but Louw had the vision to see that this building may even be able to satisfy future programmes. This is an important point because it shows the versatility of adaptive reuse as a design paradigm. In an adaptive reuse project, often radical architectural interventions are required for modern needs, as are interventions for accessibility, modern bathrooms, security, safety and ease of management. Morandotti *et al.* (2013) state that ignoring modern necessities is not possible and the risk of 'embalmed' memories is present should modern necessities not be implemented. This is in line with Viollet-le-Duc's contention that the success of a reused building is based on the functionality of the adaptation whilst still maintaining the essence of the particular building.

It is important to note that this building may be able to support future adaptations and typologies as a sort of 'built form chameleon' and in 100 years time, or sooner, it may again have be adapted for reuse in some way, whilst still preserving its historical significance.

6.3.6 Economic considerations

In pure economic terms though, 'building green' in line with the goals of sustainability does cost more initially (Maile, as cited by Slater, 2014; Kerswill, as cited by Vermuelen, 2014) The GBCSA [no date] agrees, noting that 'going green' can add up to 20% on initial building costs. These initial costs must be balanced with savings over the life of the building owing to reduced running costs (Vermuelen, 2014), higher rent yields (Bainbridge, 2015), and tourism revenue potential (Li, 2002).

There will always be friction between economics and social concerns. On the one hand, developers want to maximise profits and minimise time, and often it is easier, less cumbersome, and quicker to demolish and build anew. Louw (2013) concurs with this sentiment, stating that it would have been so much easier to demolish and start all over again. Conservationists, on the other hand, want to see history preserved. Maile (as cited by Slater, 2014) further states that sustainably designed and constructed buildings should see a return on investment in about five years, although there are many variables to this equation.

It is beyond the scope of this thesis to delve into actual financial facts and figures, and furthermore, there is little empirical research to be found on the financial costs of adaptive reuse in South Africa as naturally owners and developers need to maintain a competitive edge and thus keep such information confidential. As Mason (2005) notes, 'the economics

of preservation is an embryonic field compared with research in other economics disciplines...'. Although this author is discussing economics from an American perspective, one could posit that the sentiment holds true globally and in South Africa.

However, some Canadian research regarding the cost of adaptive reuse of historical buildings was found; i.e. by Shipley *et al.* (2006). Whilst acknowledging that this research is almost 10 years old, and was conducted in Canada and not necessarily applicable to the South African context, in this research these authors state that owners, bankers and developers generally argue that the costs of renovating and adapting these buildings for new uses is too high, and that demolition of existing buildings and replacement with new structures is the only way for investors to make a reasonable profit from the use of the land (Shipley *et al.*, 2006). Mason (2005) concurs in his research into historical preservation/conservation. As noted previously, Snaddon and Freemantle (2015) state:

'With re-urbanisation comes new business ... locations and innovation districts, and the redevelopment of old industrial locations into corporate and enterprise hubs'
(Snaddon & Freemantle, 2015).

Furthermore banks are reluctant to finance such projects, deeming the risk to be high, and requiring a substantial portion of the development to be pre-sold before advancing any money. This is exactly what happened to CMAI for the Thesen Island redevelopment, where 75% of the residential units had to be sold before they could obtain bank finance (as discussed in Chapter 4).

Shipley *et al.* (2006) also note the difficulty in finding people willing to share detailed financial information, but they were able to state that the return of investment for heritage redevelopment is almost always higher – rents are higher. This could be because adaptive reuse of industrial buildings is currently gaining traction, affording a culturally diverse, 'vibey' area within which to live, play, or work, and attracting a wealthier person seeking a cosmopolitan lifestyle. In the case of the Turbine Hotel & Spa, it is a 5-star hotel, thus attracting the high-end visitor, and the lucrative business conference market.

Shipley *et al.* (2006) found that the industry standard ROI amongst developers ranged between 20-30%, while others expected only 10-15%. One developer they interviewed claimed an ROI of 22% over only an eight month period, while another developer claimed that a 'conversion' cost almost twice as much as that of a new build (Shipley *et al.*, 2006). However, as Cantell (2005) states, industrial buildings will always have added costs associated with their reuse, but if anticipated early on, they can be successfully dealt with

through careful planning, creativity and architectural design. As Brooks (as cited by Vermeulen, 2015) states, buildings which have been adapted for reuse are generally more pleasant to work in and tend to attract higher-end tenants. Malan (2015), a green building consultant with Agama Energy, a consulting engineering company providing sustainability design services in the built environment sector, states that the sustainability aspects implemented in such buildings have a positive environmental and financial impact. Maile (as cited by Slater, 2014) concurs, noting that there are savings (owing to reduced running costs) over the life of the building.

As detailed in the previous chapter, CMAI used economic impact modelling as a tool to forecast a development's potential impact on the local and regional economy. However, Urban Econ (the company employed to conduct the economic impact modelling) did not disclose any financials, but for public consumption they were able to state that the employment opportunities during the construction and operational phases (until 2005) were higher than anticipated (Urban Futures, 2009). Louw (2014) also points to the substantial sum of rates and taxes paid to the council of Knysna – money the council would not have had if Thesen Island had not been redeveloped; thus in line with government's LED policy and upliftment of the community as discussed in Chapter 2.

According to the annual Africa Region Property and Construction Handbook of 2010 (Pillay, 2010, as cited by Louw, 2016), the cost for a new five-star hotel built at the same time as the Turbine Hotel would have been ZAR1 600,000-ZAR2 200,000 (excluding professional fees, VAT, furniture, fittings and equipment). Therefore a hotel with 24 rooms would have cost, on average, ZAR45 600,000 excluding VAT (Louw, 2016). According to Louw (2016), the total construction cost for the adaptive reuse of the Turbine Hotel & Spa (including the original acquisition cost), was approximately ZAR26 500,000 excluding VAT, professional fees, furniture, fittings and equipment.

The Turbine Hotel's construction period was exactly one year, an extraordinary short time for a 24-room 5-star hotel, with the restaurant and bar being fast-tracked and completed four months early in time for the FIFA Soccer World cup in 2010 (Louw, 2016). This concurs with the literature that adaptive reuse makes financial sense in terms of saving construction time. Langston (2008) cites Johnson (1996) in stating that adaptive reuse typically takes half to three-quarters of the time necessary for a new build.

Louw (2016) cites Hodges (2014), the main contractor (Cape Island Construction) as stating that a new build project of the same size (2618m²) would have taken them 18-24 months. It

should be noted that Greg Hodge has much experience in building hotels. These figures concur with Langston (2008) as discussed in Chapter 2. Thus one can conclude that adaptive reuse is faster than a new build, saving time and money.

According to Louw (2016), the owner of the Turbine Hotel is working on a return of investment figure which is currently at 15%, and equates to a payback period of 10-12 years if finance costs are not taken into account. This concurs with Malan (2015) regarding positive financials, and Maile (as cited by Slater, 2014) and Malan (2015) that (commercial) buildings adapted for reuse should start to see a return on investment after only five years.

The following table, which Louw (2016) compiled from various interviews and the data gathered from the relevant project documentation, provides a comparison between the adaptive reuse case study of the Turbine Hotel & Spa and a theoretical new-build hotel of the same size and specification within the same conditions.

Table 6:1: Comparison of costs – newly built 5-Star hotel and Turbine Hotel & Spa (Louw, 2016)

ITEM	STANDARD NEWLY BUILT FIVE-STAR HOTEL	TURBINE HOTEL & SPA
Total building area	2618 m ²	2618 m ²
Construction cost	ZAR45 600,000.00	ZAR26 500,000.00
Construction time	18-24 months	12 months
Return on investment and payback period (%)	8.5 (25-30 years?)	15 (10-12 years)
Estimated monthly energy use	35,000 kWh	28,000 kWh
Labour cost as a percentage of construction cost	40	50

This table clearly highlights the financial advantages of adaptive reuse.

Any development project has to show the promise of making money. South Africa has a small, but growing, group of dynamic and creative investors and stakeholders in the built environment profession with a passion for older buildings, and one must conclude that they do, in fact, realise an ROI and that adaptive reuse is profitable and thus makes financial sense. It is clear that the Thesen Island project has been immensely successful in terms of ROI.

For society, adaptive reuse can contribute to job creation, skills transfer and empowerment, as well as using skilled artisans for preservation tactics who trained in fields of expertise not used in modern buildings.

Further, it must be noted that there are reasons for adaptive reuse which one cannot reduce them to mere financials; *inter alia*, commitment, pride, imagination, integrity, tenacity, innovation, and dedication to preserve the past – one cannot put a price on this. The adaptive reuse of the old Thesen Island Power Station to the Turbine Hotel & Spa is the perfect example where all these forces came together to produce a world-class facility.

6.3.7 Sustainable/ecological design is compatible with adaptive reuse

What is clear in the literature is that adaptive reuse almost always yields fewer environmental impacts than a new construction when comparing buildings of similar size and function (National Trust for Historic Preservation, 2011). As Moe (2007) states, the 'greenest' building that exists is one that has already been built. According to the report commissioned by this body, savings in an adapted for reuse building comprise between 4 and 46 percent over new buildings when four categories of impact (climate change, human health, ecosystem quality and resource depletion) are amortized. Conejos and Langston (2010) concur, noting that adaptive reuse is a better option to building anew in terms of embodied energy, greenhouse gas emissions and construction waste.

Morandotti *et al.* (2013) concur, noting that sustainability is a necessary requirement in heritage preservation. Preservation of the built heritage has to meet modern needs in a changing world, and a fundamental necessity has become its sustainability. According to these authors, an effective strategy for the sustainable preservation of heritage buildings must consider its function and performance optimisation in terms of energy and efficiency both now and in the long-term (Morandotti *et al.*, 2013). Therefore the knowledge of the building typography, morphology, materials and preservation status are paramount. Bullen and Love (2010) note in this regard that preservation promotes sustainability principles because it prevents irreversible loss of heritage, protects valuable environmental resources and promotes the judicious use of natural capital, including renewable and non-renewable resources.

As discussed in Chapter 2 – The Literature Review, sustainable, or ecological, design seeks to conform to the environment and substantially reduce energy consumption and add to quality of life (Regenerative Leadership Institute, no date). The Brundtland Commission (as discussed in Chapter 2) uses the following definition of sustainable development:

‘... development that meets the needs of the present without compromising the ability of future generations to meet their own needs’

The National Framework for Sustainable Development (Department of Environmental Affairs, no date) is the overarching framework for sustainable development in South Africa and identifies the five priority areas for intervention. Although discussed in Chapter 2, it is worth repeating here:

- Enhancing systems for integrated planning and implementation.
- Sustaining our ecosystems and using natural resources efficiently.
- Economic development via investing in sustainable infrastructure.
- Creating sustainable human settlements.
- Responding appropriately to emerging human development, economic and environmental challenges.

Louw (2013) calls his approach to sustainability the ‘ecological approach’. This concurs with the literature in that utilising an ecological design philosophy for an adaptive reuse project, which considers the social, economic and biophysical interplay, encourages decision making at each phase of the architectural design process, and reduces negative impacts on the environment and the health of the occupants, without compromising the bottom line (Jarzombek, 2003; Carroon, 2010; Bullen & Love, 2010; Cantell, 2005) while being resilient and regenerative (Du Plessis, 2012; Ahern, 2011; Louw, 2013).

This research has shown that CMAI (guided by the Burra Charter, as discussed in Chapter 2) in their adaptive reuse of the old Thesen Island power station, have acknowledged and complied with these principles, and from the case study in Chapter 4, it is clear that CMAI went to extraordinary lengths to ensure sustainable building practices and implemented a variety of energy saving strategies. As an alternative to our ever-increasing throw-away society, adaptive reuse offers a sustainable redevelopment tactic with existing infrastructure and materials (Cantell, 2005). Thus in terms of sustainability, this adaptive reuse project is successful.

6.3.8 Adds tourism potential

Adaptive reuse of industrial buildings in South Africa can provide a niche segment of the tourism industry, which is a significant creator of jobs. According to the National Department of Tourism (2012), tourism accounts for one in every 12 jobs in South Africa. Derek Hanekom (Minister of Tourism) said in early 2015 that South Africa aimed at bringing in 12-

million international tourist arrivals by 2017-18 and increasing domestic holiday-makers from 2.8-million in 2014 to 4.1-million by 2020 (as cited by SA Commercial Prop News, 2015). Tourism is regarded as a modern-day engine of growth and is one of the largest industries globally. In 2012, G20 heads of state recognised tourism as a driver of growth and development, as well as a sector that has the potential to spur global economic recovery (National Tourism Sector Strategy, 2011, as cited by South Africa.info, no date). Historical sites of industrial architectural significance draw large numbers of visitors to the countries that host them, providing a healthy tourism revenue (Global Heritage Fund, 2002).

Already the South African tourism industry is segmented to cater for niche markets such as business tourism (relevant to the Turbine Hotel & Spa), cultural, paleo-tourism and adventure tourism (relevant to the Soweto power station cooling towers) etc., and it is posited that a niche market for industrial tourism could be created. Mixing cultural tourism and industrial tourism, the Maboneng and Newtown districts are tourism magnets. One can see much of Newtown's industrial architectural heritage preserved in the adapted reuse of the Potato Sheds, the Market Building, the workers' compound etc. Adaptive reuse of these buildings celebrates and supports the preservation of industrial architectural heritage, and hopefully will encourage more adaptive reuse of inner city buildings as theatres, museums, offices and apartments, etc. for social and cultural upliftment, as well contributing to the tourism coffers of the state.

Close to the Maboneng precinct is Newtown in Johannesburg, site of the old Jeppe Street Power Station, adapted for reuse as The Turbine Hall – now capitalising on business tourism for conferences, and using the massive interior volume and its bars and restaurants for functions (banquets, weddings, fashion shows etc.) and for cultural events such as art exhibitions, live shows, etc. Newtown and the Maboneng Precinct have formed the new 'hub' of Johannesburg, and both are well attended by local and international visitors; especially over weekends, or for specific art exhibitions etc., just as the V&A Waterfront has become the premier tourist destination in Cape Town. An interesting observation about obsolete industrial buildings, according to Dimatteo (2012), is that they can be great incubators for entrepreneurship, innovation and experimentation.

The similar situation exists at the Turbine Hotel & Spa, situated within the Harbour Town precinct; it affords visitors a chance to see all the adapted buildings within a comfortable walking distance, as well as eat in the many restaurants and take in the cultural aspects, such as the surrounding art galleries. Tangible links to the past are abundant, diverse and clearly evident. As tourism contributes directly and indirectly to the economy (7.9% of GDP

in 2009), and with the government aiming to increase the 2009 baseline of R189,4-billion to R499-billion by 2020 (National Department of Tourism, 2012), one could argue that greater awareness of South Africa's industrial architectural heritage could contribute significantly to making these figures a reality.

These findings concur with the literature (see Chapter 2) where it was noted that industrial tourism is a growing trend worldwide (Otgaar, 2010; Jansirani & Mangai, 2013; European Parliament, 2013). According to the developer/ operator of the Turbine Hotel, the hotel has experienced an increase in occupancy over the past year (2015) of 35% and an occupancy figure of 83% for their busiest month (as cited by Louw, 2016). Having been told that Knysna 'had enough hotels' (Caverney, 2013), it is clear that the uniqueness of this hotel and its industrial heritage remain hugely popular, and according to Engel (2014, as cited by Louw, 2016), the owner, it is 'outperforming other local hotels'. Clearly a case where the preservation of industrial heritage has added tourism dollars to the town's (and owner's) coffers.

6.3.9 Government and legislation

Legislation is worth nothing unless appreciated, respected, implemented and enforced. Although the National Heritage Resources Act (1999) was promulgated to protect heritage in all its forms, including the built environment, the question remains as to what is 'culturally significant', and to whom? One could posit that increasingly, the manifold repositories and dynamics of memory in South Africa are being reshaped by political change. This is a situation that does bode well for adaptive reuse of the built environment in South Africa.

The SAHRA, as the implementing body for the Act, perhaps lack the resources to enforce this legislation. As noted in Chapter 2, the SAHRA relies on the public to bring to their attention buildings which are at risk, and this implies that they are a reactive, rather than a proactive, organisation. The SAHRA annual report for 2014 states the following:

'Considering the complexity of South Africa's often painful history, it is also likely that the country's collective heritage estate can be inequitably diverse and potentially divisive' (SAHRA Annual Report, 2014:19)

They further acknowledge that the PHRAs lack the required skills, knowledge and funds to enforce the Act, and that there is a lack of resources (skills, knowledge and expertise) to ensure legal compliance. This means that often a developer will pay the fine imposed for demolition of historical buildings if he/she stands to reap substantial profits in the long run as

it is cheaper than having to work around legislation! Often the local authority will grant permission for demolition if they anticipate a substantial future revenue stream (rates and taxes) from the new development. Chapter 2 specifically pointed out the fact that many buildings (including those with industrial architectural heritage) are being lost in South Africa Brink, 2008; Coetzer, 2011; Fraser, 2007; Jacobs, 2015; Krige, 2010; Lipman, 2006; Louw & Fisher, 2011; Mare, 2012; McCulloch, 2012; Moolman, 2010; Nomico & Sanders, 2003; Picton-Seymour, 1977; Taitz, 2008; Quaghebeur, 2000; Charlton, 2015; Hart & Halkett, 1998; Worth, 1998; Visagie & Fourie, 2011).

As Louw (2016) explains, legislation and 'red tape' could have been a major obstacle to overcome, as applications had to be submitted to *inter alia* the Thesen Islands Design Review Panel, the Thesen Islands Homeowners Association, the Thesen Islands Commercial Owners Association, the immediate neighbours, Knysna Municipality (which required exhaustive negotiations regarding energy use, parking and augmentation levies) and Heritage Western Cape – all of which tested the team's endurance and commitment, but again, the tenacity of the team ensured a successful outcome. It is hoped that built environment professionals in South Africa do not see legislation as an obstacle to adaptive reuse precluding development as this project shows that it can be overcome with a successful, economically viable result.

6.3.10 Public apathy

The SAHRA relies on the public to nominate buildings to be considered as National Heritage Sites. The Heritage Portal (2015) notes that there have been more than 300 demolitions of significant buildings since January 2013, and various historical buildings have been downgraded; i.e. lost their status as heritage buildings. Picton-Seymour (1989) notes an 'uncountable number of obsolete industrial buildings' that have been demolished indiscriminately in urban (and rural) areas over the years in South Africa, where often just photographs remain as the only tangible link to the past. The previous section noted many authors lamenting the fact that many buildings in South Africa are being demolished or left to decay to the extent that they are no longer salvageable.

It should be noted that other than a few interested individuals like Philip Caverney of the Knysna Historical Society, and academics Hart and Halkett, there was no public clamour for the power station or the surrounding buildings to be kept intact. It seems the locals were just pleased that the power station had ceased operations with its concomitant airborne emissions which were polluting the town. However, this could be because the power station was situated on an island, thus geographically divorced from the actual town. As soon as

redevelopment of the island was mooted, the community and other bodies and organisations protested vigorously against any form of development, with objections seemingly centred on the survival of the Knysna seahorse. No 'body' as such clamoured for the adaptive reuse or the preservation of the power station other than a few individual members of the Knysna Historical Society (Caverny, 2013) and the academics Hart and Halkett. This clash lasted almost eight years, before CMAI were able to overcome all the objections to the development; again testament to the tenacity of the CMAI team and the owner of the hotel-to-be.

What is needed, as Chapter 2 notes, is more appreciation of the inherent characteristics of South Africa's old buildings and how they should be valued as contributing to heritage and what that means for society. As noted in Chapter 2, a historic building is one that gives us a,

'... sense of wonder and makes us want to know more about the people and culture that produced it. It has architectural, aesthetic, historic, documentary, archaeological, economic, social and even political and spiritual or symbolic values; but the first impact is always emotional, for it is a symbol of our cultural identity and continuity, part of our heritage' (Fielden, 1982:1).

This research for this project has shown that old buildings are underappreciated in every sense by the public, but once it is announced that they will be demolished, or adapted for reuse, various bodies (in this case environmental) agitate against development; and not without good reason. This view concurs with the literature, as Visagie and Fourie (2011) note that industrial heritage is unlikely to match the current public perception that old buildings have no value without a continued campaign of access and education. Läufer and Mavunganidze (2009) call for awareness campaigns, educational programs and tougher legislation to make the reuse of industrial structures sustainable and make them become part of the urban lifestyle. This is needed to challenge the prevalent view in South Africa that this period of history is 'best forgotten'. Without far-sighted owners and developers of buildings, committed professionals in the built environment, and more public awareness of the state of old buildings in South Africa and why they should be preserved, the status quo will remain.

6.3.11 Power stations as adaptive reuse projects with specific reference to South Africa's obsolete power stations

Although it can be posited that most building types lend themselves for adaptive reuse (with imagination and commitment to preservation), it is the defunct or vacant industrial facilities

(such as power plants) in cities and on the fringes of cities that afford the greatest potential for adaptive reuse projects. Obsolete industrial buildings like factories, warehouses, power plants, shipyards and etc., generally have a large surface area, and these large volumes of space are enclosed by large wall surfaces. As Cantacuzino (1989:8) states, 'industrial buildings have large occupying volumes enclosed by brick wall, frequently [comprising a] whole city block'. Further, industrial buildings are often large span buildings, so their floor surfaces are not obstructed by structural elements, thus lending themselves suitable for additional slabs and mezzanine floors (Eyüce & Eyüce, 2010). Thus the external wall surfaces can be converted to a wide variety of solid-void organisation schemes in line with the requirements of the adaptive reuse project design and programme.

However, not all industrial projects are as straightforward as is the case with factory-type buildings. It is certainly not the case with power stations, although this case study and the precedents discussed are proof that they can be adapted. As noted, Woodyard [no date] states that they represent 'tons of institutional pride'. This should always be the case, lest they suffer a fate similar to the Orlando Power Station. South Africa has some of these behemoths standing forlorn and neglected, the Athlone Power Station in Cape Town being a prime example, whilst the future of Rooiwal and Pretoria West stations is not clear. As at the time writing (2014 - to early 2015), both Rooiwal and Pretoria West were operating below full efficiency requiring prohibitively expensive maintenance costs, although there was also talk of getting these ageing and crippled power stations up and running efficiently with the help of the private sector due to the demand for energy (Rekord North, 2015). As far as could be ascertained, no final plans have yet to be made, but if costs to bring them back into full service through sale or lease to the private sector are not financially viable, and if they face the threat of decommissioning, one wonders what will become of them. In March 2017, Eskom announced the closure of four power stations; i.e. Kriel, Komati, Hendrina and Camden power station, all in Mpumalanga, but no dates for decommissioning were given.

6.4. Limitations of the research

Any research project is limited in terms of funds available, time and resources. A notable limitation is the absence of an interview with SAHRA's provincial arm of the Western Cape Province (Heritage Western Cape) to obtain their current views. Heritage Western Cape was only established in January 2003, in terms of the National Heritage Resources Act, Act 25 of 1999, after the Thesen Island project has commenced. At the time of the Thesen Island development, the previous National Monuments Act was still in force, thus the Thesen Island development pre-dated the NHRA and the establishment of SAHRA. The only

document available at the SAHRA now is Hart and Halkett's (1989) report entitled, 'An assessment of heritage resources on Thesen Island: Knysna' which is available on their website. It is not clear where information dating from the NMC is now kept.

It is a further limitation of the research that no former employees of the power station, ship building or logging industry could be found to assess whether the island and its buildings had any cultural significance for them.

6.5. Recommendations for future research

- The obvious extension to this thesis is to investigate and document what happens to the Athlone Power Station (plans currently being mooted, as at 2014), and the Pretoria West Power Station and Rooiwal Power Station in Pretoria, as well as the four power stations that Eskom announced in 2017 would be closed.
- In time, should any of these power stations be adapted for reuse, their models of adaptive reuse can be compared and contrasted with the Thesen Island adaptive reuse project for the Turbine Hotel & Spa as the benchmark for a successful adaptation of a power station to highlight lessons learnt and progress made in the adaptive reuse of obsolete power stations.
- The Thesen Island project can be also be compared and contrasted with other adaptive reuse projects regarding other industrial buildings in South Africa to further the adaptive reuse body of knowledge in South Africa, specifically as a successful strategy to preserve a building's heritage and history.
- Research can be undertaken to examine the ROI of adaptive reuse projects to see how South African figures compare with Shipley *et al.*'s (2006) research where the ROI ranged from 10% to 30% for such projects.
- Industrial tourism (visiting old or existing, working factories) is a growing trend worldwide, especially in places such as Japan, Detroit's Motor City in the USA, cigar and sugar mills in Cuba, and the former soviet factories in Tallinn – the capital of Estonia, for example. Tallinn's Old Town is a UNESCO World Cultural Heritage Site, where old abandoned Soviet factories (or what remains of them) sit side by side with modern architecture. The old buildings are used for craft markets, pop-up shops, art galleries, etc. The possibility of working in conjunction with SAHRA and the tourism authorities can be investigated as a means of showcasing both old and new architecture (as they often exist side by side), conserving industrial remains, and job creation.
- Job creation is particularly important in South Africa as unemployment is high, and tourism is a major contributor to South Africa's GDP. Highlighting our industrial heritage

may provoke more adaptive reuse of industrial buildings, or at the very least conserve what remains as part of our built heritage and history.

6.6. Conclusion

It has been stated in this research that many authors note that much of South Africa's architectural industrial heritage is being lost, although there are pockets of excellence as previously noted (Brink, 2008; Coetzer, 2011; Fraser, 2007; Jacobs, 2015; Krige, 2010; Lipman, 2006; Louw & Fisher, 2011; Mare, 2012; McCulloch, 2012; Moolman, 2010; Nomico & Sanders, 2003; Picton-Seymour, 1977; Taitz, 2008; Quaghebeur, 2000; Charlton, 2015; Hart & Halkett, 1998; Worth, 1998; Visagie & Fourie, 2011). With few completed local examples of the adapted reuse of industrial buildings, and South Africa's industrial built heritage under constant threat from development, decay and demolition, it is hoped that this precedent will add to the body of knowledge concerning the successful adaptive reuse of decommissioned power stations within the broader context of heritage conservation and sustainability.

One can conclude that The Turbine Hotel & Spa is an excellent example of how a previously derelict, neglected and obsolete industrial structure can be sensibly and sensitively adapted to house a variety of functions whilst preserving its heritage. This research has shown how adaptive reuse can be used as a successful strategy to preserve industrial architectural heritage. The adaptive reuse of various industrial buildings, including the power station, preserve architectural heritage and a sense of history – a link to an interesting and otherwise forgotten past, yet they do not look out of place within the greater Thesen Island redevelopment.

The power station building responds to the surrounding environment (Harbour Town) in a positive manner, allowing tourists, hotel guests, island residents and local members of the community access to the public spaces. Historic and obsolete industrial buildings define the character of a community by providing a tangible link with the past, and represent the collective memories of society. Further, this adaptive reuse project went further than preserving the building as much machinery and various artefacts illustrating the maritime and timber processing industries were also restored and are visible to both visitors to the hotel and the residents of the island.

Adaptive reuse, as a means to extend the life of, or preserve, obsolete buildings provides many creative architectural design possibilities and solutions. There exist neither a clearly stated design method nor established and accepted procedures as a source of guidance

when approaching the development of adaptive reuse projects and thus it is hoped that that this case study will provide much food for thought. Adaptive reuse provides a special opportunity for professionals in the built environment to make a design statement, overcome site challenges, and contribute to society and future generations' sustainable, 'green' buildings as this case study on the adaptive reuse of the old Thesen Island Power station to the Turbine Hotel & Spa shows.

This case study can be used as a benchmark for any adaptive reuse project in South Africa – it represents 'best practise' in adaptive reuse, specifically as a strategy to preserve heritage, and illustrates the social and cultural interplay between past, present and future (Feireiss & Klanten, 2009). It is sincerely hoped that the preservation of heritage architecture in South Africa will inspire national pride, reconnect society to these buildings by adapting them to meet the demands of the new users and society in general, as well as maintain the character of the specific *genius loci*.

An adaptive reuse of an industrial building challenges the general view of place making and the character of social order, in the city and in rural areas, and hopefully more building owners, built environment professionals and municipalities will rethink how they use these spaces and consider turning them into social breathing spaces. The adaptive reuse of industrial buildings, as shown in this research, also challenges the view that disused industrial spaces are valueless or have no heritage and are best forgotten.

What we need is continuity ... historic preservation is not sentimentality but a psychological necessity. We must learn to cherish history and preserve worthy old buildings ... we must learn now to preserve them, not [only as] museum pieces, but by giving them new uses. Ada Louise Huxtable (Lessons in Healing the City's Scars)

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APPENDICES

Appendix A: Ethical clearance

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Faculty of Informatics and Design

Research Ethics Review Checklist

All post-graduate students and researchers are required to complete this form before commencing with research. Post-graduate students are requested to please submit this form together with HDC 1.2 (proposal submission) to the Faculty Research Committee (FRC).

(Where applicable mark relevant boxes with an X)

Project Title: The adaptive reuse of the former Thesen Island Power station: a case study

Applicant / Researcher:	Title, name & surname Mr. Rhys Edwards:	Under-graduate	Post-graduate	<input checked="" type="checkbox"/>	Staff
	Office Telephone:	Cell:	eMail: rhysedwards@gmail.com		

Supervisor (if applicable):	Title, name & surname: Prof. Andre van Graan	Office Telephone: 021-440 2228	Cell: 082 202 0766	eMail: vangraana@cput.ac.za
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Research Checklist:		Yes	No
1:	Does the study involve participants who are unable to give informed consent? Examples include children, people with learning disabilities, or your own students.		X
2:	Will the study require the co-operation of a gatekeeper for access to the research participants. Examples include students at school, members of self-help groups, residents of nursing homes — anyone who is under the legal care of another.		X
3:	Will it be necessary for participants to take part in the study without their knowledge and consent at the time? — e.g. covert observation of people in non-public places?		X
4:	Will the study with the research subject involve discussion of sensitive topics? Examples would include questions on sexual activity or drug use.		X
5:	Will the study involve invasive, intrusive, or potentially harmful procedures of any kind (e.g. drugs, placebos or other substances to be administered to the study participants)?		X
6:	Will the study involve testing on sentient subjects?		X
7:	Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?		X
8:	Will your research involve materials or processes that could damage the environment?		X

If you have answered '**No**' to all questions, submit the completed and signed form to the FRC together with the research proposal.

if you have answered 'Yes'...

If you have answered 'Yes' to one or more questions, kindly attach a report describing how you plan to deal with the ethical issues raised by your research. This does not mean that you cannot do the research, only that your proposal will need to be approved by the Research Ethics Committee. You will need to submit your plans for addressing the ethical issues raised by your proposal to the FID Research Ethics Committee.

Declaration

As Researcher / Applicant I acknowledge that:

- It is my responsibility to follow the CPUT Code of Practice on Ethical Standards (which is currently being drafted) and any relevant academic or professional guidelines in the conduct of my study; and
- that this includes providing appropriate information sheets and consent forms and ensuring confidentiality in the storage and use of data.
- Furthermore that in the event that there are any significant changes in the design, or conduct over the course of the research, that I will notify my supervisor (where relevant) and inform the FID Research Ethics Committee if new ethics approval is needed.




By my signature below I declare that I am not aware of any potential conflicts of interest, other than those declared on THIS form, which may influence the ethical conduct of this study.

Signatures:

Researcher: <i>P. Edwards</i>
Date:

Supervisor: <i>[Signature]</i>
Date: 12.08.2013

FID Research Ethics Committee comments:

<i>Ethics approval granted.</i>													
<table border="1"> <tr> <td colspan="2">RESEARCH ETHICS COMMITTEE</td> </tr> <tr> <td colspan="2">INFORMATICS AND DESIGN</td> </tr> <tr> <td colspan="2">ETHICS APPROVAL GRANTED</td> </tr> <tr> <td colspan="2">29 AUG 2013</td> </tr> <tr> <td colspan="2">  Cape Peninsula University of Technology </td> </tr> </table>				RESEARCH ETHICS COMMITTEE		INFORMATICS AND DESIGN		ETHICS APPROVAL GRANTED		29 AUG 2013		 Cape Peninsula University of Technology	
RESEARCH ETHICS COMMITTEE													
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Approved <input checked="" type="checkbox"/>	Referred back <input type="checkbox"/>	Chair: Ethics Committee <i>[Signature]</i>	Date:										

Appendix B: Semi-structured questionnaires

Architect Questions

1. Can you give me your definition of adaptive re-use?
2. Can you give me your definition of sustainability?
3. Why (is) adaptive re-use important in South Africa?
4. How (does) adaptive re-use support sustainability?
5. What qualities/ attributes of industrial buildings, specifically power stations, make them attractive candidates for adaptive re-use?
6. In your opinion what are the advantages and disadvantages/ restrictions of adaptive re-use?
7. Why was the Turbine Hotel selected for adaptive re-use?
8. Who decided the Turbine should become a hotel? Why?
9. Are you aware of any other power stations that have been reused or should be reused in South Africa?
10. What, if any, precedents were looked at to inspire the design for the Turbine Hotel – what informed the design of the Turbine?
11. What other reuses could you envisage for the Turbine; what other options were considered?
12. It is obvious from the heritage report on Thesen island compiled by Hart and Halkett that the machinery within the power station took precedent over the build structure. Why is this?
13. What impact do you think the Thesen island development has had on Knysna so far?
14. Can you give me a break down of Thesen Island in terms of use, X% residential, X% commercial/retails etc.?
15. What impact do you think the Turbine Hotel has had so far on Knysna?
16. How does the Turbine Hotel contribute to /support the community of Knysna?
17. Did the local community have any participation in the Turbine Hotel project?
18. At what stage(s)? And to what extent?
19. Do you think that there is value in (direct) community participation in projects like these?
20. How do you think the Knysna community perceive the Turbine Hotel?
21. What obstacles/objections did you encounter?
22. What makes the Turbine Hotel special?
23. How much did the project cost?
24. What sustainable strategies were implemented at the Turbine Hotel?

25. Can you describe briefly New Urbanism and its relevance and importance in South Africa as you understand the concept?
26. With appreciation of time and budget constraints, what opportunities were missed at the Turbine Hotel?
27. Can you tell me something interesting about The Turbine Hotel that I won't find in journals or online?

Heritage Questions

1. Have you heard the term adaptive re-use, and what do you understand by it?
2. What impact do you think the Thesen Island development has had on Knysna and its community?
3. What impact do you think the Turbine Hotel has had on Knysna and its community?
4. Do you think the Turbine Hotel was sensitive and respectful to history and heritage?
5. What is the significance of Thesen Island?
6. What is the significance of the old power station?
7. What is Knysna's biggest asset?
8. What problems is Knysna currently experiencing?
9. What does the future hold for Knysna?
10. If you could change one thing about Thesen Island what would it be?
11. If you could change one thing about the Turbine Hotel what would it be?

Hotel Manager (General Manager) Questions

1. When did the Turbine Hotel & Spa open?
2. What type of people visit the Turbine Hotel & Spa?
3. How do you market the hotel, and what are the strategies involved?
4. What makes the Turbine Hotel & Spa special/unique?
5. Are the majority of guests local or foreign?
6. Are the guests here mainly on business or pleasure?
7. What is the typical length of stay?
8. Is the business seasonal? If so, how do you remain profitable in the low/off season?
9. Have you heard the term “adaptive reuse”?
10. What do you understand by the term “adaptive reuse”?
11. What do the guests comment on?
12. Are they impressed that parts of the original power station have been preserved?
13. What energy saving strategies or devices are employed at the Turbine Hotel & Spa?
14. If you could change one thing about Thesen Island what would it be?
15. If you could change one thing about the Turbine Hotel & Spa, what would it be?
16. In your opinion what is in store for the Turbine Hotel & Spa in the future?

Lecturer Questions

1. Can you give me your definition of adaptive reuse?
2. Why is adaptive reuse important in South Africa?
3. Can you give me an example of a successful adaptive reuse project in South Africa?
4. Can you give me your definition of sustainability?
5. How does adaptive reuse support sustainability?
6. What qualities/attributes of industrial buildings, specifically power stations, make them attractive candidates for adaptive re-use?
7. In your opinion what are the advantages and disadvantages of adaptive reuse?
8. Are you aware of the Turbine Hotel & Spa in Knysna?
9. Are you aware of any other power stations that have been reused or should be reused in South Africa?
10. What restrictions/potential problems could you envisage on such a project?
11. How can the adaptive reuse of decommissioned power stations benefit the surrounding community?
12. Can you give me your definition of New Urbanism?

13. How important is community involvement on projects like the Turbine Hotel & Spa in Knysna?
14. What value is there in direct input from the local community on projects like this?
15. At what stage, and to what extent, should the community be involved?

Owner Questions

1. When did you first hear about the Thesen Island power station and how?
2. When did you purchase the former Thesen Island power station?
3. From whom, and for how much?
4. What do you understand by the term adaptive reuse?
5. Is adaptive reuse important in South Africa, and why?
6. What qualities of industrial buildings, specifically power stations, make them attractive candidates for adaptive reuse?
7. What are the advantages and disadvantages of adaptive reuse?
8. Who decided to use the Thesen Island power station as a hotel and why?
9. Are you aware of any other reused power stations in South Africa?
10. What impact do you think the Turbine Hotel & Spa has had on the town of Knysna?
11. How has the Turbine Hotel & Spa contributed to the town of Knysna?
12. How do you think the Knysna community perceive the Turbine Hotel & Spa?
13. Did the community have any involvement in the Turbine Hotel & Spa project?
14. At what stage, and to what extent?
15. When is your busiest time at the hotel?
16. What strategies do you use to encourage occupancy during off-peak season?
17. What type of people visit the Turbine Hotel & Spa?
18. Can you tell me something interesting about the Turbine Hotel & Spa that I won't find in magazines, journals or online?

Residents questions / Businesses

1. When did you move to Thesen Island?
2. Why did you move here?
3. On what part of the island do you live?
4. Do you live here permanently or is this a holiday home?
5. Do you know the Turbine Hotel & Spa?
6. Have you visited the Turbine Hotel & Spa?
7. Do you know that it used to be a power station?
8. Do you know that they have conserved much of the original machinery etc.?
9. Do you think that is a good idea to conserve old buildings?
10. Do you think the architects did a good job of conserving parts of the old building?
11. Have you heard the term “adaptive reuse”?
12. Do you know any history about the island or what is now the Turbine Hotel & Spa?
13. In your opinion, has the Turbine Hotel & Spa had a negative or positive impact on Knysna and Thesen Island?
14. Why?
15. Do you think a hotel was a good idea? If not, what do you think should have happened to the old power station?
16. Are you aware that CMAI implemented many sustainable/energy/water saving strategies in the Turbine Hotel & Spa?
17. Do you participate in any sustainable practices at home e.g. recycling?
18. If you could change one thing about Thesen Island what would it be?
19. If you could change one thing about the Turbine Hotel & Spa what would it be?

Appendix C: Critical analysis of other buildings adapted for reuse, and green space issues Dry Mill Apartments, Boat Shed, Parking Shed

Introduction

This section deals with only a few of the many buildings in Harbour Town, Thesen Island, which were adapted for reuse. Thesen Island is a precinct, developed in its entirety by TIDC and CMAI over a period of many years. The adaptive reuse of the old power station to the Turbine Hotel & Spa thus cannot be viewed in isolation, specifically because all the buildings are in such close proximity in Harbour Town. Thus information on these buildings for the sake of completeness is included, and also to demonstrate the vision and commitment of CMAI in preserving these historical relics for future generations to enjoy, while ensuring they harmonised aesthetically within CMAI's architectural paradigm.

Further, they represent excellent examples of adaptive reuse as a strategy to preserve heritage, and while some of these buildings have been discussed singularly, and despite an extensive search, it was not possible to find a single source where they were all discussed together. They seem to have been discussed in various media and academia as and when they were either in the adaptive reuse phase or had been completed. A discussion of these buildings thus adds to the richness of information regarding adaptive reuse in South Africa as a strategy to preserve heritage and complements the discussion of the adaptive reuse of the old power station.

The Dry Mill Apartments

To the south east of the Harbour Town precinct, on its own island (Timber Island), are the Dry Mill Apartments. This development of 56 'lock-up and go' apartments, lofts and penthouses was designed and constructed within one of the oldest structures of the Thesen Sawmill complex, The Timber Drying and Storage Shed (Mulder & Aupais, 2008). Each apartment is assigned a private berth, which is intended to 'encourage and support an active, outdoor lifestyle as well as the use of water borne transport as opposed to using a car' (Urban Futures, 2006). The Dry Mill Apartments is an excellent example of adaptive reuse of a structure with 'lattice crane columns and roof trusses' (Mulder & Aupais, 2008). Here the architectural team retained much of the structure of the Dry Mill sheds and converted them into an apartment complex.



Dry Mill apartment signage (source: researcher's own, 2013)



Northern elevation of a portion of the Dry Mill Apartments (source: researcher's own 2013)

The new development, comprising single title, three-storey units, sectional title duplexes and penthouses allows for a range in ownership types, were built within the retained original steel framework of the Old Timber Drying shed (Urban Futures, 2007).

'The Dry Mill offers the unique blend of an unsurpassed setting of great natural beauty and relaxed, urban chic lifestyle of trend setting Thesen Island' (Garden Route Investments, 2005).



View down Dry Mill Lane - the steel framework of the original Timber Drying Shed clearly visible – a nod to the construction and form of the original structure (source: researcher's own, 2013)

'The design [for the new Dry Mill apartments] utilises components of the old building and the generous ceiling height that it offers, to retain the industrial heritage and characteristics of the original building' (Garden Route Investments, 2005). The island lies on a nearly perfect east west axis and follows roughly the dimensions of the rectangular Timber Drying Shed, 20x200m, and is bisected by a dual lane central access passage for cars and pedestrians. This passage (Dry Mill Lane) effectively splits the building and site into two distinct, parallel sections or wings; one row of apartments facing south over the lagoon and one row of

apartments facing north. This central passage allows the southern facing units to gain some northern insolation; the southern units enjoy a view over the estuary, but with substantially less insolation than the northern side (Urban Futures, 2006).

The fabric of the new development is in line with that of the old, masonry, steel and timber. It was the intention of the architects to draw on and respect the maritime and forestry history and heritage of Knysna and operations on Thesen Island and they then incorporated this into the design for the new building. These facets or devices are easily recognisable through the use of several architectural details, such as the use of tensile or membrane structures that provide shading for the verandas (Urban Futures, 2006). The design highlights 'space, light, contemporary finishes and outdoor living', according to Garden Route Investments (2005).



Further view of the Dry Mill Apartments (source: Thesen Islands, no date)

Critical analysis

One could argue that these membrane structures make perhaps too direct or obvious a translation of a sail which is immediately apparent, even to those who are not architects. Even so this device does add some much needed curvature and contrast to the rigid, orthogonal structure in addition to providing solar and wind protection. Timber has been used to clad the upper portion of the structures in a shiplap fashion, which is a detail evident on many vernacular residences, and may be a further reference to the timber milling industry on the island.



Northern façade of the Dry Mill apartments (source: researcher's own 2013)

Further examples of maritime detailing are evident, such as the use of stainless steel cabling on the abundant balconies and hand railings, as well as the fireplace chimneys. However, these chimneys could again be seen as a rather direct translation or reference to masts or smoke stacks, but do provide some relief to the extensively horizontal structure in the form of rhythmic, vertical punctuation. Perhaps the only visible reference to the past structure is the portion of steel truss left exposed over the main access corridor. Apart from that, one would never realise it was an adaptive reuse project as the old structure is not immediately apparent (Urban Futures, 2006).



View down Dry Mill Lane (source: researcher's own, 2013)

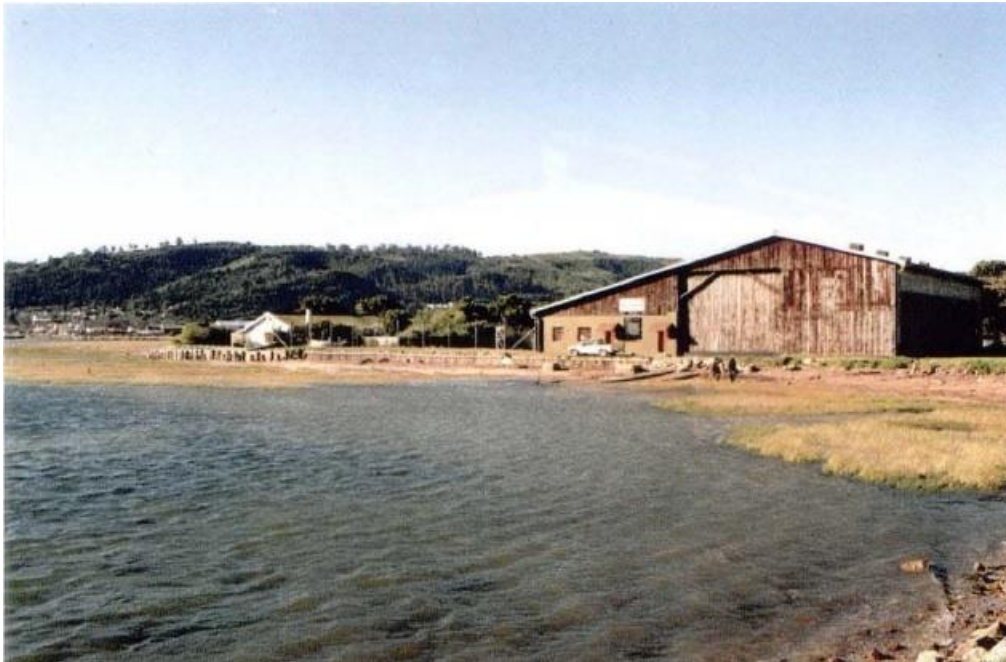
The adaptive reuse of the old Dry Mill as a strategy to preserve its heritage and history has been successfully completed. This success is acknowledged in the awards won by this project.

The Dry Mill Apartments achieved the *Recycling and Sustainable Projects Award*, by the South African Institute of Steel Construction, towards mid 2007. CNBC International Property awarded the accolade of *Best Redevelopment in South Africa* where this project won 5 stars. The Dry Mill then won another award by CNBC, *Best Redevelopment in the World finalist*, and finally towards the end of 2007, it won the *Bronze Timber Frame* award from the Timber Frame Builders Association in South Africa (Urban Futures, 2008).

The Boatshed

The Boatshed is another important building situated in the precinct of Harbour Town, located to the east of the Parking Shed and the Turbine Hotel & Spa, and north east of the main

piazza. On the site the former Thesen Island Sawmill, the Boatshed building has been adapted for reuse and now houses small retail facilities, a restaurant, apartments and offices (including CMAI's offices), as well as a small day spa and lodge (Urban Futures, 2006). The entire timber framework of the structure, along with all the existing timber cladding, has been retained and reused in-situ (Urban Futures, 2006), thus its heritage is preserved.



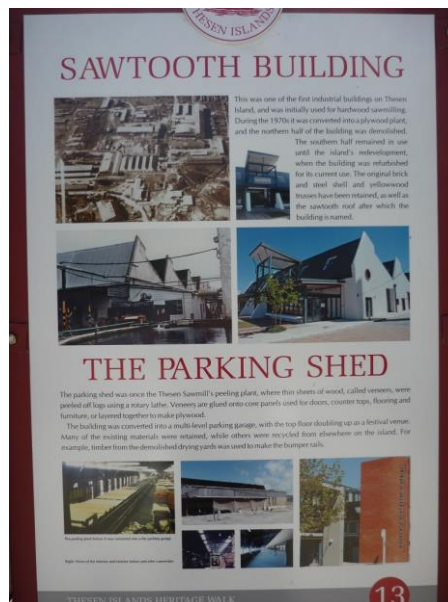
The Boatshed circa 1998 before adaptive reuse (source: Hart & Halkett 1998)

Hart and Halkett (1998) note that that building that stands today is in fact not the original Boatshed building. The original structure was built in the 1940s to house construction operations for the vessels that the Thesen's contributed to World War 2. After the war the Boatshed continued to produce vessels that turned out to be 'some of the finest racing yachts ever built in South Africa' (Hart & Halkett, 1998). The original structure was essentially a large timber framed building with a curved roof and 'large wooden doors on the west end of the structure [which] opened onto a long slipway that ran in the lagoon' for launching vessels (Hart & Halkett 1998).

This original structure was quite large and could accommodate 'boats of more than 100 foot in length', and Hart and Halkett note in their 1998 study of Thesen Island that the original Boatshed was lost to a fire in 1966: 'a devastating fire destroyed much of the boat yard on Thesen Island including the boat building sheds, crafts under construction as well as most of the machinery'. In addition, 'valuable documents including plans stored in the drafting office were destroyed', an irreplaceable loss. Thus the emphasis on preserving what history of the

building remained.

Hart and Halkett noted in 1988 that ‘the existing boat shed is not protected by any legislation because it is less than 50 years old’ (at the time of publication of their 1998 study of the island), however they did realise that this is ‘a significant structure because it successfully preserves the sense of history of the maritime aspect of the island and on a broader scale, the town [of Knysna]’. So it is interesting to note that they then recommended that ‘in redevelopment of this area, it is suggested that the maritime heritage be acknowledged in the form of a small display or signage’. It is further interesting to discover that CMAI had chosen to retain the entire existing structure for adaptive reuse; further testament to their commitment to preserve the island’s history. CMAI did as Hart and Halkett (1988) suggested, i.e. ‘a small display or signage’ but went beyond this simple suggestion by incorporating the fully reused structure into the Thesen Island Heritage Walk.



Thesen Island heritage plaque pic of Boatshed (source: researcher’s own, 2013)

Critical analysis of the adaptive reuse of the Boatshed

The vision and respect for the built heritage on Thesen Island that CMAI showed here is exemplary. ‘Architects and developers alike were more than reluctant to erase the site of an important chapter in the maritime history and culture of the area’ (Mulder & Aupais, 2008). Furthermore the architects were under no legal or obligation to preserve the structure because ‘technically, the *new* structure had no architectural or historic importance’ (Mulder & Aupais, 2008), but did so because they respected the gravity, importance and the building’s ‘tremendous nostalgic significance’ that the building had and saw its potential for reuse

(Mulder & Aupais 2008). CMAI realised that if 'properly restored, it would blend perfectly into the new vernacular' (Mulder & Aupais, 2008). The Boatshed is now once again reinvigorated and reinstated as an important integral component of Harbour Town, and on a larger scale within the new Thesen Island development.

The Parking Shed

The Parking Shed is located just to the North of the Sawtooth Building and is one of the first large structures visible upon entering Harbour Town. It is interesting to note that this structure is not specifically mentioned in the Hart and Halkett report of 1998, although Louw (2008) refers to the building as the 'old peeling plant'. Note that the structure is only visible in the aerial photograph of the island in 1977 and not in the 1933 or 1947 images (in the Hart & Halkett, 1998 document).

CMAI, in their Urban Futures (2006) publication, described the Parking Shed as another 'example of how a previously derelict industrial structure can be sensibly adapted and reuse for various applications', and how a 'normally utilitarian function like a parking garage can be accommodated in a structure that contributes to the ambience of a tourism hub'; Harbour Town being the 'hub' in question (Urban Futures 2006).



The dilapidated Parking Shed before adaptive reuse (source: Urban Futures, 2008)



Parking Shed façade showing roof ventilators and the added translucent roofing material strips to allow for the ingress of natural light (source: researcher's own, 2013)

CMAI again decided to retain the structure, not for its architectural merit, but because they saw the potential for the reuse of the structure and they knew that people would need parking space in Harbour Town. In the adaptive reuse of this building CMAI added two additional concrete levels to provide parking for approximately 200 cars (Louw, 2008, 2013). By condensing the parking requirements for Harbour Town into this single building, CMAI were able to reduce the 'hard surface area needed on the island significantly'; this was advantageous because this meant that 'more space could be used for parks and recreation' (Louw 2008).



The main entrance to the completed Parking Shed (source: Urban Futures, 2007)

Several energy saving strategies were executed in this project. In terms of water saving, a 'two thousand square meter roof' area means that a significant amount of water could be 'harvested and channelled to a freshwater pond where it can be used for irrigation' on Avocet Island (Louw, 2008). The ventilators of the original structure were retained and additional ventilators were added 'to allow for passive ventilation', also referred to as natural ventilation; these ventilators greatly reduce heat build up within the structure and have the added benefit of removing harmful fumes from the cars housed inside (Louw 2008).

The need for artificial lighting was mitigated by the installation of a 'series of translucent [roof] sheets' and a 'series of double volume areas' which allow for the penetration of natural light (Louw, 2008).

As in the case of the Turbine Hotel & Spa, all 'builders rubble was used as backfill' during construction and all new materials were 'sourced locally to reduce transport [and cost]' (Louw 2008). Sourcing and specifying local materials means that the embodied energy of the material can be kept to a minimum, and financially, that money circulates in the locality.



The completed Parking Shed (source: researcher's own, 2013)

Critical analysis of the Parking Shed

CMAI were very resourceful in this adaptive reuse project ensuring minimal waste: 'most of the old cladding material was reused' and along with any 'leftover timber from the factory' which now serve as bumper rails throughout the structure (Louw, 2008).

However, Louw (2008) in his *Ecological Design Assignment*, notes that there was one negative aspect of this project: the 'extensive use of concrete'. CMAI determined that concrete was the 'most effective means of economising on the amount of material needed', and to alleviate the use of concrete the architects specified pre-stressed concrete slabs and by doing so were able to 'reduce the thickness to a bare minimum' (Louw, 2008).

It can therefore be seen how even a typically mundane and utilitarian structure such as a parking lot can, if designed with energy efficiency and the well-being of the environment in mind, become an important and integral component of a development. Furthermore, this project shows how passive design and adaptive reuse of materials and existing structures can minimise the physical impact of a new development in an environmentally sensitive area, 'where resources like electricity and water are already in short supply' (Urban Futures,

2006). However, one does wonder about Mulder's New Urbanism view of 'walkable neighbourhoods' and Louw's (2013) explanation of the 5-minute pedestrian street, 'you have got to be able to walk to work or transit to shops'. So why are cars allowed? It seems that in South Africa, with its lack of public transport, the car is likely to remain a feature of urban landscapes.

The Sawtooth Building

According to Hart and Halkett (1988), the Sawtooth building was one of the first industrial buildings on Thesen Island. This distinctive structure is clearly visible in the 1933 aerial photograph of the island and at the time housed a sawmill (Hart & Halkett, 1998). Later, on a plan of the island in 1957 this structure is described as the 'hardwood mill' (Hart & Halkett, 1998). This being one of the largest industrial buildings on the island, it survived intact until 1977. In the years following the building was substantially altered with the demolition of the northern portion. The 1982 plan of Thesen Island clearly shows the building marked 'uniply'.



The Sawtooth building before adaptive reuse (source: Hart & Halkett, 1998)

What is visible today is the southern portion of the structure that was retained and adapted for reuse by CMAI. The pallet of materials of the structure comprised a combination of steel frame and brick infill construction (Hart & Halkett 1998).



The Sawtooth building after adaptive reuse (source: researcher's own, 2013)

In their recommendations to the architects Hart and Halkett (1988) noted that because 'the building is over 50 years old [it] therefore falls within the jurisdiction of the National Monuments Act' and thus is protected by legislation. Hart and Halkett (1998), in a desperate bid to mitigate this widespread loss of industrial architecture, determined that 'the most desirable option is the adaptive reuse of the structure'. However they also note, 'if conservation is not possible, a good structural description and photographic record of the structure should be made' prior to demolition (Hart & Halkett, 1998).



A further view of the Sawtooth building after adaptive reuse (source: researcher's own, 2013)

Critical analysis

It is pleasing to note that again CMAI recognised and appreciated the heritage and architectural significance of this structure in the island's industrial history and elected to retain the structure for adaptive reuse. In the adaptive reuse of this structure, CMAI retained 'all the existing walls, yellowwood trusses and roof structures' (Urban Futures 2006). The building, with its full potential now reinstated, functions as what CMAI refer to as 'an upmarket shopping centre' and is just one of several 'example[s] of how derelict industrial structures can be sensibly adapted and reused to house a variety of functions in a way that still retains the memory and ambience of its original state' (Urban Futures, 2006), much like in the case of the former Thesen Island power station (discussed in a previous sector of this chapter).

Green spaces and environmental issues

As pointed out, the Thesen Island development must be viewed as a precinct – one that is mixed use, and comprises residential, commercial and retail operations. Therefore, it is

germane to discuss the green spaces, and especially because the entire development was planned around the concept of sustainable design principles. Thus Thesen Island is meant to be a place where one can live, work, and play, and green spaces necessarily form an important part of the greater whole. As Schafer (2006) points out, Mulder is considered by many to be a greedy, insensitive developer interested only in profits at the expense of the region's irreplaceable countryside, but in fact he holds a doctorate in environmental planning and can be considered one of SA's leading proponents and thinkers on the 21st century concepts of 'liveable neighbourhoods' and 'New Ruralism'- systems of environmental and cultural preservation within residential communities. The Thesen Island redevelopment (and subsequently many other Western Cape developments) is testament to this.

In 2009 Mulder was honoured by the Institute for Landscape Architecture in Southern Africa (ILASA) as an icon of landscape architecture in South Africa; one of only three in the past 50-year history of the institute to have been honoured in this way. Thesen Islands also received the Institute's highest honour, its President's Award for excellence in design (Leading Architecture & Design, 2011). There are 13ha of parkland (some 21% of the island) – all the green or planted areas are easily accessible to residents via walking paths. There are also marine and marsh bird reserves, one of which is a heron breeding ground. The planting of indigenous and regional trees, shrubs and various grasses provide shelter, food and nesting for a variety of bird life such as Grey Heron, Egyptian Geese, Blacksmith Plover, Dikkop and Stilt etc. - all of which are easily spotted from the bird hide (Urban Futures, 2007).

The development also has a 'nursery complex' on the island which is responsible for the plant life of the islands and is 'managed under contract by a resident Landscape and Maintenance contractor'. The indigenous trees, bushes, flowers and succulents are all grown here for various reasons, not only for visual impact, as they form safety barriers and berms (Urban Futures, 2007).

A large area of the island is devoted to the communal vegetable and herb gardens, the orchard and the village maze, while in the residential areas of Thesen islands over '3000 indigenous trees and 400 shrubs have been planted' (Urban Futures, 2006). However, it should be pointed out that most of these are only accessible to residents, but this is understandable in view of the high prices of property and security concerns. Yet again this is further evidence of exclusivity, rather than inclusivity as a principle of New Urbanism.



Image of a portion of the bird sanctuary (researcher's own, 2013)

As Fisher (2011) notes:

'One would think any project that ameliorated the consequences of such devastation would be welcomed. But the public reaction was not sympathetic, and of chief concern was the endemic seahorse. And the heritage sentiments around the relics of a dinosaur industrial process ran strong' (Fisher, 2011).

The canal system has added almost 25 ha of viable aquatic habitat to the Knysna Lagoon ecosystem and the threat of atmospheric and water pollution caused by previous industry on the island has been removed (Urban Futures, 2006), and the seahorses are thriving!