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Rust and smoke:
A memoryscape for industrial heritage

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Abstract of a dissertation submitted in partial fulfilment of the requirements for the Degree of Master of Landscape Architecture.

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The legacy of the Industrial Revolution includes valuable but overlooked aspects of human civilisation. The concept of industrial heritage was not recognised until 1978 when The International Committee for the Conservation of the Industrial Heritage (TICCIH) was formed. Memoryscape is a multi-sensory approach to foster the act of remembering and promote immersive experience in the landscape. While industrial heritage is an important asset to be remembered, the design for heritage has been dominated by the visual, with sound, smell, taste and touch barely considered. This research critiqued existing examples of industrial heritage memoryscape design, and identified how each sense could contribute to the act of remembrance and engagement with post-industrial landscapes through three primary case studies, including Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery in New Zealand, and a range of local and international secondary case studies. The findings indicated non-visual senses were largely provocative to memories, and contributed to the meaning to the heritage sites. While not all heritage sites were capable of including all senses, there is a need for landscape architects to identify the key sensory aspect and to incorporate it to the site rather than creating design solely for visual consumption.

Keywords: Memoryscape, industrial heritage, heritage design, memory, atmosphere, sensory design.

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Chapter 1
Introduction

The Industrial Revolution changed the world significantly: not only did it change the global economy, but it also altered the lifestyle of human beings. It brought one of the most radical changes to human history. The world transformed from an agricultural society to an industrial society; from hand-tooled technology to machine-based technology with the introduction of machines. The process of industrialisation gave birth to factory production and manufacturing, and centralised such activities within one building or a central complex of buildings – the factory (Albrecht, 2013).

Industrialisation, however, does not last forever. In fact, most of the advanced economies have experienced a decline or removal of industrial activities and employment, which is referred to as the process of "de-industrialisation". De-industrialisation has shaped the landscape of the post industrialised world. Many of the industrialised countries have been facing the problems of such post-industrial landscapes: the physically, functionally, and environmentally deteriorated space, often situated at advantageous locations near city centres, along waterways, and well supported by existing infrastructure (Loures, 2009). The industrial remains have become an "eye-sore" in the modern landscape and many of them were demolished before people started to recognise the values embedded with them and regard them as something worthwhile to be preserved – industrial heritage.

This research will briefly look at the reasons why heritage, particularly industrial heritage, is valuable to human society, why it is worth remembering and preserving, and how it has been recognised internationally and in New Zealand with the development of various organisations and charters to provide guidance for the conservation of those important assets. It also aims to critique the current design practices for industrial heritage – new functions are adapted erasing the old layers of the landscape; the lack of multi-sensory and immersive experiences has detached people from the authenticity of a place (Bowring, 2006; Pallasmaa, 1994a). Originating from a subtropical "Concrete Jungle" and born in a post-industrial era, I have been heavily exposed to modern urban settings with skyscrapers, car exhaust, very hot and humid

outdoor environment but cold air conditioning in indoor areas in daily life in Hong Kong. I am interested in exploring how I can engage and become emotionally attached to places that have different cultural backgrounds and history through sensory experiences. With the lack of research on designing memoryscape for industrial heritage, this research also identifies design opportunities and strategies for industrial heritage sensorial memoryscape.

Chapter 2
Literature Review

This chapter reviews literature from a wide range of sources to explore the concepts of industrial heritage and memoryscape. Firstly, I give a brief overview of the development of heritage and industrial heritage, as well as the importance of industrial heritage in terms of its cultural values to human civilisation. Then, I investigate the idea of memoryscape and how senses are crucial in provoking memories and reinforce engagement with post-industrial landscapes. I also identify the current practices on industrial heritage conservation and how international standards and guidelines have contributed to the design for industrial heritage memoryscape.

2.1 Importance of industrial heritage and its conservation

Heritage is defined as what has been inherited from the past, to be valued and lived with in the present, and to be preserved and passed on to future generations (Heritage Council, 2017; UNESCO, 2020). William Morris, who was an artist and craftsman, founded the Society of the Protection of Ancient Buildings (SPAB) in 1877. The Society sought to protect the integrity of historical buildings from destructive and irreparable restorations which were occurring in Victorian England (SPAB, 2018). This formed the basis of the United Kingdom's heritage legislation and was the first formalised expression of heritage protection. In New Zealand, cultural heritage also put emphasis on indigenous Māori culture, acknowledging the importance of the Treaty of Waitangi and the cultural importance of tangata whenua (ICOMOS New Zealand, 2010).

As a subset of heritage, industrial heritage is defined by The International Committee for the Conservation of the Industrial Heritage (TICCIH) as:

> 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 (Nizhny Tagil Charter, 2003, p. 2).

Heritage is important to cultural identity – it is an expression of what is valued and prioritised, and provides evidence of the past and the evolution of the society which allows the society to develop its "self-consciousness" (Heritage Council, 2017).

Heritage, however, is often contested by different groups for multiple reasons. Gregory Ashworth and John Tunbridge pointed out that:

> All heritage is someone's heritage and therefore logically not someone else's: the original meaning of an inheritance implies the existence of disinheritance and by extension any creation of heritage from the past disinherits someone completely or partially, actively or potentially. This disinheritance may be unintentional, temporary, of trivial importance, limited in its effects and concealed; or it may be long-term, widespread, intentional, important and obvious (Ashworth & Tunbridge, 1996 as cited in Nilson & Thorell, 2018, p. 12).

It is not only the physical place of heritage that can become an object of conflict, but the immaterial meanings and the narratives, rooted in history and anchored to specific groups of people, attached to it are subject to dispute. Sharon Macdonald (2008) explores a particular dimension of heritage which concerns the past that has significant meaning in the present but is on the other hand contesting to the positive contemporary identity - "difficult heritage" (Macdonald, 2008). Ashworth and Tunbridge also introduce the term "dissonant heritage" to refer to heritage related to ethnic and/or religious conflicts (Nilson & Thorell, 2018).

Heritage for industries, in particular, suffers significant controversies as it is always associated to darker sites ingrained with negative values: polluted, exploited, suffering, dirty, and dangerous. Dilapidated industrial buildings and complexes are also regarded as wasted spaces in modern society. The recognition of such values has hindered the conservation of industrial heritage.

In fact, industrial heritage is not merely just a product of industrialisation, it is a cultural heritage of civil societies (Copic & Tumaric, 2015). Industrial buildings [and landscapes] have gained meaning for people. These buildings [and landscapes] have become deeply rooted in the community through their history and people's interactions with them (Krejcisz, 2012). Industrial heritage is embodied with the identity and memory of the communities, traditions, and labour movements of society (Oevermann, 2014). Industrial "sites, structures,

complexes, cities and settlements, landscapes and routes" are the witness of the progress of human civilisation (The Dublin Principles, 2011). They are evidence of the past and are spatial resources for urban development (Oevermann, 2014).

While some industrial heritage sites are important archaeological testimony of past activities and technologies, many of the sites are still in use and the process of industrialisation remains active with a sense of historical continuity. The global process of industrialisation constitutes a major leap in human history which forms the basis of the Modern World, making its heritage crucial and critical to present and future generations (The Dublin Principles, 2011).

Architect Robert Adam suggests that built surroundings are part of our traditional culture. Deliberately destroying or undermining them means deliberately destroying our culture (Adam, 1998 as cited in Krejcisz, 2012).

Also regarded as "landscapes of nostalgia" (Copic & Tumaric, 2015), "smokestack nostalgia" (Cowie et al., 2003; Smith & Campbell, 2017), industrial heritage is often associated with strong emotions. Literally and metaphorically described as being toxic in nature, industrial heritage is sometimes regarded as a negative form of nostalgia (Smith & Campbell, 2017). In fact, as Laurajane Smith and Gary Campbell (2017) argued, nostalgia is neither good nor bad, but it is an inevitable and fundamental presence within modernity. Nostalgia is sometimes a synonym of heritage and is the foundation of [industrial] heritage making. Such emotion of loss, in this case the loss of working-class spirits, is crucial to the process of remembering and commemoration of industrial history (Smith & Campbell, 2017).

With increasing awareness of the need for and importance of heritage conservation, international organisations including The United Nations Educational, Scientific and Cultural Organisation (UNESCO), The International Council on Monuments and Sites (ICOMOS), and The International Committee for the Conservation of the Industrial Heritage (TICCIH) were established to address heritage-related issues at an international level. Various charters such as Athens Charter, Venice Charter and Nizhny Tagil Charter were developed and adopted as a recognition and guidance to preserve heritage as well. Details of these key organisations and charters will be discussed in a later section. Figure 1 shows the timeline of important industrial events and establishment of heritage conservation organisations and frameworks.

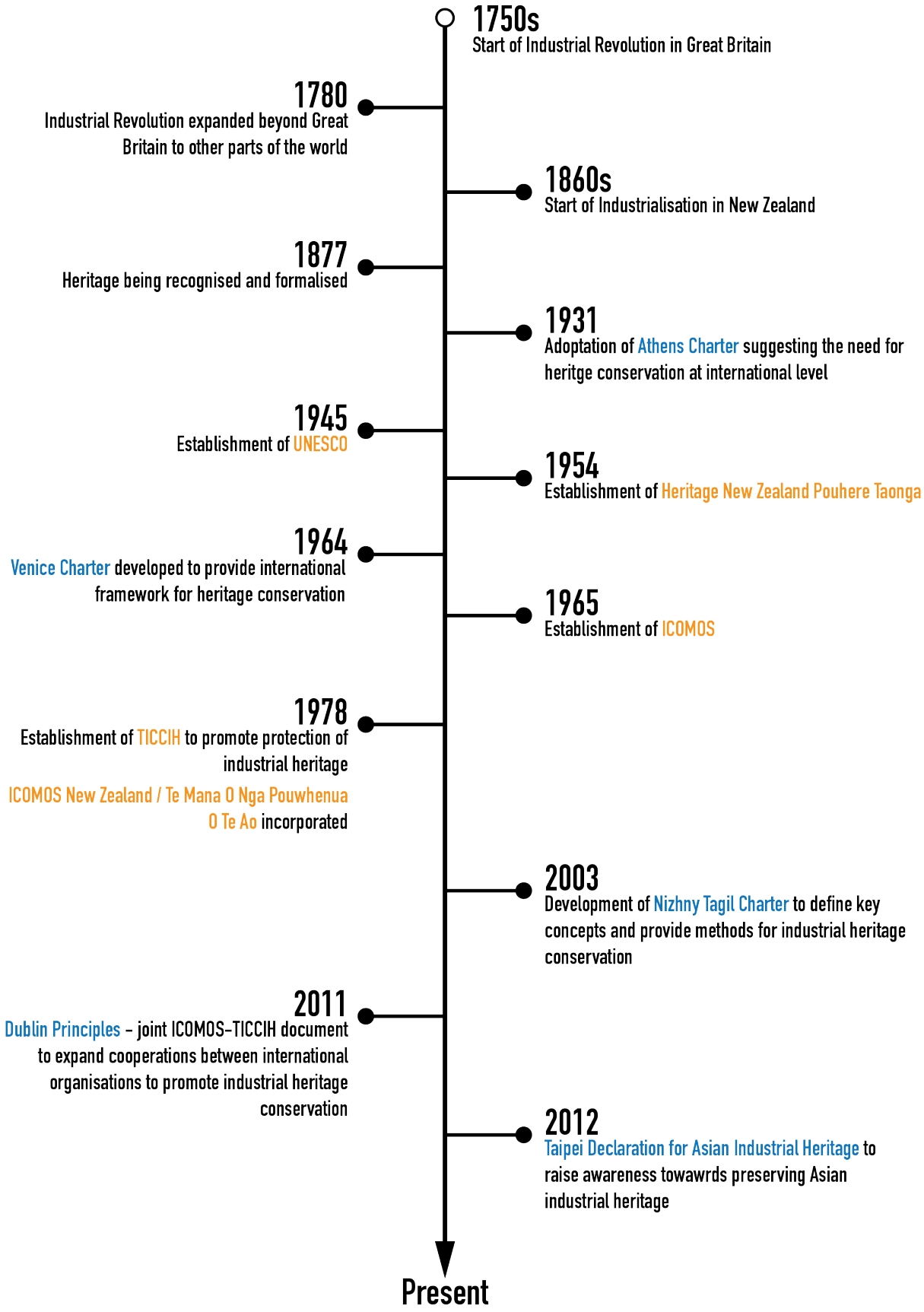


Figure 1 Timeline showing important industrial events, establishment of key heritage-related international and New Zealand organisations and framework.

2.2 Memoryscape and atmosphere

Memoryscape is about multi-sensory experiences that are immersive and engage participation (Rogage et al., 2021; Swords, 2018). Jon Gabriel Swords (2018) and Toby Butler (2007) describe how such experiences are meant to be taken from indoor settings (museums or art galleries) to outdoor public spaces, and offer opportunities for audiences to interact with the environment. Sarah De Nardi and Steven High (2021) argued that memoryscape is not solely about the concept of "memory" and "landscape" but the manifestation of place and remembrance. Memoryscape helps to unfold stories, mythic narrative, and materiality of space (De Nardi & High, 2021).

While museums, archives and galleries contain substantial and important collections that conserve an overview of history and is accessible digitally where possible, there are criticisms over the practice for de-contextualising those histories and displaying them away from where they originated. As Edensor (2005a) puts it in his work on industrial ruins, the impressions and the memories prompted at ruin sites are drastically different from conventional museums. Museums have limited not only the interpretation, but they have also limited the amount of people accessing to them and the extent that people understand them (Butler, 2007; Swords, 2018). Another criticism is that museums are often politically constructed. They consist of the past that is selected, filtered and manipulated that shape what to be remembered or deliberately sought to forget in present (Jedlowski, 2001 as cited in Edensor, 2005; Sumartojo & Graves, 2018).

Swords (2018) was concerned about the eradication of pasts and the introduction of new layers that are completely irrelevant to the place, resulting in restricting the engagement of the public with their own memories of the place. He suggested bringing the history to life through visual projections, sounds, smells and narratives – memoryscape, as a way to provoke remembrance (Sumartojo & Graves, 2018), and promoting immersive and participatory experiences (Swords, 2018).

To encourage immersive experiences, atmosphere, or ambience, is vital in affecting and connecting people with the landscape. As German phenomenologist Gernot Böhme suggested, atmospheres are "totalities", in which they consist of everything and "bathe everything in a certain light, unify a diversity of impressions in a single emotive state" (Böhme, 2013, p. 3). Atmospheres are the predominating mood of a place; evoking emotions and memories, both singular and collective, often through sensuous prompts: material-

haptic qualities, sounds, lights, temperature and smell (Borch, 2014; Gandy, 2017). As Böhme (2018) explains that atmospheric qualities are embedded in a space, it is only by physical presence that we can experience the atmosphere of a place. Atmospheres are closely related to the character (Böhme, 2013) and the spirit (Pallasmaa, 2016) of a place, thus the character and spirit are experienced as an emotional effect (Böhme, 2014). While being vague, indeterminate, intangible (Böhme, 2013), placeless and not locatable (Böhme, 2018) in nature, it has become one of the challenges for designers to create or manipulate atmospheres that encourage immersive and sensory experiences.

2.2.1 Sight

Visual experience is always highly valued and in fact dominates in various design practices. Despite the increasing critique of the hegemony of ocularcentrism (Bembibre & Strlič, 2022; Bowring, 2006; Orio et al., 2021; Pallasmaa, 1994a, 2016; Spence, 2020a, 2020b), vision still plays an important role in enhancing the experiences of non-visual senses. In many cases, visual experience is a starting point for multi-sensory attempts to shape the feeling of a space (Edensor & Sumartojo, 2015; Spence, 2020a). Visual cues are one of the tools that designers can employ to heighten people's awareness to other sensorial elements in the landscape (Bowring, 2006).

2.2.2 Sound

Specifically investigating how sound can affect the connection between place and people, Butler focuses on the practice of creating sound experience to evoke memory and connect to place. He explores the potential of, and advocates bringing the use of the audio medium to be used in outside landscape (Butler, 2007, 2009). He defines memoryscape as "outdoor trails that use recorded sound and spoken memory played on a personal stereo or mobile media to experience places in new ways" (Butler, 2007, p. 360). Soundscape consists of sounds from all units of sound in a given space, both foreground and background, and signal sounds that regulate activity. It is the acoustic environment that characterises and defines a location (Lacey, 2014; Orio et al., 2021; Rudi, 2021).

In Butler's studies, the results revealed that the attachment and affection to the place had strengthened for participants who had been rooted in the area and had developed for those who were even new to the place. Butler also emphasised the importance of locality and the presence of recorded audio as a prompt to help people to imagine and feel the stories of the

past (Butler, 2007). It is the synergy brought by physicality (being physically in the place) and sensory experience in the enhancement of sense of place – located sound.

2.2.3 Smell and taste

The concept of smellscape was coined by John Douglas Porteous, based on soundscape (Lindborg & Liew, 2021; Song & Wu, 2021). Similar to sound, smells are closely associated with memories. In fact, it is regarded as the strongest sense in evoking memories (Bowring, 2006; Pallasmaa, 1994a) and emotions (Xiao et al., 2020). In the study of neuroscience, smell is the only sense that travels directly to the limbic system of the brain which controls emotion and memory, while all other senses need to first travel to lower part of the brain before reaching the limbic system (Bowring, 2006). As Tim Edensor (2005a) emphasises, often not purposely sought, memories are reignited through unexpected encounters to largely non-visual sensual experiences, particularly smells (Edensor, 2005a). Smell therefore plays an important role in provoking emotion and memory.

Smell and taste are closely related. We sense flavours when our nose and mouth send information to our brain, our brain then integrates and interprets the information. Yet, taste is the least mentioned and considered sense in the design disciplines. In modern landscapes, the sense of taste is experienced through culinary culture which is often connected to tourism of a place (Abd Rahman et al., 2016; Concha, 2020). Evidence can be found in the presence of winery trails, spice markets, and orchards where visitors can engage with the local gastronomic landscape. Unlike other senses, taste is very voluntary: we can choose to taste it or not. This challenges designers to design the sense of taste, thus the taste has become the least considered and engaged in the landscape architecture field.

2.2.4 Touch

Regarded as the eyes of the skin (Pallasmaa, 1994a; Spence, 2020a), the sense of touch is often ignored in landscape architecture practice, yet it closely works with materials in the landscape. The skin can read texture and temperature (Pallasmaa, 1994a; Rybczynski, 2001 as cited in Spence, 2020a). Charles Spence (2020b) builds on Pallasmaa's idea (2014) that the tactile element is the basis of multi-sensory experience of [landscape] architectural design (Spence, 2020b). Touch brings about closeness, intimacy and affection (Pallasmaa, 1994a).

2.2.5 Light

Light is an important element of memoryscape which determines and has impact on people's experience within a place: their feelings, perceptions, behaviours, and usage of the place. Artificial light, in particular, plays a significant role not only in providing usage space for people at night and indoor space, but also in triggering emotions, thus enhancing experience of the place (Edensor, 2015a, 2015c; Gheorghiță et al., 2014). Edensor (2015a, 2015b) suggests the use of illumination can create defamiliarisation as a way to detach visitors from everyday experience and to promote another realm of immersive environment. The scholar, on the other hand, points out the potential of shadow and darkness to foster affective and non-visual sensory experience (Edensor, 2013, 2015a, 2015c; Erwine, 2017; Tanizaki, 1977). American architect Steven Holl mentioned in an interview that [landscape] architecture is about light, space and form. He emphasises the experiential dimension as the most essential aspect in [landscape] architecture (Pintos, 2021). Scholars suggest brightness, colour, direction, contrast and time are the tools for landscape architects in designing desired emotional effect (Gheorghiță et al., 2014).

2.2.6 Materials

Pallasmaa (2014) believes that atmospheric qualities are generated by the presence of materiality. The material presence of an object itself, as Sumartojo and Graves (2018) argued, is enough to evoke memories and how it is perceived in the present. Sumartojo and Graves also argue that material surroundings simultaneously work with sensorially prompted memories, thus shaping people's understanding to the environment and allowing the re-imagination of the past (2018).

For instance, Marita Sturken (2016) identified dust as the most powerful material in evoking emotion in her study on 9/11 museum. Dust carries the past with it and endures the material existence it carries. It gives a sense of "not-going-awayness" (Sturken, 2016). Material in the landscape fosters the engenderment of memory and imagination of the past.

2.3 Current practices on industrial heritage conservation

As mentioned in previous section, an increasing number of international organisations have been established over the past decades aiming to protect and preserve the important assets of human civilisation. Just before the end of the 19th century, architectural heritage was only

considered at a national level, and it is the period when most of the legislations on historical buildings protection in Europe were founded. It was not until the end of the two World Wars that the idea of culture went beyond national borders, with the establishment of UNESCO – the main international body to promote heritage protection (ICOMOS, 2011b). UNESCO describes cultural heritage in three dimensions: monuments, groups of buildings, and sites (See Table 1) (UNESCO World Heritage Centre, 2021).

Table 1 List of components that are considered as cultural heritage (UNESCO World Heritage Centre, 2021, p. 21).

Article 1
Monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science;
Groups of buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science;
Sites: works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.

In the First International Congress of Architects and Technicians of Historic Monuments supported by the League of Nations (now UNESCO) in Athens in 1931, the concept of international heritage was introduced, and the conference called for the establishment of international organisation for restoration on operational and advisory levels. The Athens Charter also suggested there was a need for legislation at national level regarding the problems of historical sites' preservation. In the Second International Congress of Architects and Technicians of Historic Monuments in 1964, UNESCO put forward the Venice Charter and provided for the formation of the International Council on Monuments and Sites (ICOMOS) in 1965 (ICOMOS, 2011a).

Building on the UNESCO's founding ideas on heritage, ICOMOS promotes "conservation, protection, use and enhancement of monuments, building complexes and sites" (ICOMOS, 2011b). A number of charters and guidelines were formed as the standard references internationally. Some of these guidelines include documents on the protection of built environment (The Appleton Charter, 1983) and archaeological heritage (The International Committee for the Management of Archaeological Heritage, 1990) and authenticity (ICOMOS, 2012).

Targeting industrial heritage conservation, The International Committee for the Conservation of the Industrial Heritage (TICCIH) aims "to promote international cooperation in preserving, conserving, investigating, documenting, researching, interpreting, and advancing education of the industrial heritage" (TICCIH, 2013). TICCIH is recognised by ICOMOS as a special advisor on the study and conservation of industrial heritage (Nizhny Tagil Charter, 2003; TICCIH, 2013).

In 2003, the Nizhny Tagil Charter for the Industrial Heritage was developed to define the major concepts and underlying methodology for industrial heritage and industrial archaeology (TICCIH, 2013). This is the first industrial heritage-specific charter at international level. It recognises the values of this heritage and provides framework for legal protection, maintenance, and preservation of industrial heritage (Nizhny Tagil Charter, 2003). Nizhny Tagil Charter highlights the importance of recording industrial heritage, not only the physical features and conditions, but also people's memories on industrial heritage should be recorded.

The Nizhny Tagil Charter, on the other hand prioritises preservation of industrial heritage *in situ* (Nizhny Tagil Charter, 2003), implying the importance of locality in heritage conservation practice. The Australia ICOMOS Burra Charter (2013) echoes the notion of Nizhny Tagil Charter and recognises the physical location of a place as part of the cultural significance of an [industrial] heritage in Article 9 (Burra Charter, 2013).

One thing that is worth noting is that the Burra Charter emphasises the conservation of heritage setting which includes the retention of the visual and sensory setting (Article 8 in Burra Charter), providing opportunities for multi-sensory experience for industrial heritage sites.

Adaptation and reuse of industrial sites are mentioned and encouraged in various charters (Burra Charter, Nizhny Tagil Charter, The Venice Charter) to support sustainable use of materials and energy. The practice has been widely adopted especially in the architectural field to preserve architectural heritage. While the guidelines (Burra Charter, ICOMOS New Zealand Charter, Nizhny Charter, The Dublin Principles and The Venice Charter) state that significant materials, fabrics and original patterns of circulation and activity should be maintained, adaptive reuse of industrial sites has often added new layers to the site and the history of the site has become forgotten throughout time. The current guidelines, however, seldom promotes the potential experiences, sensorial experiences in particular, in industrial heritage.

Memoryscape, on the other hand, has been used widely in memorials. Little, but growing, research and design interventions of memoryscape creation have been carried out on industrial heritage. This gives the potential to develop design strategies for industrial memoryscape by borrowing the strategies and tools from memorial practice, thus offering multi-sensory and authentic experience at industrial heritage sites.

2.4 Summary

This chapter has focused on the key research theme of industrial heritage and memoryscape. As the above sections shows, the two concepts have yet been widely discussed in the existing research in the landscape architecture field and the discussion around industrial heritage has emphasised on the technical methods of its preservation rather than a creative means of incorporating it into the modern landscape. Given the power of senses in provoking memories and creating affection, a memoryscape goes beyond the traditional approach of monumentalising heritage to a new way of engaging with industrial sites.

Chapter 3
Research Questions and Methods

3.1 Research questions

The literature review reveals how memoryscape holds strong potential to expand the ways we experience industrial heritage landscape. The challenges remain on how landscape architecture values the ability of senses and recognises the emotional power industrial sites holds. Concerned particularly with the practice of industrial heritage design and the experience at industrial heritage sites, this study investigated the following key research questions:

1. How do users engage with industrial memoryscape?

2. What are the current design practices for memoryscape of industrial heritage?

3. What are the design strategies in creating memoryscape for industrial heritage?

3.2 Methods

This dissertation employed a systematic literature review discussed by Angela Boland, Rumona Dickson and Gemma Cherry (2017) to examine the elements contributing to memoryscape and the existing design practice for industrial heritage memoryscape. This systematic literature review reported in Chapter 2 examined peer reviewed academic literature and academic books. Key words search such as “memoryscape”, “industrial heritage”, “heritage”, “atmosphere” and “sensory” were used on Google Scholar, Lincoln University Library Search, Avery Index to Architectural Periodicals, ScienceDirect and ResearchGate.

To identify design strategies and critique examples of industrial heritage memoryscapes, case studies were used as a methodology in this dissertation. Mark Francis mentions that case studies can “bring to light exemplary projects and concepts worthy of replications” (2001, p. 16). From the analysis of case studies, both the positive and negative aspects of the projects are highlighted, thus developing criticism and discussions within the landscape architecture field (Francis, 2001). Multiple case studies also allow “comprehensive and robust comparisons” and explore shared qualities and patterns (Swaffield, 2016, p. 113). This

research included primary and secondary case studies. Primary case studies were conducted through site visits to Shantytown Heritage Park, Dunedin Warehouse Precinct, and The Tannery. As Böhme (2018) emphasised atmosphere is experienced through bodily sensing, meaning that accessibility to sites was the major criterion for primary case studies site selection.

To ensure all the sensory impressions of the sites were captured, notes, photos and videos were taken to record the evidence of the tangible aspects of senses on site (see Figure 2); recordings were taken during the whole time of site visits; and hands were engaged with tactile experience where touchable. The notes, photos, recordings and videos from all the case study sites were then integrated into a table (Table 2) with all the information categorised thematically according to their sensory aspects – “sight”, “sound”, “smell”, “taste”, “touch”, “light” and “materiality”. This table provides consistency in reporting and allows comparisons of projects (Swaffield, 2016).

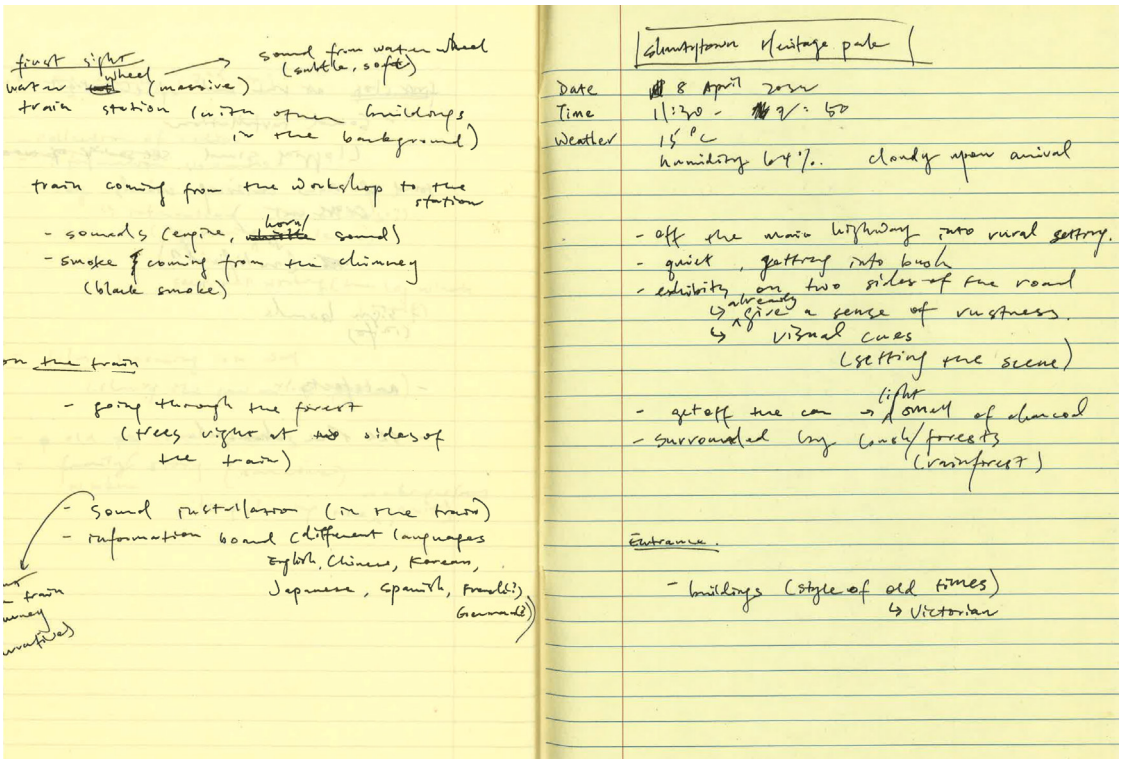


Figure 2 Example of notes taken during site visits to the primary case studies.

Table 2 Format to use for integrating sensorial elements found on site for comparison.

	Shantytown Heritage Park	Dunedin Warehouse Precinct	The Tannery
Sight			
Sound			
Smell			
Taste			
Touch			
Light			
Materiality			

The number of local case studies were largely limited by their availability, accessibility, as well as the time and budget of this research. Secondary case studies were then carried out through desktop studies based on descriptions from literature and articles, and images available online. Information gathered was integrated into a table in the same way as primary case studies. Sliders and quattro stagioni (Figure 3 and 4) were used in the analysis of case studies. As Jacky Bowring puts it, these kinds of graphic approach can place a design on a continuum in which offers “an analytical tool in order to plot the parameters of criticism being used in relation to the design” (2020, p. 176). As such, sensory experiences and qualities of the case study sites were critiqued.

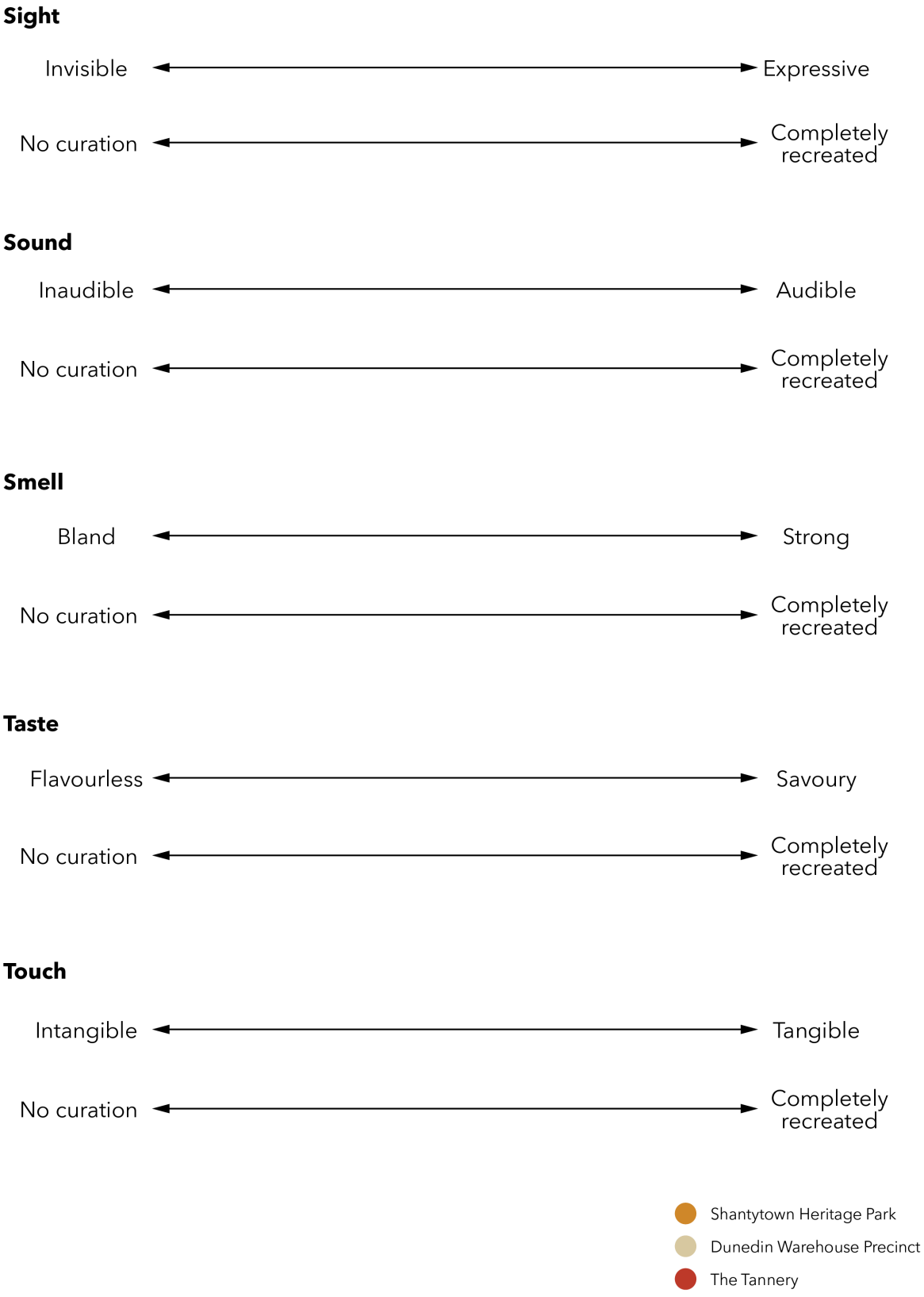


Figure 3 Sliders to use for interpreting each sensory experience in primary case study sites.

Figure 4 Quattro stagioni to interpret the tensions between uni- and multi-sensory experience, and the degree of visual dominating experience of both primary and secondary case study sites.

Design serves as a research tool to explore not just the solution, but also the possibilities for the site. Throughout the navigation towards an innovation response to the site problem, design-directed research enables us to "challenge the status quo" and "identify key opportunities" (Copley et al., 2015). As part of the methodology of exploring this potential area of design through research, I was able to undertake some testing of strategies in my 2022 Major Design Study coursework as part of the curriculum of Master of Landscape Architecture programme. In this design proposal, sensorial elements that were significant to The Tannery were identified and incorporated into heritage design. Feedback from the panel which was comprised of the examiner, lead tutor, and a professional representative from the

New Zealand Institute of Landscape Architects provided some critique of the approaches, and this is also explored further in my dissertation.

3.3 Summary

In this chapter, I outlined the methodology of literature review, case study research, as well as the approach to the three primary case study sites I visited. The use of table and diagrams described will be used in the following chapter to compare and contrast the design outcomes of the case study sites.

Chapter 4
Case Studies

The format for the primary case studies follows the suggestions from Francis (2001, p. 21) that includes details such as the context of the project, location, scale and design interventions.

4.1 Primary case study 1 – Shantytown Heritage Park

Table 3 Summary of the details of Shantytown Heritage Park. Adapted from (Francis, 2001).

Project name	Shantytown Heritage Park
Location	316 Rutherglen Road, Paroa, West Coast, New Zealand (see Figure 5 & 6)
Size	Approximately 200 hectares
Date designed/planned	Constructed and opened in the early 1970s; officially opened on 23 January 1971
Designer/planner	West Coast Historical and Mechanical Society
Design intervention	Relocation of historical buildings and artefacts
Type of use	Tourism
Managed by	Shantytown

The West Coast is a narrow strip of land surrounded by the Southern Alps and the Tasman Sea on the western side of South Island, New Zealand. In 1864, the discovery of gold attracted a large number of miners to the region. After reaching the highest yields during 1866 and 1867, alluvial gold became exhausted and the gold industry declined in the region. From the 1860s, the main coalfields in Greymouth, Reefton and Buller were discovered. Coal mining then dominated the local economy as the West Coast is the only part of the country where high-quality bituminous coal can be found. Coal served as an important resource for fuel for steamships, railway locomotives, industrial boilers and coal gas production. Today, coal remains in demand internationally and is still used for household heating in the West Coast (Nathan, 2016).

Shantytown Heritage Park is a museum village located between the major towns of Hokitika

and Greymouth on the West Coast. The Heritage Park is a replica village consisting of a living history of the old towns: 30 historical buildings were re-created housing over 10,000 artefacts originating from 1850 to 1940 including photographs, early settlers' furniture, gold mining and sawmilling equipment, and vintage clothing (see Figure 7 to 10). Shantytown Heritage Park was a community-led project advocated by a group of local railway and car enthusiasts in 1968. Their incentives were to preserve the relics and establish a tourist attraction at the site of rich gold-rush and sawmilling history (Shantytown Heritage Park, 2021).

Figure 5 Location of Greymouth area in West Coast, South Island of New Zealand. Map adapted from Cadmapper (n.d.).

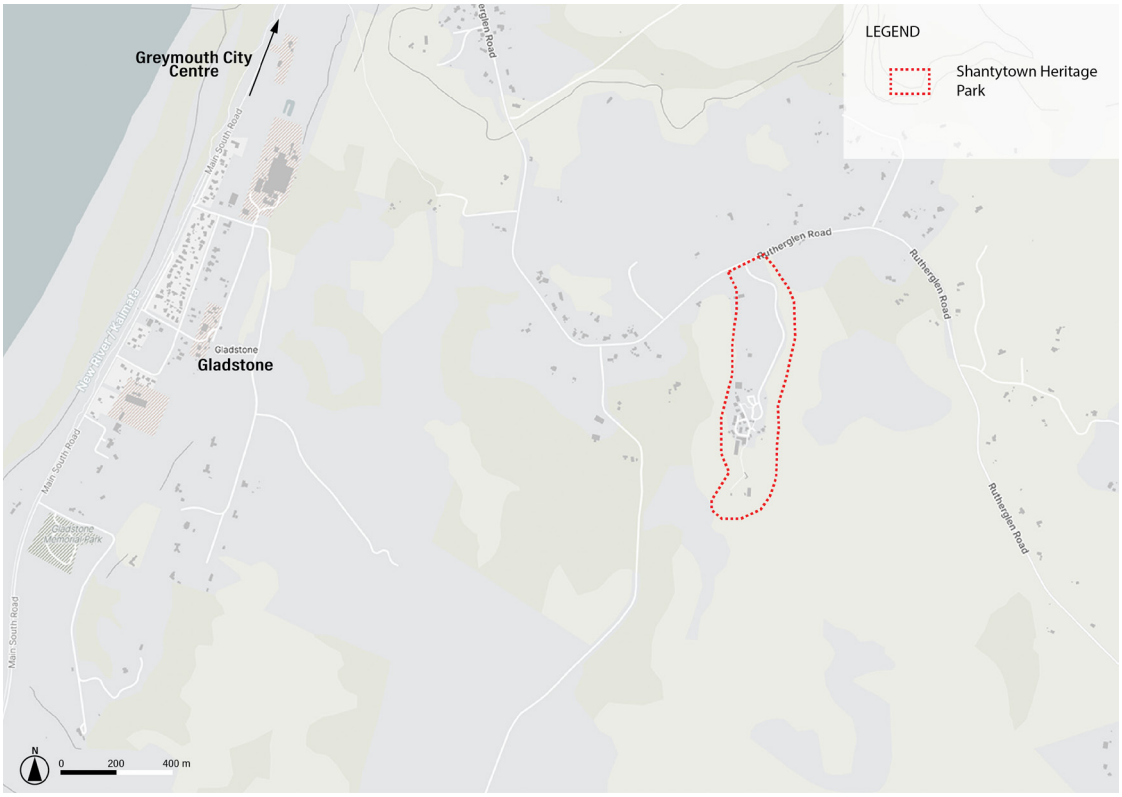


Figure 6 Location of Shantytown Heritage Park in Greymouth area. Map adapted from Cadmapper (n.d.).

Figure 7 to 10 General impression of Shantytown Heritage Park (from left to right, top to bottom) (images by author).

4.2 Primary case study 2 – Dunedin Warehouse Precinct

Table 4 Summary of the details of Dunedin Warehouse Precinct. Adapted from (Francis, 2001).

Project name	Dunedin Warehouse Precinct
Location	Bounded by Queens Garden, Police Street, Bond Street and Cumberland Street in Central Dunedin, New Zealand (see Figure 11 & 12)
Size	Approximately 5.5 hectares
Date designed/planned	Planned in 2011; staged implementation from 2017
Designer/planner	Urbanism Plus and Dunedin City Council
Design intervention	Adaptive reuse
Type of use	Residential and commercial
Managed by	Dunedin City Council

The Dunedin Warehouse Precinct was once the centre of the city's commercial and industrial growth. It accommodated a wide range of industries and enterprises including the stock and station industry, shipping industry, cordial manufacturing, woollen manufacturing, engineering, and publishing industry. The discovery of gold in the Otago Region in 1861 had contributed to Dunedin's industrial boom. Increasing numbers of offices and warehouses were established along the harbour and stages of reclamation were started from the 1860s to early 20th century. It was the period when new buildings were erected, during the time when Dunedin was the greatest and the most industrialised city in New Zealand (Trapeznik, 2014). The reclaimed land is now where the Warehouse Precinct sits on.

Industries declined in the late 20th century and the area became derelict. It was not until the Canterbury earthquakes in 2010 and 2011 that the city re-evaluated the values of the remaining collection of the Victorian buildings. The Dunedin City Council and Urbanism Plus developed the Revitalisation Plan for the Warehouse Precinct in 2011 and it is part of the strategic Central City Plan. The Revitalisation Plan is a fluid framework that evolves and responds to change as the development occurs (Dunedin City Council, 2013). As of today, some of the streets and amenity within the Warehouse Precinct have been pedestrianised and upgraded (see Figure 13 to 16). Shared spaces have been proposed to promote people-friendly outdoor space and a strong sense of history (Dunedin City Council, 2021).

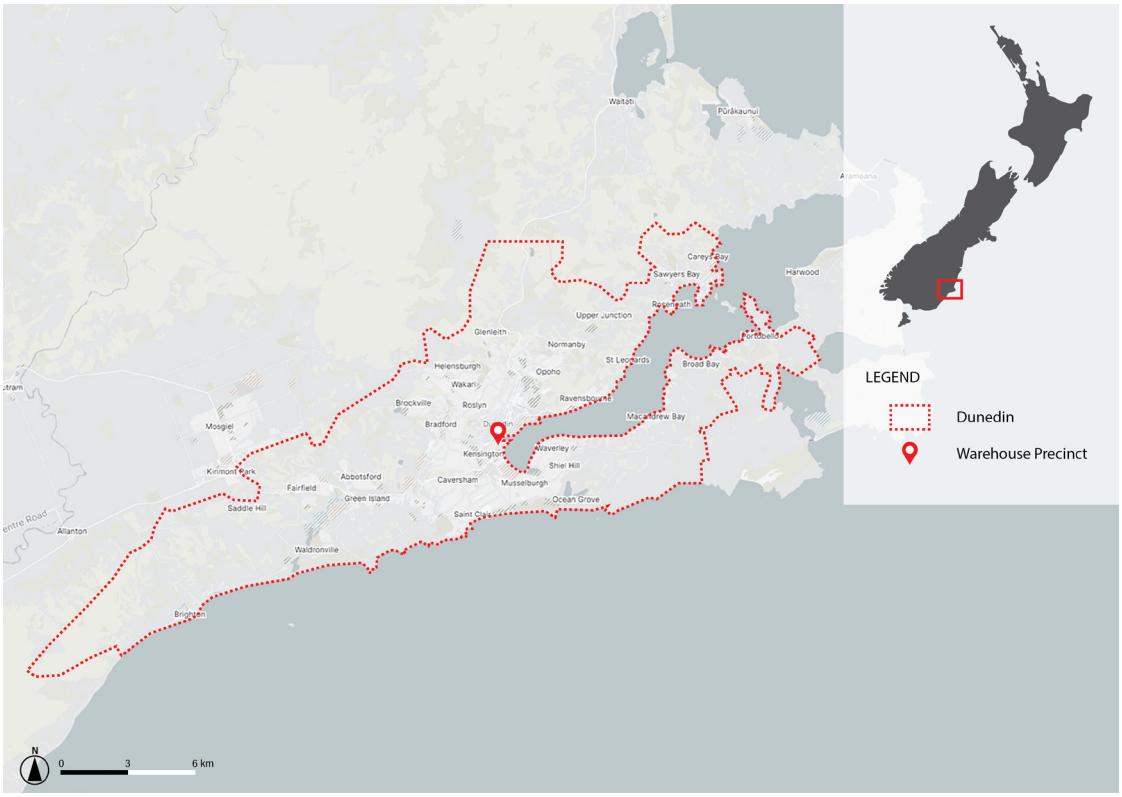


Figure 11 Location of Dunedin City in South Island of New Zealand. Map adapted from Cadmapper (n.d.).

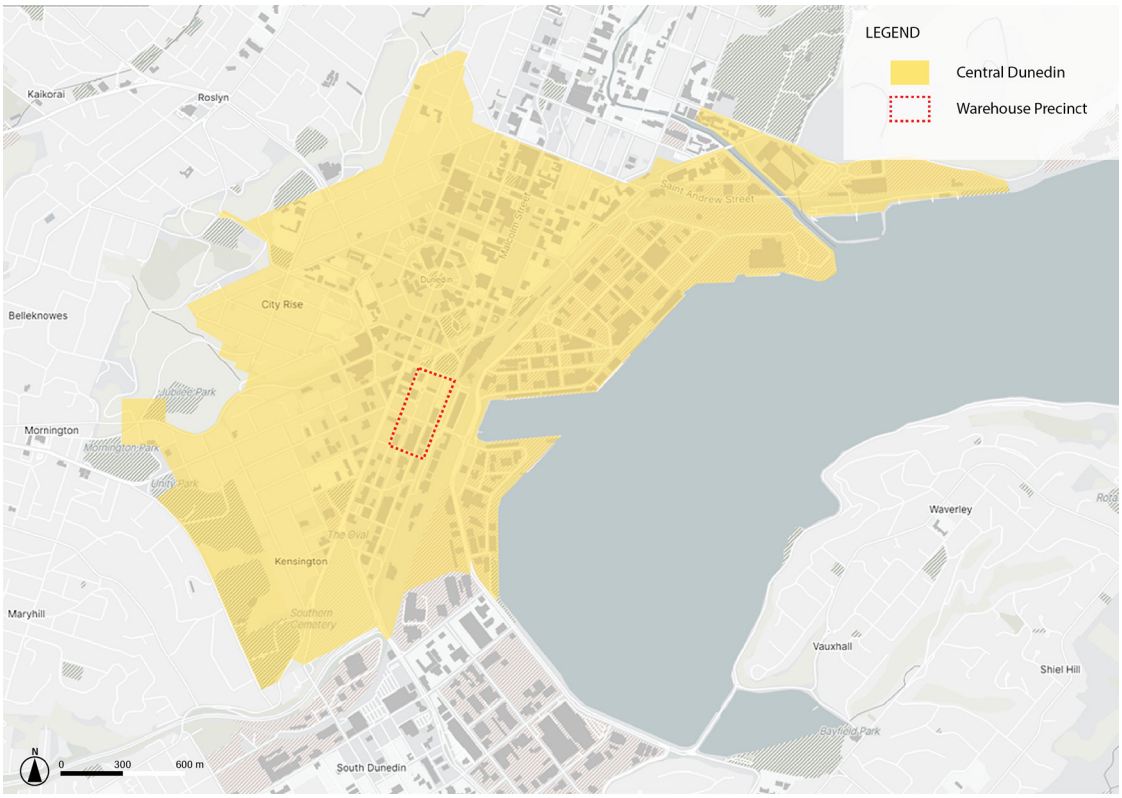


Figure 12 Location of Warehouse Precinct in Central Dunedin. Map adapted from Cadmapper (n.d.).

Figure 13 to 16 General impression of Dunedin Warehouse Precinct (from left to right, top to bottom) (images by author).

4.3 Primary case study 3 – The Tannery

Table 5 Summary of the details of The Tannery. Adapted from (Francis, 2001).

Project name	The Tannery
Location	3 Garlands Road, Woolston, Christchurch (see Figure 17 & 18)
Size	Approximately 2.86 hectares
Date designed/planned	Restoration started in 1994; development since 2000 in various stages
Designer/planner	The Cassels
Design intervention	Adaptive reuse
Type of use	Commercial
Managed by	The Cassels

The Tannery was one of the major industries in Woolston, Christchurch for about 80 years. The proximity to the Heathcote River and the railway running to Lyttelton port and Christchurch City centre made Woolston an ideal suburb for the tanneries industry. The growth of the industry was reflected in the number of wool scourers and tanneries: 7 wool

scourers and 5 tanneries were found in 1873 and both increased to 11 in 1883 (Lovell-Smith, 2010). The tannery contributed to the employment in Woolston, as well as the working-class spirit in the area.

In the 1950s, the tannery went into receivership and was closed in 1959. Other manufacturing businesses moved into the old tannery buildings in 1961. In the 1970s, the oldest tannery buildings were demolished (Lovell-Smith, 2010).

In the 1990s, the land-owner Alasdair Cassels began to restore some of the tannery buildings and leased them to various businesses. At the same time, new buildings were erected on the vacant land on site (Lovell-Smith, 2010). The Tannery is now a boutique shopping emporium, preserving the Victorian architectural style that was once commonly seen in the Woolston area (see Figure 19 to 22). Lands surrounding The Tannery remains as light industrial area. Proximate to the shopping mall was a gelatine factory which used to produce peculiar smell. Because of the smell, Woolston has been labelled as a “smelly” suburb.

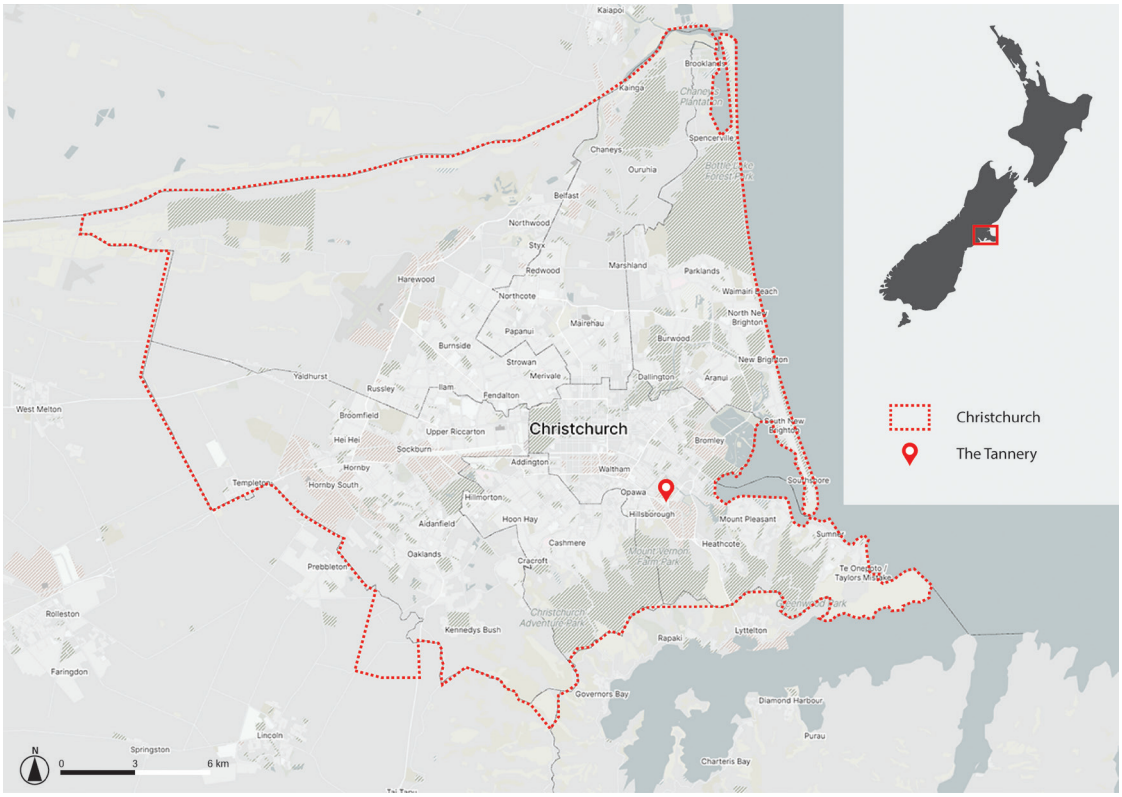


Figure 17 Location of Christchurch City in South Island of New Zealand. Map adapted from Cadmapper (n.d.).

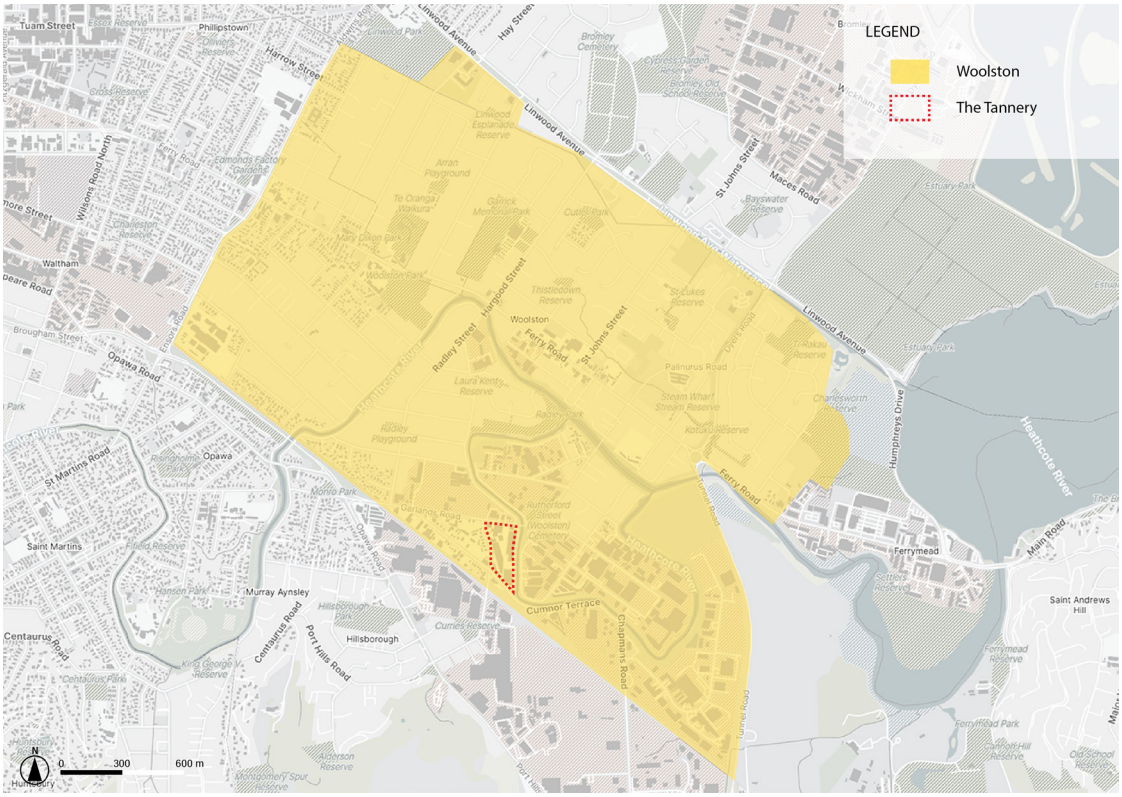


Figure 18 Location of The Tannery in the suburb of Woolston in Christchurch City. Map adapted from Cadmapper (n.d.).

Figure 19 to 22 General impression of The Tannery (from left to right, top to bottom) (images by author).

4.4 Secondary case studies

Various secondary case studies were identified in support of the analysis of design strategies for industrial heritage. These case studies consist of both local and international projects, including Tank Park in New Zealand (LandLab, n.d.; Silo Park, n.d.), Heito 1909 in Taiwan (Griffiths, 2021; Landezine, 2021), Landscape Park Duisburg Nord in Germany (Latz, 2016), Peterson & Søn cellulose factory in Norway (Skrede & Andersen, 2021; Swensen & Skrede, 2018), Domino Park (Gibson, 2018; Green, 2022; ArchDaily, 2019) and 9/11 Memorial & Museum (9/11 Memorial & Museum, n.d.; Sturken, 2016) in the United States, Camp des Milles in France (Sumartojo & Graves, 2018), *Thinking Spaces* project in Australia (Barns & Sumartojo, 2015). Six of the study sites had industrial backgrounds; two of the sites were memorials; and one of the case studies was a temporary project. Table 6 briefly summarises the details of the secondary case studies and Figure 23 shows the location of the case studies.

Table 6 Brief summary of secondary case study details.

Project	Location	Industry	Designer	Year built	Type of use	Temporary/ permanent
Tank Park	Auckland, New Zealand	Bulk storage of tallow, cooking oils, petrochemicals and caustic soda	LandLAB	2021	Recreation	Permanent
Heito 1909	Pingtung, Taiwan	Sugar factory	ECG International Landscape Consultants	2021	Recreation	Permanent
Landscape Park Duisburg Nord	Duisburg, Germany	Iron works	Latz+Partner	2002	Recreation	Permanent
Peterson & Søn cellulose factory	Moss, Norway	Paper and cellulose factory	John Wilhelmsen, Bjorn Gronna, and Sverre Storebraten	2015	Recreation	Permanent
Domino Park	New York, U.S.A.	Sugar factory	James Corner Field Operations	2018	Recreation	Permanent
Camp des Milles	Aix-en-Provence, France	Tile factory	Foundation of the Camp des Milles	2012	Tourism/ memorial	Permanent
9/11 Memorial & Museum	New York, U.S.A.	/	Michael Arad and Peter Walker	2014	Tourism/ memorial	Permanent
Thinking Spaces	Canberra, Australia	/	Dr. Sarah Barns, Michael Killalea, and Dr. Shanti Sumartojo	2013	Light projection project	Temporary

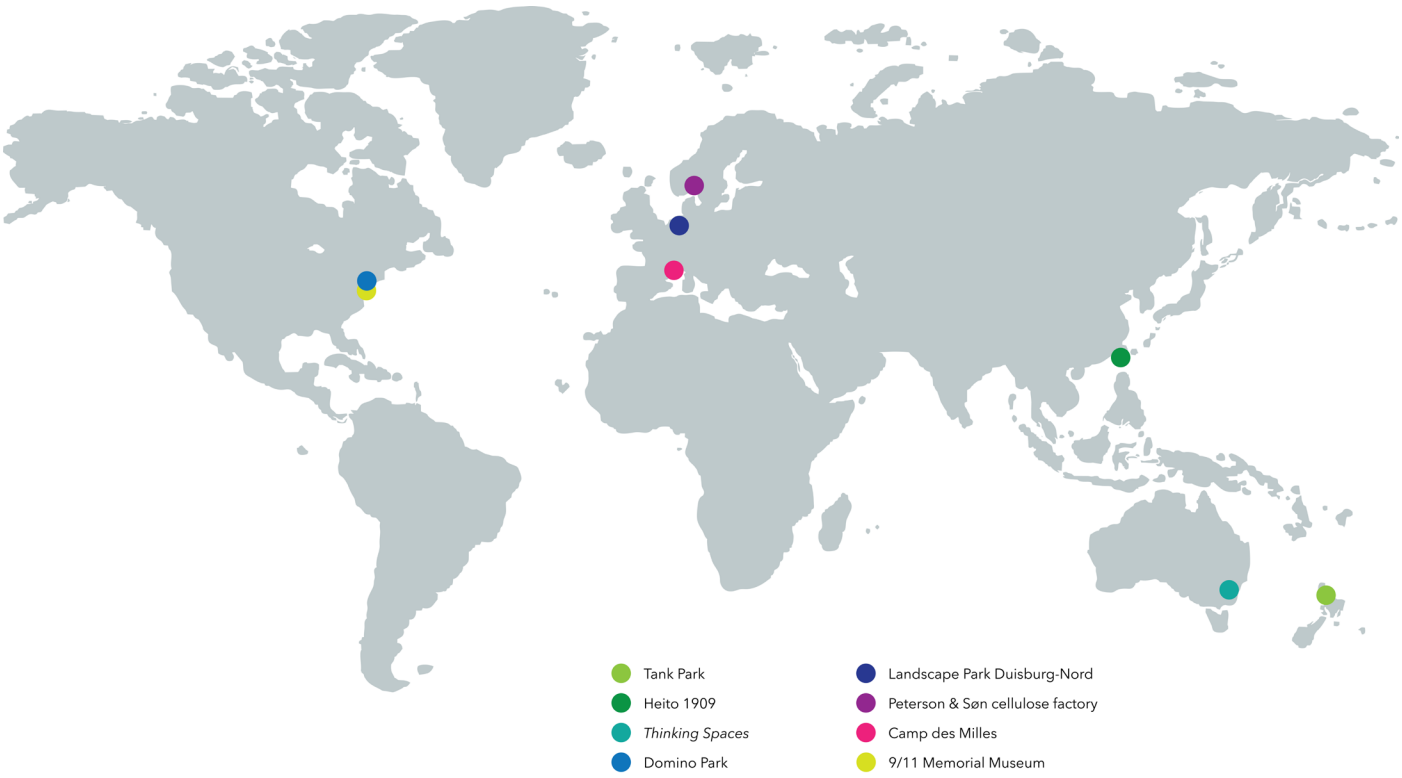


Figure 23 Map showing locations of secondary case studies.

4.5 Summary

This chapter has provided the context of the three primary case studies and briefly introduced the background of the eight secondary case studies. The results of the sensory experiences of the sites will be reported in the following chapter.

Chapter 5
Results

In the previous chapter, the backgrounds of the three primary case study sites – Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery – were introduced. This chapter first reports the findings of the site visits to the three sites in which notes, photos, videos and audio recordings were taken. The results are then described thematically according to senses and are integrated into a table and interpreted graphically as described in Chapter 3.

5.1 Rust and smoke

During my visits to the case study sites, rust and smoke were identified as the most prominent elements that were multi-sensory and were representative of the industrial epoch.

5.1.1 Rust

Rust was a visually dominating material that was dotted throughout Shantytown Heritage Park. Rust was mainly found on sculptures and artefacts such as tractor wheels, stamping batteries and balcony castings. In contrast to the surface on which it was forming, the texture of rust was rough and uneven. The number of microscopic peaks and valleys formed across the surface determined the degree of roughness and unevenness of rust (see Figure 24). When rubbing against the surface, the rust was flaky and sandy.

Figure 24 Microscopic peaks and valleys formed on metal surface that created roughness to the surface (image by author).

The colour of rust varies depending on the amount of exposure to water and moisture. This could be observed through different colours of rust showcased in open, shaded and indoor areas – orange to orange-brown in open areas, orange-brown to reddish-brown in shaded areas, and brown in indoor areas (see Figure 25 to 30).

Figure 25 to 30 Rust developed on the surfaces of artefacts found in Shantytown Heritage Park. The textures and colours of rust vary on different surfaces (from left to right, top to bottom) (images by author).

5.1.2 Smoke

In Shantytown Heritage Park, smoke appeared when the steam train started operating. Burning of coal produced large amounts of smoke and the smoke was emitted through the chimney. The smoke appeared to be in a mixture of black, grey and brown colour which spread across the town, masking some of the buildings and part of the forest near the train station (see Figure 31). Unlike rust, smoke was temporal and dissipated into the air.

The smoke was accompanied by the smell of coal. The smell grew stronger when I got closer to the steam train and was the most intense when I entered the cab of the locomotive, where there was a pile of coal (see Figure 32).

Figure 31 Smoke emitted from the locomotive in Shantytown Heritage Park. The smoke masked part of the landscape at behind (image by author).

Figure 32 Coal that was used as the fuel for the locomotive in Shantytown Heritage Park (image by author).

5.2 Sight

5.2.1 Style

At all the primary case study sites, the physical appearances of the buildings were the prominent visual experience – not only the architectural form but also the colours caught my eyes. Buildings in the study sites were all in Victorian style. Buildings in Shantytown Heritage Park feature steeply pitched roofs, rooftop finials, wraparound porches with ornamental spindles and brackets (see Figure 33 & 34). In Dunedin Warehouse Precinct, decorative brick detailing and cornices could be found on the two- to four-storey high commercial and industrial buildings. Sculptures, motifs, tall and narrow double-hung windows were some of the defining characteristics found on those buildings (see Figure 35 to 38). The red and orange-brown brick exterior and saw-tooth roof of The Tannery contributed to the distinctive visual appearance of the site (see Figure 39 & 40). Similar style to The Tannery's architectural appearance were employed in the design for mixed use buildings in the Major Design proposal.

Figure 33 Shops and buildings in Victorian architectural style in Shantytown Heritage Park (image by author).

Figure 34 Building with decorative railings (image by author).

Figure 35 Motifs found on the façade of National Mortgage and Agency building in Dunedin Warehouse Precinct (image by author).

Figure 36 Decorative cornices found on one of the historical buildings in the Warehouse Precinct (image by author).

Figure 37 Sculptures and decorative cornices found on one of the historical buildings in the Warehouse Precinct (image by author).

Figure 38 Decorative cornices and double-hung windows found on former New Zealand Insurance Company building (image by author).

Figure 39 Saw-tooth roof of The Tannery (image by author).

Figure 40 Distinctive red brick exterior of The Tannery (image by author).

On the other hand, at Shantytown and the Warehouse Precinct, there were some parts of the buildings that looked new while some parts appeared weathered (see Figure 41 & 42). Despite the façade of the buildings were newly painted, I could still see the words “Wool” and “Dalgety and Company” on the top of the wall at one of the buildings in the Warehouse Precinct for instance (see Figure 43).

Figure 41 and 42 Weathered building exterior in Shantytown Heritage Park and the Warehouse Precinct (from left to right) (image by author).

Figure 43 Words covered by new paints can still be seen in the Warehouse Precinct (image by author).

5.2.2 Interpretation

Interpretation boards, which are one of the key elements at heritage sites that help visitors to understand the significance of place and people, could be found throughout Shantytown. Stories of real characters in the past from the area, history timeline of the gold and coal mining era of the West Coast, as well as technical information showing how the machinery and equipment operate (see Figure 44 & 45). The designs for signs and interpretation boards were diverse. Different colour palettes and fonts were used for signs in different areas (see Figure 46 to 49). At the Warehouse Precinct, the only interpretation board and plaque was found on the stone wall of the historical Railway Street (or Old Cumberland Street) bridge (see Figure 50 & 51). No interpretation boards about the industrial history were found in the Tannery.

Figure 44 Interpretation boards of stories of real characters in Shantytown Heritage Park (image by author).

Figure 45 Historical events of West Coast written on interpretation boards (image by author).

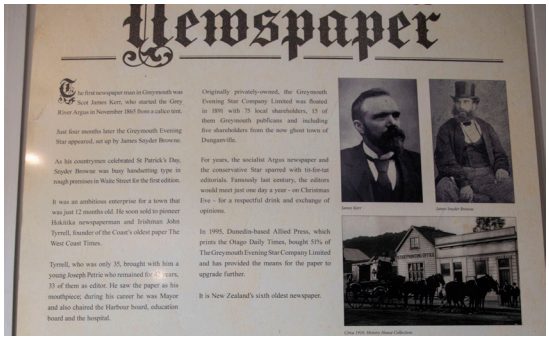


Figure 46 to 49 Various styles and fonts were found on the interpretation boards in Shantytown Heritage Park (from left to right, top to bottom) (images by author).

Figure 50 and 51 Plaque and interpretation board describing the historical importance of the railway overbridge (from left to left) (images by author).

5.2.3 Artworks and artefacts

The visual experience of Shantytown Heritage Park started prior to my arrival at the town. Before heading to the Park, I went for a walk in the Greymouth town centre and saw a series of murals telling the industrial history of the town (see Figure 52 & 53). One of the drawings is an advertisement of the Heritage Park painted with the locomotive “Kaitangata”, heavy steam coming out from the train’s chimney, and gold at the corner.

Figure 52 and 53 Murals depicting industrial history of Greymouth (images by author).

On the way to Shantytown, I exited the State Highway which has open view to the Tasman Sea and entered a densely vegetated driveway, leading me to the main gate of the Heritage Park. The first thing that caught my eyes was the sharp, yellow-coloured advertising board with photos of a steam train, gold and people wearing old costumes. As my car turned, it was then the giant wheels on both sides of the gate appearing in front of me (see Figure 54). Along the way to the carpark, there was a series of industrial relics, looking old, rusty and worn-out (see Figure 55). Such weathered and rusty relics were displayed throughout the whole town (see Figure 56 & 57).

Figure 54 Artefacts and advertising board found at the entrance of Shantytown Heritage Park (image by author).

Figure 55 Artefacts placed along the way from main entrance to carparking area (image by author).

Figure 56 and 57 Artefacts could be found throughout Shantytown Heritage Park (from left to right) (images by author).

At the Dunedin Warehouse Precinct, artworks were predominantly found on the exterior walls of the buildings and at Jetty Street. Most of the murals on site seemed to be contemporary street art that included a number of local and international themes, rather than conveying specific meaning to the industrial history of Dunedin (see Figure 58 to 61). One of the murals (see Figure 62) looked like a fish was swallowing Māori waka and a submarine, which seemed to reflect a certain historical event in the area. A feature wall which depicts a jet boat (see Figure 63) could be found at Jetty Street, revealing the shipping history of the site.

In the Major Design proposal, relics of car scrap piles from the existing metal recycling industry were retained. Machinery used in the leather-making process in the past was introduced back to the site as artefacts.

Figure 58 to 61 Street arts that do not reflect industrial history of Dunedin (from left to right, top to bottom) (images by author).

Figure 62 Mural depicting the history of Dunedin (image by author).

Figure 63 Jet boat artwork found at Jetty Street in the Warehouse Precinct (image by author).

5.2.4 Light and absence of light

The lighting at all the primary case study sites provided illuminating functions to allow the use of spaces at night time. At Dunedin Warehouse Precinct, streetlights also helped to reveal various art works at the site (see Figure 64 & 65).

In Shantytown Heritage Park, film projections at the sawmill and blacksmith's shop could be found. The projections showed films of people working in the past at this same site. The one at the sawmill was projected on the wall behind the mill at a size of about 6m wide and 2m high (see Figure 66), while the one in the blacksmith's shop was about the size of 13inch (about 33cm) TV screen. At the foundry in the Heritage Park, the use of light together with coloured glass paper has imitated the process of metal smelting (see Figure 67).

In some of the destinations in Shantytown, including the foundry, sawmill and Chinatown, lighting was not intensely used to provide illumination. Some spaces were appeared gloomy and dark. In the mining tunnel in Chinatown (see Figure 68), no light was installed. I was in complete darkness after entering the tunnel and had to turn on the flash of my mobile phone for wayfinding.

Figure 64 and 65 Lighting helps to reveal artworks in the dark (from left to right) (images by author).

Figure 66 Light projection showing footages of people working in a sawmill in the past (image by author).

Figure 67 The use of light and coloured glass paper to depict metal smelting (image by author).

Figure 68 Mining tunnel in Chinatown is the only place where darkness could be found (image by author).

The slider below (Figure 69) shows the comparisons of visual experiences between different sites. Shantytown Heritage Park showcased the most expressive visual elements of the industrial past than the other two sites: while it was largely curated compared to Dunedin Warehouse Precinct and The Tannery, the visual experience at Shantytown Heritage Park was highly related to past industries at the West Coast region and those at the Warehouse Precinct and The Tannery displayed contemporary elements. Visual experience of industrial aspects of the Warehouse Precinct and The Tannery were predominately relied on the architectural style of the buildings.

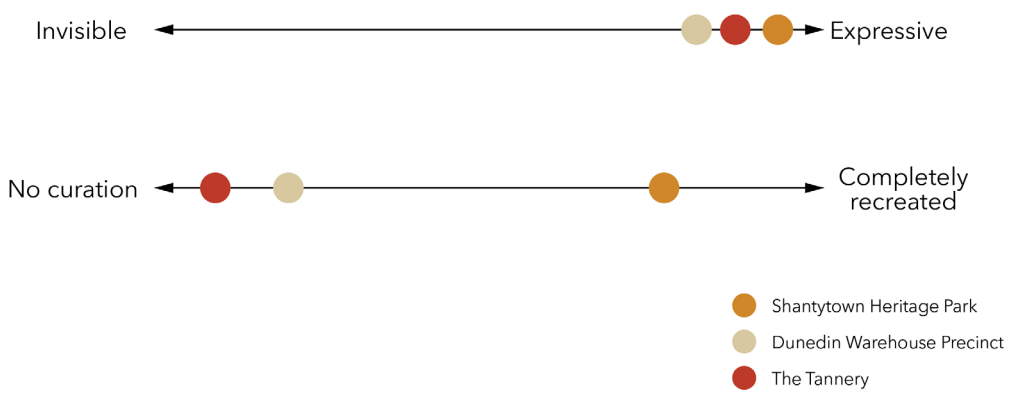


Figure 69 Comparison of visual experiences at Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery (interpretation by author).

5.3 Sound

The acoustic experience in Shantytown Heritage Park was diverse, located, but also mobile. It is the only site amongst the primary case studies where the use of sound installation and audio guides were found. Sounds of people practicing logging, using axes and crosscut saws could be heard at the end of the train line where it is enclosed by rainforest. Other sound installations include narratives of train journey introducing the history of Infant Creek tramway and narratives of a work life of a blacksmith at the foundry.

The audio guide (Figure 70) at Shantytown was available digitally. The audio guide was presented through a third-person narrator who described the history of destinations around the site and stories of real characters during the West Coast gold rush period.

Figure 70 Audiopost found at the main street of Shantytown (image by author).

Different locations within Shantytown had different ambient sounds. Near the entrance and the train station was the soft and subtle sound of water and the water wheel turning; when the train was operating, the sounds of train horn, train wheels and engine were prominent; and when the train was making its way through the Infant Creek, I could hear the sounds of tree branches and leaves sweeping the train. Almost everywhere around the whole main town, I could hear occasional hammering sounds of people doing maintenance on the buildings.

Densely surrounded by bush, Chinatown is, by contrast, rather quiet. When entering the mining tunnel, the surroundings became even quieter and silent. The only thing I could hear was my own footsteps and sounds of my clothes rustling while moving through the darkness.

I could not see anything but I could hear “splash” sounds when walking through the tunnel. The stepping sound echoed and was amplified inside the tunnel.

At Dunedin Warehouse and the Tannery, sensory of sound is less evident when compared to Shantytown. Contemporary sounds such as people talking and vehicles driving by were the main sound experience at the two sites. Inside the shops of the sites, acoustic modern music could be heard. They seemed to have no traces of sounds related to the industrial past. It was not just the absence of the heritage soundscape, but the presence of the modern soundscape has limited the sensory aspects at the sites.

The Major Design project proposed the reintroduction of brass band music to The Tannery site through both live music and sound installation, aiming to reinforce the acoustic, at the same time industrial, encounter at the site. The design project also proposed the production of sounds of leather-tanning process when visitors used play equipment at the playground.

The audio guide was one of the audio elements that engaged me with the industrial history of West Coast through the whole site visit at Shantytown Heritage Park, making the site the most audible among the primary case study sites (Figure 71). Sound installation of logging sounds and stories of daily life of the workers added onto the auditory experience, while the other two sites showed no evidence for industrial acoustics experience.

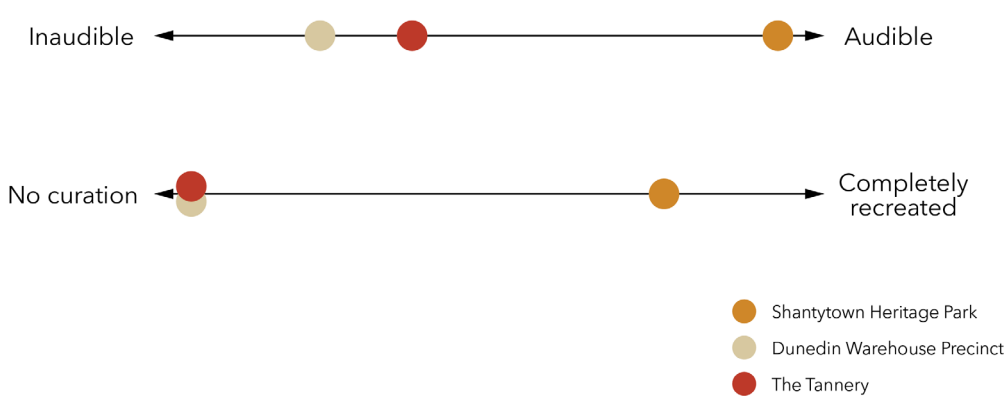


Figure 71 Comparison of auditory experiences at Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery (interpretation by author).

5.4 Smell and taste

The experience of smell is limited at the three sites. In Shantytown Heritage Park, the most prominent smell within the site was that of burning coal. The smell of coal was relatively light upon arrival. It got heavier when the steam train started to operate.

Embraced by forests, the overall smell of Shantytown gave a sense of wilderness: smell of trees and shrubs. Resonating with the weather of the West Coast region, I could smell the wetness of the air. The buildings and sheds gave a smell of dampness and staleness, and the smell was similar to that of an old house.

On a contrary, the smells at Dunedin Warehouse Precinct and Woolston Tannery were modern and urban. The choking smell of car exhaust was prominent particular along the main roads and streets at both sites. When walking along Vogel Street, where number of buildings at ground level were re-purposed into restaurants and cafes in Dunedin, there were infrequent smells of coffee and roasted food. In The Tannery, the smell of sweets was evident when walking past a chocolate café. A smell installation of gelatine, its smell now lost in the suburb of Woolston, was proposed to bring back the prominent olfactory experience of the suburb before the gelatine factory closed down.

Similar to smell, the taste of Dunedin Warehouse and Tannery were contemporary. The tasting experiences were largely affected by the smell found on site. The smells of food, coffee, and sweets in the Warehouse Precinct and The Tannery were so strong it was as if I was tasting them. In Shantytown Heritage Park, an edible garden could be found in the Chinatown in which vegetables such as spring onions, silver beet and lettuce were planted (see Figure 72). In the Major Design project, a community garden was proposed to promote edible experience in the post-industrial landscape.

Figure 72 Edible garden in Chinatown of Shantytown Heritage Park at the foreground (image by author).

Figure 73 and 74 show how the three case study sites differ in terms of their smell and taste experiences. Smells of smoke and wilderness contributed to the olfactory experience at Shantytown Heritage Park reflected the industrial and natural aspects of the region. While the other two sites, despite the presence of smell, did not have evidence of industrial-related olfactory experience. Similarly, the sense of taste appeared at Dunedin Warehouse Precinct and The Tannery was contemporary and had no evidence of the industrial past.

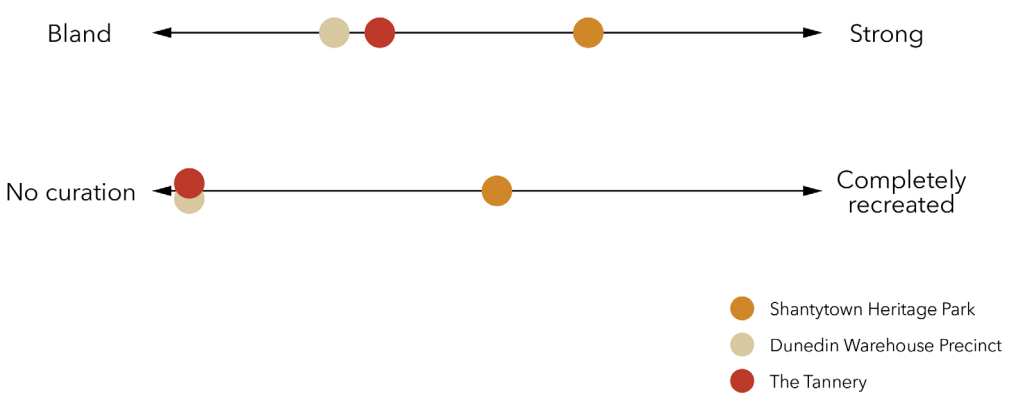


Figure 73 Comparison of olfactory experiences at Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery (interpretation by author).

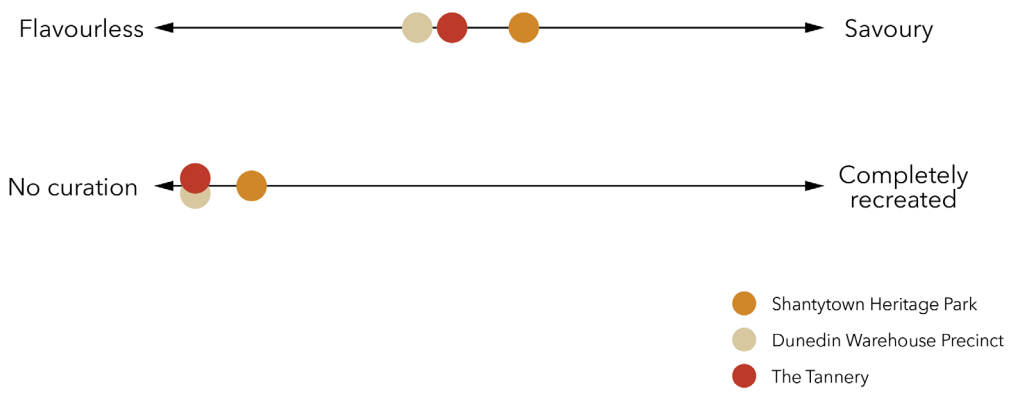


Figure 74 Comparison of taste experiences at Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery (interpretation by author).

5.5 Touch

5.5.1 Temperature

The surfaces of the objects and buildings were predominately cool at the three primary case study sites. The nature of the materials and the ambient atmosphere contributed mainly to the coldness of the surfaces. Coldness was particularly prominent during gold panning when I could touch the water at Shantytown Heritage Park. There was unexpected coolness when touching the red-coloured glass papers which depicted smelted metal (Figure 67 in p.41).

5.5.2 Texture

The textures of objects and buildings dominated the haptic experience at all primary case study sites. Rust on the machines and equipment used in the past in Shantytown, brick, stone and weathered concrete surfaces of the buildings at Dunedin Warehouse Precinct (see Figure 75), and the brick surface at the Tannery gave roughness to touch experience (see Figure 76). On the other hand, smoothness could be felt on the new painted exterior walls of buildings in Dunedin (see Figure 77) and the timber interior in The Tannery.

Figure 75 Rough stone surface on railway overbridge in Dunedin Warehouse Precinct (image by author).

Figure 76 Rough brick surface in The Tannery (image by author).

Figure 77 Relatively smooth concrete surface in Dunedin Warehouse Precinct (image by author).

5.5.3 Barrier

Touching is not possible in some parts of Shantytown. Some smaller sized artefacts such as fossil rocks and stones, and photographs were contained in glass cabinets (see Figure 78 & 79) while some other collections were separated from visitors by fences and rope barriers (see Figure 80 & 81). At the other sites, barriers were not present to hinder touching experience.

Figure 78 and 79 Exhibits contained in glass cabinets (from left to right) (images by author).

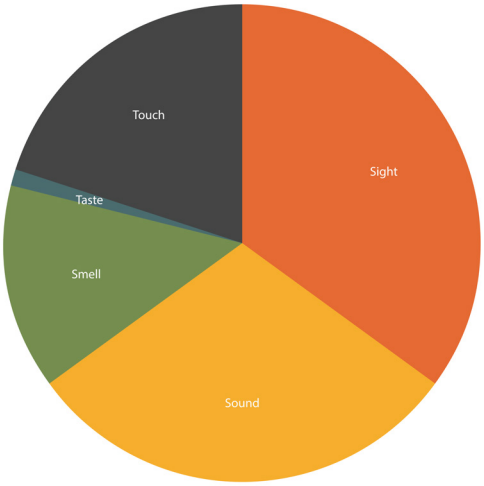
Figure 80 and 81 Fences and ropes that prevented touching experience in Shantytown Heritage Park (from left to right) (images by author).

While Shantytown Heritage Park provided more diverse tactile experience than Dunedin Warehouse Precinct and The Tannery in terms of thermal aspect and textures, barriers limited touching opportunities at the site to a large extent (see Figure 82).

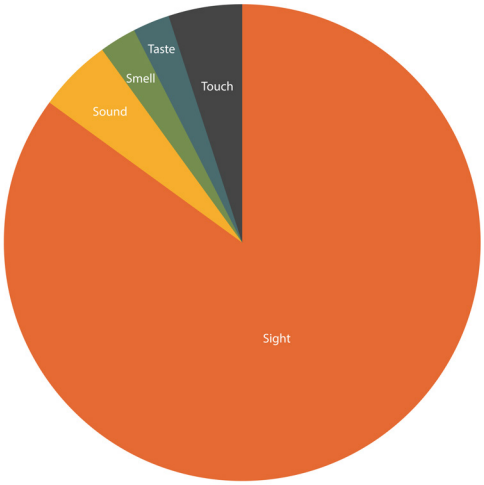
Figure 82 Comparison of touching experiences at Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery (interpretation by author).

5.6 Sensory performance

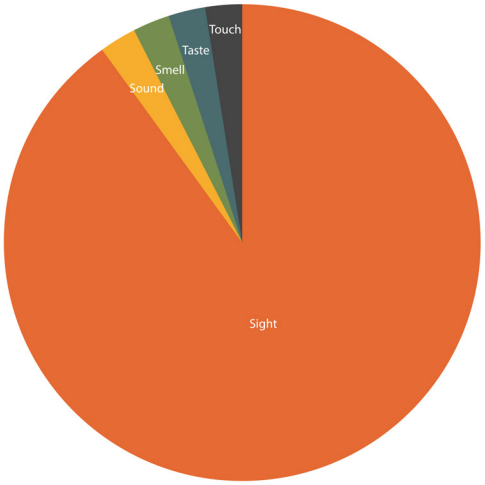
The overall sensory experience at Shantytown Heritage Park showed a more balanced experience: the sense of sight, sound, smell and touch shared similar proportion and taste was the least experienced sense (Figure 83). On the other hand, the sensory experiences at Dunedin Warehouse Precinct and The Tannery were highly visual dominated. Despite the presence of sound, smell, taste and touching experience, these senses were modern rather than reflecting the industrial past. Sensory experiences at secondary case study sites were identified through researching literature and newspaper articles. Information gathered was integrated into Table 7.



Shantytown Heritage Park



Dunedin Warehouse Precinct



The Tannery

Figure 83 Pie charts showing the sensory performances of each primary case study sites (interpretation by author).

Table 7 Table summarising sensory experiences of all case studies.

Primary case studies

	Shantytown Heritage Park, West Coast, New Zealand	Warehouse Precinct, Dunedin, New Zealand	The Tannery, Christchurch, New Zealand
Sight	• Victorian style buildings • Relatively new exterior (maintenance) • Interpretation boards, artefacts and relics, coal for locomotive • Film projection at general smith and sawmill) • Smoke from locomotive (spreading across the town)	• Buildings (mix of new and old structures) • Fire escapes on some buildings • Façade of buildings (architecture; keep the character) • Art installation at Jetty Street (jet; reflecting the history) • Interpretation board at Railway Street bridge	• Architectural appearance (orange, red colour; saw-tooth roof)
Sound	• General smith shop (narrative sound installation) • Audio posts narrative (can be downloaded) • Train horn; train engine • Narrative about the train journey; sound of train; sound of vegetation sweeping on the train • Water wheel (subtle and soft) • Logging sound (sound installation)	• Contemporary sounds (people and vehicles)	• Contemporary sounds (people and vehicles)
Smell	• Coal (light smell when first arrived; got heavier when train started to operate) • Smell of vegetation (rural, forest) • Stale, damp and mouldy smell in the buildings and sheds (smell like old wood/house)	• Car exhaust • Coffee, roasted food	• Car exhaust
Taste	• Vegetable garden (but could not taste them)	• Strong smell of food and coffee as if tasting them	• Strong smell of sweets as if tasting them
Touch	• Cold metal and water • Rough rust • Barriers to touch (display boxes and fences)	• Rough weathered concrete surface and brick surfaces • Smooth heavily painted wall • No barriers found	• Rough brick surface • Smooth timber interior • No barrier found
Light	• Mining tunnel – darkness (Chinatown) • Rooms of miners – dimly lit (Chinatown) • Yellow and red glass paper with light (imitate the process of smelting) • Gaslight	• Street lighting that provides illumination for usages at night time • Lighting that reveals artwork at night time	• Street lighting that provides illumination for usages at night time
Materiality	• Rust on old structures • Smoke	• Mix of old bricks and new concrete	• Brick

Table 7 Table summarising sensory experiences of all case studies (Con't).

Secondary case studies

	Tank Park, Auckland, New Zealand	Heito 1909 (Pingtung Sugar Factory), Pingtung, Taiwan	Landscape Park Duisburg-Nord, Duisburg, Germany
Sight	• Remnants of silo tanks • Interactive art display at viewing portals on silo tanks	• Interpretation boards (history of the sugar factory) • Relics of old mechanical equipment • Steel column structures representing a 1920s bamboo pavilion in the past • Shade structures representing the skyline from the past • Water basins and underground spaces of the past excavated • Miniature sculpture to recreate the layout of the sugar factory	• Relics of tank wagons (entrance), railways bridges and tracks, bunkers, iron-clad partitions, and pipes • Blast furnaces and sinter plant as industrial monuments • Regenerated green spaces • Artwork/graffiti on concrete walls that were formerly used to separate bulk materials (at Meiderich Goods Yard) • Rusted appearance of relics
Sound	• Sound of flowing liquid at Play Line • Talking tube at Play Line • Contemporary sounds (people)	• Contemporary sounds (people and performances)	• Sounds of nature • Contemporary sounds (people)
Smell	/	/	• Smell of vegetations
Taste	/	/	• Agricultural crops
Touch	• Wet and moist (misting effect at Play Line)	• Steep climbing structure at Adventure Playground • Rough surfaces of concrete walls	• Roughness of concrete walls • Climbing park, steps and railway walk to provide topography for body movement
Light	• Film projections (occasion) • Lighting up the pipes at Play Line • Interactive lighting system (silo tanks)	• Street lighting that provides illumination for usages at night time	• Colours of lightings as the reminiscence of functions of the individual parts of the ironworks (red for fire; green for gas; blue for water)
Materiality	• Silo structures • Cylindrical Cor-ten steel seating (intended weathering)	• Rust on equipment from the past • Weathering steel as new implanted materials for circular tunnel and arched gateway to provide connecting points between old and new spaces	• Rust
References	(Silo Park, n.d.) (LandLab, n.d.)	(Griffiths, 2021) (Landezine, 2021)	(Latz, 2016)

Table 7 Table summarising sensory experiences of all case studies (Con't).

Secondary case studies

	Peterson & Søn cellulose factory, Moss, Norway	Domino Park, New York, U.S.A	Camp des Milles, Aix-en-Provence, France
Sight	• Physical presence of the digester of former cellulose factory (as a visual cue and object to attach local people's memories)	• Artefacts from the Sugar Factory laid across the park, including 21 original columns from the Raw Sugar Warehouse, cylindrical tanks, crane tracks of approximately 178m high, gantry cranes, syrup tanks and screw conveyors • Playground that reflects the sugar refining processes with materials from the old refinery incorporated • "Pier Reveal"/fog bridge that reveal the old pier piles • Colours for building materials of the playground echo the original factory's colour palette (vibrant yellow, turquoise, green and brushed metal colours)	• Vaguely industrial, old-looking building and structures • Interpretation boards
Sound	/	• Contemporary sounds (mainly from people)	• Guided tour or audio guide explaining the history of the site
Smell	• "The smell of Moss" • Smelling art installation (imported from a cellulose factory in Sweden, to recreate the same smell produced at Peterson before the factory closed)	• Contemporary smell (food from a Mexican restaurant)	• Smell of rust invoked one of the research participant's childhood memory • Dusty air breathed in
Taste	/	• Salty and spicy taste of Mexican food	/
Touch	/	• Have direct contact with custom furniture made from materials from the old sugar factory • Moisture of mist and fog at "Pier Reveal" • Artifact Walk and playground towers that require visitors to walk or climb up	• Coldness • Dusty air particles that could be rubbed by fingertips
Light	/	• Street lighting that provides illumination for usages at night time	• Light plays along the walls, casting shadows of beams and hanging fixtures that crosscut their mottled and pocked surfaces
Materiality	/	• Rust on industrial relics • Intended weathering – Cor-Ten steel framing planting areas • Yellow pine wood preserved from a demolished factory building	• Rust • Dust and dirt
References	(Skrede & Andersen, 2021) (Swensen & Skrede, 2018)	(Gibson, 2018) (Green, 2022) (ArchDaily, 2019)	(Sumartojo & Graves, 2018)

Table 7 Table summarising sensory experiences of all case studies (Con't).

Secondary case studies

	9/11 Memorial Museum, New York, U.S.A	*Thinking Spaces*, Australian National University, Canberra, Australia
Sight	• The absence of the Twin Towers • Archaeological remnants of the original Twin Towers, including the Survivors' Stairs and exhibits related to the terrorist attack such concrete retaining wall that was built to hold back water of the Hudson River, and personal items from the victims • Interpretation boards	• Photos and videos of the past
Sound	• Audio guide about the collapse of the Twin Towers, stories and testimony of victims, as well as the design of museum	• Recorded audio from the videos
Smell	/	/
Taste	/	/
Touch	• Dust-covered pile of jeans from the Chelsea Jeans store exhibited behind glass and handled as a dangerous substance	/
Light	/	• Filmic projections • Lighting up the usually dark spaces • Revealing texture of architecture
Materiality	• Dust as the primary visual motif, dominated the trauma-scape • Dust as a symbolic substitute for the ashes of the dead	/
References	(Sturken, 2016) (9/11 Memorial & Museum, n.d.)	(Barns & Sumartojo, 2015)

Figure 84 is a quattro stagioni diagram showing the tensions between multi- and uni-sensory experiences, and the degree of visual experience at different sites. The results show that recreational and tourism sites including Shantytown Heritage Park, Tank Park, and Camp des Milles were multi-sensory and non-visual dominated. Heito 1909, Domino Park, Landscape Park Duisburg Nord, and 9/11 Memorial & Museum were as well multi-sensory. The visual experience at these sites did not dominate the site, but were balanced with other non-visual senses as a whole. Peterson & Søn cellulose factory, temporary light projection project *Thinking Spaces*, and commercial sites Dunedin Warehouse Precinct and The Tannery were heavily visual and there were absences of other senses at these sites. The graph also shows an absence of uni-sensory but non-visual project.

Figure 84 Comparison of sensory experiences between all case study sites (interpretation by author).

5.7 Summary

This chapter provided detailed results of sensory experience at the three primary case study sites: Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery. The sensory experiences of both primary and secondary case studies were identified and categorised according to senses. The results showed the tendencies of uni-sensory and visual dominant, and multi-sensory and non-visual dominant approach in heritage design. The analysis of such tendencies will be discussed in the next chapter.

Chapter 6
Discussion

In Chapter 5, I presented the results from site visits to the primary case study sites, and desktop studies for secondary case studies. This chapter analyses the data collected and discusses how each sense contributed to how people remember the sites and the creation of memoryscape for industrial heritage. I also explore the design opportunities according to the context of the sites.

6.1 Sight

Sight has been regarded as the most important sense for centuries. This can be traced back to Classical period in ancient Greek when philosophers Plato and Aristotle advocated the notion of vision being the noblest sense. It was believed that vision and light represent knowledge and truth (Pallasmaa, 2012). The dominance of eye was further influenced by theory of picturesque that was first put forward by William Gilpin in 1768 (Bowring, 1997). The “picture-like” practice has substantial impact on design professions. Technological culture has also detached us from engaging with the landscape. We see, but barely listen, smell, taste or touch. Vision remains at the highest level of the hierarchy of five senses. While there are growing criticism on ocular-centrism and more attempts have been made to promote non-visual senses, it seems to me that sight is still an inevitable sense to understand our world. This can be seen from the emerging volume of research done on sensory mapping which attempts to visualise the abstract and intangible qualities of other senses. This includes a considerable number of smellmaps done by Dr. Kate McLean (McLean et al., 2018) which will be briefly introduced in Section 6.4.

I regard sight as an inseparable sense to participate in the heritage landscape. As a foreigner in New Zealand, I have been mostly exposed to the scenic beauty but have very limited knowledge about the history of the country. Prior to visiting Shantytown Heritage Park, Dunedin Warehouse Precinct and The Tannery, I only acquired limited information from desktop research about these case study sites. During my exploration in Shantytown and Warehouse Precinct, interpretation boards were the key for me to gain understanding to the sites. They serve as the foremost tool to connect me to the industrial history of West Coast. Through texts and photographs, I learnt about how small and remote villages transformed into busy towns surrounded by noisy stamper batteries, how large machinery and equipment

were transported from overseas to the wilderness, how natural disasters affect the lives of the workers, how people in the past were risking their lives working on the goldfields and coal mines. My first-hand experience of the sites was part of my case study investigation, and this allowed me to test how effective the designs of heritage landscapes were. This adds to the development of design strategies for industrial heritage sites, within the scope of my dissertation.

Reading through the interpretation boards, there were moments when I was emotionally affected by the stories of workers. Descriptions such as “we worked eight hours days, six days a week and travelled in our own time. We started at 8.00 a.m. and worked four hours straight with no stops for smoko, had half an hour for lunch and then knocked off at 4.30 to travel home in our own time” and “my mate was very keen on large ‘scarves’ and, as we were felling trees up to 6 feet (about 1.8 meters) in diameter, this meant a scarf 5 foot (about 1.5 meters) long at the widest point, and about 2 foot 6 inches (0.8 meters) deep. To cut this in tough rimu took quite a while, and I must say that my mate’s enthusiasm for so much axe work was not shared by me” reminded me of my previous work in a golf course in my hometown Hong Kong. We do not have “smoko” culture in workplace in Hong Kong and we also worked 5 hours straight and had one hour lunch, and then another 4 hours non-stop before knocking off at 4 p.m. Working as an arborist and horticulturist, including felling trees was part of my job. I remembered the hard work cutting down trees with chainsaws under hot and humid weather. I could imagine it would have been even harder for the workers to fell trees with axes and cross-cut saws. At that point, I felt so emotionally connected with the timber workers. The similar use of interpretation boards is also identified in memorial sites such as 9/11 Memorial and Camp des Milles. Testimonies of the victims are displayed and form part of the affective environment for visitors to engage with (Sturken, 2016; Sumartojo & Graves, 2018).

Although the signs and interpretation boards in Shantytown did not have a large degree of regularity, i.e. some of them appeared to be in different shapes and fonts in different areas and rooms, they did not distract much of my encounter at the site contrary to Mary-Catherine Garden’s arguments (2006). Garden demonstrates how cohesiveness can build stronger heritage landscape, allowing visitors to remain in the setting of the past. She points out the massive variety of signs could sidetrack our engagement with the landscape because of their individuality that gave much stronger visual prominence (Garden, 2006). Despite the diversity of signs in Shantytown, the interpretation boards appeared to have consistent styles and forms in the same area. For instance, the signs in the Sawmill were in the same design and so were those in the Foundry. If the design for those interpretation boards varied within

the Sawmill or the Foundry, such inconsistency would have greatly affected the degree of immersion at the site.

Compared to the tremendous amount of interpretation boards in Shantytown, Dunedin Warehouse Precinct and The Tannery had little or no signs. I found it hard to understand or comprehend the background to these sites, as there was nowhere to connect to any history of the sites, except for their architectural styles.

While interpretation boards provide a more official translation of the industrial history, artworks allow more diversified and less limited interpretations to the past. Some murals found in Dunedin Warehouse Street showed connections to the history of the Warehouse Precinct. One example is the suspended dress on the wall of a building (see Figure 85). The art piece originally depicts and reflects the empty status of the building. Rather than writing what it means exactly, the mural prompts me to imagine the stories of the place that could possibly happen. I wondered if the building was once a clothing factory. I also wondered if it was a place where mainly women were employed. In this way, the connection between me and the post-industrial landscape could be fostered as the artworks require me to take time in the landscape and they are not purely for eye consumption. Artwork and graffiti (see Figure 86) found on the concrete walls at the Meiderich Goods Yard in the Landscape Park Duisburg Nord in Germany, despite not conveying meaning to the industrial past, has characterised and gives an artistic feel to the yard (Latz, 2016). Martin Rowney believes that contemporary art and heritage practice coincide with each other, and art form is important to “develop community identity” and “enhance spaces and places in local areas” (Rowney, n.d.). The inclusion of artists in the International Council on Monuments and Sites (ICOMOS) conferences also demonstrated how international heritage organisation has put emphasis on public art in heritage practice (Australia ICOMOS, n.d.). However, the absence of interpretation boards and artworks have made the red bricks and sawtooth of The Tannery become an aesthetic appreciation.

Figure 85 Comtemporary art reflecting the empty status of industrial building in Dunedin Warehouse Precinct (image by author).

Material removed due to copyright compliance

Figure 86 Artwork found in Meiderich Goods Yard. The graffiti contributes to the artistic character of this part of the Landscape Park Duisburg Nord. Image source: (Latz, 2016).

Prior to reading any of the interpretation boards or artworks, the physical appearances of the historical buildings in the three case study sites were the most prominent visual experience. Surrounded by the Victorian architecture, I could recall the scenes I have been exposed to when watching movies and dramas that portrayed a story background of the 19th centuries. I was also reminiscing the time when I travelled alone to South America and Europe where I was amazed by similar architecture style found in Shantytown and the Warehouse Precinct. It somehow felt like travelling back time when walking around the two study sites, particular in Shantytown. However, the "time travel" stopped when there were elements that were inconsistent with the non-modern architecture appeared.

The visual sense is still greatly adopted by designers. We often use symbolic elements for people to "see" and "read" with their eyes (Mumcu et al., 2017). A metaphorical approach is evident in case study cases. The playground Sweetwater in Domino Park, New York makes reference to the sugar refining process (Figure 87) and its colours, graphics and layout are associated to the sugar factory (Designboom, 2018). In Heito 1909 in Taiwan, one of the preserved wastewater basins references the bamboo pavilion that was built for Japanese emperor Hirohito in the 1920s through using steel columns that have the shape of bamboo stalks (Figure 88) (Griffiths, 2021). Even my own design for the playground at The Tannery used this kind of symbolic design. These symbolic dimensions include using rectangular form of tanyard pits and colours of dyes commonly used in the past, playground tower that adopts the shape of sawtooth roof and smokestack of The Tannery, and the climbing mound taking the form of the existing scrap metal car piles with colours referencing the fire event happened on site (Figure 89). These examples demonstrate how designers rely on visual elements to refer back to the industrial history and allow more straight-forward interpretations of the past (Mumcu et al., 2017).

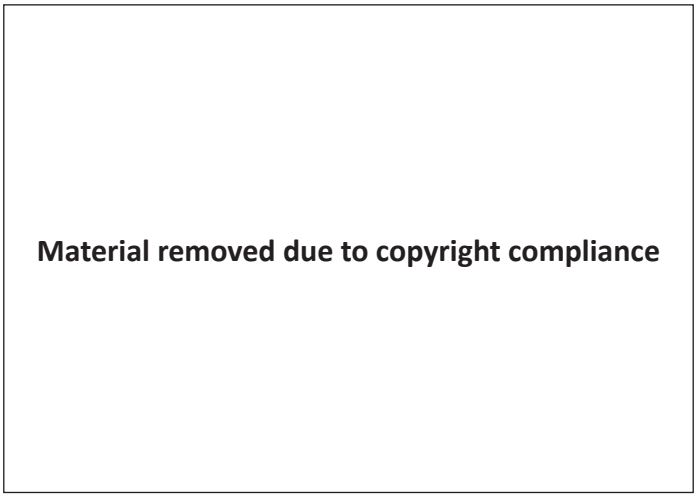


Figure 87 Playground equipment depicting sugar refining process in Domino Park. Image source: (Levin, 2018).

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Figure 88 Steel columns depicting a 1920s-made bamboo pavilion in Heito 1909. Image source: (Griffiths, 2021).

Figure 89 A metaphorical design to reference industrial processes of the tanneries in Christchurch (work by author).

6.2 Light

6.2.1 Lighting up the space

Edensor (2015a, 2015b, 2015c) suggests that light and its opposite are considered only when they are beyond the normative experience or when it is in form of art works. Light possesses powerful impact on altering our perception of place and shaping affective experiences in the landscape (Edensor, 2015c; Erwine, 2017; Malnar & Vodvarka, 2004). In the primary case studies, the use of light serves as mainly illuminating function rather than providing specific meaning to the industrial history despite the physical appearances of the lights themselves in Shantytown and The Tannery are replicas of or similar to the lightings used in the 19th century.

Taking advantage of technology, the use of light projections has become more common, especially in museum practices. A temporary projection event *Thinking Spaces* at the Australian National University (ANU) in 2013 discussed by Sarah Barns and Shanti Sumartojo (2015), large scale projections of documentary records featuring the historic scenes of the development of the national university and life on campus projected on the front wall of the Menzies Library. Among the three primary case studies, Shantytown Heritage Park is the only site that uses light projections of old videos showing people working in the past.

Both cases have clearly demonstrated the locality of projections: film footage of people working with a timber mill at the sawmill in Shantytown and the image of a man drawing curtains recorded at the same place where it was projected in ANU. Barns and Sumartojo (2015) suggest that such kinds of site-specific projections provide a temporal and experiential sense of past and present moments. Memory is no longer just appeared in an archival form, but it also becomes "nomadic, mobile, located and writ-large" in the landscape (Barns & Sumartojo, 2015).

As scholars point out that light possesses the ability to reveal various qualities of the landscape: texture, material, perception of security, moods, and sense of community (Bille, 2013; Cochrane, 2004 as cited in Edensor, 2015c; Orange, 2018; Sumartojo et al., 2019). For instance, the projection in the foundry in Shantytown unveiled the brick wall behind the artefacts; in *Thinking Spaces*, the projected images on the side wall of the Menzies Library shows the stone texture and colour of the building and other projected illuminations had lit up the usually dark environments, revealing the Brutalist wall. Without these light projections, the materiality and texture are seldom realised, particularly in dark environment.

Barns and Sumartojo (2015) emphasise the possibilities of lights in the creation of sensorial and phenomenological experiences. The *Thinking Spaces* project used neglected darkened spaces of the university campus for storytelling and displays. Those projections had defamiliarised the usually dark environments and lit up those spaces with past moments.

Not only did the projections defamiliarise the quotidian dark parts of the campus with light, but in the case of *Thinking Spaces*, light projections have also defamiliarised the well-known buildings and images. The images were transformed into something unusual: the scales of the photographs were no longer in a handful size but were enlarged dramatically. Such disruption

of light in the landscape, either in a gradual or abrupt manner, can draw our attention, thus prompting the reappraisal of and literally looking again at the familiarised environment (Barns & Sumartojo, 2015).

6.2.2 Shadow and darkness

On the other hand, the opposite of light – shadow and darkness – provides other qualities of light that offers a totally different experience. In recent decades, there has been increasing focus on the importance of shadow and darkness. In fact, as Erwine (2017) suggests, shadow [and dark] spaces, just like light spaces, should be intentionally designed for places of intimacy and refuge.

Pallasmaa (2012) points out the importance of shadow on the ambiguity it brings to depth and distance of vision. The scholar also mentions that "in great [landscape] architectural spaces, there is a constant, deep breathing of shadow and light; shadow inhales and illumination exhales light" (Pallasmaa, 2012, p. 51). Today, however, much of our built environment is over-illuminated and light has now been regarded as a pollutant. Pallasmaa (2012) and Erwine (2017) criticise the standardised level of light has flattened our sensory experience. The obsessive use of large plate windows and lighting in modern architectural works has deprived our "sense of intimate life" (Pallasmaa, 2012) and "sense of place" (Erwine, 2017). Excessive light creates distraction or glare while little contrast of light makes a space flat and dull (Erwine, 2017).

In Japanese novelist Jun'ichirō Tanizaki's work *In Praise of Shadows*, the writer highlighted that some Japanese aesthetics, objects and home interior were meant to be appreciated in dim conditions. As he wrote that "And I realized then that only in dim half-light is the true beauty of Japanese lacquerware revealed…Darkness is an indispensable element of the beauty of lacquerware" (Tanizaki, 1977, p. 13). Tanizaki insisted that our world is to be experienced in different light conditions and that brightness is not always the ideal condition. Building on a similar idea, Pallasmaa believes that "imagination and daydreaming are stimulated by dim light and shadow. In order to think clearly, the sharpness of vision has to be suppressed" (2012, p. 50).

Another extreme condition – no light, or darkness, forms part of the sensorial experience of the landscape. Always associated with insecurity, danger and uncertainty, darkness has long

been regarded as an undesired condition. For instance, darkness and black colour in Chinese culture is regarded a sign of evil and bad luck. Yet, Edensor considers darkness, despite its cultural connotations, has the potential to foster sensory and affective experience (Edensor, 2015c).

The darkness in the mining tunnel in Shantytown has offered non-visual experience of dark space. The loss of vision implies that the ambiance of other senses is predominated and heightened. As Edensor writes that “in the absence of light, other sensations of tactility, sound and smell were foregrounded, provoking an enhanced awareness of the velvety textures of the wall lining, the footsteps and breathing of other visitors, and the scents of perfume and body odour” (Edensor, 2013, pp. 446-447). In this instance, I could smell the wetness inside the tunnel and feel the coldness of the air.

For me, darkness, as suggested by its traditional connotations, produced mysteriousness and uncertainty even before I entered the tunnel as I was not sure or could not predict what I would encounter or where it would lead me to. Because of the insecurity, I had to turn on the flashlight not only for wayfinding, but also for relieving the fear that darkness brought me. Eventually, light penetrated from the exit of the tunnel together with a sense of relief. In this way, light and darkness interplay with each other and cause contrasting emotions of the perceiver. Along with the enhanced engagement between the perceiver and the landscape, light and darkness have also strengthened the atmospheric production within a landscape.

6.3 Sound

Sound is undoubtedly essential to the experience of the landscape: it provides cues to the function, and the identity or proportion of a space (Spence, 2020a). Although the aspect of sound in contemporary time has been more discussed and researched in terms of “noise” and “unwanted sound” (Rovang, 2019; Schütz, 2017), the sounds of the industrial era, particularly in the 19th century were regarded as symbols of technological progress, while quietness represented stagnation and dormancy (Rovang, 2019). Yet for today’s generations, industrial sounds, for instance the sounds from trains, windmills and machines, can be overwhelmingly loud (Rovang, 2019) and cause what we refer to noise pollution. The negative perception on industrial soundscape makes it unappealing to be included in modern landscape. This often leads to a design to reduce, absorb and isolate these industrial sounds (Schafer, 1977 as cited in Spence, 2020a).

In the process of designing industrial soundscape for The Tannery in my Major Design project, I was wondering how we landscape architects can negotiate with these contested sounds and incorporate them into the landscape. To achieve this, I introduced the sounds of rotating dyeing drums that were used to dye leather into hamster wheels in the playground area. The loud whirring sound of an operating dyeing drum will be produced while visitors are playing on the wheels. Here I am wondering if industrial sounds would become more accepted by the public under a playful and recreational setting, so that the sounds could be something to be experienced rather than reduced or isolated.

On the other hand, not all industrial soundscapes are antipathetic in modern society. Brass bands, which originated in the early 19th century and Industrial Revolution, were symbolic icons for working-class communities. In New Zealand, workplace brass bands such as colliery bands and railways bands began to increase from the 1870s onwards. Some of these bands received financial support from their employers or towns' councils. Brass bands provided social and recreational opportunities for workers and they were essential for civic pride (Clayworth, 2017).

Woolston Brass Band is one of the brass bands in the country that emerged during industrialisation and is still actively playing in various contests and events today. This nationwide acclaimed band was once sponsored by Skellerup which is one of the oldest and largest manufacturers in Christchurch. The Skellerup Woolston factory was also located close to The Tannery. In my Major Design project, the re-introduction of brass band music through sound installation and live music performances were aimed to reinforce the locality of the industrial sound. This has also resonated one of the panel members who knows the band as she remarked "…it is great to include the brass band music as an acoustic experience…I know the band…it definitely adds to the sense of place for the community". Brass band music has not only symbolises the industrial time of Woolston, but it also continues to contribute to the social bonding, as well as the identity of Woolston.

The use of sound or audio to enhance visitor experience has long been adopted in museum or art gallery practices (Butler, 2007; Rudi, 2021). This is still evident as shown in both the primary and secondary case studies, museums such as Shantytown Heritage Park in New Zealand, Camp des Milles in France and 9/11 Museum in New York are the only sites offering this kind of sound experience. But as Butler (2007) observed, increasing attempts have been made by artists to promote the use of outdoor sound trails. Architectural historian Sarah Rovang (2019) suggests that the use of art sounds and sound installation is not meant to

recreate the past but serves as a new means to engage with the landscape acoustically. These sounds, no matter what form they appear to be, interact with and reanimate the site, thus forming part of the sensory experience. As she remarks "As I moved through the site listening, the audio narration becomes part of my sound experience of the Heritage Park" (Rovang, 2019).

Butler (2007) points out the importance of the narrator on the effects of auditory experience. In his study involving over 150 people who took part in his audio trails along the River Thames in London, he demonstrates the use of "real" people or first-person narrative on creating greater authenticity and affectivity to the listeners than using a third-person narrative. He believes that this way of storytelling can produce connections to place as it brings a sense of closeness and empathy. As one of the respondents in Butler's study, who was a newcomer to London wrote "now I know a sense of a beginning attachment" and another respondent described the experience as "deepening my attachment to the river" (Butler, 2007, p. 368). In this sense, auditory experience constructs the opportunities to connect to the past and the place, and affective environment. As Butler writes about his experience in the audio route *Linked*, a permanent sound installation established along the M11 motorway in London by Graeme Miller:

> Walking through the acres of cars in the supermarket car park, where I have learnt from the transmitter there were once cows grazing, I can now ponder the link between driving to a shop instead of walking, and the soon-to-open mirrored room of treadmills next door. This, I now realise, is a linked moment; I have been linked (Butler & Miller, 2005, p. 82).

The affective power of this kind of audio experience can be further enhanced through the way the narrator delivers the stories of the landscape. Interestingly, the interviewees in Butler's study were encouraged to speak in the present tense, talking about the past as if the event was happening in front of them. Butler and Miller (2005) suggest this approach allows the recorded voice to be presented in a temporal and geographical sense. The voice and the listeners are then connected to the same space-time instead of a parallel one as the writers describe that "two people's present tenses are meeting in the same place" (Butler & Miller, 2005, p. 83).

Contrastingly, the use of third-person narration in the Shantytown audio guide has shown more objectivity towards the life of the gold miners. The third-person narrative allows omniscient point of view and objectivity, avoiding any misleading emotional expression.

While it is believed that third-person narrative is less intimate than that of first-person, to me, the narrative of the Shantytown audio guide was equally affective. When describing the gold miners' journey from Christchurch to West Coast, the audio guide portrayed it in detail: "it was a hair-raising journey with rivers across and steep-winding roads along the river valleys with sheer drops to the rivers below. And it wasn't riding all the way either. The men had to walked up the hills to lighten the load for the horses. And sometimes all passengers had to walk on downhill sections as the brakes on the carriages were none too efficient". I have travelled to the West Coast a few times and know that the way to the West Coast is never easy, particularly when driving through the Southern Alps. When listening to the audio guide, I could recall the narrow and windy road, the steep and rocky gorge; at the same time, I could also imagine how hard and dangerous the travels for the miners were in the past. From this, regardless the personal pronouns that were used in the narration, the audio guide still carries emotional power, the ability to prompt memory, as well as room for imagination.

Audio guides serve as important tools to enhance the overall sensory experience. Rovang (2019) states that the commentary of the audio narrative had prompted her to listen more consciously as she was navigating the site. Angharad Saunders and Kate Moles (2016) suggest audio walks offer a more exceptional, authentic and real experience of a place.

However, audio walks do not always provide visual clues in the landscape to the listeners. Some of the narratives presented in the Shantytown audio guide were not located and required the listeners to imagine, for example, the hardship of people travelling from the other side of the South Island in the pursuit of gold. Similarly, Butler describes his experience of the *Linked*: "You might as well close your eyes. I did exactly that when I heard deeply personal descriptions of homes that have been replaced by the motorway trench before me. There just seemed to be no point of reference to hang the descriptions onto – just acres of Tarmac" (Butler & Miller, 2005, p. 83). In fact, this process of imagination and interpretation, together with the official and personal narrative of memories and place, encourages people to engage with the landscape, which is an important element to a memoryscape. In this way, the affective bond between us and the landscape is created or strengthened.

Like visual cues, sound installation plays a role in heightening the overall sensory experience of the landscape. The audio prompted me to be aware of the surrounding environment such as "…time to move on to the next step: over the Cobb & Co. stable, you can see it from here" and "…there is a big quartz rock by the battery, see if you can spot some gold in it" (Shantytown Heritage Park, 2020). A similar kind of acoustic pause was identified at the coal

mining heritage site *Bois du Cazier* in Belgium. Rovang (2019) describes commentary like "It's quiet now…you can hear the birds chirping. It's so peaceful, and so nice. How will people ever know what the mine was actually like? How will they know what that day was like…the day of the accident?" had raised her awareness to the ambient sound as she explored the site (Rovang, 2019).

6.3.1 Silence

Pallasmaa believes that silence is the key acoustic experience created by [landscape] architecture (Pallasmaa, 1994a, 2012). Here again, taking the mining tunnel in Shantytown as example, it was not only the light was taken away, but also the sound. Even though my exploration in the dark tunnel was not long, the sound of my own self – my breath, my footsteps and my movement – became so prominent. Pallasmaa (1994a, 2012) believes that "a powerful [landscape] architectural experience silences all external noise" and silence heightened our consciousness on our very existence, turning our awareness on our fundamental solitude. As the architect also notes:

> All great art is engaged in silence. The silence of art is not mere absence of sound, but an independent sensory and mental state, an observing, listening and knowing silence. It is a silence that evokes a sense of melancholy and a yearning for the absent ideal. Also great architecture evokes silence. Experiencing a building is not only a matter of looking at its space, forms and surfaces -- it is also a matter of listening to its characteristic silence. And every great architectural work has its unique silence (Pallasmaa, 1994b, p. 78).

In some of the case studies, water played a crucial role in those industries: it was either one of the major elements in the production process, or essential for transporting materials and goods. As such, I believe the sounds of rivers and harbours were an essential part of the industrial soundscape in the past. Yet, the sounds of water have now become so hidden and neglected that they can hardly be noticed. The absence of sounds thus provides opportunities to foster other kind of acoustic experience. Silence, in this context, does not refer to an absolute absence of sound, but an absence of *unintended* sounds: silencing the background noise can highlight the intentional sounds linked to the industrial soundscape.

The Tank Park, located at Wynyard Quarter in Auckland, New Zealand which was once a bay known as Waiatarau "The Reflecting Water", was built on reclaimed land for storage of tallow, cooking oils, petrochemicals and caustic soda (LandLab, n.d.). The Tank Park is now transformed into a vibrant public space that allows authentic and interactive experience

through repurposed use of the silo tanks and industrial structures. In this case, water is not only culturally important, but it has also added contextual meaning to the site. Surrounded by water, I see the potential of using some of those industrial remnants to foster the sound of the water. For instance, I wonder could one of the retained tanks become an isolated and silent space where people can enjoy the echoes of water waves of the harbour. The absence of sounds of vehicles and crowds in the silo tank can perhaps makes present the ambient sound of water.

Returning to the primary case studies, although Dunedin Warehouse Precinct and The Tannery have no specific audio guide or any curation of sounds, the history or the geographical locations of the sites can be referenced through sound. In the Warehouse Precinct, reclamation has increased the distance between the area and the harbour. The sounds of water can hardly be experienced within the formerly industrial zone. I suggest a careful placement of a water feature such as a water fountain or pond together with the existing jet boat wall could not only enhance the acoustic experience, but also reinforce the site history of the Warehouse Precinct. Whereas at The Tannery, the river that runs next to it is currently isolated and there is very limited access to the river. Here I also see the possibility of including the river as part of The Tannery, allowing the public to gain access to river. In this way, sounds of flowing water could be part of the soundscapes and ultimately adding to the overall sensory experience.

6.4 Smell

The olfactory is a sense that is under-appreciated and least valued. Even though we breathe in and out more than 20000 times a day, we notice odour only when it is strong, unexpected, or particularly pleasant or unpleasant (Erwine, 2017). Otherwise, smell seems to be a sense that we always forget and leave it in the ambiance as if there is no smell in the air. More recently during the global pandemic COVID-19, face masks have become one of the barriers that limit our smell experience in both outdoor and indoor environment. Hand sanitisers have literally sanitised our environment and alcohol from those sanitisers became the most prominent smell. Despite the ocular-centric practice in culture in general, there is increasing research on how olfactory experience affects our perception to the landscape.

Urban smellscapes and smell mapping have been largely discussed by McLean and Victoria Henshaw. The two researchers identified methods for conducting smell walking (Henshaw, 2013; McLean, 2017; Perkins & McLean, 2020) and McLean conducted series of smell

mapping in Europe and the United States, investigating the relationship between urban smellscape and personal experience and memory (McLean, 2012, 2013a), and placemaking and understanding of place (McLean, 2013b, 2020). Recently, Louisa Allen (2021) has conducted a series of smell walks to investigate the experience of lockdown during COVID-19 in Auckland, New Zealand. Her account through presence and absence of certain smells has not only revealed how lockdown affected the nation socially and economically, but also the geographical identity of a community (Allen, 2021). Smell is therefore essential to the understanding of our surrounding landscape.

During my visit to Shantytown, when I got out of my car upon arriving at the entrance, I could breathe the air with a light, unfamiliar but somehow familiar smell – coal. The smell of coal is unfamiliar in a way that it is not an odour that I have ever experienced in my home country; but it recalled my trip on the Earnslaw steamboat to Walter Peak High Country Farm in Queenstown, New Zealand in the summer of 2022. I remembered when the crew shovelled piles of coal into furnace; steam coming up when the coal was burnt; the steam had fogged up my glasses blocking my vision and I could see nothing but feel the heat and humidity of the steam. As Piet Vroon mentioned that "sometimes the sense of smell can function as a kind of 'starter motor' that evokes all kinds of apparently forgotten experiences and events from the past" (Vroon, 1997 as cited in Malnar & Vodvarka, 2004, p. 134). Similarly, the smell of rust in the French national memory site Camp des Milles invoked the childhood memory of one of the research participants in Sumartojo and Graves's study (Sumartojo & Graves, 2018). Pallasmaa also believes that odour creates the strongest memory of a space, and a particular smell could bring up the erased retinal image and memory (Pallasmaa, 1994a); thus, smell provides gateways to the past and provokes emotions and memories (Erwine, 2017; Odeuropa, 2022).

The smell of coal in Shantytown is perhaps an alienated experience to an outsider like me who has barely exposed to coal. Nonetheless, to the local community of the West Coast who still use coal for daily household heating due to its accessibility and cost, the smell of coal is not only the part of their coal mining history, but it is still part of their daily lives. As Malnar and Vodvarka (2004, p. 137) write that "odour memories reflect the whole of the environment and everyday life". Imagining if coal was no longer able to be used, I believe the smell of coal would become an odour that causes the West Coast community to become nostalgic.

The experience of smell, as shown above, is both personal and collective. In the study

conducted by Dr. Alan Hirsh in 1991, respondents born before 1950 tend to associate their nostalgic feeling upon smell of nature, while the group born after 1960 regarded the smell of Play-Doh, chlorine and exhaust as their nostalgia (Malnar & Vodvarka, 2004). Similar to the use of light in Denmark discussed by Bille and Sørensen (2007), odour has the power in exercising social inclusion, as well as exclusion. In Jonathan Reinarz's book *Past Scents: Historical Perspectives on Smell*, he discusses about how smell is differentiated between social classes. He argued that the coding of smell has encouraged class discrimination. Historically, "pleasant" smell is exclusively enjoyed by royalty, while working class is always associated with "bad" smell (Reinarz, 2014). Long perceived negatively and labelled as "lower class smell" (Erwine, 2017; Reinarz, 2014), industrial-related odours have been unwelcomed and confronted by the society, leading to the sanitising practices in modern times: households and the city are deodourised or concealed with scented cleaners and bleach to produce a hygienic and antiseptic environment.

In the case of Moss in Norway, the remaining structure – a 70-meter-high digester of a former cellulose factory owned by Peterson & Søn – was under great dispute when the city was planning for the future landscape at the old industrial site. Not only did its appearance stand out visually in the landscape, but the digester is also famous for the smell it emitted (Skrede & Andersen, 2021). As Yi-fu Tuan suggests "odours lend character to objects and places, making them distinctive, easier to identify and remember" (Tuan, 2001, p. 11). Douglas Porteous (1985) also explains how historically individual towns were identified by the distinctive smell of the predominant industry of the town. "The smell of Moss" is so unique and representative that is known throughout Norway, though it is not perceived as a "pleasant" odour.

"The smell of Moss", despite its peculiarity, was even designated as an intangible heritage in the Norwegian Year of Cultural Heritage 2009, showing the potential historical and cultural values olfactory can bring. However, the people in Moss considered the memory of the smell is something they wish to forget. Some considered the smell made Moss attached to an uncomfortable symbol, but they also realised the re-branding of Moss with completely new identities has made the city become what it is not (Skrede & Andersen, 2021). This sanitisation has flattened the smellscape of Moss and attempted to erase the palimpsest of the landscape which had once predominated the history of the city, contesting our identity to a place (Bembibre, 2020).

Woolston in Christchurch, New Zealand shares similar characteristics with Moss in terms of

olfactory experience. Located close to The Tannery was the country's sole gelatine-producing factory which had been operating since 1913 (Gelita, n.d.) and was closed in 2018 due to a destructive fire. The gelatine factory was notorious for its stinky smell and had received numerous complaints from its neighbouring residents. The foul odour no longer exist after the factory has stopped operating and the smell was not part of my olfactory experience at The Tannery during my site visit.

When I was generating design ideas for The Tannery for my Major Design project and had discussion with one of my tutors, she mentioned "when I think of Woolston, it is the gelatine smell…every time when I drive through Woolston, I will have my car windows closed". Unlike "the smell of Moss", the highly disputed "smell of Woolston" was neither nominated nor listed as an intangible heritage in New Zealand, but I regard the smell as a quality that gives Woolston a unique character and is equally important to the predominating red bricks of The Tannery. As such, I have re-introduced the gelatine smell through a smell art installation as part of the sensory experience at The Tannery. However, comments including "you might want to re-consider the choice of smell" and "I would rather have the smell of bakery than the gelatine smell" from the Major Design panel group have shown the reluctance to include "bad" smell which is part of our culture and history. There is a tendency to keep or create pleasant things in the landscape, but based on the literature and examples discussed above, I challenge the perspective that the landscape should only contain positive emotions like happiness and ecstasy. In fact, emotions such as fear and disgust are part of our experience within a landscape. Vittoria Di Palma mentions post-industrial sites are greatly related to the emotion of disgust and that "disgust can therefore help to shed light on the systems through which different kinds of landscapes are valued, and the reasons why ethical or moral arguments so often appear in the context of discussions regarding derelict or polluted sites" (2016, p. 18). Just like the mining tunnel in Shantytown Heritage Park, darkness produced uncertainty and uneasiness.

Evident in the case studies presented in previous section, the presence of industrial smell is not prominent. Similar to sound, the presence of smell has become forbidden and heavily managed. Designers nowadays tend to avoid, treat and eliminate odour through "separation, dilution, deodourisation and masking" (Erwine, 2017, pp. 192-193). Smell in the landscape, in many cases, is not purposely designed. I suspect the experience of the smell of coal in Shantytown is a mere coincidence rather than an intention to encourage nasal experience. Yet, the control over smell has deprived us from authentic engagement with the landscape and memory, and our sensory experience. Cecilia Bembibre (2020) believes that experiencing the smell of the past could enrich our understanding to it and make us be part of it, allowing us to captivate the history in a more affective and mesmerising way.

Valuing the importance of the olfactory to our emotions and memories, there are increasing research projects, experiments and smelling art installations to reproduce and import scents associated with significant moments and places. As part of Norway's Momentum biennale which promotes the emotional aspect of Nordic art, "the smell of Moss" has returned to the city through importing the odour from a cellulose factory in Sweden. The designer and former workers of the factory recreated two versions of "the smell of Moss": one is the "same" smell produced at the Peterson factory and the other one is a diluted version of the smell for visitors who found the original smell overwhelming.

Whether or not the historical scent is something people want to remember, here I question the reproduction of smell as the opposition of authenticity, which is essential in heritage practice. The same question applies to the Odeuropa project which engages a group of chemists and historians to attempt to recreate scents in the past in Europe. Further discussion on authenticity will be included in a later section.

As mentioned in the beginning of this section, smell is a rarely considered sense and our olfactory ability has been shrinking. Bernard Lassus suggests a minor invention could make us be aware of and enhance the experience of the ambience around us. It can be done even without altering the physical presence of the landscape, for instance, he proposes a sign writing "par vent d'Ouest…*MOUSSE AU CHOCOLAT* (Courtesy of the west wind, chocolate mousse)" as a visual prompt to highlight a non-visual experience (Lassus, 1998 as cited in Bowring, 2006). Likewise, the material presence of the digester in Moss serves as a visual cue to the citizens to remember "the smell of Moss" and to attach their memories upon (Skrede & Andersen, 2021), though in this case, prompts are not to be created but to be preserved.

6.5 Taste

The sense of taste is seldom discussed in the landscape architecture field. Pallasma observed how the materials of the DL James Residence in Camel, California has provoked gastronomic experiences: "deliciously coloured surfaces of stucco lustro, a highly polished colour or wood surfaces also present themselves to the appreciation of the tongue" (2012, p. 63). The common approach to design for taste experience nowadays is through planting edible gardens. Fruit trees, vegetables and herbs are planted to enhance gustatory experience in community spaces. The vegetable garden in Chinatown in Shantytown Heritage Park, while I

believe not purposely planted for enhancing sensory experience back in the 20th century, was one of the socialising spaces for the Chinese gold miners and their families. The garden, in some way, contributed to the sense of community and hominess. The sight of edible garden is also a suggestive of taste. Visual experience such as colours and details can be transferred to the sense of taste through imagination (Pallasmaa, 2012). John Eberhard also writes about how taste is related to architecture: “the design of a restaurant can have an impact on your ‘conditioned response’ to the taste of food” (Eberhard, 2007 as cited in Spence, 2020a, p. 12).

Nur Hidayah Abd Rahman, Zainab Khalifah and Hairul Nizam Ismail (2016) and Paz Concha (2020) discussed how the sense of taste is curated in night markets and contributed to the atmosphere of place in tourism and marketing aspects. The authors agree that in modern society, taste experiences are designed for enjoyment and pleasant atmospheres. Similarly in the three case study sites, the presence of cafes, restaurants and a lolly shop reflects preferences towards something that tastes “nice”. What would it have been like to taste an industrial landscape? While fumes and smoke in food markets provide us with the savoury experience of barbequed food, those in an industrial context would perhaps give a bitter choking taste.

As mentioned in previous section, the modern landscape is sanitised and has flattened our daily encounter with all of the senses. This sanitisation is not simply to remove the unpleasantness of industrial smells and tastes, but also to clean up the heavily toxic and polluted lands of post-industrial sites. The Landscape Park Duisburg Nord is one of the classic examples of mitigating massive poisonous industrial lands. The primary focus of the project was to restore the ecology of site, which put emphasis on the inclusion of both native and exotic plant species, and the treatment and removal of contamination. Soils and water needed to be cleaned up in order to carry out horticultural and aquatic planting, and crop rotation (Latz, 2016). The way the Landscape Park was mitigated has perhaps allowed the sense of taste to be experienced, this time not just in the imagination as suggested by Pallasmaa (2012), but the opportunities to actually taste the landscape.

The smoke in Shantytown somehow reminded me of the incense smoke in temples in Hong Kong. There are some occasions when my family and I go to temples and burn incense to remember and honour our ancestors, as well as to pray for good luck. Incense smoke is particularly heavy inside the temple as there is incense burning everywhere: the smoke can be heavy enough to block my vision, irritate my eyes and make me cough. Such smoky environments have become places I try to avoid and stay away from. Correspondingly, people

used to work and live in similar industrial environment in the 19th and 20th centuries might have also felt the same way that they wished to move and live in a cleaner environment. Despite the “bad” taste, smoke in modern time may perhaps generate a sense of nostalgia, and to me a sense of home.

6.6 Touch

> And I found that of all the senses the eye was the most superficial, the ear the most haughty, smell the most voluptuous, taste the most superstitious and inconstant, touch the most profound and philosophical (Diderot, 1749 as cited in Paterson, 2007, p. 1).

The sense of touch is argued to be the most primal form of non-visual perception. Our skin reads the texture, weight and temperature of the space. It is claimed that touch is the only sense that gives a sensation of spatial depth as it can sense the “three-dimensional shape (gestalt) of material bodies”, allowing us to feel the space in all directions (Pallasmaa, 2012). As Pallasmaa (2012, p. 12) evocatively puts it “All the senses, including vision, are extensions of the tactile sense; the senses are specialisations of skin tissue, and all sensory experiences are modes of touching and thus related to tactility”. Spence (2020a) believes that touch forms the basis of multisensory experience in [landscape] architectural design.

Unfortunately, the sense of touch has often been ignored even though it is an inescapable encounter in our daily lives (Pallasmaa, 2012; Paterson, 2007; Spence, 2020a). Jennie Morgan (2012) criticises that the absence of tactile engagement with bodily experience in museum practices and that the collections are for largely for visual consumption. Similarly, heritage practice has been largely visual. This is because heritage has an inseparable connection with tourism. The production of photographs and postcards for heritage tourism has therefore made visual culture deeply rooted in heritage practice (Watson & Waterton, 2016). Laurajane Smith also points out the effect of Authorised Heritage Discourse (AHD) on the visuality in heritage practice. This discourse advocates the notion of “conserve as found”, “monumentality” and “aesthetically pleasing” (Smith, 2012). While vision allows us to see things at a safe and antiseptic distance, the sense of touch requires proximity, affection and intimacy, uniting us with the world (Erwine, 2017; Pallasmaa, 1994a; Paterson, 2007).

Touch requires contact but this tangible sense has not been welcomed. In daily life, parents ask their children not to touch and urge them to wash their hands after touching anything;

hand sanitisers and antibacterial wipes can be found everywhere, especially since the global outbreak of pandemic; and almost in every museum, the “Please do not touch” signs are ubiquitous. We are often separated from objects by glass cases and barriers and Edensor (2007) compares the touching experience in museum with that in industrial ruins. Items in industrial ruins are available to be touched and picked up. He describes such touching experience as delightful and it reminds his childhood memory living in similar environment (Edensor, 2007). In museums, the use of lighting has also ensured us to see effectively, negating the need for touch (Classen, 2005 as cited in Morgan, 2012). This is evident in Shantytown as shown in the Results chapter and some other industrial monuments such as the blast furnaces and sinter plant at the Landscape Park Duisburg Nord in Germany, and heritage sites where some of the artefacts and displays are either contained in museum display cases or placed behind fences or other forms of barriers, hindering the sense of touch.

The fear of danger and disease and the hegemony of eye are distancing our experience in the landscape and these particular downsides of touch are often related to industrial history. The not-to-touch culture has deteriorated our tactile sense. In fact, even if there are no signs or barriers deterring us from touching, it seems that we are now used to seeing but have no thoughts of touching things. However, hapticity, as Pallasmaa (2012, p. 12) stresses that “touch is the sensory mode that integrates our experience of the world with that of ourselves”.

Touch is not only sensorial, but also emotional. We say that “we are touched” when something affects us in an empathic and affective way. Tactile sense is also a sense of communication. As Erwine writes “we touch something and it, in turn, touches us back” (Erwine, 2017, p. 85). It brings distant things into closeness, allowing us to interact (Erwine, 2017; Paterson, 2007).

Touch is also extended to a sense of the body. The way we experience and touch a space when moving through it can affect our emotions and feelings. One of these aspects of touch is temperature. Erwine (2017) talks about how thermal realm is closely related to our daily life. Warmth, in particular, has been long associated to sense of community and coziness. We feel comfortable and protected in warm areas. Depicted in many television dramas, books and movies, the thermal environments of factories were harsh: they were either too hot or too cold to work at and were never regulated to provide comfort like the offices in modern society. In all the case studies, the thermal realm was seldom considered except at Camp

des Milles in France where the room was purposely unheated to create a cold environment. Through the manipulation of temperature, visitors can, on one hand, gain empathy of the workers from the past; on the other hand, the unexpected thermal change can arise certain memory of personal experience. For instance, the unanticipated chilly water in the gold panning area in Shantytown Heritage Park has reminded me of the cold water in the outdoor swimming pool I used to practice swimming in my early life. I remember how cold the water was even the pool was steaming and how reluctant I was to dive into it every time when I go to practice. Such thermal experience brought a nostalgic moment to me, allowing me to reminisce about the time I missed.

Edensor (2007) and Erwine (2017) criticise the modern urban environment, observing how it is flattened and polished with smooth surfaces and has limited the amount of haptic experience in our daily lives. Roughness, as Erwine (2017) describes, can either make one refuse to touch or call for an immersive touch to explore the peaks and cavities. In heritage, rough surfaces reflect a passage of time and make contrast with the smooth contemporary surfaces. Roughness of rust and concrete at various case study sites including Shantytown Heritage Park, Dunedin Warehouse Precinct, Heito 1909 and the Landscape Park Duisburg Nord conveyed their “material essence [and] age” (Pallasmaa, 2012, p. 34), adding to a heritage atmosphere at the sites.

Again in Edensor’s discussion on industrial ruins, he describes his experience “to access the ruin, I must pick my way over a mound of rubble, brick, girders and earth piled high, and when walking inside the decaying sheds I have to sense the conditions of flooring and the stability of precarious overhead roofing” (Edensor, 2007, p. 227). Pallasmaa, who regarded such kinesthetic senses as the sixth and seventh senses, insists that “authentic [landscape] architectural experiences consist then, for instance, of approaching or confronting a building [and landscape], rather than the formal apprehension of a façade” (Pallasmaa, 2012, p. 68).

In Edensor’s account, the fear of falling and the concerns for personal safety when exploring the industrial ruins have demonstrated how the disorder and rough surfaces force us to feel and apprehend the landscape. The anxiousness the landscape conveys has on the other hand make us to take time to explore the site as this kind of touching experience is dramatically unfamiliar and different. However, in all the three primary case study sites, tidiness and the lack of topographical changes has made our surrounding environment so familiar that the connection between our muscles and the landscape become largely limited.

6.7 Materiality

The materiality of a space can be significant in creating the atmosphere and mood of a space. As described in the Results chapter, the rust and smoke in Shantytown Heritage Park contributed largely to the settings of the site. Rust, in particular, produced a sense of age and weathering in the landscape. Nonetheless, such aged landscape and weathering are not generally tolerated in contemporary times and maintenance is carried out on a regular basis to fix and replace the old and weathered materials. This is evident in Shantytown Heritage Park where I could literally see and hear maintenance workers repairing the façade of a building. Even in the Warehouse Precinct, new paints have casted over the old bricks, hiding the cracks and stains that were formed throughout time.

Yet, the action of repairing has led to the question that Mohsen Mostafavi and David Leatherbarrow (1993) raised three decades ago upon the inevitable process of weathering, questioning the potential value of weathering as an addition and enhancement rather than a minus, and how weathering can be something for appreciation, not a problem being solved. The prejudice over weathering and ageing as negative elements is also challenged by Pallasmaa (2000). These authors argue the process of weathering is in fact a constructive layer adding on [landscape] architecture – newer surfaces of the same material are exposed in its depth. Cracks or stains are not foul in [landscape] architecture, but they have incorporated and added to the completeness of a building and the landscape (Mostafavi & Leatherbarrow, 1993).

Especially in the context of heritage, which emphasises the aspect of time and place, weathering seems to be an essential element to demonstrate the testimony of time of a landscape and create “the present form of a past life” (Mostafavi & Leatherbarrow, 1993). The romantic appreciation of an aged building and landscape is often through the sense of weathering; hence, weathering tells the narrative and history of the place. As Pallasmaa (2000) and Kunawong (2019) explain, the manipulation of the natural weathering process – maintenance – might result in a timelessness landscape that belongs to nowhere in a timeline. The existence of weathering is not only inevitable, but it is also necessary in a landscape.

In Peter Latz’s book *Rust red: Landscape Park Duisburg-Nord*, he talks about materials at the industrial complex were recycled. One of the examples was the “Piazza Metallica” where iron slabs from a ferromanganese foundry were used to create a public plaza in the park (see

Figure 90). These slabs, according to the writer, have been eroded from the very beginning of their existence and will "**continue to rust and weather**" (bold in original text) (Latz, 2016, p. 245). Similar intention to retain and allow rusting are identified in other case studies: rusted mechanical equipment at the old sugar factory in Heito 1909, as well as the rusty fittings in the Camp des Milles. Rust shows a sign of decay, but in the meanwhile is a witness of time, and provides character and identity of place. The book title "*Rust red*" has shown an example of rust has characterised the industrial heritage of Landscape Park Duisburg Nord.

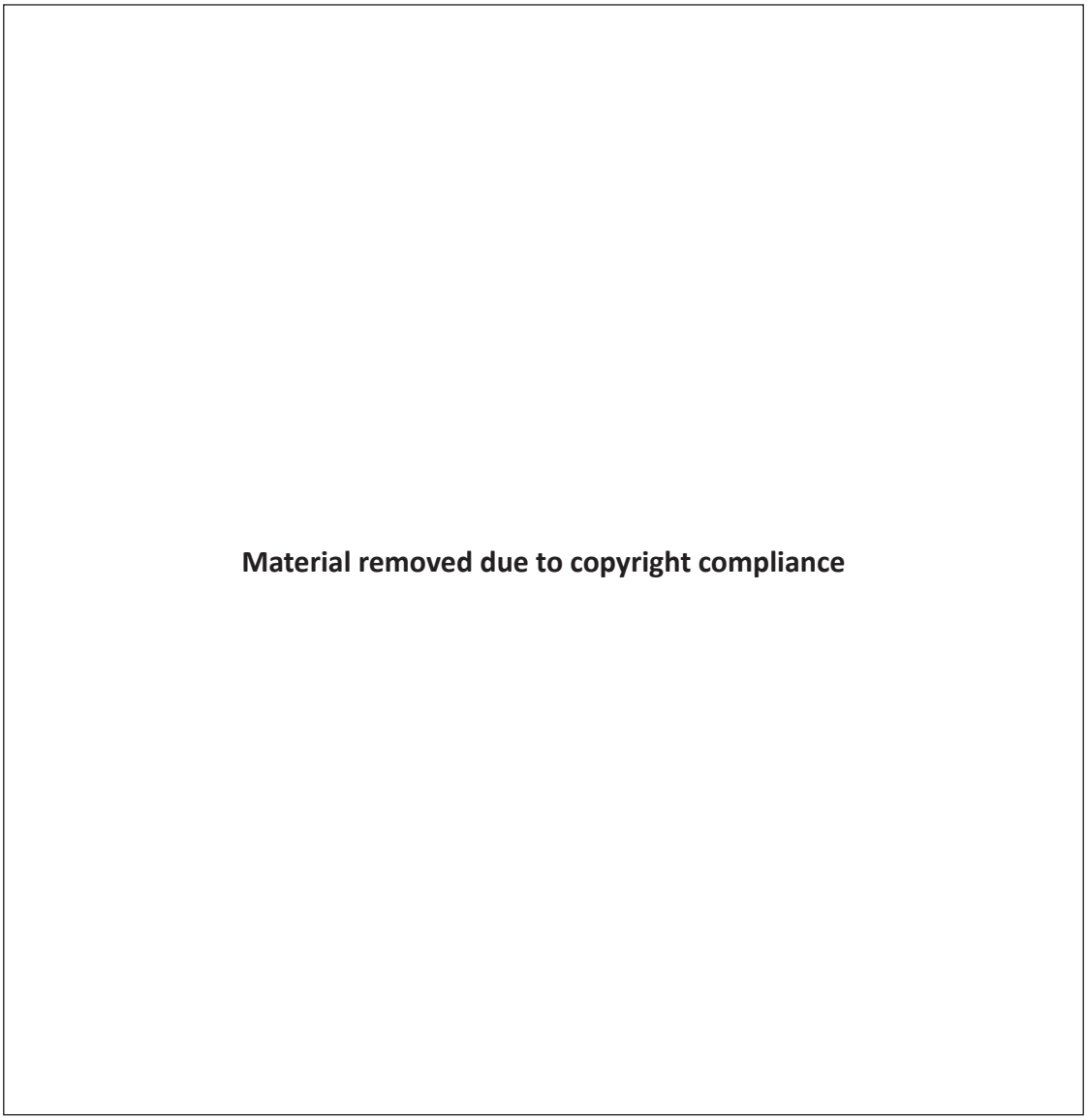

Figure 90 Rusty iron slabs were recycled from a ferromanganese foundry and created a public plaza in Landscape Park Duisburg Nord. Image source: (Latz, 2016).

More recently, the increasing use of weathering steel or Cor-Ten steel in contemporary landscape architecture has proven the popularity of intended weathering to give an aesthetic of ruination. In fact, when dealing with historical sites, designers often preserve or introduce weathered materials and structures to give a sense of an aged landscape. Similarly in the secondary case studies, the use of Cor-Ten steel is seen in the examples of seating in the Tank Park, weathering steel-made sculptures in Heito 1909, and planter frames in Domino Park. The intended material surrounds have created and reinforced atmospheric conditions that convey a passage of time. The intended use of weathering steel, however, has led to the controversy over the authenticity of the design outcome and I will explain this shortly.

While weathering erases a surface and reveals newer one, deposition of dust and dirt on a surface creates another sign of age of a landscape. The varying degree of dust indicated the degree of interaction of the space and yet any movement upon the layers of dust simultaneously creates new marks and traces (Lushetich, 2018). Usually being something to be cleaned, Jorge Otero-Pailos's *The Ethics of Dust, 2009* (Otero-Pailos Studio, n.d.) has preserved and made visible centuries of dust on the wall of Doge's Palace in Venice. Otero-Pailos's work has not only restored the original stone building of the Palace, but it has also opened a new lens for the aesthetic of pollution, which is part of our cultural heritage.

Dust, suggested by Lushetich (2018), carries mnemonic and affective register. The author argues that dust can trigger nostalgia as "a structuring absence" and that dust continues to resonate an object's [or the landscape's] past potentiality through haptic and emotional visuality (Lushetich, 2018). Lushetich's argument has echoes of Sturken's (2016) discussions on the complex quality of dust in her study of the 9/11 Memorial Museum – that dust represents not only the transformed materials of the massive buildings, but it also symbolised the remains of the dead and families were given urns of ashes to mourn over their loved ones. In this case, dust is not just a nostalgic presence of the World Trade Centre Twin Towers, but it is also a traumatic substance that dominated New York City immediately after the collapse of the Towers. The experience of the trauma was shaped by the extent to which people came into contact with dust. People walked on the streets covered in it and went home with it on their clothing, hair and faces (see Figure 91). This example of the dust in the wake of the collapse of the Twin Towers highlights how even ephemeral materials construct the emotion and the atmosphere of the landscape.

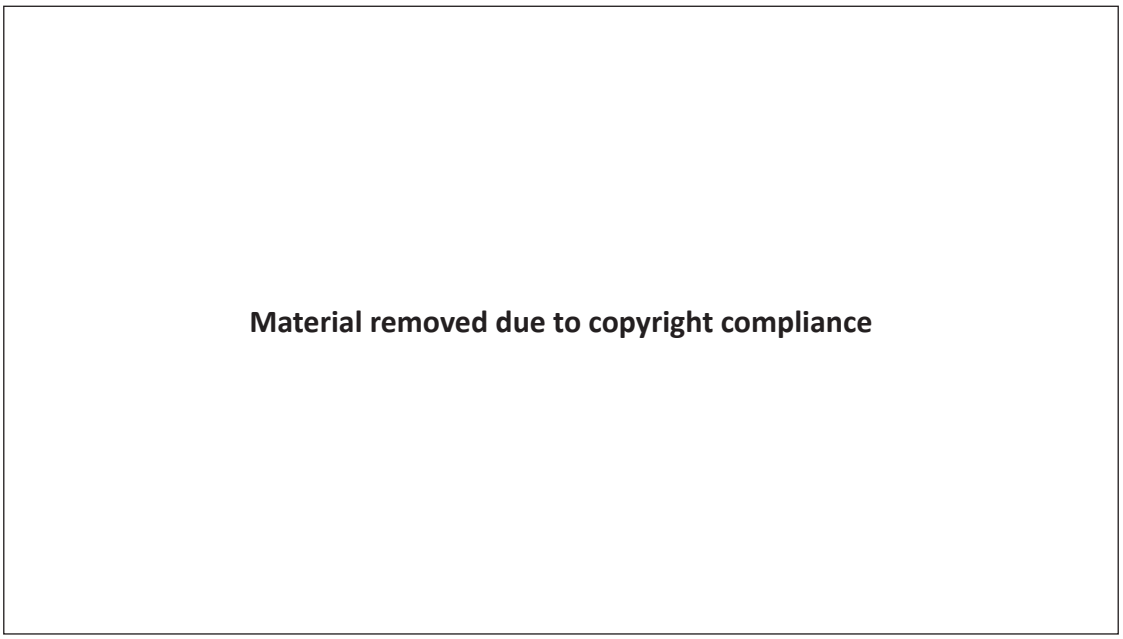

Figure 91 Streets were covered with dust and ash after the Twin Towers collapsed in New York City. Image source: (Viviane, 2001).

Smoke, being one of the most dominating materials during industrialisation, possesses an opposite characteristic to that of dust. Smoke dissipates in the air rather than depositing on a surface. Like industrial sound and smell, smoke is considered as pollution, with its emission largely controlled and minimised. Yet it plays a critical role in creating an adventurous and mysterious atmosphere in Shantytown Heritage Park as smoke obscures vision but reveals a landscape once it disperses.

The temporal quality of smoke and the present-day perception over smoke make it challenging for landscape architect to incorporate smoke into a design. *The Ethics of Dust* has provided a creative means not only to preserve a transformed form of smoke, but also allow the physical presence of smoke as an art piece. The "Pier Reveal" (see Figure 92) in Domino Park has made use of engineering, employing fog effect pumps and nozzles to create a foggy and smoky effect. The fog effect has partially reconstructed the typical scene of New York's industrial waterfront during the 20th century and at the same time become an interest point where the old pier piles are revealed when the fog disappears. Using such materiality in industrial heritage design revives the history of the place and fosters the sensory and atmospheric experience of the former industrial sites.

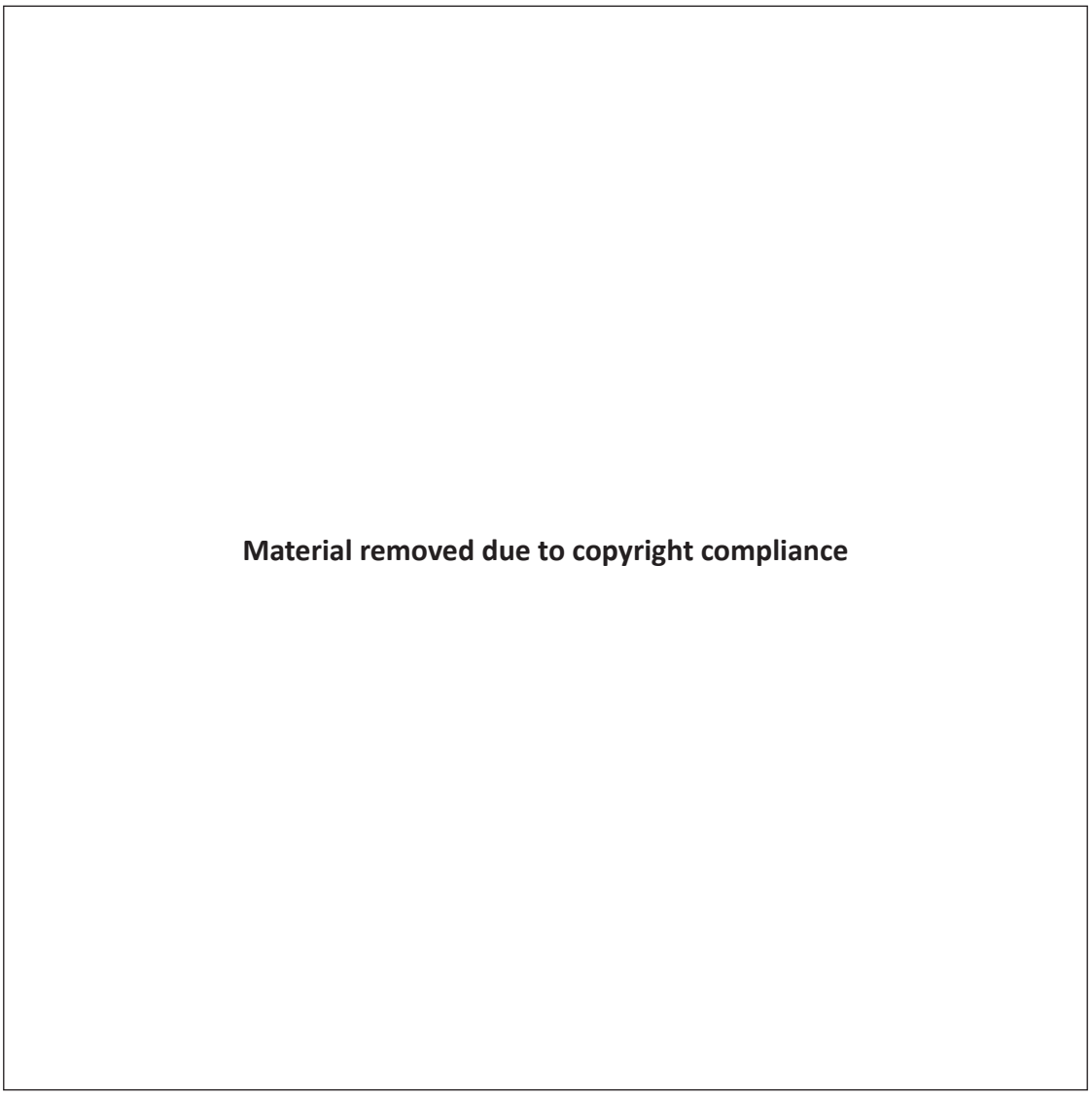

Figure 92 Old pier piles are revealed after the fog disappears in Domino Park. Image source: (Daniel, 2018).

On the other hand, materials have a significant ability to prompt memory. In Sumartojo and Graves's study of the Camp des Milles, the location of a tile factory and an internment camp, one of the respondents recalled the memory of his childhood when he encountered the dust and rust. The respondent rubbed his fingers against his thumb when describing his experience, on one hand reminiscing the time he helped his father working in a blacksmith workshop, on the other hand imagining the dusty and rusty environment and empathising the hardship of the people imprisoned in the Camp (Sumartojo & Graves, 2018). As such, the materiality of the site has rendered the site's affectivity and prompted not only memory but also imagination towards the past. The personal memory was prompted through the material presence of dust and rust and the sensorial qualities the materials contained. It also connected the respondent to the experiences of people who were in the same space, forming an affective bond to them. Ultimately, memories of different times and imagination

are provoked through material presence, in a mixed and layered manner, linking the present to the past.

DeSilvey (2017, p. 14) argues “memory does not rely on stable material forms for its expression” if memory is understood as something that engages between mind and matter. However, the physical presence of materiality plays an important role in sparking memories, particularly involuntary ones, and the encounters with material can even trigger the memory that has been relegated in the past (Edensor, 2005a; Muzaini, 2015). For instance, the material presence of a helmet from the war and the school where Japanese soldiers interrogated and murdered the Malaysian civilians were enough to invoke the unwanted wartime memories disregarding how the objects or buildings are shaped into in present day (Muzaini, 2015). Similarly, despite the unwanted identity of “the smell of Moss”, the remaining digester in Moss is the only thing left to serve as a reminder of industrial history and for the factory workers to attach their memories to.

6.8 Multi- and uni-sensory

In contrast to other design disciplines, landscape architecture places a greater emphasis on sensory experience. The senses are a crucial but often overlooked dimension of what landscape architects work with in a landscape. As Spence explains “the [landscape] architect must act as a composer that orchestrates space into a synchronisation for function and beauty through the senses – and how the human body engages space is of prime importance. As the human body moves, sees, smells, touches, hears and even tastes within a space – the [landscape] architecture comes to life” (2020a, p. 14).

The design for multi-sensory experience is not common, not to mention in the context of industrial heritage of which the industrial sound, smell and taste are often not appealing in present day. The lack of multi-sensory experience in some case study sites is also due to the types of use of those sites. In the tourist industry, the senses have been largely discussed due to its importance to consumer experience: including increased comfort (Ba and Kang, 2019 as cited in Spence, 2020a), motivation and engagement, and experience quality (Abd Rahman et al., 2015). Senses possess power not only to improve the overall quality of embodied experience, but also to associate tourists’ understanding and emotion to the sites. Various research has shown how sensory curations for heritage sites, parks, and museums have greatly contributed to the branding of place, motivation and perception, interpretation and engagement of visitors, and the experience quality and satisfaction (Abd Rahman et al.,

2015). It is obvious that studies sites for tourism and recreation uses have accommodated more senses related to industrial history than sites for commercial and residential uses.

As mentioned in Chapter 2, though the adaptive reuse is able to save the industrial buildings from demolition, little emphasis is put on the non-visual sensory experiences. Dunedin Warehouse Precinct and The Tannery are the examples of adaptive reuse of which the physical buildings are preserved while functions are no longer industrial-related. Cafes, restaurants, book shops, florists, offices have occupied the spaces and there are no traces of any past industrial sounds, smells, taste or touch, leaving the Victorian-styled facades the only visual experience of the industrial heritage.

However, not all industrial heritage sites can be transformed into recreational park or tourism spots which allow more rooms for multi-sensory experiences, as Edensor (2005b) points out, the production of heritage theme parks has significantly increased private spaces and reduced public spaces. As landscape architects, we can utilise the more prominent senses at commercial and residential sites. Once again, smell, sound, taste and touch play a stronger role in evoking memory than sight. I would imagine playing brass band music in The Tannery or re-introducing the industrial smell in Moss will create a more powerful memoryscape than preserving the saw-tooth roofed red brick buildings or the digester alone. This is also demonstrated in the audio installation *Linked* at M11 motorway where none of the old London can be seen but only the stories of the city can be heard. While nothing was physically preserved for the London dwellers to attach their memories to, the acoustic experience provided through the audio trail has made the place become somewhere for imagination, reminiscence and learning about the past.

While Pallasmaa (2012) addresses that having all of the senses together is important for a “life-enhancing” [landscape] architecture, at the same time, an integration of five senses can help to create an atmosphere which the designers intended and hence foster the emotion that the landscape brings. The enhanced atmosphere was obvious in Shantytown Heritage Park where it accommodates more diversified senses related to the industrial times than the other two primary study sites. The visual experience of architectural style, relics and artefacts, the smell of coal and the materiality of rust and smoke worked simultaneously, bringing me not only to a time travel back to the 19th centuries, but also recalling my own memory of my travel. The atmospheric effect is not the result of a single sensory element, but the synergy between all those senses.

While Spence (2020a) points out the potential of sensory overload when the combination of all senses becomes too stimulating, the sensory experiences in Dunedin Warehouse Precinct and The Tannery were visually dominated and have demonstrated the lack of quality – non-visual senses, such as the contemporary sounds of traffic, smells of coffee and food, were inconsistent with the industrial history of the places. This perhaps reflects what Spence (2020a) has discussed about sensory congruency. The author argues that the congruency of sensorial stimuli determines our responses to multi-sensory environment.

Garden (2006) has also pointed out the importance of consistency as one of the key attributes to heritage landscape. She believes the stronger the connections between each component, the higher level of engagement we can have in the landscape. While the author suggests the invisibility of heritage site boundary makes one's encounter to the landscape succinct as we physically move "in and out of the past" (Garden, 2006, p. 400), similar argument applies to the incongruency of senses. When the visual sense allows one to start participating in the past, contemporary sound, smell, taste and touch keep pulling us back to the present as the senses are not relevant to what we are visually experiencing. As such, we constantly travel between the past and the present, deterring us from fully engaging with industrial heritage landscape.

To convey a stronger memoryscape, it requires a more consistent sensory experiences at the two sites. For instance, a sound installation of brass band music and an intensive use of leather for door handles and street furniture at The Tannery can not only reinforce the symbolic meaning to the site, but the auditory, olfactory and touch experiences the materials bring also contributes to the congruency of the site.

6.9 Authenticity

Authenticity is an essential topic in heritage practice. It has long been recognised as one of the important considerations for evaluating the values of a heritage site. The Nara Document on Authenticity (1994) defines authenticity as "the degree to which information sources about these values [of cultural heritage] may be understood as credible or truthful" (ICOMOS, 1994). The degree of authenticity is determined by "form and design, substance and fabric, technology and craftsmanship, location and surroundings, context and setting, use and function, traditions, spiritual essence, and sense of place, and includes tangible

and intangible values" (ICOMOS New Zealand, 2010). One of the reasons why authenticity is highly debatable is that the term recognises the very intrinsic nature of the heritage. Authenticity in the ICOMOS New Zealand Charter (2010) considers the integrity of "surviving evidence". In the Burra Charter (2013), while there is no clear definition of authenticity, its principle has been emphasised through preservation and restoration of the "existing fabrics". This makes introducing new materials and elements controversial when designing for heritage.

The matter of "real" and "unreal" is particularly problematic in the discussion of authenticity. There are also criticisms over the attempt to recreate the past as a pursuit of the nostalgic past. Tuan regards such as "calls for illusion rather than authenticity" (1979, p. 194). Garden (2006) argues that authenticity has been mistakenly identified as criterion to define past. She believes that a heritagescape should not solely consider whether or not it is a '"real" version of the past' but it is about how the components of the landscape work together to "create a distinct place of the past" (Garden, 2006, p. 408). Using similar philosophy on memoryscape of industrial heritage, the reconstruction of past industrial elements may not represent the most authentic version of the past, but it provides a new way for us to engage with the history and the landscape. The reconstruction of historical smell in Europe by Odeuropa or the use of intended materials such as weathering steel, though they are not fabrics inherited from the past, are essential to create the atmosphere of the past, ultimately provoking memories and affection to the landscape.

6.10 Summary

This chapter presented in-depth discussions on how sight, sound, smell, taste, touch and materiality have affective powers to evoke memories in industrial heritage. Vision remains as the major approach to heritage design, and existing urban transformation of industrial heritage reflected how landscape architects has put little or no emphasis on the non-visual senses. However, the potential for the non-visual senses to evoke memory and create immersive engagement with the landscape is significant. Senses of industrial time might not represent the most sublime aspects of the civilization, but they provide opportunities to reflect on and commemorate the history. An industrial landscape does not necessarily contain solely a welcomed emotion, but it includes diversified emotions: nostalgia, hatred, disgust and so on.

While not all uses of the post-industrial sites have the capacity for a multi-sensory

experience, it is important that landscape architects identify the most representative senses of the sites to create more effective memoryscape for industrial heritage sites.

Long established practices from heritage guidelines such as authenticity have limited the potential for heritage design. This research shows that heritage design may not provide the truest version of the past, while not manipulating or changing any fact of the industrial history, but it opens to more flexible interpretations and imaginations of heritage sites.

Chapter 7
Conclusion

The concepts of industrial heritage and the practice of a multi-sensory design in the landscape architecture discipline have been understated. The traditional approach of heritage guidelines from international heritage conservation bodies have placed little emphasis on preserving the sensory aspects and settings of heritage, which often leads to the overlooking of importance of senses for heritage design.

This research has explored a number of local and international case studies to show how sensory experience can be a new opportunity for industrial heritage memoryscape. Although different sites have their own character, culture and history, it requires us as landscape architects to identify these elements and to carefully incorporate them into heritage design. Rather than monumentalising the heritage for eye consumption, a multi-sensory experience provides bodily encounters in a place. In a sanitised urban landscape where our non-visual senses are suppressed, our roles as designers are essential to awaken people's attentions to the sound, smell, taste and touch aspects of the landscape.

Limited by time and resources available, this research was not able to conduct interviews to collect larger sample size and the results relied on mainly my personal experience. The number of field work was also limited that multiple visits were not possible. Acknowledging sensory experience can vary under different time, weather, and seasons, the senses captured during single site visit may not be representative to all conditions. There were also challenges of gathering sensory information during field work. There were no tools for recording the senses of sound, smell and taste, thus the record of these senses relied on metaphorical descriptions, for instance "it smells like" and "it tastes like".

The limitation of research mentioned above has suggested future research on a methodology for conducting sensory research. There is little methods or frameworks developed approaching and capturing senses. Given sensory experience is a subjective matter, interviews and inviting people to experience the landscape may result in more representative findings.

The senses possess the ability to sparkle memories and affection within the landscape. The emotions generated through sensory experience are not necessarily positive, as associations with industrial time are largely negative and shunned in modern time; however, the negative emotions are part of the culture and history of industrial heritage. Embracing such emotions into the landscape is a way we reflect and remember our history.

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