

# Sound Interpretation

## Acoustic ecologies and urban history

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This paper explores how sound artefacts within urban acoustic ecologies can inform our perceptions of place, engaging a new dialogue with the cultural and built histories of post-industrial Tasmanian urban environments.

Two modes of inquiry underpin this research. The first concerns sound as a cultural palimpsest that exists – often subliminally or beneath consciousness – across urban environments, which the paper argues can be materialised as sonic artefacts through various recording, production, playback and installation techniques to provide an interpretive window into the histories of place.

The second mode of inquiry critiques normative assumptions regarding definitions of heritage status and discusses the value of sonic artifacts and acoustic ecologies in the re-evaluation of cultural and historic assessments of urban heritage, thus furthering the field of conservation studies to include the identification and interpretation of the aural characteristics of place.

The research in this paper speculates that from these two modes of enquiry acoustics can foster new approaches to urban design that engage the histories and patterns of our built environment. Evidence for this is provided through a discussion on the changing soundscape condition of the Tasmanian post-industrial mining township of Zeehan, highlighting how the fundamental characteristics of place become engraved acoustically within the physical fabric of urban environments over time. A subsequent analysis of which enables an important recalibration of Tasmanian urban place heritage where past historic conditions can be acoustically contrasted against their current state, enabling an aural register based on the resonances and frequencies of historic urban environments to become a valued tool in not only our evaluation of

heritage status, but in determining appropriate responses when dealing with the conservation of urban environments.

**Keywords:** Soundscape, acoustic ecology, urban heritage, urban history, convolution reverb, indeterminacy.

The field of urban environments and urban heritage studies has typically lacked investigations into the aural dimensions of place, particularly regarding their cultural and historic values. Whilst acoustics exists in its own well-established field of engineering and research, there has been little discourse that concerns the conservation of sound, or analyses of how dynamic and interrelated soundscapes – or what we in this paper will call *acoustic ecologies* – may improve our understanding and appreciation of historically significant environments. The Tasmanian post-industrial urban landscape is the case in point in this paper.

Through relevant conceptual frameworks that underpin the connections between urban environments and issues of heritage through an acoustic lens, this paper aims to improve our understanding of the aural characteristics of place as a historical parameter. This argument is supported by an analysis of field recordings taken at the post-industrial urban sites in Zeehan and Launceston in Tasmania, facilitated by a speculative sound installation. The paper speculates on how acoustic characteristics of place may be re-contextualised within a contemporary context to facilitate the interpretation of urban environments and to determine their historical significance.

While the case study utilises different methods of recording, production, and playback they collectively demonstrate what R Murray Schafer has termed ‘sound imperialism,’ where an existing localised acoustic ecology has been overpopulated and transformed into a monotonous lo-fi industrial soundscape (Schafer 1977, p. 77). The paper discusses how a qualitative analysis, rather than quantitative measurements of such acoustic conditions can lead to new interpretations of our built environments and landscapes, not as fixed constructs but entities in constant flux. This leads into a discussion of temporality in urban and landscape heritage from the perspective of what Tim Ingold calls ‘taskscape’ which denotes a pattern of activity across time that consequently influences the construction of a landscape (Ingold, 1993, p. 174).

It can be argued here that acoustics provides not only a valuable register of change, but also a temporal record of cultural activity and occupation across urban environments. An acoustic ecology can act as a register for a particular spatial condition, or period in time, which can be repeated or replayed within new contexts to provide contemporary understandings of historical conditions. The paper concludes that acoustics is an integral component of urban heritage, through which it is possible to not only re-configure our understanding of heritage evaluation, but to also be used in planning appropriate responses for the conservation of urban environments.

The paper proceeds with a sketch of three conceptual frameworks that underpins the connections between acoustic ecology, urban history and heritage conservation:

- acoustic ecologies as creative performance;
- historical soundscapes through contemporary acoustic artefacts; and

- heritage conservation through compositional indeterminacy.

### **Acoustic Ecologies as Creative Performance:**

Schafer called for a re-evaluation of the way in which we relate with the world by shifting our primary focus of perception away from culturally accepted visual norms, toward our marginalised aural perception (Schafer 1985, p. 88). As an environmentalist, Schafer was primarily interested in preserving the complex acoustic relationships between living beings and their natural environment, which he refers to as an ‘acoustic ecology’ (Westerkamp 2002, p. 52). An acoustic ecology is fundamentally a register of the historical, cultural and biological make-up of place, and their fluxian relationships, manifested as an audible (but at times inaudible) spatio-temporal soundscape.

Schafer identified the 3 key elements of a soundscape in his seminal 1977 text ‘The Tuning of the World’ as:

- (1) Keynote Sounds: Background sounds heard consciously and unconsciously
- (2) Sound Signals: Foreground sounds heard consciously
- (3) Soundmark: Similar to a landmark, a sound that is unique to a location

Acoustic ecologists such as Schafer are primarily concerned with preserving soundscapes as acoustic representations of present and past physical makeups of place. Noise pollution from our increasingly urbanised and industrial societies is the biggest threat to this conservation, which Schafer refers to as an inevitable consequence of our “transition from the rural to the urban landscape” (Schafer, 1977, p. 43). Schafer goes on to discuss how growing noise pollution is moving society away from the hi-fi soundscape represented by the sonically diverse rural setting, into a lo-fi soundscape represented by the sonically monotonous ambient drone of an urban setting (Schafer, 1977, p. 43). This debate reached its peak during the late 1960s with the World Soundscape Project led by Schafer, which sought to defend then hi-fi soundscape from impeding lo-fi urbanisation.

However, the problem with theories of acoustic ecology is that the debate is rooted within an idealised notion of how the world should be sonically composed, rather than interpretive analyses of actual acoustic conditions. Westerkamp summarises this argument when she compares the work of an acoustic ecologist to that of soundscape composer:

“The acoustic ecologist would rather do a noise level survey from different perspectives and conduct interviews with commuters. But the soundscape composer might discover, for example, the beauty within the Doppler effect of a passing Harley Davidson and enhance and descend the pitch.” (Westerkamp 2002, p. 54).

The acoustic ecologist will seek to investigate place through sound by quantitatively analysing what the key acoustic characteristics are, in the hope of being able to reconstruct a historic soundscape in the name of preservation. The soundscape composer on the other hand investigates qualitatively how sound affects our impressions of, and behaviour in everyday environments. The work of the composer accounts for the relational characteristics of acoustic ecologies in the sense that no ecology can be investigated as discreet from being affected by the investigator and investigation. In the article ‘*Discrete mapping of urban soundscapes*’, Olivier Balay highlights the necessity for a qualitative perceptual mode of soundscape mapping for its inherent potential to inform new

interpretations and identify new phenomena stating that “we have stopped describing sound and now only measure its quantity; instead of taking account of the perceptible effects of sound material we now study its acoustic impact” (Balay 2004, p. 1).

A re-calibration of the methods by which we analyse acoustic ecologies is necessary if we are to provide new sonic perspectives on the manner in which our environments have changed, and still are changing. From the perspective of qualitative experimentation through soundscape composition, acoustic ecologies involves the creative assemblage of both sounds recorded from the past, spatial and topographical dimensions of historic urban environments, as well as the sound playback contexts in the present and the participation of audiences through their performative engagement in receiving and interpreting the sound, which in turn affects the playback and reception of historical acoustic ecologies. Here we can speculate to what degree a soundscape composition as a creative work plays in our heritage evaluation of post-industrial landscapes and built heritage.

In contrast to Schafer and acoustic ecologists, sound artists O+A (Bruce Odland and Sam Auinger) propose the notion of a *Sonic Common*, “where many people share an acoustic environment and can hear the result of each other’s activities” (Odland and Auinger 2009, p. 64). At first this description seems to correlate with that of an acoustic ecology. It describes how the characteristics of place are represented by, and fundamentally engrained within, the acoustic context. However, unlike an acoustic ecologist, the primary interest in *Sonic Common* is not a measured analysis, but an investigation into the flux of a soundscape as produced by human activity. Through the process of translating urban sounds by tuning tubes into ‘overtones’ that are then played in harmony through loudspeakers O+A are able to speculate how urban occupations of space alter the acoustic field, which when translated creatively into a composition, creates an asymmetrical relation with the visual field. This experience is a construction of an urban environment which is imbricated with both human behaviour within it and interpretations of it.

*Sonic Commons* proposes that soundscapes are constantly shifting, with multiple perspectives, occupations, identities and influences. Tim Ingold in his article ‘*The Temporality of Landscape*’ argues for the introduction of the term ‘taskscape’ to denote patterns of dwelling, representative of active and perceptual engagement within landscapes (Ingold 1993, p. 174). Occupations of landscape, which may not be initially visible or which display no physical record, can nevertheless still exist perceptually through sound, accessible intuitively or subconsciously where the process is “neither mental, nor material, but a phenomenon of experience” (Ingold 2007, p. 1).

If we take on the one hand that landscape and the built environment are characterised by shifting soundscapes rather than a concrete and quantitatively definable set of acoustics variables, and we understand Ingold’s ‘taskscape’ to be fundamentally temporal and representative of habitation, then we may reasonably speculate that a qualitative mapping and subsequent creative composition of acoustic environments informs our understanding of the histories engrained within place. That is, acoustic ecologies, with the traces of temporalities and spatialities carried within them, can only become productive in practices of remembering and practices of historicising, only if they are performed. The performativity of acoustic ecologies, whether through amplification, mediation, feedback, or translation will trigger an experience in the listener that combines asymmetrically, sensation and interpretation. Such an approach to acoustic ecologies to inform the heritage

understanding, and this the conservation, of historic urban environments, moves away from a quantitative practice of sound measurement and recording, towards an essential multidisciplinary creative practice. After all, as Schafer himself says, “whenever one writes about sound or tries to graph it, he departs from its essential reality, often in absurd ways” (Schafer 1985, p. 88).

The theory in this topic compares methods of acoustic analysis and speculates how a qualitative study of soundscapes rather than a quantitative measurement can lead to an improved understanding of the temporal nature of sound, which will in turn assist in informing new interpretations on the histories of urban environments.

### **Historical Soundscapes through Contemporary Acoustic Artefacts**

Following the concept that acoustic ecologies are performative, it follows that sound can be understood as an acoustic palimpsest of cultural and historical conditions and change within urban environments, only when it is materialised as an acoustic artefact that contains information on the conditions of place and traces of human settlement.

Robin Rimbaud, a prominent sound artist, describes the recording process for an early installation where he captured telephone calls via a police radio scanner as *intercepting the data stream* (Rimbaud 2001, p. 65). The title of the work metaphorically expresses the notion that sound waves exists beneath the subconscious level of everyday human experience, as a catalogue of data, which if intercepted reveals details on the history of its context. *Intercepting the data stream* is a process of sonic archaeology, uncovering a trail of acoustic resonances representing the history of activities and occupations across landscapes and the built environment. Rimbaud elaborates that when recorded these resonances capture a moment in sound, manifested into what he calls a *Sound Polaroid* (Rimbaud 2001, p. 65). Analogous to an artefact, a *Sound Polaroid* “seizes an image and immediately exposes it to the permanence of interception” (Rimbaud 2001, p. 65), suggesting that acoustic ecologies can be apprehended to form an acoustic experience with interpretive value. It is at the moment of apprehension that the past, inherent in the aural experience and the taking-form of the acoustic artefact, is made to appear and becomes part of active recollection. The acoustic artefact is a process of reactivation, which will always involve to some degree invention or creativity, that allows history to emerge as an experience that then triggers the processes of interpretation.

It has, for instance, been suggested that sound waves emitted during the construction of ancient pottery could have been captured and held within the grain of the material, theoretically enabling the acoustic condition to be replayed today. In this instance the physical object becomes an acoustic register capturing “the hidden resonances and meanings within memory and, in particular, the subtle traces that people and their actions leave behind” (Rimbaud 2001, p.69).

Sound therefore transgresses the passage of time. If like the ancient pottery we take a musical instrument made fifty years ago and play it today, we are actually playing a sound from the past. Sound will create and re-create perpetually. This means we have access to historic acoustic ecologies, assuming on one hand that we have the object, or access to the conditions responsible for producing it in the first place. On the other is the idea that implicit within certain contemporary soundscapes are traces of historical conditions already. Needless to say, any recreation of soundscapes will not be the same. Depending on the manner in which it is recreated we may

discover what Bender describes in relation to phenomenology as multiple sound interpretations, “measured in terms of human embodied experience of place and movement, of memory and expectation” (Bender 2002, p. 103). From this point it is interesting to consider how on the one hand the nature of a soundscape is altered by changes in the physical environment, on the other it is also itself capable of reconstructing the nature of the place itself. This relation between physical landscapes and acoustic ecologies offer up new possibilities for design practice where “the landscape architect might also assume the role of the soundscape architect” (Fowler 2012, p. 2).

### **Heritage Conservation through Compositional Indeterminacy**

Penny O’Connor in *Turning a Deaf Ear: Acoustic Value in the Assessment of Heritage Landscapes*, states that:

“Acoustics, and other multi-sensory values, have been neglected because cultural heritage has not engaged with theoretical discourses on aesthetics beyond the visual paradigms that have traditionally dominated Western art and architecture” (O’Connor 2011, p. 269).

O’Connor goes on to suggest that the neglect of acoustics as a sensorial value has led to the acoustic properties of place becoming linked specifically with the visual sense and with aesthetics (O’Connor 2011, p. 269). It can be argued that our acoustic register requires independent sensory recognition, differentiated from other senses because it operates in an inherently different mode of comportment, which Pocock describes as:

“An event world, in contrast to that of vision which is an object world. It is a world of activities...It is dynamic: something is happening for sound to exist. It is therefore temporal, continually and perhaps unpredictably coming and going.” (Pocock 1989, p. 193)

For acoustics to be justifiably recognised as a component of heritage assessment in its own right, a conceptual framework is required that delineates its characteristics from other senses. In ‘compositional indeterminacy’, John Cage prioritises “chance-oriented events in which sounds and non-sounds, control and chaos, are placed on an even footing” (LaBalle 2006, p. 7). Rather than a prescribed or quantitative acoustic analysis of place, indeterminacy moves “away from compositional control and towards non-intention, where ‘something’ and ‘nothing’ are unopposed” (Shultis 1995, p. 345).

Cage, who after visiting an anechoic chamber in which he heard nothing but the sound of his own body, came to the realisation that there is no silence, there is always sound (Kahn 1999, p. 191). This discovery led Cage to understand that “what we have been in the habit of calling silence should be called what in reality it is, non-intentional sounds – that is, sounds not intended or prescribed by the composer” (Nyman 1974, p. 22). In Cage’s 4’33” composition, there is a deliberate absence of intentional instrumentation, often mistaken as silence, that directs the audience’s attention toward the non-intentional contextual sounds of the environment. (Figure 1) Cage rejected “the importance of whether a musical sound was present or absent within a composition and, in the process extending the field of artistic materiality to all the non-intentional sounds surrounding the performance” (Kahn 1999, p. 158).

Indeterminacy in this regard poses intriguing possibilities for heritage evaluation because it allows for a broad scope of inquiry that is capable of producing previously unexpected outcomes. However, to Cage there remains an intentional stance in indeterminacy owing to its compositional nature: while the final dimensions of the work may be indeterminate, the compositional effort is intention, even if the intension is not to do anything but to listen for a fixed period of time, or in a specific place. Indeterminacy here becomes purely acoustic discussion without recourse to the visible, leading to new compartments to place, and therefore possible new tools to heritage assessment.

Alvin Lucier's seminal work of 1969 'I am sitting in a room' provides a key illustration for compositional indeterminacy and its possible uses in heritage conservation practice. In the composition, Lucier records the sound of his own voice narrating a text, which he then plays back into a room and re-records. The process is repeated over and over, until finally the initial sound of his voice disappears, replaced by the "natural resonant frequencies of the room that have been articulated by the speech" (Nyman 1974, p. 92) (Figure 1). The composition investigates the acoustic qualities of place through a structure that allows the outcome to "'become' in processes rather than as fixed objects." (Shultis, 1995, p. 319). Compositional indeterminacy in this context provides a window into how a place may be 'listened' to, and how this process of listening can provide a framework for a new understanding of the physical configurations of place.

This is not to suggest that indeterminacy is random composition or the result of random experimentation. Indeterminacy must still exist within a determinate framework, rigid enough to delineate a sample range, but loose enough to ensure unexpected results. Compositional indeterminacy increases the potential for the historic spatial configurations, topological conditions and cultural practices held in the acoustic ecologies that are composed into natural resonant frequencies, to be expressed or encountered. Paterson describes this practice as "perceiving random events as occurring within the structure of time; and while the mind demands structure, form moves freely within it" (Paterson 2002, p. 245). In the context of heritage conservation practice, the determinate framework can be understood as the history of occupations and activities across landscapes and built heritage, and compositional indeterminacy allows access to acoustic relationships specific to place that we are yet to listen to.

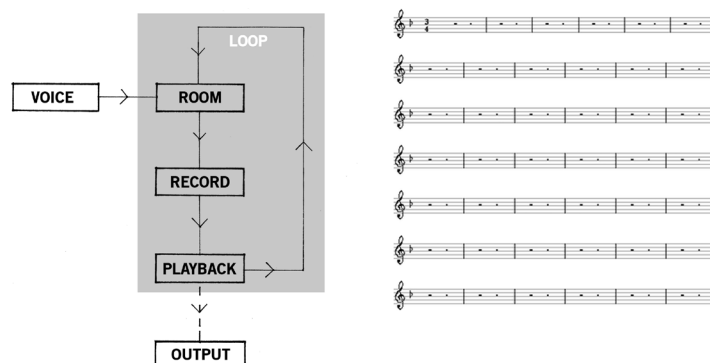


Figure 1: <http://thequietus.com/articles/05438-silence-why-john-cage-s-4-33-is-no-laughing>, viewed 05/06/13.

Qualitative sound mapping and performative engagement with designed acoustic artefact provides experiences of temporal changes due to settlement and activities that occurred across urban environments through sonic remnants. Creative works that apprehend past acoustic ecologies can provide historical evidence of previous habitations that remain within a place long after the physical traces have been removed. It also reinforces that urban environments are constantly shifting, both in response to the acoustic condition and because of the acoustic condition. Lastly, non-intentional sounds investigated through a process of compositional indeterminacy can be understood as an alternative process of exploring the acoustic makeup of place, allowing previously unrealised interpretations of place to be heard. These points provide a conceptual framework that underpins the inclusion of acoustics as a necessary component of heritage assessments.

### **Zeehan: The acoustic ecology of a post-industrial mining townscape**

The final section of this paper focuses on a project that investigates the historical significance of the changing urban acoustic ecology and soundscape of the post-industrial mining township of Zeehan, located in Tasmania's remote northwest. Drawing from the previously outlined conceptual frameworks, this project, through design, enacts processes by which a previous urban acoustic condition or urban soundscape can be revived and subsequently re-interpreted using indeterminate recording techniques that draw parallels with the methodologies of John Cage and Alvin Lucier. The discussion which follows explores how various periods of Zeehan's mining history are immanent to the changing construction of its soundscape, which when investigated through an indeterminate acoustic compositional methodology can provide new interpretive approaches for the urban history of the township. On a larger scale, the investigation provides support for the future realisation of an acoustic method of urban heritage evaluation.

Zeehan began as a frontier township on the wild and rugged northwest region of Tasmania in the late 19<sup>th</sup> century. The geologically rich terrain soon encouraged large-scale mining activity and by 1914 Zeehan had a population of approximately 10,000 and was the "metropolis of the West and the third largest town in Tasmania." (Pink, 1975, p. 43). The township was the centre of silver and lead mining in the northwest of the State. It is therefore reasonable to assume that during this period, the soundscape of Zeehan would have been at its loudest.

The acoustic ecology of a townscape such as Zeehan during this period in its history refers directly to Ingold's discussion of taskscape; in particular the manner in which noise generated from the processes of industrial mining acted as a narrative for the evolution of the town, most notably the mine steam whistles that "echoed along the valley at the change of shift." (Pink, 1975, p. 44) The rhythmic whistles signaled the advance of an industrial age in Zeehan, which at the time would have drowned out all other elements which made up the complex acoustic ecology of the region.

However, the acoustic ecology at this industrial peak was short lived. As the mining boom slowed and Zeehan entered a steady period of decline from which it has never recovered economically. At the time of the 2011 Census, Zeehan had a population of 786, less than a tenth of that during its peak one hundred years prior. While the rise and fall of Zeehan as a consequence of mining has been well documented historically, there is little research on the changes to the soundscape as a result of the rise and fall of mining and the manner in which these acoustic ecologies are able to

provide a historical record of changes, and more importantly approaches to the heritage conservation of the place through its acoustic registers.

The acoustic ecology of Zeehan prior to the first days of mining and the subsequent post-industrial collapse would have been a characteristically hi-fi soundscape, comprising various flora, fauna and human habitation all influencing and composing a dynamic – perhaps symphonic – acoustic ecology. In contrast, the acoustic ecology of Zeehan's mining peak would have been typical of a lo-fi soundscape, where the repetitive drone of mining overwhelms the sounds of other alternate activities in the area, preventing them from being heard, experienced, understood or act as markers and backdrops which organized everyday life. This what Schafer has referred to as sound imperialism, where the dominance of a singular acoustic property overwhelms all other sonic eccentricities of place (Schafer 1977, p. 77). This is a condition that Schafer argues has been used both deliberately and as a result of other circumstances to propagate industrialisation at the detriment of cultural diversity (Schafer 1977, p. 78).

Interestingly the present day acoustic ecology of Zeehan, following the decline of mining, no longer comprises the lo-fi repetitive drones of an industrial lo-fi soundscape. Instead Zeehan has returned to its initial condition as a hi-fi soundscape, where a wide array of acoustic narratives are audible. The acoustic condition of Zeehan has oscillated back and forth between these two soundscape conditions over the course of its relatively short occupied history, with each change representing different and highly specific moments in time. As one soundscape ends and another begins, and the changes to the acoustic ecology of Zeehan fundamentally becomes a register of physical changes to its urban fabric.

To develop a project for Zeehan that investigates the manner in which an acoustic ecology represents the physical changes that have occurred across an urban environment, a prototype sound experiment was carried out in the context of a present day urban environment. In this prototype, the lo-fi soundscape of a busy inner-city highway was acoustically mapped in order to understand how traffic volume fluctuated, and to what effect that fluctuation had on the resultant acoustic ecology it produced. To achieve this, a condenser microphone placed underneath the entrance to a four-lane overpass recorded various resonances of traffic sound. As vehicles passed across the road surface, the sounds they emitted would travel down through the tarmac and into an industrial urban volume shaped by the highway network. This urban volume reverberated and morphed the traffic sounds with other urban noise, producing the lo-fi urban soundscape of road networks. Testing was conducted at various time intervals across a full day, acoustically capturing the flux of activity, and the registration of that activity by different materials and spatial volumes of the city.

In post-recording, the time interval samples from the highway were compressed into a single timeline, which was subsequently stretched and distorted so that when the final piece was heard it was no longer possible for the listener to discern precisely the source of what they were hearing. The recognisable acoustic characteristics of traffic had morphed together so much so that the reverberating sound of cars became nothing more than a pulsating drone, which slowly grew or decayed depending on the volume of traffic. Schafer suggests that in the lo-fi soundscape "there is so much acoustic information that little of it can emerge with clarity." (Schafer 1977, p.71) With this experiment the aim was to reduce the complexity of noise initially present during the field recording

to its bare essentials, revealing only the resonant qualities of traffic flow rather than the actual sound of passing vehicles.

The purpose of such a test is to depict acoustically how the physical conditions of an urban environment change, and how that change is inseparably linked to its soundscape; and how this finding can be applied to Zeehan's soundscape. Using this methodology, it is possible to expand the concept so that the sounds recorded and played were not just representative of a single day, but were in fact acoustic (re)productions relating of a much longer history. In the Zeehan project the aim was to recreate and re-interpret the juxtaposition between a diverse hi-fi soundscape, existing either side of an industrial lo-fi one. The project explored to what extent an audible difference in character between the two soundscapes can inform our understanding of the urban histories of place.

Beginning with a discussion on the lo-fi industrial soundscape of Zeehan's early 1900 mining boom. It is possible to speculate about the conditions of a lo-fi soundscape because of our established understanding of mining in industrial societies. The project uses a methodology based on Alvin Lucier's *'I am sitting in a room,'* to provide another interpretation of the seemingly undifferentiated lo-fi soundscape through compositional indeterminacy. As highlighted earlier, Lucier's seminal work explores how the physical construction of a space determines the manner in which a sound is produced in that space. Furthermore for each time that sound is played back throughout that same space it will change again, with each repetition creating a new and entirely individualistic representations of the exact moment of recording.

With Lucier's work and the highway soundscape experiment discussed previously there is a common thread where "sound and space are inextricably linked, interlocked in a dynamic through which each performs the other, bringing aurality into spatiality and space into aural definition" (LaBelle 2006, p.123). Recreating the aural condition of Zeehan at various points in its history give us an insight into its spatial composition, is an extension of this concept. However instead of recording within a space and listening to how the changes to that physical environment affect the resultant sound that is produced, we invert the equation so that changes within a sound gives us an insight into the spatial quality that brought the sound into existence (Figure 2)

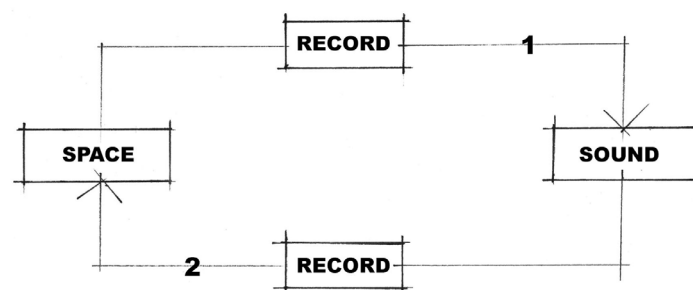


Figure 2:

The inversion of this strategy, so as to begin with a sound rather than a place is a necessary decision when dealing with the acoustic ecology of a past condition. The lo-fi industrial soundscape of Zeehan is a time period that we cannot physically occupy and record, which consequently means the only available option is recreate an aural condition from what we already know to have happened within the context of that space. In this scenario the aural must come before the spatial rather than the spatial leading to an understanding of the aural. This is a key point in understanding the relevance of acoustics to issues of urban heritage. In this scenario previously unknown interpretations of place have the potential to be uncovered because of an inversion in the way in which we investigate the histories of place. Beginning with the aural in order to create a picture of the visual that has yet to be determined.

In order to re-create the lo-fi soundscape of industrialised Zeehan a recording simulation method known as convolution reverb is required. This technique utilises the present day built fabric of Zeehan as an acoustic resonator, through which archival sound material, sourced from highly specific time periods in Zeehan's history can be played. The resulting affect is a simulation that aurally recreates a specific moment or event in time, enabling us to listen, understand and interpret exactly how that moment would have sounded live. The technique provides an alternative to hearing an archived sound played within a contemporary context because it enables the sound to re-interact with the spatial conditions that first created in, it is therefore not just the sound we are hearing but the actual physical contours and materiality of the space in which it was originally recorded. Re-iterating the words of LaBelle this method brings "aurality into spatiality and space into aural definition" (LaBelle 2006, p.123).

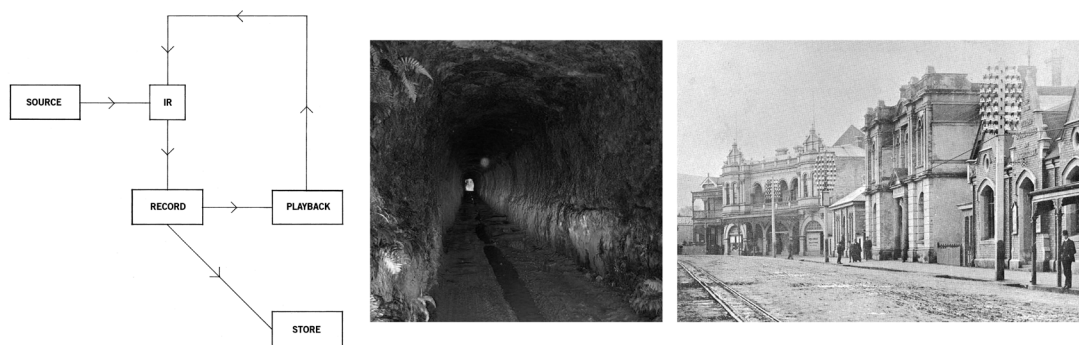


Figure 3: Pink, K 1975, '100 Years of Western Tasmanian Mining,' Published by the West Coast Pioneers' Memorial Museum, Zeehan, Tasmania, p. 42.

<http://wordsthatshine.com.au/wpcontent/uploads/2012/07/041009.42Spray-tunnel-2.2m-wide-3m-high-Zeehan-West-Tas.jpg>, viewed 09/06/13.

The site chosen to undertake this Convolution reverb field recording is the Zeehan Spray tunnel, a narrow railway passage originally carved through a hillside in 1901 for the transportation of mining goods. Impulse responses (IR) were conducted using a starter pistol fired at regular intervals along the length of tunnel, the decaying reverb of which was recorded as the sound absorbed into the

angular rock faces. The recorded impulse responses provides an acoustic template of the Spray Tunnels through which source archival mining sounds from Zeehan during the peak of mining could be played through. This process used computer simulation to create a convolution reverb that re-created the actual acoustic ecology of the spray tunnels during Zeehan's mining peak but played within the present time frame (fig.10.)

As a method of sonic reconstruction this process speculates with a high degree of accuracy how the Zeehan Spray Tunnels would have sounded during the peak days of mining in the town, providing a blueprint for the urban condition of the area during that time. Furthermore the process gives us an insight into how the urban condition of the town might have sounded today had its mining industry not collapsed. While these are interesting concepts the key outcome is that the process enabled a visual interpretation of place, stemming purely from an acoustic origin. The recording process investigated was composed within a specific determinate framework that stipulated exactly how sounds were to be captured and within what timeframe, however the visual interpretation imagined by the listener when these sounds are re-played is an entirely new condition.

The third phase of the project is to investigate the hi-fi soundscape of Zeehan and compare how the characteristics of that acoustic ecology are heard when juxtaposed against the previously discussed lo-fi soundscape. While the lo-fi industrial soundscape of Zeehan was contained within a relatively short period of time, the hi-fi condition on the other hand is in an ever-present soundscape capable of being heard and reheard perpetually outside of the boundaries of time. This is because the hi-fi soundscape of Zeehan is not attached to a particular moment in time or event – unlike the lo-fi soundscape which only existed during the era of mining. Instead the hi-fi soundscape is a perpetual acoustic representation of the physical structure of Zeehan, which cannot disappear from existence so long as there are physical objects to produce sound, but which can be interrupted and become inaudible as was the case during the peak mining boom of the area. key to interpreting the hi-fi soundscape of Zeehan consequently revolves around an investigation into which parts of the acoustic ecology were interrupted by the lo-fi industrial era, and to what extent those sounds are now audible again.

A simplified method of live recording is necessary to undertake this investigation. Using John Cage's *4'33"* and as precedent to determine how the construction of place informs the sounds which are heard, the reverse of what was previously explored in the lo-fi condition. In *4'33"* Cage utilised a deliberate absence of instrumentation in order to amplify the non-intentional contextual sounds of the performances location. The result was a condition where the audience was actually listening to a live composition representative of the specific environment they were in, as the place around them changed, the sounds they heard would change. Whether that be the wind blowing, or an audience member coughing, the affect is the same: the dynamics of the localised acoustic ecology becoming the performance piece.

Using the Zeehan Spray Tunnel again as the location of the experiment, a series of live field recordings were undertaken which sought to capture the indeterminate, non-intentional sounds of the hi-fi Zeehan soundscape - an acoustic ecology comprised of sounds that are audible now, but would not necessarily have been during the period of lo-fi industrialism. The recording technique was much looser in structure than previous experiments, microphones were left at various intervals throughout the tunnel for an unmonitored period of time, whilst other recordings were done while

walking through the space of the Spray Tunnel. The recorded sounds would subsequently be replayed against the recreated lo-fi soundscape in order to contrast and audibly compare exactly what has changed to the soundscape, and therefore the physical condition of Zeehan between these two periods.

With the Zeehan recordings, the effect of listening live to the contextual sounds as with Cage's 4'33" only occurs during the initial phase of recording. During subsequent playback, the sounds are no longer heard live, instead they become representative sound bites of a past condition because they have been dislocated from the original spatial context that produced them. Unlike the convolution reverb recording of Zeehan, this methodology no longer has a pre-determined link between a sound and the physical space which produced it, the intricacies of that connection will instead come down entirely to the listener's own interpretations. It is this re-interpretation that occurs post recording during the moment of listening that contains the critical moment of indeterminacy, a by-product of the recording process rather than the process of recording itself. Whilst the recordings are composed live, and are therefore unpredictable, they are not random producers of sound and are therefore not in themselves indeterminate.

Rather than a production of arbitrary or unconnected sounds, indeterminacy amplifies the non-intentional sounds of an environment. The elements of a hi-fi soundscape can only be heard in their original condition live. When recorded and played back within a new condition will inevitably lead to a re-contextualisation of that acoustic condition within a contemporary space. For instance, the sounds of the wind blowing through the Spray Tunnel or the rain dripping over the stone surface have not changed across the history of Zeehan, but the ways in which we hear these sounds have. Such sounds have been audible on location for a just over a century, but during Zeehan's period of industrialisation they may have been completely inaudible beneath the noise of the lo-fi mining ecology. Listening to the current condition of Zeehan's hi-fi soundscape reveals the likelihood of a past condition, but more importantly it allows an interpretation of the extent to which the urban condition was altered during the mining boom.

Only with an exploration into changing soundscape conditions can we begin to delve deeper into interpreting the physical disruptions to the urban fabric of Zeehan and begin to strengthen a discussion on heritage characteristics. The processes explored here offer an insight into the heritage value of Zeehan's Spray Tunnel as an acoustic resonator of cultural change by investigating how historic conditions of Zeehan are actually contained aurally within the material and form of its physical fabric. Furthermore the process opens a discussion on how the attenuation of the various components within acoustic ecologies, altered primarily by the changing spatial conditions in the urban fabric that are the result of industrial mining activity, can lead back to a interpretation on the physical conditions which produced it. Using the same conceptual frameworks and recording techniques explored here as a basis for further research, it is possible to speculate on the manner in which much larger issues of urban heritage may be explored through acoustic ecologies, providing new interpretations on historic narratives and cultural changes across entire urban environments.

**Note:** All diagrams by author.

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