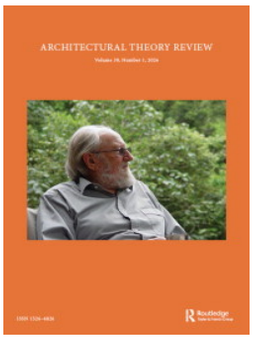

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The Aural Architecture of Chile's Modern Ruins: An Acoustic Archaeology of the Quinta Bella Water Tower and Inground Reservoir

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ABSTRACT

Throughout Santiago, Chile, numerous water towers mark the urban skyline as modern ruins of industrial heritage, serving as cultural landmarks of the city's collective memory and identity. Once abandoned and emptied of the water they once held, these structures have instead become inhabited by sound through distinctive acoustic properties, turning functional absence into aural presence. This article develops an aesthetic practice of acoustic archaeology within industrial architectural heritage. Focusing on the water tower and inground reservoir at Quinta Bella, the research investigates their aural architecture through acoustic activation as a creative practice, inviting us to explore a space through its particular acoustic "voice." On this occasion, the voices of the water tower and the inground reservoir at Quinta Bella are compared, revealing how the acoustic character of these structures constitutes an aesthetic experience that uncovers hidden knowledge of industrial memory.

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Aesthetic practice; acoustic archaeology; acoustic heritage; urban entropy; sound art; industrial architecture

Introduction

The term "aural architecture" was introduced by Barry Blesser and Linda-Ruth Salter to refer to the way we listen to multiple sources of sound interacting with the spatial elements of their context and the symbolic meanings attributed to them by the listener.[1] They argue that every space has an aural architecture, which can be manipulated by modifying spatial attributes to create new aural experiences. This research aims to explore aural architecture as an aesthetic practice in itself, through a process of acoustic archaeology in which sound engineering methodologies serve to activate and render legible the voice of a particular space, translating measurable evidence into embodied acoustic experience and sensory understanding. This represents an epistemological shift in how knowledge is produced: acoustic measurements do not constitute the product of this research, but rather the means by which knowledge becomes possible. What emerges does so through the aesthetic act of listening, from the encounter between a body and a space activated and made sonically legible by

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way of sound collection techniques. In this sense, the practice of listening to the voice of a space is itself the epistemic process this research proposes.

Aural architecture is distinct from architectural acoustics, a discipline practised by architects and acoustic engineers, focused mainly on achieving sound fidelity. Architectural acoustics is concerned with developing design strategies to dampen or eliminate acoustic phenomena such as acoustic reflections in spaces dedicated to music or speech. In contrast, aural architecture aims to promote and enhance such phenomena, seeking to understand these qualities through listening and the effects they have on the listener's body. Unlike architectural acoustics, this research strives to study spaces where these acoustic "problems" are exacerbated, where their presence is so powerful that we can almost touch it—the moment when sound becomes plastic. Aural architecture uses human experience as its language, analysing the physical properties of sound in space in a dialogue with sound perception—constituting, in this way, an aesthetic practice in itself.

Aural Architecture

Aural architecture cannot be fully explained in spatial terms alone, but rather may be thought of as a dynamic that unfolds as a direct expression of time—a temporal structure shaped by relational intensities, converging sensibilities, affect, corporeality, and topological manifestations. It resonates with Gilles Deleuze and Félix Guattari's concept of the "body without organs," a non-stratified entity lacking fixed form and grounded in subjectivity.[2] Aural architecture engages in a process of "de-territorialisation,"[3] liberating architecture from its conventional "organs"—that is, from physical, functional, and disciplinary constraints. This disassociation from fixed structures opens a field of subjectivities, creative flows, intensities, and desires that emerge prior to their inscription into established forms of meaning. It initiates a process of deconstruction within the discipline, challenging traditional hierarchies that privilege the physical over the sensorial, the objective over the subjective, and the useful over the useless. In doing so, it proposes alternative modes of existence and creative approaches to spatial construction, grounded in sensory experience.

The process of deterritorialisation involved in conceiving aural architecture within the framework of acoustic archaeology reflects a disciplinary migration from the conceptual territories of architecture, sound engineering, and the arts, into a transdisciplinary niche. Within the arts broadly considered, new territories have emerged that are essentially nomadic, fluid concepts that drift like islands between disciplines, occupying residual spaces left behind by traditionally established fields. It is in these peripheral zones that aural architecture emerges as a construct born from intersecting relationships. It positions itself as a site-specific, context-driven practice that gives rise to perceptual phenomena. Taking this as a starting point for research, the following question arises: how might we access aural architecture?

In her critique of scientific knowledge, Donna Haraway challenges the social constructs that uphold and privilege objectivity as the dominant method of accessing knowledge, often at the expense of experiential approaches.[4] She critiques the term "objectivity" as emblematic of the hegemonic authority of science over other ways of

accessing knowledge. In contrast, Haraway proposes an "embodied objectivity" that aligns with a feminist epistemology grounded in the notion of "situated knowledge." Ocularcentrism in Western culture and science has elevated sight to a dominant, even colonialist, position—prioritising rational, *a priori* knowledge that distances the object of study from the knower. Haraway's critique gestures towards the importance of lived, embodied knowledge. In this context, aural architecture can be understood as a form of situated knowledge: multidimensional, embodied, and inherently subjective. It engages critically with lived experience through listening and sonic embodiment, linking perception and imagination to construct virtual realities that extend beyond the visual domain.

Within aural architecture, the act of listening is approached as a fragmented process of engaging with architecture through aurality. Sonic embodiment shapes the dynamic interaction between the subject and the acoustic information emitted by the space and its environment. Aural architecture is not something visible to the eye, nor is it limited to the sounds heard within a space; rather, it is a cognitive process of creative knowing that is simultaneously subjective and objective. It involves sensation, perception, and sense-making in a continuous process of learning and responding to one's surroundings. In this process, the interaction between the body and the acoustic context alters how sensory information is felt, perceived, and interpreted. Perception, therefore, is not a passive reception of sensory information but an active, creative act—one in which the perceiver constructs their own experience by giving sense to it.

Blesser and Salter introduce the concept of "auditory spatial awareness," defining it as the active detection of and response to sound sources and spatial acoustics.[5] According to these authors, auditory spatial awareness is a skill that can be cultivated to explore aural architecture. It involves extending one's perception beyond immediate auditory input to embrace a holistic awareness that encompasses the physical, environmental, and phenomenological dimensions of the aural experience. Therefore, aural architecture constitutes an aesthetic practice of spatial knowledge.

Modern Ruins

The concept of a *modern* ruin requires a redefinition of what we understand of "ruin." Robert Smithson's The Monuments of Passaic (1967) drifted along the periphery of New Jersey through what he called "ruins in reverse"—not constructions that will eventually become ruins, but structures that emerge as ruins before they are even built, as monuments to a future that never arrived.[6] This vision departs from Walter Benjamin's conception of ruins as the accumulation of history pushing us forward; in Smithson's peripheral landscape, there is no past to accumulate, only a present that was already ruined before it began. Francesco Careri describes this as the "diffuse city": a territorial system with its own ecosystems and inhabitants, existing in a state of entropy that permits neither a global nor a clear vision of itself.[7] In this state of entropy suspended between a past function and an unimaginable future, these abandoned structures begin to speak. Emptied of their original contents, modern ruins acquire a new presence: that of sound.

Modern ruins connect to a long tradition in which the act of exploring marginal spaces constitutes, in itself, an aesthetic practice. From the Dadaist's first urban

readymade, through the Surrealist *déambulation* and its investment in the unconscious life of the city, to the Situationist *dérive* as a constructed operation of psychogeographic investigation, the twentieth-century avant-garde progressively articulated a form of research in which walking through residual urban space was the art itself. As Careri argues, these practices did not merely describe the city but produced knowledge through the bodily experience of traversing it.[8] The acoustic exploration of the water tower and inground reservoir at Quinta Bella—the act of entering these abandoned infrastructures, activating their acoustic voices, and receiving that activation through a listening body—constitutes an aesthetic practice that inherits the logic of the *dérive*: the residual space is the subject, and the embodied encounter with it is a creative act.

Yet these ruins are not only residual spaces of human history. As Timothy Morton argues, certain entities—ecological, geological, systemic—operate across non-human temporal scales, phasing in and out of human perception without ever being fully legible to it.[9] Modern ruins participate in this condition through the entropic processes that produce them. The exhaustion of extractivist models, the slow decomposition of industrial infrastructure, and the ecological consequences of capital cycles unfold across timescales that exceed human perception. What remains is a material trace of processes operating at frequencies the human senses cannot directly access. In this process, sound becomes an element of denunciation: the acoustic transformation of these spaces, from used to abandoned, offers a situated and embodied access to temporalities that would otherwise remain imperceptible.

Architecture is designed around a programme, and that programme generates its own sonic world that becomes internalised as the acoustic identity of the space. When that programme collapses and the building is abandoned, emptied of activity, the residual sounds—and their absence—reshape the space, creating a new and distinct sonic atmosphere. What happens to architecture when unfamiliar sounds are projected into these abandoned structures? What kinds of knowledge might emerge through such a process of sonic recontextualisation?

In an abandoned water reservoir in Prenzlauer Berg, Berlin, Edwin van der Heide created *The Speed of Sound*, a site-specific installation that engages the circular architecture of concentric rings to explore acoustic perception. By exploiting the delay between emitted sound and its echo, the artist manipulated audio through temporal shifts and pitch modulation. Van der Heide explains, "The sound travels from one side of the wall, all the way along the corridor, and arrives at the other side of the wall […] therefore experience the speed of sound."[10] The result is a composition that the acoustic space continually reflects and filters. In this context, sonic materiality functions not only as a vibrational stratum but also manifests as embodied responses—bodily attitudes shaped by the experience of sound. As Raviv Ganchrow states, the listening space reveals itself as an uninterrupted interior with dynamic and temporal boundaries.[11] It represents a cognitive space of sounds apprehended through vibrational interactions.

At the Tuned City Festival, the artist Raviv Ganchrow created a sound intervention within one of the three 60-metre domes of the former Tallinn Hydroplane Hangar.[12] Exploiting the site's unique acoustic properties, ambient recordings were diffused through an array of loudspeakers, circulating and focusing sound within the dome's

curvature and across the bodies of spectators. The installation revealed how the abandoned space shapes sound while being simultaneously activated by it, conceiving spatiality as a perceptual container "illuminated" by sound waves and modulated by the hangar's geometric structure.

Archaeoacoustics

Numerous studies in archaeoacoustics have employed acoustic measurement—such as of reverberation times, standing waves, and echoes—to investigate the sonic properties of prehistoric sites. Research has focused on locations like stone circles with unusual outdoor echoes and subterranean structures with distinct resonant frequencies. For example, drawings of bulls in echo-rich chambers may have been intended to evoke the sound of stampeding. Paul Devereux, Robert G. Jahn, and Michael Ibison found that six Neolithic and Iron Age burial sites exhibited strong resonances between 95 and 120 Hz, aligning with the male vocal range and possibly enhancing ritual chanting.[13] At Stonehenge, Aaron Watson and David Keating identified modal resonances and low-frequency filtering, suggesting intentional acoustic design.[14] Similarly, at Chichen Itza, phenomena such as the "chirp" echo produced by clapping in front of El Castillo's staircase and the auditory illusion of rain as one ascends the steps point to a sophisticated engagement with sound in pre-colonial architecture.[15]

Though primarily focused on prehistoric and ancient sites, the study of acoustics in historical spaces extends to other locations such as temples, churches, cathedrals, theatres, and concert venues from the classical and medieval periods. For example, studies have examined the reverberation times in the Basilica of Saint-Denis in Paris (1144), or the whispering gallery effect in the Dome of St. Paul's Cathedral in London (1697). Across these diverse cases, archaeoacoustics operates on a shared assumption: that acoustic properties are legible as evidence of intentional design, ritual use, or symbolic meaning encoded in built form. Might the methods of archaeoacoustics also be applied to architectural industrial heritage within modern ruins?

The answer requires a revision of the field's foundational premise. Traditional archaeoacoustics has focused on sites whose acoustic properties are attributed to intentional design, employing sound engineering methodologies to recover and interpret past sonic experiences. The present research borrows from this methodological tradition but inverts its temporal logic: rather than using acoustic analysis to excavate the past, it applies these same methods to generate conditions for present-future aesthetic and artistic experiences. The acoustic properties of these modern structures were not designed but emerged from the geometry of functional enclosures. They are, in this sense, unintentional acoustics. Yet as these structures pass from use into abandonment, their sonic character becomes a form of material memory; the sound of absence that outlasts the substance that once filled them. It is this accumulated acoustic presence that opens modern ruins to what we might call a future-archaeoacoustics: a practice that reads the acoustic traces of the present not to reconstruct the past, but to activate new aesthetic possibilities yet to come.

The Voices of Industrial Architecture

A voice refers to the sound emitted by both humans and non-humans, such as animals, objects, or materials. The simplest examples include the human voice and the timbre of musical instruments. When referring to physical space, the voice represents the ephemeral character of sound unique to each space. Through a wave that excites every particle of matter, the voice is shaped through acoustic space and manifests itself as sound. The ontology of sound is rooted in the premise that all matter is already in a state of molecular vibration, where sound waves vibrate and resonate the material components of space.[16]

The acoustics of a space conveys sonic information, tracing a vibratory path of propagation. In industrial sites, this reaction is amplified by pure geometries and vast dimensions. This sonic identity contributes to the personification of industrial architecture, animating its static infrastructure through sound. The translation of these structures into sound acts as a mirror, reflecting their monumental visual presence in an audible form of equal magnitude, creating a synaesthetic effect that transforms the experience of space from primarily a matter of visual perception to one of acoustic sensation. It is a dialogue between sound emitted into the air and the constructed reality that contains, shapes, and sculpts it—like an effects pedal at a human (and superhuman) scale—filtering and transforming the sounds that pass through. On this occasion, the focus is on the voices of two case studies: the water tower and the inground reservoir at Quinta Bella, Recoleta, Chile.

The Water Tower of Quinta Bella: Urban Landmark, Functional Obsolescence, and Cultural Significance

Quinta Bella, located in northern Santiago, Chile, takes its name from the chapel built in 1864 by mining entrepreneur José Tomás Urmeneta. Once part of a rural leisure estate symbolising nineteenth-century prosperity, the chapel is now a protected historic monument. Its current abandonment, however, reflects the profound transformations that have reshaped the surrounding landscape.

By the mid-twentieth century, Quinta Bella began to undergo significant transformation. The first urban developments in this formerly agricultural area appeared in 1951, with the construction of housing estates intended to provide accommodation for informal settlements located in the La Chimba district, on the north bank of the Mapocho River. This marked the beginning of a process that would transform a bucolic nineteenth-century landscape into a dynamic urban neighbourhood. During the second half of the twentieth century, the Quinta Bella area was shaped by processes of urban development as well as profound social and political changes that deeply affected its community. During the military dictatorship which began in 1973, the population experienced raids, arbitrary detention, torture, and other severe human rights violations. The local sports field became a site for inspections, while a nearby Investigations Police headquarters on Parque Central Street functioned as a detention and torture centre. These events left indelible marks on the collective memory of its inhabitants.

Between the 1950s and ‘80s, a network of water towers was constructed in Santiago for the storage and distribution of water. The water tower at Quinta Bella in

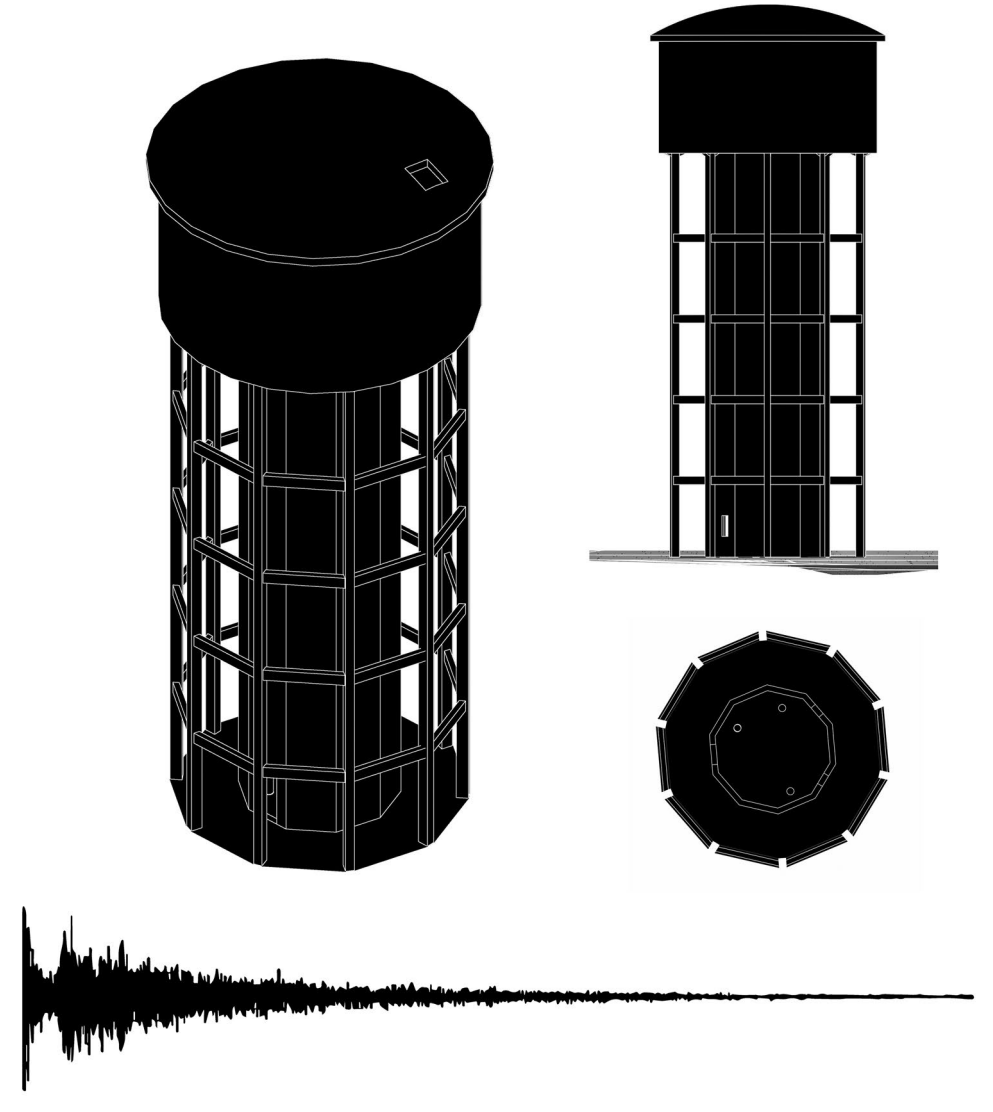
particular was a key element in the consolidation of the neighbourhood. Built during the 1960s to supply the newly established housing developments, the tower enabled a significant transition—from a rural environment reliant on irrigation canals to a modern potable water distribution system. This was a substantial improvement in the quality of life for local residents. Although the infrastructure was precarious, it also symbolised a form of progress for the inhabitants of Quinta Bella.

Beyond its practical function, the water tower played a significant role in the construction of community identity. Gardens and parks were developed around the structure, encouraging social interaction and collective care of the environment. Local families planted trees and beautified the area, creating shared spaces that fostered a strong sense of belonging. Long-time residents of Quinta Bella recall with nostalgia how the water tower once served as a hub of social activity. It represented not only the arrival of essential services to the neighbourhood, but also stood as a symbol of unity and collective effort.

Today, the tower at Quinta Bella lies disused (fig. 1), as do most of the water towers built at the time.[17] Nevertheless, like Quinta Bella's chapel, both structures remain culturally significant landmarks that reflect the historical evolution of the area. With its imposing yet abandoned structure, the water tower symbolises the memory of the urban and social transformations that have defined the character of the area.

The water tower is a concrete structure with a decagonal base with 1.5 m sides, measuring 5 m wide, surrounded by 10 pillars that rise together to a height of 20 m, supporting an elevated reservoir at its top (fig. 2). The elevated reservoir, with a circular base, 5 m in height and 10 m in diameter, is crowned with a flattened dome. At

Figure 1. Satellite view of Quinta Bella, photography dated May 21, 2024, Google Earth.



T60 (S)	VOL (M3)	H (M)	L (M)	W (M)
10-13	348,520	20	4.87	4.63

Figure 2. Quinta Bella's water tower, Recoleta, Santiago de Chile. Left: 3D view. Top right: Front view. Bottom right: Ground level. Wave form IR T60–2″. QR: Audio of IR. Data taken from the base of the tower.

the tower's base, sound reverberates with metallic echoes. Climbing a 25 m high staircase, one reaches the tower's top with a panoramic view of northern Santiago. Descending through a hatch to the interior of the elevated reservoir, the curved surfaces amplify sound, resulting in a subtle fluttering sensation in the ears. At the centre, atop a hemisphere, the sound becomes so concentrated that it seems to be

Figure 3. Quinta Bella's water tower. Left: Exterior of water tower. Top right: Ground level of water tower. Bottom right: Interior of water tower. Photos by the authors, 2022.

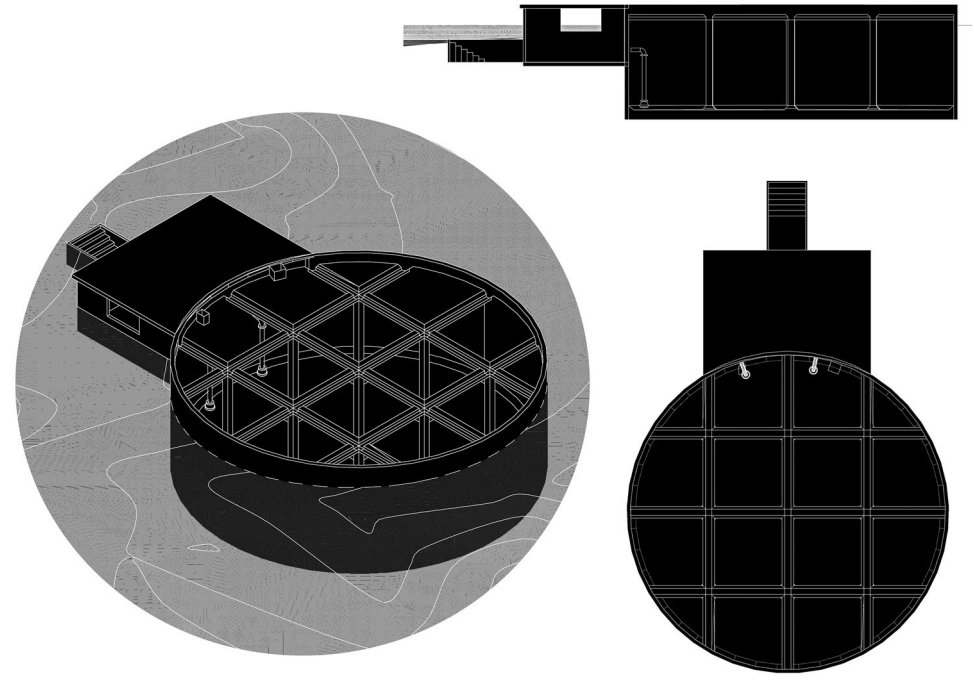
emanating from within. The Quinta Bella water tower has a transparent structure that surrounds its perimeter (fig. 3), offering both a plastic and aesthetic value as a monument visible throughout much of the commune.

The water reservoir is located next to the water tower. They functioned together as an industrial system, with the inground reservoir storing water that was pumped up to the water tower's elevated reservoir. From there, the water was distributed to the rest of the neighbourhood.

The reservoir is a concrete cylinder, completely enclosed, with only two small openings. It has a surface area of 220 m^2, a diameter of 16.8 m, and a height of 5 m (figs 4 and 5). Inside, there is a structure of nine pillars supporting the concrete slab, arranged in a three-by-three pattern with a distance of 3.9 m between pillars. Currently, it is an empty space that housed water for decades (fig. 6). Inside the reservoir, a dry layer of black residue indicates the old waterline. Two pipes, covered with orange rust, are connected to the engine room, which pumped water from the inground reservoir to the elevated one. This rust serves as a tangible reminder of the passage of time, bearing witness to both periods of operation and abandonment.

Analysis: Acoustic Archaeology of Modern Ruins

The method of observing and understanding aural architecture is grounded in the aesthetic experience of the listener. Empirical methods, such as architectural surveying and acoustic experimentation, serve to reveal and project the sonic character of



T60	VOL (M3)	H (M)	R (M)	D (M)
22-35	1,121.6	5	8.45	16.9

Figure 4. Quinta Bella's water tower. Left: 3D view. Top right: Front view. Bottom right: Ground level. Wave form IR T60–2″. QR code: Audio of IR.

a space as it is encountered by a listening body. The architectural survey examines the morphological characteristics of the space: its entire form is measured and translated into plans and 3D models. This geometric information functions as a framework for interpreting acoustic behaviour. Drawing on techniques from both acoustic engineering and artistic practice, acoustic experiments activate the space either through acoustic or electronic means, and the space's sonic responses are documented as field recordings. These recordings are evidence of how the space performs for a body present within it (fig. 7).

The study involved fieldwork conducted by the authors: two researchers with backgrounds in architecture and sound studies. This work was carried out between 2021

Figure 5. Satellite view of Quinta Bella's water infrastructure, photography dated May 21, 2024, Google Earth.

and 2022, under conditions of attentive listening. No external participants were recruited. As a practice grounded in situated knowledge, the body of the researcher is the site where acoustic information becomes experiential. The distinction between observer and observed collapses here by methodological design. What is documented is what these specific bodies, in these specific encounters, were able to apprehend and render legible. The sound information was collected in the water tower (fig. 8) and the inground reservoir (fig. 9). Readings were taken in both reservoirs and at the base of the tower.

The specific method of activating space involved obtaining impulse response, frequency sweep, and resonant frequencies from the spaces. These were recorded with a RODE hypercardioid microphone, a LOM geophone, a H2D Aquarian Audio contact microphone, and an X/Y Zoom H6 stereo microphone. For electroacoustic activation, we used a 2.1 audio configuration, using a 10″ Wharfedale WH-S10E subwoofer and two 5″ ESI active studio monitors.

Additionally, a group of specialists from the Sound Department of the Faculty of Arts at the University of Chile, including Gonzalo Gaete Di Egidio, Michael Useche, Nicolas Jara, and Carla Badani conducted a study of the natural frequencies in the inground reservoir using a Sonometer Larson Davis LXT sound level meter (Type 1). The studies were carried out using Odeon and Adobe Audition software.

This acoustic study of impulse response enabled the visualisation of the temporal sound flow caused by the molecular vibration of air in the form of reverberation (Table 1). The movement of this fluid, which has direction, rhythm, speed, and density, allowed us to observe the propagation of the space's voice, revealing its acoustic

Figure 6. Interior of the water reservoir. Top right photo by the authors, 2022.

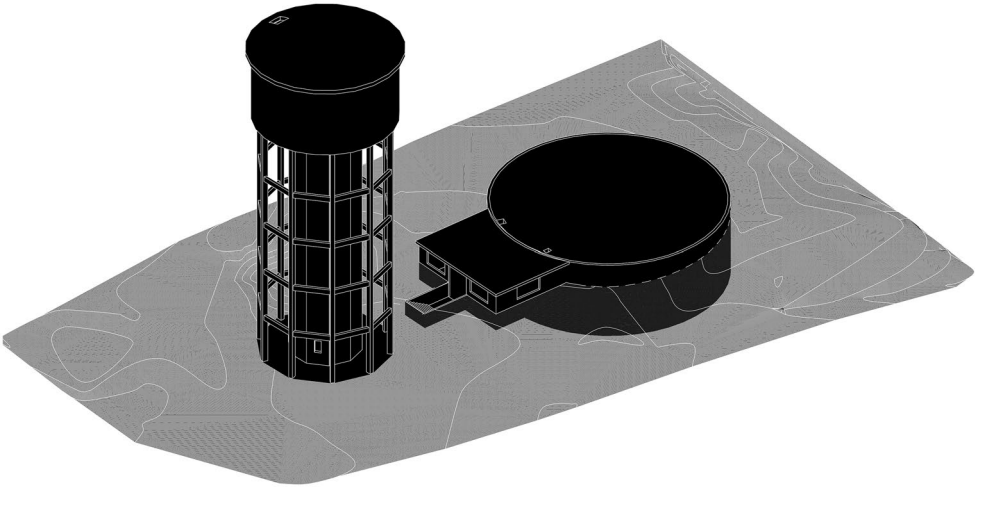


Figure 7. 3D model of the Quinta Bella water tower and reservoir.

character. Figure 10 illustrates the differences in the three spaces through the waveform and spectrogram of the impulse response. The inground reservoir produced an average reverberation time of 26 seconds, with a decreasing fluttering effect repeating

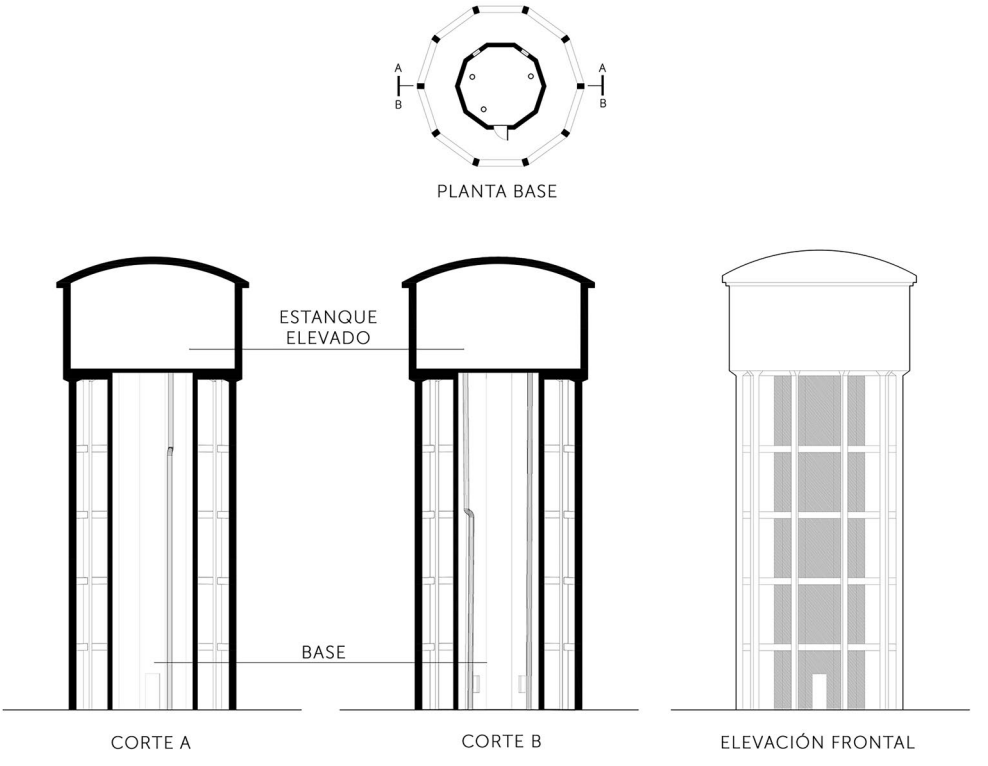


Figure 8. Plans of the Quinta Bella water tower.

three times before decaying. The elevated reservoir exhibited 15 seconds of reverberation and a more pronounced flutter, with five repetitions. Both cylindrical spaces concentrate sound reflections in ways determined by their dimensions: the smaller elevated reservoir allows sound waves to reflect more frequently due to the shorter distances travelled. At the base of the water tower, the reverberation time measured 10 seconds and produced not a flutter but a distinct echo; a consequence of the 20 m floor-to-ceiling height exceeding the 17 m threshold typically required for an echo to occur.

By comparing these three spaces, we can identify a unique and characteristic voice for each. These voices act upon the listening body, generating experiences that are multidimensional, essentially subjective, and constitutive of a situated knowledge that cannot be separated from the specific conditions of each encounter.[18] They carry the historical weight of spaces that were functional for decades but never inhabited by humans. This condition of acoustic presence emerging from absence renders them significant as aesthetic material. In Deleuze and Guattari's terms, this acoustic condition enacts a process of deterritorialisation:[19] these three water infrastructures, liberated from their functional purpose, become instead fields of intensities—spaces produced sensorially and subjectively within the body of the listener. Each of these three spaces enacts this condition in a distinct and unrepeatable way.

At the base of the tower, the sounds of the street are palpable. External sounds enter the space and are filtered by its acoustics, processed as if through an effects pedal: the urban soundscape is absorbed, coloured, and returned with the tower's own sonic signature. The dominant feature, however, is the echo: a precise repetition

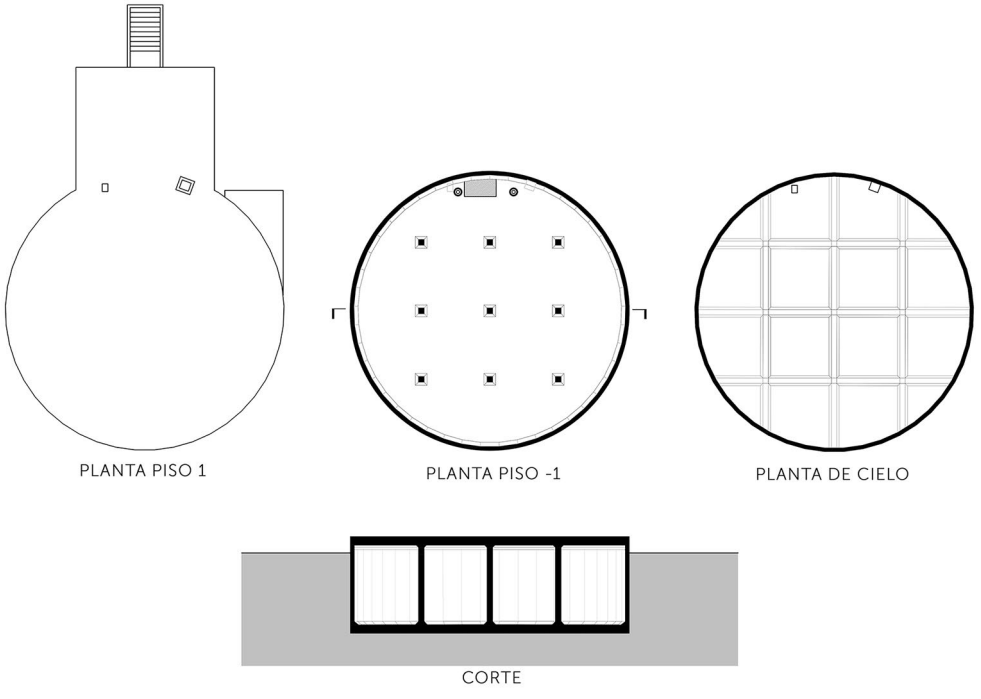


Figure 9. Plans of the Quinta Bella reservoir.

Table 1. Reverberation time (T60).

Spaces	Time (s)	Vol (m^3)	H (m)	L (m)	W (m)
Water tower	10–13	348.5	20	4.87	4.63
Inground reservoir	22–35	1,122	5		16.9
Elevated (high) reservoir	15	393	5		10

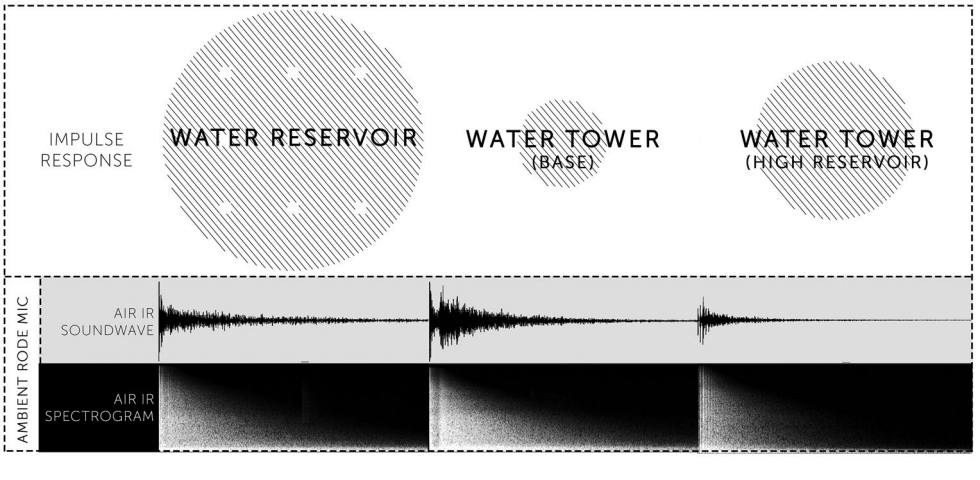


Figure 10. Impulse response.

of every sound produced within the space, descending from 20 m above. This echo functions as a second presence—the space itself responding with its own voice to any sound emitted. LaBelle explores sound and architecture as an aesthetic project directly intertwined with spatial experience and imagination, where sound contributes an aspect of performance to architecture.[20] Within this framework, the echo does not only reflect sound—it performs it, animating the staticity of the abandoned structure through its own acoustic expression, and opening, as LaBelle argues, an ambiguous gap between sound and architecture where sound art becomes possible as a cultural practice that broadens the possibilities of spatial production. The verticality of the tower is not only visible but audible: the height of the ceiling can be read through sound alone, establishing a sonic connection with a dimension of the space that exceeds normal bodily perception. This quality of a space that "performs" renders the water tower significant as an aesthetic experience.

The elevated reservoir, accessed by climbing to a height of 20 m above the neighbourhood, offers a third and distinct condition. Its position makes it a receiver of the city. The space functions as a giant microphone, gathering the sounds of the neighbourhood from above. Inside, the combination of cylindrical walls and a double-curved vaulted ceiling produces a singular acoustic effect. When positioned at the centre, the listener experiences an intensified concentration of concentric reflections from both the walls and the vault simultaneously, as if the space transforms into a sonic helmet, enveloping the head in layered sound. This unrepeatable condition renders the elevated reservoir irreducible as aesthetic material—a sonic experience that can only be lived from within.

The inground reservoir produces the most immersive and corporeally overwhelming condition. Its prolonged bass reverberation generates a perceptual expansion of the space; the cylindrical form concentrates concentric reflections that can be physically felt travelling through the body, and the duration of the sound creates the sensation of a space with larger dimensions. According to Merleau-Ponty, perception enacts lived experience as inseparable from bodily existence:[21] perception here is an active, full-body encounter with the material properties of sound. For the researchers, this produced a simultaneous experience of unease and aesthetic stimulation; the deep, slow decay evoking desolation and enclosure, while the perceptible movement and directionality of the reflections revealed sound as a plastic, navigable material. What Blesser and Salter identify as auditory spatial awareness—the active capacity to detect and respond to spatial acoustics as a multidimensional experience[22]—emerges as an aesthetic practice that encompasses physical and phenomenological dimensions simultaneously. The reservoir does not merely contain sound—it shapes, extends, and returns it, constructing an acoustic volume that exceeds its physical dimensions and imposing that awareness upon the body of the listener. It is this quality of sound as something felt, navigated, and inhabited rather than merely heard, that constitutes the aesthetic raw material of acoustic embodiment, the process by which the body becomes the medium through which sonic information is felt, interpreted, and signified.

The reservoir was designed to hold water, not to be inhabited. Its interior was inaccessible during its entire operational life, present as infrastructure but absent as experience. The reverberation encountered today is therefore the acoustic condition

of emptiness: a sonic character that became possible only now that the water is gone. This encounter constitutes a form of situated knowledge:[23] essentially subjective and multidimensional, arising from aesthetic practice. It is a dynamic process, involving aural architecture as a symbiotic creation between the acoustic activation as aesthetic action and the creative perception of the listener, who not only perceives but actively contributes to the creation of the subject and the work.[24] For the residents of Quinta Bella, this structure has been a physical and symbolic landmark for generations, yet entirely inaccessible as interior experience. Its acoustic world existed in complete isolation from the community it served. What the listening body encounters inside is therefore the sound of a hidden interiority—the acoustic dimension of a landmark that defined the character of the neighbourhood from the outside, now finally accessible through the act of listening.

The inground reservoir alone was mapped within a cartography of space as aesthetic exploration through sound, collecting samples at ten different positions to investigate how the cylindrical geometry distributes and concentrates acoustic energy (figs 11 and 12). This mapping uncovered distinct sonic conditions, a different facet of the reservoir's voice. Analysis revealed that sound waves projected perpendicularly onto the wall surfaces, reflecting at varying angles depending on the source position.

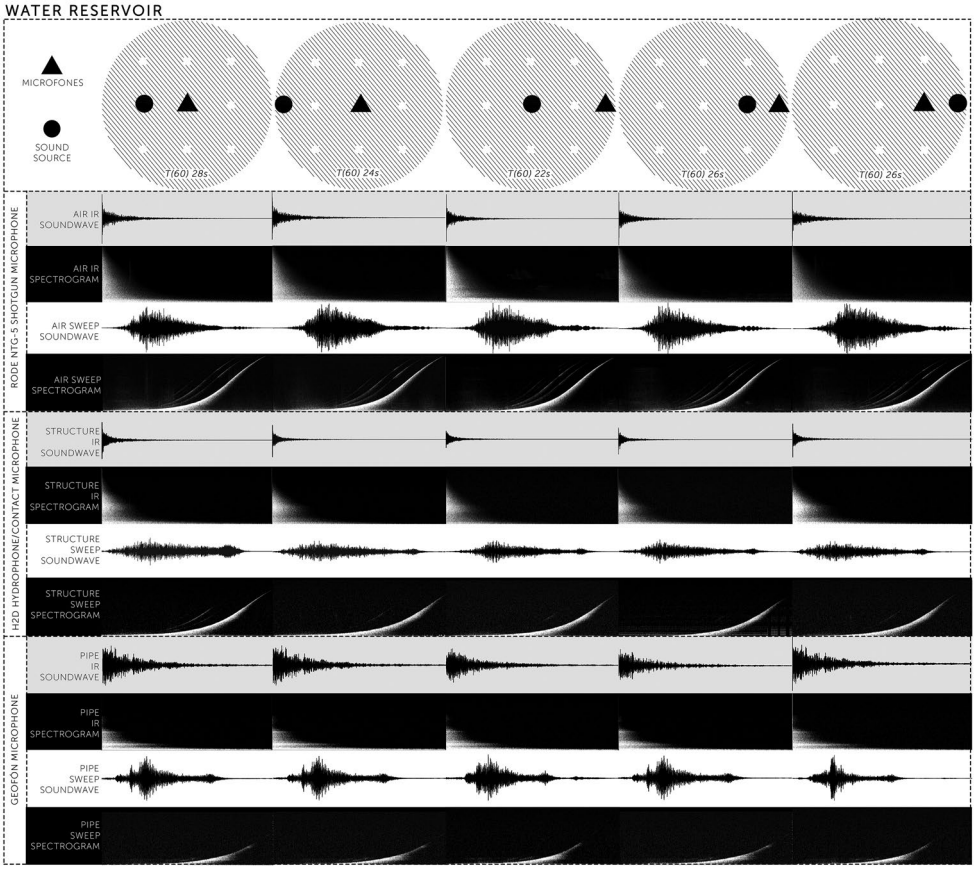


Figure 11. Water reservoir impulse response and frequency sweep, part 1.

The most remarkable discovery was the half-radius condition: when both source and microphone were located at r/2, sound waves emitted from that position concentrate simultaneously at the mirrored r/2 point, producing a reverberation time of 35 seconds, the longest recorded in the study. This is an acoustic phenomenon with direct aesthetic implications: a precise location within the space where sound accumulates to an overwhelming degree, where the voice of the reservoir reaches its maximum intensity.

Access to the inground reservoir is gained directly from the outside, and upon crossing the access hatch, one immediately perceives the density of its acoustic voice. Governed by a deep bass reverberation, speech becomes largely unintelligible throughout most of the space. However, at its very centre stands a column, and when one stands close to it, the voice becomes strikingly clear—as if cleansed. Reflections from the centre towards the periphery appear to converge back at the core, creating the sensation that all sound returns to the speaker, amplifying the original signal and sustaining it, reverberating both within the space and within the body, as if sound were trespassing the body itself. This condition is described by Voegelin as the experience of sound as temporal relationship: not a relationship between things, but sound itself as *the thing*—"what I perceive is what I hear."[25] At the centre of the reservoir, the distance between subject and sound collapses, reaching its maximum expression: the body can no longer distinguish whether the sound originates from within or without.

The perimeter of the reservoir offers a contrasting and equally remarkable condition. Where the centre produces an intensely individual experience, the perimeter opens a relational one. When standing anywhere along the circular edge, sounds originating from distant points along the perimeter remain perfectly audible, almost as if transmitted through a telephone line. Despite the considerable distance of nearly 17 m, whispers and soft speech travel along the curvature of the walls directly to the listener's ears. As Ouzounian argues, space and embodiment constitute one another through sound, and in this situated and embodied experience, sounds contribute to the perception of the body in relation to itself and other entities—social, physical, or imagined—forming intricate and unpredictable spatial networks.[26] The curved wall becomes a medium that connects bodies across space, transforming the reservoir into a site of acoustic intimacy between distant presences.

In collaboration with the Sound Department of the Faculty of Arts at the University of Chile, an acoustic study was conducted to investigate the natural frequencies of the reservoir. The study identified resonant frequencies ranging from 24 Hz to 49 Hz. The experiment utilised the frequency sweep method and pure frequencies. The results illustrate sound as a mass that uniquely occupies the space at each frequency, visualising the standing waves produced by the resonant frequencies, thus demonstrating its physical presence. Figure 13 illustrates how the space responds to thirteen resonant frequencies using three different types of visualisation arranged in three columns: the first illustrates acoustic pressure zones where antinodes (points of maximum displacement) are situated, with grey indicating crests and black indicating valleys. The second column identifies silent zones between areas of higher acoustic pressure, where the nodes (points of no displacement) are situated. The third column represents the architectural layout that shapes these nodes and antinodes, representing

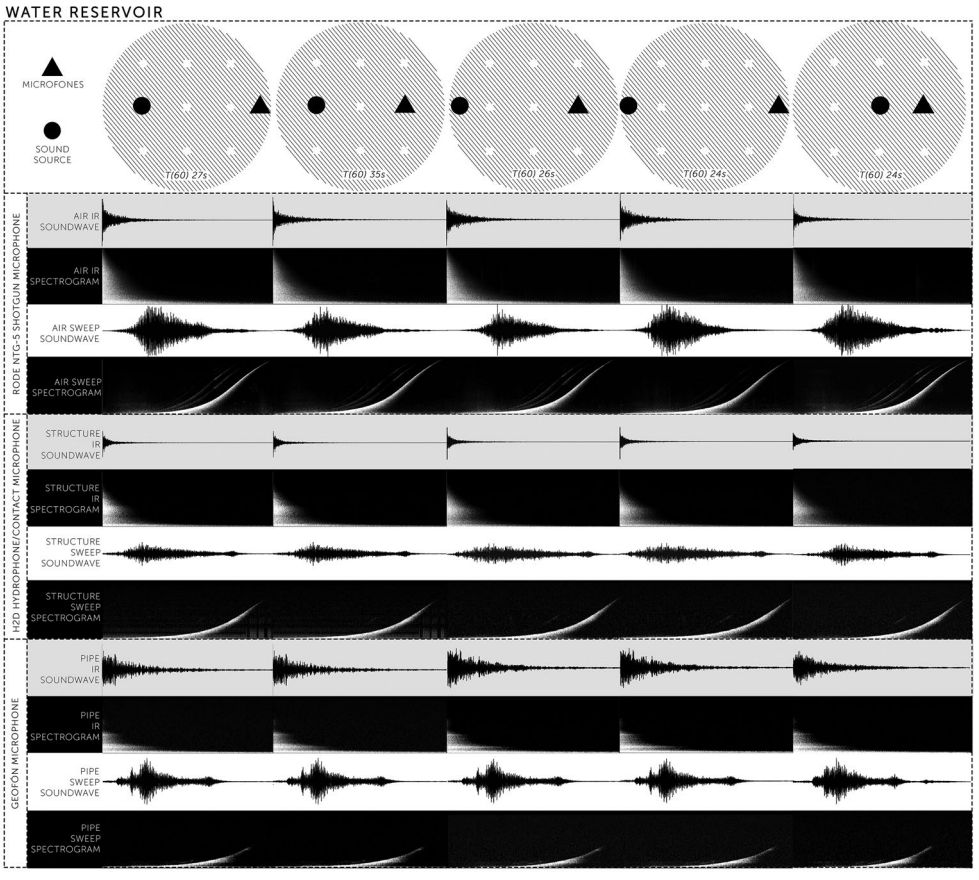


Figure 12. Water reservoir impulse response and frequency sweep, part 2.

the invisible yet perceptible spatial arrangement they produce through "architectures of silence."

The acoustic study reveals distinct "architectural forms" corresponding to the patterns that standing waves create across the space when exposed to the resonant frequencies of the space. As the frequency increases, these resonances create overlapping "sonic structures." At 24.871 Hz, the silent zone takes the shape of a cylinder; at 27.291 Hz, an asterisk; and at 34.475 Hz, a circular plane. These shapes intersect at 42.395 Hz and 43.861 Hz: the former combining a plane with a cylinder, and the latter a plane with an asterisk. The plane recurs in several instances, often overlapping with other shapes. In addition to the circle, plane, and asterisk, a simple wall was also observed spanning from side to side. The asterisk expands its vertices as the frequency increases. These aural architectures are perceptible within the space through the acoustic delineation of its walls of silence, evoking a fluctuating sense of volume and spatial perception across different resonant frequencies.

An interesting comparison can be drawn with Chladni figures, suggesting that the plates used in the experiment are analogous to space, transforming the two-dimensional behaviour of resonant frequencies into a three-dimensional one. Chladni plates are used to visualise the modes of vibration on a flat surface.[27] When a plate with sand

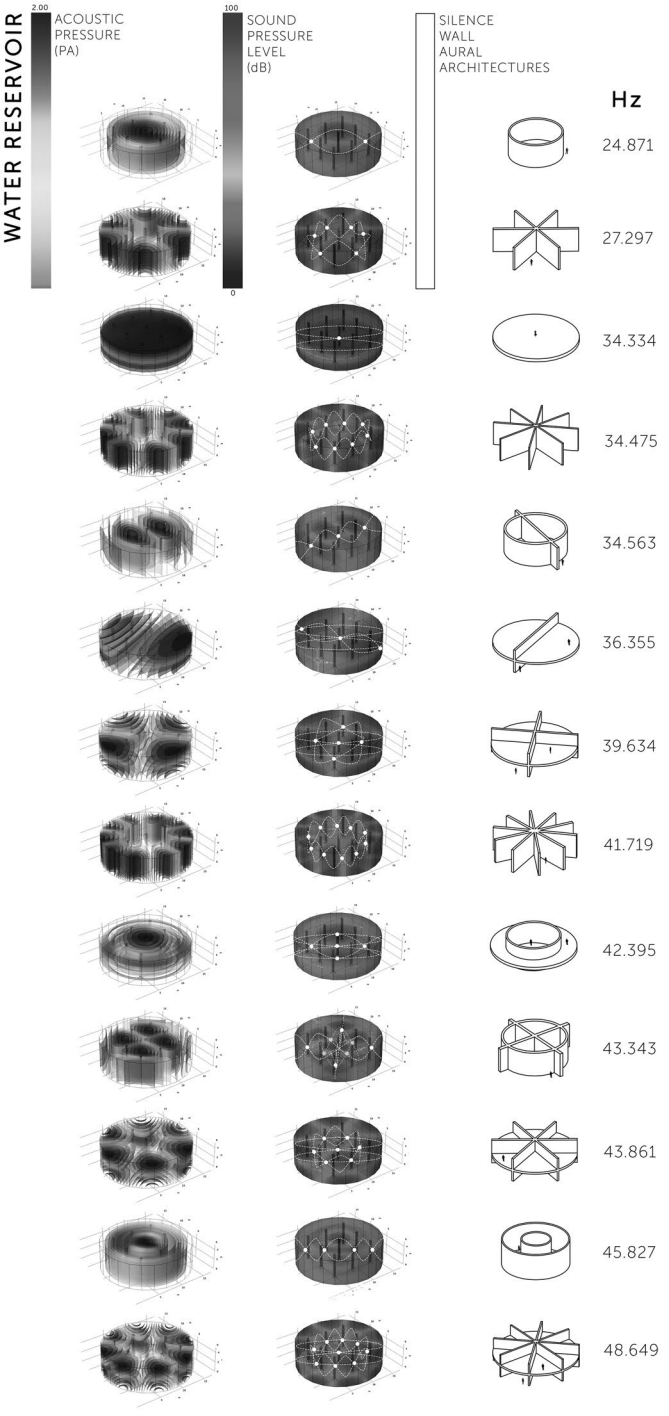


Figure 13. Resonant frequencies study and aural architecture representation.

on its surface vibrates, it forms distinct standing wave patterns where the sand accumulates at nodal lines, creating diverse figures that illustrate the forms of vibration (fig. 14).

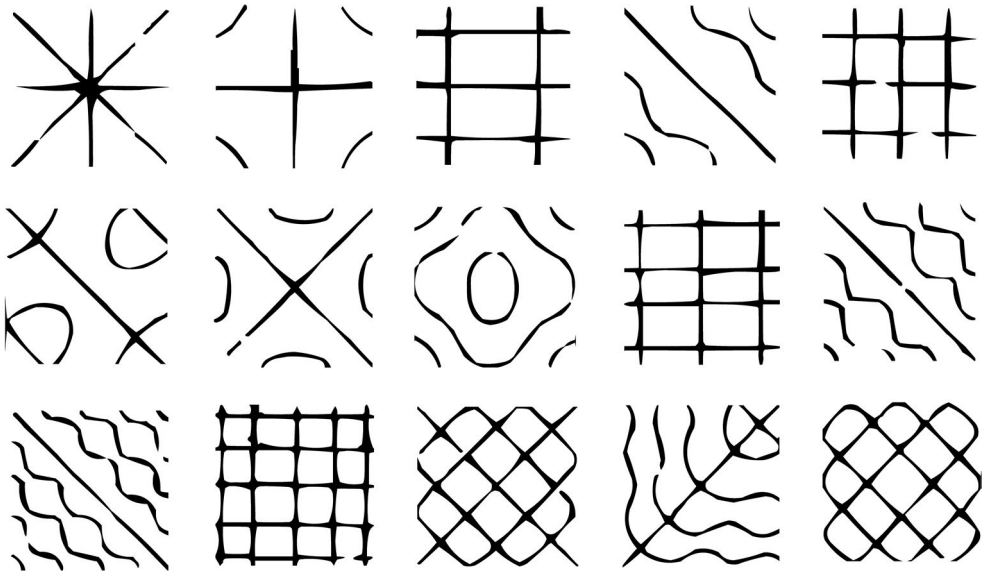


Figure 14. Chladni figures.

Similarly, the water reservoir displays its own vibrational patterns, represented in fig. 14 as a three-dimensional Chladni plate. Each resonant frequency corresponds to a distinct mode of vibration, producing a specific aural architecture—much like the varying patterns formed on a Chladni plate visually express resonance and harmonic structure. Within the space, these resonant frequencies manifest as standing waves, fixing themselves in place and forming a map of nodes (zones of silence) and antinodes (zones of high acoustic pressure). This creates a haptic map—an invisible architecture composed of sound and silence. These 3D vibrational patterns remain suspended in space, forming a sonic structure that, while immaterial, behaves like a living organism—an organic acoustic body that inhabits and reshapes the physical space, generating a dematerialised architecture of sound. Architectures of silence can only be encountered bodily, by moving through the space until the shift between node and antinode becomes perceptible as a physical sensation. In Morton's terms, this acoustic body is an entity that cannot be perceived in its totality: it exists independently of any listener, phasing in and out of human perception only when the conditions for encounter are deliberately constructed.[28]

The inground reservoir has a dominant resonant frequency at 30 Hz, which, within the audible spectrum, lies at the very low end, rendering the space perceptibly haptic. Morphologically, this means the sound waves are physically large, and perceptually, one can sense how nodes and antinodes radiate outward from specific points. As one moves through the space, it becomes clear when one passes through these standing waves—encountering zones of intense sound and vibration, next to zones of complete silence. It becomes possible to navigate the space by traversing these aural architectures, forming a mental map of the material presence of sound waves.

Aural Architecture as an Exploratory Practice (of Modern Ruins)

> Sound, as the result of a series of material frictions or vibrations, arises from a given object or body to propagate and leave behind the original source—it brings the original source from there to here. This movement grants the feeling of a progression; the temporality of sound, in vectorizing the image, does so by always leaving behind its origin to enliven sense of place with continual animation.[29]

Propagation effects such as echo, reverberation, or resonance are temporal dynamics that occur within sound displacement. As LaBelle states, "the echo exaggerates the passing sound, staging it as a performance."[30] He argues that acoustics are the performative condition of space, rendering sound as a dimensional spatial object with a reverberating presence. In this regard, the staticity of architecture becomes animated, and industrial spaces abandoned by "progress" are brought back to life through their own acoustic expressions. This sonic transformation of space collapses the distance between past and future, turning the chronology of sound into a spatial dimension. The modern ruins of the future are the abandoned monumental acoustics of the present—spaces evoking an industrial heyday and a subsequent decline. Aural architecture witnesses the decomposition processes of the capital machine and their transformation into residual urban matter. These processes operate at scales that exceed human planning, unfolding across timescales that are not directly legible to the senses: their entropic cycles neither begin nor end within the span of human experience, yet their acoustic traces remain perceptible, available to a listening body that can apprehend them as fragments of totality—echoing Timothy Morton's notion of "phasing loops," which describes fourth-dimensional entities (such as global warming) that fluctuate in and out of phase with human temporality.[31] Aural architecture utilises aesthetic experience to detect such traces that lie beyond the limits of human perception.

The acoustics of space serves as an exploratory tool that captures the reverberant dynamics of modern ruins. These spaces become an enlarged instrument envelope, an inhabitable resonant chamber of performative force. The echoic potential of these spaces constitutes an aesthetic experience in permanent availability—present whenever a listening body enters into relation with it. This animating dimension of reverberation suggests a voice that returns sonorous energy through acoustics as a filtered answer, an auditory mirror that speaks back with a voice of its own. If sound is emitted, the acoustic space will augment it beyond human proportions. In this regard, human expression mixes with a non-human voice to produce something new in an aesthetic collaboration.

Conclusion

Aural architecture is a practice grounded in listening, subject to our exploratory aural skills—in this case, employed to investigate modern ruins. These ruins are the remnants of industrial structures, abandoned as residual artefacts of capital-driven cycles. The production systems inherent in industrialisation or extractivist models are

ephemeral processes with limited futures due to ecological devastation, social degradation, or shifts in the global economy. These industrial monuments, once erected by humans, transcend human existence and projections, becoming obsolete and entering a process of decomposition. While listening to their acoustics, we can propose innovative ways to interpret those decomposition processes. Acoustic heritage serves not only as a medium for exploring the aural properties of forgotten industrial architectures, but also as a form of critical knowledge: a situated, embodied diagnosis of entropic processes that exceed the scale of human perception, legible only through the traces they leave in matter and in sound. Modern ruins can be understood as evidence of this temporal disjunction, and the collection of their acoustic heritage serves as a form of denunciation of these entropic processes. The aesthetic practice of listening to the voice of industrial spaces is the knowledge this research explores. That knowledge, grounded in the body and in the encounter with absence, carries a critical force: it makes perceptible what capital leaves behind, and what time, operating at scales beyond human measure, continues to transform—and in doing so, makes legible processes whose consequences, ecological and social, are already underway.

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Notes

1. Barry Blesser and Linda-Ruth Salter, *Spaces Speak, Are You Listening? Experiencing Aural Architecture* (MIT Press, 2009).
2. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (University of Minnesota Press, 2005).
3. Deleuze and Guattari, *A Thousand Plateaus*.
4. Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (1988): 575–99.
5. Blesser and Salter, *Spaces Speak*.
6. Robert Smithson, "The Monuments of Passaic," *Artforum* 6, no. 4 (1967): 48–51.
7. Francesco Careri, *Walkscapes: el andar como práctica estética* (Gustavo Gili, 2002).
8. Careri, *Walkscapes*.
9. Timothy Morton, *Dark Ecology: For a Logic of Future Coexistence* (Columbia University Press, 2016).
10. Edwin van der Heide, "The Audience Inside the Instrument," in *Site of Sound #2: Of Architecture and the Ear*, eds. Brandon LaBelle and Claudia Martinho (Errant Bodies Press, 2011), 283.
11. Raviv Ganchrow, "Hear and There: Notes on the Materiality of Sound," *OASE* 78 (2009): 70–81.
12. Raviv Ganchrow, "Crescents," in *Site of Sound #2: Of Architecture and the Ear*, eds. Brandon LaBelle and Claudia Martinho (Errant Bodies Press, 2011), 289–98.
13. Paul Devereux, Robert G. Jahn, and Michael Ibison, "Acoustical Resonances of Assorted Ancient Structures," *Journal of the Acoustical Society of America* 99, no. 2 (1995): 649–58.
14. Aaron Watson and David Keating, "Architecture and Sound: An Acoustic Analysis of Megalithic Monuments in Prehistoric Britain," *Antiquity* 73, no. 281 (1999): 325–36.
15. Maricela Garza et al., "Arqueoacústica Maya: La necesidad del estudio sistemático de efectos acústicos en sitios arqueológicos," *Arqueología Mexicana* 92 (2008): 675.
16. Walter Gershon, "Vibrational Affect: Sound Theory and Practice in Qualitative Research," *Cultural Studies ↔ Critical Methodologies* 13, no. 4 (2013): 1–6, https://doi.org/10.1177/1532708613488067.
17. Jorge I. Vielma-Cabruja, Inés González-Viso, and F. Corvalán-Tapia, "Arquitecturas inusuales: experiencias 'otras' en la arquitectura y urbanismo, Santiago de Chile (1950–2020)," *Arquitecturas del Sur,* 41, no. 64 (2023): 68–91.
18. Haraway, "Situated Knowledges."
19. Deleuze and Guattari, *A Thousand Plateaus*.
20. Brandon LaBelle, *Acoustic Territories: Sound Culture and Everyday Life* (Continuum, 2010).
21. Maurice Merleau-Ponty, *Phenomenology of Perception* (Routledge, 2012).
22. Blesser and Salter, *Spaces Speak*.
23. Haraway, "Situated Knowledges."
24. Salomé Voegelin, *Listening to Noise and Silence: Towards a Philosophy of Sound Art* (Continuum, 2010).
25. Voegelin, *Listening to Noise and Silence*, 5.
26. Gascia Ouzounian, "Embodied Sound: Aural Architectures and the Body," *Contemporary Music Review* 25, nos 1/2 (2006): 69–79.
27. A. Ashton, "Armonógrafo," in *Quadrivium*, ed. J. Martineau (Librero, 2015).
28. Morton, *Dark Ecology*.
29. LaBelle, *Acoustic Territories*, 6.
30. LaBelle, *Acoustic Territories*, 7.
31. Morton, *Dark Ecology*.