

SIGHT *of* SOUND

Designing for the Senses

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By Kate Shepherd

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I would like to thank; my mum and dad for their never ending love and support, both financially and emotionally. For never letting me settle for something I would not be proud of. To Brad for being my rock and my welcome refuge. And to Phillippe for his guidance and encouragement. This would not be possible without each and everyone's help over the years.

0.1 Abstract:

It has been agreed that one of Interior Architecture's primary roles is to create atmosphere. This is generally achieved by engaging the senses in specific spatial conditions that shift the emotions and create moods. This view of interior is more particularly relevant to the needs of inhabitants/ users with sensory impairment. The intention within this thesis is for individuals with hearing and sight impairment to experience space/ interiors, with at least the same, wholeness as those with the capacity of full range of sense.

Pallasmaa states that "it is evident that 'life-enhancing' architecture has to address all of the senses simultaneously" (Pallasmaa (C) 11). It has been suggested that if a sense is taken away there is a higher importance placed on the remaining senses. Early research has indicated that people, specifically children with sight impairment "perceive the built environment very differently and pay more attention to tactile, haptic, auditory and olfactory aspects" compared to a person with full sensory abilities (Vermeersch et al. 1). Engagement with all possible senses allows a connection with space and orientation within architecture. It is this engagement with surroundings which "is a key component of happiness" (Fox, "Emotion Science"). This helps to achieve the independence that is desired among the sensory impaired. "A dialogue between architects and people with visual impairment can therefore contribute to a more multi-sensory design approach to architecture" (Vermeersch et al. 1).

While specific senses engage with mood to stimulate a learning experience for those with hearing and sight impairment, this design research demonstrates how the play of light and water can be used as a tool in creating specific atmospheres. These in turn influence moods in creation of interiors for multisensory experience. Henry Plummer's light categories are the basis for which this research invents categories of sound. It is also proposed as a tool for interior designers to think about space for people with sensory impairment and to design with specific guidance. This invention will be tested by applying a program, Gallery of the Senses, to a Wellington site.

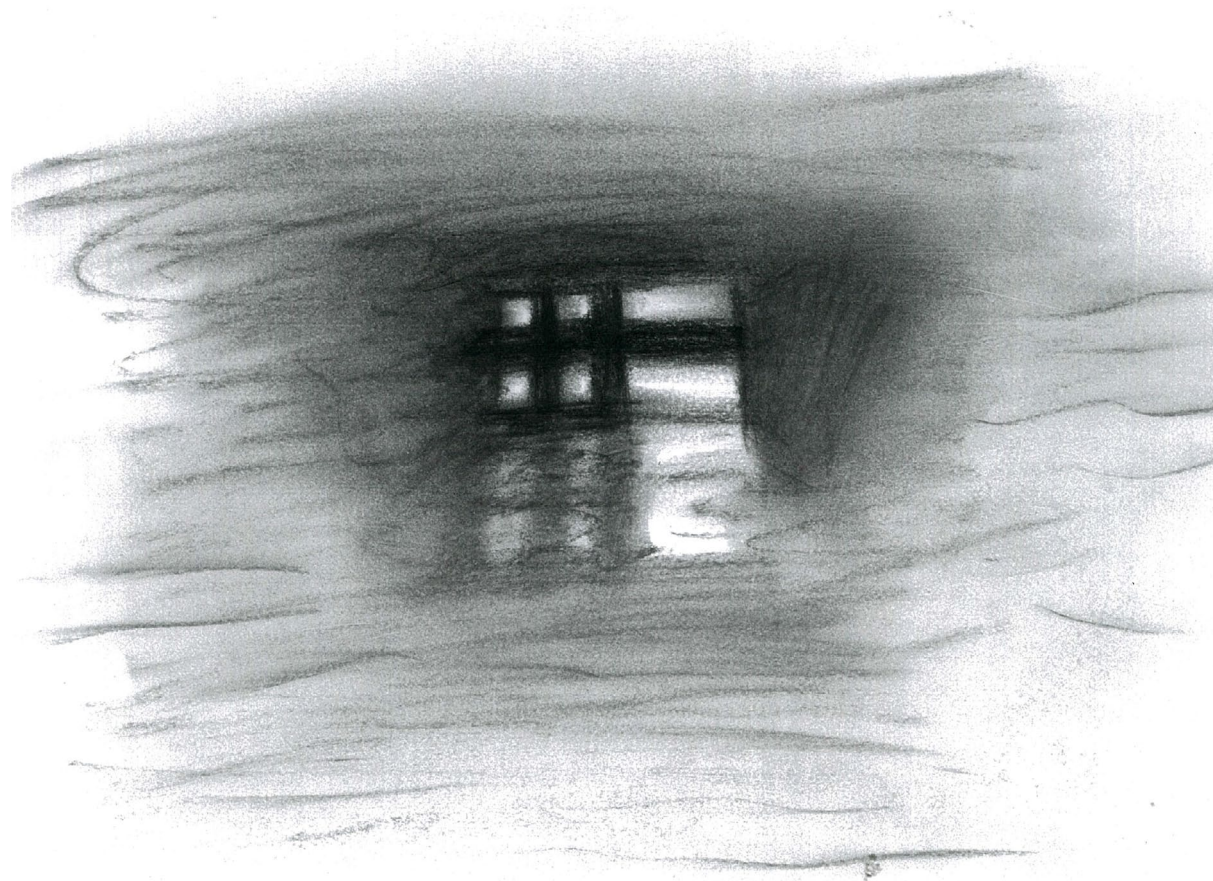


Figure 1: Drawing of interpretation of light and water

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0.3 Introduction:

The author proposes that the discipline of interior architecture/design has the opportunity to lead in the domain of sensory engaging space. It is hoped that this design led research will provide a strategy for designing for the senses, allowing those without the full range of sensory the ability to engage with space.

In the context of a contemporary practice of architecture largely focused on the visual propriety, this thesis offers a specific strategy of multisensory focused design. While this is offered as a general stance, the particular case of creativity spaces for people with visual and/or hearing impairment is here tested.

The first chapter discusses the background of knowledge required for this proposition. It briefly looks at the human psychology of wellbeing. It provides a stance on the un-defined idea of atmosphere and continues to explore the idea of the sense and consequently sensory impairment. Following a look at precedents and case studies.

Chapter two explores the light categories of Henry Plummer. It also looks at the author's creation of sound categories that are developed from Plummer's work. These categories are a celebration of sound imagery and overall mood atmospheres.

The third chapter uses mapping, imagery and diagrams to document and explore the qualities of the chosen site for the design, Circa Theatre.

Chapter four explores initial program response for the design. It explores sound zoning and diagrams. Explorations into case studies begin to shape the design and concepts and developments of program are completed. An initial design response is generated.

The fifth chapter explores a second design iteration. Looking at senses more closely and a more developed design is generated.

The sixth chapter shows further design development and a final proposition is produced. Reflection and conclusions are made.

It is hypothesized that the developed design strategy will provide an imaginable and viable solution strategy to designing for sensory engagement for those with a sensory impairment.

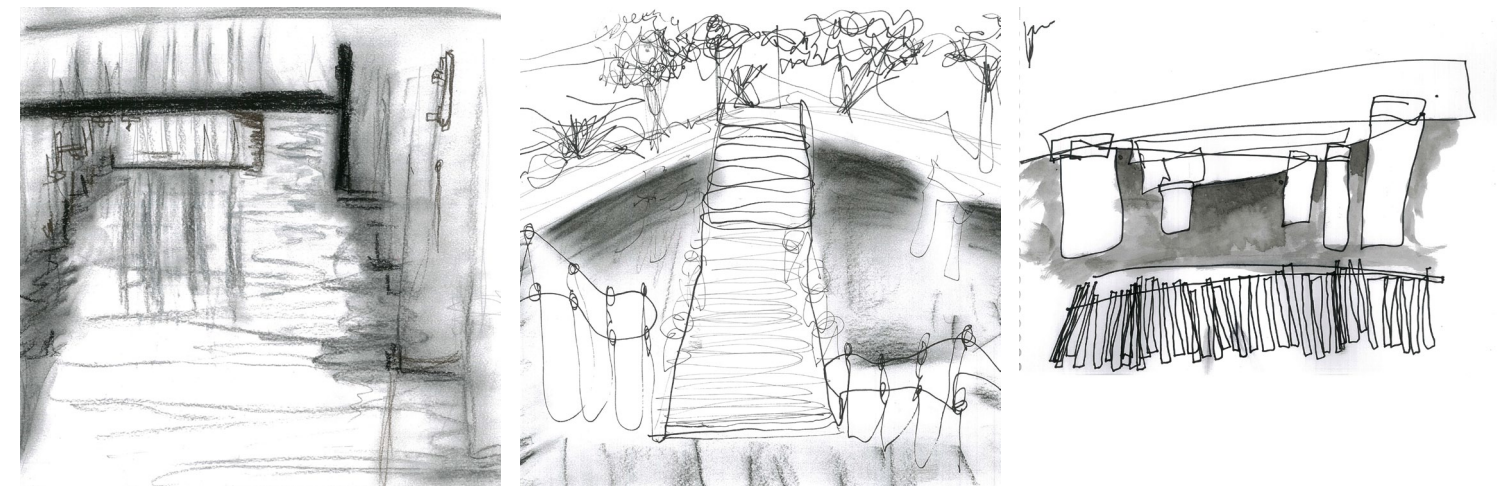


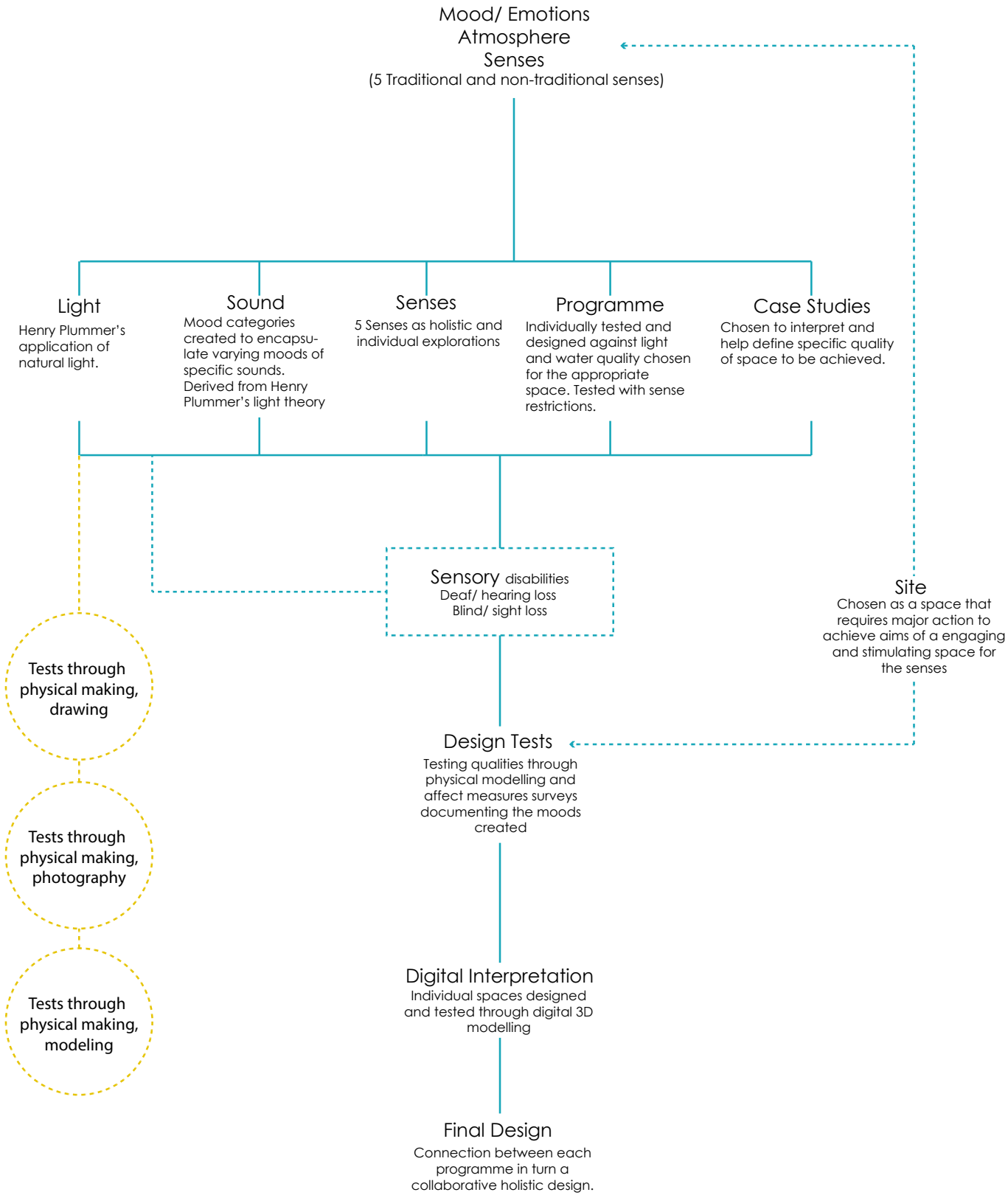
Figure 2: Drawing set showing mood created by light and water at the wellington waterfront

0.4 Thesis Structure:

In order to achieve a cohesive design that utilises water and light together to stimulate the senses and shift the mood of the individual, allowing those with sensory impairment the opportunity to be engaged with interiors, a number of methods will be utilised.

This method is outlined in the following diagram showing the considerations undergone for this design led project. Throughout the research, drawing, photography and maquette making will be employed to illustrate text and test findings.

0.5 Methodology:



1

Part

1.0 The conscious experience:

Some definitions:

Emotions are established as any brief "mental experience with high intensity and high hedonic content" of pleasure or displeasure (Cabanac 69). The way in which "several different subsystems are coordinated in order to produce an adaptive reaction" to "evaluate or appraise the significance of the events around us determines the type of emotion that is required" (Fox 8, 23).

This varies from mood which is defined as "'states of emotion' that tend to become frequent or even continuous over long periods of time" (Fox 53). Whereas temperament is defined as "dispositions to react in certain ways to a variety of stimulations" in relation to "particular neural circuits in the brain" (Fox 53). Personality must also be considered in this discussion. Personality "characteristics can have a profound influence on affective experiences, especially as a factor in determining emotional reactivity as well as influencing regulatory processes" (Fox 56).

"Emotions are at the heart of what it means to be human" (Fox XV). They play an important role in accessing situations and are the driver of everyday life. How we process the information around us "can determine our general happiness* and well-being" (Fox 19). This may be even more accurate in individuals with disabilities as 'Designing for the handicapped' states "the environment can exacerbate or deter the development of mental, physical and physiological health in the individual" (Bayes and Francklin 4). Cognitive appraisals "are evaluations of the relations between the self and environment" (Fox 8). These appraisals are exercised through the use of sensory engagement. "Since each sense contributes a slightly different perception of the world, the more senses involved in a particular experience, the fuller, the rounder, the experience becomes" (Heschong 29). The senses are required in order to detect the important information within our surroundings. "The determination of what is relevant or salient or what has value is... crucial to this process and... many aspects of selective attention do seem to be influenced by the affective significance of sensory events" (Fox 165). "Interest overlaps to a considerable extent with 'curiosity', 'wonder' and 'intrinsic motivation'" (Fox 332). This induces an urge to engage and explore the environment. It is this engagement with ones surrounds that "is a key component of happiness" (Fox 332). In fact Fox states that

"the happiest of people are those who orient their life around the pursuit of all three: positive affect, engagement and meaning" (Fox 320).

*Happiness although not fully defined within this thesis is used here as a synonym as a way to describe a state of wellbeing.



Figure 3: Interplay of light and water at wellington waterfront

"Light that is not seen with the eyes can be felt. Lights psychological effects can lead to extremes of feeling with direct repercussions."
(Holl 112)

1.1 Atmosphere:

Atmosphere is a difficult concept to define.

Mark Wigley in 'The Architecture of Atmosphere' describes atmosphere as, "some kind of sensuous emission of sound, light, heat, smell and moisture; a swirling climate of intangible effects generated by a stationary object" (Wigley 18). He goes on to state that "atmosphere might even be the central objective of the architect", yet this is so often neglected within interiors (Wigley 18). Arguably for a space to be wholly engaging it must create atmosphere.

"Whether people are fully conscious of it or not, they actually derive countenance and sustenance from the 'atmosphere' of things they live in or with" claims Frank Lloyd Wright (qtd. in Wigley 19). This raises the importance of atmosphere and human well-being, highlighting the devastating effects that abandoning these elements could cause. People do not desire to linger in the majority of the spaces they spend their days in, but exist within them through necessity.

"...We need more from architecture than physical contentment. We expect our building to be emotionally satisfying: to appear alive rather than dead; to take hold of our affections with moods that resonate with what we wish to feel inside; to keep us in touch with the flow of nature; and to empower us to make spaces our own by activating our preconceptions and dreams" (Plummer 6).

In the book 'Atmospheres', Zumthor attempts to explain, what atmosphere means to him. He endeavours to answer the question of "architectural quality" and how people "design things with such a beautiful, natural presence, things that move me every single time" (Zumthor 11). Within these chapters Zumthor sets out to provide ways in which to achieve this idea of atmosphere and quality.

Zumthor states "the greatest secret of architecture" is that "it collects different things in the world, different materials, and combines them to create a space" (Zumthor 23). This is supported by Wigley who states "architecture

is but a stage set that produces a sensuous atmosphere" (Wigley 20). Zumthor explains how this requires a material compatibility. "Architects are special effects experts" that "look and see how these things reacted together" so that the "material composition gives rise to something unique" (Wigley 20; Zumthor 25).

The passage further explains how the lighting of these materials as an important part in constructing a specific atmosphere. "Where and how the light fell. Where the shadows were. And the way the surfaces were dull or sparkled or had their own depth" (Zumthor 57).

Zumthor discusses how "architecture involves movement" (Zumthor 41). He discloses "that means thinking about the way people move in a building" and this becomes a critical idea when dealing with the task of designing a space which can alter the human experience (Zumthor 41). He talks of the "gentler art of seduction, of getting people to let go, to saunter" in order to create a kind of "voyage of discovery" (Zumthor 43).

This research will consider the above ideas on atmosphere, taking into consideration Zumthor's ideas on creating atmosphere, with a focus on sensory engaging spaces for the chosen program.

1.2 Sense:

Architecture, specifically modern architecture, has been largely focused on the sense of vision. It has been argued that this has created sterile environments which 'lack atmosphere'. This is enforced by Pallasmaa who states "the inhumanity of contemporary architecture and cities can be understood as the consequence of the body and the senses, and an imbalance in our sensory system" (Pallasmaa (C) 17-19).

In order for a more enriching experience of architecture to be reinstated a focus on all the senses is required. Pallasmaa notes how sight never truly acts of its own accord. "Vision needs the help of touch", which provides sensations of 'solidity, resistance and protrusion'" (Pallasmaa (C) 42). This is important as "the only way we have of responding to the outside world is on the basis of information received, and operated on, by our sensory systems" (Mueller 2). All of the senses "are selectively receptive to environmental changes" within interior spaces" (Pallasmaa 115). In fact "one of the magical things about our senses is that they do not function in isolation. Each sense contributes to the fuller comprehension of the other sensory information. Indeed, one may not even be able to understand the information from one sense properly until it can be related to information from other senses" (Mueller 24).

All the senses have their own specific qualities and give us different information about our surroundings (Heschong 28). Heschong states how the "most vivid, most powerful experiences are those involving all of the senses at once" (Heschong 29). This is reinforced by Pallasmaa in his essay Architecture of the Seven Senses where he denotes "Every touching experience of architecture is measured equally by the eye, ear, nose, skin, tongue" (Pallasmaa (A) 42).

Sight:

Sight is traditionally considered the most noble of the senses, where "certainty was based on vision and visibility" (Pallasmaa (C) 15). Sight allows us to look at the appearance of an object or a space and make assumptions on the qualities of these items without having to physically be in contact. The "eye invites and stimulates muscular and tactile sensations" (Pallasmaa (C) 26). Vision allows us to access an item's feel, temperature, weight all before we physically touch it. In fact the "sense of sight may incorporate and even reinforce other sense modalities, the unconscious tactile ingredient in vision is particularly important and strongly present in historical architecture" (Pallasmaa (C) 26). However the positive attribute of sight is essentially flawed as its "vulnerable to error" (Pallasmaa (C) 19). And in recent years there is a call to "challenge the hegemony of vision –the ocularcentrism of our culture" (Pallasmaa (C) 17).

Sound:

Sight was not always the dominant sense, "a primordial dominance of hearing has only gradually been replaced by that of vision" (Pallasmaa (C) 24). It is important however to not forget the many qualities of sound. Where "sight isolates... sound incorporates... sound is omni-directional" (Pallasmaa (C) 49). Sound has the ability to help define space. "Hearing structures and articulates the experience and understanding of space" (Pallasmaa (C) 49). Sound does this by measuring space. Hence making the "scale comprehensible" (Pallasmaa (C) 51). "A space is understood and appreciated through its echo as much as through its visual shape" (Pallasmaa (C) 50). In the same way that a sound track to a movie helps to bring a sense of plasticity and "continuity if life" sound creates "an experience of interiority... sound approaches me; the eye reaches but the ear receives" (Pallasmaa (C) 49). In fact Pallasmaa notes the "extraordinary capacity of the ear to carve a volume into a void of darkness. The space traced by the ear in the darkness becomes a cavity sculpted directly in the interior of the mind" (Pallasmaa (C) 50).

The remaining three senses of smell, taste and touch have received much less attention than sight and sound in the design process yet each play an important part in memory and time.

Smell:

The sense of smell is often ignored and rarely reflected within design yet "the most persistent memory of any space is often its smell" (Pallasmaa (C) 54). Smell is linked closely to memory and can evoke many reactions and spark emotions within an individual, whether this is a positive or negative reaction. "A particular smell may make us secretly remember, enter a space that has been completely erased from the retinal memory; the nostrils project a forgotten image and we are enticed to enter a vivid daydream" (Pallasmaa (C) 54). The same way that the scent of pine needles may remind the participant of Christmas, and family. Smell is a developed sense. "We need only eight molecules of substance to trigger an impulse of smell in a nerve ending, and we can detect more than 10,000 different odours" (Pallasmaa (C) 54). This demonstrates how important considered scent can become within interior locations.

Taste:

Taste being the least considered sense within architecture perhaps due to its more challenging application is still crucial within interiors. These limitations can be lessened when an understanding that taste need not solely require a physical contact act. As "certain colours and delicate details evoke oral sensations" the architect can start to utilise this information within design (Pallasmaa (C) 59). The sensation of smell is associated closely with the sensation of taste. Since they work almost simultaneously with each other, they both carry a weight of importance, for the qualities produced singularly and together. This does not mean however that taste doesn't play a significant role in relation to other sense modalities. In fact there is "subtle transference between tactile and taste experiences" (Pallasmaa (C) 59).

Touch:

Touch is considered the "parent of eyes, ears, nose and mouth" (Pallasmaa (C) 11). Without touch, vision lacks sensations of permanence and holding. It is our skin that has the ability to read "texture, weight, density and temperature of matter" (Pallasmaa (A) 45). It is for this reason that tactile sense experiences are of utmost importance to our understanding of space and time. "Berkeley, Hegel claimed that the only sense which can give a sensation of spatial depth is touch, because touch 'senses the weight, resistance, and three-dimensional shape (gestalt) of material bodies, and thus makes us aware that things extend away from us in all directions" (Pallasmaa (C) 42). In fact our "skin traces temperature spaces with unerring precision" (Pallasmaa (C) 58). This can be felt by the "cool and invigorating shadow under a tree, or the caressing sphere of warmth in a spot of sun" (Pallasmaa (C) 58). It is thus these experiences that create space and place within our minds understanding. Touch connects us with "time and tradition" and it is through these impressions that one "shakes the hands of countless generations" (Pallasmaa (C) 56).

This research will primarily focus on increasing the engagement with the more often neglected senses, sound, smell, taste and touch but will still endeavour to include design responses to the visual aspects.

1.3 Sensory Impairment:

This research focuses on individuals who are either or both hearing and visually impaired. This is because sensory impairment helps better our understanding that for a happy and healthy life the spaces we live in need to be engaging on more than one sensory level. They provide a stance for which there is increased importance to acknowledge that, specifically sight, but also hearing can no longer be the sole driver within design.

As addressed previously all the senses are required to produce a wholly engaging and well-being experience. "The built environment is perceived through the whole of the body. Not only how a space looks, but also the sound, the tactile aspects, and the smell are of importance" (Mellaerts qtd. In Vermeersch et al. 2). When one or more of the senses is diminished or extinguished a greater power is placed on the remaining senses. People with a sensory impairment require a great deal of consideration and emphasis to be placed on all of the senses in order to participate with interiors with as much engrossment as un-impaired individuals. In fact it could be argued that without the over emphasis on the sense of sight a deeper and richer enterprise may be had.

The richness in impairment:

"The world of the blind, of the blinded, it seems, can be especially rich in... in-between states the intersensory, the metamodal –states for which we have no common language. And all of these... blend into a single fundamental sense, a deep attentiveness, a slow, almost prehensible attention, a sensuous, intimate being at one with the world which sight, with its quick, flickering, facile quality, continually distracts us from" (Oliver Sacks qtd. In Pallasmaa (B) 54).

Blind people interpret interior spaces differently to that of a sighted person. "To understand space, a blind person must draw on all of their remaining senses, combining this information and using their senses in cooperation, rather than isolation, to be certain of their surrounding environment" (Dawkins 17). Blind people take more time "to become accustomed to environments, they explore the building, listening to the spaces and the way their body influences the space. They touch and physically engage with the building, becoming more aware of their surroundings" (Dawkins 17). Dawkins reinforcing Pallasmaa's previous statement affirming that "like the sighted, the blind walk through time not through space, but their awareness and engagement with space is likely to be much richer than the experience of a sighted person" (Dawkins 17).

"Every opportunity must be used to enhance tactile and other sensory experience" (Bayes and Francklin 25). When designing for people, specifically children within learning environments who are sensory impaired, multi-sensory stimulation is required. "Multisensory interactive work uses communication and language techniques, tactile and practical tasks, music and movement, specialist ICT, and light or sound technology resources" (Hawkins et al. 16). This can be achieved "using colour, light, sound, texture and aroma therapeutically" (Hawkins et al. 25).

However it is not just the disabled who require multi-sensory design. Debbie Brown states "everyone needs multisensory design, not just the blind" (Nolen 37). This leads to the issue of segregation versus inclusion of individuals with disabilities. It is agreed that "the unnecessary segregation of the handicapped is neither good for them nor for those with whom they must associate" (Plowden report: Children and their primary schools, 1967 as qtd. In Bayes and Francklin). One of the key items argued for in 'Designing for the handicapped' when designing for the blind is integration. "The blind often are and feel isolated and need to be integrated with their local communities" (Bayes and Francklin 48).

Light and water can be noted as key elements within natural settings which demonstrate sensuous impact, for those with and without sensory impairment. This is mainly due to its typically tactile nature. This can be seen in the movie 'Marie's Story' directed by Jean-Pierre Améris, where a young blind and deaf girl bonds with a nun over her learning in response to sensory engaging elements. Light and water can also be seen within past architectural work to demonstrate sensory impacting spaces. This will be further accessed as a way of honing in on elements which provide natural engagement with the body within interiors.

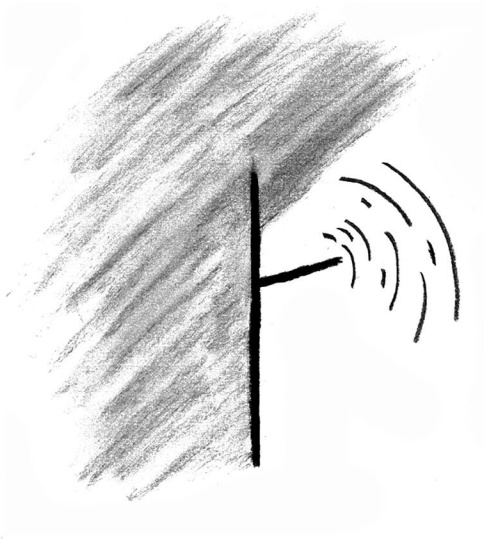
Figure 4: Intuitive abstract drawings of senses from Marie's Story



Exploration of the sense of smell



Exploration of the sense of touch of water



Exploration of the sense of touch of light



Exploration of the sense of sound

1.4 Light and Water:

In order to achieve a design that engages with the senses, research into elements that can achieve this, needs to be explored. Intuitively light and water stands out as elements which have achieved sensory absorbing interiors in previous works of architecture. For this reason light and water will be examined as a starting point for beginning to participate with materials of engagement.

Holl establishes the idea that "light that is not seen with the eyes can be felt. Lights psychological effects can lead to extremes of feeling with direct repercussions" (Holl 112).

Peter Zumthor mentions how the use of light can be used in creating a sense of movement within space, Pallasmaa looks at the physical ways this can be achieved. "Reflection, graduation of transparency, overlay and juxtaposition to create a sense of spatial thickness, as well as subtle and changing sensations of movement and light" (Pallasmaa (C) 32). Pallasmaa goes on to disclose how "architecture is essentially an extension of nature into the man-made realm" and bringing nature into architecture is fundamental in continuing to evoke the senses (Pallasmaa (C) 41).

"When used in the right amount at the right time and in the right place, light can accentuate, direct attention, create an atmosphere of contemplation and composure, foster togetherness in prayer, or underline the solemnity of festiveness of an occasion" (Stegers 60).

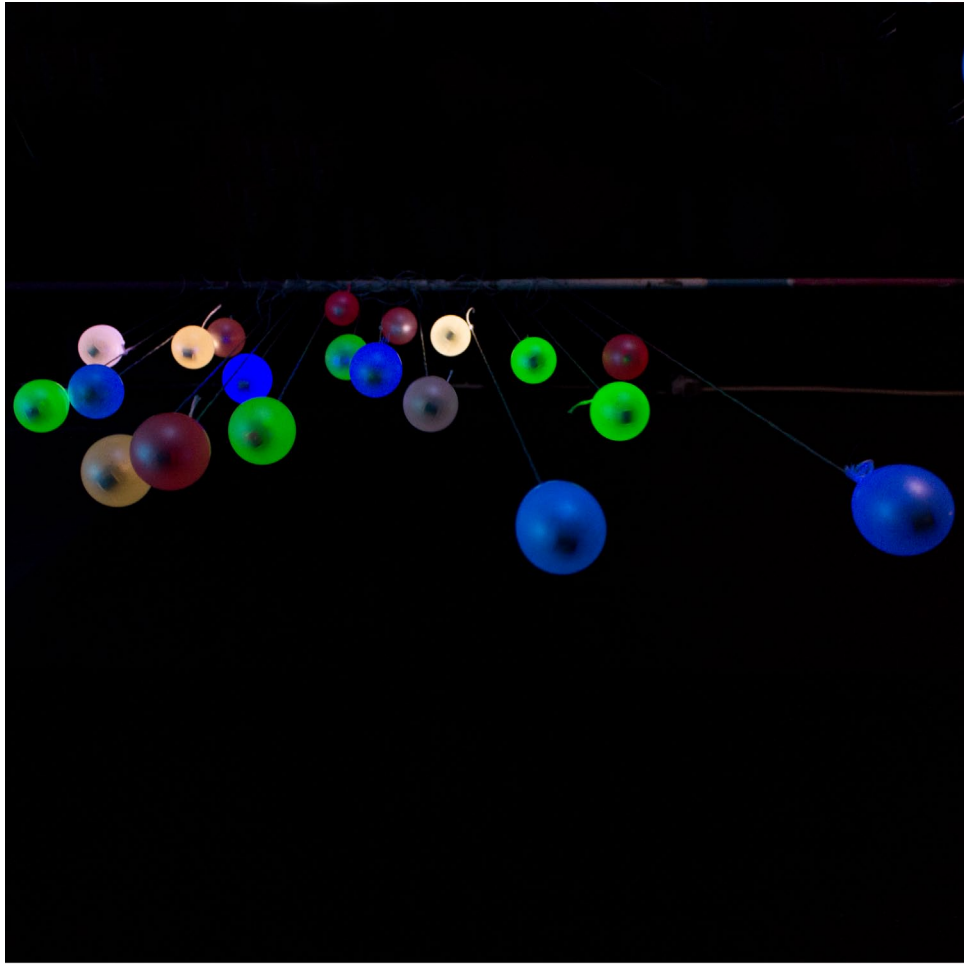
Light and water will be considered when beginning to look into the design of architecture within this body of research.

1.5 Hierarchy Concepts:





Figure 5: Experimental installation of water and light



2

Part

2.0 Henry Plummer's Light Categories:

The existing model

Henry Plummer states that "We need more from architecture than physical contentment. We expect our buildings to also be emotionally satisfying: to appear alive rather than dead; to take hold of our affections with moods that resonate with what we wish to feel inside; to keep us in touch with the flow of nature; and to empower us to make spaces our own by activating our perceptions and dreams" (Plummer 6). Plummer then goes on to discuss how light "allows us to see, to know where we are and what lies around us" (Plummer 5). Light helps to "enhance visual acuity and to help us negotiate the physical world" (Plummer 5). In fact light can be "an ethereal presence at the outer limits of material existence with a miraculous capacity to bring things alive at a sensory level, and to create, before ones very eyes, a sudden intensity of being" (Plummer 6).

Plummer explains an idea that our buildings exist with this "realm of ambience and mood, shadow and reflection, tonality and temperament" that people "can apprehend and feel through circuits of perception and sensibility" (Plummer 15). Plummer therefore hones these aspects and has developed a theory to encapsulate different qualities of light within buildings into seven categories which is discussed below.

Atomization:

Sifting of light through a porous screen

Veils of Glass:

Refraction of light in a diaphanous film

Canalization:

Channelling of light through a hollow mass

Evanescence:

Orchestration of light to mutate through time

Procession:

Choreography of light for the moving eye

Atmospheric Silence:

Suffusion of light with a unified mood

Luminescence:

Materialisation of light in a physical matter

Atomization:

This model of light is "retarded not by refraction, but by the splintering and pulverizing of its routes" (Plummer 114). This can be evoked within architecture via the art of a screen, as the "possibility of cancelling weight by aerating the boundary – reducing it to a 'weightless element that hovers above things like a cloud or, better, perhaps, the finest dust or, better still, a field of magnetic impulses" (Plummer 114). Architects work like opticians manipulating "the interplay of perforation size, surface finish and illumination levels before and behind" in order to create balance "between light and shadow, transparency and opacity, materiality and ethereality" (Plummer 116). Here the aim is to "create a sensation of lightness and a world of ambiguity that includes confusion, where images tend to emerge and vanish as one moves through a building" (Plummer 116). Plummer further states that "as boundaries slip out of focus, at one moment coming into shape and the next moment empty yet loaded with energy, they give architecture a dream-like quality that invites us into their formulation" (Plummer 119).

Veils of Glass:

This model of light can be described as "poetic values of ambiguity and mystery attained when glass interferes with light rays, diverting and delaying their course of passage" (Plummer 82). Plummer discusses "the controlling of a screen's proportion of holes and material finish to create a kind of porous wall that is simultaneously gauzy and luminous, offering mysterious yet scintillating views that excite our powers of imagination" (Plummer 73). This is more or less achieved through glass which has the ability to "veil rather than fully reveal, and thereby incite one to gaze" (Plummer 77). Glass is influenced by reflections and refractions which "induce glass to sparkle and glow" thus exhibiting its own "ravishing presence" (Plummer 82). Plummer explores how the architect can exploit glass and plastic to "construct phenomena whose sensuous pleasures demand real creative work on the part of the observer, requiring him or her to negotiate effects overlapping images, obscuring reflections, dazzling interventions, and generally unstable perceptual readings" (Plummer 83).

Canalization:

This model of light is most simply defined as sheets of light "drawn into the building to segment and dissect volume into parts" (Plummer 154). Plummer explains how architects can "carve out routes for natural forces to penetrate the innermost depths of a building, transforming the paradigm of a cellular mass into something new" such as "a spatial lattice riddled with tunnels for daylight to travel through" (Plummer 150). Plummer divulges that canalization has a special way of "giving formless light a memorable character" (Plummer 150). He further explains that "daylit voids continue to transcend the criteria of rational illumination, merging poetic and pragmatic values of light. Cavities in these indefinitely porous masses are perceived, in part, as optical tools with which to distribute light. Devised to steer while measuring out and restraining its flow" (Plummer 150).

Evanescence:

Plummer explains how "while buildings may be physically static, their ability to register changes and movements of natural light allows them to perceptually transform and display signs of life" (Plummer 18). This is at the core of this model of light. Plummer continues, "deadened volumes begin to stir when beams of light pierce into rooms or glide over walls; mute objects take on moods derived from the weather or hour of day; shadows appear as a palpable presence and thin or deepen, soften or sharpen according to how they are cast onto walls or settle in space" (Plummer 18). He explains how "Spaces brighten or dim in relation to their allotment of sun, seeming to fall asleep and come awake as they respond to what flows across the sky" (Plummer 18). He further goes on to state how "it is these quiet perturbations that allow architecture to rise above its physical limitations and mirror the rhythms of our innermost life" (Plummer 18). Plummer therefore acknowledges, it is intriguing "the way fluid light constructs a greater world of space" (Plummer 18). This idea of light quality can be achieved by "adjusting the size of gaps between walls and extending walls to cut off the sun at particular times, thereby giving each plane its own unique optical moment and pressure within a larger sequence. These slits are then grouped into rhythmical sections to construct an overall 'image of time', to use Langer's term" (Plummer 21-22).

Procession;

Plummer discusses that due to its seductive and attractive power “light has always played a pivotal role in successions of space that are rewarding and memorable” (Plummer 54). He continues to explain that “It is not single, isolated moments or views that are important for the moving eye, but a continuous flow of human perceptions” (Plummer 54). Plummer argues this is the essence of this model of light. Plummer extends that this be “the proverbial ‘light at the end of a tunnel’ or ‘lamp in the window at night’” for the fact that both “exerts a visual attraction, and electrifies space with strong perceptual and emotional forces” (Plummer 54). Plummer describes this light as fluid and evolving (Plummer 54). This type of light allows the spectator to follow and itinerary as the scenes “unfold in a wide variety of forms” (Plummer 54).

Atmospheric Silence;

Plummer acknowledges how many architects have attempted to “grasp the elusive ability of natural light to create its own spirit of place when imbuing a building with mood” (Plummer 180). Plummer goes on to explain how this model of light “does not merely illuminate form or episodically dazzle the eye, but creates an overall atmosphere, whose phenomena have become so intimately linked that they blend into a radiant whole, vibrant with modulations” (Plummer 180). This results in an overall ambience which “bathes every object in one’s field of vision” which can be “grasped by the eye at a single glance” (Plummer 180). Plummer notes that this is best achieved when surfaces are “reduced to a single material” of matching tones that which allows the mood to be seen as a whole (Plummer 180). He states “The nearly uniform reflectance allows light and shade to clarify forms rather than materials, producing a total effect to which each individual tone contributes, and linking objects with the atmosphere that envelops them” (Plummer 180). Plummer continues that this can be seen as “a diffusion of light into various states of warm water, giving the liquid a congealed glow that dissipates above into phosphorescent vapour” (Plummer 182).

Luminescence;

Plummer talks about the importance of this model of light, discussing how the “capacity of light to penetrate matter and temporarily produce an inward glow and intensity of being is a timeless source of human wonder” (Plummer 218). Plummer delights that “at such moments, light exerts a mesmerising, even miraculous, power to transform otherwise mute objects and dull materials and make them shine with an elevated beauty and a sense of being more fully alive” (Plummer 218). This model of light is becoming more prominent with changing technologies. Plummer notes “new forms of luminous matter are being created through a range of innovations in the fabrication, assembly and finish of materials to enhance or alter their natural properties” (Plummer 218).

2.1 Precedent and Case Studies:

Henry Plummer light study precedents:

Herzog & De Meuron's Dominus Winery located in California, USA is chosen for its successful application of Henry Plummer's 'Atomization', a sifting of light through a porous screen. The ingenious transmutation of stone turns a normally solid material into an airy screen (Plummer 134). Light collects within this space in a sporadic display allowing an engagement with the interior.

Meinhard von Gerkan's Christus Pavilion located in Germany perfectly demonstrates Plummer's 'Veils of Glass', a refraction of light in a diaphanous screen. The layers of transparent sheets with trapped elements infused within dapple the light with contrasting colours and shadow patterns (Plummer 100).

Louis Kahn's National Assembly Building located in Bangladesh displays perfectly Plummer's 'Candalization' a channelling of light through a hollow mass. The cut out geometric shapes from the side of the building create portals for light to stream through in beams that engage the senses as it falls over the body. Another building exceeding in this category is the Karnak Temple located in Luxor, Egypt. Tiny slots allow light to seep through to the underground tunnels and provides a way of collecting the light. Awakening the senses the still dark of the tunnel is contrasted by the channelling of light.

Another of Louis Kahn's buildings, The Salk Institute located in California, USA also greatly demonstrates the light category of 'Evanescence' the orchestration of light to mutate through time. The institute has the ability to "register changes and movements of natural light" which allows the building to transform and display signs of life (Plummer 18).

Peter Zumthor's Therme Vals located in Switzerland is perhaps the most obvious of precedents due to its incredibly successful interplay of light and water. The Therme Vals are also successful in articulating Plummer's 'Procession' the choreography of light for the moving eye. Zumthor uses light to instil a sense of movement within the spaces allowing light to be the main material in guiding the viewer through the spaces.

Tadao Ando's Koshino House located in Japan displays a sense of 'Atmospheric Silence' as defined by Plummer as a suffusion of light with a unified mood. The way the light is considered within every room as a small selection of glowing aura allows the space to be unified with its atmosphere.

Carlos Scarpa's Olivetti Showroom located in Venice demonstrates the way manipulating materials to appear to glow creates a kind of 'Luminescence'. The mixture of marble dust, glue, coloured pigments and linseed oil that is worked into the layers of stucco allows the walls to react differently in the light. As the light is drawn beneath the surface it appears to glow from within.



Dominus Winery
Herzog & De Meuron
California, USA



Christus Pavilion
Meinhard von Gerkan
Germany



National Assembly
Building
Louis Kahn
Bangladesh



Salk Institute
Louis Kahn
California, USA



Therme Vals
Peter Zumthor
Switzerland



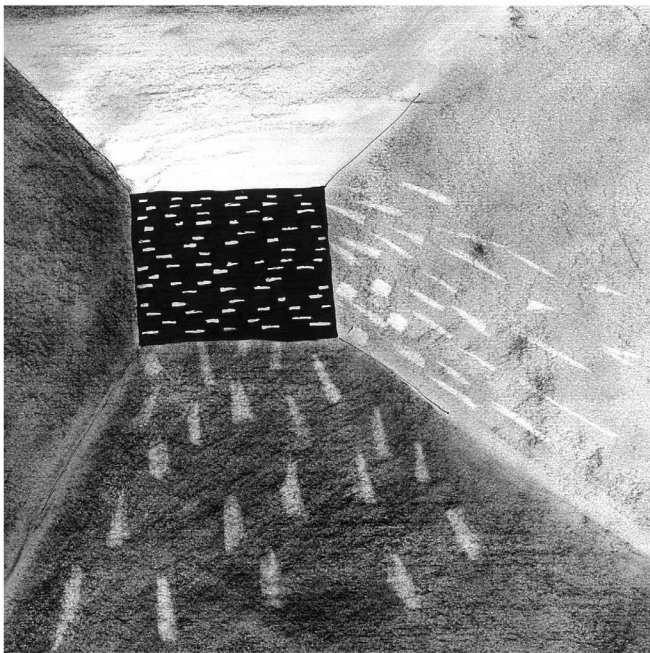
Koshino House
Tadao Ando
Japan



Olivetti Showroom
Carlo Scarpa
Venice

Figure 6: Henry Plummer light category precedent and case studies

2.2 Henry Plummer: Drawing Experiments:



Exploration of atomization of light



Exploration of veils of light

Figure 7: Drawing exploration of Plummer's theory

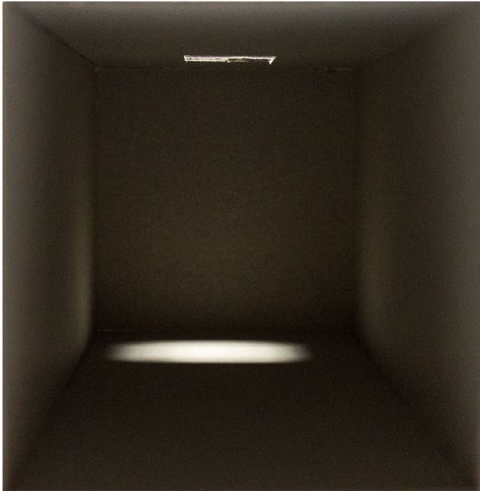
2.3 Henry Plummer -Light Models:



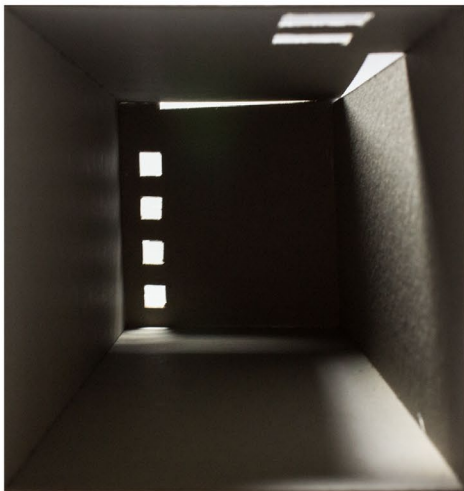
Atomization:
Sifting of light through a porous screen



Veils of Glass:
Refraction of light in a diaphanous film



Canalization:
Channelling of light through a hollow mass



Procession:
Choreography of light for the moving eye



Atmospheric Silence:
Suffusion of light with a unified mood

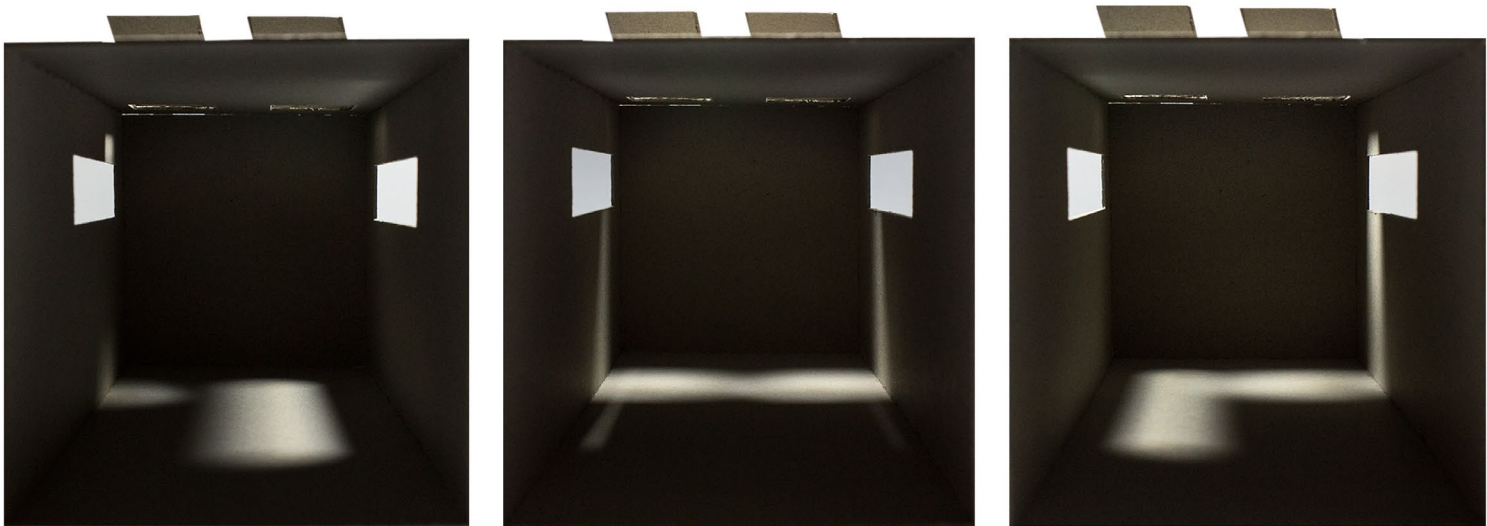


Luminescence:
Materialisation of light in a physical matter

Figure 8: Models of Plummer's theory

Figure 9: Models of Plummer's theory

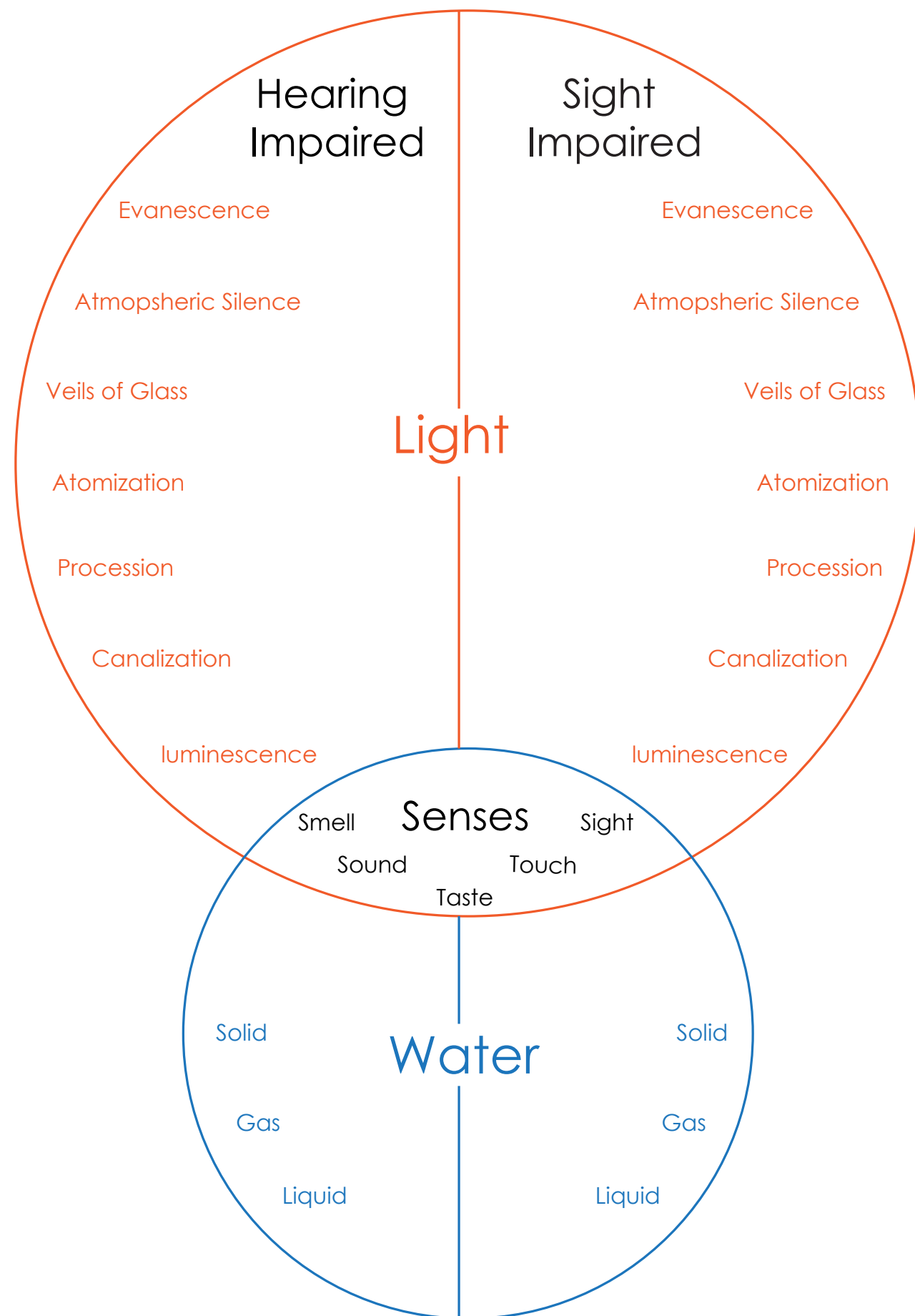
2.3 Henry Plummer -Light Models cont.



Evanescence:
Orchestration of light to mutate through time

Figure 10: Models of Plummer's theory

2.4 Hierarchy Diagram:



2.5 Author's Sound Theory: The invention

Light to sound.

A new theory is now proposed. Henry Plummer's light categories are used as a base for the following exploration. To reconsider the primary dominant sense of hearing as explained in chapter 1.2, sound categories are established by the author. This has been achieved by taking each light category and exploring its unique qualities in relation to sound. The qualities of water in its varying states (liquid, ice, mist and steam) are distilled down to graphic representations. Consciously thinking about sounds correlating to water situations, such as rushing, dripping and flowing water. The interplay of light and water is then used as the inspirations for the explorations of sound. The type of sound (harmonic, discrete, continuous) is defined for each category. Details on quality and quantity of the sound for each category is noted. Examples for each sound category, is also highlighted. This starts as a basis for advancement of the author's sound theory.

2.6 Light to Sound Category Matrix:

Henry Plummer Light Categories	Sound Categories	
Atomization: Sifting of light through a porous screen	Discrete impact sound: Detailed, Fast, Analytical, Body Amount of silence? 40% Acoustic Variables? 10%	Light rain pattering down
Veils of Glass: Refraction of light in a diaphanous film	Harmonic sound: Musical, Veiled, Muffled, Airy, Blanketed Amount of silence? 20% Acoustic Variables? 20%	Soft materials falling on and dragged through water
Canalization: Channelling of light through a hollow mass	Discrete impact sound: Articulate, Cool, Hollow Amount of silence? 80% Acoustic Variables? 0%	Sole drip of water into a larger pool of water
Evanesence: Orchestration of light to mutate through time	Discrete impact sound: Decay, Resolution Amount of silence? 50% Acoustic Variables? 100%	Ice crackling as it freezes and melts
Procession: Choreography of light for the moving eye	Continous sound: Imaging, Detailed, Decay, Depth Amount of silence? 50% Acoustic Variables? 80%	Regular splashes of same interval over varying area and material qualities
Atmospheric Silence: Suffusion of light with a unified mood	Continous sound: Balance, Musical, Pace, Rhythm Amount of silence? 50% Acoustic Variables? 50%	Roaring/ rushing water
Luminescence: Materialisation of light in a physical matter	Harmonic sound: Blurred, Musical, Muffled, Warm Amount of silence? 40% Acoustic Variables? 40%	Water bubbling and twinkling

2.7 Chromesthesia:

chromesthesia
n.

A condition in which another sensation, such as taste or smell, is stimulated by the perception of colour.
("Chromesthesia.")

Chromesthesia is defined by Stephen E. Palmer, (and for the purpose of this thesis) as a "neurological condition called 'sound-to-colour synesthesia,'" (Palmer). Where an individual can "effortlessly and spontaneously experience their own personal light show while hearing music and other sounds" (Palmer). This condition is "relatively rare, occurring in only about 1 in 3,000 individuals" (Palmer). People with this condition simultaneously experience a reaction from one sense when another sense is engaged, thus providing a unique way of exploring sound qualities.

Studies have found that "non-synesthetes do have music-to-colour associations similar to the cross-modal experiences of chromesthetes" (Palmer). Using this research as a basis it can be established that a physical response to music/sound can be developed, that the sense of sight can be engaged by sound. Research indicates that "fast-paced music...tends to elicit bright, vivid, warm colours, such as intense yellows. [Whereas] slow-paced, quieter selections... are more likely to evoke darker, grayer, cooler colours, such as shades of blue, purple, and gray" (Palmer). This can be seen in the following initiative response to sound. Where paint palettes are developed in relation to specific sound selections. It has been found that "the musical features that matter most in determining the colours people choose include tempo (slow to fast), energy (low to high), volume (soft to loud), mode (minor to major), pitch (low to high), harmonic and melodic content (consonant to dissonant), complexity (simple to complex), and distortion (clear to distorted)" (Palmer).

2.8 Author's Sound Theory Explorations:

The succeeding work is a further development of the author's sound theory. The aim of the following exercise is to produce a physical reproduction of sound. All five senses are considered when exploring the categories. Especially looking at ways that sound can be touched and seen rather than just heard. This will allow the opportunity for those people who are hearing impaired to experience sound. Taking the unique qualities of sound for each category and distilling it into one. Combining all attributes from both sound and light categories, to create an overall mood to design with.

The research acquired on chromesthesia is here used as a part of the process of producing the sound theory. The author listened to specifically chosen excerpts of water sounds that relate to each category and intuitively painted colour palettes which best represented each category. A short description on the qualities of each sound category follows the colour palette. From here overall mood collages were created to establish a visual representation for each sound model. Water and light are highly considered within each of these mood collages. Next 3-D models of sound are produced. This was achieved by creating a visual line work showing the sound wave of each sound model and bringing this into a 3-D digital modelling programme. Here small models were created before being brought into a physical format through the use of 3D printing methods. From this point all of the above exercises are here combined into digital models of overall mood for each sound category. Considering colour, light, water, sound and the physical representations of sound, within the iterative process of progression. This is also the point where water is dropped as a main focus. Due to the physical development of sound, actual displays of water is no longer a priority in providing a sensory engaging space. The sound categories are now developed enough to be used within the design process.

2.9 Atomization:



Figure 11: Atomization colour palette

Individually separated. Distinct. A sprinkling of sound. A sound that is fast and reproduces a rapid transient with increased sense of realism and snap. A sound that has body. A sound that carries with it the details of its origin. An articulate sound with little acoustic variables. A sound split by silence. Little breaks allowing you to breathe among the intensity of the music. It is the vibrancy of sound softened by the pause. But heightened by the suspension of the inevitable. A slow and steady fall of rain pattering down.



Figure 12: Atomization mood collage

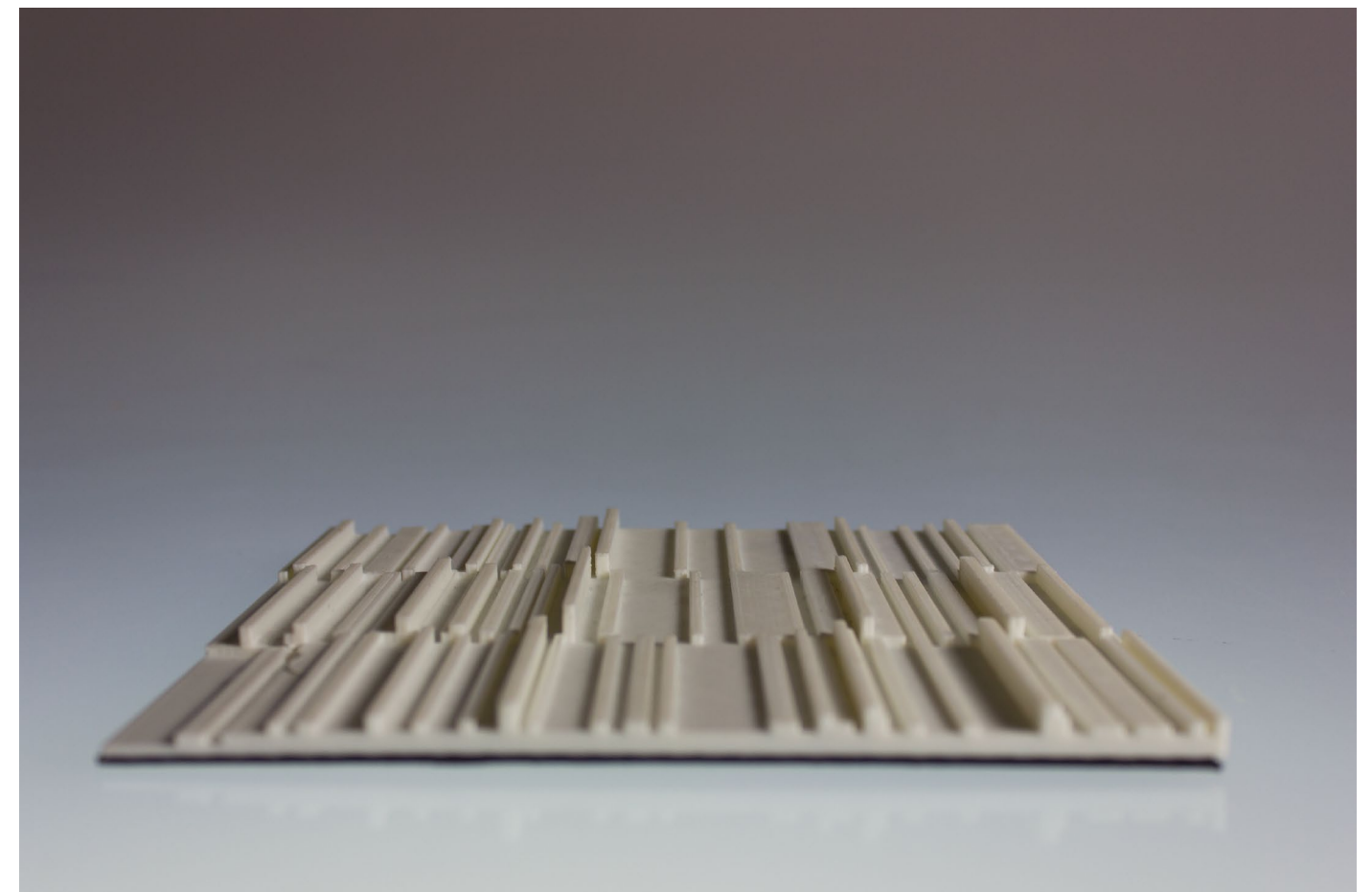
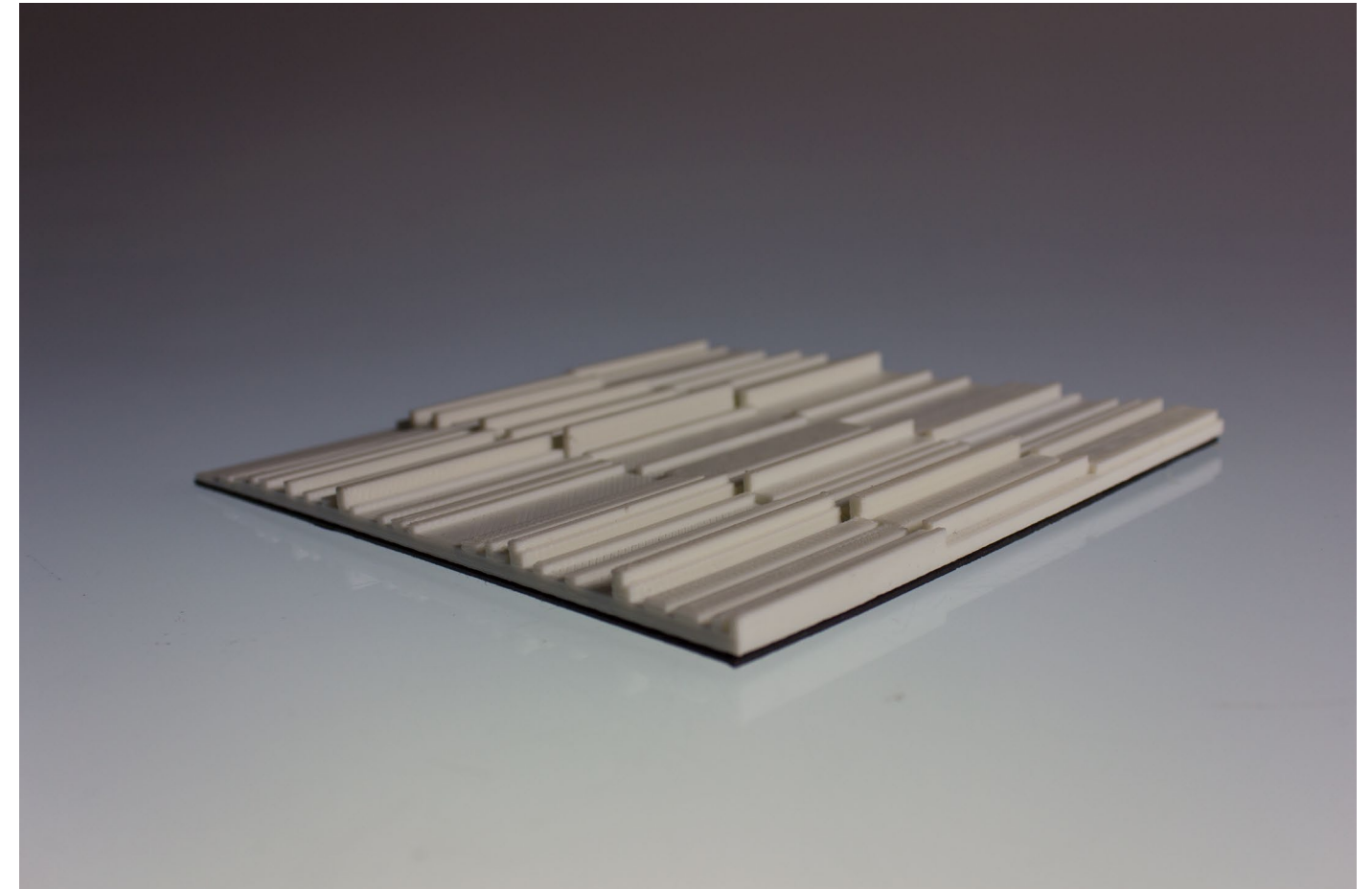


Figure 13: 3-D printed physical realisation of sound of atomization

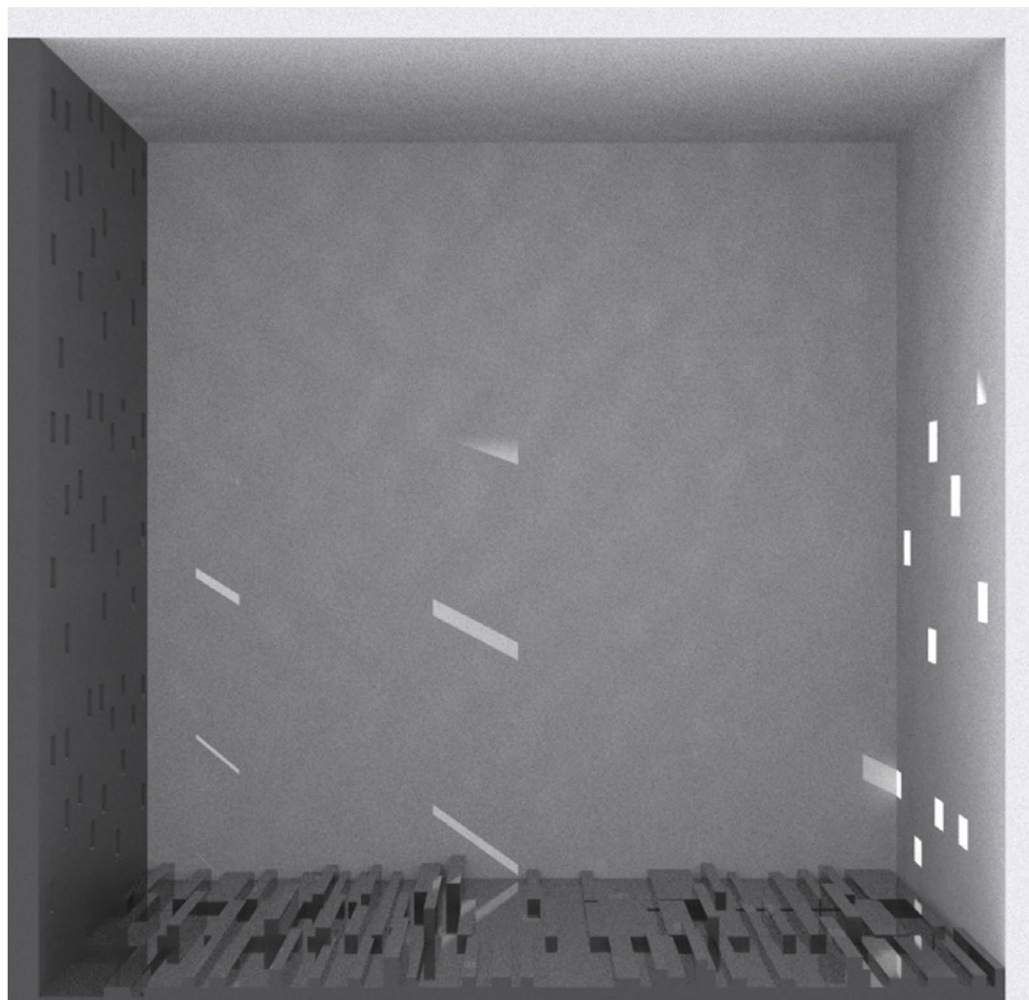


Figure 14: Realisation of the mood of atomization in space

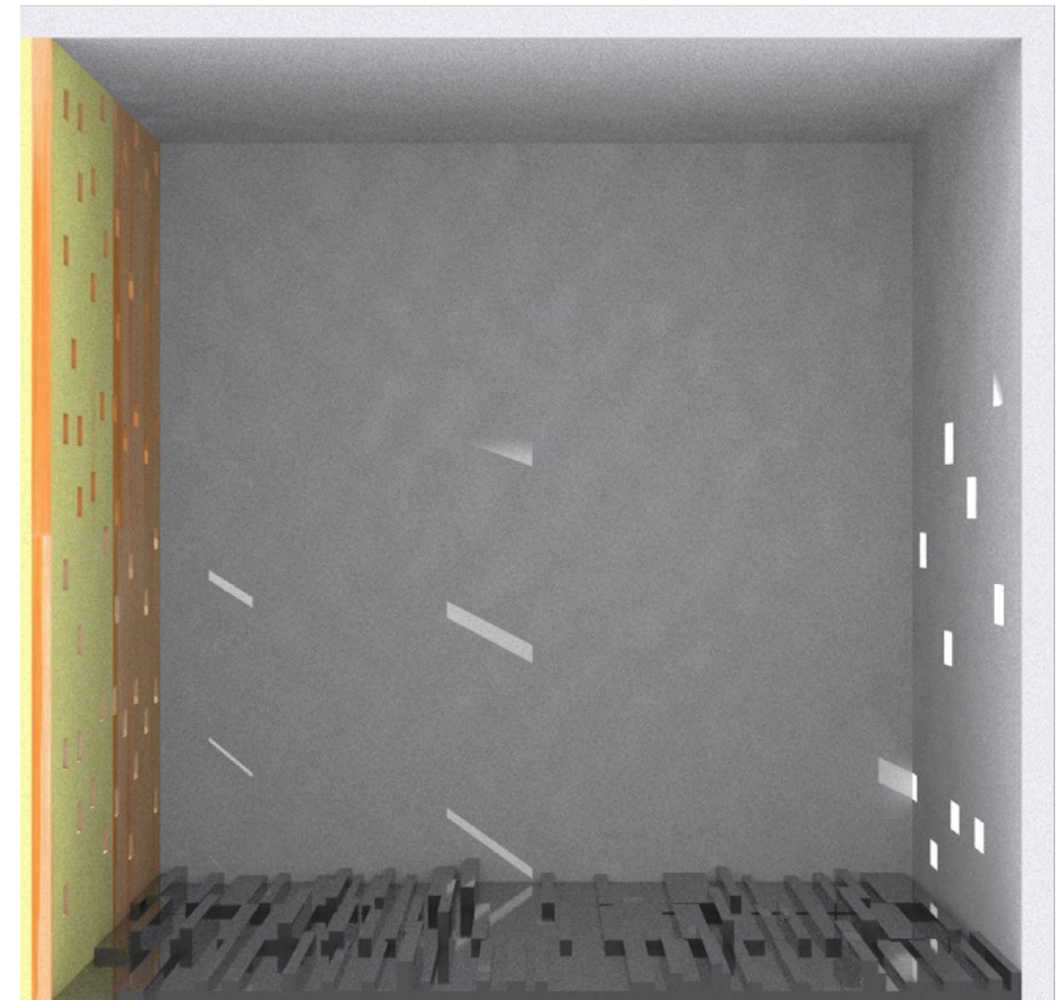


Figure 15: Realisation of the mood of atomization in space

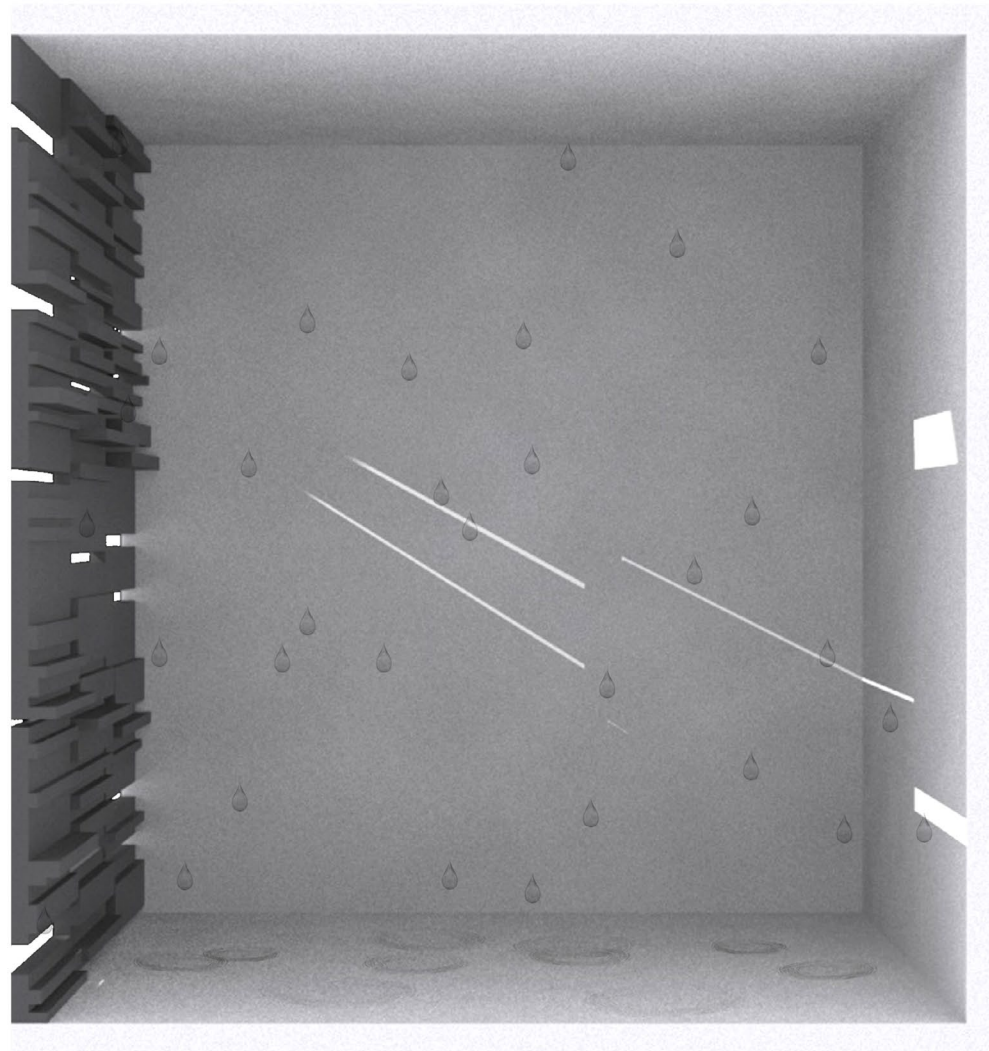


Figure 16: Realisation of the mood of atomization in space

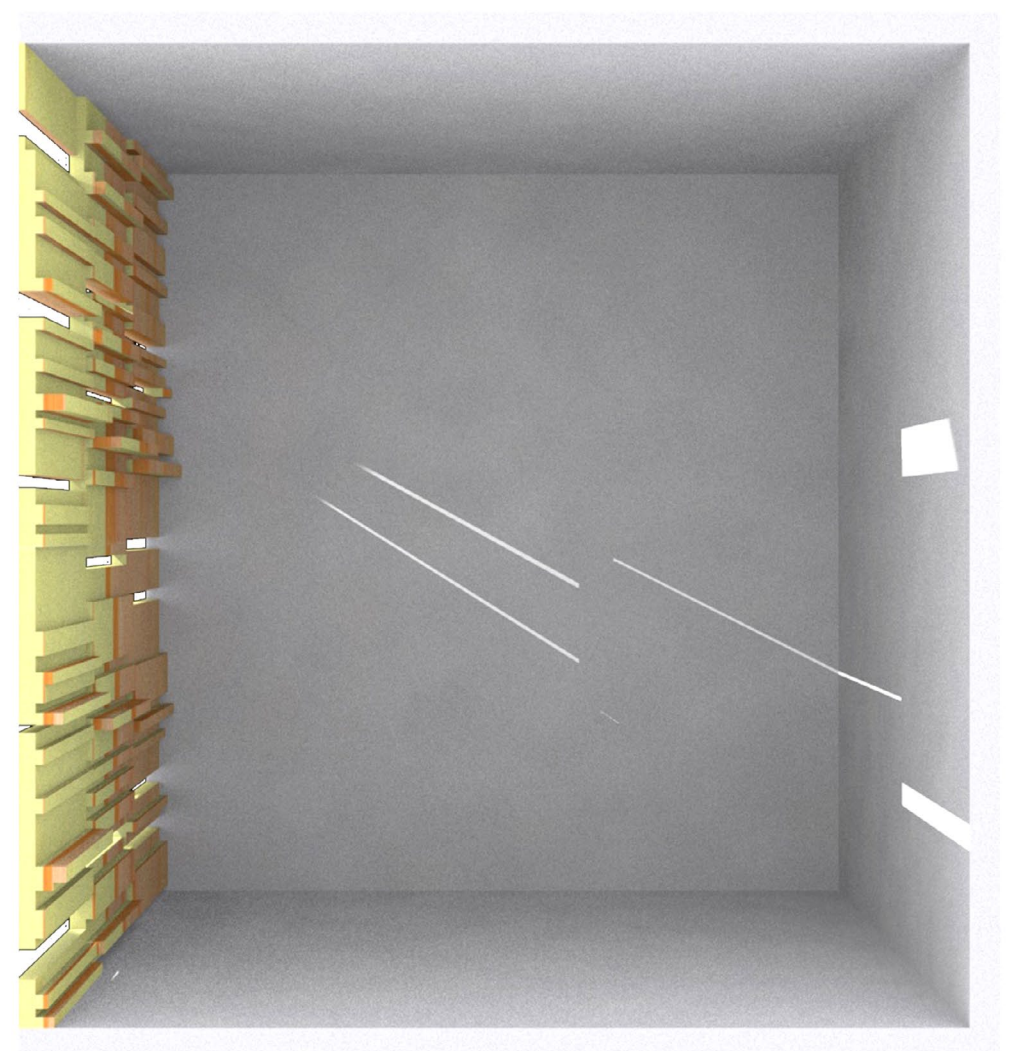


Figure 17: Realisation of the mood of atomization in space

2.10 Veils of Glass:



Figure 18: Veils of Glass colour palette

Of harmonic sound. A sound which is soft and musical. Filling space with cohesion, carrying with it a subjective 'rightness'. Like a silk blanket holding you close. A sound in which the details are lost in rhythmical melody. Rarely silent with little acoustic variations. Airy and muffled. Delicate sound with calming effects that leaves a creamy taste in your mouth. Soft. Smooth. Serene. A silk sheet falling into the sea and sinking deeper.



Figure 19: Veils of Glass mood collage

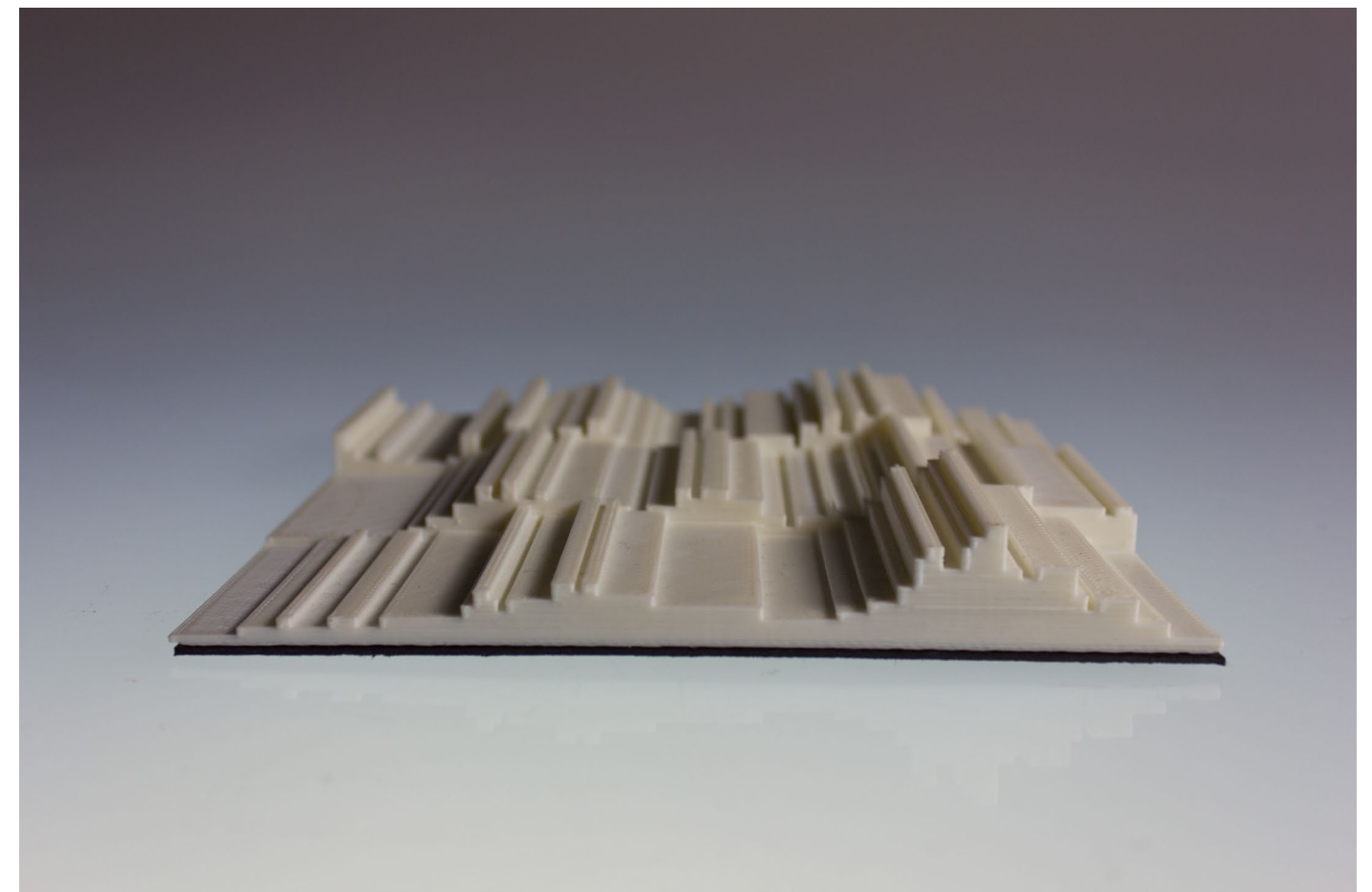
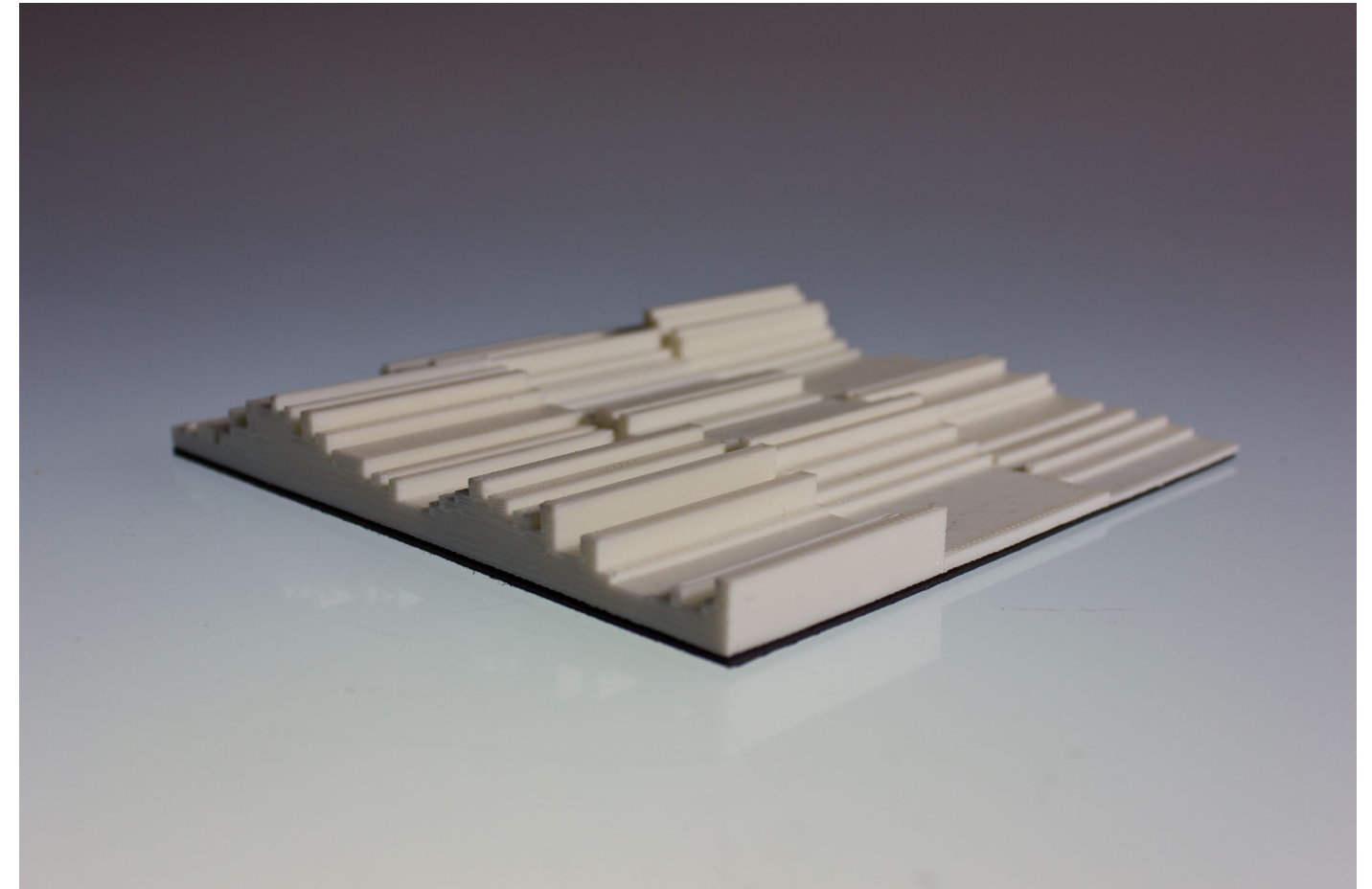


Figure 20: 3-D printed physical realisation of sound of Veils of Glass

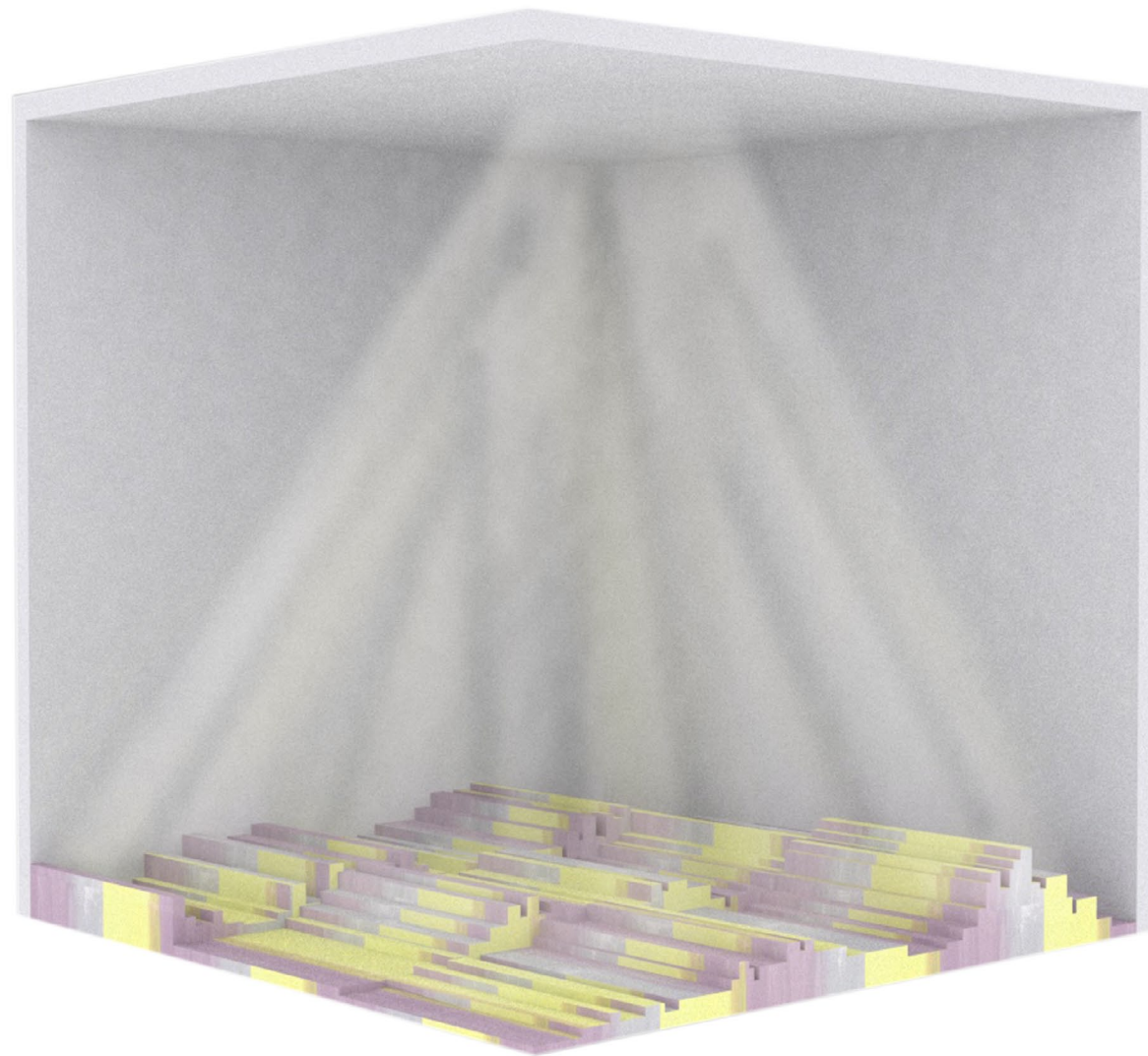


Figure 21: Realisation of the mood of Veils of Glass in space

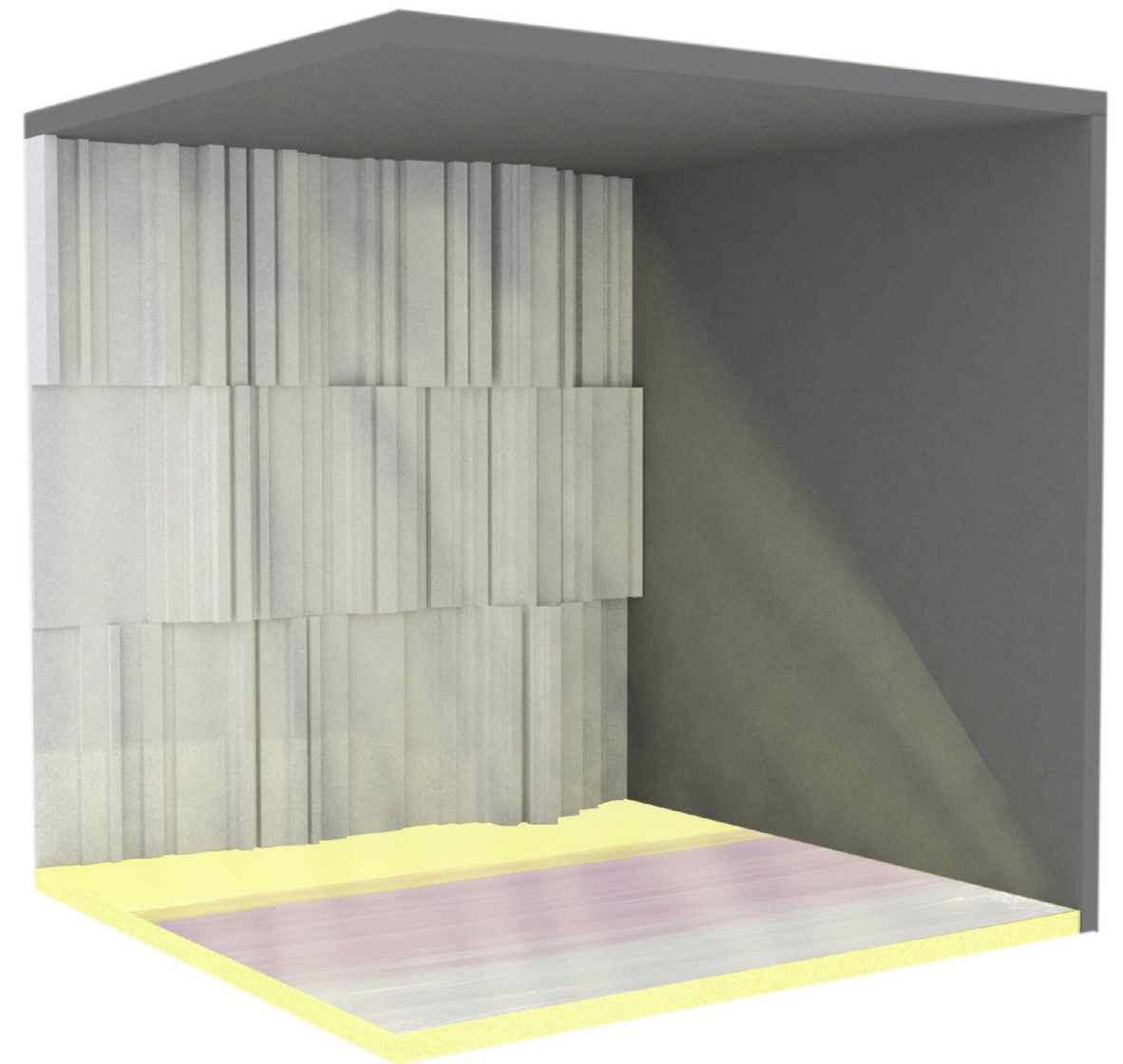


Figure 22: Realisation of the mood of Veils of Glass in space

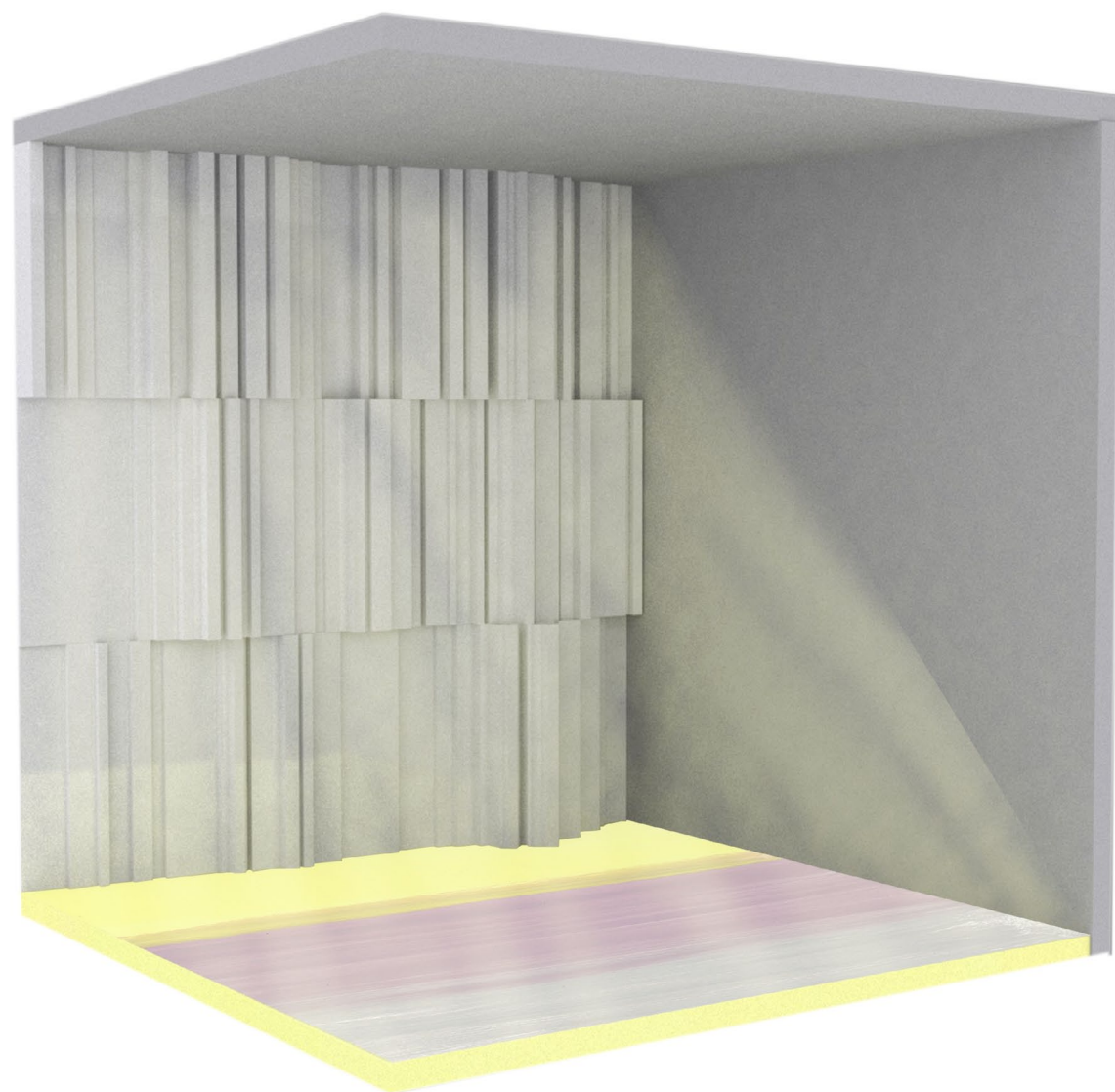


Figure 23: Realisation of the mood of Veils of Glass in space

2.11 Canalization:



Figure 24: Canalization colour palette

A silent melancholy broken only by a distinct glimpse of life. Individually separate moments of sound. Repetitive and unvarying. A monotonous sound that continues without variations in acoustics. Dull. Dark. Lacking in vibrancy, body and warmth. Cool. Articulate and calculated in points of intrigue. A lone drip into a still pool of water. Rippling out and filling the space of volume.

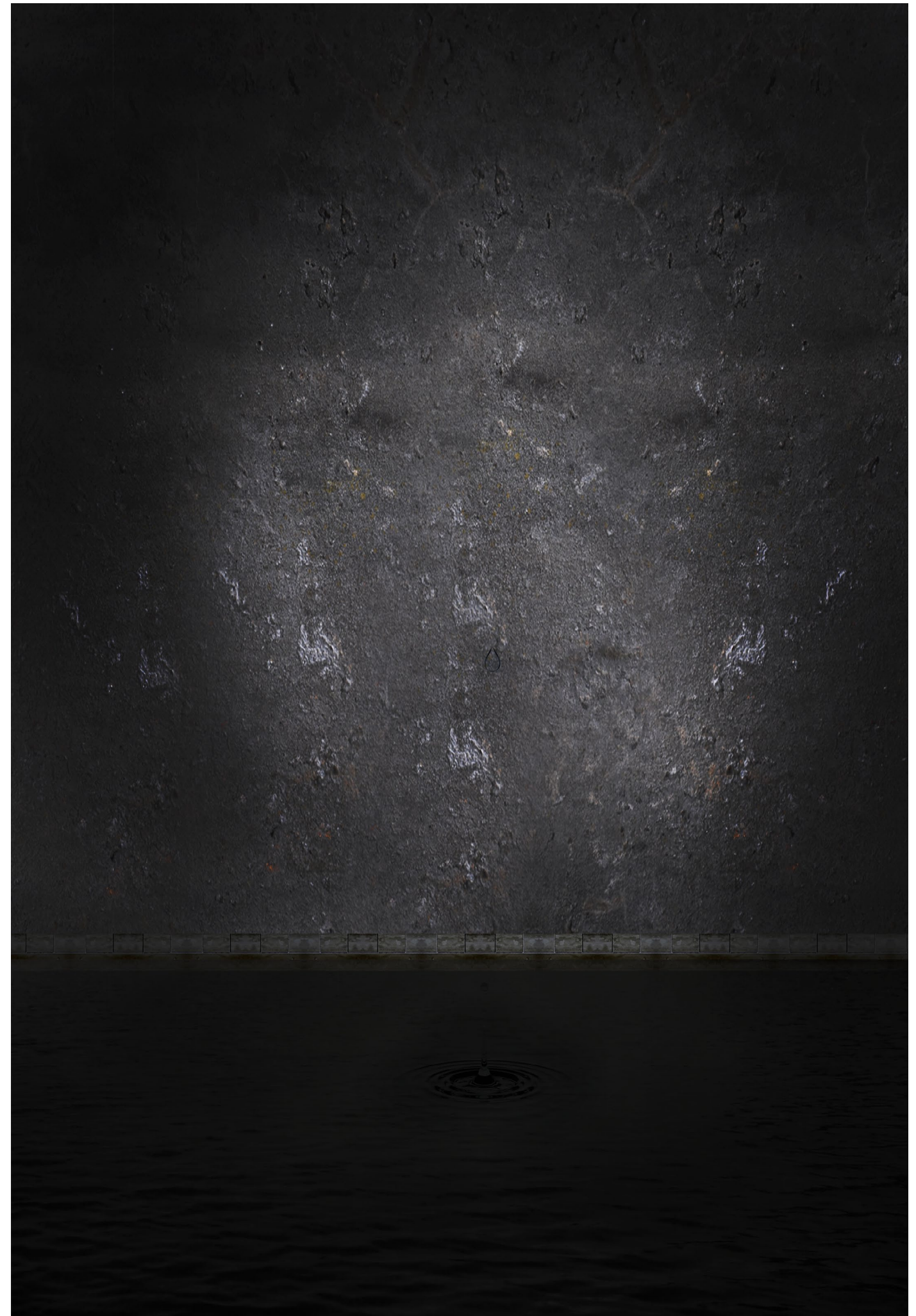


Figure 25: Canalization mood collage

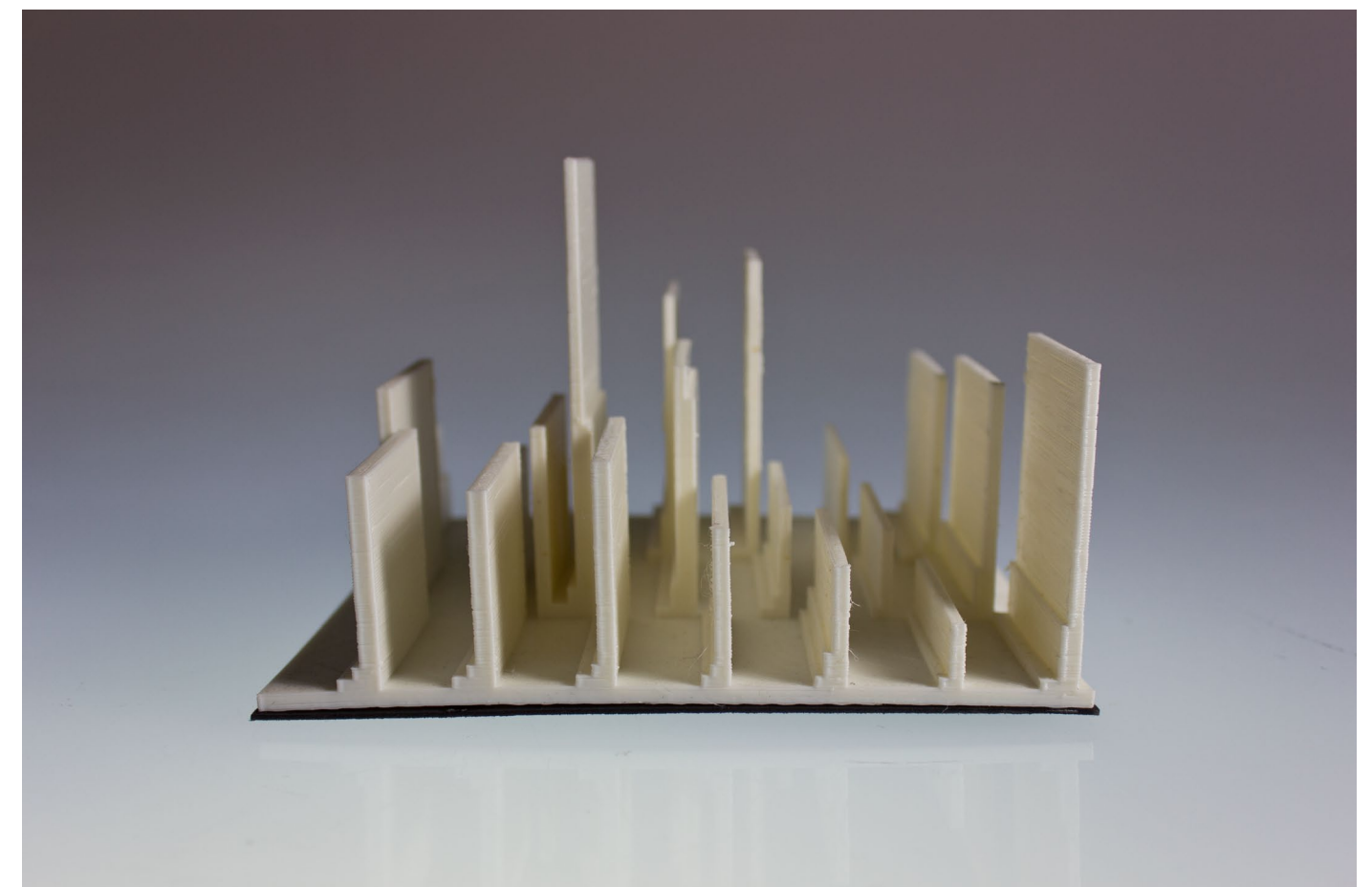
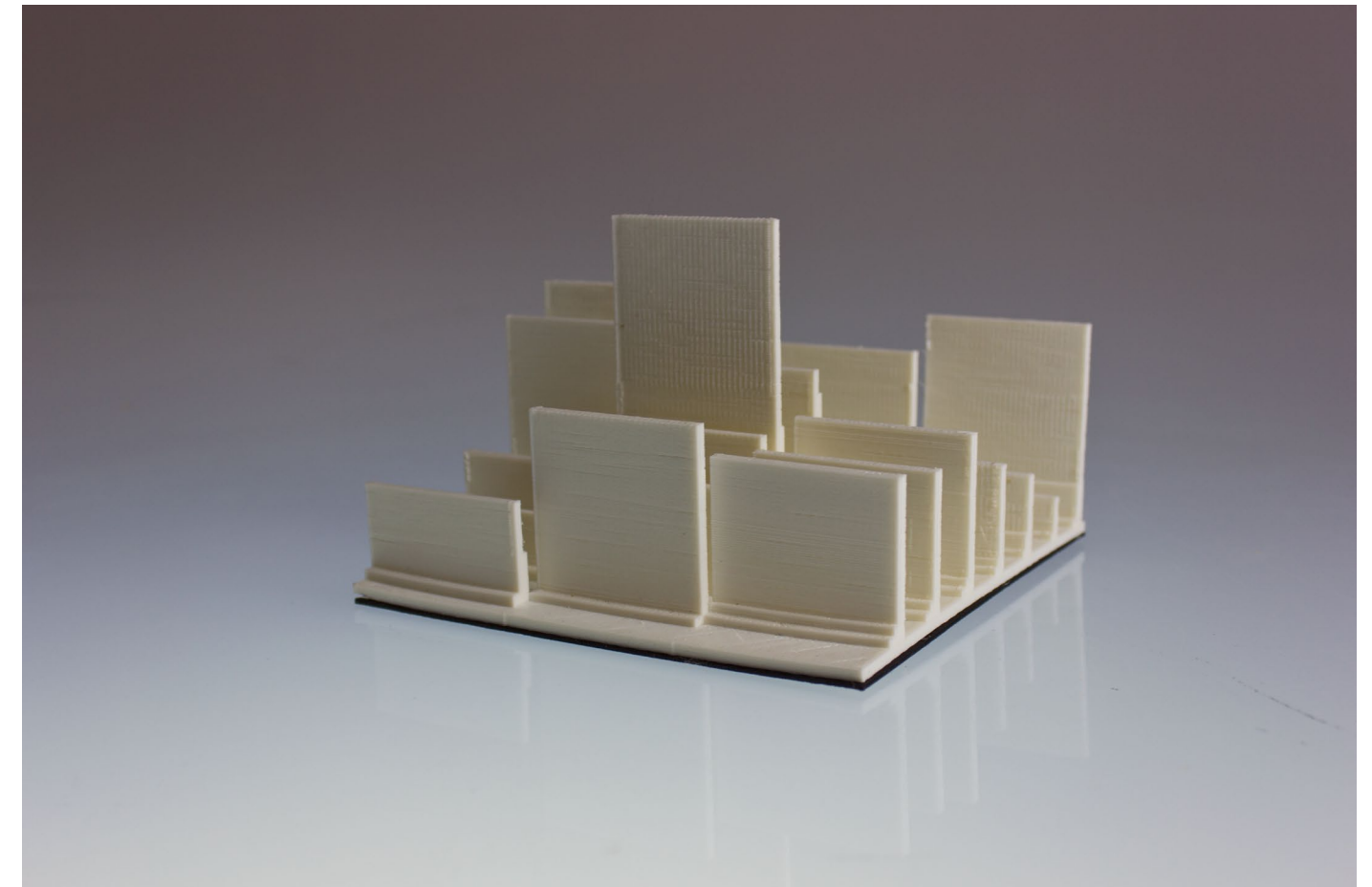


Figure 26: 3-D printed physical realisation of sound of Canalization

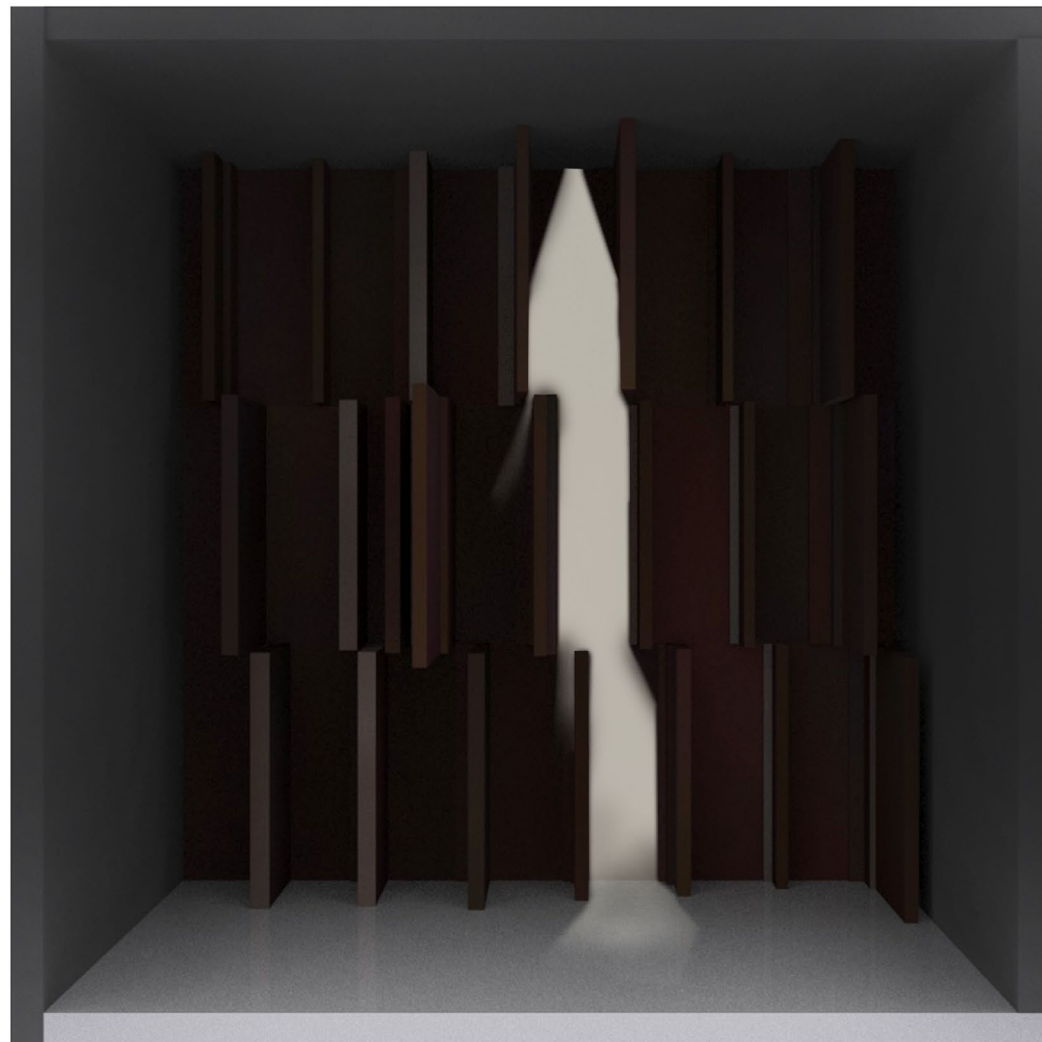


Figure 27: Realisation of the mood of Canalization in space

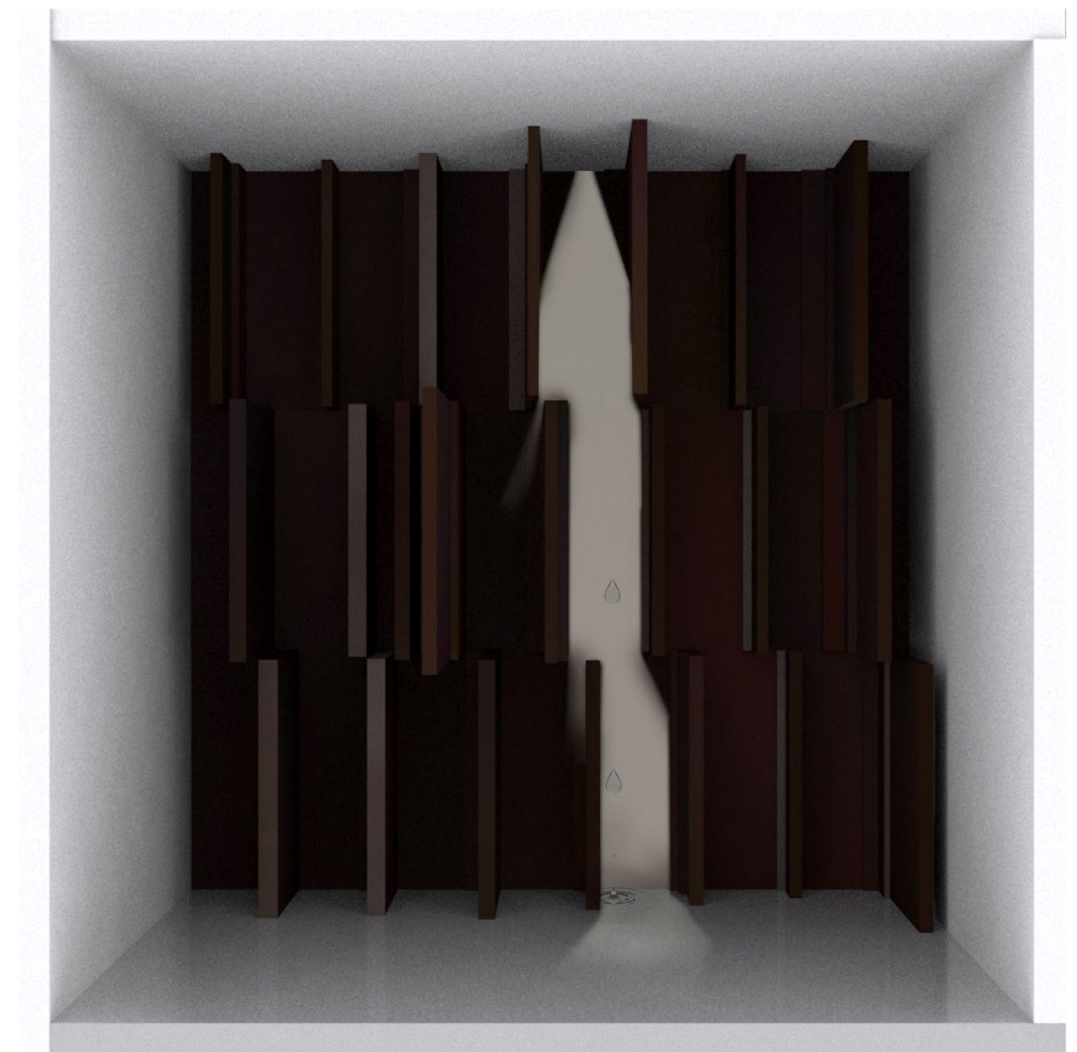


Figure 28: Realisation of the mood of Canalization in space

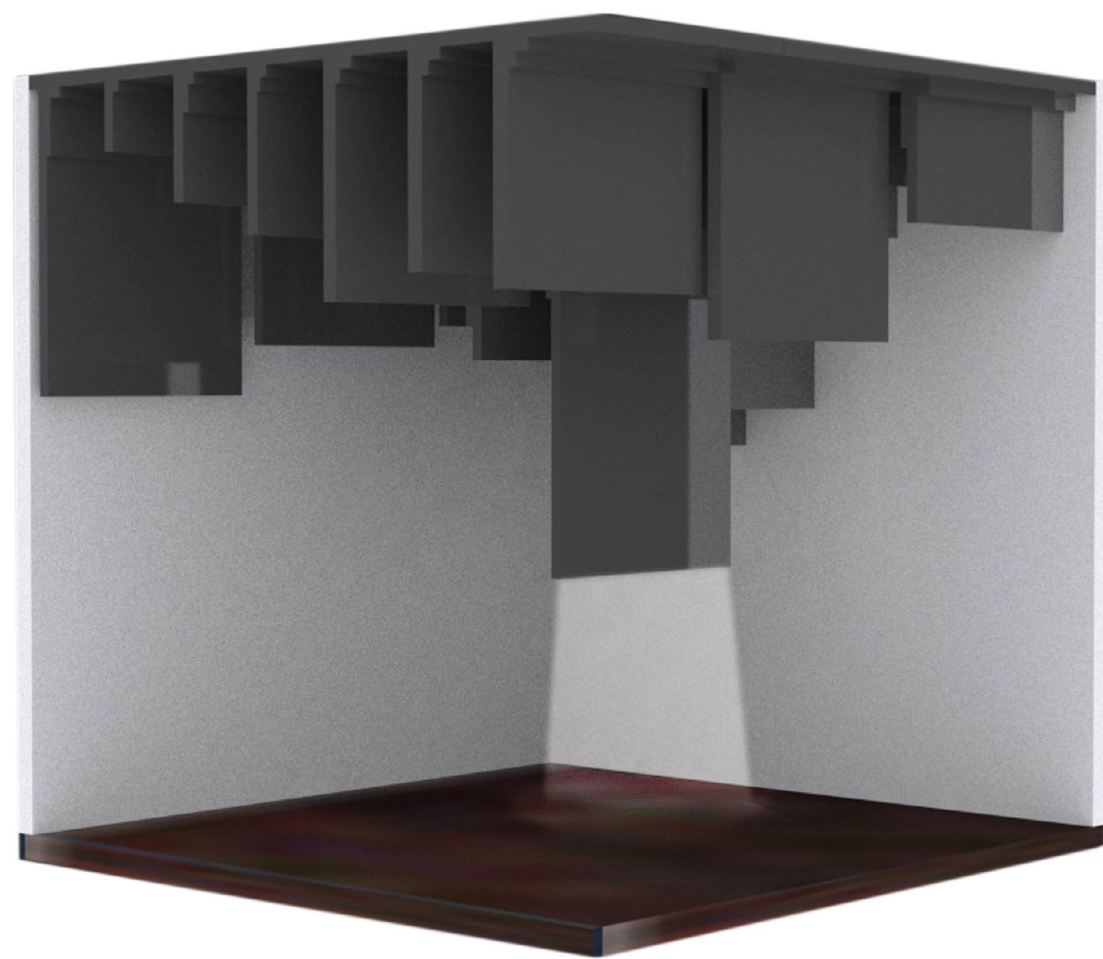


Figure 29: Realisation of the mood of Canalization in space

2.12 Evanescence:

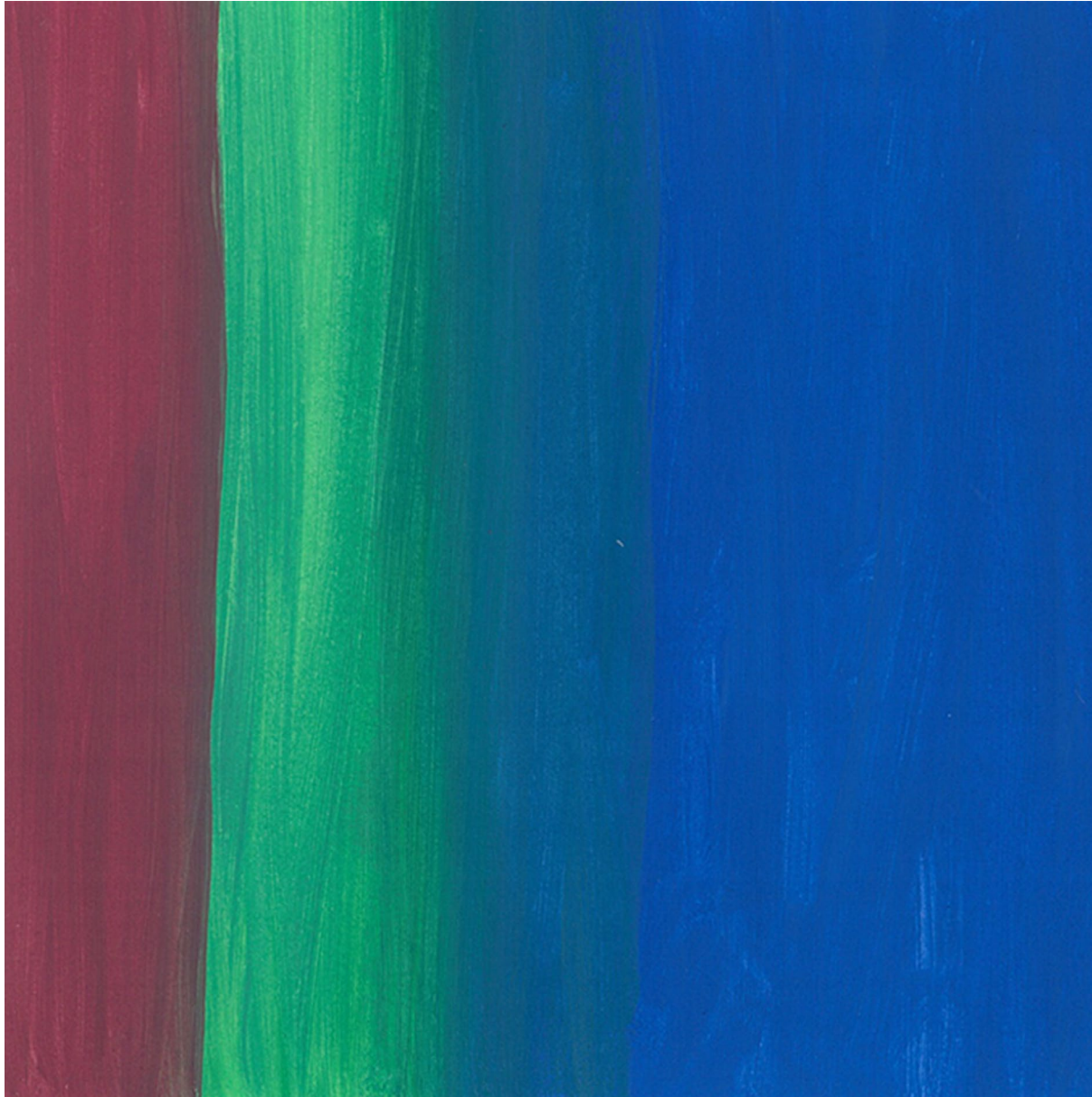


Figure 30: Evanescence colour palette

Distinct sound. Bottled up into little compartments of delight. Separated by the passing of time. Fading in and out. Decaying. Revealing subtly the information that becomes fundamental to the beauty of the sound. A balance of silence and sound. Contentment in the arousing of varied acoustics. Bold movements that don't quite mix as one continuous moment. The crackling of frozen ice. The melting of ice. The drip of water. As the day goes by.

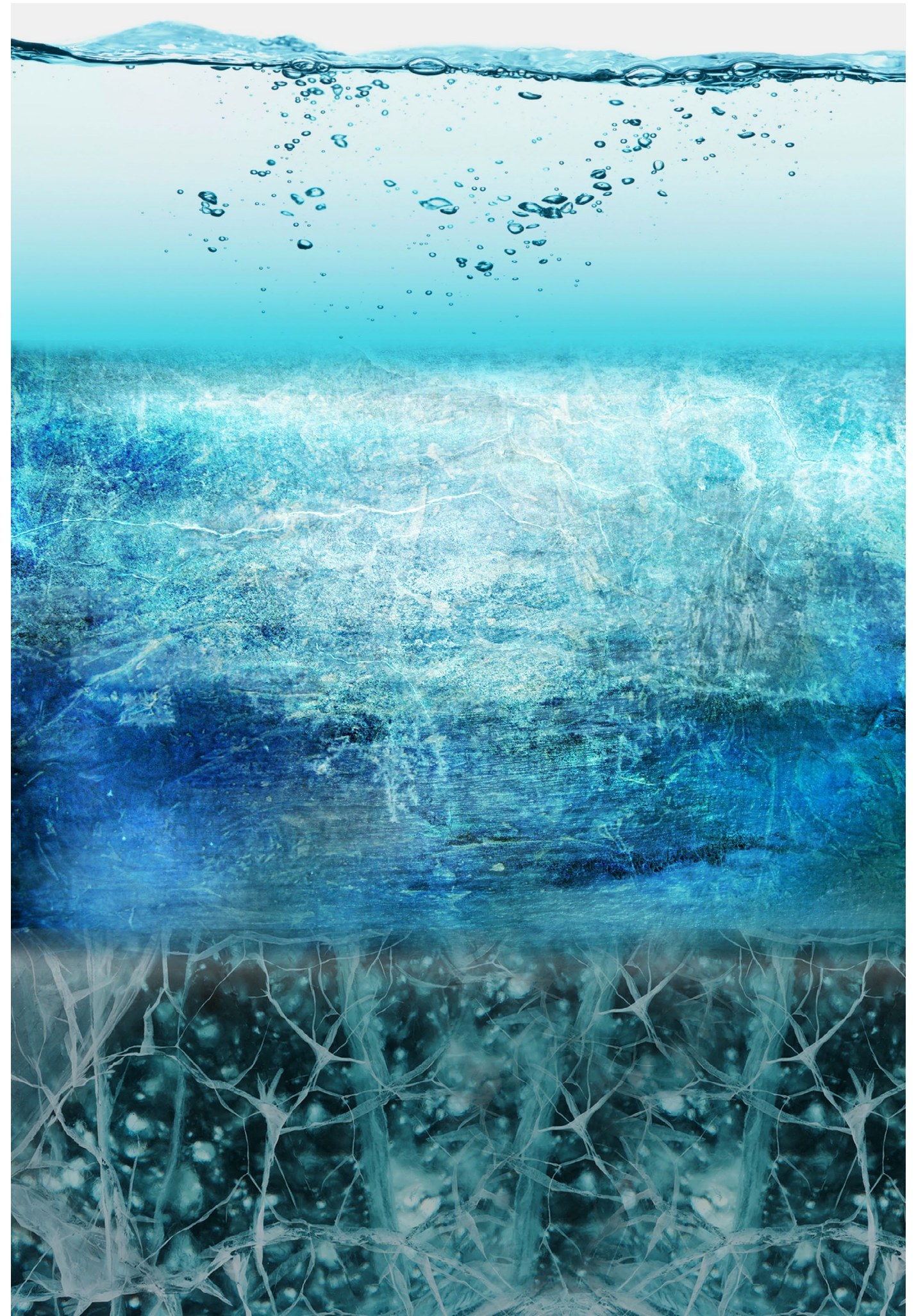


Figure 31: Evanescence mood collage

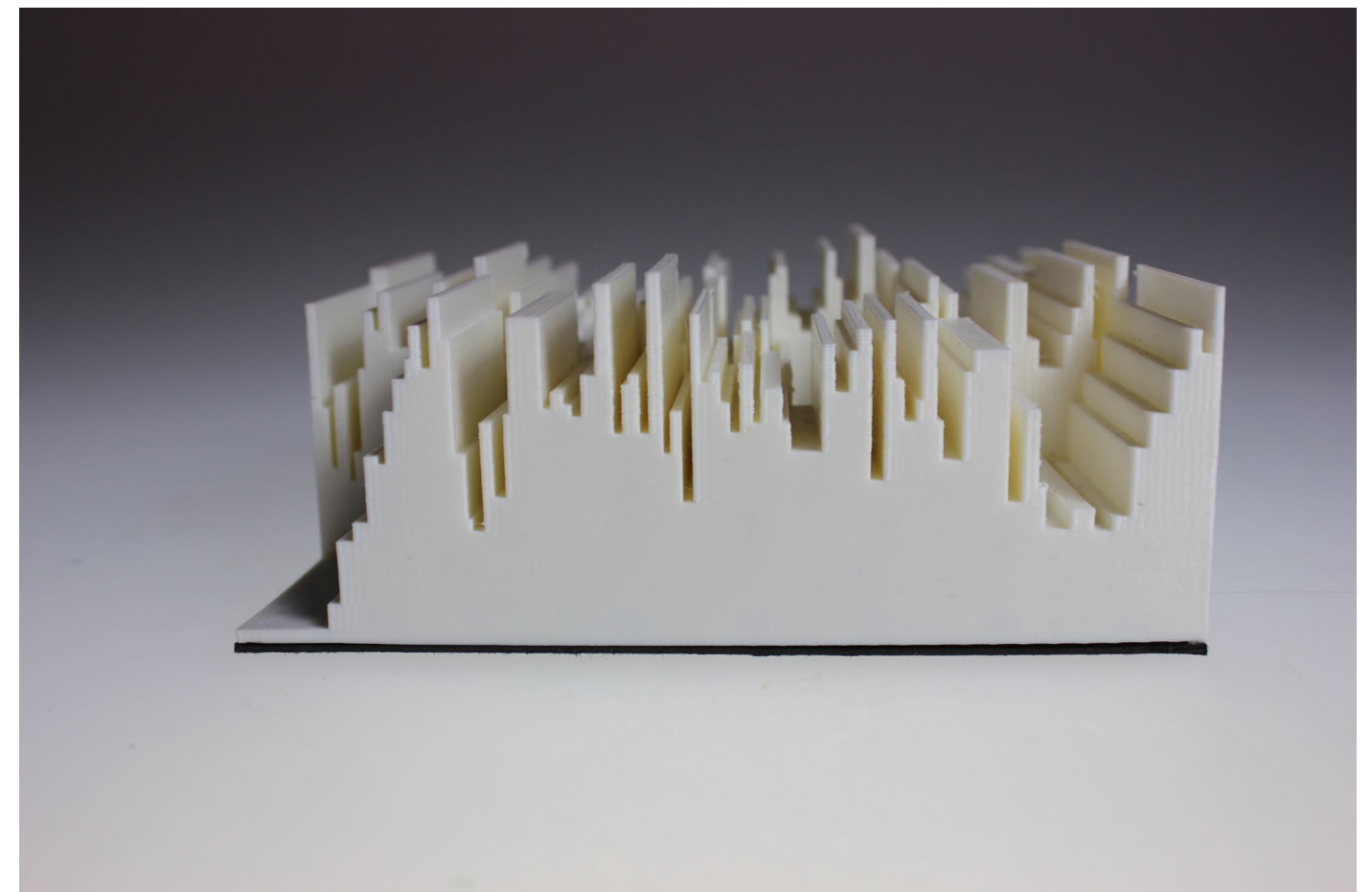
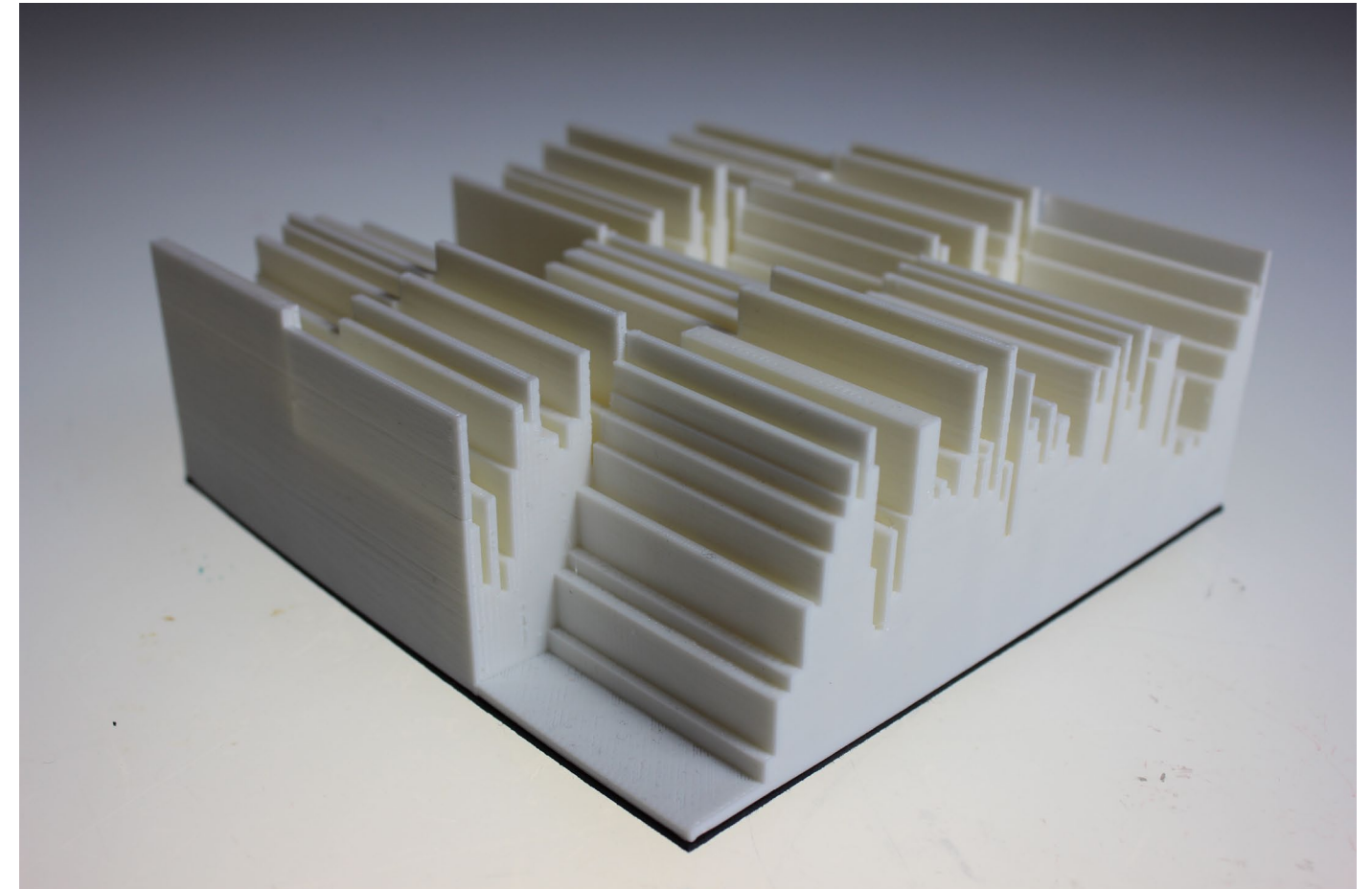


Figure 32: 3-D printed physical realisation of sound of Evanescence

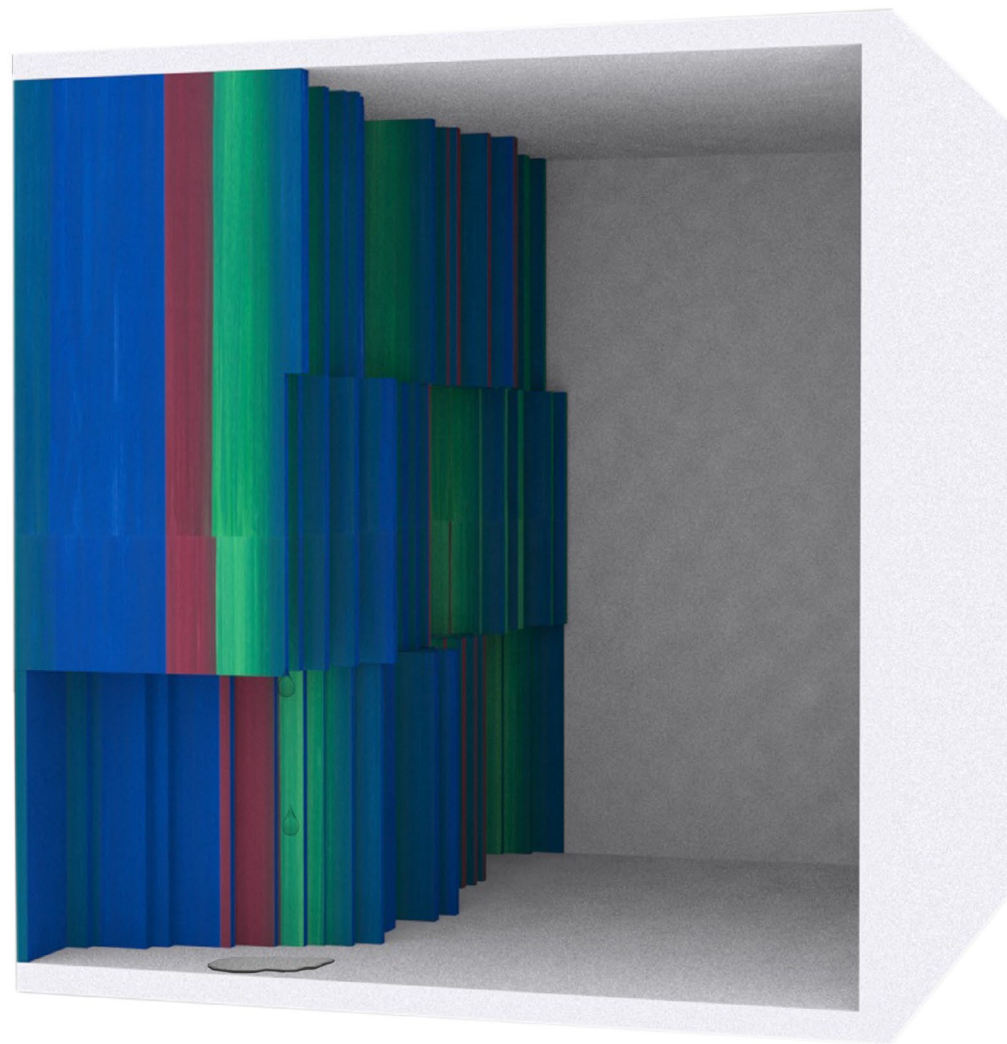


Figure 33: Realisation of the mood of Evanescence in space

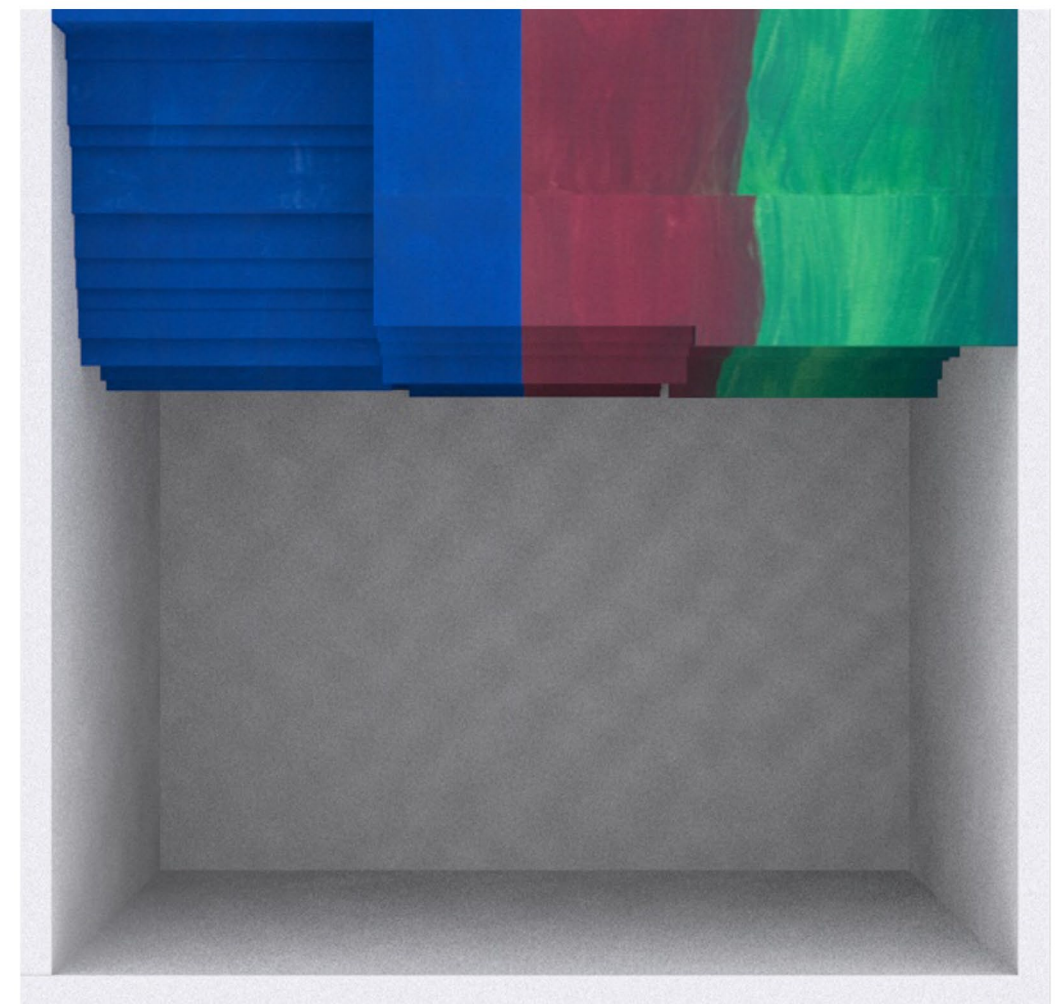


Figure 34: Realisation of the mood of Evanescence in space

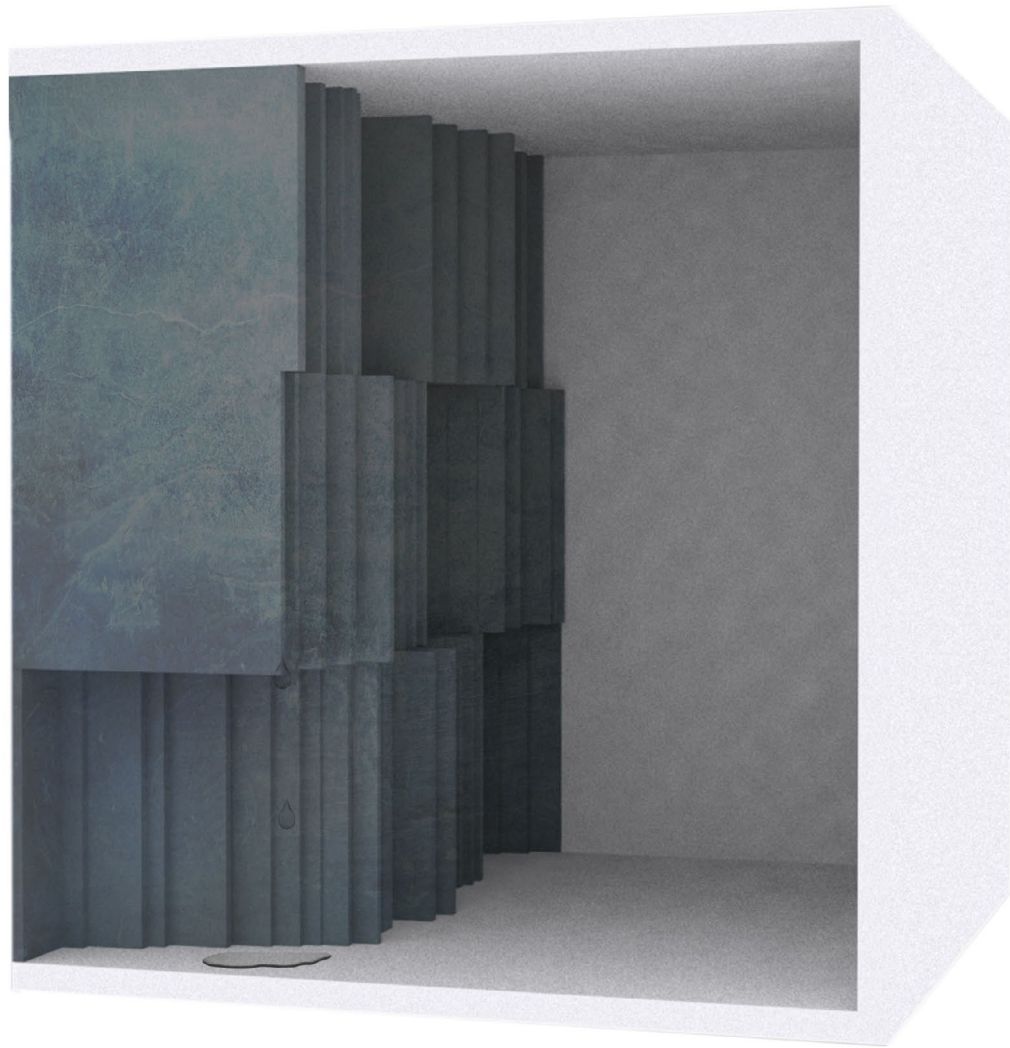


Figure 35: Realisation of the mood of Evanescence in space

2.13 Procession:



Figure 36: Procession colour palette
Sound forming an unbroken whole. Without interruption. Endless. Imaging allowing the sound to be placed within specific zones in spatial collaboration. Procedural sound. Sound that carries with it the depth of the ocean. Fading as it carries away across the desert planes. Laid with distance. Tiny details easily articulated within the endless moments made of acoustic shifts. The pit-pat of rain as it falls over concrete, wood and tin. Always the same but ever different.



Figure 36: Procession colour palette

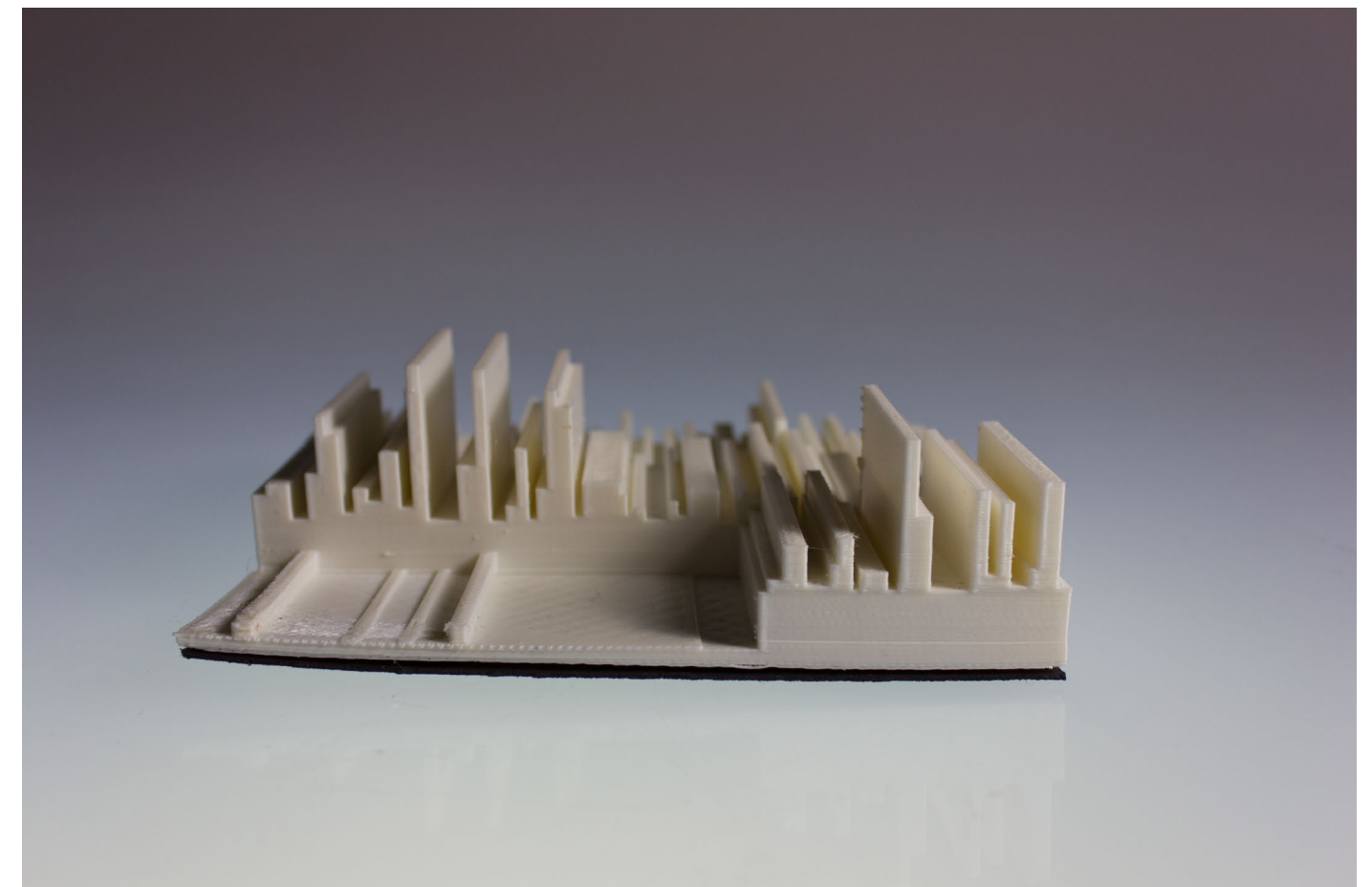
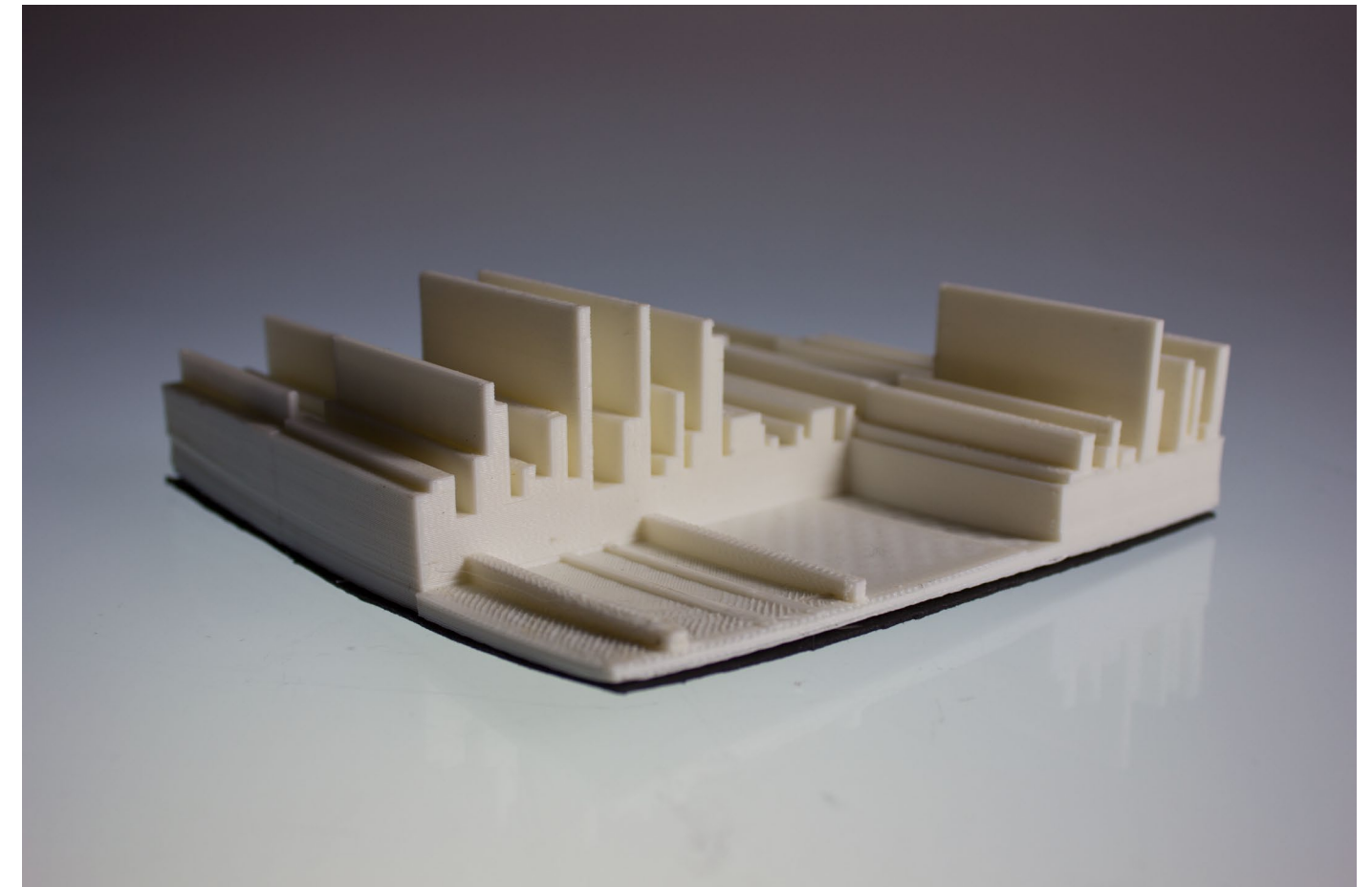


Figure 38: 3-D printed physical realisation of sound of Procession

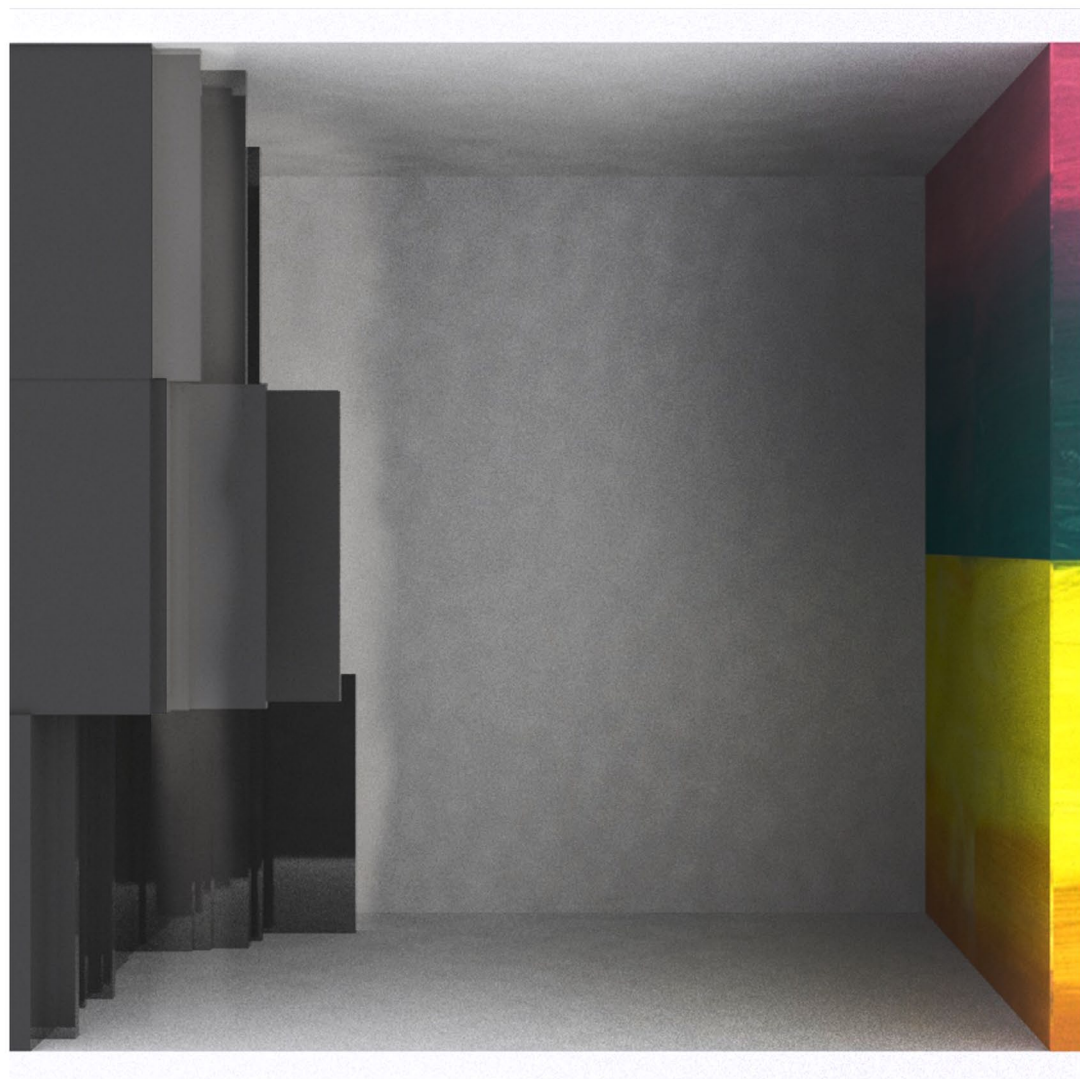


Figure 39: Realisation of the mood of Procession in space

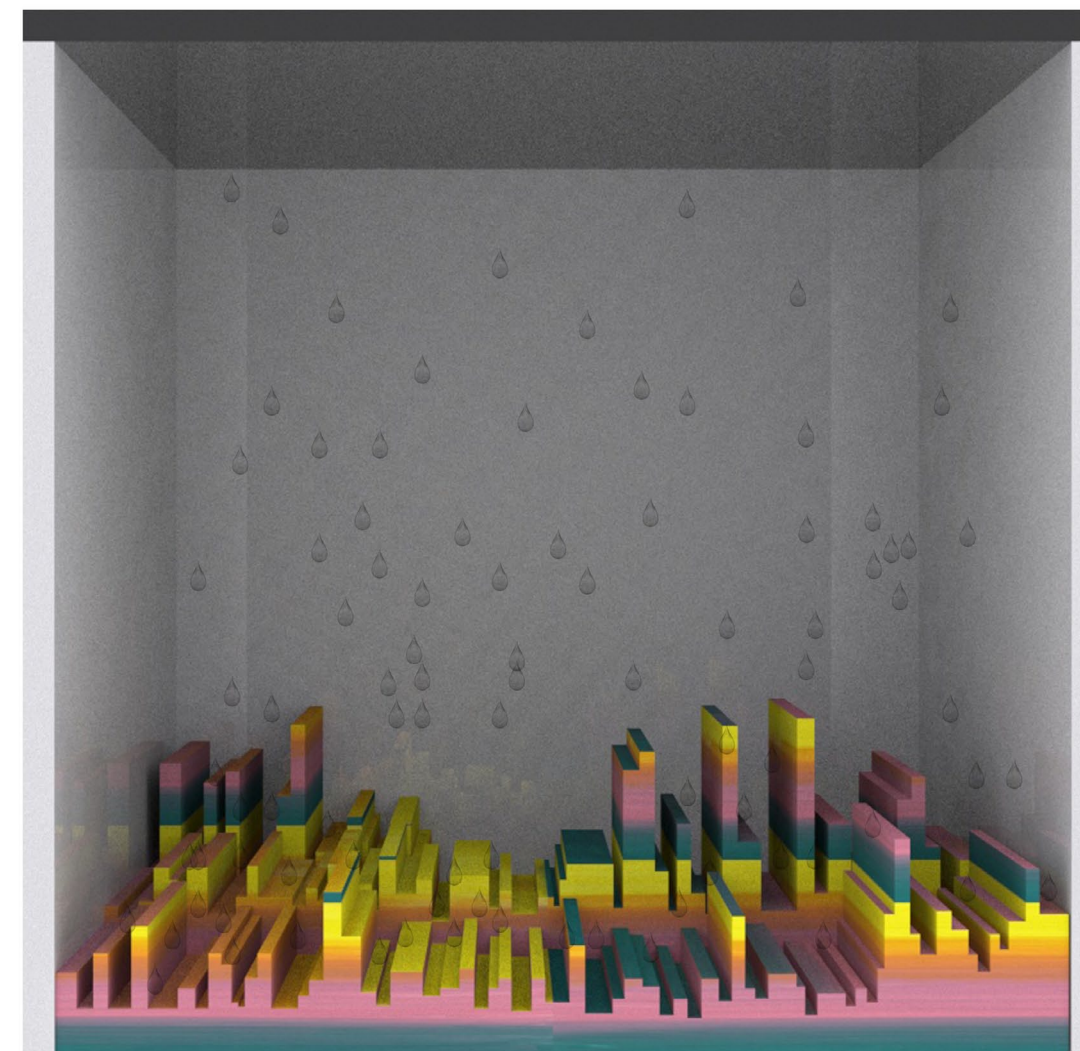


Figure 40: Realisation of the mood of Procession in space

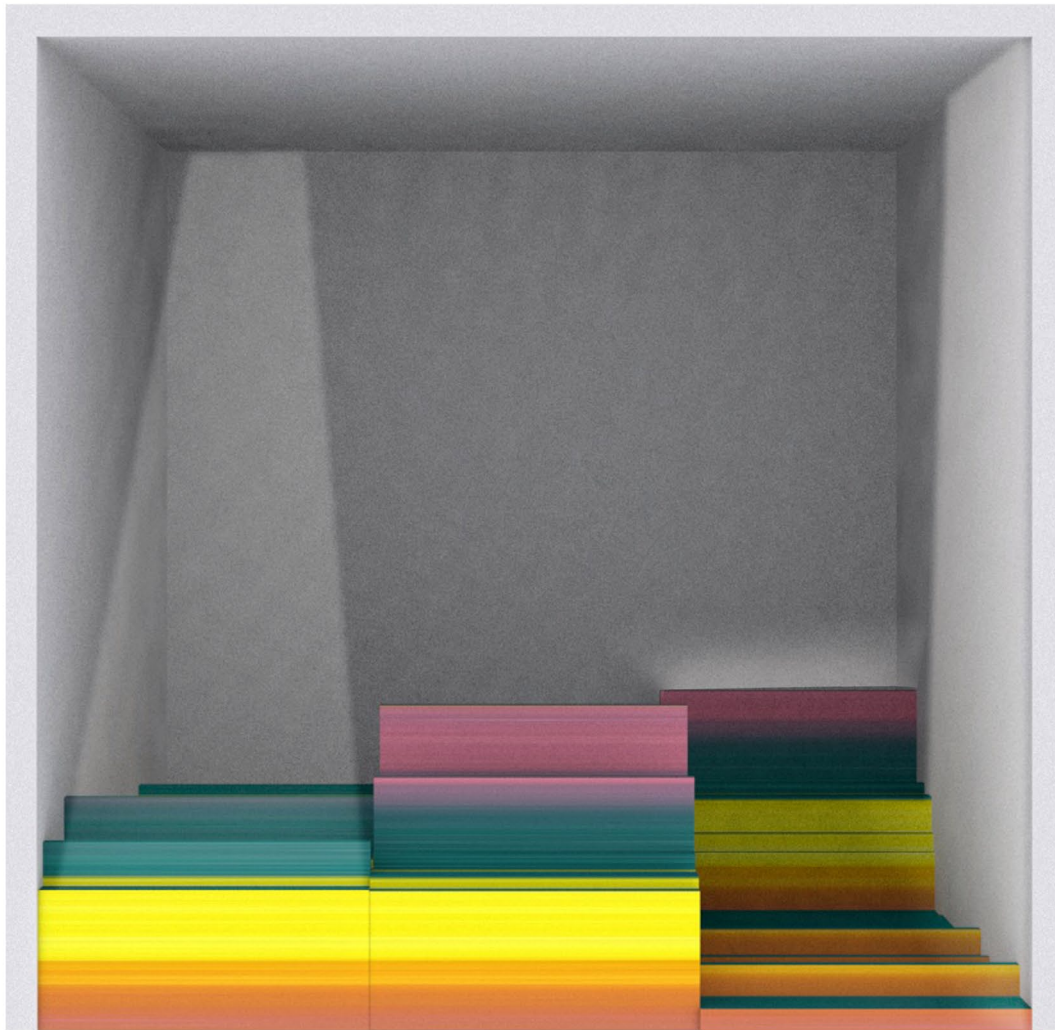


Figure 41: Realisation of the mood of Procession in space

2.14 Atmospheric Silence:



Figure 42: Atmospheric Silence colour palette

Bold, bright and beating. Sound unceasing in its cohesion. Projecting a sense of rightness. Sound that is perfectly balanced in its continuation of solidarity and harmony. A pace laden in rhythm. In time. On beat. Sound purely tensioned in silence and acoustic variance. The rushing sound of a waterfall, tumbling down over rocks and crashing into the deeper pool below. Roaring. Resounding.

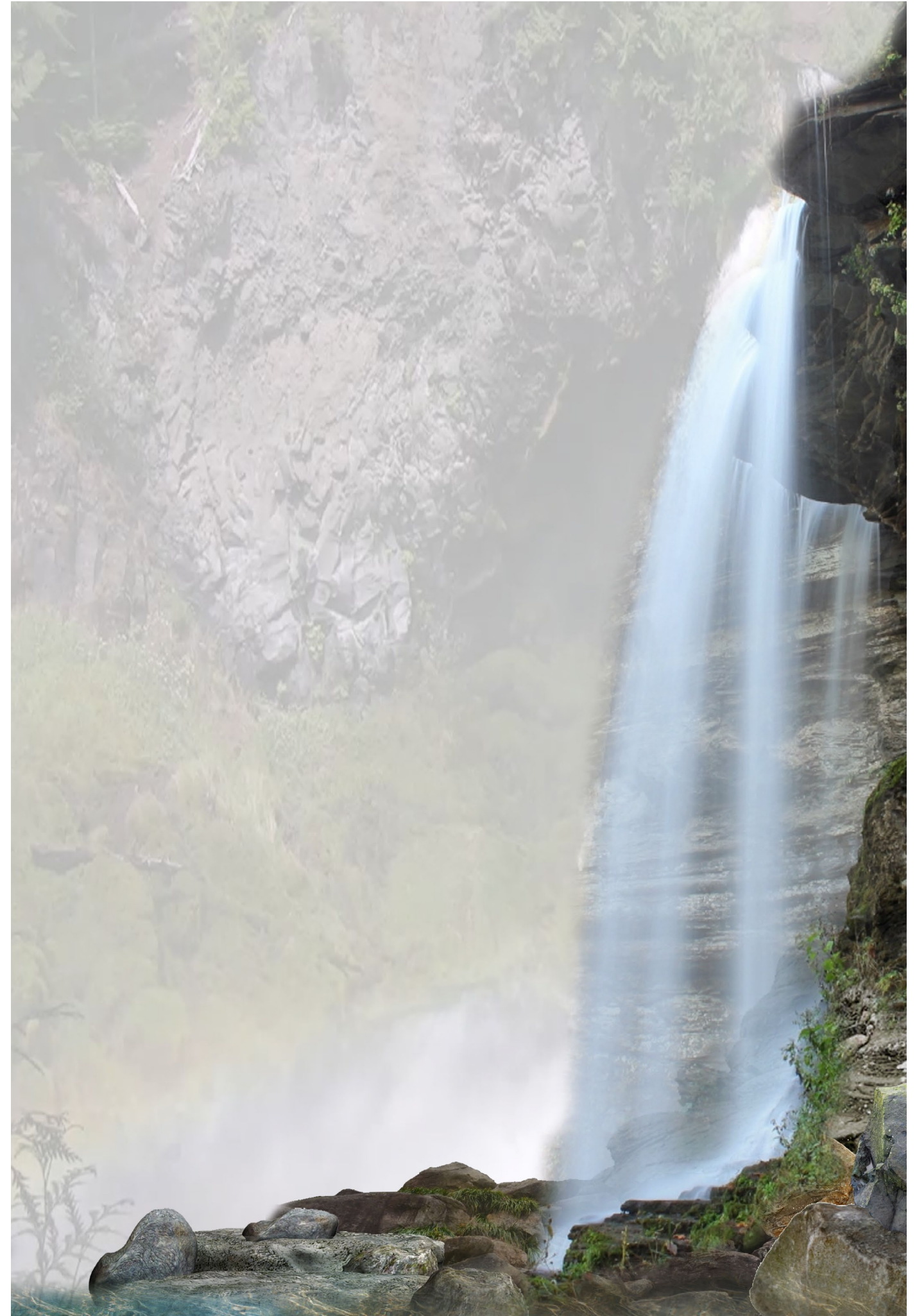


Figure 43: Atmospheric Silence collage

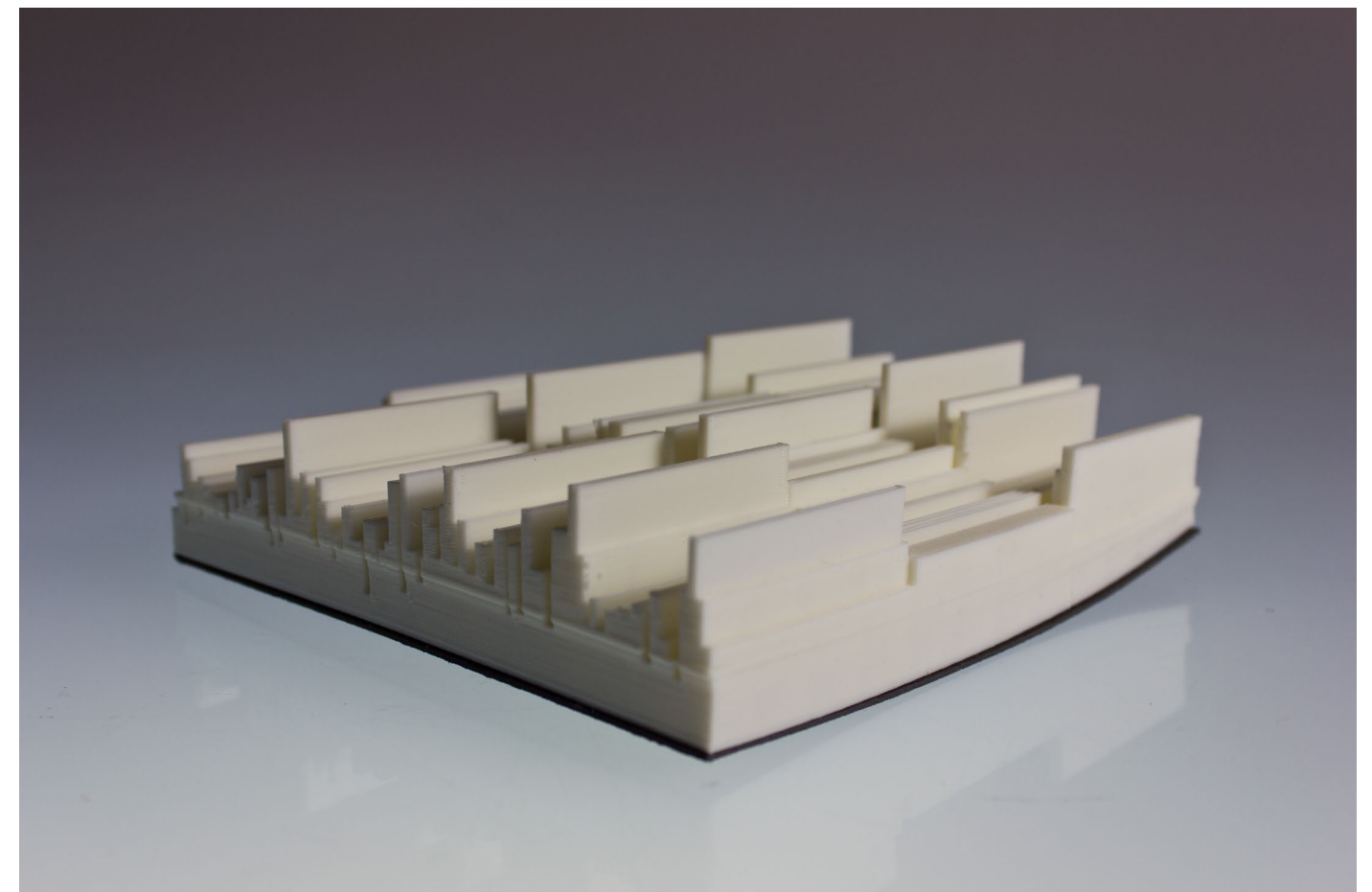


Figure 44: 3-D printed physical realisation of sound of Atmospheric Silence

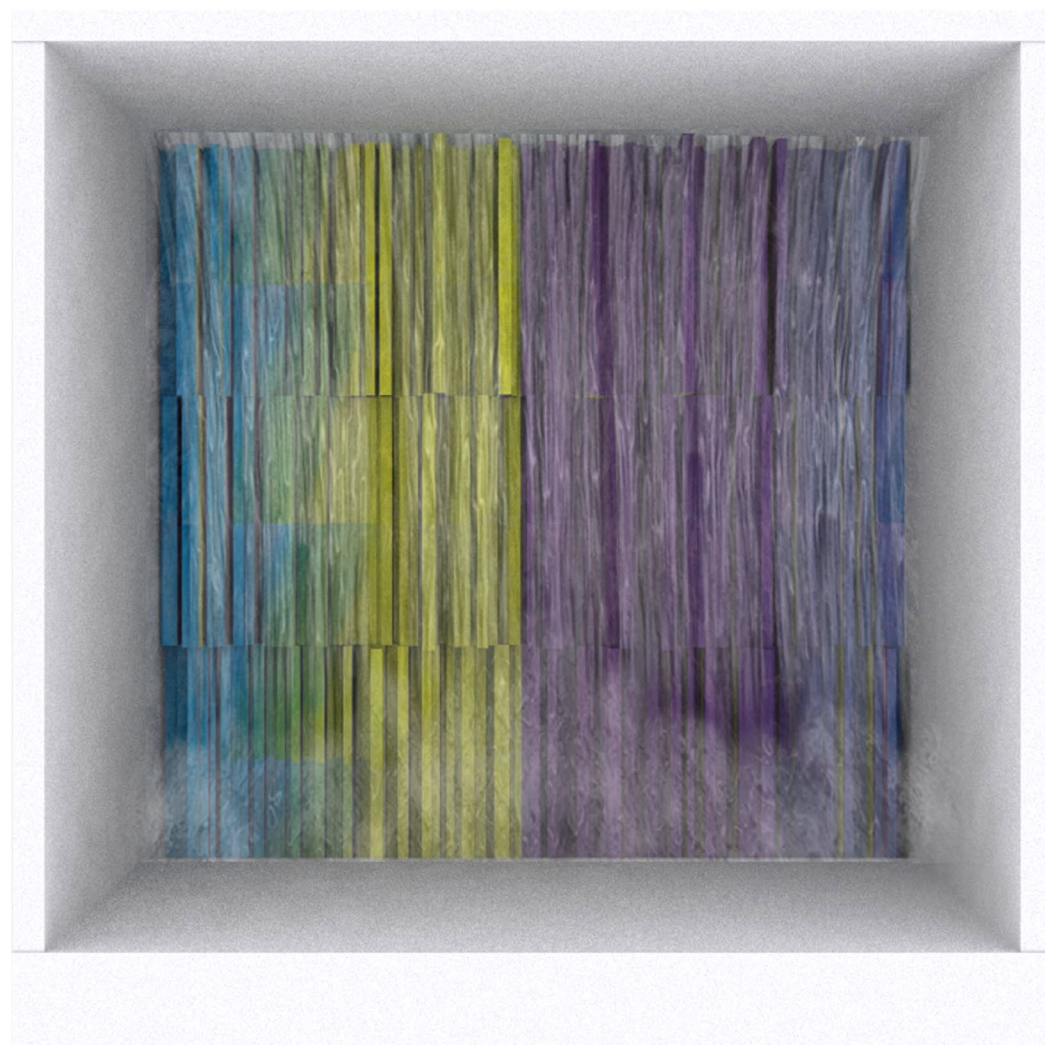


Figure 45: Realisation of the mood of Atmospheric Silence in space

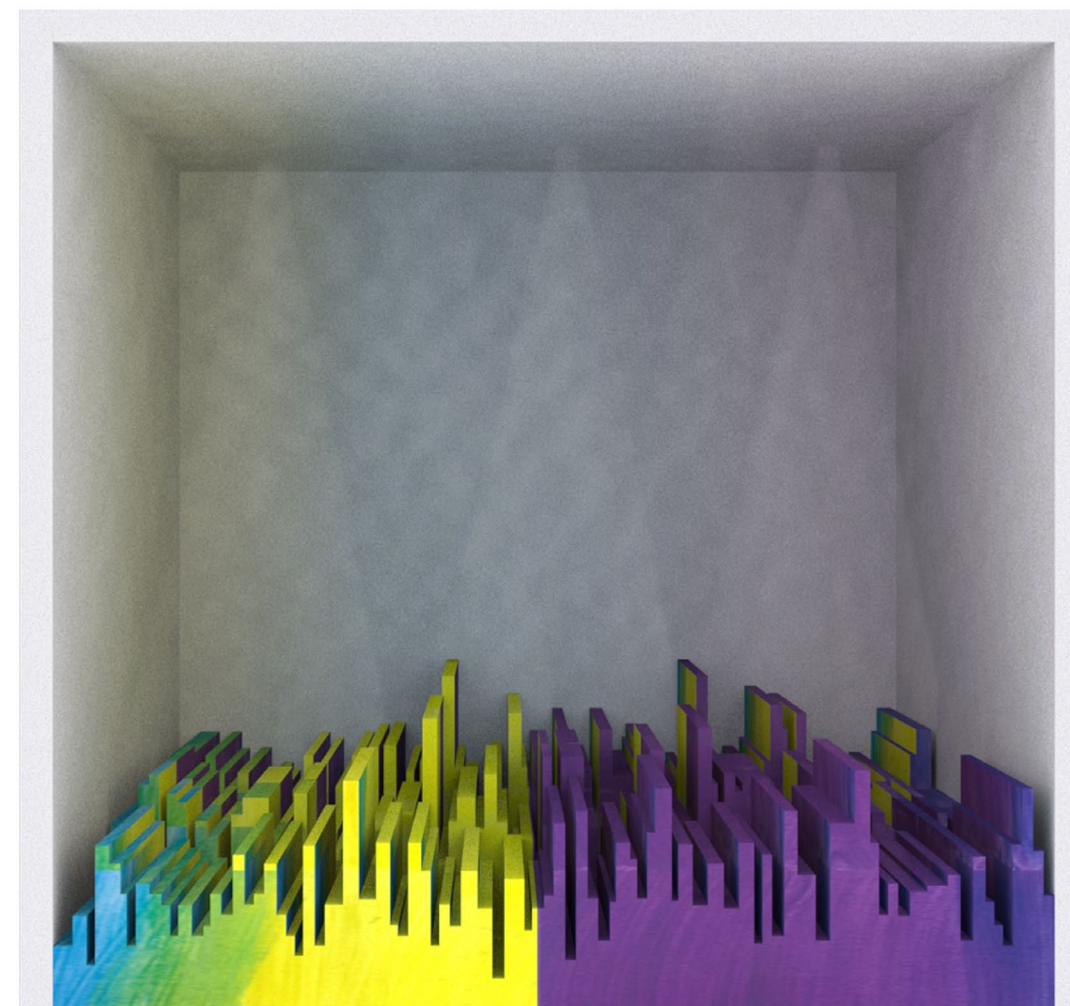


Figure 46: Realisation of the mood of Atmospheric Silence in space

2.15 Luminescence:

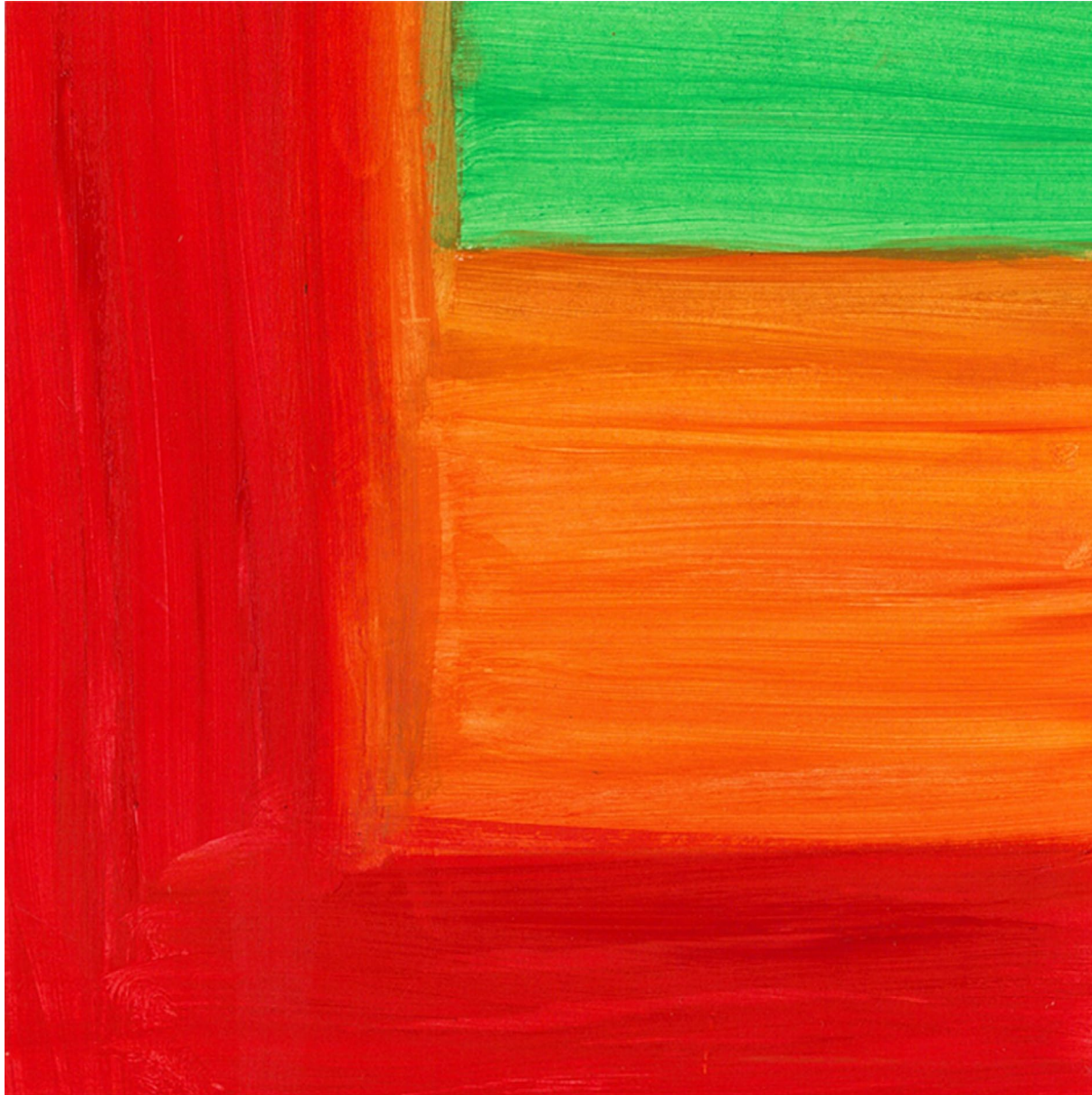


Figure 47: Luminescence colour palette

Joyfully musical sound of harmonic blend. Soft yet effervescent in tune. Draped with fabric, the sound controlled to middle tones. Coherent and right. Filling the soul with a sense of warmth. Rich, round and reverberating. That sweet taste on the tip of your tongue. Small silences with small variances. The bubbling water. The swoosh after a sweet dive into the blue.



Figure 48: Luminescence mood collage

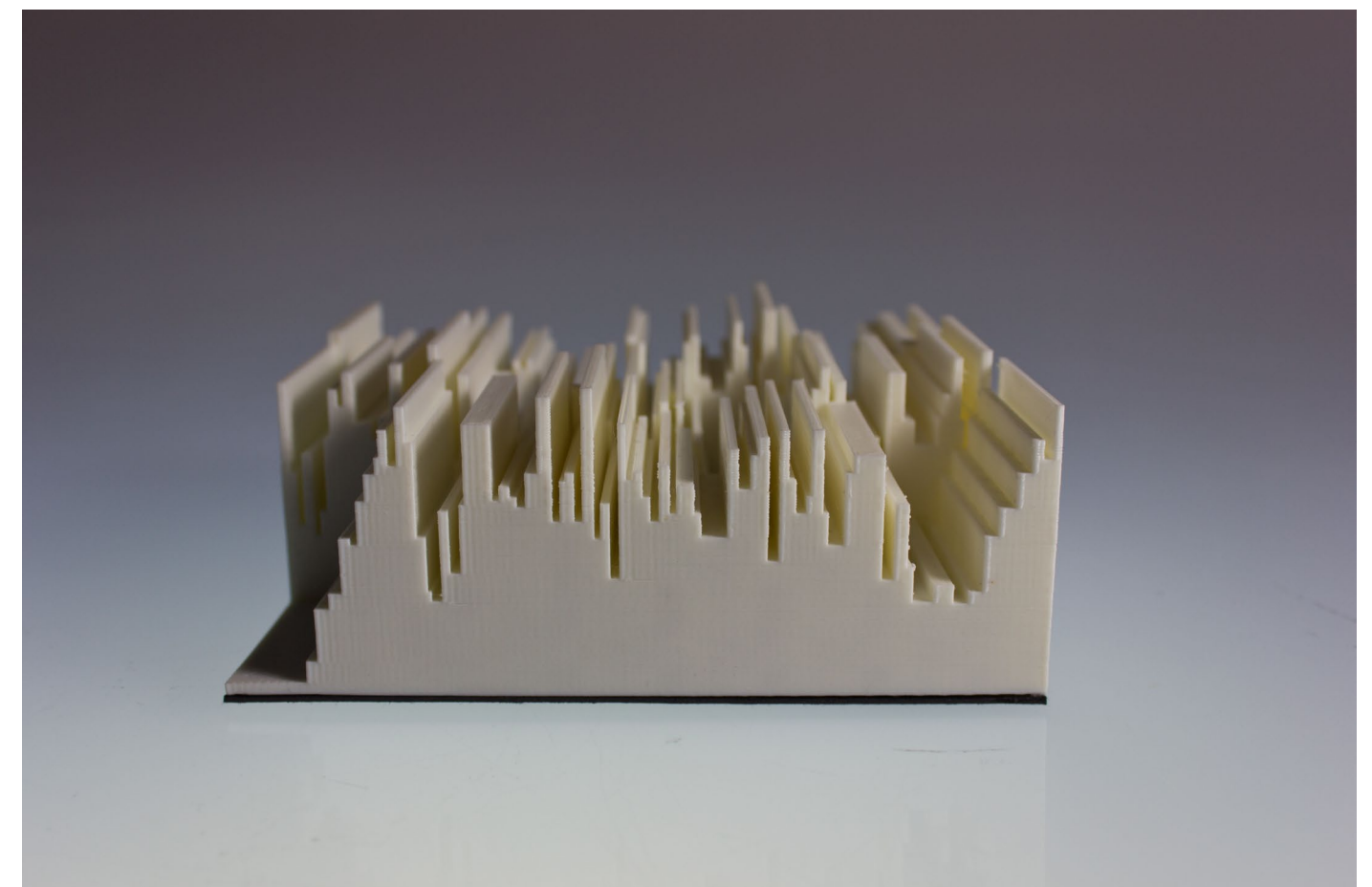
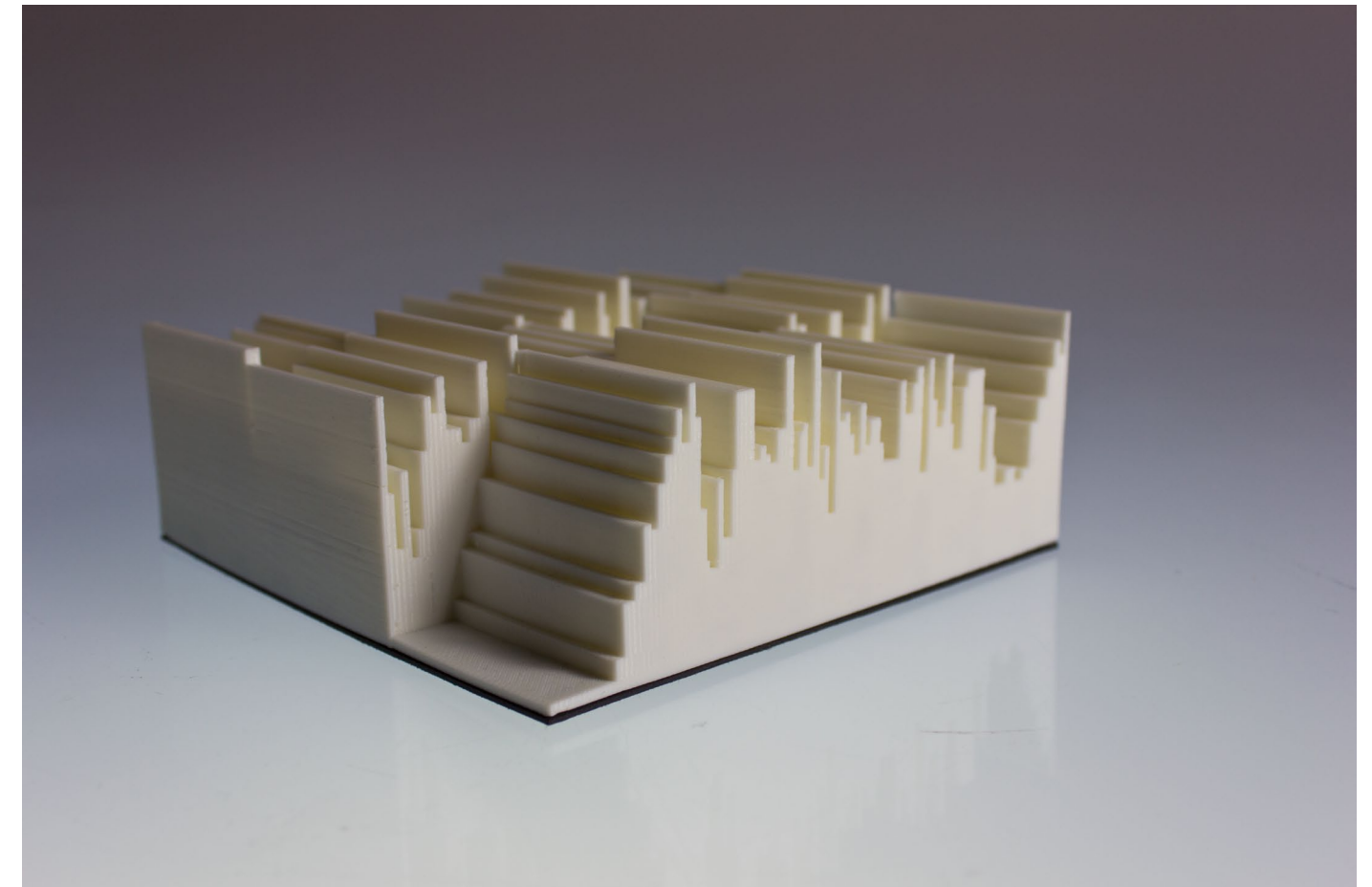


Figure 49: 3-D printed physical realisation of sound of Luminscence

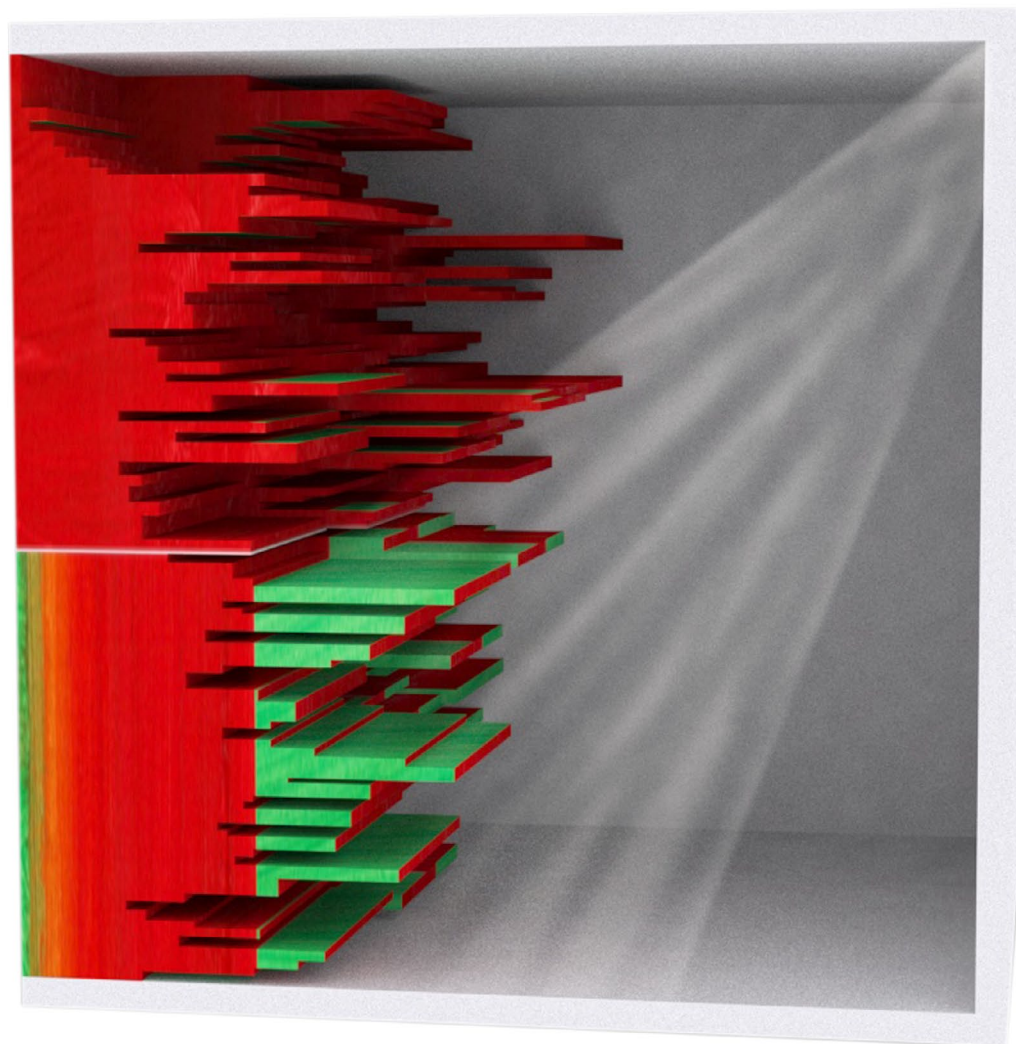


Figure 50: Realisation of the mood of Luminscence in space

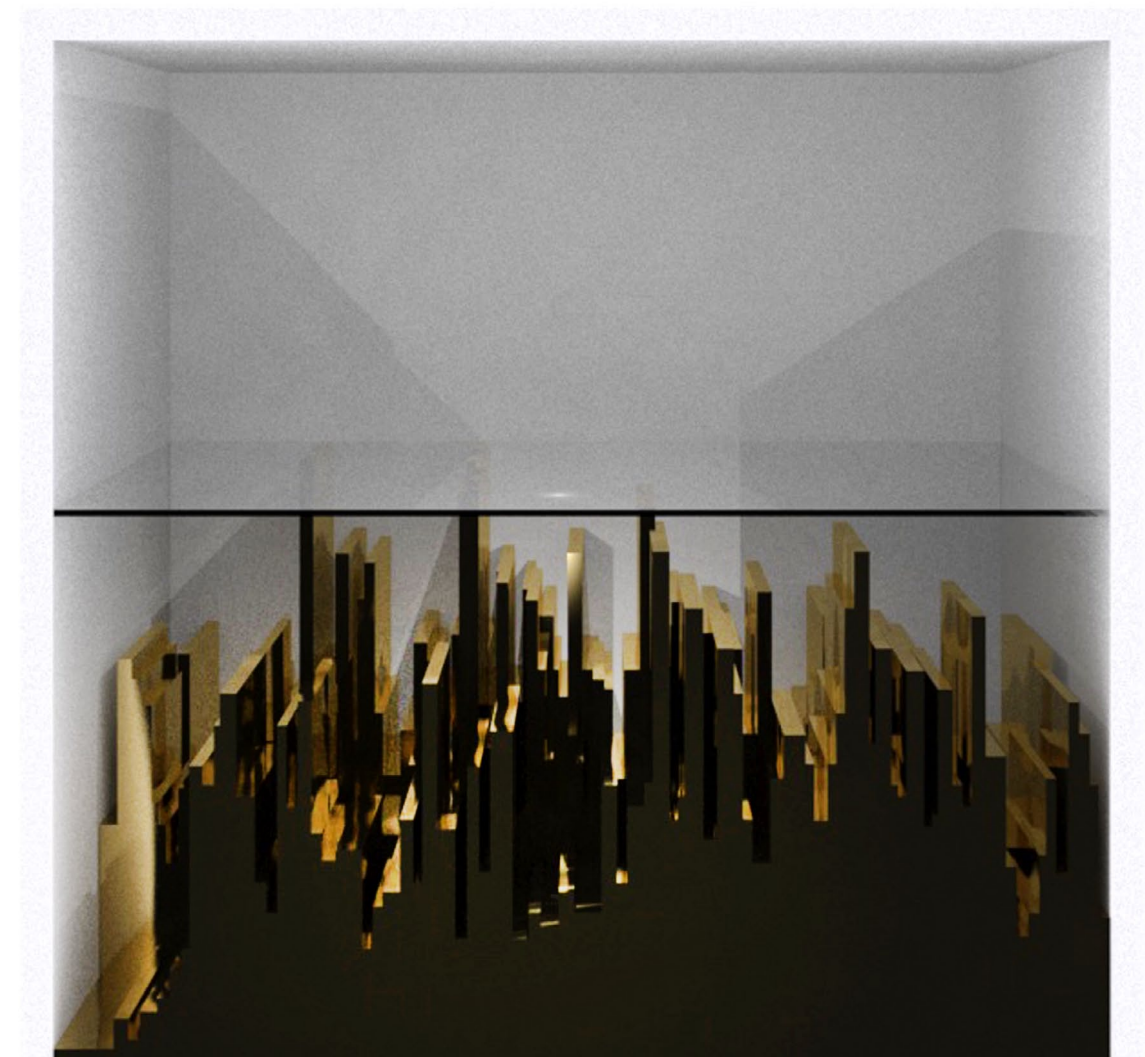


Figure 51: Realisation of the mood of Luminscence in space

3

Part



3.1 Circa Theatre:



Figure 53: Signage on the building

An actual site for a sensory design iteration is proposed in order to test the newly developed categories of sound, and the role of light within an interior architectural environment.

What is now considered as the Wellington waterfront was once a part of the Wellington harbour, but land reclamations beginning in 1857 and ending in 1970 saw a new shoreline established. This rich and vibrant history tells of many small and large reclamations that occurred over this time period. In the 30 years following the 1900's "reclamations for Railways and Harbour Board purposes, more wharves, the building of a seawall at Oriental Bay and a boat harbour at Clyde Quay" allowed for possible architecture works in this location ("Waterfront reclamation.").

Number 1 Taranaki Street lies at the top end of the 1.3 kilometre stretch of road and sits adjacent to Cable Street. Here beside the National Museum of New Zealand, Te Papa Tongarewa is the current site for Circa Theatre. Circa Theatre made the move to its new premises in November 1994. Grahame Anderson of Ampersand Architects with support from Grant Tilly together designed the building we see today ("Circa History.").



Figure 54: Exterior of building

The theatre includes the western facade of the former Westport Coal Chambers which was across the road on Cable Street on what is now the BP Site. "The Westport Coal Company was formed in 1885 and was once NZ's biggest coal supplier" (PhilBee NZ). This building was originally built in 1916 before its repurposing for Circa. The theatre also used timber salvaged from the former Odlin (now NZX) Building as a part of the bar area (Inc., STQRY).



Figure 55: Interior of building



Figure 56: Exterior of building

3.2 Location Map:



Figure 57: Location map
Map showing the location of the site in the wider context of Wellington city. Highlighting points of interest and main streets.

3.3 Map of Surrounding Context:

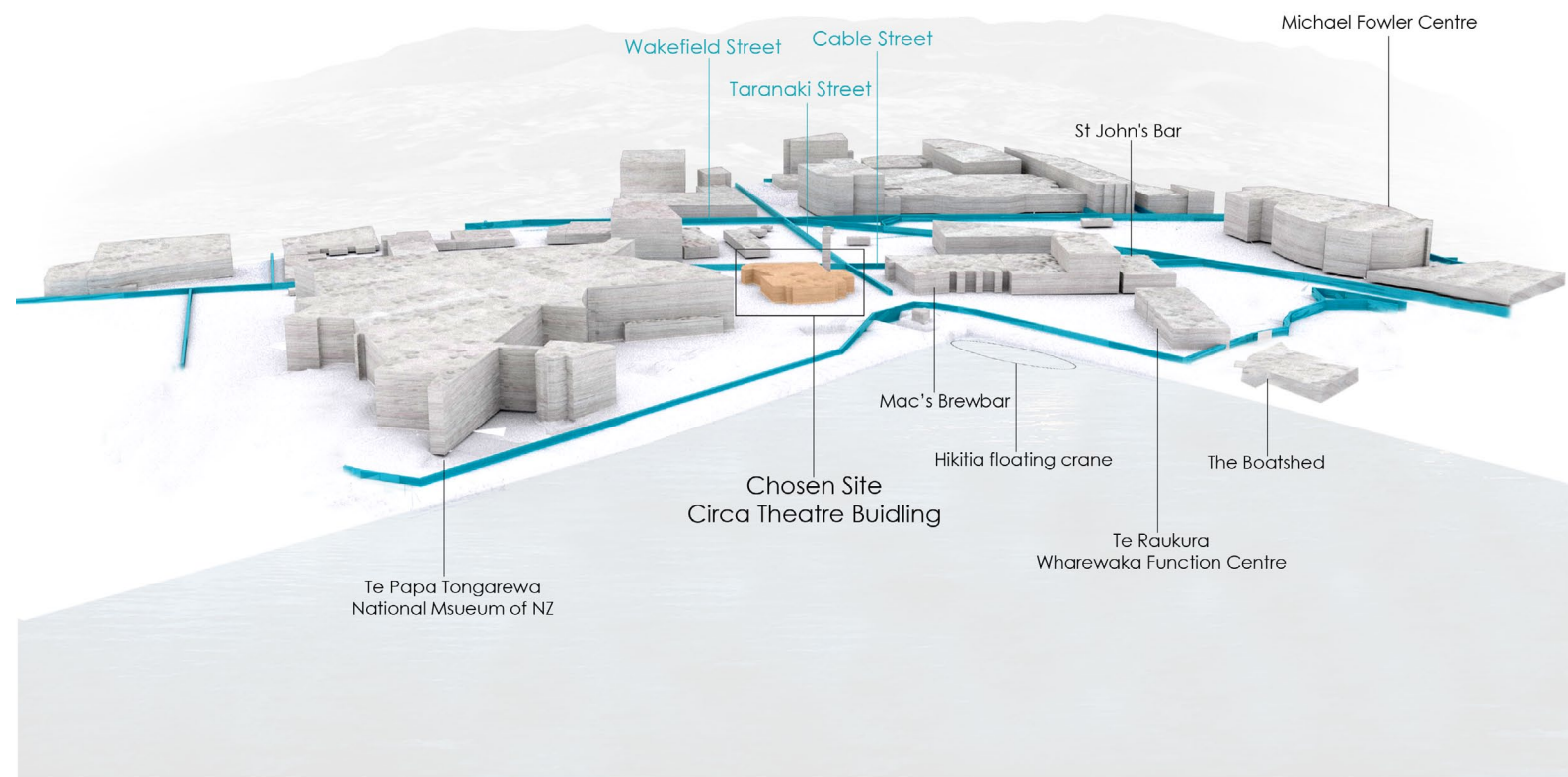


Figure 58: Map of surrounding context
3D visual of site location on wellington waterfront in context to Te Papa and other key points of interest.

3.4 Movement Diagram:

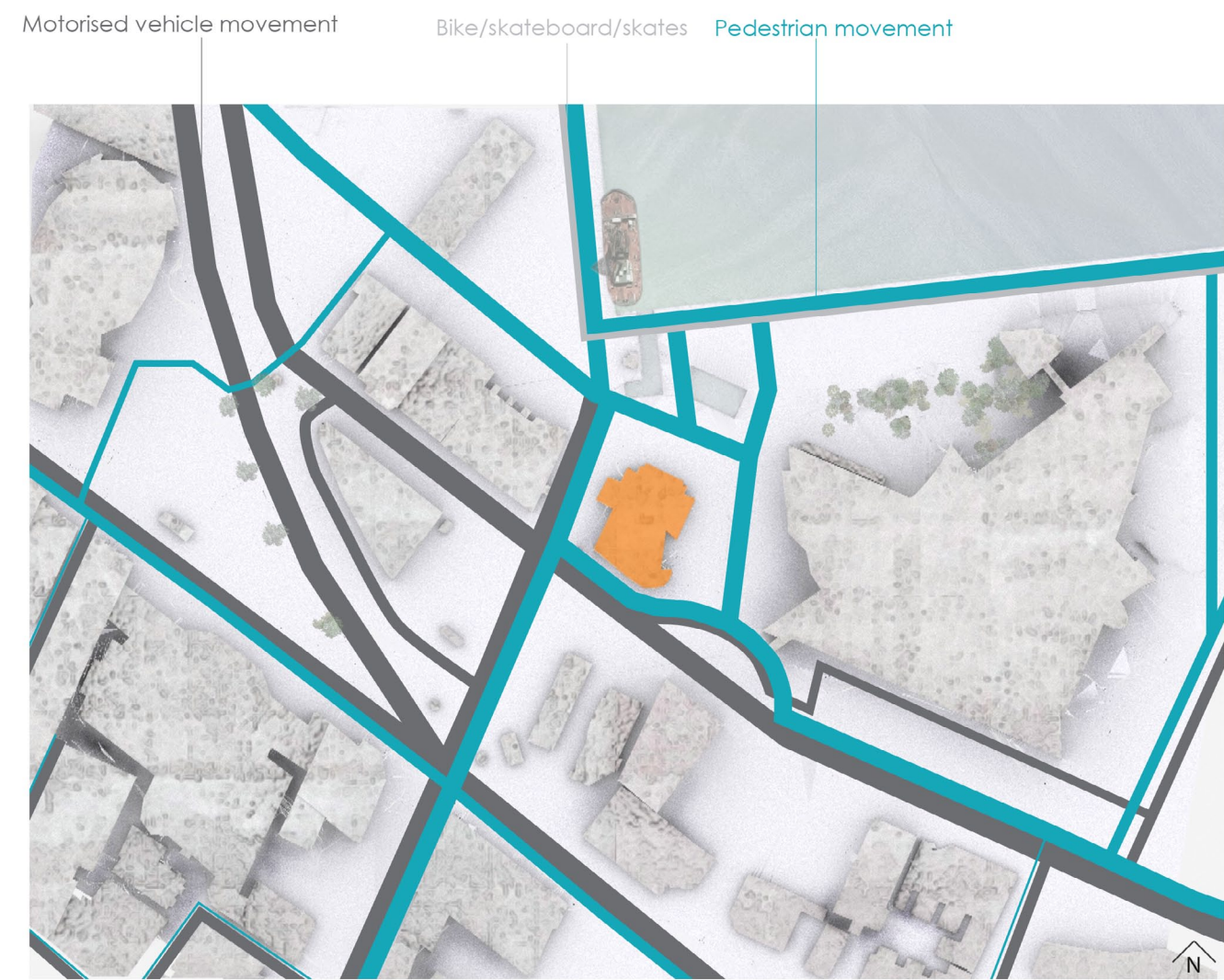


Figure 59: Movement diagram
Map showing where motorised and non-motorised vehicle and pedestrian movements are located and the intensity of that movement. This shows the available access of vehicles around site and areas of coverage for pedestrians which will be an important factor in the programming process.

3.5 Light Study:

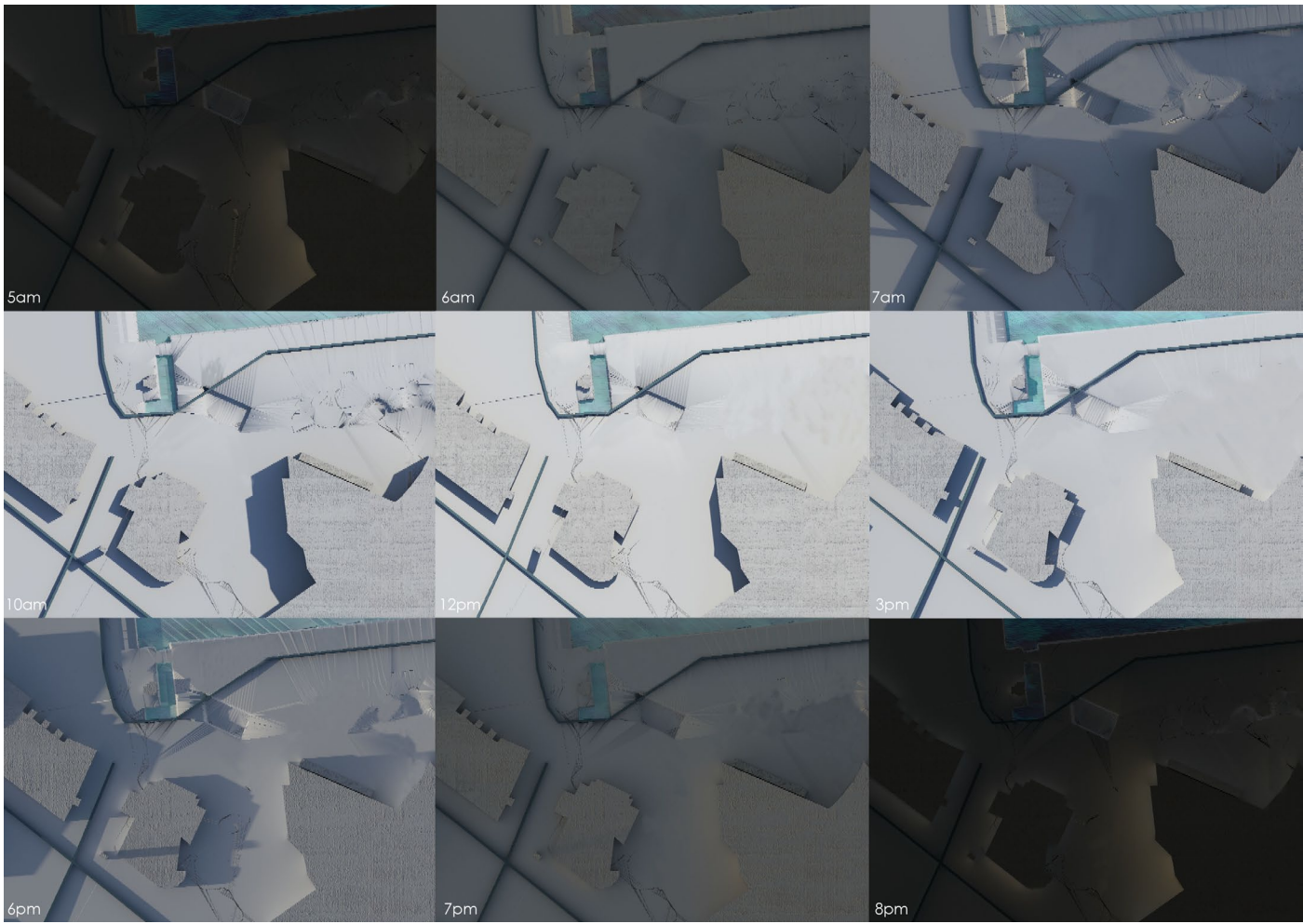


Figure 60: Light study
A digital light study is carried out using the verified geographic metadata from 3ds Max for the specific location in order to determine where the light and shadow falls on the site over the period of a day (summer was chosen for this exercise). This will help in positioning of each programme area.

3.6 Sound Map of Exterior Noise:

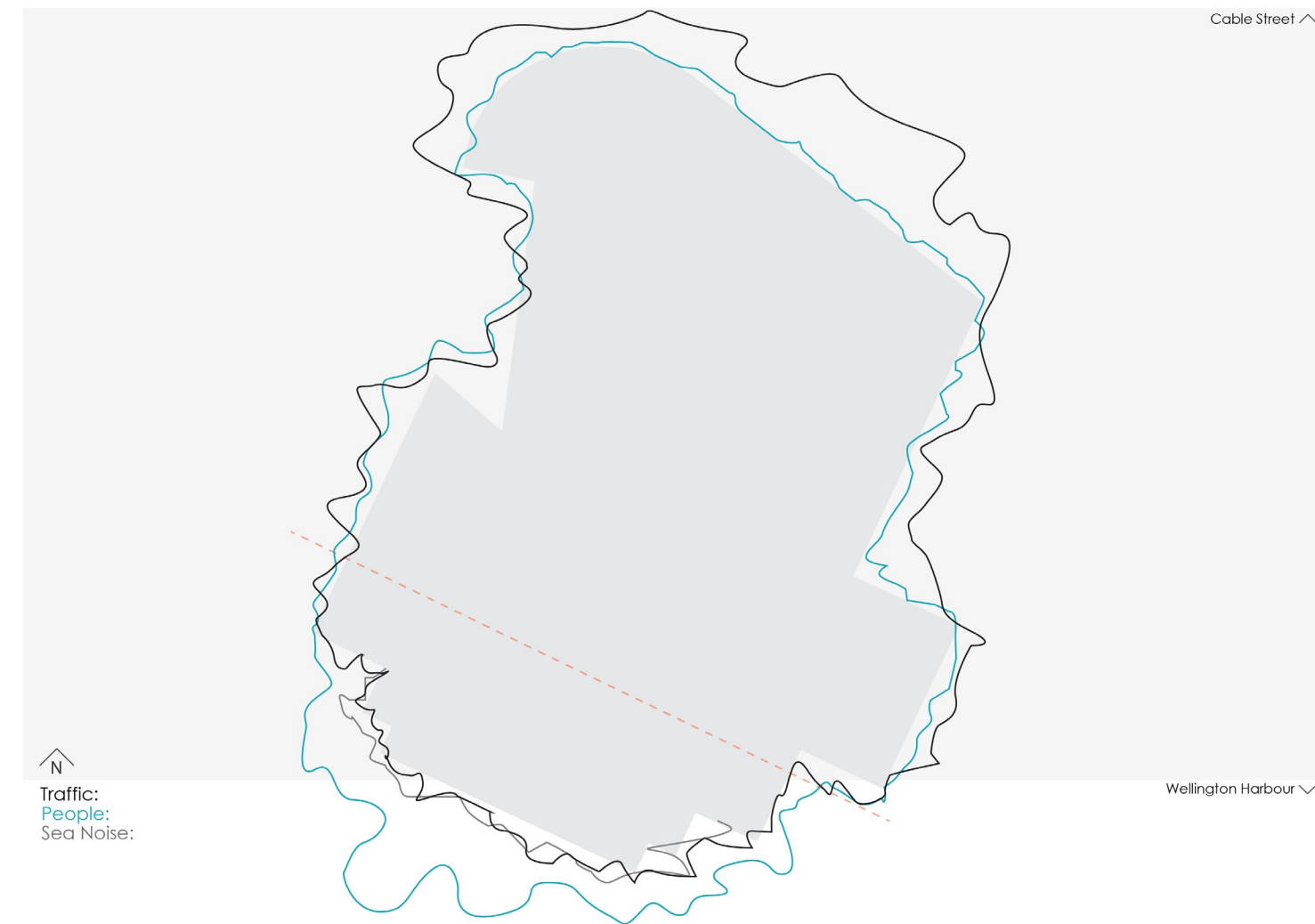


Figure 61: Sound map of exterior noise

Sound map created by walking around the exterior of the building and recording my own personal response to sound. Noting different categories of sound that can be heard, traffic, people, sea noises and their respective levels of intensity.

4

Part

4.0 First Iteration:

The following chapters will now look at testing the previous developments in chapters one and two combined with the information gathered on site in chapter three in order to evaluate the proposal of sound theory.

4.1 Initial Programme:

Centre for Sensory Enlightened Education

As previously mentioned in chapter 1.3 it is important for those who are sensory impaired to be integrated into society. This is achieved through creating spaces that are easily accessible, useable and engaging for people with and without impairment. A centre for sensory enlightened education is chosen as a programme as an opportunity to achieve this. The space will be a place for learning for the public and for people who are sensory impaired. It is to be a place designed for sensory awareness. The design will include a central hub for organisations providing those with sensory impairment. Allowing all necessary amenities to be easily located in one zone making navigation for the visual and hearing impaired easier and more realistic. It will be a place inclusive of public awareness and communication with the sensory disabled communities, demonstrating the benefits of multi-sensory design. It is designed to be a place to celebrate all the senses and their benefits to well-being and happiness.

This will include the following facilities:

Offices/ hub for organisations Deafblind (NZ), New Zealand Federation for Deaf Children and Deaf Aotearoa.

Spaces for sensory exhibitions (Gallery for the senses)

Classrooms for after school and extra learning support, for those with and without sensory disabilities (consisting of open plan and adaptable design)

Public rooms for rest and socialisation:

- Mandatory services;
- Bathrooms
- Kitchens

4.2 Mood to Programme Matrix:

Mood Category:	Programme Category:
Atomization:	Entrance/reception area
Veils of Glass:	Learning Facilities
Canalization:	Bathrooms
Evanesence:	Gallery of the senses
Procession:	Kitchens
Atmospheric Silence:	Public rooms for rest and socialisation
Luminescence:	Offices

Figure 62: Mood to programme matrix

4.3 Sound Zoning Diagram:

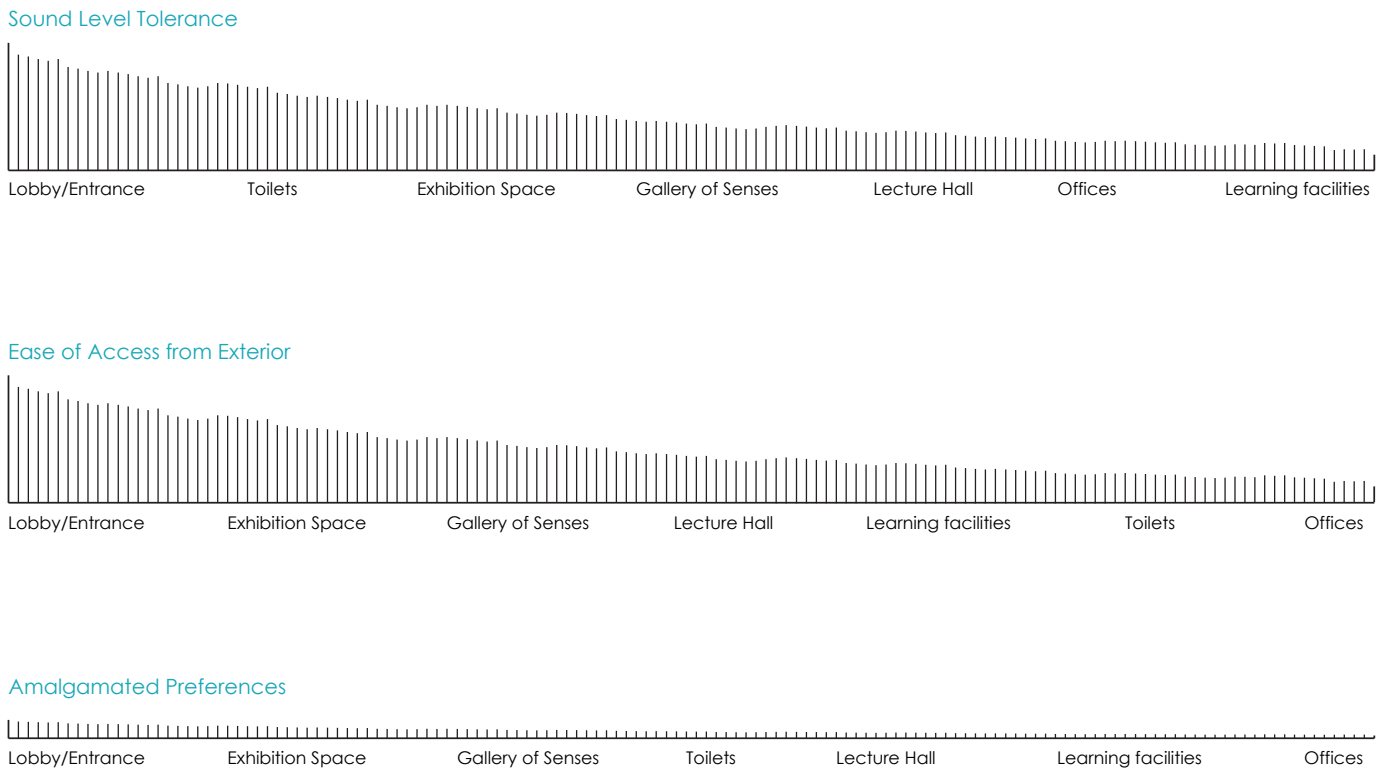


Figure 63: Sound zoning diagram

This graph depicts first the level of sound each program category can tolerate. Next it looks at the requirement of each program category to be easily accessible from the exterior of the building. The third graph combines the data from the graphs above. This helps to determine the ideal positioning of each of the categories in relation to entry, sound level and to each other. This will help in the following mapping process.

4.4 Sound Zoning Mapping:



Figure 64: Sound zoning mapping

Mapping of possible program layouts represented by various water imagery. Rough and moving waters used to show areas of high noise and public interaction such as the entrance zone. Calm waters to show quiet areas such as the lecture hall.

4.5 Case Study -Hazelwood School:

Hazelwood School;
Alan Dunlop Architect Limited, Glasgow

Located in Glasgow, Scotland lies The Hazelwood School for children aged 2 to 18, who are “blind and deaf – ‘dual sensory impaired’” (“Hazelwood School.” Architizer). Completed in July 2007 this 28,632 square feet building is designed to be usable and easily navigated by anyone (“Hazelwood School.” IHCD). “The distinctive curving interior spine meets the complex demands for an intuitive wayfinding system as well as the substantial storage needs for a wide range of equipment used by children with a variety of disabilities” (“Hazelwood School.” IHCD). The curriculum is “multi-sensory and differentiated to meet the individual needs of pupils” (“Hazelwood School Handbook.” 4). This is achieved through the many aspects of the design which engage with multiple senses allowing each student to get enjoyment and engagement out of a space regardless of the severity of the disability. Such as the “Redundant signage throughout the school, in Braille and pictograph and Moon” allowing communication at every level (“Hazelwood School.” IHCD). There is also the use of subtle colours, contrast, and adaptable lighting elements to maximize the use of children’s residual vision, specifically to identify transitional and storage spaces (“Hazelwood School.” IHCD). Neglecting a visual bias the curved form of the building reduces the visual scale of the main circulation spaces (the ‘street’). “The installation of tactile aids, contrasting colour and materials, and creation of uncluttered, readable interior and exterior spaces factored significantly in the design” (“Hazelwood School.” IHCD).

The “Trail Rail” is implemented within the design to provide tactile cues for the children to navigate the building safely. “Each bay of sensory trail wall is individually shaped. This helps children orient the length of the circulation space in the school” (“Hazelwood School.” IHCD). Acoustics was also strongly considered within the design. Acoustic ceiling tiles lay overhead reducing higher volume reverberation while underfoot varied materials are used which each have their own feel and sound to distinguish different special zones. Even the sense of smell is considered with materials such as naturally weathering larch boarding used to stimulate the nose to allow for memory space recognition.



Figure 65: Trail Rail wall detail



Figure 66: Interior photo showing colour and materials



Figure 67: Exterior of building

4.6 Case Study -Installations:



Figure 68: Glass pod, herb garden



Figure 69: Tactile flooring



Figure 70: Perfume tasting mist

The Sensorium exhibition located at the contemporary art museum MUDAM in Luxembourg by Céline Merhand and Anaïs Morel aims to engage all five of the senses. As shown here with the glass pod herb garden, allowing an exploration of smell, touch and taste all at once (Williamson).

Here the floor moves under the weight and pressure from the touch of the feet as the user walks across the space. Thus allowing a further more comprehensible engagement with touch and therefore the space itself.

YSL Black Opium brand case study by the Robin Collective showcases an innovative and original exploration into the sense. Turning the iconic scent into tasting combinations and then turning this into flavoured mist which can be enjoyed by the user (The Robin Collective Ltd.).

4.7 Program Mapping Concepts:

Bubble diagram:
The entrance needs to be easily located and at the forefront of the programme hierarchy. Directly accessible from the entrance needs to the offices and the public rooms.

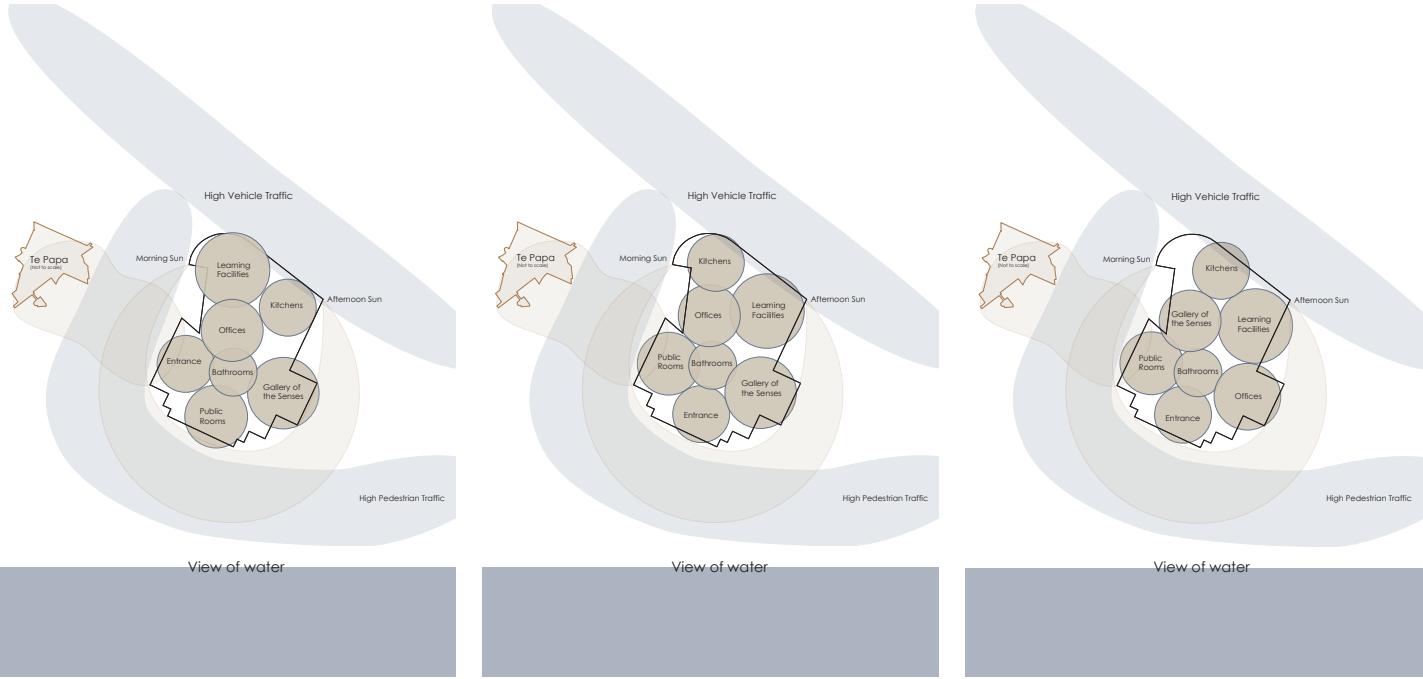


Figure 71: Program mapping concepts 1-3

Option 1:
The entrance is placed in option 1 due to its location in proximity to pedestrian movement. Here it will gain the most attention as a large amount of pedestrian traffic goes past this area, as people move to and from Te Papa. The entrance will get morning and mid-day sun in this position.

From here the public rooms are located behind the entrance, so as to be easily accessed. Being placed in the waterfront side of the Circa building also means the pedestrian movement which flows past can be enticed in. A good view of the harbour ideal for rest and relaxation is also prominent here. Sun for the majority of the day is also beneficial.

The Gallery of Senses is located off the public rooms so a flow can be established between the two spaces. Here the Gallery of Senses will be able to experience afternoon and evening sun. This works well as the space is expected to have peak times of 11 to 4pm in winter and longer in summer.

The offices are placed on the other side of the entrance so reception staff can direct people when necessary.

The learning facilities are placed behind the offices so the two can work together to create a hub of learning/working environment.

Both the offices and learning facilities will only receive morning sun in this location. Here both spaces are exposed to the loudest noise from people and sea noise. This works as these spaces are meant to be public so don't require as much sound prevention as the offices and learning facilities do. Bathrooms are centrally located within the building so can be easily accessed by all patrons.

The kitchen is located so it can be accessed by both the offices and learning environment as a social gathering space where people can cook and enjoy meals together.

Option 2:

Entrance is placed in option 2 so it can be easily navigated to by the large amount of pedestrian traffic which passes in front of the Circa building. Here it also has an appealing view of the harbour and sun for the majority of the day.

Behind the entrance the public rooms are placed so as pedestrian traffic from Te Papa flows past and can easily create an allure for people to be encouraged in.

The Gallery of the Senses is placed on the other side of the entrance so to be in close proximity to the public rooms and easily accessible by the public from the exterior.

Both Gallery of the Senses and public rooms will receive good sunlight for the majority of the day at this location.

Bathrooms are centrally located within the building so can be easily accessed by all patrons.

Offices are located here adjacent to the learning facilities so that a working hub can be initiated. Placed at the back of the building so more privacy can be experienced. Complementing each other the offices in this location will receive morning sun while the learning facilities will receive afternoon sun. The learning facility and offices sit in the quieter sections of the building allowing adequate sound prevention here.

Kitchens are placed behind the two working environments so they can be used by the patrons for both facilities as a central hub for social gatherings of meal preparation and consumption. The kitchen requires little sound protection, so having it placed in the spot that has the most vehicle traffic noise is beneficial for the other programme areas.

Option 3:

Entrance is located in option 3 at the waterfront side of the building so as to be easily seen by the large amount of pedestrian traffic that passes by here. Here it also has an appealing view of the harbour and sun for the majority of the day.

To the right of the entrance the offices are placed in a position that easily attracts pedestrian traffic and people going to and from Te Papa. This is so reception staff can direct people when necessary.

Behind the offices the learning facilities are placed. From here the learning facilities and offices can work together to create a working environment hub. Both the offices and learning facilities sit along the quietest section of the building meaning the low noise tolerance of these two spaces is met.

Both offices and learning facilities will receive mostly afternoon sun in this location.

The kitchen is then easily accessible to both the office and the learning facilities so it can be used as a central hub for social gatherings of meal preparation and consumption.

The public rooms located to the left of the entrance so can be easily accessed by the public. Here the pedestrian traffic from Te Papa flows past and can easily create an allure for people to be encouraged in.

The public rooms and entrance will experience the highest outside noise from people and water which is acceptable for these programme types.

Behind the public rooms sits the Gallery of the Senses so a natural flow can happen between the two spaces. Both the public rooms and Gallery of the Senses will receive mainly morning sunlight in this location.

Bathrooms are centrally located within the building so can be easily accessed by all patrons.

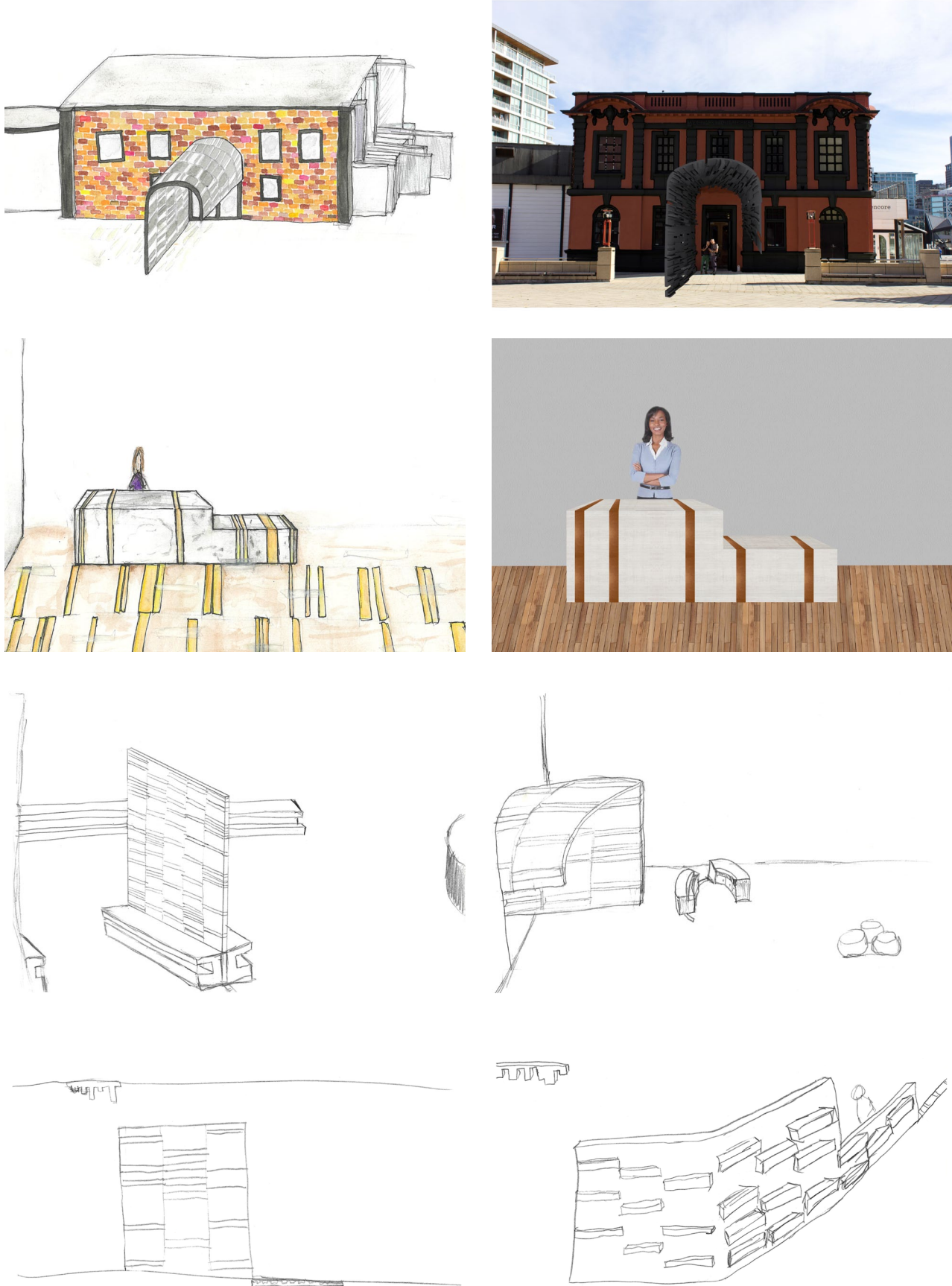
4.8 Program Mapping Development:



Figure 72: Program mapping development

The chosen programme combines the best attributes from previous program options to produce an interior program map which allows the main spaces to experience the most sun and public interaction, allowing the quiet zones to be exposed to the least amount of noise while enabling easy and appropriate flow between all public areas and separately all private spaces, while still allowing access to the bathrooms.

4.9 Initial Design Concepts:



The first concept looks at providing a threshold from the exterior to the interior by creating an archway, leading the user inside. Cut out pieces of the form allow both a physical sound of atomization to be realised and additionally the light to fall through.

The second concept looks at creating a reception desk with white marble, layered with strips of bronze to break it up. This will be patterned to the atomization form.

Further design sketches look at how the atomization wall can be incorporated into the waiting area and how the sound wall might pass from each of its platforms, the floor, wall, and ceiling.

Figure 73: Initial design concept sketches and collages

4.10 Sound Wall Design Concept:

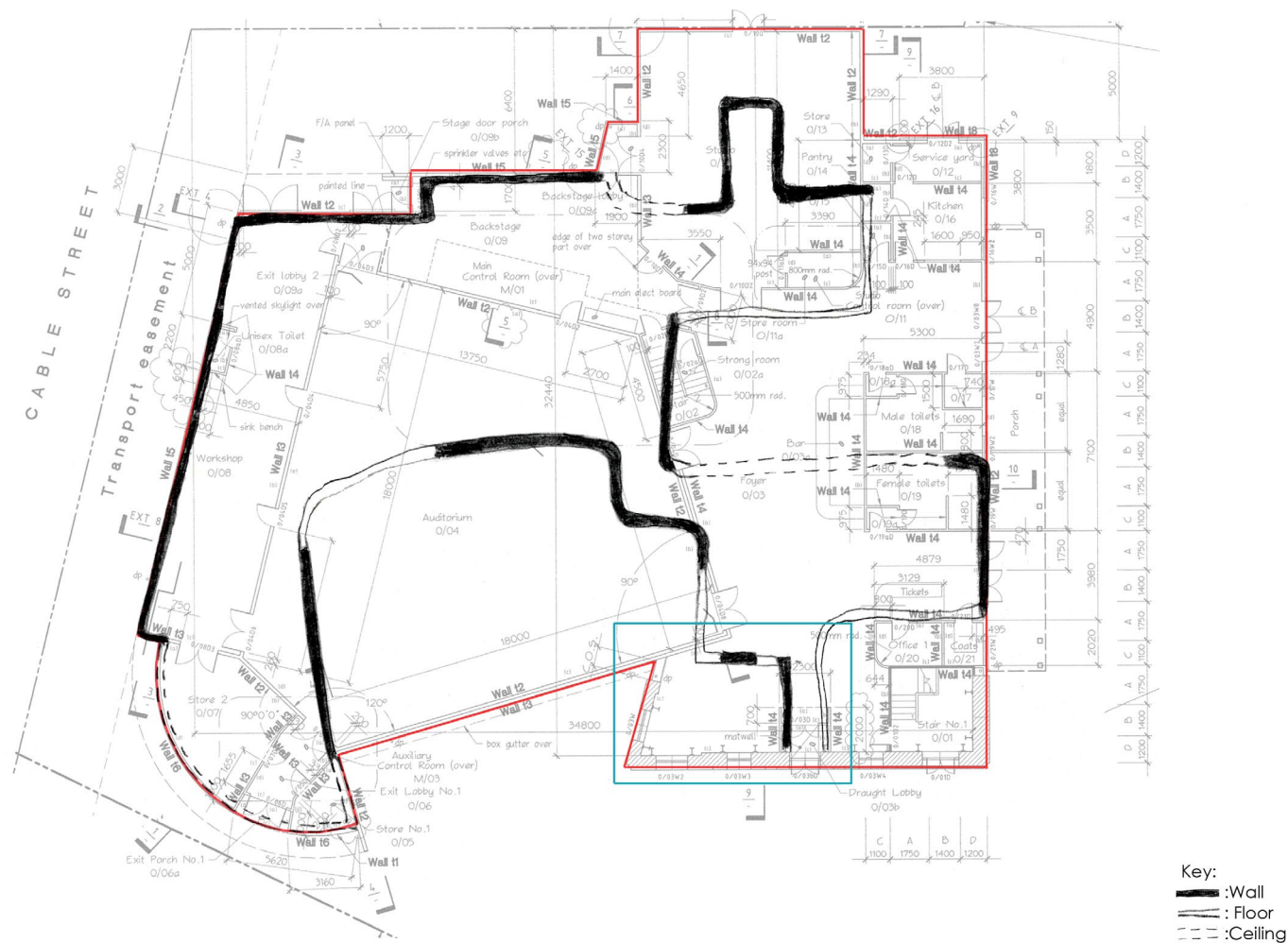


Figure 74: Sound wall design concept

The sound wall is designed to be a way finding element through the space. The wall changes form as it goes from floor to wall and ceiling detailing when required. It creates and divides space as it flows through the interior. The form changes as it passes from one program to the next to match that specific areas mood category form.

4.11 First Iteration Renders:

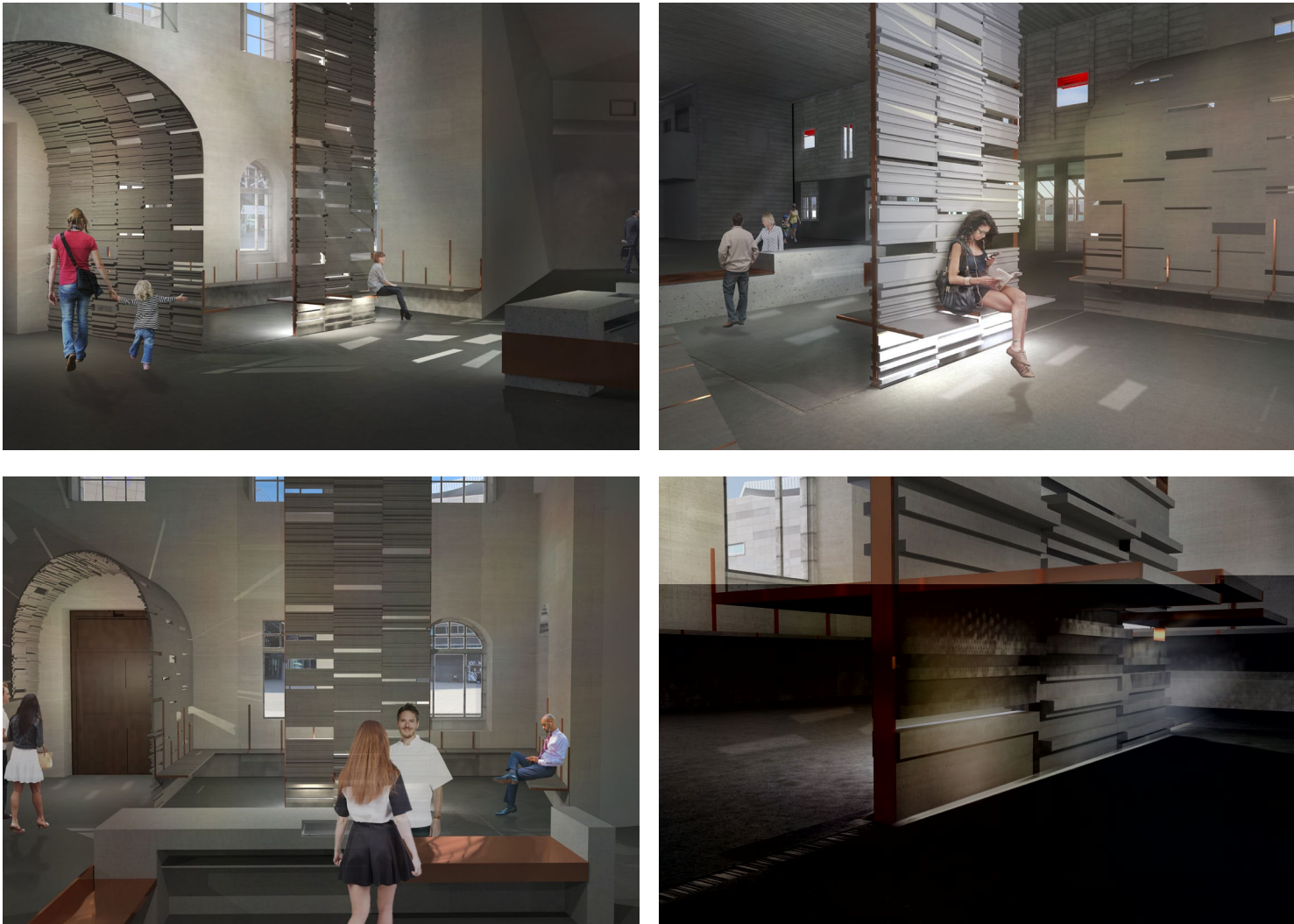


Figure 75: First iteration renders with concrete material



Figure 76: First iteration renders with wood material

4.12 Reflection:

Following the August review some changes will need to be explored for the continuation of the design. Feedback was given that the current design is too safe and atmosphere through the physical interpretation of sound needs to be pushed further. Material, texture and scale will be explored in order to achieve a more wholesome atmospheric experience. Feedback was also given that the programme and typical stance of the learning rooms needs to be addressed and furthermore altered to better fit the aim of sensory design. The design needs to challenge the “typical” idea of education spaces. For this reason moving forward the programmatic space of learning facilities will be explored with the atmosphere Veils of Glass. More extreme scales and textures will be explored in hopes of challenging the norms of a class room facility.

Through the process of designing the learning facilities area several findings were discovered. Due to the nature of the form of the mood category once established into the design an intensity is developed which has its own standing within the space. This meant that the form is too large to not become a feature of the space but too small to fill it in its entirety. Its standing is too prevalent to be in competition with other mood categories within the site. A change is required here as the form did not fit in line with its current position within the interior. A move in its location or change of its format is necessary. The space will become too busy and cluttered as more program and mood areas are added to the design. A lack of cohesion and flow is evident even in the early stages. This means the design is becoming a forced and disillusioned enterprise. These findings led to the design decision to develop a new program which encapsulates learning facilities, public rooms and the Gallery of the Senses into one space. Distilling the program down to its essentials. And subsequently allow the offices to be left out of the building all together. It led to the decision to solely focus on one of the seven qualities previously developed for this main space within the design. For this main space this will be the ‘Veils of Glass’ sound model. Such as the spaces that display excellent examples of Henry Plummer’s light categories. A more successful design can be developed if only a couple of categories are the focus. This will allow them to be pushed to their fullest extents to create deep and rich interiors. This will allow a more coherent space that will work more successfully as an example of ‘Veils of Glass’. This will also allow more space for each of the sensory experiences within this designed journey to breathe and be employed

in a more generous and successful way. Museum and Gallery type facilities have been found to be an incredibly beneficial aid to standardised learning within a classroom. A study conducted by RCMG explains how “Museums inspire powerful and identity-building learning in children, young people and community members” (Greenhill et al. 4). There is five key learning outcomes that have been identified from the study.

- Knowledge and understanding
- Skills
- Attitudes and values
- Enjoyment, inspiration, creativity
- Action, behaviour, progression (Greenhill et al. 8)

This further reinforces the design idea to move towards a more open plan, museum/gallery layout of space where people are able to learn through their interaction. “The most popular installations... required intensive visitor activity” (Hornecker and Stifter 6). As the learning spaces were always intended to be an addition to normal schooling this becomes a natural and smooth transition. “Museums can engage with contemporary social issues, such as social inclusion” (Greenhill et al. 24). This is important in helping to meet the program objective of creating a space that is inclusive for everyone. “Museums can work effectively with both special needs and vulnerable groups and also with the mainstream” (Greenhill et al. 38).

As previously discussed, the colours of a space can have an influence on a person and their feelings towards or within that space. For ‘Veils of glass’ the key colours are neutral, yellow, purple, red and blues. The space needs to be calming and soft but not boring. As previously discussed in 2.7, chromesthesia is a concept that is utilised here to bring a connection to the mood of specific sounds through physical means. Small accents of bright colours will aid in keeping the interest in the space alive and allowing a more engaging atmosphere. “It is best to have a calming and / or neutral colour on the walls, but it may be a dull room, so the furnishings would be used to add colour to the space” (Wastra). Blue, specifically light blues are soothing “on our minds as these blues help to produce some calming chemicals in the brain” (Wastra). Yellow “attracts attention” the fastest of any colour (Wastra).

“Light yellow instils or encourages feelings of happiness and comfort; it is seen as warm, summery and lively” (Wastra). Red is a strong colour and will therefore be used “as an accent colour” (Wastra). The opportunity to use natural material colours remains open here as the ‘Veils of Glass’ mood allows for this.

Here it has also become apparent that a revisit of the senses is required in order to reconnect with the aim of sensory architecture. A closer focus on the sound category (Veils of Glass) and its respective sensory connotations will be beneficial in establishing a starting point for material, texture and scale advancement within the interior.

5

Part

5.0 Second Iteration

5.1 Program Development:

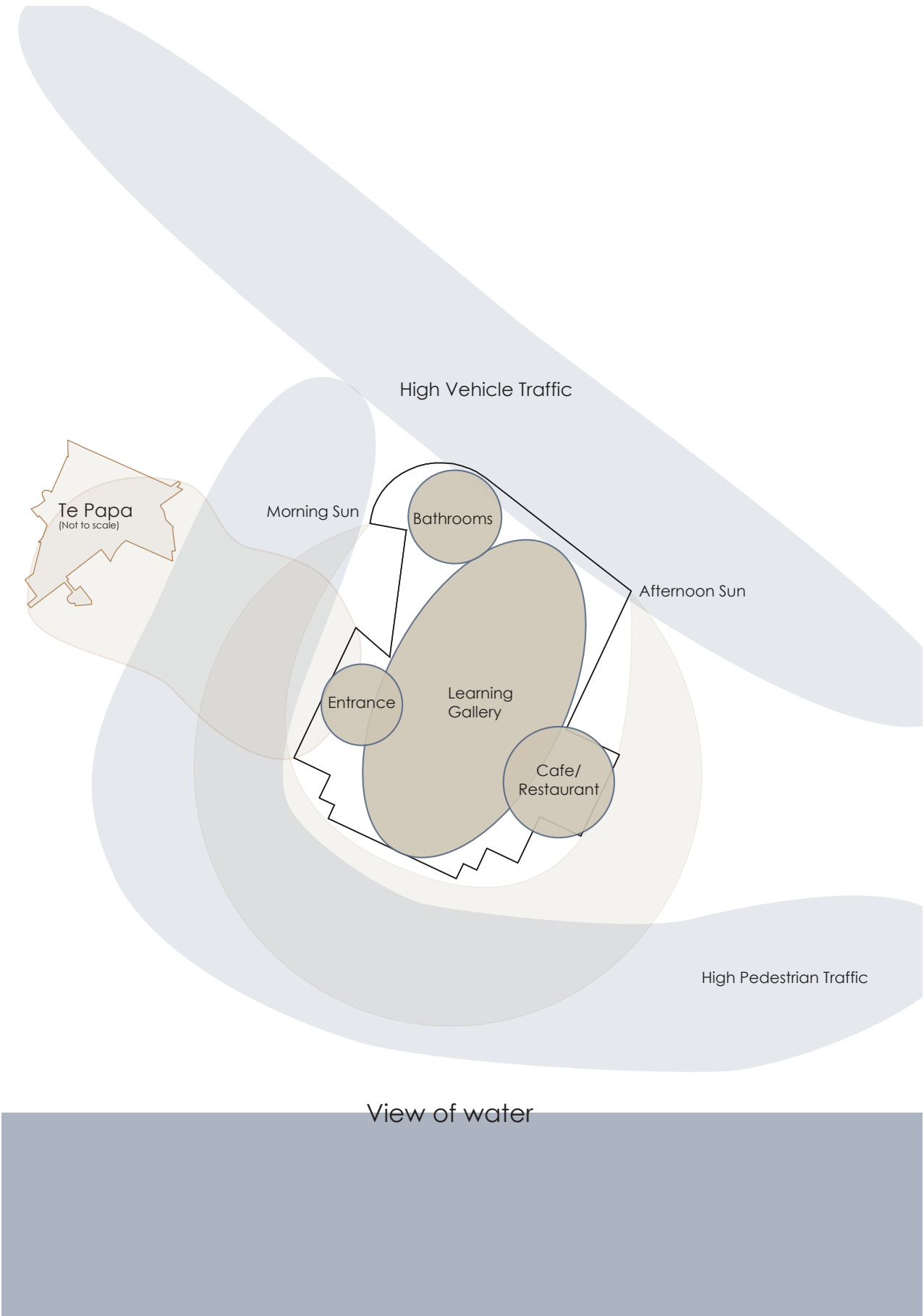


Figure 77: Program development map

Mood Category:	Programme Category:
Atomization:	Entrance/reception area
Veils of Glass:	Gallery of the senses
Canalization	Bathrooms
Atmospheric Silence:	Cafe

Figure 78: Program development matrix

The program is adjusted to only include the crucial aspects required for a sensory engaging design. The entrance remains and is staying in the same location as this is still the most appropriate position for it. The Gallery of the Senses is developed. The gallery acts as a celebration of the senses and acts as a museum of interaction which as discussed within 4.12 is a unique way for those with impairment and those without to engage and learn. The Gallery of Senses in order to reach its full potential is given a prominent spot within the space with plenty of square footage. The bathroom is placed at the back corner of the space. This is because the bathroom can handle the high noise output from the exterior here and doesn't require natural lighting. And finally the café/restaurant which is aimed to show case sensory experimental food is located at the other end of the building. This is done so that the user may experience a kind of journey as it moves from entrance to café. In a way forcing the anticipated interaction of the patron.

5.2 Sense Experiences:

Revisiting the sensory aspect the following collage imagery is used as a visual exploration of the interior journey. A sensory journey is established for the patron when moving across the Gallery of the Senses, further into the room. This journey is then broken up into five different experiences. Each of these experiences is given a key word describing what the desired mood or feeling of the occupant is for each zone. A visual and evocative image is then created which displays the senses engaged in each zone and its connection to the mood of Veils of Glass. This imagery then works as a starting point in order to create physical design attributes which can be utilised within the space.



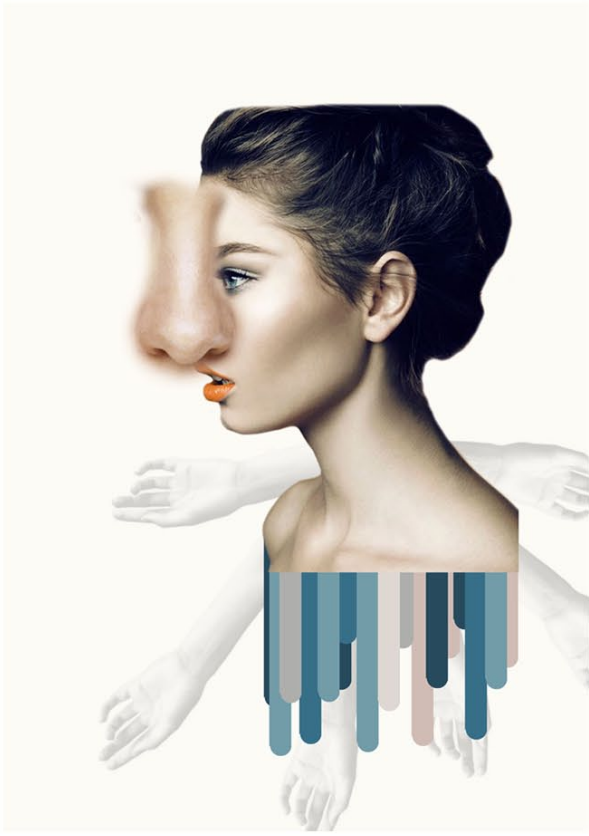
Experience 1:
Senses engaged: Sight, touch
Intrigue



Experience 2:
Senses engaged: Sight, touch, sound
Curiosity/engage



Experience 3:
Senses engaged: Touch, sight
Create



Experience 4:
Senses engaged: Smell, touch, sight
Uncover



Experience 5:
Senses engaged: Taste, sound, touch
Surprise

Figure 79: Sense experience collages

5.3 Initial Design Concepts:



Figure 80: Design concept sketches

The following design features are influenced by the sensory collages located on 5.2.

Floor, Wall, Ceiling Application:

Experience one; sight, touch -Intrigue.

The floor, wall and ceiling is layered in the Veils of Glass pattern. This creates intrigue from a distance, as the user can see the variation on normal material application. The user may then approach the design and can touch the form with his/her hands and feet.

Light Design:

Experience two; sight, sound, touch -Curiosity/
Engage.

The design of the light needed to be appealing to the eye in order to insight curiosity and engage the element of sight within design. This meant the initial concept designs were judged on colour and aesthetics, form and scale. To include the element of touch the light needed to be easy to hold and feel nice and pleasant to touch. The chosen concept is then designed to include a speaker in the interior of the light. This is crucial to the design in order to include sound within the design and allow engagement with the object. The speaker design is detailed to include position and shape within overall design.

Slide Walls:

Experience three; touch, sight -Create.

The sliding glass walls are filled with various objects, such as sand, feathers, glitter etc. and are made of varying colours. This allows for the user to see and create their own Veils of Glass lighting by combining and separating the panels in alternating positions.

Smell Draw:

Experience four; smell, touch, sight -Uncover.

The smell draw is designed with inset lighting above to catch the attention of the user. This stimulates the sense of sight. The draw is opened by pressing the touch pad, thus including touch in the design. This allows the user to uncover the sense of smell. The draw opens to a smell pad inlaid inside, which can be changed out for new scents when desired to vary smell, this allows for a unique smell experience.

Taste Pod:

Experience five; taste, sound, touch -Surprise.

The taste pods are designed to capture the eye and provoke pre conceptions around the flavour of each pod. The user can place his/her head inside the organically curved pod and taste the flavoured mist is dispersed through a small hole in the bottom of the pod. The user can then enjoy the element of surprise as the unique taste of flavoured mist is in contrast to the colour of the pod. For example, the green pod tastes of cotton candy or raspberries whereas the pink pod tastes of apples or lime.

5.4 Second Iteration Renders:

The following renders show the development of the design and the implementation of the elements detailed in 5.2 combined together to create an interior gallery of the senses.



Figure 81: Second iteration render -overview



Figure 83: Second iteration render -speaker light



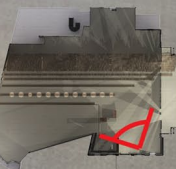
Figure 82: Second iteration render -smell draw



Figure 84: Second iteration render -smell pod



Figure 85: Second iteration render -overview from entrance



5.5 Reflection:

Upon reflecting on the design presented at the November review a number of items are identified to require further thought. Number one of these is the practicality of the large form of the gallery. Creating risk of user accidents and injuries the un-even surface on the flooring will need to be addressed to provide a safer environment for people to walk on, especially considering those who have visual impairments and cannot see the immediate obstructions. Secondly further attention to the details of the design will need to be considered, such as joints and materiality. Thirdly the mood Veils of Glass, although present in the space, still has opportunity for improvement in creating a more cohesive and vibrantly expressive view of this mood.

6

Part

6.0 Final Iteration:



Figure 86: Image of 3-D model of Veils of Glass

The following developments look to address the dangers of the previous design concept and to develop a more cohesive and considered overall design proposal that emits the Veils of Glass mood in a more convincing manner.

6.1 Design Concepts -Form:

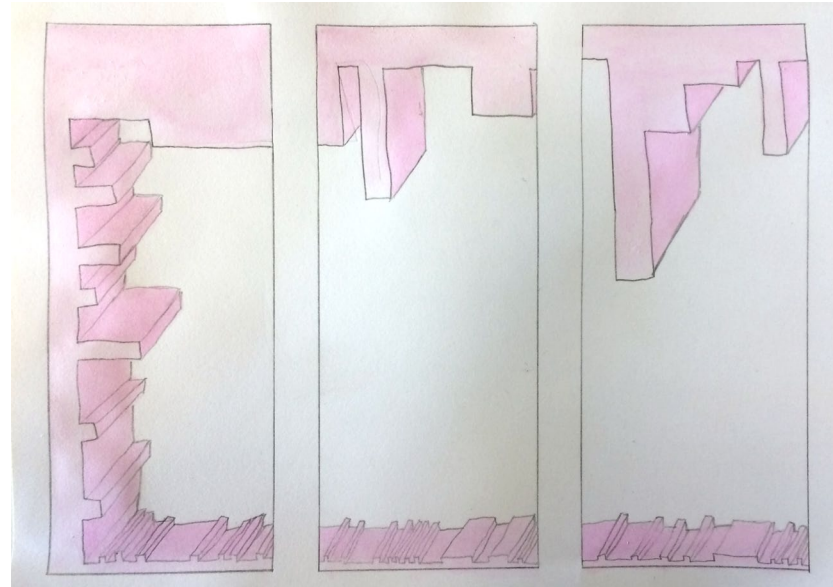


Figure 87: Design concept sketches 1

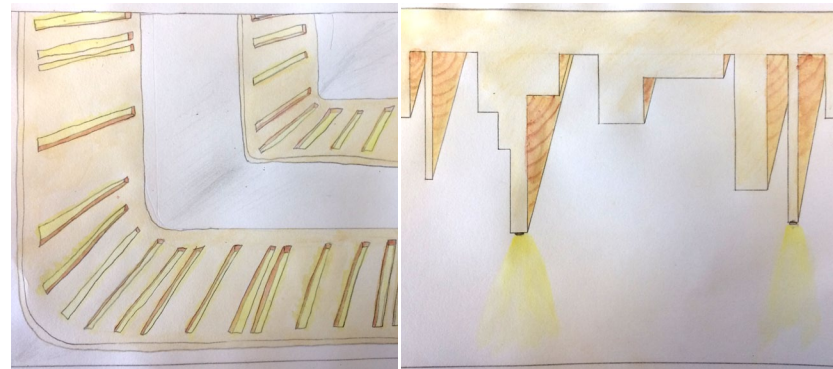


Figure 88: Design concept sketches 2

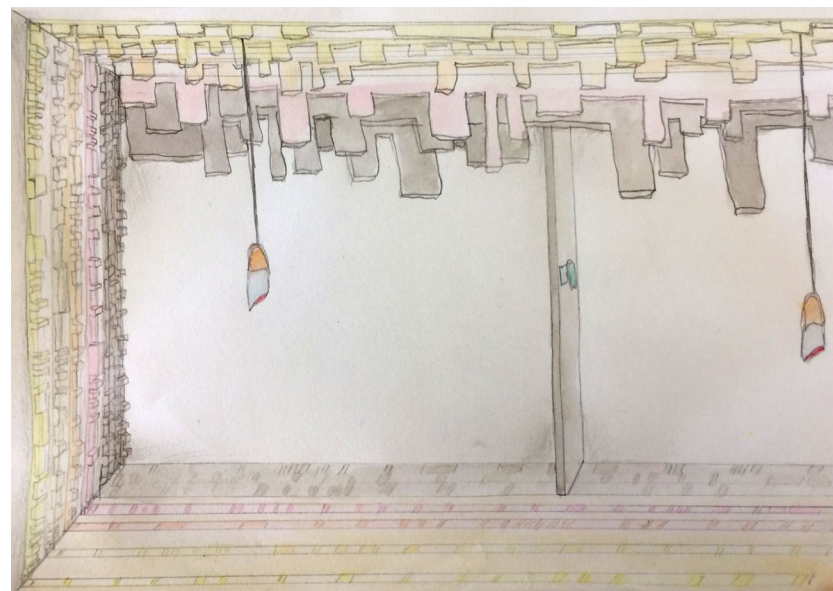


Figure 89: Design concept sketches 3

Concept 1:

Looking mainly at material changes and small scale re-dimensioning. Concept 1 looks to use the material of coloured felt for each of the strips on floor, walls and ceiling. It will increase in scale as it goes from floor, wall to ceiling. The ceiling will be of large scale protruding into the space making the space more closed in and comfortable as the high ceiling of the interior could make the area feel daunting.

Option 1 although the colour improves on previous design in bringing the mood of Veils of Glass to life, none of the other issues are addressed. Scale is slightly reduced on floor but still is a hazard with uneven surfaces. Additionally is not as engaging as it could be.

Concept 2:

Again looking at change of scale and material but also looking at a change in form. This concept looks at creating a board walk type form for the floor and walls and only keeping the original form on the ceiling. The floor and walls will have small slits in the wood platform with lights inlaid underneath. The ceiling will have inset lights on the longest protruding pieces into the space.

Concept 2 reduces the dangers of uneven surfaces to walk on but does not diminish the threat completely. This option provides nice light qualities but loses the element of Veils of Glass mood via reduces form and colour qualities.

Concept 3:

Looking at changing scale and materials. This option explores carpet on the floor. Carpet will be layered/textured so as to create the patterned effect required for the Veils of Glass interface. The walls and ceiling is made from painted wood material. The scale increases on walls from the floor and increases again on the ceiling.

Concept 3 seems the most viable as the transition of using two different materials provides for an interesting and engaging interchange. The use of colours here works well in bringing the Veils of Glass mood to life. This is also the most practical of the options as no danger of walking on the carpet. Therefore this will be the chosen concept to move forward with.

6.2 Design Development –Material Selection:

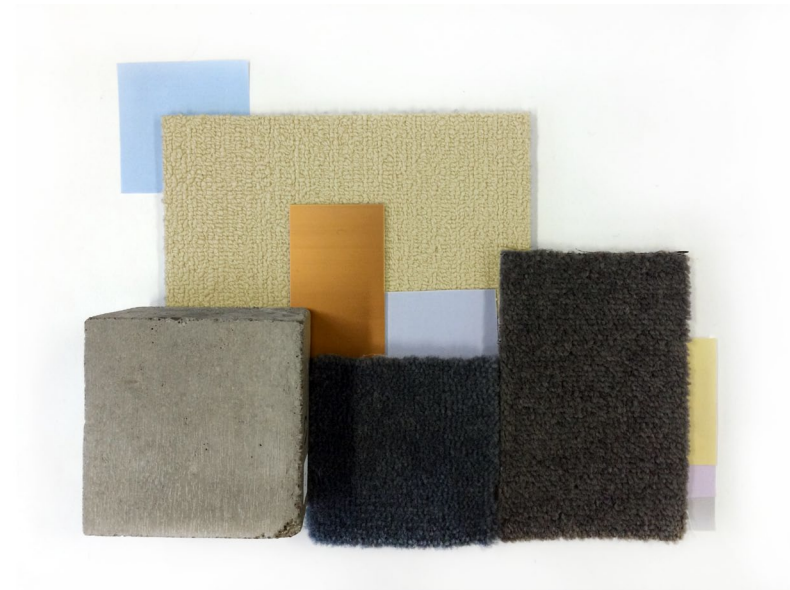


Figure 90: Material selection -option 1

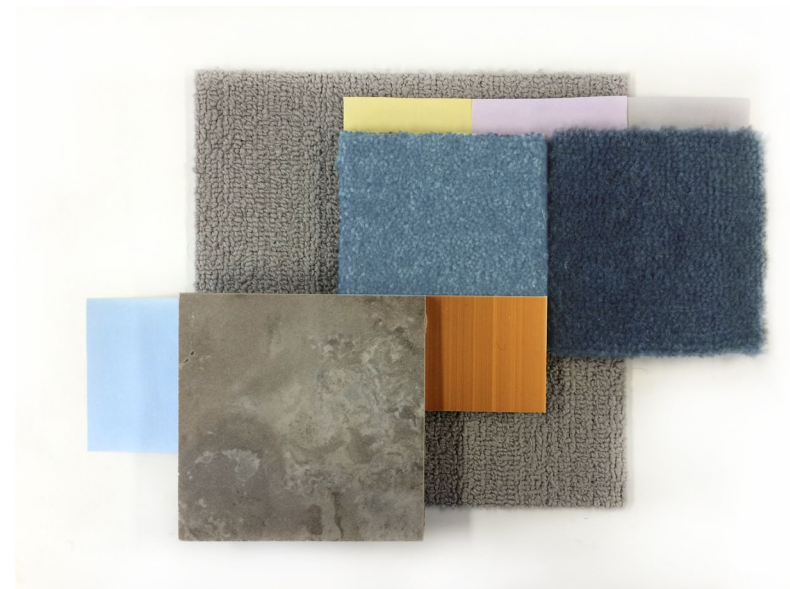


Figure 91: Material selection -option 2



Figure 92: Material selection -option 3

Option one explores polished concrete, Option two explores grey porcelain tile and Option 3 explores oak timber and how each of these materials works with the carpet and copper material palette. Exploring how the carpet works as Veils of Glass colour selections and at the varying levels of texture. Looking at how the colours from Veils of Glass, Resene Dreamer, Resene Drover, Resene Concrete and Resene Blue Chalk also work within this material palette.

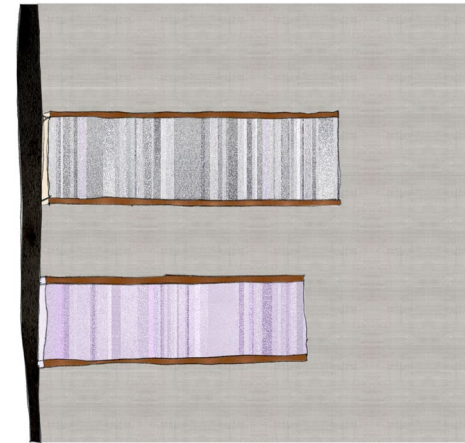


Figure 93: Material selection in plan -option 1

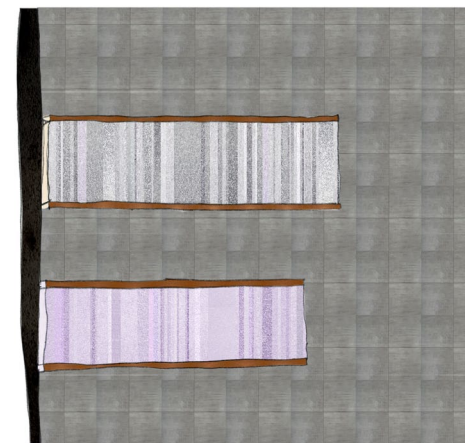


Figure 94: Material selection in plan -option 2



Figure 95: Material selection in plan -option 3

Floor plan view looking at material palette options. Showing the colour and texture patterns for the carpet and looking at the three varying options for flooring and wall surfaces. Option one looking at polished concrete, Option two looking at grey porcelain tile and Option three looking at oak timber.

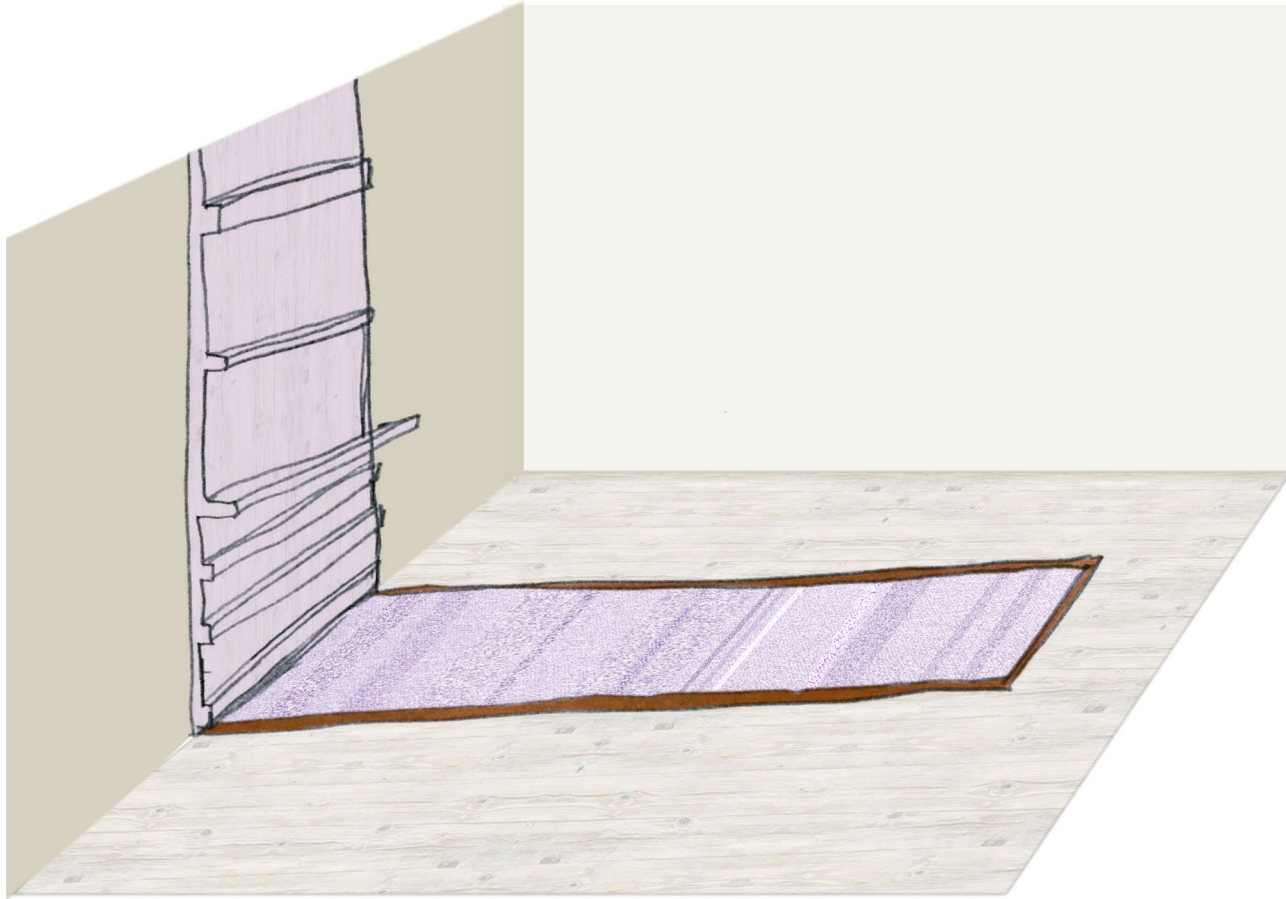


Figure 96: 3-D render of material selection

3D view showing chosen material palette for the design. Copper detailing. Resene Ecu White on the standard Gib walls. White washed oak wood on the floor. Textured carpet coloured in Resene Drover, Blue Chalk and concrete as it moves across the panels. Corresponding colour Resene on the wall panels painted over white washed oak wood.

6.3 Photographic Study –Veils of Glass:

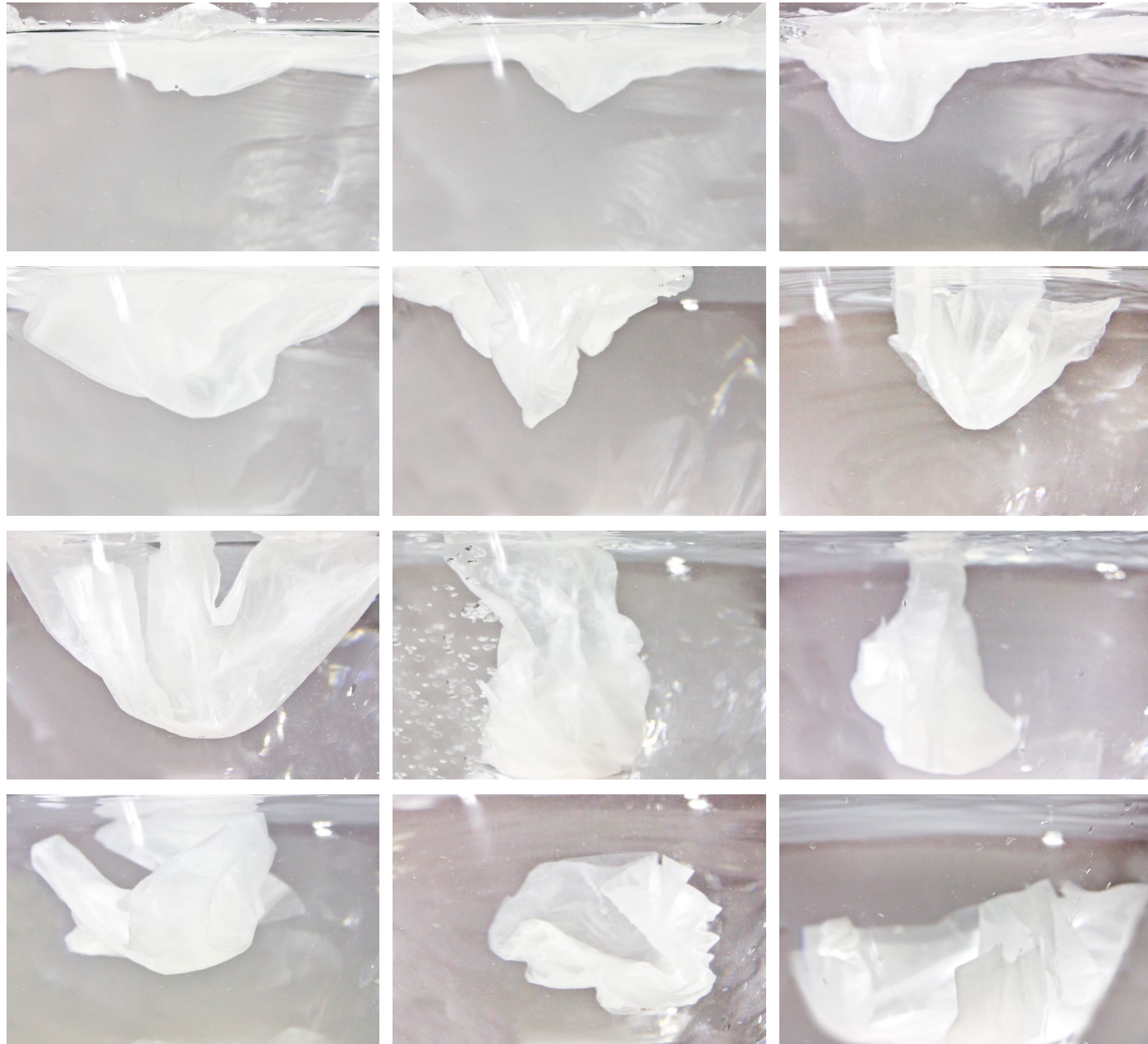


Figure 97: Photographic study -veils of glass

This photographic study was carried out by capturing the process of a tissue/fabric piece falling through water. This was done in order to encapsulate the mood Veils of Glass in a physical format in order to generate forms for design development.

6.4 Pod Design Concepts:

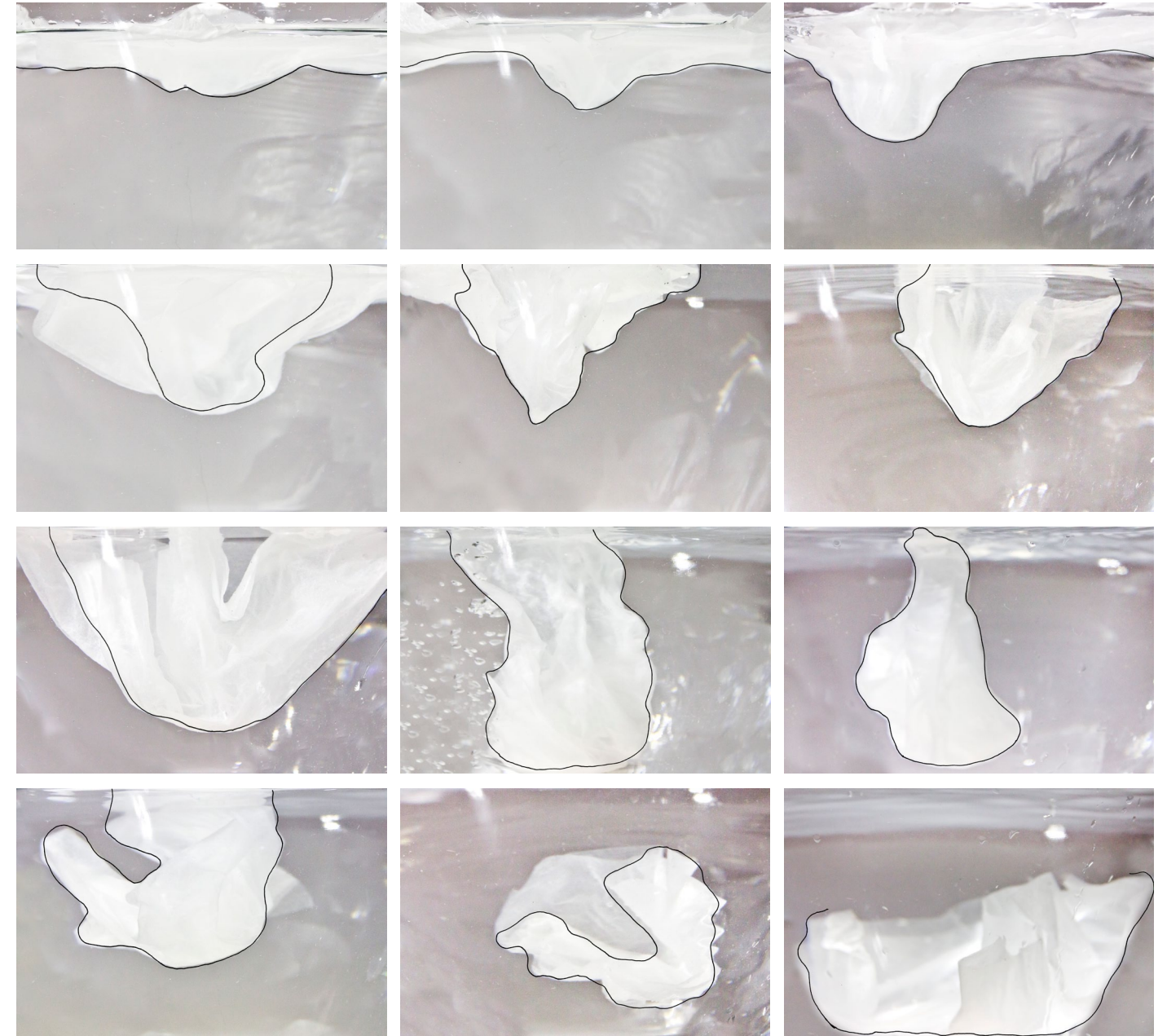
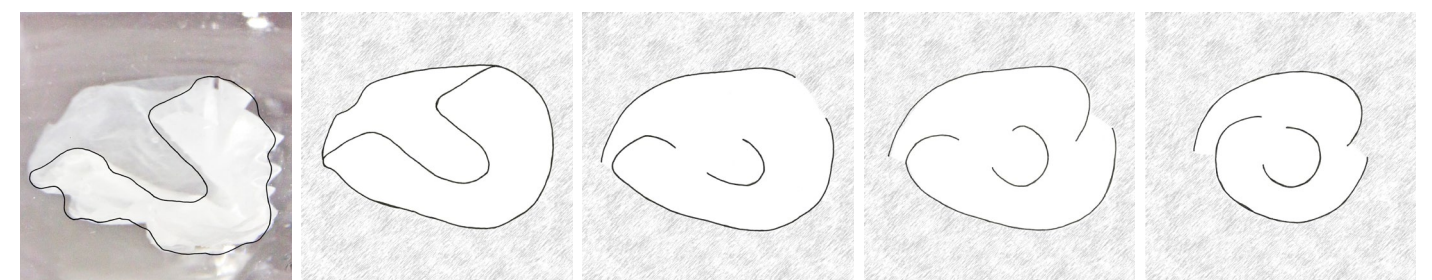
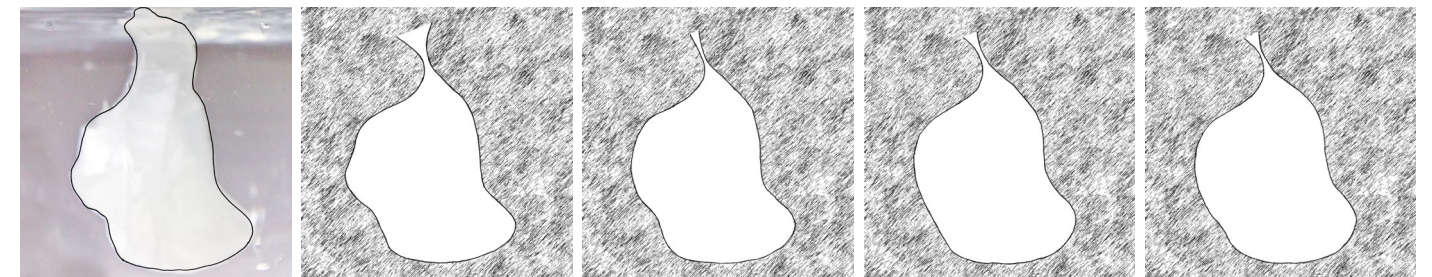
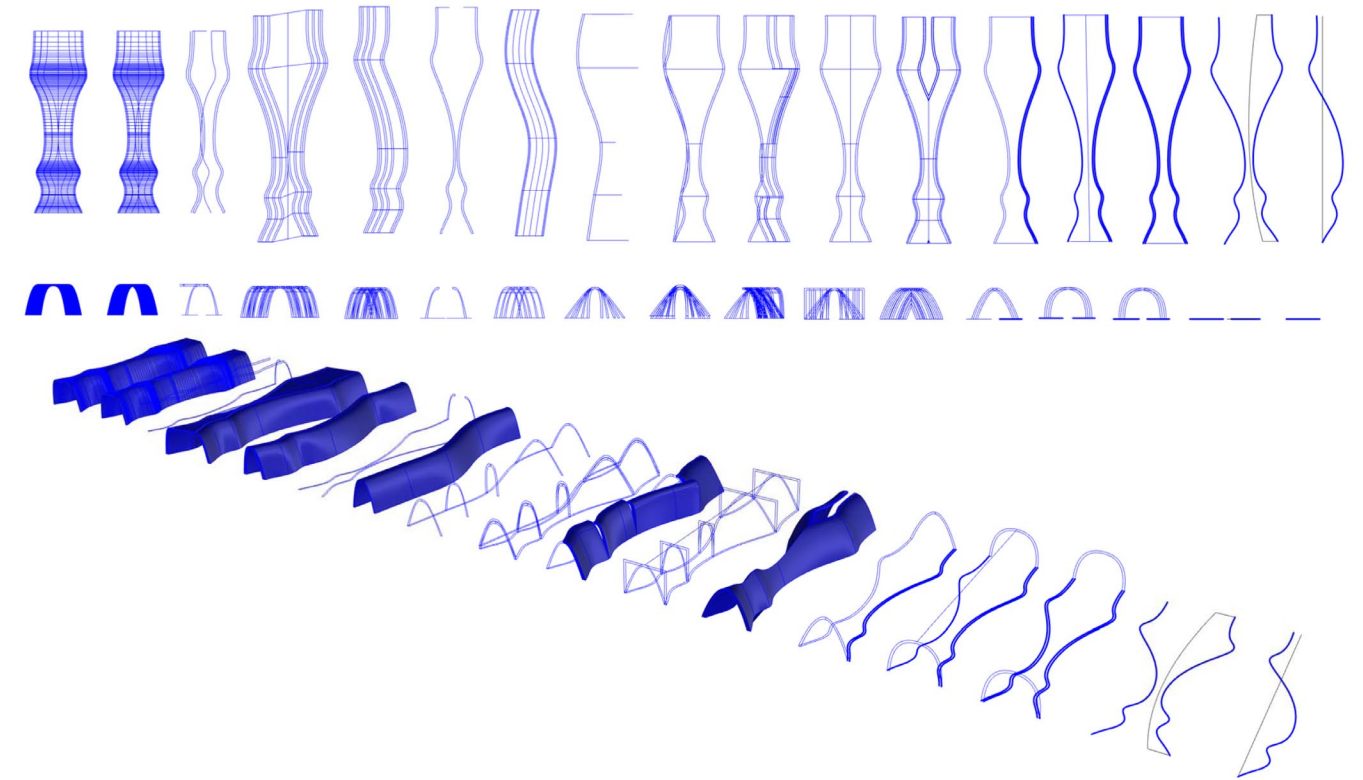


Figure 98: Pod design concepts

The idea of creating a pod is developed in order to allow the different sense experiences, which had been previously developed, their own breathing room within the space. The aim being to provide a little enclosure for each sense experience to allow the full potential of the sense experience to be realised. The form of each pod will be generated through the configuration discovered through tracing the shapes made in the photographic study.

6.5 Pod Design Developments:



The shape for the second sense experience is developed from the first stage of the photographic study. The tunnel shape was then refined in order to achieve a useable form for the design. Many attempts to create the form were made in rhino as a part of this process.

The third sense experience was inspired from the first moment the tissue/fabric becomes fully emerged within the water. The form was then refined through a series of line drawing adjustments.

The fourth sense experience comes from the last point of emersion in the sequence of photographs. Further development details series of drawings to refine the form of the pod.

Figure 99: Pod design development sketches, models and iteration drawings

6.6 Photographic Study –Atmospheric Silence:

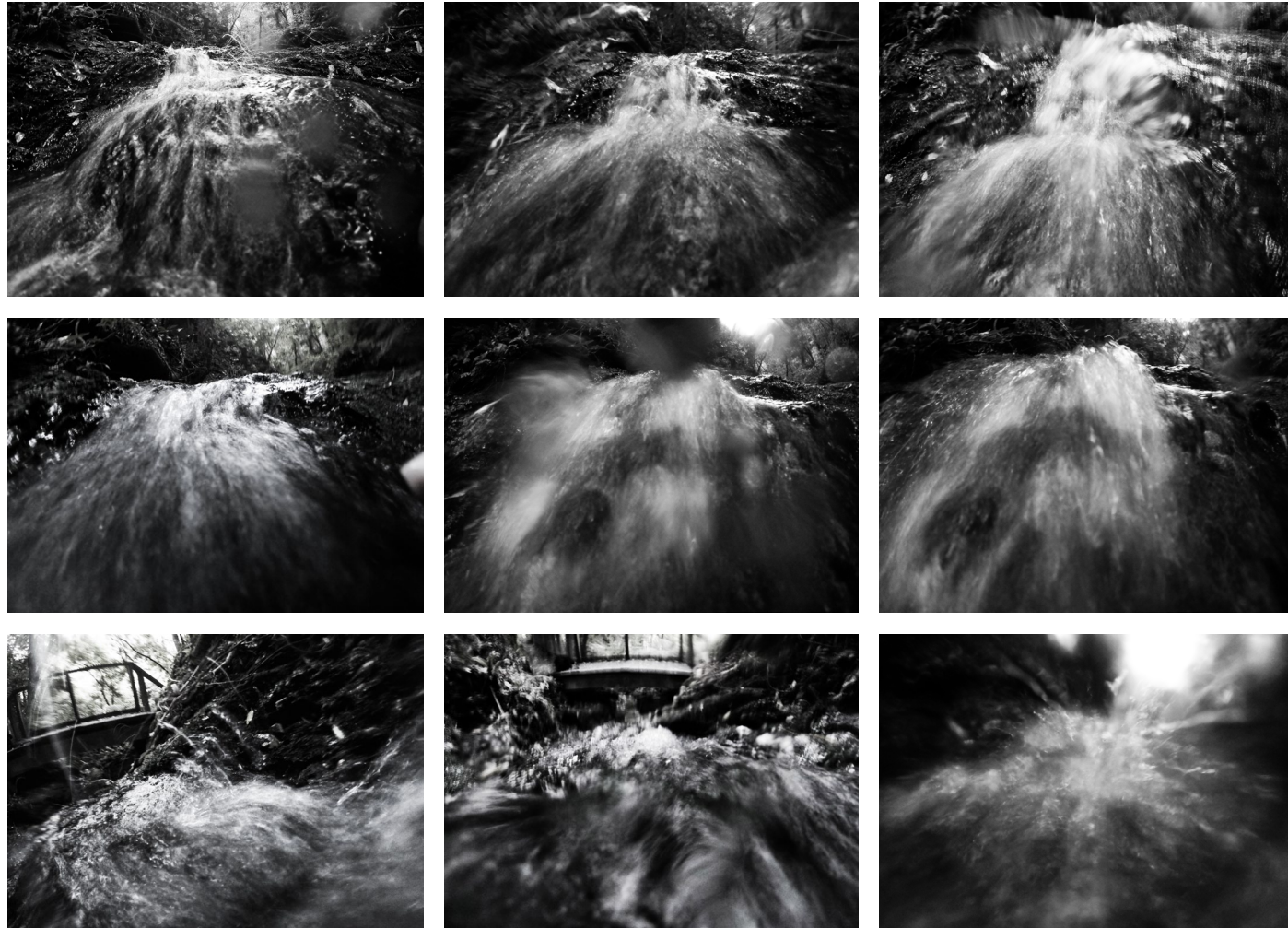


Figure 100: Photographic study -atmospheric silence

The design of the café area falls in the atmospheric silence mood category. This photographic study of a waterfall was carried out due to its rushing and roaring nature which aligns with the mood category. The focus being on the movement and flow of the water in order to generate form for the design of the café, specifically café counter and table and seating areas. The horizontal flow becoming the focal point of the counter design. While the splashing, splattering effect of the bottom of the waterfall is utilised in the table and seating design.

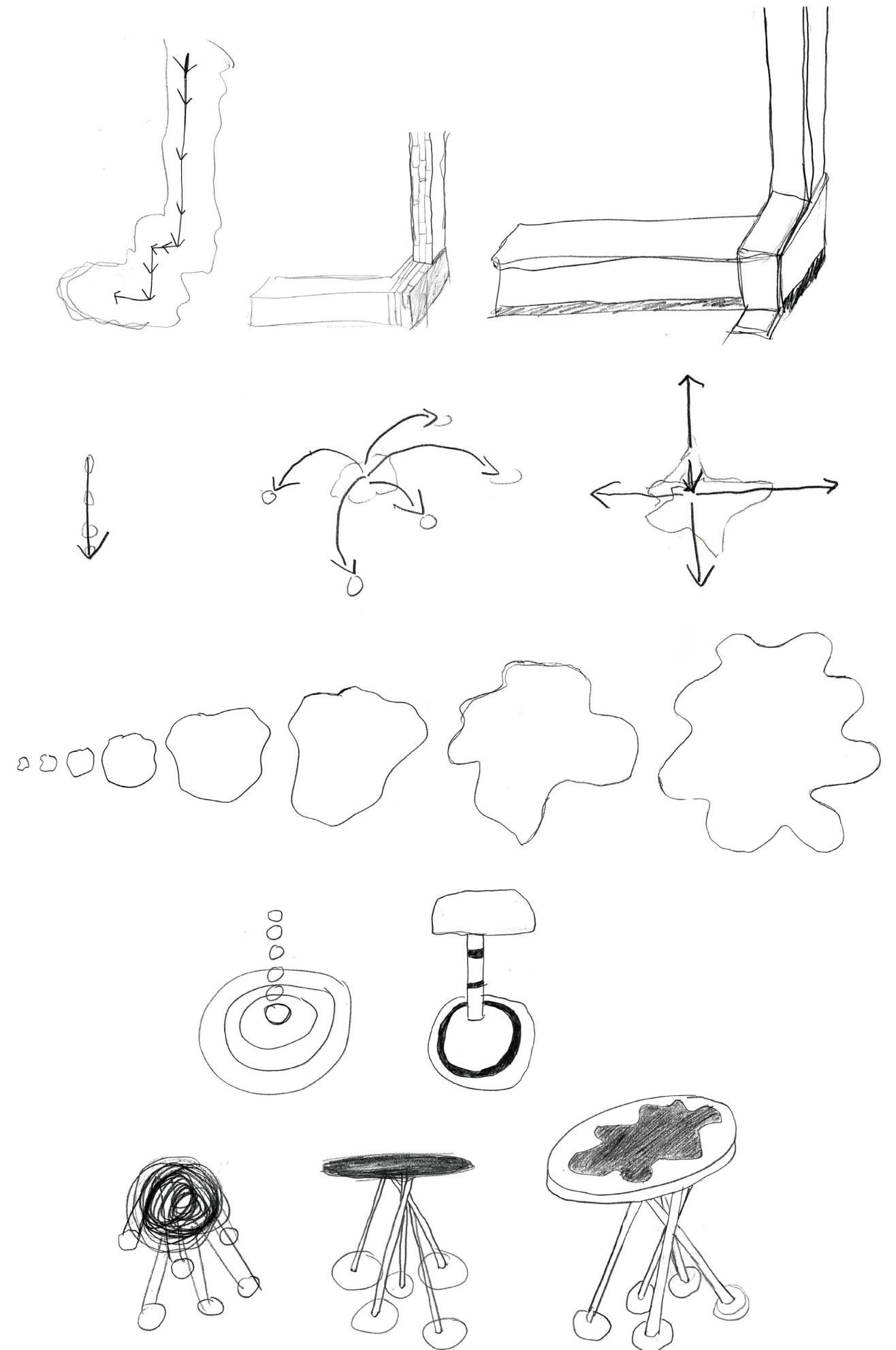


Figure 101: Café design development sketches

6.7 Final Design:



Figure 102: Final design render -overview from entrance



Figure 103: Final design render -overview from café seating



Figure 104: Final design render -overview from entrance arc



Figure 105: Final design render -behind café overview



Figure 106: Final design render -café



Figure 107: Final design render -café overview

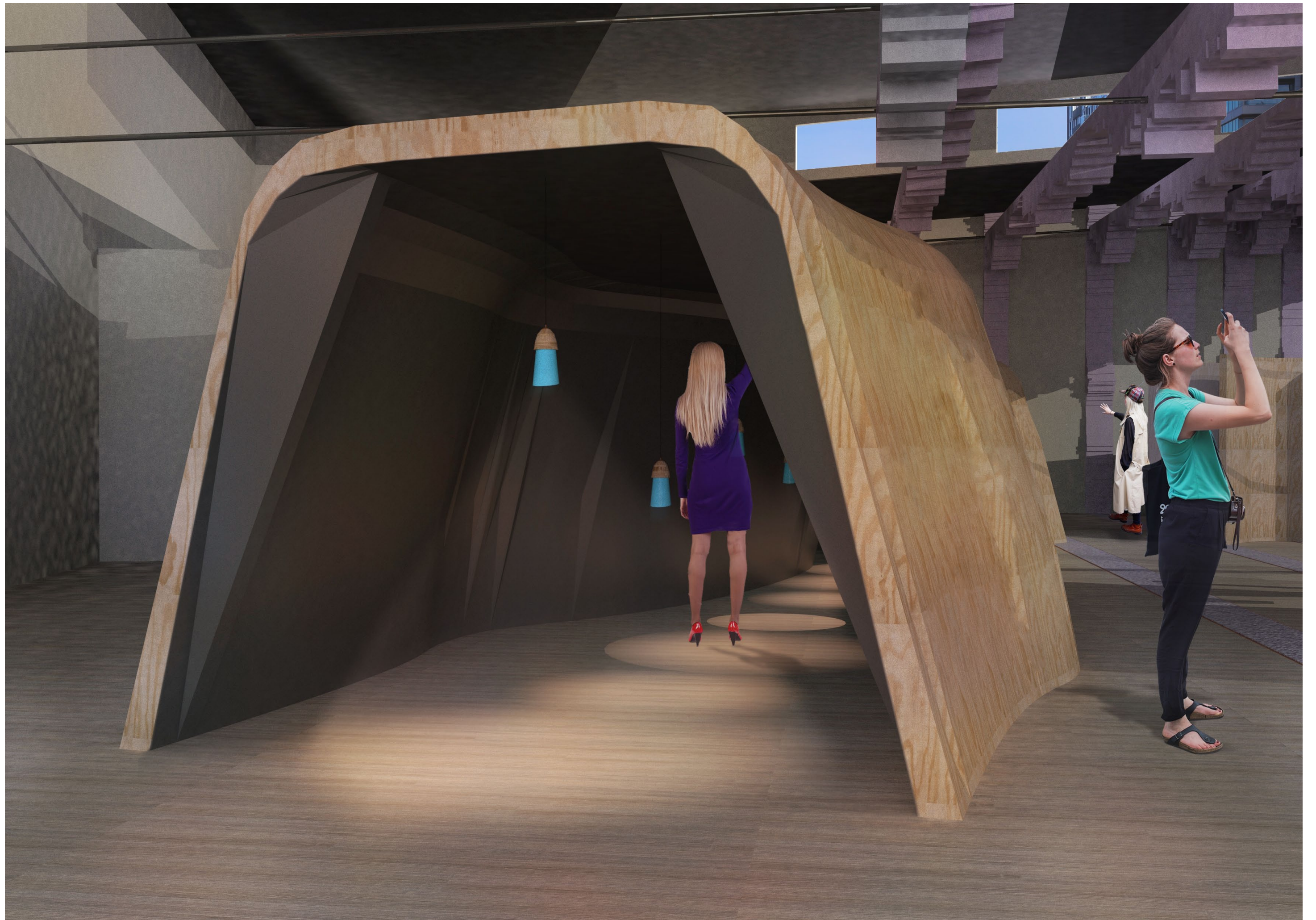


Figure 108: Final design render -pod 1 overview

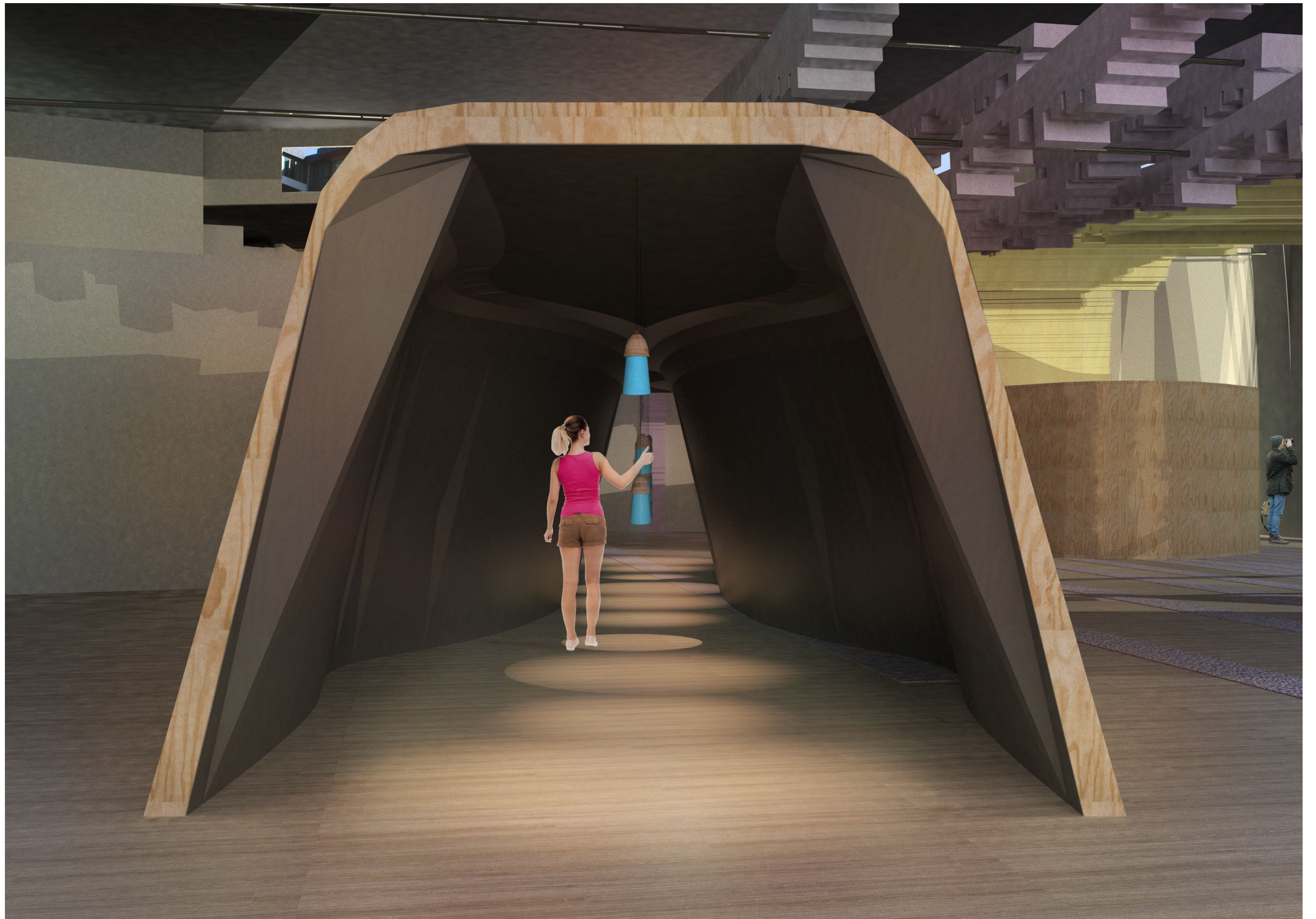


Figure 109: Final design render -pod 1 entrance



Figure 110: Final design render -pod 1 speaker light detail

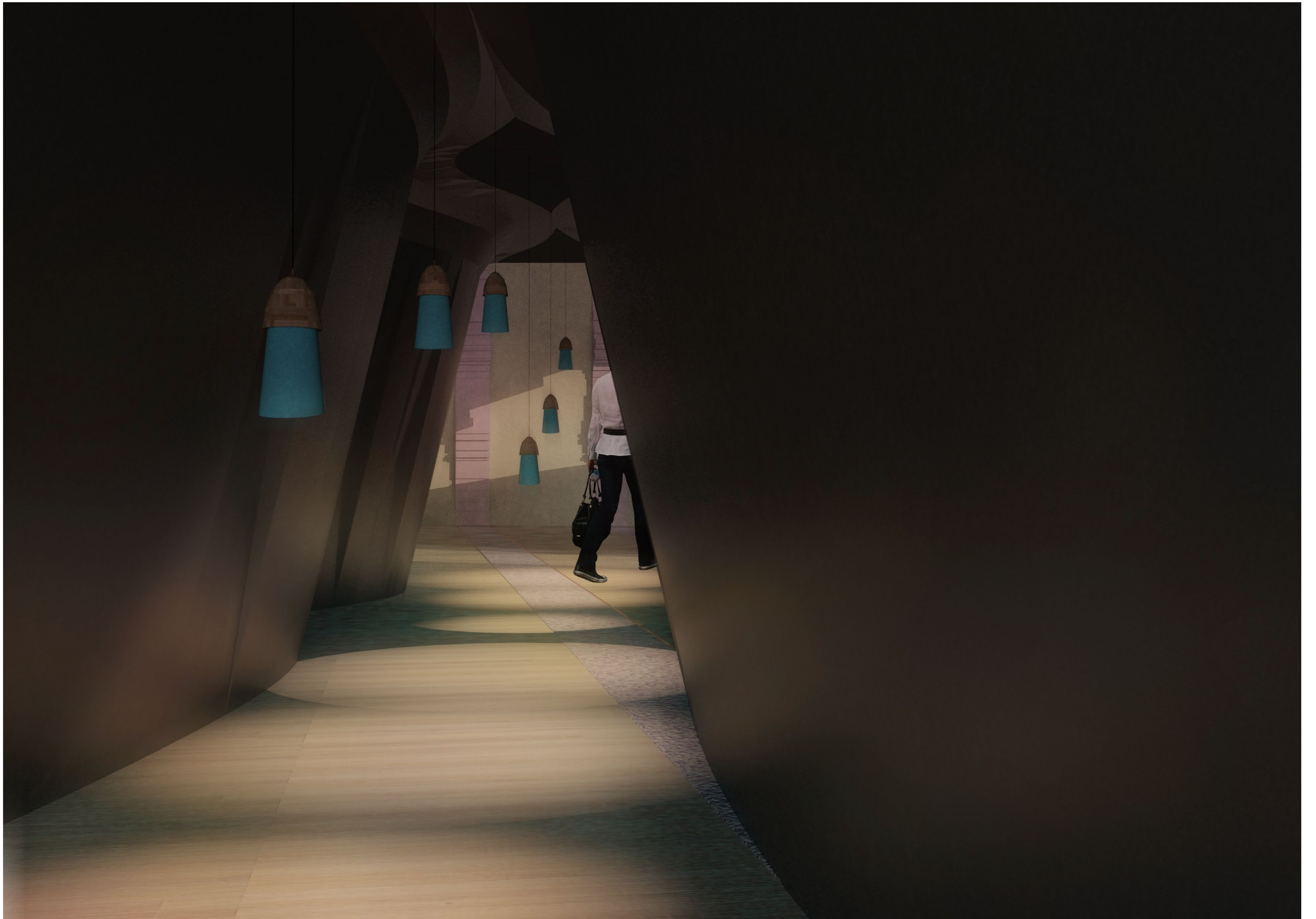
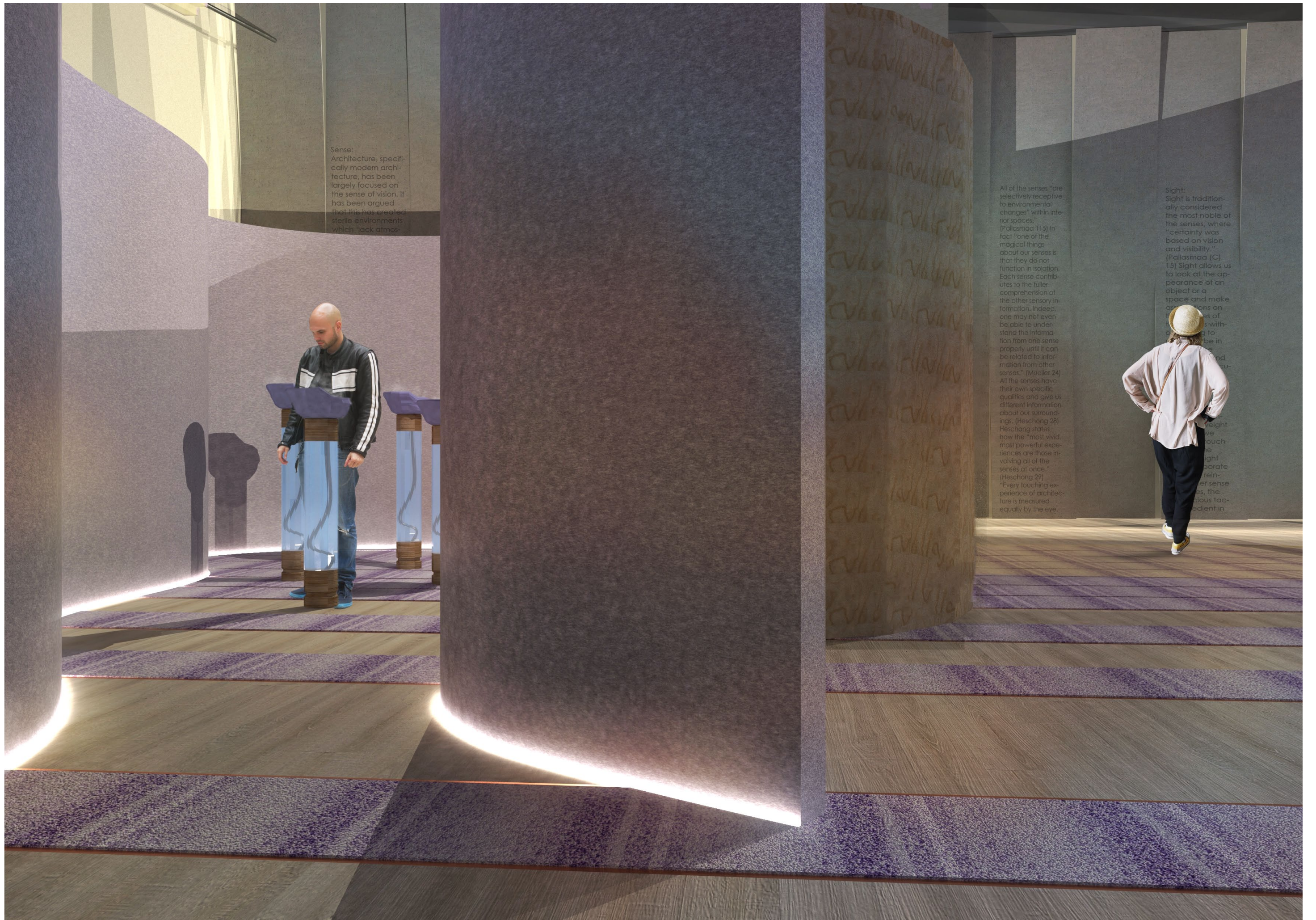


Figure 111: Final design render -pod 1 interior



Figure 112: Final design render -pod 1 exit



Sense:
Architecture, specifically modern architecture, has been largely focused on the sense of vision. It has been argued that this has created sterile environments which 'lack atmos-

All of the senses "are selectively receptive to environmental changes" within interior spaces." (Pallasmaa 115) In fact "one of the magical things about our senses is that they do not function in isolation. Each sense contributes to the fuller comprehension of the other sensory information. Indeed, one may not even be able to understand the information from one sense properly until it can be related to information from other senses." (Mueller 24) All the senses have their own specific qualities and give us different information about our surroundings. (Heschong 28) Heschong states how the "most vivid, most powerful experiences are those involving all of the senses at once." (Heschong 29) "Every touching experience of architecture is measured equally by the eye.

Sight:
Sight is traditionally considered the most noble of the senses, where "certainty was based on vision and visibility." (Pallasmaa (C) 15) Sight allows us to look at the appearance of an object or a space and make associations on the basis of what we see. Sight is the most powerful sense, the most conscious tactile element in

Figure 113: Final design render -pod 2 entrance



Figure 114: Final design render -pod 2 interior



Figure 115: Final design render -pod 2 bowl detail

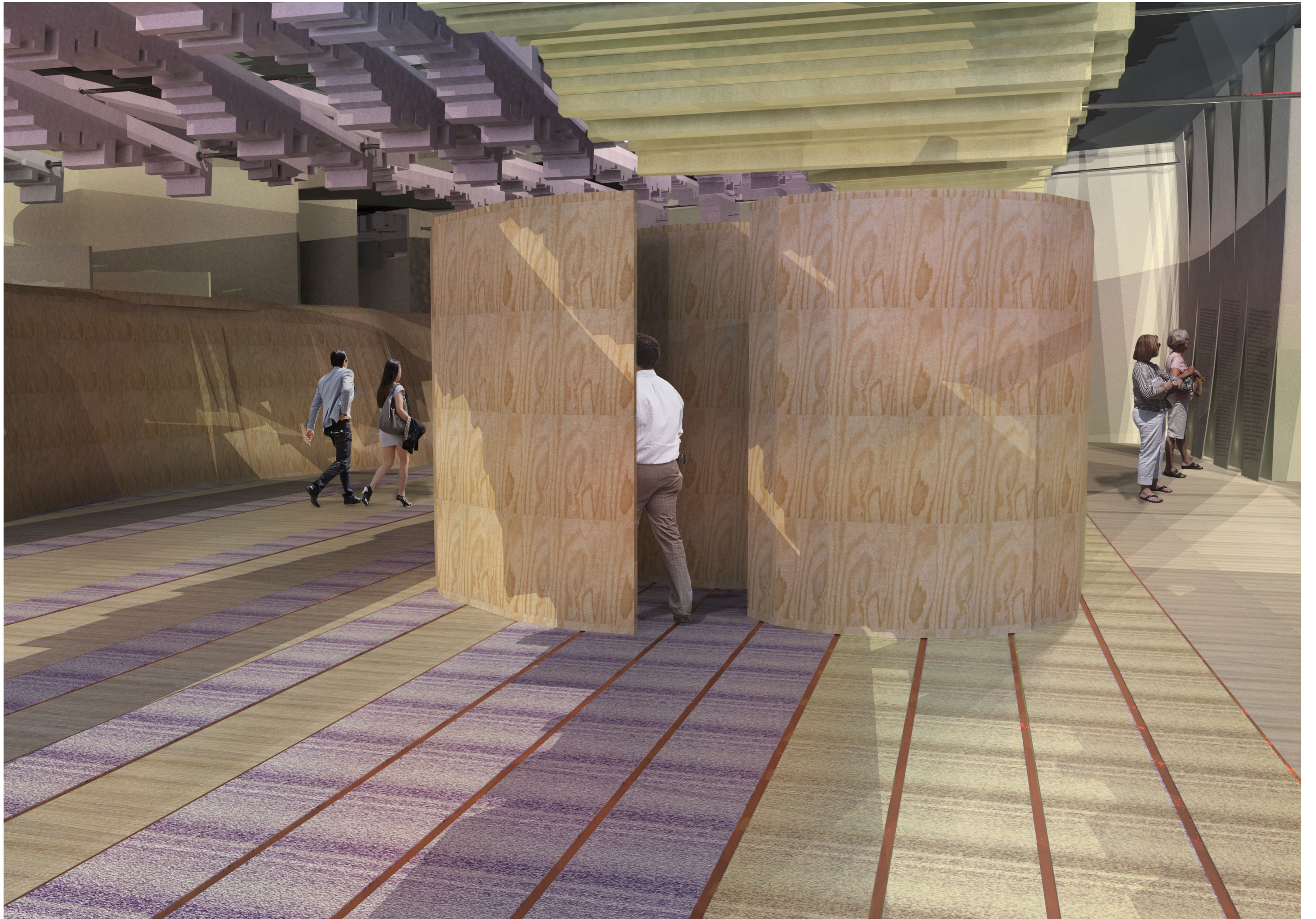


Figure 116: Final design render -pod 3 overview



Figure 117: Final design render -pod 3 entrance



Figure 118: Final design render -pod 3 interior



Figure 119: Final design render -pod 3 light panel detail

6.8 Final Design Details:

Figure 120: Design detail renders



Detail 1:
Veils of Glass ceiling and wall form-
The ceiling form is Resene Drover, Blue Chalk and Concrete painted white washed oak wood and is connected to the ceiling via a gunmetal steel rod that bolts onto the form and into the wall. The same material form is also attached flush to the back wall which is Resene Ecru White standard gib wall.



Detail 2
Pod one tunnel-
Plywood tunnel exterior with a moulded charcoal metal formed to the interior of the pod.



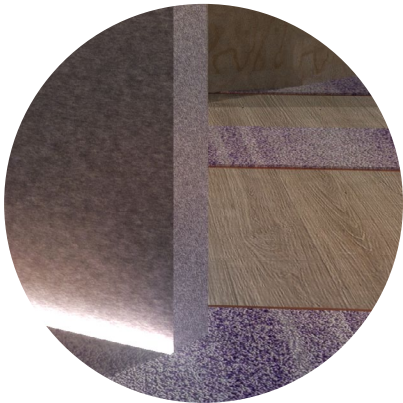
Detail 3
Tunnel light-
The tunnel light is designed with a copper top piece connecting onto the wooden rimu which slots in the light blue porcelain base. On the interior of the base situated in the centre is the speaker. The LED light strips sit around the outside of the speaker.



Detail 7
Café chair-
Bright purple, yellow and blue cotton material cushions sitting on black metal bases with copper ring insets.



Detail 8
Smell plinth-
The plinth consists of light wooden bases, clear glass stalks with copper pipes on the interior carrying the smelling mist into the top wooden pieces and into the light purple porcelain bowls.



Detail 9
Pod 2 design-
Pod two has the same exterior plywood as pod one and a light purple felt interior that is glued onto the plywood.



Detail 4
Café Light-
The café light is detailed with a polished copper top with a light blue porcelain base.



Detail 5
Café counter feature-
The café counter features a copper strip which runs from the ceiling down to the counter top along the length of the counter and down the side to sit at the feet of the patrons.



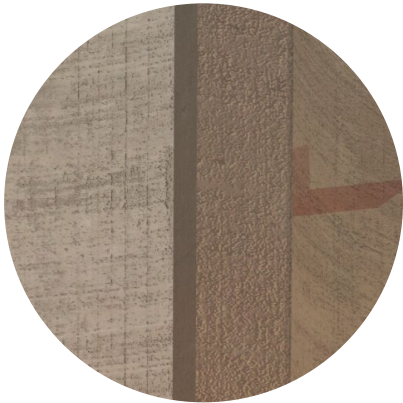
Detail 6
Café counter-
The counter top is a black speckled marble slab sitting on bright purple, yellow and blue tile base with a black gloss kickback.



Detail 10
Light panel-
The light panels come in three colours, yellowy green, red and blue pieces that can be turned via the small metal joint that's hidden within the wall.



Detail 11
Carpet and flooring-
White washed oak panel flooring with rich coloured and largely textured carpet floor lined by copper strips for the flooring strips.



Detail 12
Pod 3 design-
Pod three again is the same as pod one and two with a plywood exterior but has a smooth white concrete interior.

6.9 Gallery of the Senses –A Sensory Experience:

After the final design outcome has been explored and exhibited there is the opportunity to evaluate and address the sound theory that has been developed. The design shows how a physical expression of sound can be brought into a space to make it more engaging for the senses and thus more engaging to the individuals who are sensory impaired along with those with the full sensory capacity.

Overall the mood veils of glass is apparently evident within the space. The colours of the main form, purple, grey and yellow works to give the space a soft, smooth and delicate feel. The form of the ceiling is now incorporated into the space through the two halves which are tilted and lowest at the centre. This allows the Veils of Glass mood to be exhibited in a way so the form holds the viewer close like a silk blanket falling into water.

From the moment, the patron first enters the space the first sense experience is initiated. The encompassing form of the space and the layout of the pods creates the desired intrigue. And as the viewer ventures into the interior the sense of touch begins to be engaged. The textured carpet can be felt underfoot providing a non-visual reflection of the mood. This is also engaged at the back wall where patrons can feel the shapes of the main form. The lowered ceiling can also be sensed by the viewer without visual cues. The carpet and lowered ceiling work together to provide the opportunity for an acoustic shift within the interior. This zone will echo less and have a more close and softened sound. This means that multiple senses are engaged allowing for those who are visual or hearing impaired to be experiencing the space.

Overall the development of the pods has worked successfully in providing a capsule in space, in which the specific senses which are targeted in each pod have the ability to blossom and be emphasised without the distractions from the remainder of the interior. The pods allow those both with the full sensory range and sensory impaired to be exposed and deliberately forced to experience more than one sense at time in a way that feels both natural and exhilarating.

As the patron enters the first pod the light shifts and the tunnel is darker than the rest of the interior. The metal interior material increases the darkness of the tunnel which allows the spotlights that run down the middle to be the focus. As the user gets closer to the lights the faint sound

of music can be heard, as the sound waves bounce off the metal interior, beginning the element of curiosity. The user is then propelled to engage with the light as they touch the smooth, warm porcelain and copper light, to lift the speaker closer to their ears. The combination of senses becomes engaged and new sounds explored as the person moves through the tunnel. The lights are hung at varying levels allowing children, adults and wheelchair users of varying heights to reach the lights. Although this has its benefits this may still require further development as potentially the lights may hang too low for tall visually impaired users.

Once exiting the tunnel the placement of the second pod invites the patron in. This is the base for the fourth sense experience. The inside material of the pod is a soft purple felt which softens the sound inside the pod, making the space quiet and calming and close. The glowing glass from the plinths inside illuminate the pipes that moves through from the wood base to wood top. The smooth purple porcelain bowls which emit a fine mist, each plinth with its own distinct smell. As the patron moves around the plinths they can uncover the varying smells from the mist. With smell, touch and sight engaged within the pod the user is allowed a full experience not dependent on one dominant sense.

The third pod is the showcase for experience 3. The user follows the smooth white polished concrete interior of the pod to the centre where the pod is alit with multiple colours all reflecting off the interior palate. The user then has the opportunity to create their own light patterns within the space by turning the coloured glass panels in order to shift the light reflections. Using touch and sight to guide the artistic expression of the design.

The final and fifth sense experience is moved from the veils of glass mood to the atmospheric silence mood which is used for the café space. Overall the café space encompasses the mood of atmospheric silence as it is bold, bright and balanced. This is seen in the colour of the seating materials and the table arrangements. The feature of copper sheet which runs down from the ceiling and over the counter to sit at the feet of the café patron has a rushing and tumbling effect emanating that of waterfall. The rhythmic splashing of water is represented in the tables and seating areas. The café serves experimental food. Food that appears differently to its expected taste, example being

coloured differently to normal. Experimental drinks are also served from the taps at the end of the counter where users can serve themselves and add different spoonful's of substances which change the colours of the drinks. The experimental food gives the element of surprise allowing the fifth sense experience to fit into the café space. The patrons use taste, sound, touch and sight when enjoying the café experience.

Overall the three mood categories work well together within the space allowing for smooth, subtle and natural transitions of mood as the user moves through the varying programs. From here the final programme of the toilets will still require further development when detailing up the design to match the canalisation mood category. This is anticipated to begin with deep red and green tiling to match the canalisation colour palate.

6.10 Conclusion:

Interior architecture creates atmosphere through engaging with the senses, through manipulation of specific spatial conditions and qualities. This has been established as extremely important when dealing with those who have a sensory impairment. Henry Plummer's theory on light provided a basis for the author's new theory on sound, with its own specific spatial and mood qualities.

The sound theory was created to provide a strategy to bring the consideration of sound back into interior spaces. The theory provides seven categories that align with Plummer's. This allows for both theories to be used together in harmony to provide a stronger, more effective outcome for each category. The sound theory provides a colour palate, an overall graphic representation of mood, a physical representation of sound and a realisation of how all elements may work together within an interior. This allows both sound and light to be used in conjunction providing a way for both sight and hearing to have a reinforced idea within interiors and allowing the remaining senses to also be revitalised. The theory is tested against a programme at a specific site. The theory is successful in providing a space which is engaging and more accessible for a wider range of society, for those who are and are not sensory impaired allowing them to enjoy their surroundings at a higher level. The theory still requires improvements when dealing with spaces that are smaller with higher restrictions.

At the end of this body of design research it has been found that the most important thing when considering the senses within design is scale and materials, especially when dealing with the Veils of Glass mood category. Scale of form play a massive part in determining the overall impression the instalment of sound has on the space and also informs users practically, and thus required in order to generate a design which can be physically realisable. Materiality, including the colour of materials is crucial in instilling the very specific mood which is associated with each sound category. Materiality carries with it its own associations with the senses, (what does the material smell like? what does it feel like? Etc.) And it is these associations that carry with it the importance of these design tools.

The sound categories that have been developed have provided a frame work for designing with the senses. This provides the opportunity to be taken into other designs in order to achieve a sensory engaging interior. The sound theory has

been tested in the programme of Gallery of Senses. As this is the most natural programme for the sound theory to work it can be assumed there will be certain challenges involved when using the sound theory to design an interior with a different programme. There may be restrictions on form, colour and scale when dealing with spaces with different programmatic constraints. Such as, offices or schools requiring multiple desks and specific standards of design. There is also the potential challenge involved when looking at different site locations. This is due to the scale changes which may be required when dealing with smaller or larger sites. The material of water has remained as a graphic realisation in the sound theory, as a further development of the design and as the theory is taken into new programmes and locations there would be the opportunity to discover how a physical representation of water might immerge within the interior. In overview the sound theory that has been created provides an exciting and innovative response to sensory architecture which allows the reintroduction of the senses into interiors to be realisable and possible at the design level; thus providing new opportunities for those with sensory impairment to enjoy spaces where they have not been capable of previously.

7

Part

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