A Re-examination of the Learn-to-Swim Experience

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Abstract

This Master of Design study develops a mobile learn-to-swim facility for use in New Zealand primary schools. The design seeks to address both the physiological and psychological needs of young children who are learning to swim while promoting children's confidence and excitement throughout their interaction and experience of the space.

As a personal response to the issues of declining access to learn-to-swim pools for New Zealand School children, I examine and analyse traditional and contemporary pools.

An iterative process of design exploration developed an overall design solution. Further focused design addressed the user-experience of entering the pool.

The design maximises the engagement of children with the learn-to-swim process by addressing a number of the stress factors associated with the swimming pool environment. A criteria set is developed for a learn-to-swim pool that is effective in terms of provision of learn-to-swim education, and affective in terms of generating positive emotional response from its users. This design-led research project suggests a pool space that is responsive to a range of users' swimming abilities, learning styles and emotional confidence.

Acknowledgements

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Special thanks to my supervisor Rodney Adank and Postgraduate Coordinator Julieanna Preston for saving this project from drowning. Your encouragement and support were invaluable and most welcome. Thank you both very much.

My love and thanks to my wonderful family.

This thesis is dedicated to my wife Lara for all your love and support, and to my sister Anna for teaching me to swim.

Limitations of the Study

This research project is limited by the exclusion of input from the end users; children learning to swim. The process of involving child participants in the research project proved impractical. This project has drawn data, information and analysis from contemporary literature on the subject and first-hand experience of NZ learn-to-swim pools as the basis for the design proposal.

The design of the learners' pool does not incorporate considered access for users with disabilities. This subject is of great importance to designing for the needs of all end users and is also an issue of personal interest. The time constraints of this study did not allow me to thoroughly explore the requirements. Rather than give perfunctory consideration to the needs of users with disabilities, and suggest they were properly catered for, the final design should not be considered complete without significant further design research in this area.

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Chapter One Introduction to The Mobile Pool Project

1.0 Background to the Project

New Zealand schools are losing their swimming pools at an average rate of 53 per year. The learn-to-swim pool construction boom of the 1950s and '60s has left a legacy of concrete swimming pools that are tired and deemed no longer fit for purpose. Funding cuts and budget pressures in the education system have meant that school pools are increasingly viewed as luxury items and no longer as crucial educational tools.

This research project has its origins in a radio interview I heard in 2008. I was washing the dishes in my kitchen; my least favourite aquatic activity. The topic of discussion was the issue of New Zealand schools losing their swimming pools. The interviewees were Matt Claridge, Chief Executive of Water Safety New Zealand and Jamie Delich, Recreational Facilities Manager at Wellington City Council. They outlined the situation of primary and secondary schools closing their pools due in part to budgetary cuts, compounded by many local governments' inability to meet the growing demand from schools for public pool space. I listened with interest and scrubbed the pots.

The increasing loss of these learn-to-swim facilities and the learning opportunities they provide would create a generation of New Zealand children growing up with less swimming ability than their parents, effectively producing the first generational regression of aquatic skills since the country's colonial times. The forecast consequence of this decline in the populations swimming ability is a steady rise of the nation's drowning toll, already one of the highest per capita in the developed world. There were no solutions forthcoming from central government. It was, all agreed, a looming crisis.

Figure 1. Decommissioned pool, Avalon Intermediate, Lower Hutt NZ.

I rinsed the last of the cutlery and thought, "Why not have a mobile pool that could be moved from school to school? The cost could be shared by more users. It could be made out of a shipping container." And so this project was born, whole and complete, a topical problem and a practical solution; a lack of pools and an affordable, mobile facility. It all seemed so simple.

The journey of this research project has seen my assumption of what the problem with school swimming is, and the solution I formulated that morning, morph and expand considerably: the surety I sought in providing utility and function eventually giving way to the uncertainty of designing for user-experience, and concern for physical dimensions giving way to concern for emotional response.

I have had to examine my own memories of learning to swim and question whether my experiences were typical. I had taken for granted that learning to swim was an enjoyable process and that it was also the end goal of the project. The focus of this research has shifted from simply providing a learn-to-swim pool, to creating a space which reduces the anxieties associated with learning to swim and fosters exploration and discovery. The end goal of this project to is reinforce positive associations of swimming so that young pool users will be self motivated to continue swimming for a lifetime.

1.1 Research Aim

The aim of this research project is to produce a design for a mobile learn-to-swim facility for junior primary school children that is effective in terms of cost and usability, and affective in terms of promoting confidence in young swimmers and building positive associations with aquatic activity.

1.2 Research Questions

1. What are the legislative compliance requirements of a learn-to-swim pool?

2. What are the shortcomings of traditional learn-to-swim pools?

3. What is the nature of contemporary mobile learn-to-swim pool facilities?

4. What is it like to learn-to-swim and what are the possible negative emotional aspects of learning to swim at school?

5. How can design thinking mitigate the causes of user anxiety in a learn-to-swim pool and improve the user-experience?

1.3 Research Methods

This project uses the following research methods:

- **Informal interviews and site visits** with a range of stakeholders (17) to gain insight into the needs and concerns of the many groups connected with the project.

- **A literature review** to examine the origins of New Zealand's school swimming education and the design criteria of the original learn-to-swim pools.

- **First hand accounts** via email feedback from friends who provided a description of their memories of their learn-to-swim experiences. These first-hand accounts allowed me to gain a broader understanding of the emotional aspects of learning-to-swim.

- **A market analysis** of existing learn-to-swim pools to investigate the functionality and usability of these facilities and questions how well they meet the physical and emotional needs of their end users.

- **Iterative sketching, CAD models and scale model construction** were used to study and develop a range of pool enclosure systems, pool entry systems and components.

Chapter Two Context Review

This chapter investigates the social and political factors that led to the development of school swimming education in New Zealand, the advent of the school learner pool, the success and proliferation of this pool design and the reasons these pools are now being decommissioned.

2.0 Drowning in New Zealand

Drowning is the third leading cause of accidental death in New Zealand (Drownbase, 2010). The association of New Zealand with accidental drowning dates back to colonial times "By 1870, just a few decades after European settlers first arrived, rivers had been responsible for 1,115 recorded drownings. Drowning became known as 'The New Zealand Death'." (McSaveney, 2009). The propensity for accidental drowning in this country can be attributed to the following complex combination of factors —

- Geography — New Zealand is an island nation with an extensive coastline, accessible beaches and strong ocean currents. With only one inland city most of the population live near the coast - 90% of homes are within a 20 minute drive of a beach. The country's high rainfall has also produced many rivers, lakes and estuaries.

- Lifestyle — New Zealanders take pride in being outdoors people. Tied to the land through our traditional agrarian industries, many urban dwellers seek reconnection with the outdoors through numerous recreational activities. Fishing, swimming, sailing and tramping allow people to enjoy and value the natural splendour of the country. But these activities also carry a degree of danger.

Figure 2. Lifeguard on patrol, Piha Beach, NZ.

- Attitude to safety — The nation's relatively recent pioneering history has produced a 'can-do' and 'she'll be right' mentality. When faced with a situation that poses potential hazards, often the New Zealand default attitude is to have a go and hope for the best.

One way to counter the social and economic cost of the drowning rate in a population is through aquatic education including teaching swimming and water safety in schools. Wallis (2011, p.103) contends that learning to swim is an important part of a child's development and that a child's school is the ideal place for the delivery of swimming education:

> A school's impact on a pupil's swimming education is critical and can be the foundation for a lifetime of water based activities. Aside from the positive health benefits it brings, swimming is one of the truly vital life skills in the curriculum, as important to a child's life as numeracy, reading and writing... Furthermore it can provide a learning environment that is fully inclusive, with everyone at some point having specific learning difficulties, as the environment provides physical and sensory challenges to all participants. Everyone was a non-swimmer at some time or other. A child's first experience of swimming may be during their first swim lesson at school, so making these early experiences memorable can develop an interest in swimming...that will remain with them throughout their life.

Figure 3. Rock fishing at Muriwai NZ.

2.1 A History of New Zealand School Swimming

Aquatics education was an important part New Zealand's school curriculum for over one hundred years as Dr Kevin Moran (2001) explains in his definitive article on the subject *Aquatics Education and the Advent of Primary School Learners' Pools in Post World War II. New Zealand.* In 1901 the Education Department provided a capitation payment to schools based on the number of students enrolled in swimming classes. In 1920 the government agreed to provide a subsidy of one pound to every two pounds raised by voluntary contribution to the cost of erecting school pools to a limit of £150. The subsidy was removed during the depression years of the 1930s but the outbreak of WWII reiterated the importance of physical education in schools in large part due to..."concerns for the physical health and abilities of the nation's youth in defence of the realm... recognition of the functional need for a fit military force." (Moran, 2001, p.58). It seems somewhat ironic that the Government of the day promoted physical education in schools for the express purpose of producing fit soldiers willing to sacrifice their healthy bodies in European wars.

At this time a key figure in the development of school swimming Ken Reid, Auckland Teachers College lecturer in physical education, devised the prototype 'learners' pool' (also known as the Reid pool). The pool, which later became the template for school learners' pools across New Zealand, was commissioned in 1940 at Cornwall Park School in Auckland. It was made from a converted concrete curing tank that belonged to a local concrete company. The tank measured 30ft by 12ft and with the help of school fathers it was moved on to the school grounds, a foundation laid, the pool set in place and filled with three feet of water. The pool was considered to be a successful combination of functional design and affordable construction.

> The pools were specially designed to give confidence to beginners as they were shallow (.8–.9m), held a relatively small amount of water which heated quickly, and had hand rails all around lower initial cost (£1000) and suitability for all grades of learners, even the infants. (Moran, 2001, p.62).

Figure 4. Bathers at Kaiwharawhara Stream Pool 1932, Wellington NZ.

The concept of the learners' pool was considered so impressive that in 1941 it became government policy to subsidise the construction of the pools.

The post war prosperity of the 1950s fuelled the proliferation of learners' pools in New Zealand schools. The government tripled spending on education between 1950 and 1960 to accommodate the baby boomers arrival into the education system, and learner pools were being built at an average of 50 per year. Between 1941 and 1960, 1,200 schools built learners' pools. While the government subsidy of £300 provided great incentive, it was the local communities that provided the balance of funds and the majority of the construction labour. The pools were seen as community assets and became a summertime social hub, especially in areas where no public pool existed.

The original pools were very basic in design, construction and operation. A concrete foundation slab was poured and reusable wooden boxing was used to form an eight inch thick cavity which was filled with concrete slurry to create the three foot high rectangular concrete walls. A steel hand rail was fitted along with either one or two fixed steel ladders for entry and exit. Occasionally a basic changing shed was built adjacent to the pool. No pool fencing or water filtration system was deemed necessary. The pools were emptied and refilled completely (usually) weekly in a process known as 'draw and fill'. This system led to high water costs for schools as well as great variation in water quality and user comfort. In an interview with the author's mother she recalls the school pool of the mid 1950s as "Crystal clear and cold as hell at the start of the week, then warm and decidedly yellow at the end of the week. We didn't put our heads underwater past Wednesday." (J. Donaldson, personal communication, 1 December 2011). Water hygiene in learners' pools became a serious public health concern with the pools described as "...unsanitary, germ breeding duck ponds" (Moran, 2001, p.63). In 1959 the government began to subsidise the installation of filtration units.

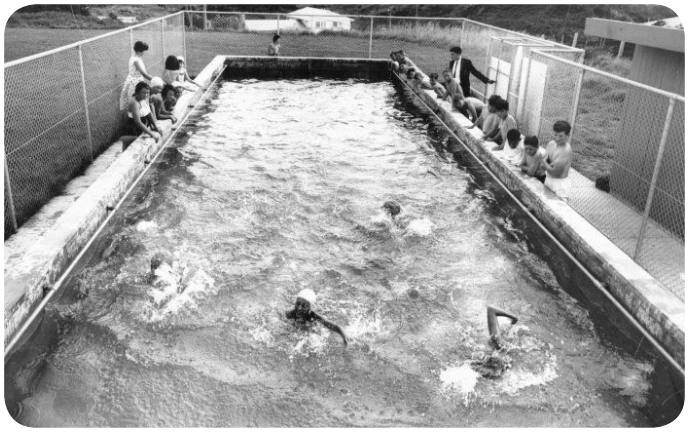


Figure 5. Teachers stands pool-side and demonstrates stroke technique at Johnsonville West School 1962, Wellington, NZ.

The design, construction and filtration of the learners' pools were original to New Zealand. The pools were considered so successful that by 1962 they were being replicated in Australia, South Africa and Canada. By 1970 the construction of school learners' pools reached its peak with 70% of New Zealand primary schools having a pool for teaching.

Points of Reflection

New Zealand has been a world leader in the design and implementation of learn-to-swim facilities in schools in the 20th century. Public concern over the high drowning toll influenced political backing for a solution. A functional design based on affordable construction processes was financed by the Board of Education, supported by local communities and eventually adopted as an international standard.

Figure 6. Northland School Pool 1975, Wellington NZ.

Figure 7. *Decommissioned pool, Avalon Intermediate School, Lower Hutt, NZ.*

2.2 Why Did Schools Start Closing Their Pools?

Since the early 1990s there has been a growing trend for both primary and secondary schools in New Zealand to close, decommission and demolish their swimming pools. New Zealand's once vaunted pool stock is ageing, and various economic and social pressures are causing schools pools to disappear. According to The New Zealand Educational Institute, 20% of schools have closed their pools in the last decade (Education Aotearoa, 2012).

Until the late 1980s funding for school pools was paid for by local education boards. Under the 'Tomorrows Schools' education reforms of the late 1980s and early 1990s greater financial control was given to schools to decide how their operational funds would be spent. Provision for funding the maintenance and running costs of school pools now had to compete directly with other school costs. Around the same time a major revamp of swimming pool health and safety regulations meant many schools were forced to upgrade their pool pump and filtration equipment and perimeter fencing. Many of the concrete pools were now in their forth decade of use and were showing signs of wear – cracking concrete and delaminating plaster surfaces. School Boards of Trustees were faced with difficult budget requirements and an easy target for cost cutting was often the school's old and under-used swimming pool.

According to Brooklyn Primary School Principal Chris Bryant (personal communication, 7 April 2010), there are many factors that influence a school board to decommission their school pool:

- high repairs and maintenance costs
- the limited swimming season — (especially for outdoor unheated pools) usually only the summer term of 10 weeks
- time pressure from other areas of the school curriculum and an increase in the perceived importance of academic learning at the expense of physical education

- competition for school space from classrooms, car parks, playgrounds etc
- lack of teacher training and enthusiasm
- lack of parent enthusiasm
- safety fears of staff and parents (especially regarding after-hours access)
- the availability of local public pools as a substitute.

Between 2001 and 2008, 323 school pools were closed, a rate of 40 per year. In 1985 Wellington had 48 schools with operating swimming pools. In 2010 that number had decreased to 12. (SGL, 2011). Consecutive central governments have shown little initiative to reverse this trend. A steep rise in New Zealand drowning statistics is the forecast result (watersafetynz, 2011).

> Kilbirnie School Principal Mike McGimpsey said running a pool was costly and schools received little help from the Ministry of Education. "We receive $280 a year from the ministry to operate the pool. That doesn't even pay for half of the chemicals needed. That's really why schools are closing their pools. Under the old system the Wellington Education Board paid the bills for the pool. Now it comes out of our operations grant. (Armstrong, D. 2009)

2.3 My Experience of School Swimming

The following scenario is from my own memory of school swimming.

A five-year-old boy stands shivering in line with his class for his first swimming lesson at his primary school. He has not been in the school pool before and he's worried about getting into the water. He's also afraid of looking scared in front of the other kids who mostly seem pretty excited about getting into the pool. His swimming ability is also not very good; he wonders if he will be the worst swimmer in his class. The line moves forward as his class mates climb the ladder and enter the water.

"Oooh, it's cold!" they yell.

The boy is now at the ladder and he grabs the rails to mount the first step. The steel is cold on his foot and he starts to panic. He reaches the top of the ladder and now he must turn around on top of the pool wall, he looks down into the water and can't see the bottom of the ladder clearly.

"Come on slow coach!" another classmate behind him urges, eager to get in the pool. The boy starts to descend the ladder to the first rung he can see below him. The water *is* cold and he wishes his mum was here but he is determined not to cry. But now he can't see the next rung down as it's below the one he's standing on. He has to reach down with his foot and hope he touches it. The water is so cold! Where is the step? He starts to go back up but the other boy is on top of the wall and has blocked his way. "Come on man! I wanna get in!" He wants to get out and get warm but down the ladder he goes. He finds the step and then the next, but the fourth step is not where is should be! How deep is the water? "What if I go under and no one sees me?" Panic sets in before his foot touches the pool floor two inches below where he expected the final rung to be. His breathing is rapid and the water is up to his chin. He bounces on his toes and

clings to the steel hand rail next to the ladder. The boy is close to tears but tries desperately to hold them back. The boy behind him bounces down the ladder and splashes past, swimming off to the middle of the pool.

"Right, are you all ready?" The teacher bellows from the pool side.
Tears fill the boys squeezed shut eyes and his chin, chattering with cold, starts to wobble with sobs.

I would like to claim that I was the cold, fearful boy in 1983 who went on to overcome his fear of the school pool and become a strong swimmer. But I wasn't. I was the boy behind him — the impatient, pushy one, keen to get in and show off my swimming prowess to my peers. I remember at the time of this incident that I couldn't understand why the boy was so scared and sad.

As a school boy in the 1980s I was a beneficiary of the legacy of the Reid Pools. Three of the four primary schools I attended had a learners' pools. Schools with pools were the norm. My memories of school swimming were all happy, in fact most of my best memories of primary school involved school swimming sports day. I was a strong swimmer before I reached school having been raised on a farm with the best of boyhood amenities: a forest, a barn and a pool. Winters were for exploring creeks and building hay bale huts and summer was devoted almost exclusively to being in or around the pool with my older siblings and every neighbourhood child and their visiting cousins. By the time I reached primary school the school pool seemed shallow and tame. I was not a particularly academic student but my opportunity to prove my worth arrived with the swimming season. In the pool I darted past my classmates (the neat hand writers and good spellers) with ease, showing off my freestyle and backstroke and even whole lengths underwater. At last, a school activity I was proficient in!

I approached this research project without considering whether my experience was

Figure 8. School Swimming Sports day at Belmont Primary, Auckland NZ.

typical. I initially assumed the goal of my research was to design a pool that could reinstate the ability of schools to provide swimming lessons for students as they had done in the past. The nature of the experience of those lessons was not my concern, who was I to tell swimming instructors how to teach children to swim? The problem, as I saw it, was that schools could no longer afford to keep their pools.

As I discussed my research with friends and colleagues I gathered unsolicited tales of childhood experiences of school swimming lessons, powerful memories that had stayed with people into adulthood, many of the stories were traumatic."I remember school swimming, I didn't like putting my head under water and I had an old bastard of a teacher who would push a great big heavy book on my head to make me go under the water, I was so terrified, I still hate going under water even now'' (Personal communication, Fellow Master Student, 2011). The appreciation of swimmer anxiety expanded the scope of this research from developing a mobile pool to exploring learn-to-swim pedagogy and how the anxieties of learner swimmers could be mitigated through affective design consideration.

Now, as a father of two daughters at primary school, this research project has even greater personal significance for me. I have been able to compare and contrast my experiences of school swimming with those of my children and analyse the changes in the learn-to-swim experience that have developed over the past three decades. From here the opportunity exists to re-examine what the learn-to-swim experience could become with the user-experience as the focal point and the abolition of fear as the goal.

2.4 Emotional Requirements for Learning to Swim

Learning to swim is an emotionally challenging experience for most children. While taking into account traditional aspects of usability, such as applied anthropometry, consideration of the emotional user-experience is needed. Desmet's *Model Of Emotion Due To Product Engagement* (Desmet, 2002) is useful in this regard as it identifies factors such as 'concern' that the individual may bring to a product engagement. When the individual's concern is informed by the 'stimulus' (anything that the individual may sense though vision, touch, hearing, smell and taste) he or she forms an appraisal of the product experience. This appraisal can lead to the forming of a positive or negative emotional response by the individual. This model is dynamic as the appraisal and response can change as the engagement develops.

If the appraisal is negative the individual will more readily develop a negative emotional response such as fear, anxiety and stress. The emotional response can in turn reinforce the individual's concern and influence them to avoid the experience in the future. The learn-to-swim environment provides a range of potentially stressful interactions for the individual. These stresses and/or anxieties may be a result of preconceived ideas about the coming interaction or a result of previous experience. Understanding stress allows us to design to mitigate this experience.

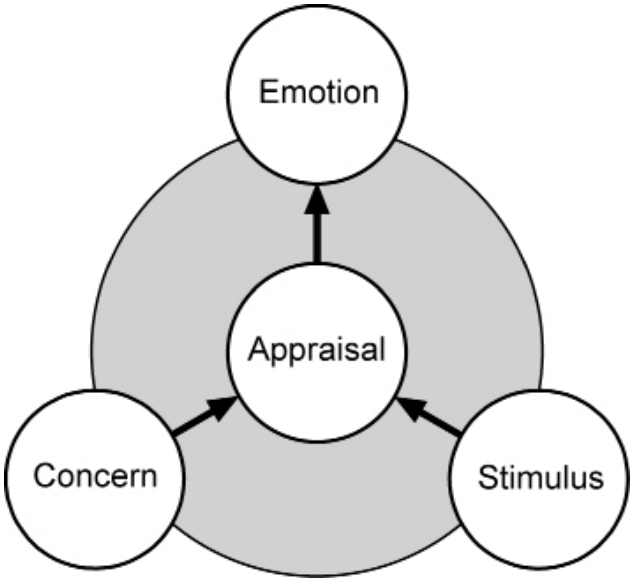


Figure 9. Desmet's basic model of emotion due to product experience. (Desmet, 2002)

Point of Reflection

A pool that compounds users' anxieties regarding the process of swimming may reinforce negative associations with the activity and deter the user from engaging in the lesson or participating in future swimming lessons.

2.5 Other People's Learn-To-Swim Experiences

At the commencement of this project I had an understanding of my own school swimming experiences and those of my daughters. But what was it like for other people? To gain a broader appreciation of the learn-to-swim experience I sent an email request to fifty friends asking for a brief description of their own learn-to-swim experiences and, if applicable, the experiences of their own children (Appendix 1). I was hoping to discover some patterns or recurring themes of experiences and emotions, perhaps a correlation of a parent's experiences to those of their children. I received a diverse range of feedback ranging from fond nostalgia of how the smell of chlorine brings back wonderful childhood memories, to traumatic horror stories of being thrown into the pool and told by teachers to "follow your instincts".

What became apparent was that there is no singular typical user-experience of learning to swim: people's experiences and emotional responses covered a broad spectrum. The process is subject to a combination of the nature of the physical learning environment, in terms of both the comfort of the facilities and the quality of the teaching staff, and the confidence and state of mind the child brings to the experience. What *was* a evident from the stories was the vividness of people's memories of their experience and the lasting potency of the emotional response to the process. Other recurring themes included the following:

- individuals feeling embarrassed about their level of swimming ability in front of their peers
- people's aversion to cold water in pools
- the distressing noisiness of indoor pools
- the fear of not being able to touch the bottom of the pool
- inadequately trained and poor quality teaching staff.

Of the respondents who recounted difficult or negative emotional experiences of learning to swim, some had overcome these experiences and had gone on to develop a love of swimming, whilst others had been put off swimming altogether and had struggled to enjoy swimming even in adulthood.

Points of Reflection

A child's emotional responses to the learn-to-swim experience can be powerful factors that either motivate or deter them from pursuing the activity. If the goal of teaching children to swim is to encourage life-long swimming, the design criteria of a new learn-to-swim pool must address both the physical and emotional concerns of young learner swimmers.

2.6 Environmental Requirements for Learning to Swim

To better understand the emotional and environmental requirements of a learner swimmer, I met with Scott Wilson, former owner and director of Wellington's TSW Swim School. I asked Scott to outline the environmental and emotional requirements of teaching a child to swim and the initial lesson content. Scott stated that before any lesson content can be delivered it is essential for a child to be relaxed and focused in the pool. For this to occur the water needs to be warm (Scott recommended 31 degrees Celsius) and the space should not be overly noisy: A child who is cold or distracted by noise cannot focus on lesson content. The first stage of teaching concerns breath control; when to inhale, holding breath and when to exhale. This is taught by practicing blowing bubbles into the water. The next stage Scott teaches is the importance of correct body position in the water; understanding buoyancy and floating by getting the child to stretch out on top of the water so that they can appreciate that the water will hold them up. (S. Wilson, personal communication, September 5 2011)

Point of Reflection

A child will not be in an optimal state to start to learn the fundamentals of swimming without first being physically comfortable in the pool. A redesigned pool should fulfil the sensory requirements of users in the space so they feel comfortable and are able to focus on lesson content.

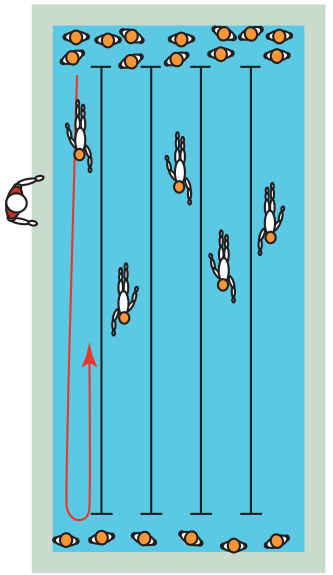
2.7 Spatial Movement in a Learn-to-Swim Pool

Rectangular pools are designed to accommodate several users swimming lengths at the same time. This type of movement pattern is typical of the training of competent swimmers who swim continuous lengths and/or compete in races. However, this long, linear movement is not reflective of how children learning to swim use the pool space.

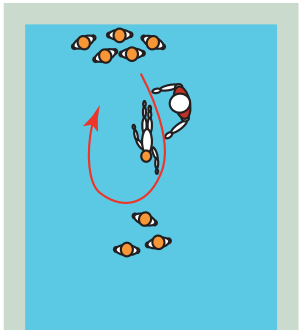
The initial exercises in a learn-to-swim programme require very little pool space as they deal with allowing swimmers to become accustomed to, and comfortable with, being in the water. For example, lessons explore concepts of submersion, buoyancy and breath control i.e. holding breath, blowing bubbles and fully submerging. Once the child is comfortable in the water and has started to master some stationary skills the lesson progresses to understanding the concept of propulsion through the water such as pushing off and gliding from one point to another, kicking, stroke development, and attaining correct body position in the water.

Where Do I Swim To?

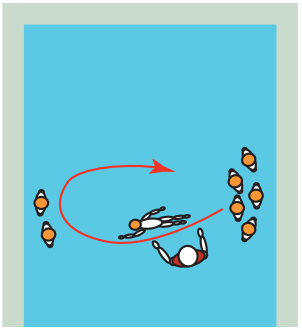
In a large rectangular pool the distance of the initial movement-based exercises are determined by the swimming instructor indicating where the children should swim to. Often the instructor will point to a location several metres in front of the group of swimmers and say "I want you to glide to here and stop." This can be confusing for young children and often in a swimming lesson the instructor will repeatedly say either, "Keep going" or, "Stop there." Asking children to swim to an undefined position in the pool means they have no fixed physical reference of destination. Seemingly minor points of confusion like this can reduce a child's motivation to stay involved in the lesson.



Lane swimming represents a culmination of basic swimming skills, not the commencement of learning.



The first lateral movements are approximately 2-3 metres.



As swimming ability develops children swim increased distances.

Figure 10. Patterns of user movement in a Learn-to-swim pool.

Variation of User Needs

Within a typical class of junior primary school students there will be a spectrum of swimming ability and water confidence. Some children will start school already confident swimmers, some may have had no swimming experience, and some may have had traumatic experiences that have created negative associations with swimming. To accommodate this range of users' needs, the pool should feature spaces and movement options that reflect the diversity of users' physical abilities and emotional confidence.

Chapter Three Analysis of Learn-to-Swim Pools

A review of learn-to-swim pools was carried out to determine the usability and functionality of the various swimming pool systems. This information was used to create a criteria set for a redesigned mobile learn-to-swim pool.

3.0 The Reid Pool

Moran (2001) observes that in its time the Reid Pool was considered a triumph of user-centred design, but on closer analysis this claim can be disputed. The Reid Pool is simply a shallow concrete water-tank without a roof, designed to hold water for many years with minimal maintenance. The pools are a product of their era, based on a cost effective, low tech construction method that the local community could assist with. The prototype Reid Pool, made from a concrete curing tank, was that most Kiwi of things: an improvised solution. The intent of the scheme, to teach children to swim, was considered so admirable that serious regard to the form of the pool was limited to its length, breadth and depth.

The materiality, form and sensory experience of the Reid Pool does not match the process that happens inside it. If the Reid Pool is considered from a product design point of view, the packaging does not reflect the content. The pool is hard, cold, linear, solid, and heavy, while the water it contains is soft, transparent, dynamic and buoyant and the users' bodies sent into the pool to explore the space are soft, warm, fragile, and uncoordinated. There is a distinct disconnect with the form and the function of the pool. This disconnect is manifested by children colliding with the pool wall and floor; bumping their heads, arms and chins; scraping knees and stubbing toes. Anyone who learns to swim backstroke in a Reid Pool knows the fear of hitting the end wall with an outstretched arm or their head.

Figure 11. The traditional Reid Pool with single steel ladder entry. Te Aro School, Wellington, NZ.

The Sensory Experience of a Reid Pool

Touch

Concrete and steel, the pool surfaces are hard and the water is cold. Small bodies loose heat quickly and a child who is cold will have difficulty paying attention to instruction and will want to get out as quickly as possible.

Taste

The typical chlorine taste associated with pools is caused by the presence of high levels of chloramines; the result of chlorine combining with ammonia (present from pool users urinating in the pool, a common occurrence apparently in school pools). Murky or foul tasting water, eye and skin irritations caused by poor pool water management, high levels of contaminants (urine, sweat, sun tan lotion), and insufficient filtration capacity are significant health and safety concerns but also influence user-experience.

Smell

Chloramines can remain in the water or evaporate into the air above the pool and produce a pungent smell. In the enclosed space around indoor pools they can reach dangerous concentrations and pose a substantial health risk. High chloramine concentration levels can cause acute eye and respiratory tract irritation in swimmers and other people in the indoor pool environment and may also contribute to asthma and respiratory disease.

Sound

Many Reid pools have been converted to indoor pools by the addition of an enclosure to extend the swimming season and make users more comfortable. But the common brick or fibreboard walls and corrugated tin roofs of these enclosures mean the spaces are notoriously reverberant. Large expanses of hard flat surfaces

filled with noisy splashing children and a teacher shouting to be heard, can create a difficult environment for children to hear instructions and concentrate.

Visual

Young swimmers are not always able to see over the top of a Reid Pool wall so are unaware of what the pool environment is like until they are about to descend into the water via the ladder. The unknown visual element can cause anxiety in children unfamiliar with the pool. The interior of the pool is typically a visual desert and provides little incentive for children to venture below the surface of the water. Putting one's head under water is one of the learn-to-swim skills that must be mastered but without anything to see there is little motivation for a child to explore the waterline.

Points of Reflection

Reid pools are utilitarian water tanks, outdoor versions are unusable for the majority of the school year and indoor variants are noisy and distracting. All are hard, cold and visually boring, if not intimidating.

3.1 Wellington Regional Aquatic Centre

Figure 12. WRAC spray pool, Wellington NZ.

Figure 13. WRAC teaching pool, Wellington NZ.

Like many schools without their own pool, Brooklyn Primary School transports its junior students to Wellington Regional Aquatic Centre (WRAC) once a week in the fourth term. The outing takes 2.5 hours and students have 30 minutes to play in the spray pool followed by a 15 minute lesson provided by trained swimming instructors in the adjacent teaching pool.

I have accompanied my daughters to their swimming lessons in the past and have made several observations regarding the user-experience: the pool space is very noisy and reverberant; the indoor space features broad expanses of hard surfaces; tiles, glass, sheet metal and concrete. Several instructors talk loudly at distracted children while many other children play noisily just metres away. Some children have difficulty hearing instructions and often have to guess what it is they are supposed to be doing.

The groups only occupy a small area of the pool at any one time; typically one quarter of a roped lane. Children are asked to push off from the wall and swim to an arbitrary point in the lane. Often children become confused about where to swim to and when to stop.

The whole process can be exhausting for both the children and the accompanying staff and parent volunteer helpers.

3.2 Hunt Davies Tennent Ltd Proposed Semi-Permanent School Pool Facility

Wellington has a shortage of usable year-round pool space. The situation was outlined in a 2011 report to the city council by research group SGL

> Wellington City Council swimming pools have been under growing pressure as a result of increasing demand particularly in respect of learn to swim and the needs of particular aquatic sports codes. The pressure has been exacerbated through the ongoing closure of school pools during the last decade... (2011, p.2)

In 2009 the Wellington City Council commissioned architects Hunt Davies Tennent Ltd to design a semi-permanent swimming facility for Wellington schools. The council's goal was to fill geographic holes in the city's ability to provide swimming facilities to all citizens within a 30 minute walking distance (J. Delich, personal communication, 3 March 2010).

The design featured a 10 x 8m Myrtha pool, under an open weave sun shade, bordered by five shipping containers housing changing rooms, ablutions, plant and storage space. The facility is designed to be constructed on a school's grounds and to service the local community. The component assembly system is designed to allow the pool to be easily dismantled and reallocated to another site if the school decides to build more permanent structure on the land.

To date the project has not been commissioned due to council budget constraints and a reassessment of core council responsibilities.

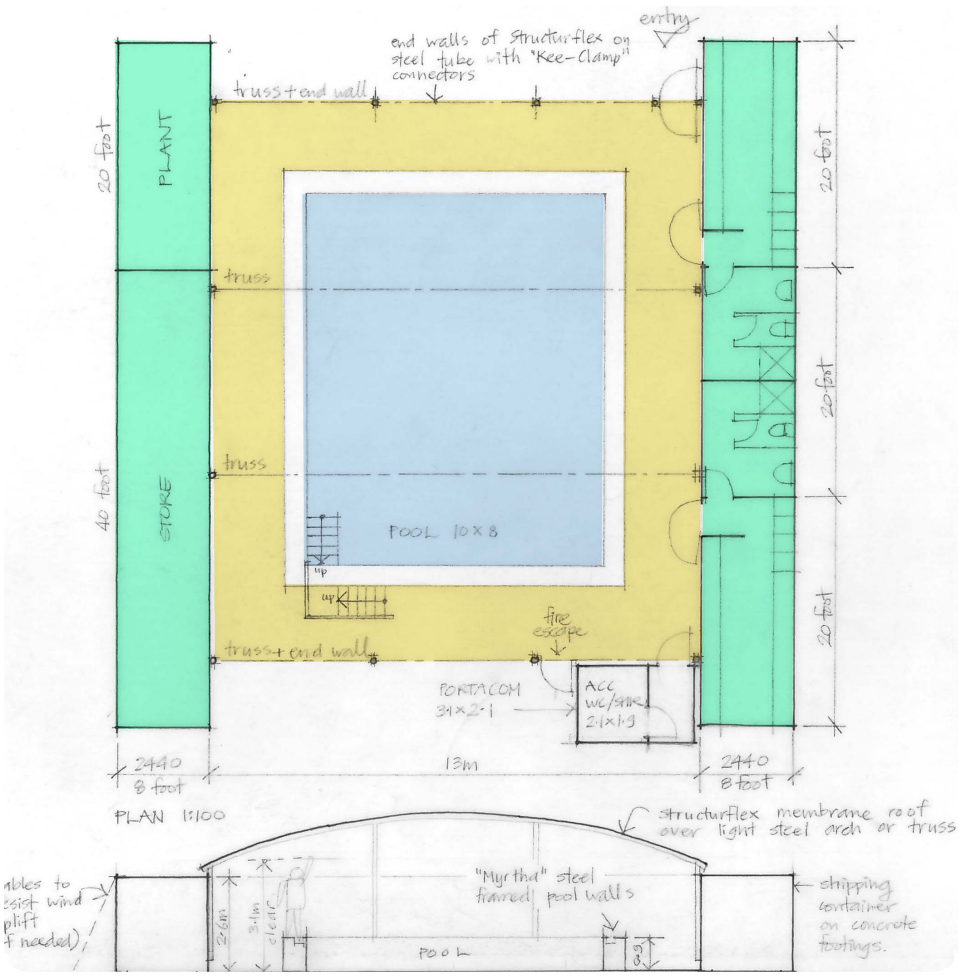


Figure 14. Proposed semi-permanent school pool facility. 2009. Hunt Davies Tennent Ltd.

Figure 15. The Pools iN SchoolZ facility, 2011, Oranga Primary School, Auckland NZ.

3.3 Pools iN SchoolZ

Established by Watersafe Auckland Inc in 2011 Pools iN SchoolZ (formally Pools2Schools) is a not-for-profit school swimming and water safety education initiative that supplies low decile schools with a temporary teaching pool housed in a marquee. The pools are set-up on site for half a term (five weeks) and then packed down and transported on a trailer to the next school. Pools iN SchoolZ provides the service free of charge to the schools. This includes a heated, covered 4m x 10m pool as well as professional development and ongoing support for teachers.

In February 2010 the prototype 6m x 10m free-standing pool, housed in a marquee, was set up at Red Hill Primary School in South Auckland. The trial was a resounding success with higher than expected participation rates and improved swimming abilities as well as noticeable improvements in students' class attendance, alertness and attitude (Stanley, 2011, p. 205). The Pools iN SchoolZ initiative has proven hugely successful and popular. Twelve pools are now in rotation around the country with more on order.

Analysis of the Pools iN SchoolZ System

Features

- Tubular steel snap-lock pool frame and laminated PVC pool liner.
- Pool frame height is 12m with a water depth of 1m.
- A scaffold access platform and steps at one end of the pool.
- Regulation compliant fencing at either end of the marquee.
- An electric heat pump water heating unit.
- A customised twin axel trailer housing the plant as well as providing transport for all the components.

Advantages

- The relatively small trailer can access narrow spaces within a school's grounds.
- The pool facility is inexpensive costing approximately NZ $50,000 (poolsinschoolz.com, 2011).
- Provision of the marquee means schools do not have to dedicate indoor space to house the pool.

Disadvantages

- The pool water is heated but the pool is not insulated meaning the heat pump must be constantly working to maintain a comfortable water temperature.
- No adjacent changing room space.
- The ends of the marquee are open to the air making the pool space prone to wind chill and heat loss.
- Teachers are not in the water while delivering swimming lessons.
- The pool is too deep for year one and two students.
- The aluminium stairs extend one metre into the pool space and pose a collision hazard.
- The stairs have no hand rail.
- the pool has no fixed hand rails.

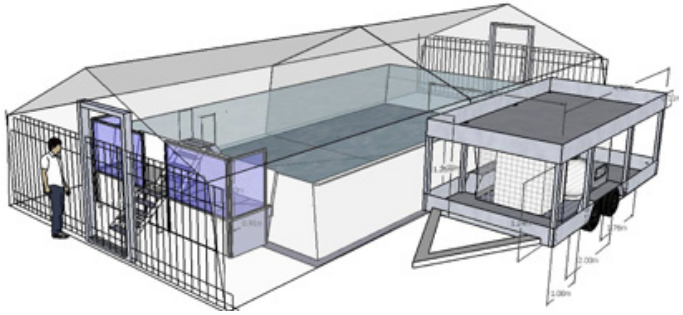


Figure 16. CAD model of thePools iN SchoolZ pool, marquee and trailer.

Figure 17. Volunteers attaching the cover to the marquee framing. Linwood Avenue School, Christchurch NZ.

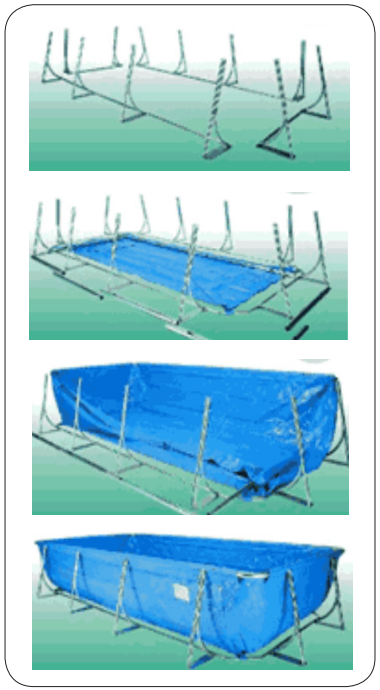


Figure 18. The Technypool assembly procedure.

Figure 19. The community assisting with the set-up of the Pools iN SchoolZ pool facility. Queenspark School, Christchurch NZ.

Functionality of the Pools iN SchoolZ Pool and Marquee

Pools iN SchoolZ use the Italian made 'Technypool' brand of free-standing pool. These pools feature a slung PVC liner attached to a tubular steel frame. The frame is comprised of many separate components which must be inserted into the liner and then clipped together.

The pool and marquee have very similar framing systems that sit adjacent to each other. A purpose built system could combine the two frames to reduce the number of components and set up time.

The pool facility is constructed from mostly preexisting components which maintains a low capital cost but results in an ad hoc aesthetic.

Analysis of the Pools iN SchoolZ User-experience

- Having no integrated changing rooms means children must get changed in their classroom or school changing rooms and walk to the pool in their swimming costumes. There is nowhere to leave towels so students must also walk back to their classrooms wet. This increases the likelihood of user discomfort and the potential for illness.

- Because of the height of the scaffolding platform, children lined up to enter the water cannot see the pool surface until they are descending the stairs into the water. Because it is difficult to judge water depth from above, users have little idea of the depth of the pool.

- Children lined up outside the marquee cannot see other users in the water and so do not know what to expect.

- The single occupant entry point means children are harried into the water in a moving queue, potentially compounding anxieties for less confident pool users.

- A lack of rails on the stairs make entry and exit more difficult and dangerous.

- The absence of fixed handrails at the waterline mean young swimmers must reach above their heads to hold the top rail of the pool frame.

- The marquee is open at one end allowing wind to enter the pool space. The water is heated but the air is not. In colder weather children will be transitioning from warm water into cold air.

- The water depth of one metre extends the usability of the pool for the older students in the primary school, but at the cost of many of the junior students who would find the pool too deep to stand up in.

Points of Reflection

The Pools iN SchoolZ pool is an affordable and utilitarian solution for schools needing swimming facilities. The pool and enclosure provide children with the opportunity to swim at their own school but the facility does not meet the physiological or emotional needs of all its users.

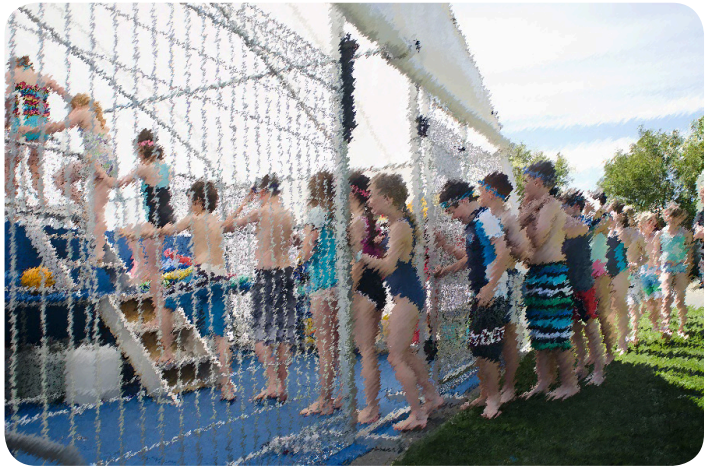


Figure 20. Pools iN SchoolZ swimmers must line up outside the marquee and enter the pool in single file.

Figure 21. The Pools iN SchoolZ Pool The aluminium stairway extends into the swimming space creating a collision hazard. The open risers are also an entrapment hazard.

Figure 22. Pools 4 Schools pool. The raised platform around the pool creates an 'in-ground' pool experience.

3.4 Mobile Pool in England: Pools 4 Schools

'Pools 4 Schools' is an initiative to provide temporary pools and teaching staff to primary schools in areas of "aquatic deprivation across the UK" (Total Swimming.com, 2011). England has a similarly poor rate of child swimming ability to New Zealand with one in five children leaving primary school unable to swim 25 metres. Launched in May of 2009, within its first year the programme taught 10,000 children to swim. The pool facility comprises a kit-set steel-walled pool, made by Myrtha Pools of Italy, which is installed into a school's hall or gymnasium, or, if the season permits, into a playground or carpark.

The pool takes a team of six trained workers one week to assemble and the same time to dismantle. The pool is in situ for six weeks and allows each child five hours of swimming time over the period.

The project is the brainchild of former English Olympic Swimmer Steve Parry and the scheme is sponsored by British Gas. In November 2010 the Pools 4 Schools and British Gas were recognised at the prestigious European Sponsorship Awards where they received the Business to the Community Award. The pools have proven to be a very successful sponsorship venture for British Gas who continue to fund 100% of the cost of the pools and the teaching programme.

In a 2010 survey by Bridgemary Sports College in the United Kingdom (Total Swimming, 2011) teachers at a school which had recently hosted one of the pools were asked if they had noticed any pupil improvements. The teachers responses were as follows (% increase);

Academic results 17.6%
Attendance 35.3%

Self Esteem 76.5%

Attitude towards activity and health 76.5%

Friendship and teamwork 17.6%

In summary, the experience of having the pool at the school provided positive academic and social results as well as increasing students ability to swim.

Features

- Walking platform around the pool edge.
- Two qualified swimming instructors teaching in the pool.
- Funded by Major Sponsor British Gas and local civic bodies.
- Pool size is 12m x 6m x 1m.
- Lessons are provided for students in years four, five and six (age nine, ten and eleven years).
- Primary focus is helping children achieve the National Curriculum requirement of swimming 25m unaided but also general water confidence skills and overcoming fear of water.

Advantages

- Trained instructors in the water provide a consistency of service and a hands-on teaching method.
- Schools pay nothing for the service.

Disadvantages

- The system is labour intensive and time consuming to install.
- The pool requires the use of an existing indoor space therefore tying up the school hall or gym for the period of use. This also means the room must be made secure to protect against accidental drowning.
- The depth of the pool is not suitable for years one, two or three students.

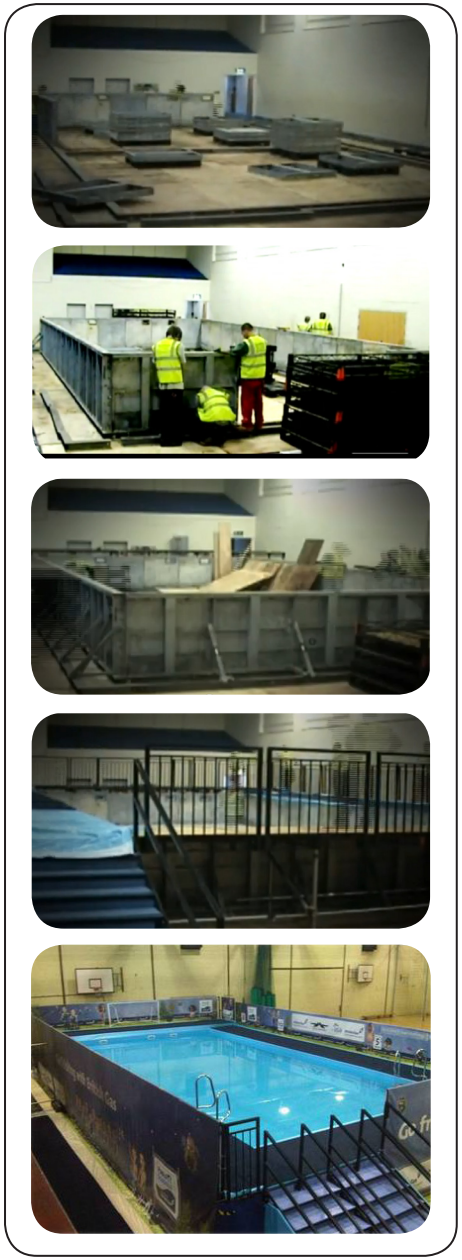


Figure 23. Time lapse sequence showing the set up of the Pools4Schools pool in a school gymnasium. Broadway School, Liverpool UK.

The programme caters for only senior primary school students.

- The facility does not have its own changing rooms.

Points of Reflection

The Myrtha pool is designed to mimic the qualities of a traditional concrete in-ground pool, i.e. square sided walls, hard surfaces and an elevated pool surround. This results in a component-heavy facility with a high installation cost in terms of time and human resource. The lack of its own pool enclosure or changing rooms means a school must dedicate its hall or gymnasium to the use of the pool. This would be disruptive to other activities in that space. The experience of the swimming sessions has positive implications for students beyond improved swimming ability.

Figure 24. Pools 4 Schools sponsor branding.

Chapter Four Swimming Pool Regulations

A review of New Zealand swimming pool regulations was undertaken to ascertain how the Donaldson pool would need to comply. The standards reviewed were: NZS 4441:2008 Swimming Pool Design, NZS 5826:2010 Pool Water Quality and NZS 8500:2006 Safety Barriers and Fences Around Swimming Pools, Spas and Hot Tubs.

4.0 The New Zealand Safety Standards For Swimming Pools

The New Zealand Swimming Pool Design Standard 4441:2008 (Standards New Zealand, 2008) provides compliance guidance for swimming pool designers, builders and operators. Water quality is an area of highlighted importance and the standard includes a formula to calculate the maximum number of students permitted to use a pool at any one time to ensure hygienic water quality. The instantaneous bather load (IBL) is the maximum number of persons allowed in a swimming pool of any given dimensions at one time It is dependent on a number of factors, including surface area of water in the pool, volume of water and the type of bathing activity for which the pool is to be used. The IBL formula can be used to determine the required dimensions of a pool designed to accommodate a class of school students. Based on a water depth of less than one metre a pool of 12m x 6m can sustain an IBL of 32 persons.

Other relevant requirements of the codes include; the provision of water circulation from the pool to a filtration system either via pool skimmers or a perimeter gutter and back to the pool via return jets; non-climbable pool fencing that isolates the pool space from other activities; the elimination of any entrapments hazards from the pool space such as small openings, ladders or rails where swimmers could get their heads, limbs, hair or fingers trapped.

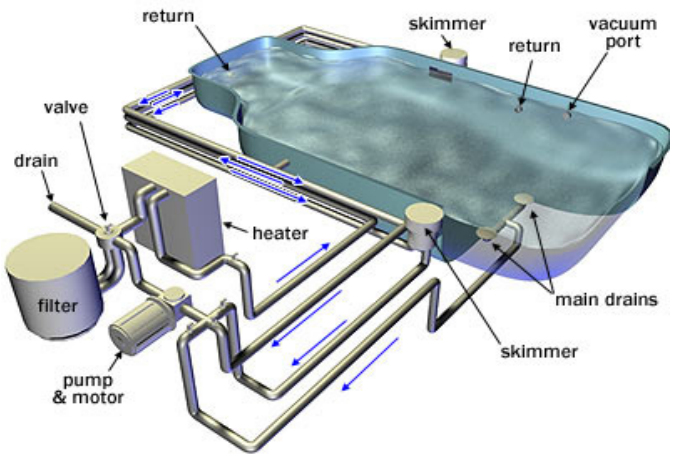


Figure 25. Diagram of a swimming pool water circulation system.

Figure 26. A swimming pool plant room.

4.1 Pool Water Circulation and Treatment

Swimming pools require a system of water circulation and filtration to ensure the quality of the water remains consistently high. The New Zealand Swimming Pool Design Standard 2008 (Standards New Zealand, 2008. p 31) states:

> The circulation and treatment facilities shall include all of the following:
>
> - Piping that circulates water from the pool or balance tank, through a water treatment system, and returns the water to the pool;
> - A hair and lint strainer.
> - A pump or pumps.
> - Water filter(s) complying with section 17.
> - Dosing equipment that adds a disinfection agent into the water.
> - A facility to dose a water pH correction Chemical.
> - Additional treatment processes such as ozone or UV light may be used.

Plant Room

A pool plant room keeps dangerous and essential substances and processes for pool water treatment (chlorine, acid, electricity, gas and noise) away from the pool users. The space must be lockable and secure to avoid unauthorised entry, but accessible for pool operators to monitor and maintain the equipment.

Pool Skimmers

Most swimming pools utilise pool skimmers to collect and remove floating debris from the pool water. Skimmers are cavities set into the pool wall at the waterline that contain a skimmer basket to catch large foreign matter and a suction line that draws water through the basket and away to the plant room. To maintain a constant but controlled amount of water entering the skimmer basket, a floating weir is hinged to the opening of the cavity. The weir flaps back and forth allowing a small amount of water in and stopping water and debris from surging back out.

If skimmers are set flush with the wall there must be provision made for them to fit behind the liner. If they are located inside the pool they become a swimming obstacle.

A Vanishing Edge

An alternative method of collecting floating matter from the pool surface is to allow the water to flow over the top of the pool wall into designated collection points; either a perimeter gutter or a vanishing edge wall. The concept of a vanishing edge is explained by pool designer Brian Van Bower

> The vanishing-edge effect is created by spilling water over the top of the wall so it flows out of view. To achieve this look, builders set the top of the wall so that it sits slightly lower than water level. The water spills over the top of the wall, called the weir. It drops into a catch basin, a miniature pool on the back of the wall made specifically to contain the spillout until it is recirculated back into the pool. (Bower, 2012)

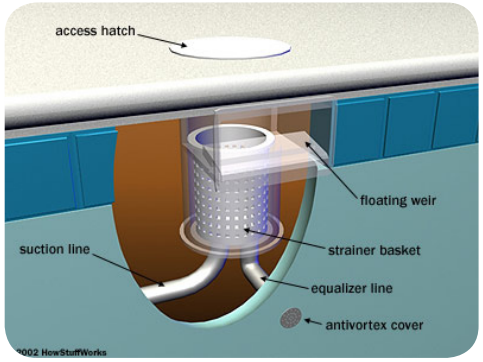


Figure 27. Diagram of a swimming pool skimmer.

Figure 28. The Poolz iN Schools Pool skimmers are located inside the swimming space.

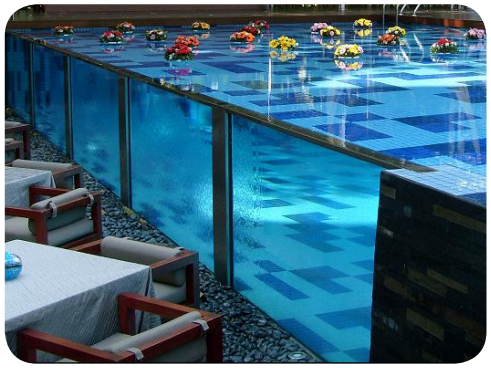


Figure 29. A glass walled vanishing edge pool, Changi Village Hotel, Singapore.

4.2 The Donaldson Pool Criteria

Based on the research into existing learn-to-swim pools and swimming pool regulations a criteria set for a new mobile learn-to-swim facility was developed. (In keeping with referring to traditional learn-to-swim pools in New Zealand primary school as 'Reid pools', the working title "Donaldson pool' is used during the design development of the new mobile learn-to-swim pool.) The criteria are divided into two categories; performance design and experience design although there are criteria which overlap the category division.

The re-designed self contained indoor swimming facility must meet the following performance criteria:

- have enough space for 32 five-seven year olds
- contain integrated changing rooms
- be simple and fast to erect (take two people two hours to set up)
- conform to New Zealand Swimming Pool Design standard 4441
- transport easily
- be lockable and secure
- have full insulation (for year round use)
- is a non-reverberant space
- have only soft, slip resistant surfaces

The facility must meet the following experience criteria:

- be an exciting and stimulating space
- mitigate users' fear of the unknown
- have multiple water entry points
- allow individuals movement options within the pool space.

Chapter Five Pool Enclosure Concept Generation

Using the criteria set derived from pool analysis and user feedback, an iterative process of concept generation, development and evaluation took place. Questions that drove the process forward included:

- What will a mobile pool look like?
- What will it be made of?
- What will be the nature of the user-experience?

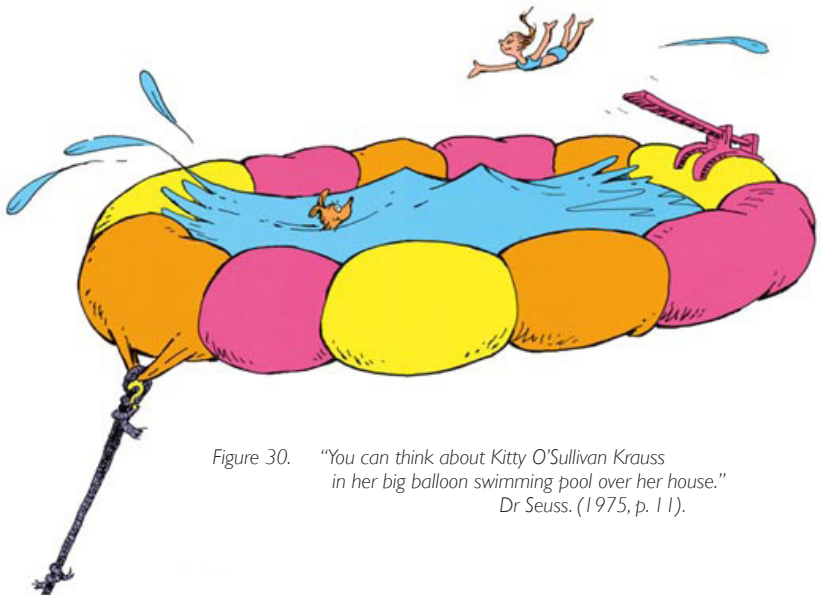


Figure 30. "You can think about Kitty O'Sullivan Krauss in her big balloon swimming pool over her house." Dr Seuss. (1975, p. 11).

Figure 31. A truck trailer based mobile art gallery, Wellington High School NZ.

Figure 32. The Life Education Trust mobile classroom, Khandallah School, Wellington NZ.

Figure 33. A trailerised mobile dental clinic, Hamilton, NZ.

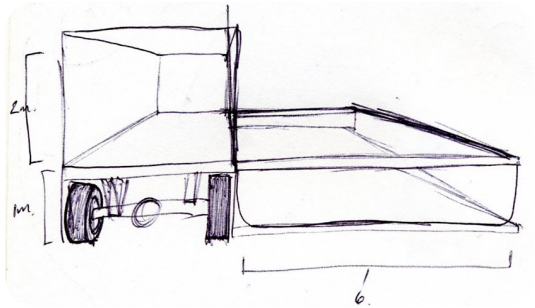


Figure 34. Sketch of a semi trailer based mobile pool.

5.0 Mobile, Automated and Self Contained: The Pool Enclosure

When considering the form of a self contained mobile teaching facility, a modified semi-trailer is a popular choice of design. There are many examples of mobile teaching facilities that utilise an articulated truck trailer. This design is ideal for transport and allows single person drop off and pick up. But due to the accommodation of the chassis, wheels and axel assemblies, the teaching spaces are elevated approximately one metre above the ground; this makes wheelchair access difficult. Trailers also have high capital and maintenance cost (new tyres, mechanical inspections and repairs, road user charges etc) even though the roadworthiness of the trailer is redundant while the facility is in use.

Because the Donaldson pool would be located at each school for a period of approximately five weeks at a time, there is no need for the unit to be poised upon its wheels while in operation. It would be preferable to have the facility at ground level; designed with usability and ease of access as the focus rather than transport. While ease of transport and automation of set-up are important considerations, the new mobile pool should be a *pool* facility foremost and a *mobile* facility secondly.

5.1 Shipping Containers

The decision to use an ISO shipping container as the basis of the Donaldson pool was made for several reasons. Shipping containers have the following attributes:

- universally transportable by contractors via road, sea or rail
- relatively cheap to purchase
- easy to modify
- secure
- strong and durable
- increasingly recognised as a worthy medium of contemporary architecture and design.

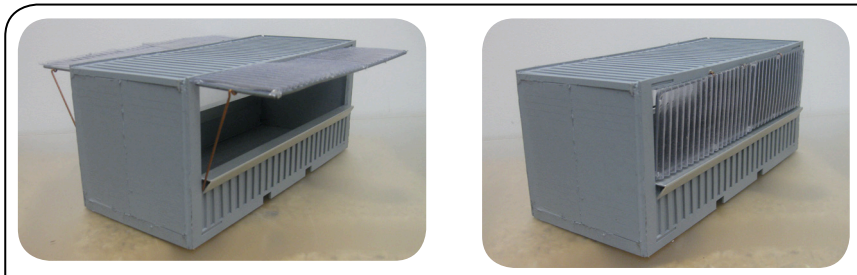
Point of Reflection

The decision to house the pool facility in a shipping container provided the project with defined dimensions within which to work. This created limitations at times and restricted the scope of what the facility could become. But at the same time it was reassuring to be confined to those parameters. The shipping container provided a secure starting point: a structure from with to work outwards.

Figure 35. Surf Life Saving Association New Zealand's mobile public information kiosk, Wellington, NZ.

Figure 36. A HIAB truck off loading a 12 metre shipping container, Manakau, NZ.

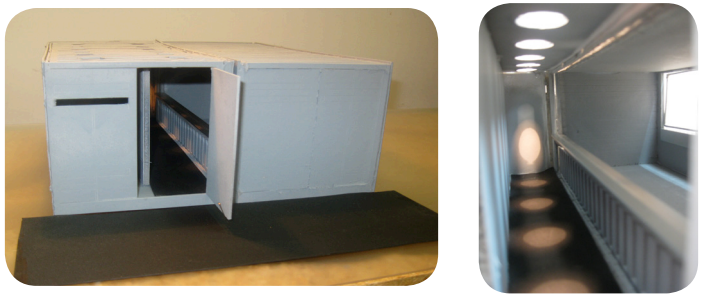
Figure 37. Converted shipping container swimming pool, New York.



Single container mobile pool concept.

Twin container concept. One for the pool, the other for the changing rooms.

The requirement for a more pool space led to the three container concept.



Internal images of the container pool model.

Figure 38. Sketch models of the Original Donaldson Pool.

5.2 The Initial Donaldson Pool Concept

The original concept for the Donaldson pool was very basic: A single 12m insulated shipping container converted to hold water 1m deep. Plastic glazed upper wall sections would lift with the help of gas struts, to form awnings. The pool plant equipment would be housed in the cavity left by the old refrigeration unit at one end of the container.

An additional container could be attached to provided integrated changing rooms.

The pool space in a single container was not sufficient to meet the IBL of a class of 32 students so the subsequent iteration of the design added a third container to double the pool space to 4.8m x 11.8m.

On reflection this design would require three truck deliveries to transport the facility, the trucks would essentially be transporting empty containers. The multiple container approach was abandoned in favour of a collapsible/expandable iteration that could pack down into a single container for efficient transport.

5.3 Sliding Enclosure Concept

The transport costs of a multi-container approach were restricting. A more transport-friendly solution was to have an indoor pool that could fold away into a single container.

The sliding enclosure involved fitting an existing sliding pool enclosure to a high-cube shipping container to create a retractable indoor pool space.

Figure 39. A sliding pool enclosure.

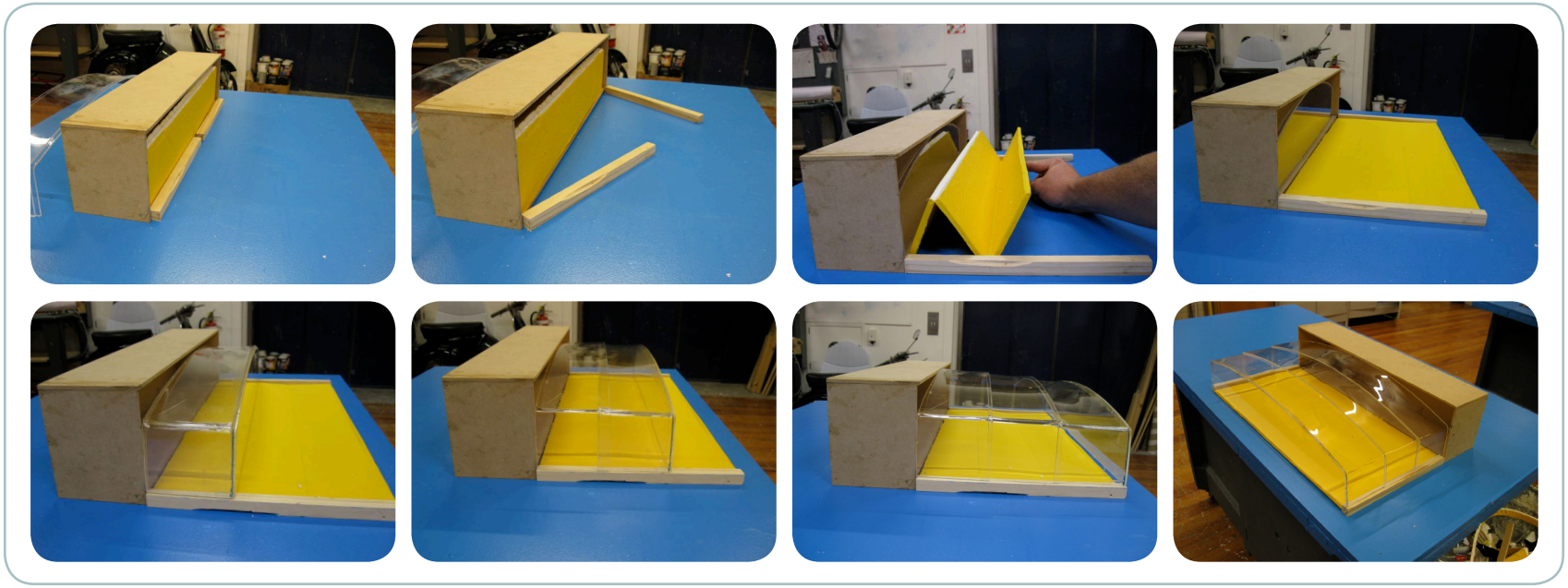
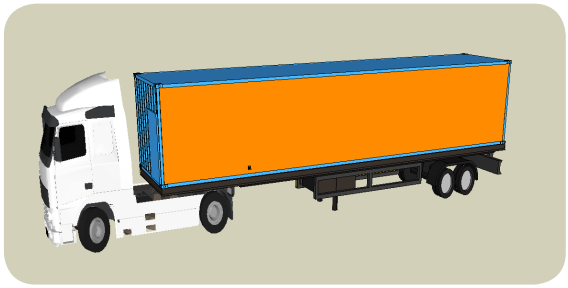
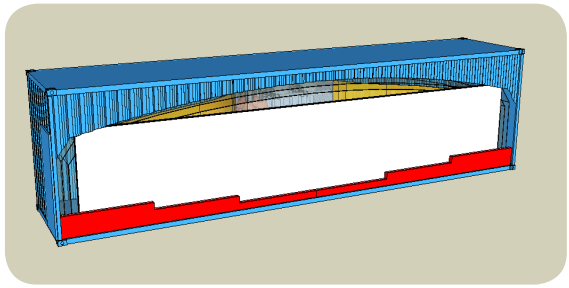


Figure 40. Sliding enclosure concept scale model.

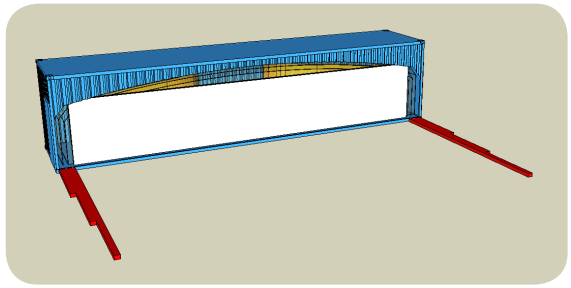
Deployment of The Sliding Enclosure Concept



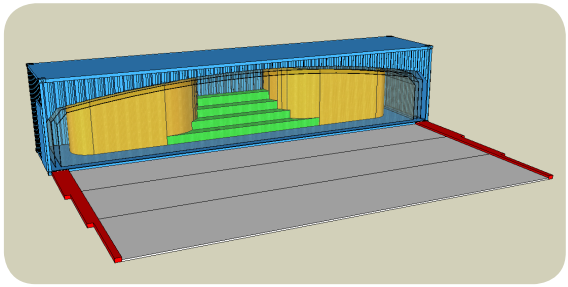
1) The pool facility is delivered and unloaded by a HIAB truck.



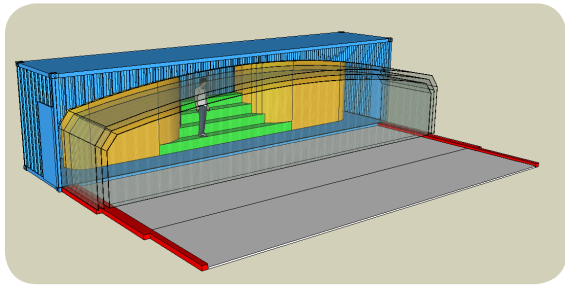
2) The curtain side is removed revealing all the components inside the container.



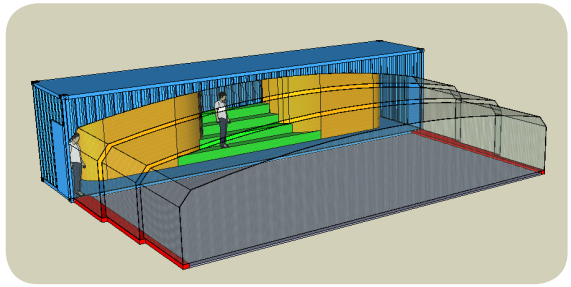
3) Aluminium rails are connected to the corners of the container.



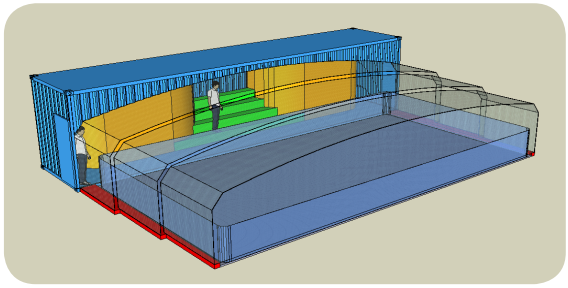
4) The polystyrene flooring is folded out between the rails.



5) The enclosure sections are rolled out of the container onto the rails.



6) The enclosure locks into place.



7) The pool liner is fitted to the enclosure wall and then filled with water.

Figure 41. The deployment sequence of the sliding enclosure concept.

My main concern regarding the viability of this concept was the internal ceiling height of the enclosure at the outer corners of the pool.

The sliding glass sections structure gains its strength from the curved roof. Because the sections of enclosure fit under each other, the lowest point of the structure will be above the outer corners of the pool.

I made a CAD model of the concept and sent this to a manufacturer of sliding pool enclosures in the Czech Republic to determine if the structure could be made to fit in the space. They said the concept would work but (as I suspected) the head room would not be sufficient to allow an adult to stand up in the space without potentially hitting their head on the ceiling.

This concept was abandoned.

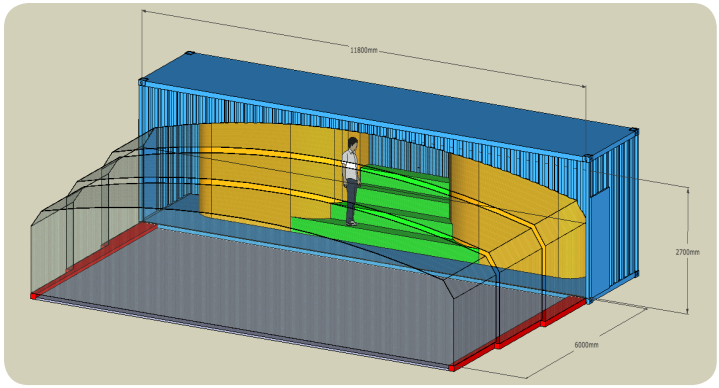


Figure 42. Dimensions of the sliding enclosure concept.

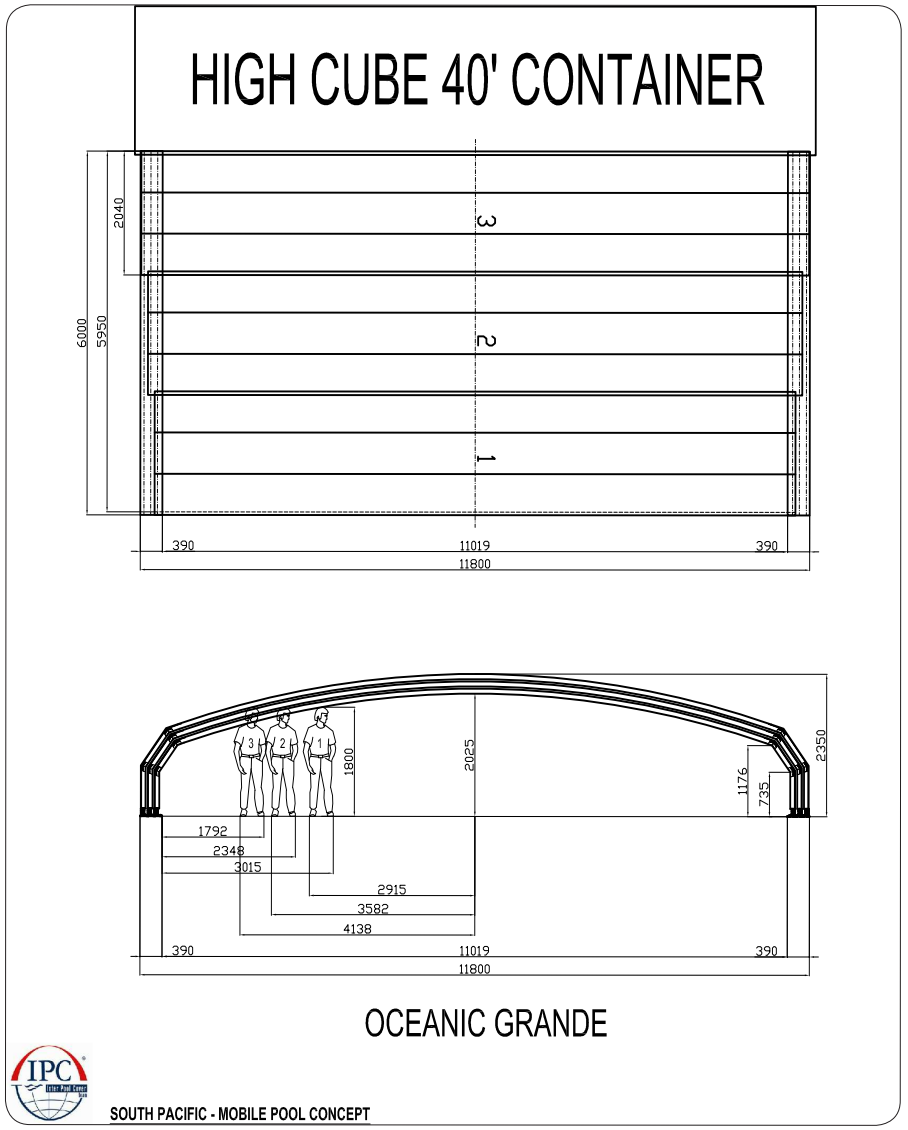


Figure 43. Dimension drawings for the mobile sliding pool cover from South Pacific Pools Ltd (2010) showing users hitting their heads on the glass ceiling.

Figure 44. Single layer pressurised pool enclosure.

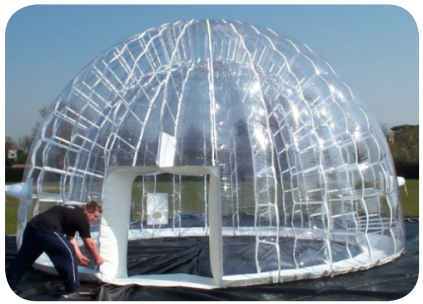


Figure 45. Double layer inflatable dome enclosure.

Figure 46. Inflatable frame marquee.

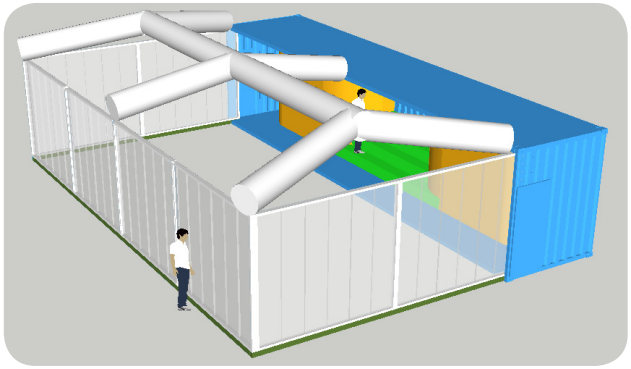


Figure 47. Pool enclosure concept with an inflatable roof frame.

5.4 Inflatable Enclosure Concept

The possibility of using inflatable structures to form the walls and ceiling of the enclosure was investigated. An inflatable structure has the following advantages:

- lightweight
- requires no framing
- fast and easy setup.

In the mobile pool context, the disadvantages of this system include:

- requires a connection to a fan
- potential noise issues
- vulnerable to vandalism.

In the event of a power failure or a tear in the material, the structure could potentially collapse onto children in the pool and trap them underwater. While an inflatable structure had several desirable features, the potential risk of injury due to system failure was too great. A fixed solid frame system, while more labour intensive to set up, provided greater reassurance.

5.5 Folding Enclosure Concept

A range of folding enclosure systems were investigated and a concept combining articulating end walls, a sliding side wall and a modular clip-on roof system was proposed.

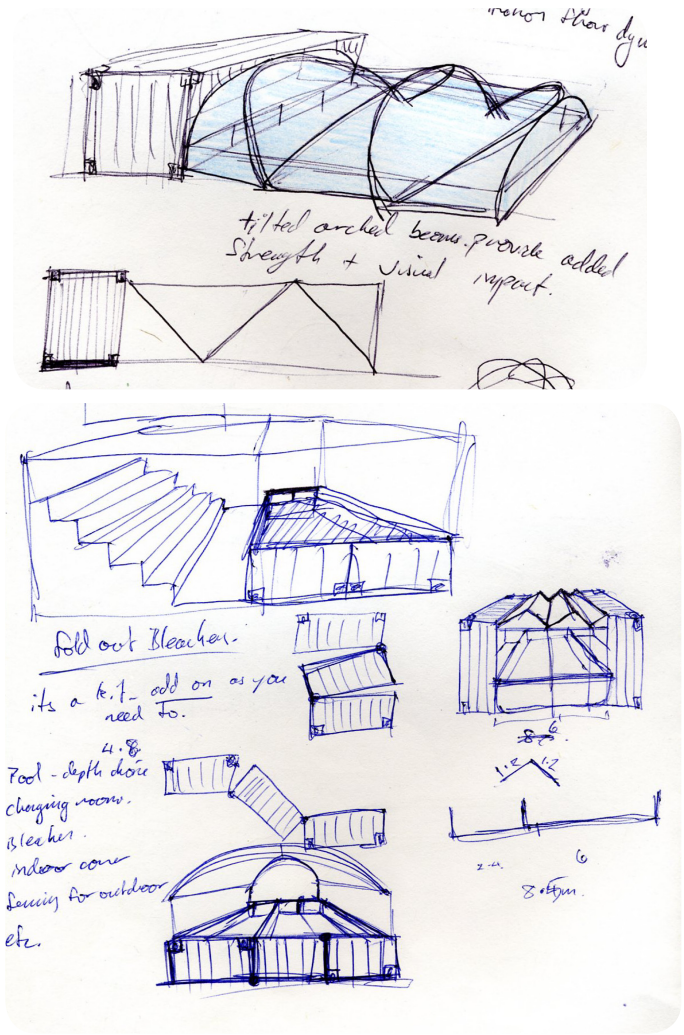


Figure 48. Sketches of various mobile pool enclosures.

Figure 49. Early scale model of the folding enclosure.

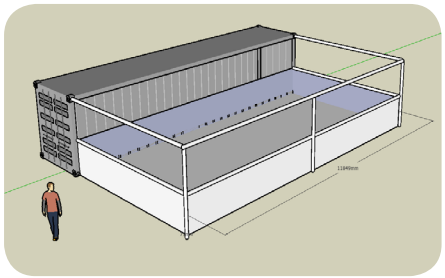


Figure 50. Early CAD model of the folding pool enclosure concept.

Chapter Six Pool Enclosure Design Development

While this project cannot hope to cover all aspects of the specification of the Donaldson pool design, key components and systems were explored and developeed in conjunction with New Zealand manufacturers and industry specialists.

6.0 Folding Enclosure Walls

The frame of the pool enclosure is comprised of extruded aluminium box section. Three horizontal beams are supported by upright beams at 1500mm spacings. Cladding can be attached to the exterior facing of the beams.

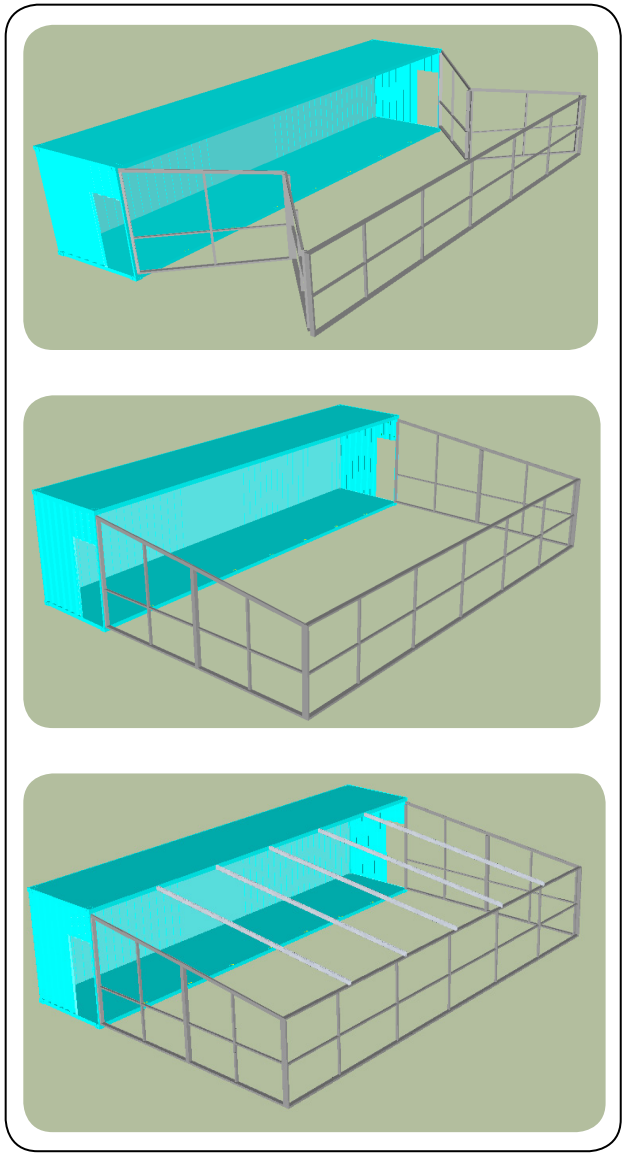


Figure 51. Developing the folding enclosure frame and clip-on rafters.

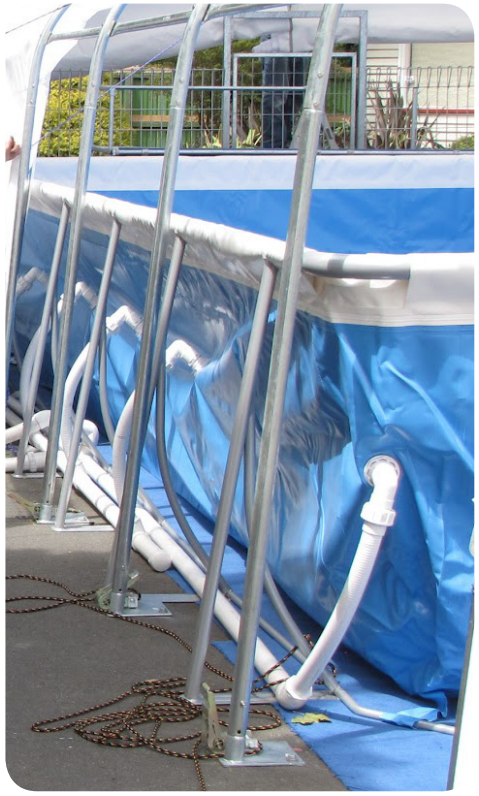


Figure 52. The Pools iN SchoolZ facility. Two similar framing systems sit adjacent.

6.1 Integrating the Pool and Enclosure Framing.

Using a standard tubular steel frame to support the pool liner would create a void around the edge of the pool between the pool frame and the enclosure wall. It would result in a double up of similar framing systems and a waste of space. If the pool was to completely fill the space of the enclosure, it would make sense for the pool liner to attach onto the enclosure framing. This would have the duel advantage of eliminating the need for a separate pool frame and greatly reduce the set-up time of the pool.

With the pool liner attached to the enclosure frame, once the pool was filled the weight of the water in the liner would create a 64 tonne ballast holding the enclosure in place. This would also eliminate the need for mechanical fasteners or guy ropes to secure the enclosure to the ground to keep it from being moved by the wind. The enclosure would hold the pool liner up, and the pool liner would hold the enclosure down.

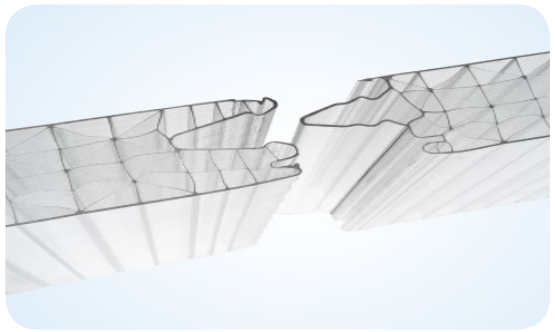
6.2 Cladding

The polycarbonate cladding product 'Thermolick' was chosen as the cladding system for the pool enclosure.

The multi-wall extruded sheet panel has a tongue and groove edge that eliminates the need for vertical supports. This allows the exterior wall to be completely flush making it very difficult for anyone to climb onto the roof of the enclosure and cause damage or accidental injury.

Features and benefits the Thermoclick system:

- excellent strength and rigidity to weight ratio
- superior thermal insulation compared to double glazed glass
- provides natural lighting while filtering out ultraviolet radiation
- available in a range of colours and effects.



The Thermoclick tongue and groove profile.

Internal metal fasteners hold the sheets onto the steel purlin.

Profile free exterior cladding.

Figure 53. The Thermoclick Cladding System

Figure 54. Inspiration for the roof system was the New Zealand Life Saving mobile kiosk.

Figure 55. CAD model of the aluminium rafter with channels which allow for 'double glazing' of the roof....

Figure 56. ...a clear PVC waterproofing layer on top ...

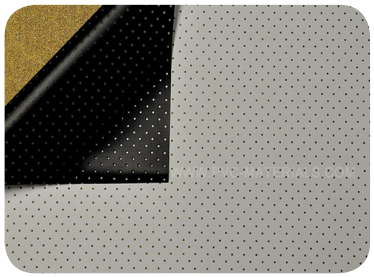


Figure 57. ...and a sound-absorbing, perforated PVC bottom layer.

6.3 The Enclosure Roof

The roof is made of five 6m long aluminium rafters which attach onto the leading edge of the container roof at one end and onto the top of the long enclosure wall at the other end. Each extruded rafter has two sets of tracks on either side. The top tracks house panels of clear PVC material which form a weather proof barrier. The bottom tracks house panels of sound absorbing, perforated PVC material which reduces the noise reverberation withing the pool space. Air trapped between the two layers double insulates the roof against heat loss and reduces condensation build-up on the ceiling. The design of the roof makes the pool space warm, quiet and comfortable.

6.4 Folding Floor Insulation

Large sections of 50mm high-density polystyrene, enclosed in hinged nylon covers, would be stored inside the container behind the folded enclosure. Once the enclosure was opened the floor could be folded out into the enclosure space. This system would have several advantages including:

- protection of the pool liner from damage caused by contact with the ground
- reduction of heat loss from the pool water into the ground resulting in energy savings
- provision of a soft floor for swimmers to reduce head injuries associated with concrete pools.

Figure 58. Scale model of the folding floor insulation.

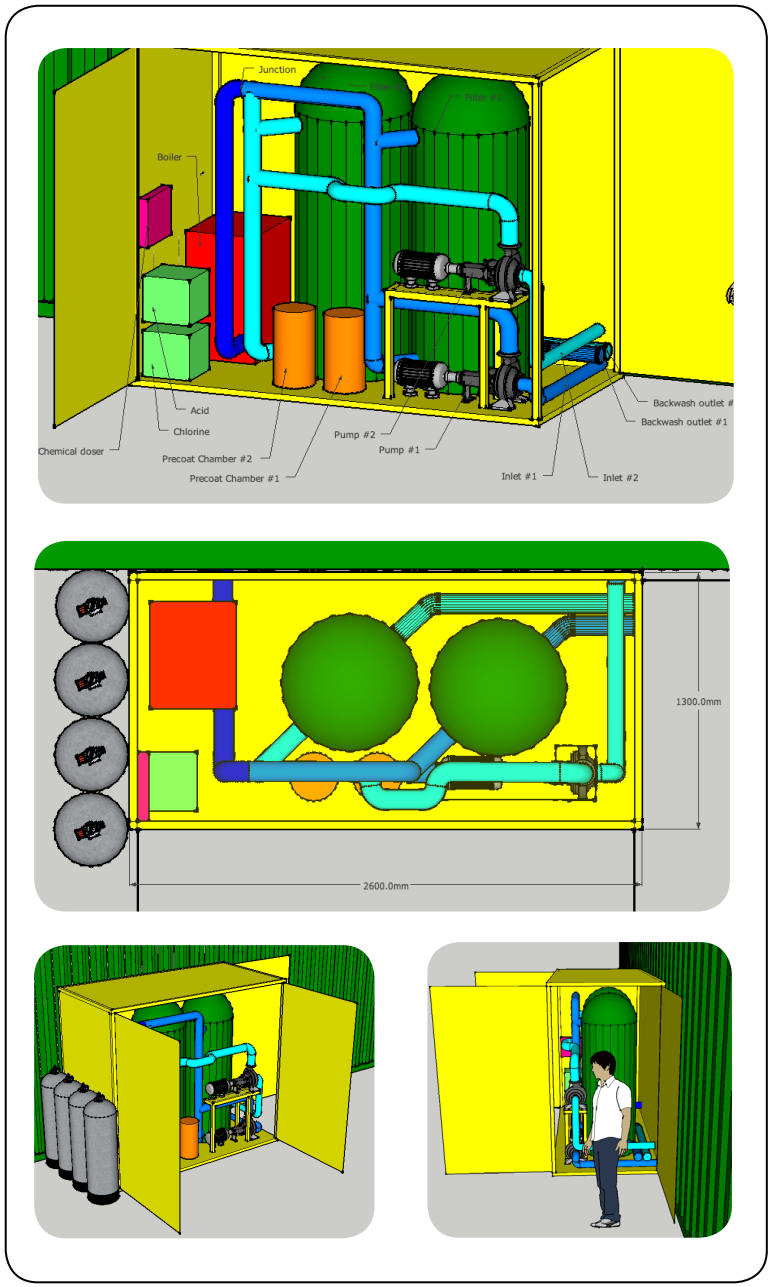


Figure 59. The plant cabinet layout.

6.5 Plant Room

To ensure the Donaldson pool complied with the New Zealand Standard for Swimming Pool Design NZS 4441:2008 (Standards New Zealand, 2008), the specification and layout of the plant components was carried out in consultation with David Cameron of Filtration Pumping Commercial Limited of Palmerston North. David was involved with the review of the 2008 standard so was ideally placed to provide expert technical advice.

A conventional plant room has walking space between the plant components to allow access to each component for maintenance. Space constraints with the new design mean the plant room needs to fit into a 1.2m x 2.4m footprint so the cabinet could locate between the changing rooms when in transit. The plant components are positioned as close together as possible on the steel frame, and access for maintenance is via two double doors on the rear and one on the side of the cabinet. The plant cabinet contains:

- two 2hp single phase water pumps
- two PCT100 diatomaceous earth filters
- a 20L chlorine tank
- a 20L pH correction chemical tank
- an automatic chemical dispenser
- an LPG califont water heater
- a remote monitoring unit
- connecting pipe work and service valves.

Four LPG gas bottles are located in a lockable cage (not shown) on the left exterior wall of the cabinet. The gas califont allows the pool to be heated much faster than an electric water heater.

Deploying the Plant Cabinet

The plant room locates inside the container during transport. Once in situ, two parallel steel rails are attached to the rear of the container behind the plant cabinet. The cabinet is unlocked and is rolled backwards on its four v-grooved wheels. The plant cabinet sits flush with the exterior of the container when in transit and flush with the interior of the container when in situ.

Flexible 80mm hosing connects the plant room to the pool via the forklift pockets in the container floor.

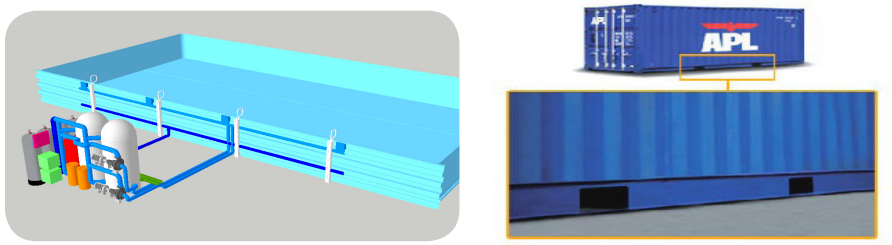
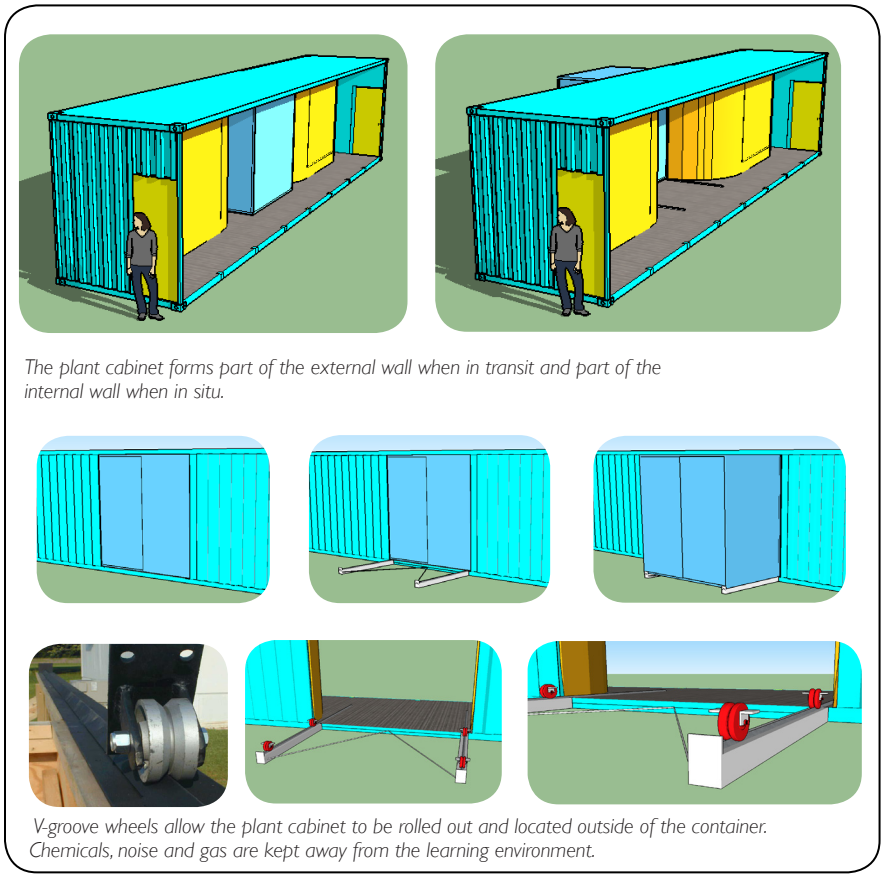


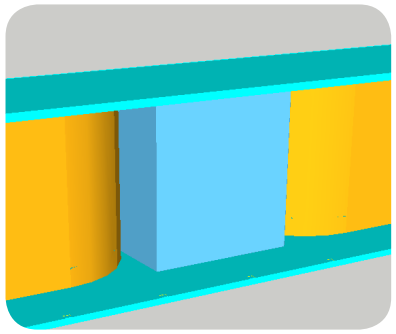
Figure 60. Water pipes run under the floor of the container through the forklift pockets.



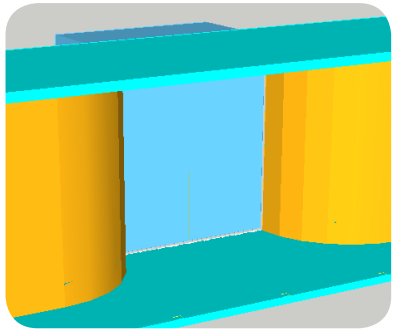
The plant cabinet forms part of the external wall when in transit and part of the internal wall when in situ.

V-groove wheels allow the plant cabinet to be rolled out and located outside of the container. Chemicals, noise and gas are kept away from the learning environment.

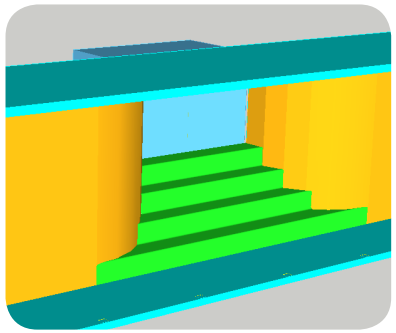
Figure 61. Deploying the plant cabinet.



The plant cabinet in the container during transit.



The plant cabinet rolled out into location.



The seating attaches to the exterior walls of the changing rooms and the front wall of the plant cabinet.

Figure 62. Terraced spectator seating.

Figure 63. Sliding gymnasium seating.

6.6 Terraced Seating

Four rows of terraced seating attach to the exterior of the changing room walls. They fill in the space left by the plant cabinet and can seat a class of 32 year one students. The seating can also be used by visiting parents or by children who cannot participate in a lesson.

The terraced seating is provided to give a class of students a space to gather and be debriefed by a pool instructor or their class teacher either before or after they get changed. The seating provides a relaxed space for children to become accustomed to the pool environment before they are asked to get in the water. Visiting parents are able to sit and watch their children from an elevated view point.

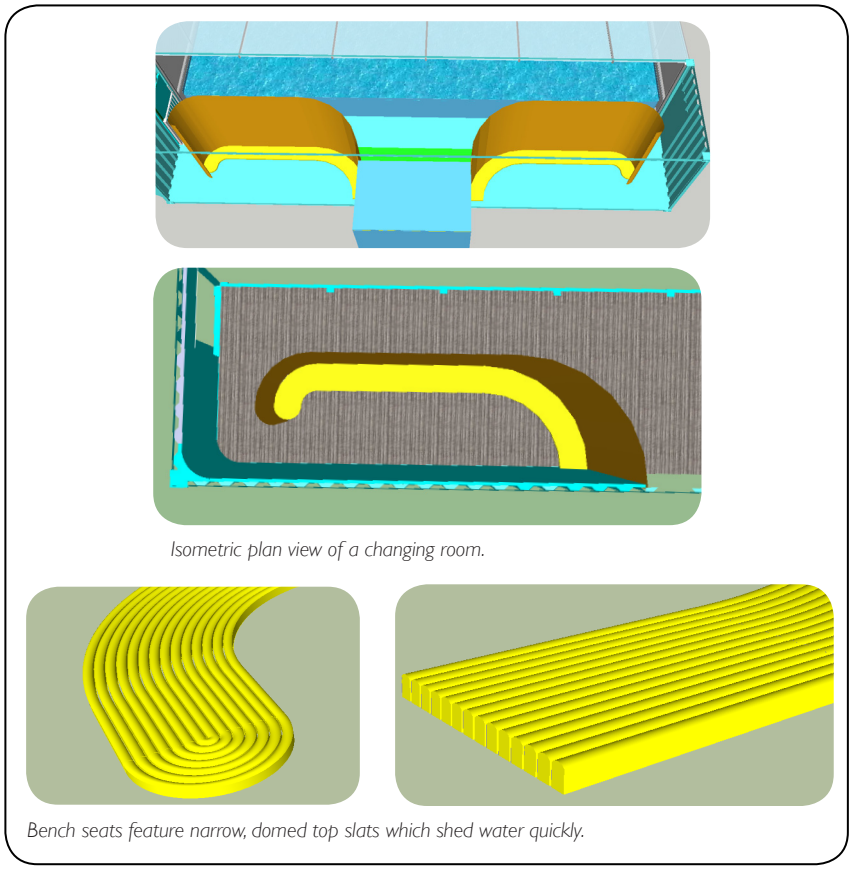
The retraction system for the seating requires future consideration.

6.7 Changing Rooms

The walls of the new changing rooms are made from the removed section of the container wall which has been split, curved and welded to the roof panel and to the steel cross members in the floor. The changing room wall supports the container roof and ensures the container maintains its strength.

- The walls are curved to improve traffic flow in and out of the spaces and are lined with long pile carpet to make them collision friendly, condensation resistant and sound absorbing. The carpet also adds visual and tactile interest.
- The bench seats are made from narrow strips of polyethylene with rounded top faces so the seat sheds water and dries faster than the traditional broad, flat top bench seat.
- Rubber tube matting on the floor provides a soft surface for bare feet and ensures clothing stays dry during the changing process.

A storage system for bags, towels, shoes and clothing has not been resolved. This is an important feature for the facility as it provides users with a personalised space for their belongings. This is one of many areas of design consideration for the future.



Isometric plan view of a changing room.

Bench seats feature narrow, domed top slats which shed water quickly.

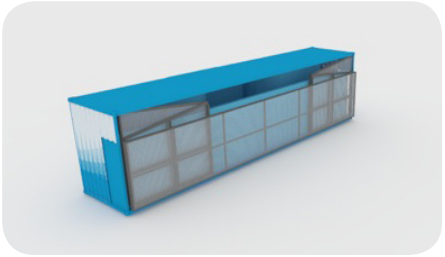
Figure 64. The changing rooms.

Figure 65. Tube matting on the floor is soft to walk on and stops dropped clothes getting wet.

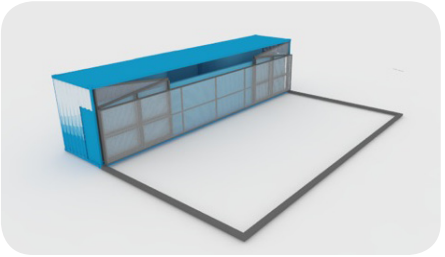
Figure 66. Carpeted walls are soft, fun and sound absorbing.

6.8 Set-up Sequence of the Enclosure

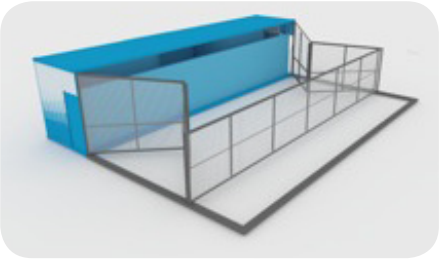
1) The container is lifted off the truck on to the school grounds.



2) The curtain side is removed.

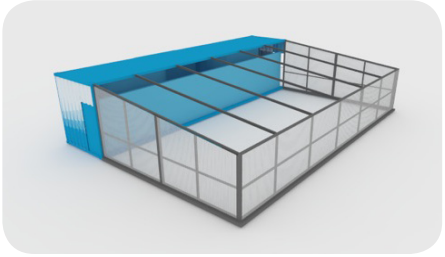


3) Three aluminium rails, stored in the container, are attached to the corners of the container.

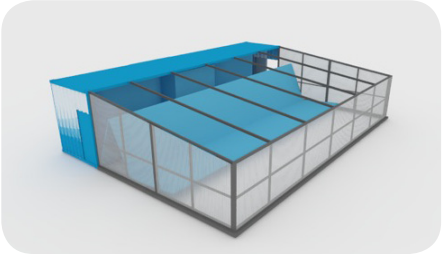


4) The enclosure walls sit on two v-groove wheels that roll out on the rails.

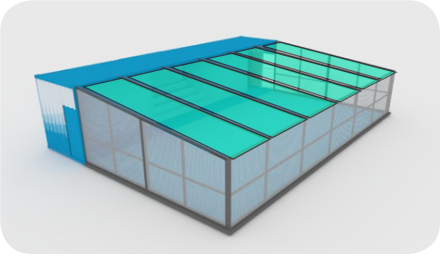
5) Once fully extended the enclosure locks into place on the rails.



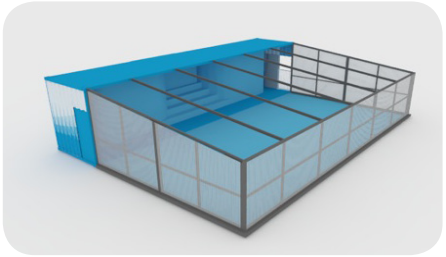
6) Five aluminium rafters attach from the container roof to the top of the side wall.



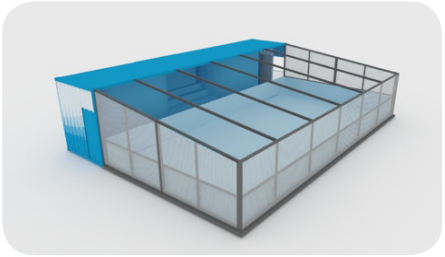
7) The three sections of polystyrene flooring, in a nylon cover, are folded out to form the enclosure floor.



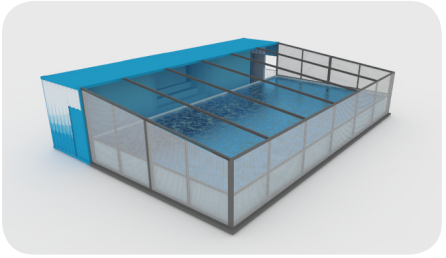
8) The PVC roof panels are slid into the roof beams and fastened at each end.



9)The plant room is rolled out and the terraced seating is installed.



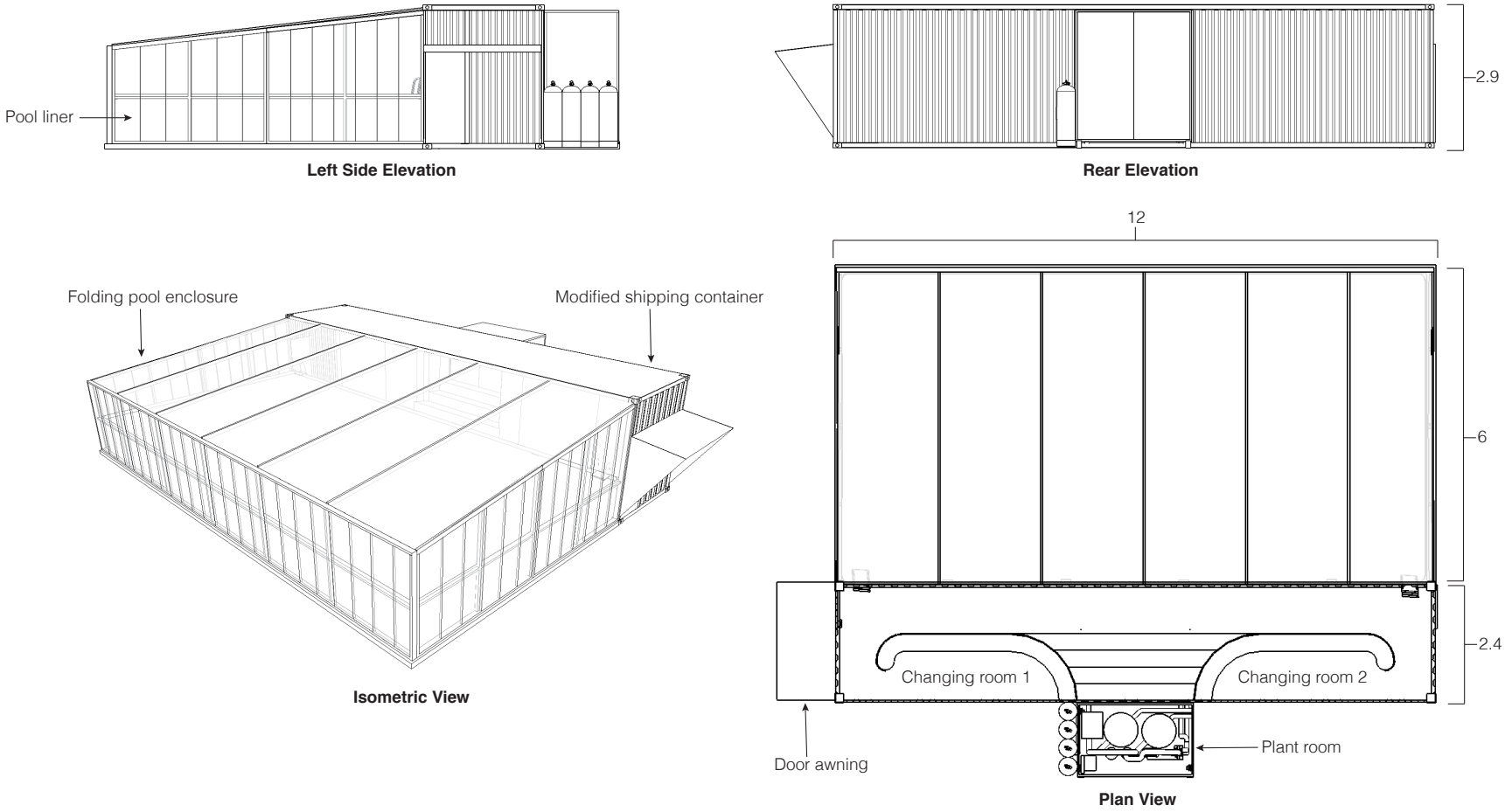
10) The pool liner is attached to the enclosure frame and the water pipes are connected.



11) The pool is filled from a fire hydrant.

Figure 67. The set up sequence of the Donaldson pool enclosure.

6.9 General Assembly Drawing of The Donaldson Pool



General Assembly Drawing of The Donaldson Pool Facility		
Scale: 1:100	Units: metres	Date: 8 / 2/ 2011
Author: A. Donaldson		

Figure 68. TGeneral assembly drawing of the Donaldson pool.

Figure 69. CAD views of the Donaldson Pool.

6.10 Features of the Donaldson Pool Enclosure

- An awning above the door provides shelter from the elements.
- An air curtain above the door helps keep air borne dust out of the pool space and maintains the temperature in the enclosure.
- An air conditioning system built into the plant room reduces condensation in the enclosure and keeps the air temperature comfortable year round.
- A spring loaded pool gate at the mail entrance eliminates the need for extra pool fencing.
- The gate and awning can be attached to either end of the container to best match the orientation of the main entrance to each specific school site. The secondary door acts as an emergency exit.
- The exterior surfaces of the container and the enclosure walls provide a large, flat branding space for sponsors.

6.11 Operating the Pool

The Donaldson Pool is intended to be on a school site for a five week period (half a school term). The container will arrive on flat bed truck and be unloaded onto a flat sealed surface; a netball court, playground or carpark. The deployment of the enclosure and the set up of the facility will take two pool staff members approximately two hours plus another three hours to fill the pool from a fire hydrant using a 100mm canvas hose. Depending on the season the water will take up to two days to heat to the operating temperature of 30 degrees Celsius. If the pool is emptied and packed away on a Friday afternoon after school and relocated and set-up the next morning, the pool will be ready to swim in by the following Monday morning.

A single phase power supply to the plant room will provide power for the plant, security cameras and lighting. A domestic garden hose connection to the plant room will provide supplementary water supply to compensate for evaporation from the pool.

The two trained pool staff will manage the pool facility while it's on site. They will deliver hands-on, in-the-water, swimming lessons to classes from 9am to 3pm. Lessons will last for 40 minutes with a 10 minute change period between classes. Pool staff will also be responsible for water quality and plant maintenance; sanitation and securing the pool facility at the end of the day. While the students are swimming, their class teacher will be able to monitor behavior and safety from the vantage point of the terraced seating. Teachers will be responsible for recording each student's swimming progress and reporting this information to parents.

The wrap around service will provide a 'plug and play' opportunity for the school meaning that no staff or parent volunteers are required to assist with the setup or running of the facility.

Figure 70. A single phase power inlet on a modified shipping container.

Figure 71. The Author comparing standard and high-cube shipping containers. Christchurch, NZ 4 February 2011.

Figure 72. The swimming pool at Beckenham School in Christchurch damaged by the earthquake on the 22 February 2011.

6.13 Design Feedback

In February 2011 I travelled to Christchurch and met with Nigel Guest the operations manager of Royal Wolf Ltd, an international firm who sell, lease and custom modify shipping containers. I presented my design concept to Nigel and questioned him on the viability of the design regarding the container modifications. Nigel said the modifications I was suggesting were practicable and the concept was sound from a manufacturing point of view.

Nine days later Christchurch was hit by a destructive earthquake which, among many other things, destroyed 60% of the city's swimming pool capacity (ccc.govt.nz, 2012). Thanks to the assistance of the Pools iN SchoolZ Trust there are now six portable pools in rotation at Christchurch Schools and more on the way.

In April 2011 I presented the design to members of Water Safety New Zealand and the Wellington City Council. The presentation received positive feedback from both groups who were keen to help progress the concept further.

6.14 Construction Costs Comparison

Based on quotes gathered in 2010–2011 from New Zealand manufacturers, the construction and fitting-out cost of the proposed Donaldson Pool are outlined in *Table 1*.

The cost of building a traditional outdoor concrete learners' pool is discussed in a New Zealand Educational Institute online magazine article (Education Aotearoa, 2012). In 2003 Albany Primary School in Auckland were quoted $650,000 to replace their school pool (pool dimensions 17m x 5m) while Paengaroa School near Te Puke raised the $1,000,000 needed to build a new pool (18m by 5m) in 2011. These costs cover the construction of the pools and installation of the plant, they do not take into account the value of the land taken up by the pool grounds or the construction of fencing or changing facilities. Due to New Zealand's seasonal temperature variation, even if the water is heated these outdoor pools have, at best, a two term (twenty week) operating season.

Components	Cost NZ$
Container purchase	9,000
Container modifications	50,000
Polycarbonate cladding	9,000
Pool liner	8,000
Enclosure Roof	16,000
Plant	55,000
Pool cover	2,500
Interior fit out	12,000
Seating	4,000
Floor mats	1,500
Acoustic panelling	4,000
Lighting	3,000
Security cameras	2,500
Insulated flooring	4,500
Total	$181,000

Table 1. Estimated Cost of Construction of The Donaldson pool (Donaldson, 2011).

Expense	Estimated cost NZ$
Transportation of unit	$600
Electricity	$300
Water	$30
Staff wages	$5,500
Pool chemicals	$200
LPG gas	$1,540
Total	$8,170
Per swim cost	**$4.54**
(Total cost / 120 students / 15 sessions)	

Table 2. Running Cost of the Donaldson Pool for a five week period (Donaldson, 2011).

Funding source	Allocated funding NZ$
School operational budget	$6,400
Parent levy	$3,000
Kiwisport Fund top-up.	$1,000
Total cost	$10,400
Per swim cost	**$8.66**
(total cost / 120 students / 10 sessions)	

Table 3. Brooklyn Primary School Funding Breakdown of School Swimming Programme 2010. (Donaldson, 2011).

6.15 Operational Costs Comparison

Estimated running costs for the Donaldson pool shown in *Table 2* are based on industry quotes gathered in July 2011. The cost of electricity and gas would fluctuate during the year and according to geographic location of each school as cooler winter temperatures (especially in the far south) would increase energy consumption.

As mentioned in Chapter 3, Brooklyn School in Wellington transports its junior classes by bus to the local aquatic centre for swimming lessons once a week for the ten weeks of term one. *Table 3* provides a breakdown of the funding sources for Brooklyn Primary School's annual swimming programme for their junior classes.

Analysis of Cost Comparison

Considering the Donaldson pool has a 200–400% longer swimming season than an outdoor pool, even if the estimated construction costs of the Donaldson pool were doubled the cost comparison shows the new facility is a financially attractive alternative to a traditional concrete pool.

The per swim cost of the Donaldson pool is approximately 25% lower than the cost of transporting classes to the aquatic centre for lessons. This figure does not take into account the amount of school time wasted while in transit.

6.15 Reflection on the Donaldson Pool

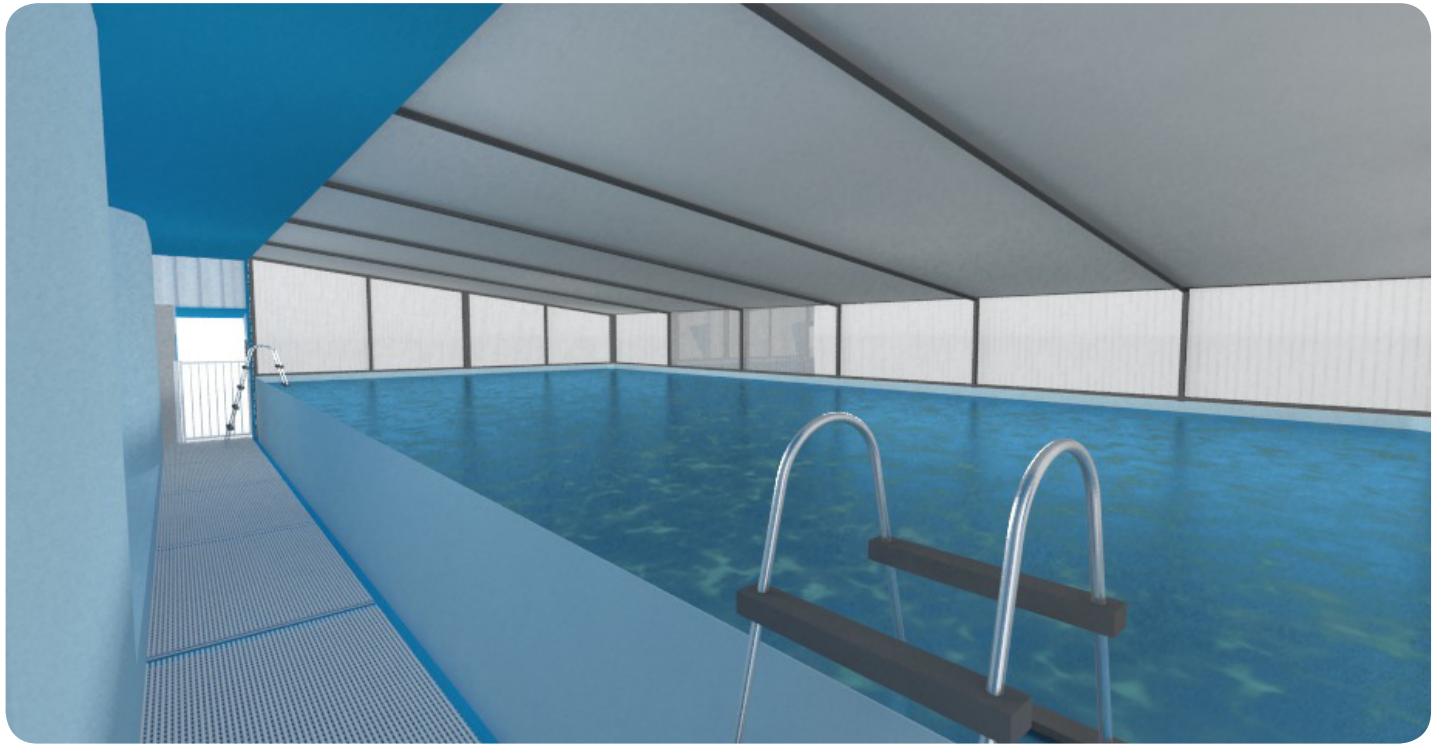


Figure 73. Internal View of the Donaldson pool, early design stage rendered model.

The major unresolved element of the Donaldson pool was, at this stage, the front wall of the pool: it was still shown as a two dimensional plane. Two pool ladders were added to the rendered model to provide a sense of scale but these highlighted the inadequacies of traditional ladders for the new facility.

The design detail of the pool wall and the entry system are elements crucial to the success of this project. The front wall of the pool will be the first impression children get of the pool as they enter the space, and the entry system will define how children's possible trepidations of the water are recognised and, hopefully, alleviated. The following chapter explores the redesign of both these important elements.

Chapter Seven Designing The Pool Experience

7.0 Designing for User Emotion

The user-experience of learning to swim does not start with the commencement of the lesson. As Scott Wilson pointed out, before a child can engage in the lesson they must first be in a comfortable state of mind in the water.

A child who is anxious is a child who is not enjoying themselves or learning. If a child has preconceived anxiety regarding a swimming lesson they may start worrying days before the lesson, or conversely, some children may be feeling excited about the prospect of swimming right up to the point of entering the pool but some small aspect of the pool space will make them balk at getting into the water.

The first impression of the pool will be important for the child deciding whether the environment of the pool, and therefore the process of learning to swim, is enjoyable or not. If the process of getting into the water causes the child to become anxious they will not be in an ideal state to start learning swimming skills and may also build a barrier to engaging in lessons in the future.

Just as different children who are learning to swim will have various levels of ability and learning styles, they will also have different levels of anxiety about getting into the pool and being in the water. Using Desmets *Model Of Emotion Due To Product Experience* (Desmet, 2003) as a reference, a scenario of a child entering the pool space can be imagined. If the child's concerns about getting into the pool are compounded by the design of the pool, the child's resulting emotional state may negatively affect the learning outcomes of the lesson. The design of the Donaldson pool must recognise these concerns and attempt to mitigate against them.

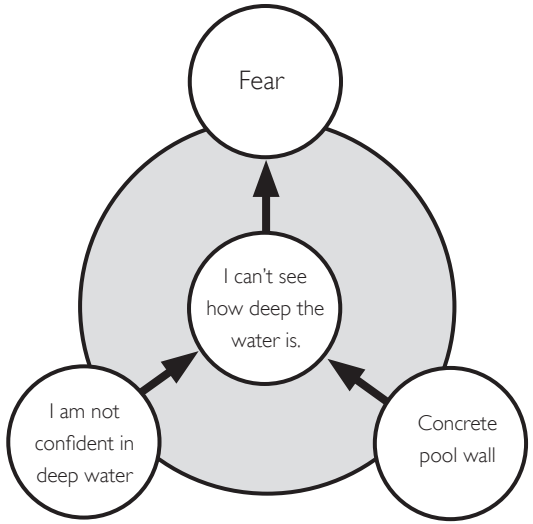


Figure 74. Model of child swimmer possible emotion response to entering a pool. Based on Desmet, (2002).

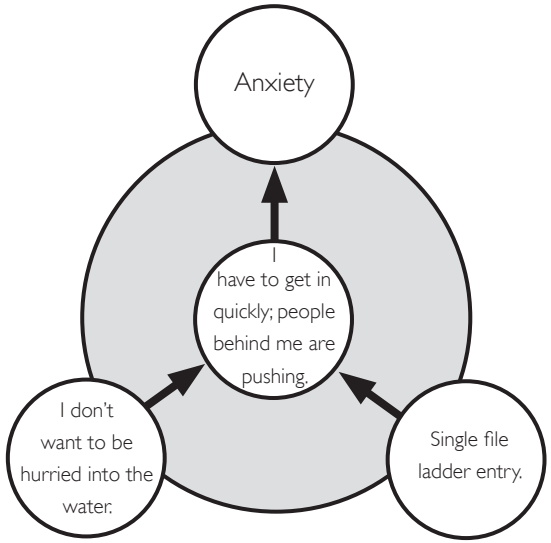


Figure 75. Model of child swimmer possible emotion response to narrow pool entry system. Based on Desmet, (2002).

Figure 76. Fear of deep water. 'Pool Fun', Marcel Baumann

7.1 The Ideal Pool Depth

Both the Pools iN SchoolZ and Pools4Schools programmes use pools with 1m water depth. These programmes are chiefly focused on ensuring children have sufficient swimming ability to save their lives by the time they *leave* primary school. Because aquatic skill development is tailored to the needs of children at the end of the primary school age group, children in the junior years must use a pool that is too deep for many of them to comfortably stand up in.

In a 1995 study on the most suitable age for children to learn to swim the front crawl, researchers found "The optimal readiness period was identified in this study to be between 5 and 6 years of age." *(Blanksby, 1995)*. At Wellington's Brooklyn Primary School swimming lessons are only available to students in the first three years of school. This is because by waiting until the senior years of primary school to teach swimming skills, younger children are at greater risk of drowning.

The target age range of the Donaldson pool is five to seven years. The anthropometric dimensions of the pool facility must be appropriate for this target demographic. This includes consideration of water depth, seating dimensions, stair height and tread depth.

Pool Depth–1,000mm

While there is a common belief that children will learn how to swim faster if they cannot touch the bottom of the pool. Scurati (2010) disputes this assumption:

> The depth of the swimming pool seems to not significantly affect the results. Children can approach guided experiences equally either in shallow or deep water to learn the swimming basic skills and independence in the water, with no differences in the rate of acquisition or in the quality of the skills.(p. 1)

While this research shows young children can learn to swim in deeper water, there is a cost to this approach in terms of anxiety generated in the swimmers and added safety issues.

In a pool of 1,000mm water depth more than half of five year old children will not be able to simultaneously touch the floor and keep their mouths out of the water to breath.

Anthropometric Analysis of Five Year Old Children in Pool Water Depth of 1,000mm

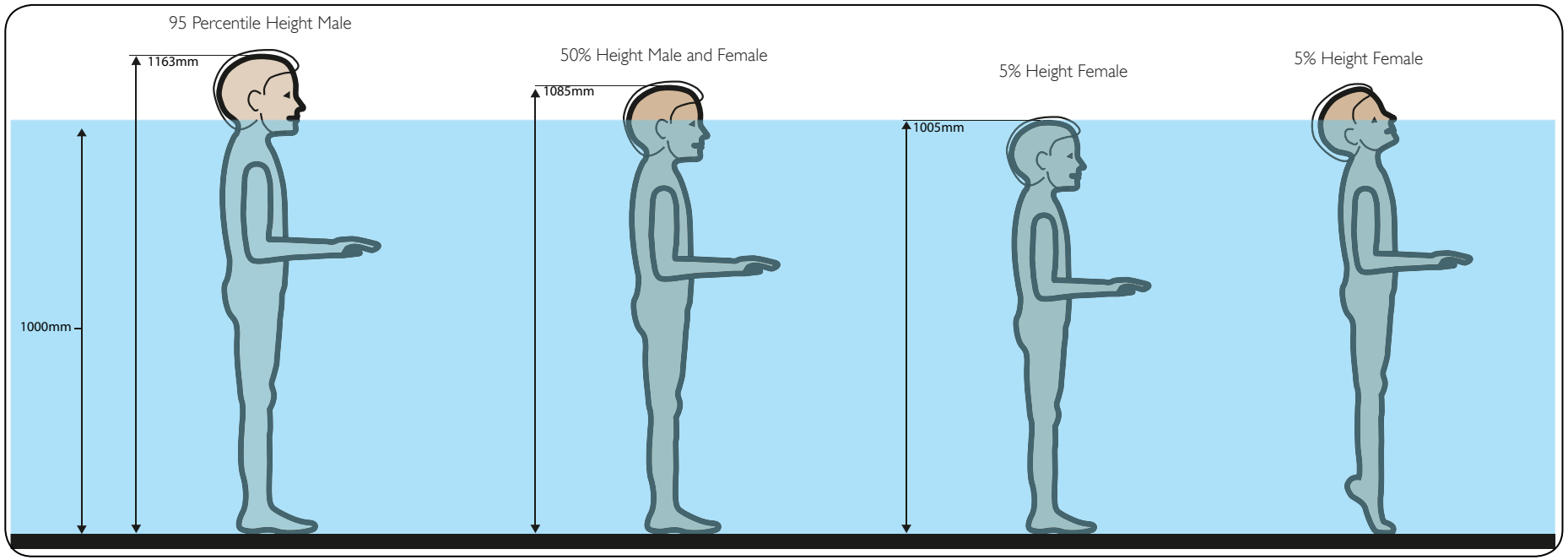


Figure 77. Anthropometric Analysis of Five Year Old Children in Pool Water Depth of 1,000mm. Donaldson, 2012. Adapted from Henry Dreyfuss Associates. (1993)

Pool Depth–900mm

In 900mm of water, a five year old female child in the 5% height category can keep her head above water by standing on her toes and tilting their head upwards.

In a pool shallower than 900mm children in the target age range would have difficulty learning to tread water without touching the pool floor.

The process of learning to swim should provide a level of challenge in order for a child to overcome it, but not to the extent that the challenge creates anxiety for the child.

Anthropometric Analysis of Five Year Old Children in Pool Water Depth of 900mm

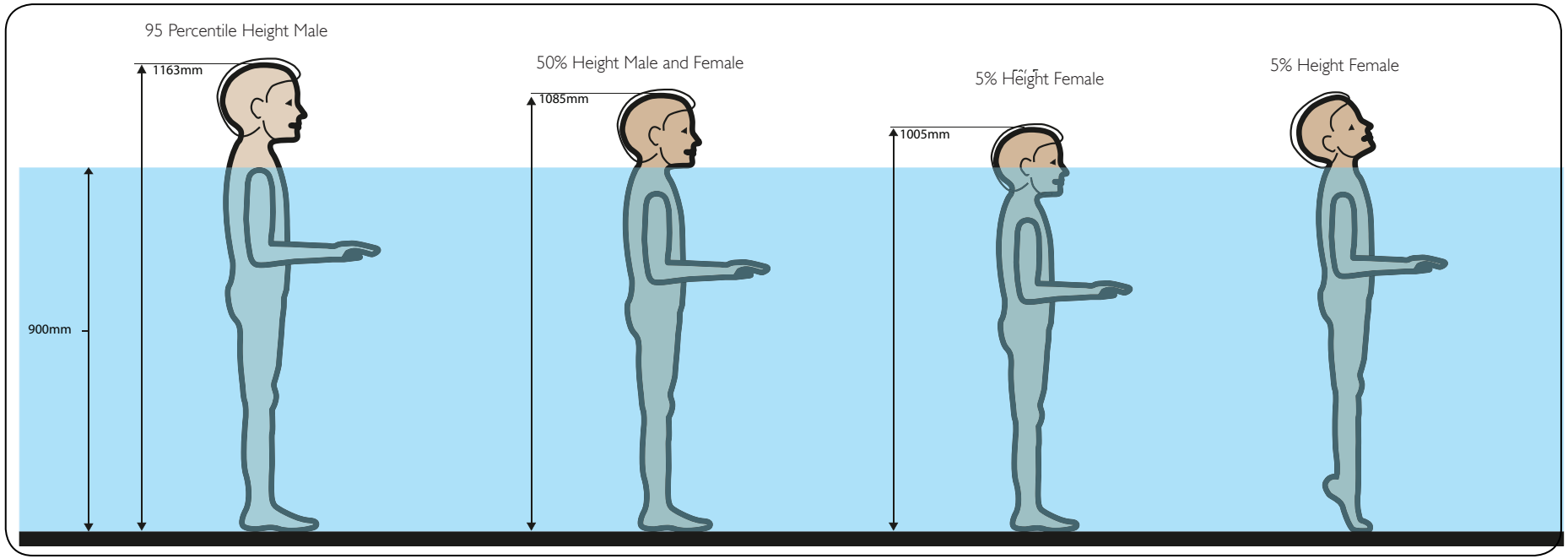


Figure 78. Anthropometric Analysis of 5 Year Old Children in Pool Water Depth of 900mm. Donaldson, 2012. Adapted from Henry Dreyfuss Associates. (1993)

7.2 Provision of a Hand Grip

A hand rail provides swimmers a sense of safety and reassurance. A hand rail at the waterline is a useful teaching aid that allows users to isolate separate techniques i.e. a learner can hold the rail and practice kicking without having to concentrate on staying afloat or moving through the water.

The NZ Swimming Pool Design Standard states: "Hand rails in swimming pools should be avoided because they increase the risk of entrapment. Suitable hand grips other than handrails should be formed into the tops of walls." (NZS 4441:2008, p.22).

Reid Pools have a steel hand rail usually on or close to the waterline. For the learner swimmer this creates a security perimeter around the pool edge where they can hold on and feel safe.

Freestanding kit set pools, such as the Pools iN SchoolZ facility, do not have a grab rail at the water line because the pool liner would need to be punctured with fasteners to attach the rail causing potential points of leakage and making the pools difficult to pack away. The top rail of the pool frame which supports the pool liner is approximately 300mm from the water line so is too high to function as an effective hand hold for younger swimmers.

The Pools4Schools pool has a ledge for swimmers to hold. The ledge is elevated above the pool skimmers and slopes toward the pool to return splashed water, this makes the hand hold too high to function as an effective teaching aid and difficult to hold on to.

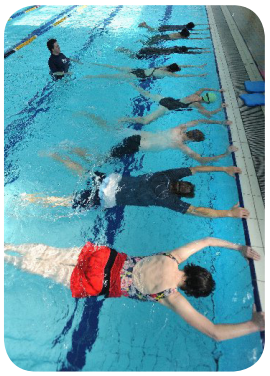


Figure 79. Hand-holds at the waterline, Moana Pool, Dunedin, NZ.

Detail of the Pools iN SchoolZ pool liner and support rail.

Detail of the top of the Pool4Schools liner.

Figure 80. Comparison of mobile pool hand grips..

The Splash Zone

The area of pool liner above waterline height can be considered the water 'splash zone'. The splash zone does not need to contain water under pressure, just return splashed water back to the pool. If the pool liner is attached to the framing of the enclosure wall and a water tight seal is made between the top of the liner and the polycarbonate cladding, the enclosure wall could function as the splash zone. Any water splashed over the liner would hit the enclosure wall and run back into the pool. Therefore the height of the top of the pool liner could be lowered so that it sits just above the waterline. This would allow a fixed hand grip to be situated just above the waterline.

A Duel Function Hand Grip

An extruded flexible urethane beading, attached to the edge of the pool liner, would perform two functions: it would allow the liner to be easily located into a corresponding aluminium channel that forms part of the enclosure frame,making it very quick and simple to set-up and pack-down, and it would also act as a hand grip *at* the waterline where is it most useful.

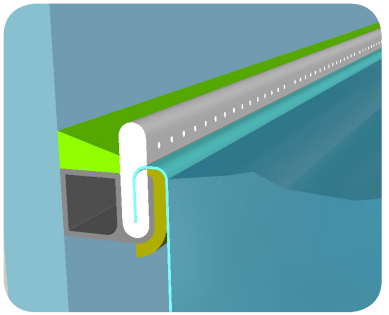
The flexibility of the urethane material would make the hand grip soft to hold and collision friendly and also allow the pool liner to be rolled up for storage while in transit.

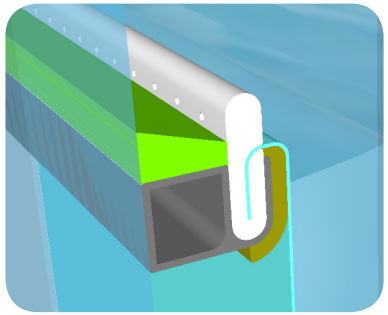
7.3 The Liner Bead / Hand Grip

- The liner is edged with a 50mm, flexible urethane hang bead that allows for quick 'drop in' attachment of the liner onto the enclosure frame.

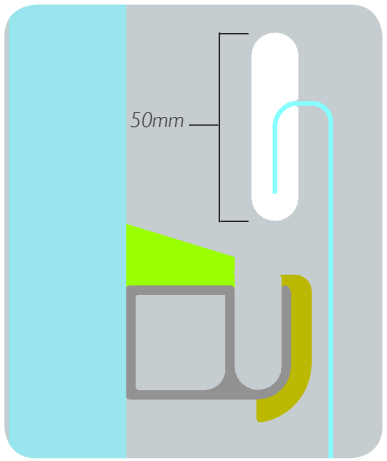
- By using the interior wall of the enclosure as a 'splash zone' the water level in the pool can be raised up to close to the top of the liner. The liner bead can then function as a hand grip at the water line where it is most useful.

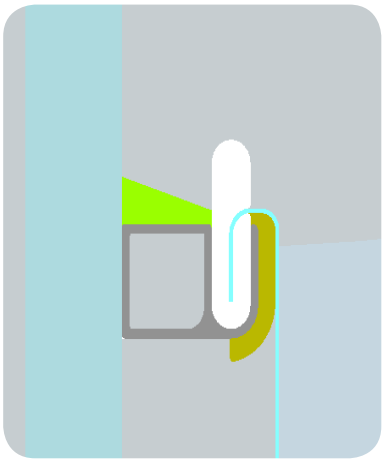
- The integrated pool liner bead and hand grip will improve the functionality and usability of the pool for both the installer and the swimmer.





The hand grip is at the waterline, swimmers can grasp the soft hand grip and wrap their fingers over the top. All the exposed material surfaces are impact friendly.





To attach the pool liner the installer lifts the liner up by the bead and drops it into the aluminium channel.

Figure 81. The liner bead / hand grip.

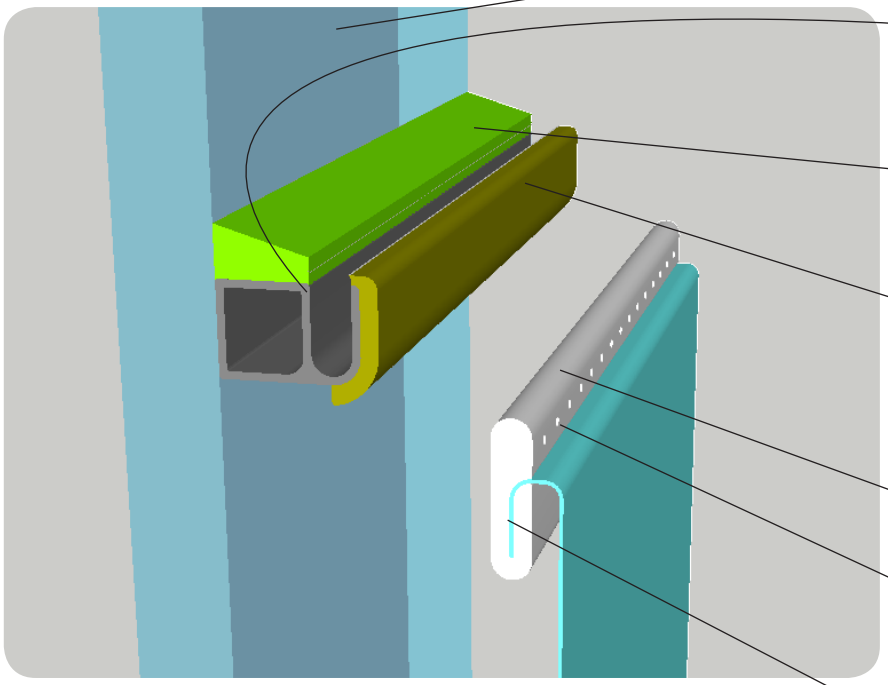


Figure 82. Cut away section of the liner bead/ hand grip.

- Multi-walled polycarbonate cladding
- Aluminium extrusion provides support for the cladding as well as holding the pool liner bead.
- A high density foam strip forms a water tight seal between the interior face of the cladding and the liner bead.
- A synthetic felt strip provides cushioning between the liner and the frame. This protects a swimmer's head from hard knocks against the aluminium framing.
- An extruded flexible urethane liner bead doubles as a hand grip.
- Holes through the hand grip allow water splashed against the wall to collect on the foam and drain back to the pool.
- The liner is glued and stitched into the slot in the bead. The flexibility of the bead allows the liner to be rolled and folded as usual for transport.

7.4 Analysis of Existing Swimming Pool Entry Systems

Ladders

A traditional pool ladder is an object of utility: The bare essentials to facilitate the process of getting a person over the pool wall and into the water. But this efficiency comes at the cost of the quality of the experience. The design of the pool ladder does not take into account the emotional needs of a hesitant swimmer.

Ladders, unlike stairs, require users to support themselves with both hands when ascending and descending. This limits the width of a ladder to the width of the user, meaning there is no provision for someone to pass another user while on the ladder.

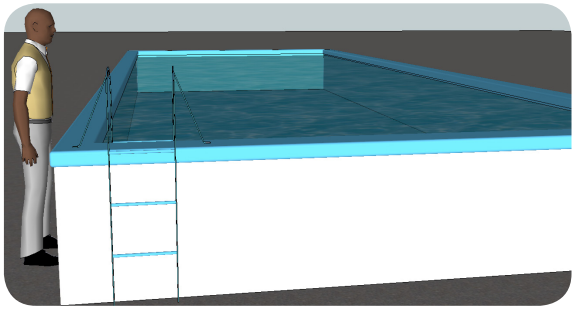
A ladder in a pool poses a collision hazard. For this reason pool ladders have shallow profiles and are usually located in the corners of the pool, tucked out of the way of swimmers. Fewer ladders equates to fewer pool obstacles and therefore most learn-to-swim pools have only one or two ladders.

The traditional single ladder design of the Reid Pool creates a bottleneck of anxiety where children are compelled to line up and file into the water via the steel ladder as quickly as possible. This 'production line' entry process assumes each child is willing and happy to enter the water at a consistent speed.

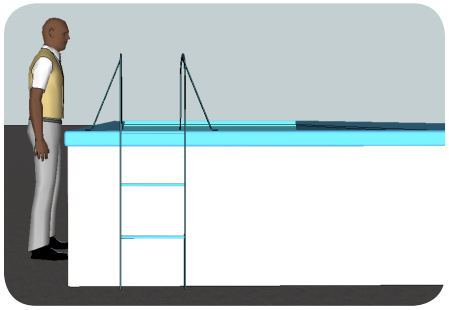
If a child is afraid of descending backwards into cold water of unknown depth, s/he has no opportunity to reconsider or pause because there is a line of children behind. The child can not move sideways to let others pass while they adjust to the water at various depths on the ladder.

Once a swimmer is in the pool, the ladder represents the only point of exit. If a child is anxious about moving away from the safety of the ladder, anxiety levels are likely to increase the further away s/he is compelled to move.

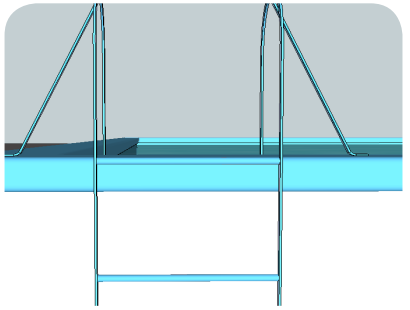
Figure 83. The traditional Reid Pool with single steel ladder entry. Te Aro School, Wellington NZ.



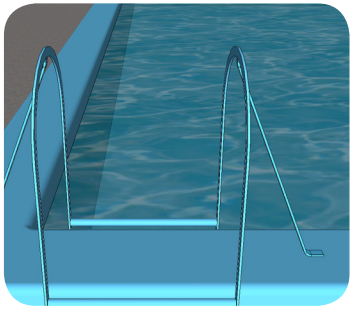
The view of a Reid Pool from an adult perspective.



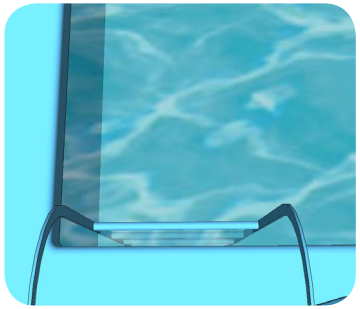
The view of a Reid Pool from a five year old child's perspective.



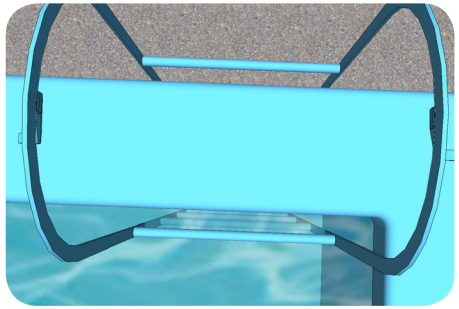
Approaching the ladder the water surface is only visible at the far end of the pool.



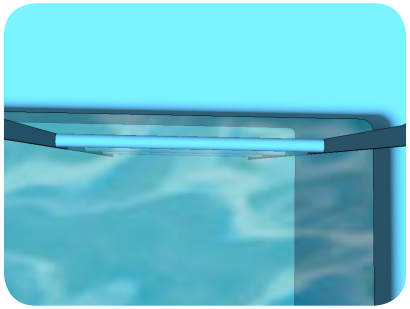
The child climbs the ladder...



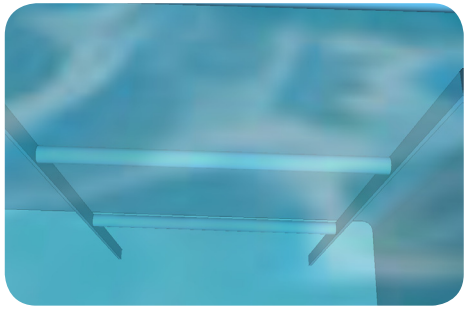
and must turn 180 degrees at the top...



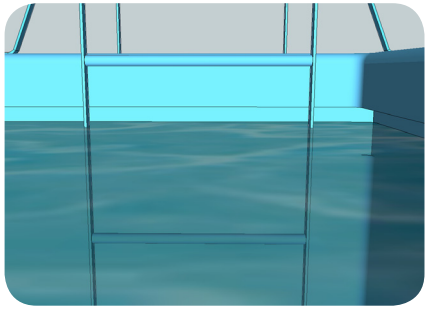
...and descend into the water backwards.



The vertical ladder makes it difficult to see the next rung below.



It's difficult to gauge distance through the water.



The child reaches the pool floor feeling cold, rushed and unnerved.

Figure 84. User experience of entering a Reid pool.

Task Analysis: Entering a Pool Using a Ladder

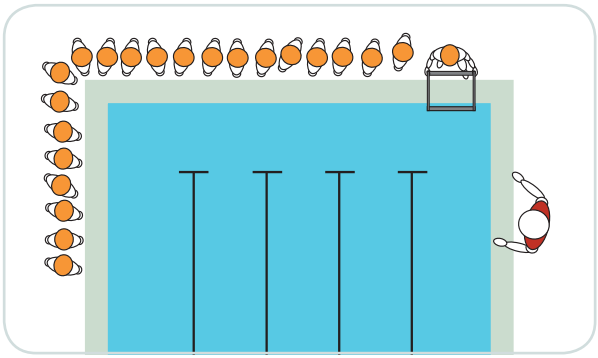
For first time users getting into a pool via a ladder can be a physically and emotional taxing experience.

Physically taxing

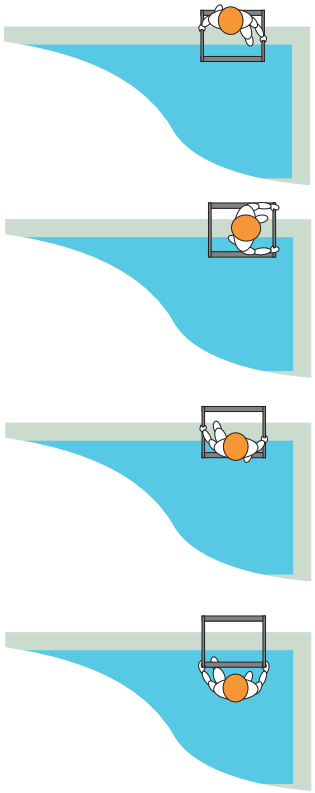
- high steps—300mm
- having to turn around at the top of the pool wall
- climbing down backwards and not being able to sight the ladder rungs
- getting into cold water quickly.

Emotionally taxing

- not knowing what is on the other side of the wall
- being compelled to get in the water as fast as the queue is moving forward
- having nowhere to pause and adjust to the sensation of being in the water while at a comfortable depth.



The bottleneck caused by the pool ladder.



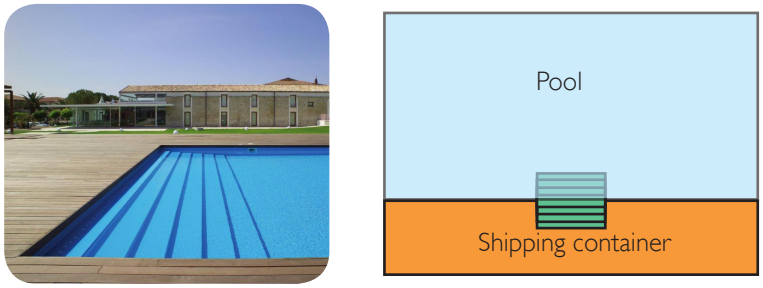
1. A child climbs the pool ladder to the top of the pool wall.

2. The child must release one hand rail, grab the opposite hand rail, rotate 180° on the top of the wall, and take hold of the rail again.

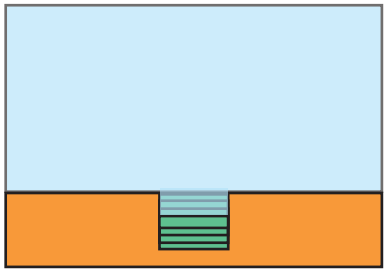
3. The child must then descend the ladder backwards.

4. The child continues down the ladder into the cold water. The ladder rungs are directly below each other and are difficult to see, the user must guess the location of the next rung and reach out with their foot for it.

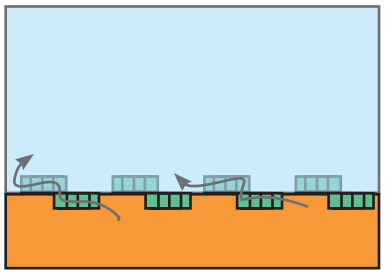
Figure 85. The process of getting into a Reid Pool.



Wide stairs in the pool protruding into the swimming space create a collision hazard.



Wide stairs set flush with the pool wall would protrude too far into the container space.



Multiple points of entry taking up less swimming or walking space.

Figure 86. Comparison of pool stair layout options in the Donaldson pool.

7.5 Stairs

Stairs, especially when equipped with hand rails, create easier access into and out of a pool, but they also take up more space and create more of a collision hazard if they protrude into the swimming area.

Pool stairs can be set back from the swimming space, with the bottom stair set flush to the pool wall, but this requires more dedicated space on the outside of the pool, especially in an above-ground pool where space is needed for two flights of stairs; one up and one down.

Ladders and stairs are most safely climbed with a hand rail on either side, but this reduces the width of the stairs or ladder to a single occupant width. This means each swimmer is compelled to go down the ladder or stairs by the people in the queue behind them.

Water Depth Variation

Most learn-to-swim pools are of one consistent depth. Whilst this eliminates the hazard of a child accidentally getting into deeper water than they anticipated, it has the disadvantage of not allowing a learner-swimmer the opportunity to inhabit a shallower, more comfortable water depth. Wide pool steps allow users to sit or stand on the stairs and adjust to the pool depth while others users can move past them.

7.6 Anthropometric Testing

Finding definitive anthropometric data concerning the ideal dimensions of stairs for the target user age group proved difficult. To better understand the required dimensions a 1:1 scale model of a five year old boy (50th percentile height) was created and used to determine the ideal height and depth for the Donaldson pool stairs and the requirements for the hand rail.

Findings

- Stair height should not exceed 230mm.
- Tread depth should be at least 200mm.
- The pool wall could be used as a handrail at the bottom of the stairs but not at the top. Provision for a hand hold must be made for users entering the pool.

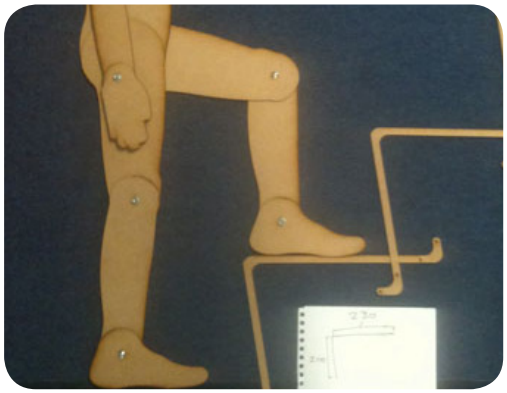
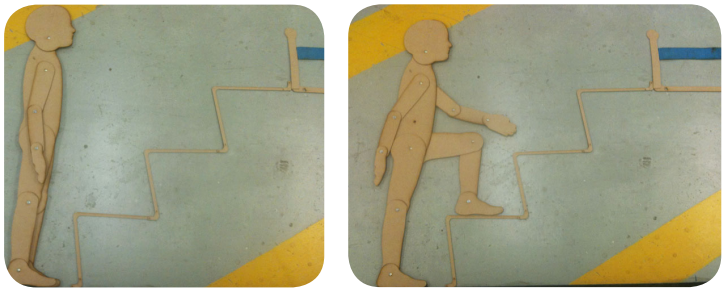
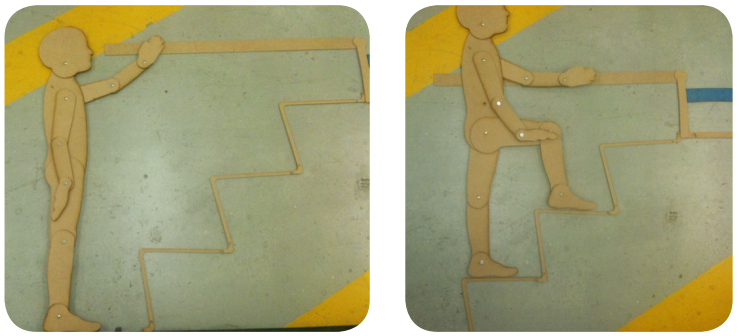


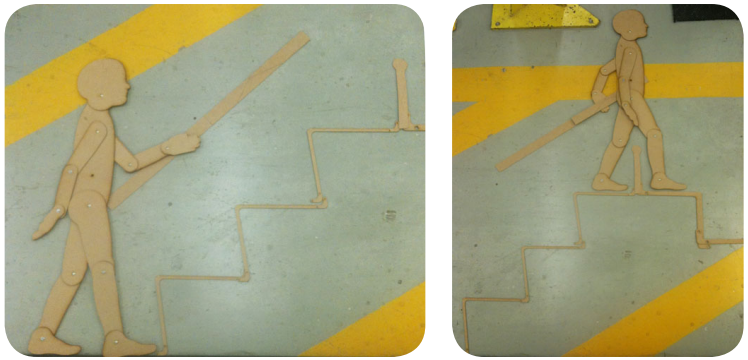
Figure 87. Using the model to establish a maximum stair riser height (220mm) and a minimum tread depth (230mm).



Examining the process of climbing the stairs without a hand rail.



Using the top of the pool wall as a hand rail for the stairs.



Using a separate angled handrail.

Figure 88. Anthropometric testing of pool stair layout.

7.7 Criteria For The Pool Wall and Entry System

The redesigned pool entry system must make accommodations for the end users physical and emotional needs. These provisions include:

- at least two entry and exit points from the water
- space for pool users to sit, stand and move between different water depths
- use of soft impact-friendly materials on surfaces
- allow unhindered thoroughfare in the container space between the changing rooms and the exits
- fast and simple to set-up and break-down
- two points of water pick up to the plant room and four return jets to the pool
- stair riser height less than 230mm, tread depth greater than 200mm
- provision of a handrail for ascending and descending stairs and for transferring over the pool wall.

Point of Reflection

The criteria of the Donaldson pool entry system has two conflicting requirements: the need for the components to be compact while at the same time providing generous paces for pool users to enter the pool and explore the water at different depths. A ladder offers a compact and cost effective entry system but the user-experience is poor. A more expansive entry system needs to add value to the learn-to-swim experience to justify the extra cost of construction and space requirements.

Chapter 8 Pool Wall & Entry System Concept Generation

The redesigned pool wall and entry system are integral to each other. There should be symmetry between when children initially view the pool and the understanding they form of the pool space and how they are expected to engage with it. Upon first viewing the pool, swimmers should feel reassured about the environment they are being asked to enter and also confident that they understand how to get in and that the process will be easy and enjoyable. The aim is for children to be internally motivated to get into the pool. By providing spatial and movement options for swimmers entering and moving through the pool they will not feel rushed, confused or intimidated.

An iterative process of concept generation was undertaken to produce a design that would provide positive user experiences and also comply with the space constraints of the established Donaldson pool enclosure.

Figure 89. The top step of this scale model incorporates a pool skimmer.

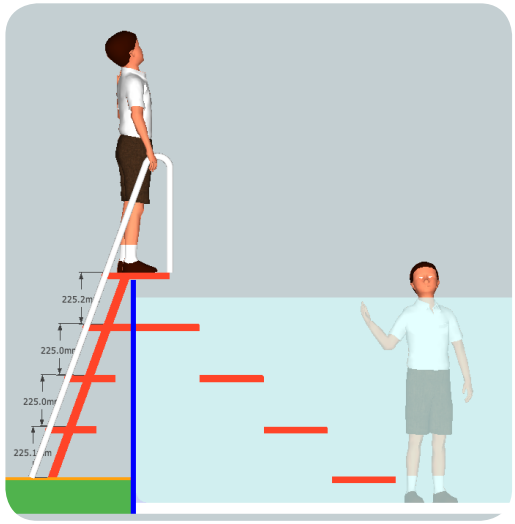


Figure 90. Industrial ladder exploration.

8.0 Industrial Ladder Concept

An industrial ladder is a half way point between a ladder and a flight of stairs. The angle of ascent allows a user to climb with less reliance on the hand rails than when climbing a vertical ladder. Its steep incline means the industrial ladder takes up less space than a flight of stairs.

One concept explored for this project involved a combination of an industrial ladder on the pool exterior and more generous stairs on the interior. This design saves space on the outside of the pool i.e. inside the container. A pool skimmer with a mesh top, designed to capture water off the swimmer exiting the pool, is incorporated into the top step of the ladder.

The industrial ladder entry concept provides an easier ascent for users than a vertical ladder, but the incline suggests to users they can descend the steps facing forwards (as with stairs). This can be dangerous due to the shorter treads and taller risers than a normal flight of stairs. This concept was abandoned due to its potential to cause confusion and falls.

Figure 91. An industrial ladder.

8.1 Ladder Wall Concept

I investigated the way people climb over different walls to better understand the mechanics of the process. I concluded that if users were to straddle the top of the pool wall as they do when climbing over a fence, they would not have to climb so high and therefore would not be in danger of falling from the full height of the pool wall.

This concept integrates the pool ladder into the pool wall by using horizontally corrugated aluminium panels to form sections of the wall. The wall is climbable from both sides and has a curved top rail for the user to straddle. It has rounded edges on both sides for fingers to grip.

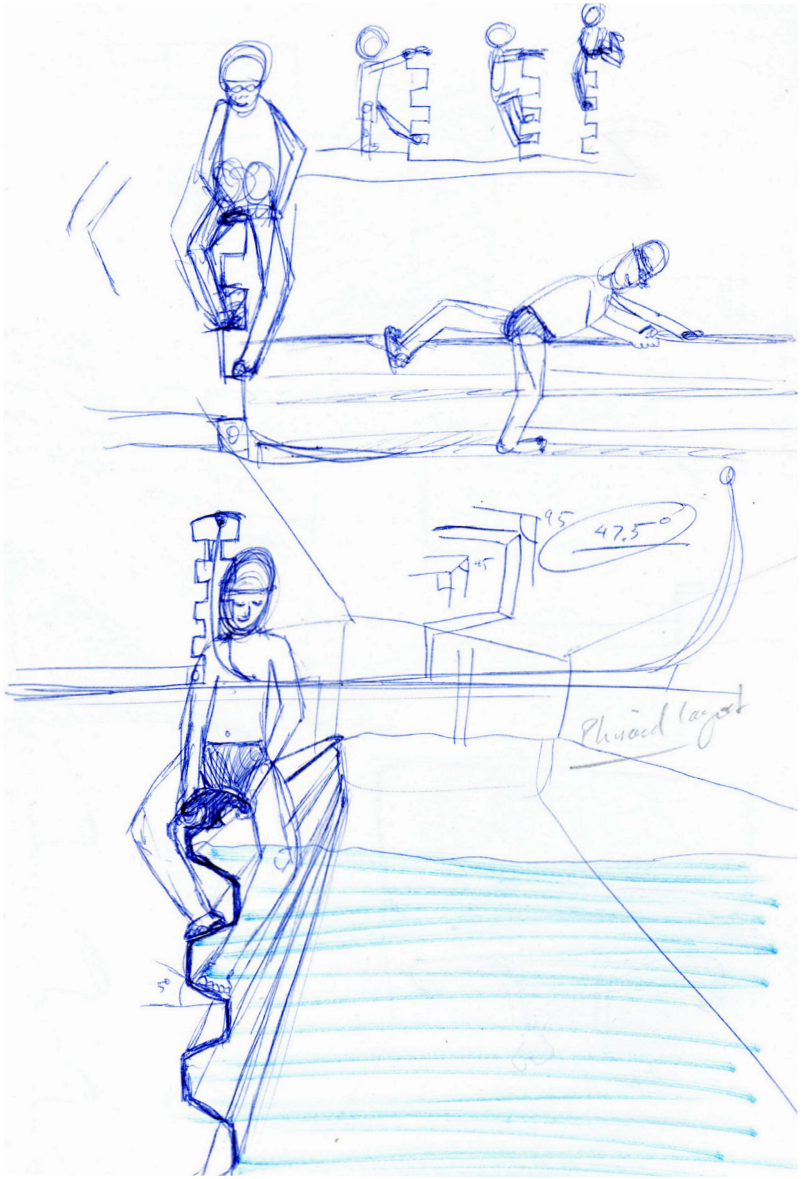
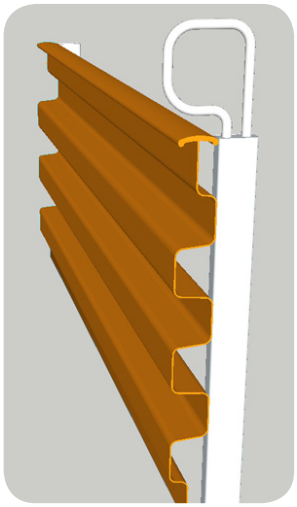
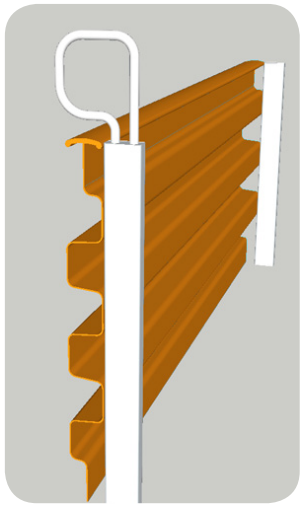


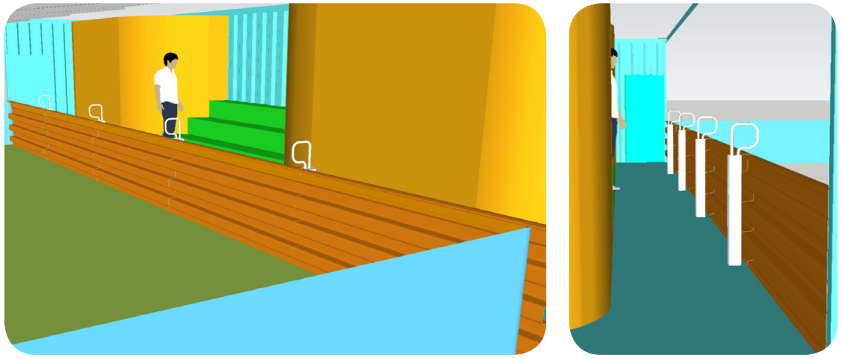
Figure 92. The Ladder Wall concept sketch.



Ladder wall section internal side.



Ladder wall section external side.



Views of the Ladder Wall concept.

Figure 93. The Ladder Wall CAD model.

Ladder Wall

Features

- Aluminium sheet folded to form double sided climbable wall panels.
- Box section aluminium beams welded to the panel edges which slot into corresponding cavities in the shipping container floor.
- A rolled-over top rail.
- A pool liner custom made to fit snugly into the wall corrugations.
- Vertical handrails at the end of each panel provide extra hand-hold stability for users.

Advantages

- The corrugations in the wall add strength to the panels allowing the wall to be made from lighter gauge material than if the panels were flat.
- Easy 'drop in' installation.
- Users can enter or exit the pool from any point along the wall eliminating the swimmer bottle neck at the ladder.
- Users can straddle the top of the wall and pause before getting into the water.

Disadvantages

- Users require strength and balance to climb over the wall safely.
- Because the wall is a single thickness, the steps are offset on each side by 150mm. This may make it less intuitive to negotiate at first as the step indentations are offset on each side.

Point of Reflection

This concept was an efficient way of providing multiple points of entry along the pool wall while creating a strong, lightweight pool wall system that could be easily assembled. But the task of climbing the wall may prove too challenging for the target age group and it does not provide space for pool users to sit and relax in different water depths.

8.2 A Transparent Pool Wall

The users first impression of the pool space should be one of maximum excitement and minimal fear. In an above-ground swimming pool the wall is a physical barrier between the user and the water. The pool wall is an important threshold of the experience, the boundary between the known and familiar, and the unknown and scary.

The Reid Pool wall is thick hard concrete. It does not reflect or reveal the nature of the aquatic environment it contains.

If the pool wall was transparent a child could better comprehend the environment they would be climbing into. By standing next to a see-through wall they could easily understand the relationship of the water depth to their body height and see where the water will come up to on them when they are in the pool.

Children would also be able to see other swimmers in the water and through understanding the processes happening inside the pool a child's fear of the unknown would be greatly diminished.

Figure 94. Kelly Tarlton's Underwater World, Auckland NZ.
A pool that reveals it's contents eliminates fear of the unknown.

Figure 95. Transparent products reveal their inner processes and add fascination.

Transparent Pool Wall Material Comparison

Glass or Acrylic Sheet

Advantages
- Strong
- Excellent optical clarity.

Disadvantages
- Heavy
- Expensive
- Difficult to create a reliable water-tight connection with the rest of the pool liner
- Hard surface able to cause collision injury to heads, arms etc.

Clear PVC Tarpaulin Liner on a Tubular Frame

Advantages
- Stronger than non reinforced PVC.

Disadvantages
- Reduced optical clarity.

Inflatable PVC

Advantages
- Good transparency
- Lightweight
- Fast and easy to set up.

Disadvantages
- Thin PVC is not strong enough to counter the water pressure on a larger scale pool.

Clear PVC Liner and Steel Mesh

Advantages
- Allows the pool wall to have more sculptural form
- Excellent strength to weight ratio.

Disadvantages
- Increased risk of tearing due to abrasion of the liner on the steel mesh
- The steel mesh produces a collision hazard.

Figure 96. Transparent pool wall material comparison.

A Corrugated Pool Wall

Rather than being a flat plane, the pool wall could be formed into corrugations which would create a set of 'bays' and 'headlands' that children could explore, traversing from one bay to the next, down the length of the pool. Games would spontaneously be created with children moving from their 'own' bay to their neighbours' bay. The shape of the wall could promote movement and exploration in the pool.

Advantages:

- Stronger than a straight sided wall.
- Could concertina and nest into a tight configuration for easy transportation inside the container.
- Creates a series of 'bays and headlands' that would provide users a sheltered space in which to become accustomed to the water before venturing into the main pool space.
- Creates 'hiding' spaces that foster spontaneous play with swimmers traversing from one bay to the next playing hide and seek type games.

Figure 97. Undulating pool walls add visual interest and suggest movement through the pool space.

Figure 98. A sheet piling wall combines a strong structure with the ability of the components to nest together.

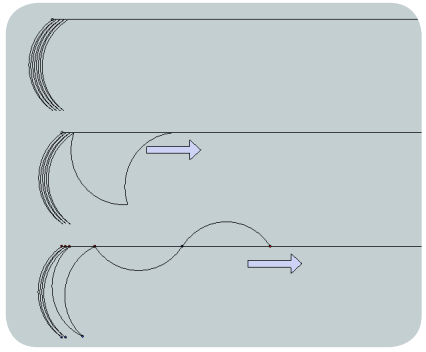


Figure 99. Plan view of the wall sections nested and then being puled out to form the corrugations.

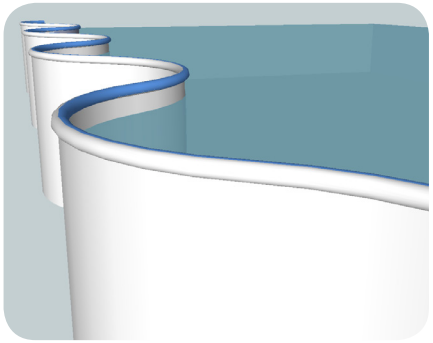


Figure 100. CAD model of a corrugated pool wall.

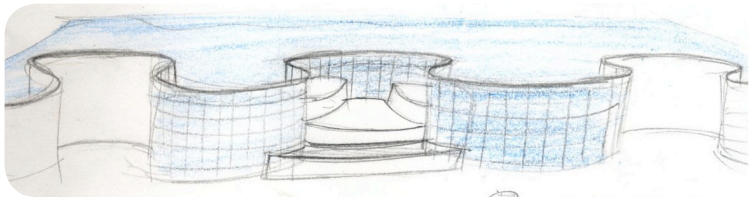
A Transparent, Corrugated Pool Wall

A traditional free standing pool liner hangs off a top rail. The liner It must be strong enough to hold in the water without stretching. The liner material is fibre reinforced opaque PVC, or PVC tarpaulin. Clear PVC could be substituted but the amount of fibre within the fabric would detract from the optical transparency.

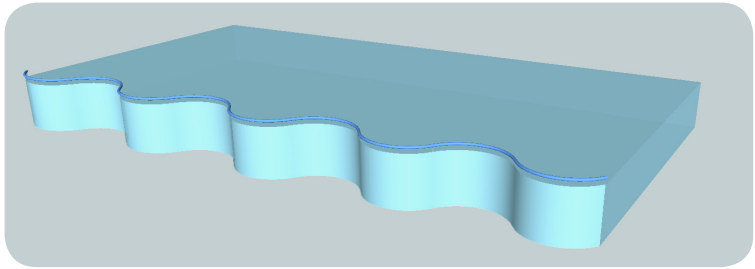
While researching clear pool wall material I found an image of a cylindrical, above ground pool that utilises a thin clear PVC liner, supported by a steel mesh frame. The optical transparency was excellent and the pool appeared to be very simple to set up and pack down. I thought this could be an interesting way of producing a sculptural wall that was see-through and curved in both convex and concave corrugations.

On further reflection this system would only work with convex walls where the water pressure against the liner stretched the steel. To create an inward curving wall (viewed from outside the water) the steel mesh would need to be of a thicker gauge to hold back the pressure of water. This could make the components too heavy for easy setup by two people. The mesh would also create a hard surface that could cause injury and would also abrade against the vinyl liner and shorten its life-span.

A steel mesh and PVC pool wall.



Sketch of a corrugated steel mesh pool wall.



The combination of a corrugated form and transparent material would create a visual dialogue between the pool wall and the water it contained.

Figure 101. The transparent corrugated pool wall concept.

8.3 Wavy Wall Concept

This concept offers users multiple points of entry and exit from the water. The corrugations provide each user their own 'bay' or personal alcove where they can sit in 300mm of water and familiarise themselves with the pool space. From here they can observe the pool and traverse around the 'headland' to the adjacent bay to 'visit a friend'.

There is an integrated pinch rail at the front edge of the internal platform and a recessed step at 300mm from the pool floor which mirrors the height of the exterior step. This concept was devised prior to the anthropometric testing. The step dimensions proved to be too high but aspects of the design were retained for later concepts.

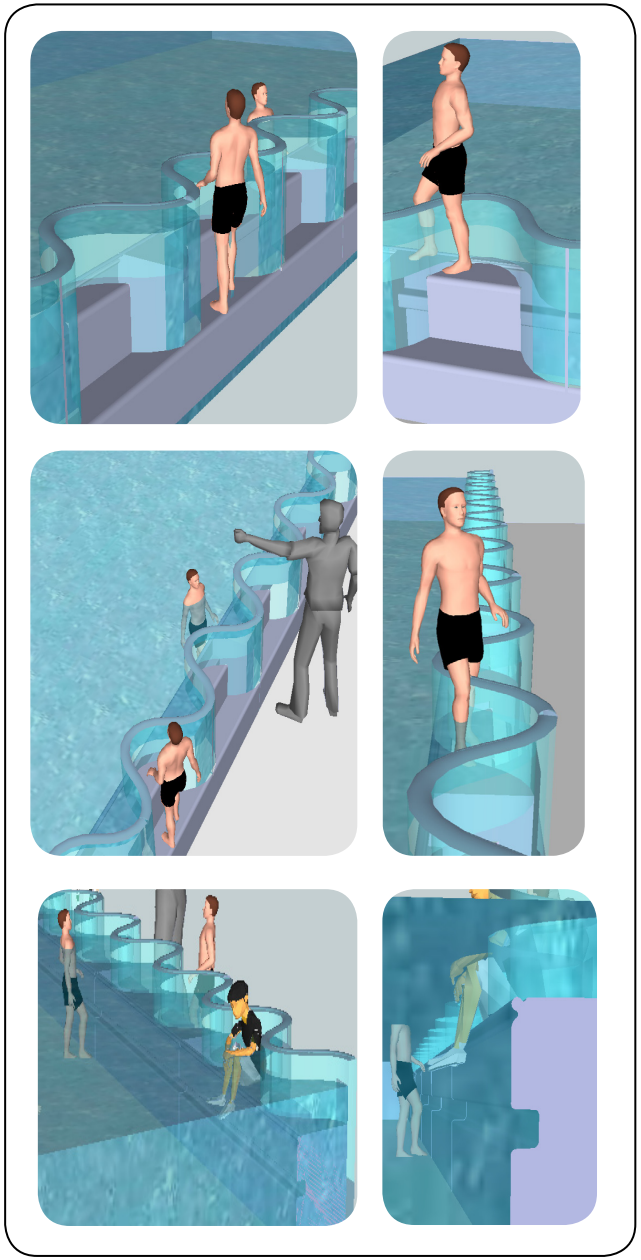


Figure 102. The first wavey wall iteration.

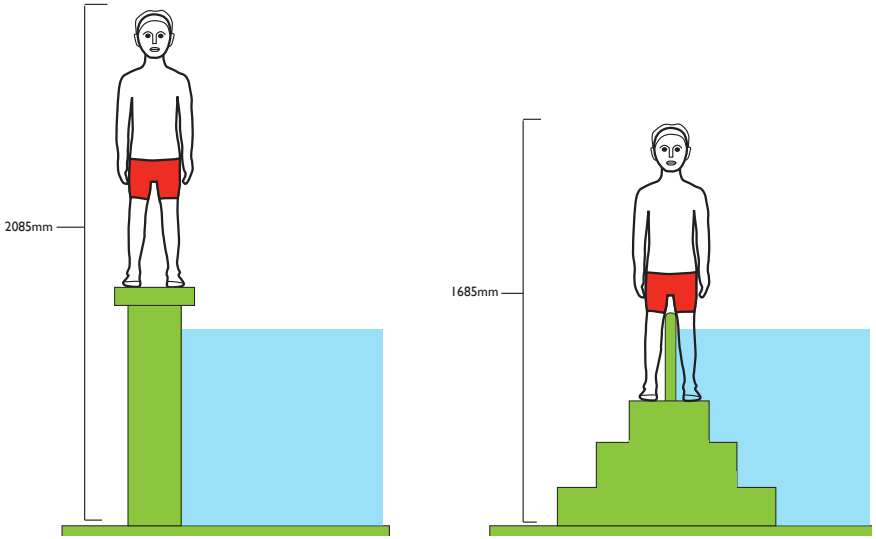


Figure 103. Comparison of potential fall height of a Reid Pool wall and the 'straddle wall' concept.

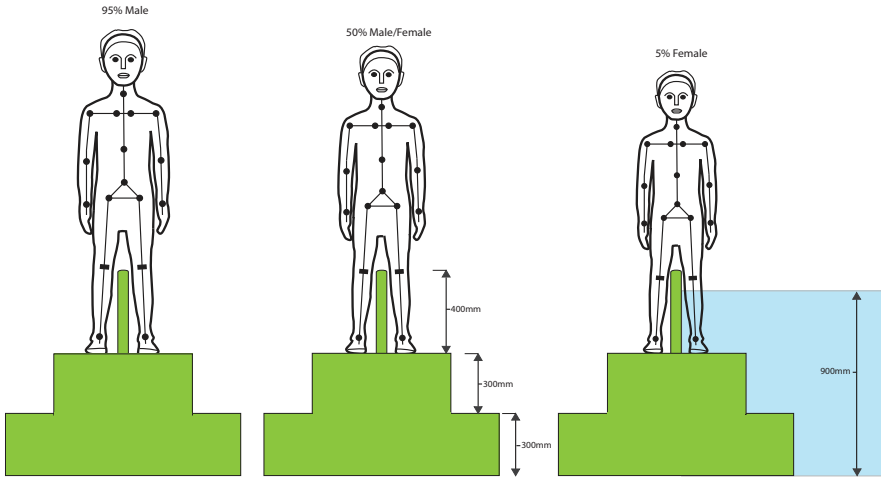


Figure 104. Calculating a suitable height for the top of the straddle wall.

8.4 Straddle Wall Concept

The user climbs the three steps and straddles the acrylic wall while holding the top of the wall. The straddling feature eliminates the need for the stairs to ascend to the full height of the wall, this means the users feet are never more than 600mm from the ground. If a user were to fall from the step to the ground the lower height would reduce the potential of serious injury.

This concept also eliminates the need for a separate hand rail as the user can hold the pool wall with both hands while climbing over it. This action is analogous to climbing into a bathtub; (Figure 105) a familiar activity for most children which has associations with relaxation and play in warm water.

Figure 105. The straddle wall concept is based on climbing over the side of a bath tub. The top of the wall provides the user with a place to sit and pause while climbing into the water. The hand-hold is formed by a rollover edge on both sides of the pool wall.

8.5 Wavy Wall Stairs

The corrugations in the Wavy wall concept were enlarged and various iterations of stairways were explored using half scale, 1:10 scale and CAD models.

The two sets of stairs (one set ascending the pool wall from the outside and one internal set going down into the water) mirror each other in form and dimensions so that users have a sense of rhythm in their step pattern. The stairs ascend towards the back of each corrugation in the pool wall, the challenge was to create a fluid transition from the top of the ascending stairs to the top of the descending stairs. Pool users would climb the stairs and at the top of each flight they could choose to go either right or left over the pool wall and arrive onto the top of the internal steps. The transition across the pool wall needed to be simple and intuitive to use and not pose a trip hazard.

A transition step that allows users to move from the top of the external stairs to the top of the internal stairs was trialed (Figure 106). The tread was set flush with the top of the pool wall in order to be as low as possible. The form of the transition step needed to be generous enough to allow easy movement over the pool wall but not so large as to be in the way of swimmers. Several iterations of the transition step were created in search of a balanced solution.

Figure 106. Up, across and down. Half-scale sketch models of the corrugated pool wall and transition stair layout.

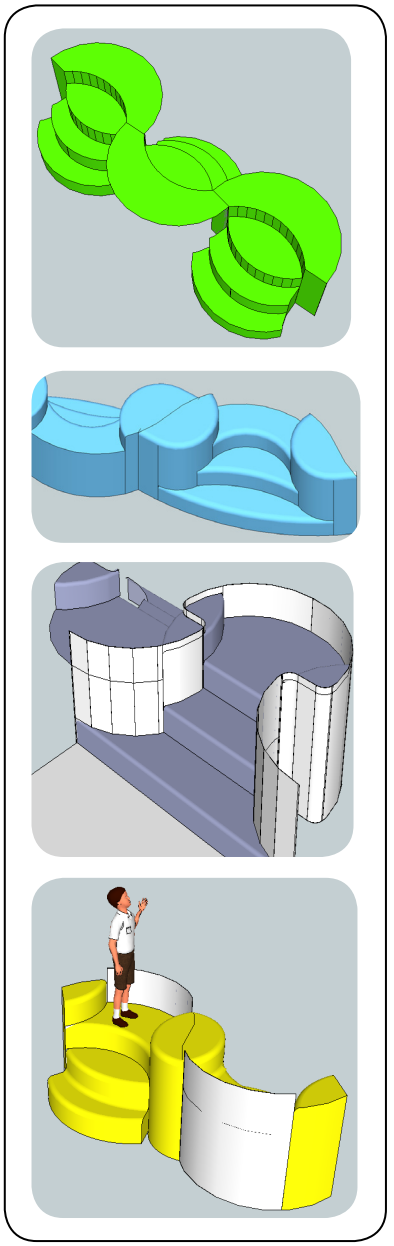
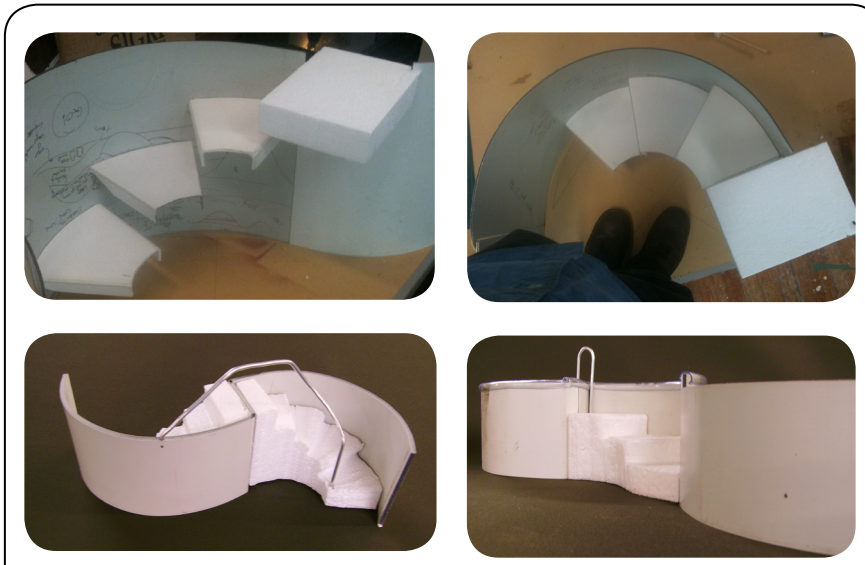
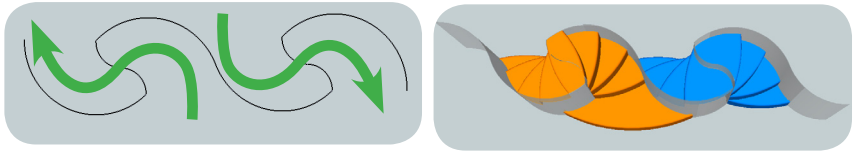


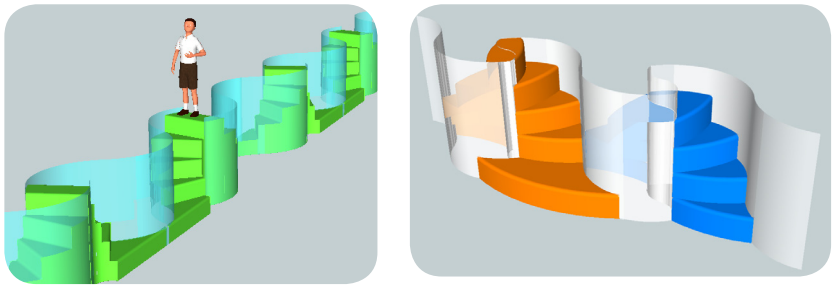
Figure 107. CAD concept iterations of the wavy wall stairs.



Iterative sketch models exploring spiral stair layout.



Multiple spiral stairs would allow flowing movement in and out of the pool



CAD concept of a multiple spiral stair pool wall.

Figure 108. Spiral stair concept exploration.

Spiral Stairs Concept

Fitting spiral stairs into the curvature of the pool wall would allow for greater elevation over a shorter distance than a straight flight of stairs. A number of variations of spiral stairs which followed the curve of the pool wall were created in both CAD and physical scale models.

Spiral stairs are fun to use, are elegant in form and have a small footprint compared to straight flights of stairs. However the tight rotation of the spiral creates large variation in the depth across the span of the tread and presents a potential trip hazard. The stairs were also too narrow and would not allow users to safely pass each other to avoid user congestion on the access way.

Broader Access Way

The spiral stairs were widened and lengthened to allow one pool user to pass by another on the stairs This would allow children to pause on entry if they felt unsure about getting into the water while other children could file around them.

This concept still did not address how the shape of the pool wall and the entry system would reflect how learner swimmers used the space in the pool. The functionality of the stairs ended once the users were in the water.
The design process was starting to feel forced and laboured with the various performance and experience criteria competing with each other.

Reflecting on the Entry System

After exploring many iterations of the symmetric corrugated pool wall, I re-evaluated the design criteria. I realised the shape of the wall was determining the form of the stairs and therefore the movement of the users into the pool. The form of the design was being driven by the ability of the wall sections to fold and nest during transport. The design did not 'feel' right because it was not user centred. On reflection it became obvious that the pool wall should conform to a more ideal layout of the steps, which in turn, should be determined by how the users could be made more comfortable when entering the water.

The next question: How could the form of the pool wall improve traffic flow into and out of the water and also reflect and facilitate how the pool space is to be used?

Figure 109. Broader spiral stairs with a straddle wall.

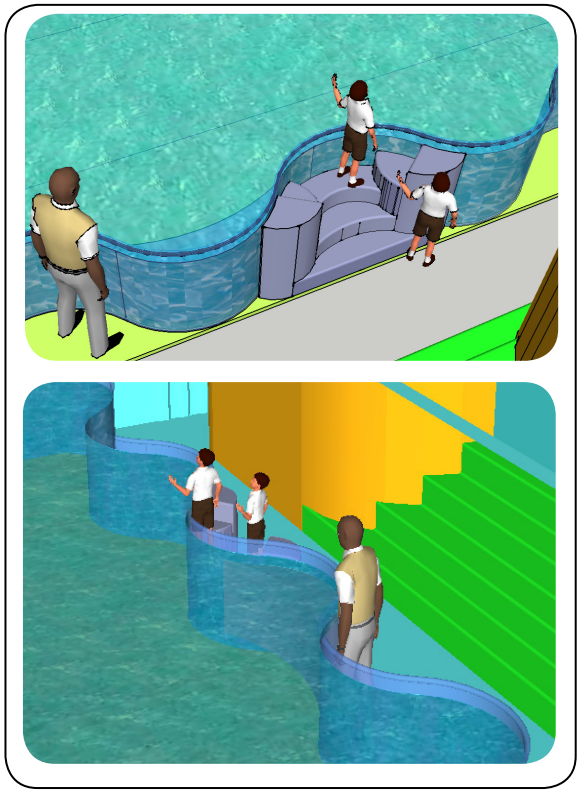


Figure 110. The wavy wall and stairs in context.

Figure 111. *A frameless free-standing pool.*

Figure 112. Industrial trip curtains made of thick, transparent PVC.

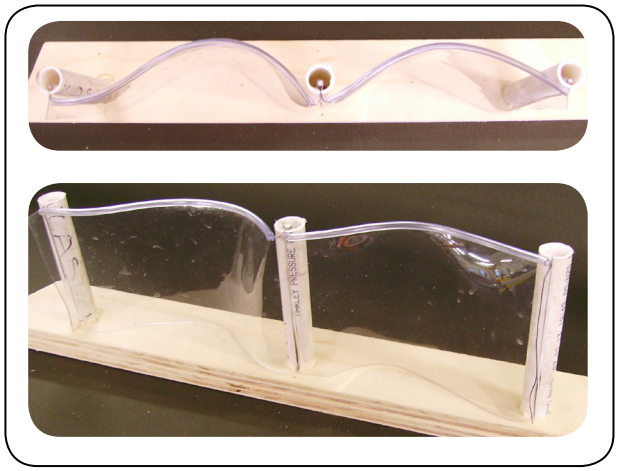


Figure 113. Sketch model of a pool wall made of thick PVC slung between support posts.

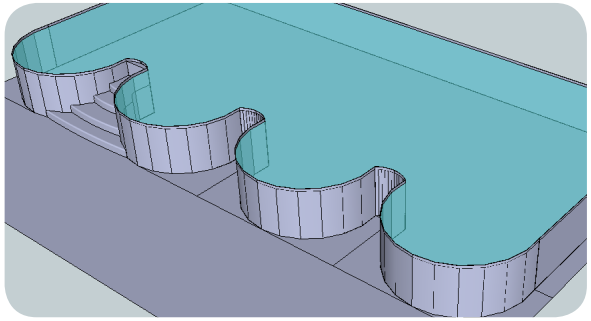


Figure 114. The bays are made larger and the headlands are narrowed and lengthened.

8.6 Bulging Wall Concept

Some free-standing pools do not rely on a frame to hold up the liner (Figure 111). Instead the pattern of the liner is tailored to be wider at the base when filled with water. The top of the liner is suspended by an inflatable PVC ring which stops the wall collapsing into the water. These pools are usually made of opaque PVC tarpaulin. This material is made as thin and as lightweight as possible to reduce the cost of manufacture and allow the pool to fold into as small a retail unit as possible.

If the front wall of the pool was constructed from much thicker, clear PVC, such as that used in industrial strip curtains (Figure 112), and supported along the 11.8m span by several vertical structures, it would potentially be strong enough to hold the water pressure from the pool while providing a high level of transparency and a soft, collision-friendly surface. Consumer pools are not made of clear PVC because of the prohibitive weight and bulk of the material required to compensate for the strength provided by fibre reinforcing in PVC tarpaulin. But in the Donaldson pool application, only the front wall would be made of the heavier material and the storage and weight concerns of a consumer pool are not relevant in the containerised transport context. The heavier front section would be joined and sealed onto the rest of the pool liner which would be made of standard .7mm thick, PVC tarpaulin.

If sufficient material was added between the upright supports, the pool would naturally bulge into a series of 'bays' while the supports would be analogous to 'headlands' between each bay (Figure114) This 'bulging wall' concept would allow for long 'alleyways' between the bays that would house flights of stairs. Additionally, the front part of the pool space would be partially divided into separate learning spaces, separate bays providing ideal learning spaces for beginner swimmers.

8.7 Evolution of the Big Bays Concept

The decision was made that the bays and headlands did not need to be symmetrical. This allowed for the bays to be larger and become useful teaching spaces that reflect the way the pool space is used.

Changing the design of the wall also changed the material and construction options. The large bays would act in a similar way to a round free-standing pool and thus require little vertical support: The headlands would provide the suspension support for the bay walls. The arc of each bay would be self forming due to the even pressure of the water on the liner. The bays would be soft and stretched and the headlands would be rigid and supportive.

The Big Bay Concept was a move away from the symmetrical toward an asymmetrical design that reflected the variation in distances and movement patterns that occur in a learn-to-swim lesson for young children.

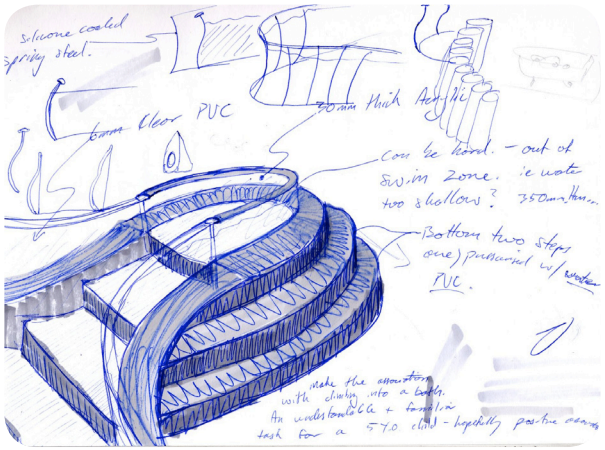
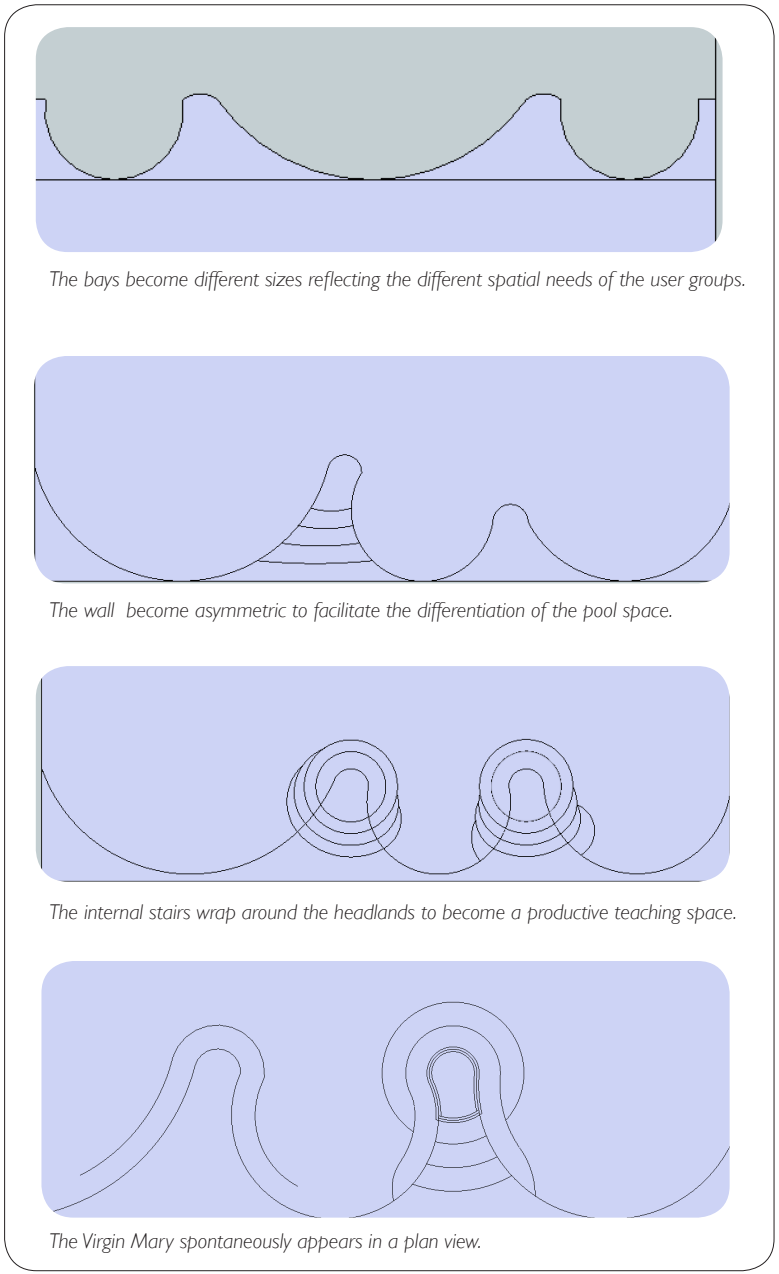


Figure 115. Sketch of the 'headland' stairs.



The bays become different sizes reflecting the different spatial needs of the user groups.

The wall become asymmetric to facilitate the differentiation of the pool space.

The internal stairs wrap around the headlands to become a productive teaching space.

The Virgin Mary spontaneously appears in a plan view.

Figure 116. Plan views of the iterative development of the Big Bays concept.

EXPLORE THE Rockpool

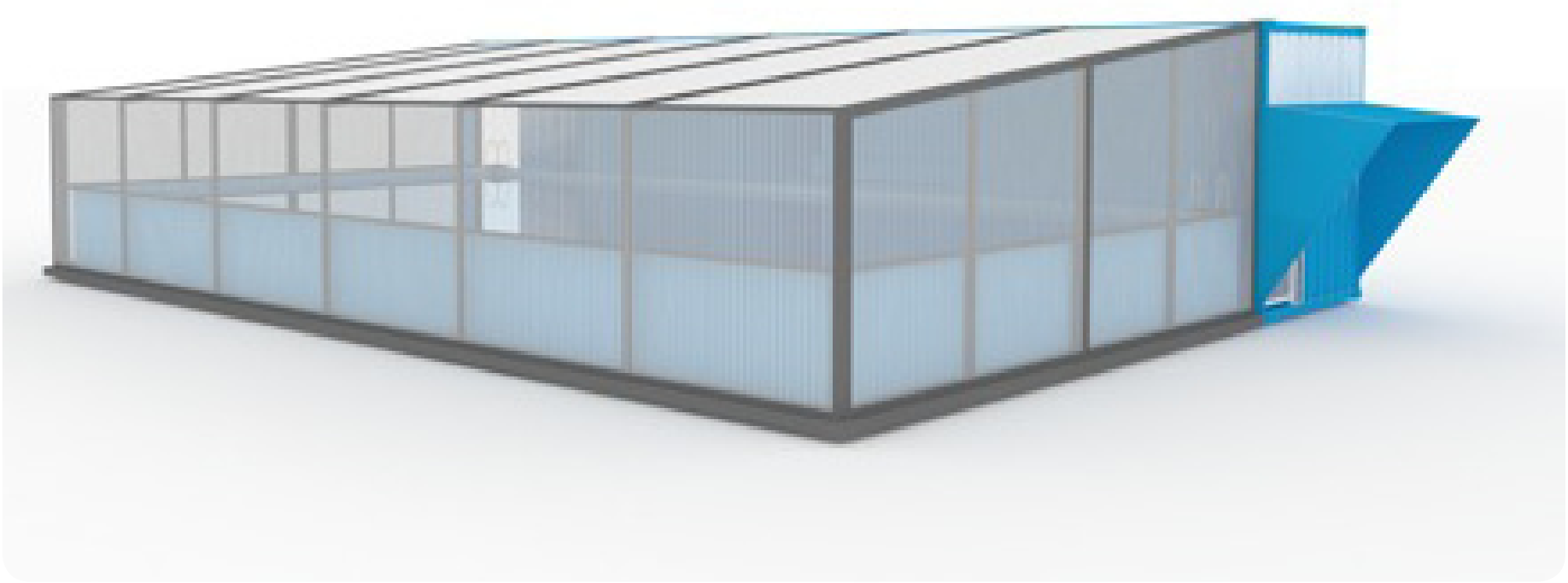


Figure 117. The Rockpool.

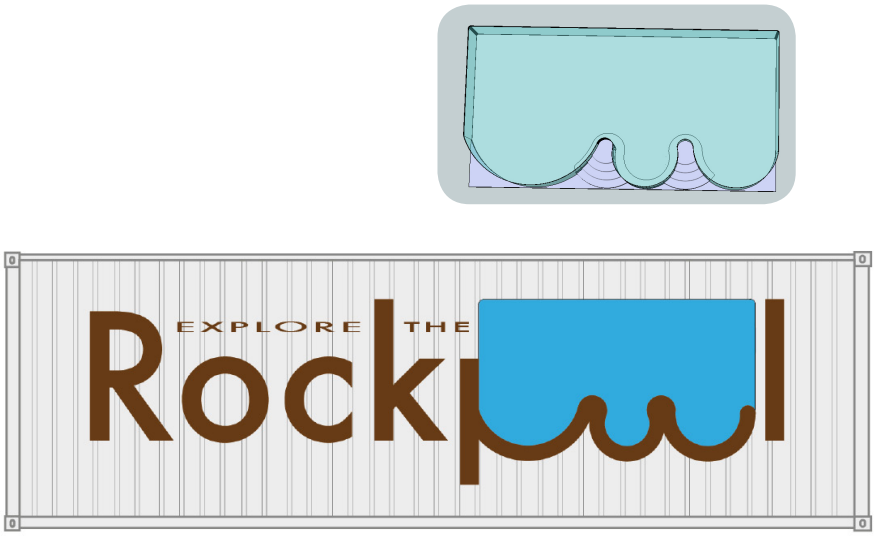


Figure 118. The shape of the pool is incorporated into the logo.

Figure 119. Children explore rock pools in Gisborne, NZ. Fur seals explore the rock pools of Kaikura, NZ.

9.0 The Rockpool

The name Rockpool draws on the association of the relative safety of rock pools compared to the open sea. Coastal rock pools provide a sheltered nursery environment for groups of New Zealand fur seal pups to practice their swimming skills before they venture into the open sea. This is analogous to learner swimmers developing skills in the bays of the pool before venturing into the open pool space.

The name also suggests links with the New Zealand coastline and childhood exploration; exploring rock pools for marine life and hidden treasure is an iconic Kiwi childhood activity.

And it rocks!

9.1 Layout of The Rockpool

The final iteration of the pool wall and entry system combines a high degree of usability and functionality. The clear PVC pool wall allows children to gauge the depth of the water before they get in the pool. As children enter the container space and view the pool for the first time they can see all the way through the pool interior and comprehend the dimensions of the space. They can stand next to the wall and see the height of the water line and can intuitively understand the relationship of their bodies to the depth of the water; even before they get in they will know where the water will come up to on them. The pool wall is soft and yielding; children can push against it and the wall will bounce; they can thump it and the water inside will jump. The children can control cause and effect over the pool and by understanding the nature of the space they will be empowered to transform their anxiety of the unknown into excitement and the thrill of discovery.

The two external stairways are braced against the front lower edge of the shipping container and form a buttress support for the two headlands (75mm curved acrylic panels), which in turn support the PVC pool liner. To enter the water a child climbs the stairs, holds the top of the acrylic wall and swings one leg over the wall into the water. The user can then sit on the wall if they wish to take time to acclimatise to the water as the platform is large enough for other users to move around a sitting child. Once in the pool and standing on the circular platform, children can make their way into the main part of the pool down one of the round, inflatable, water-filled stairs or alternatively they can follow the pool wall down one of two more gently inclined flights of stairs to the rear of one of the three bays.

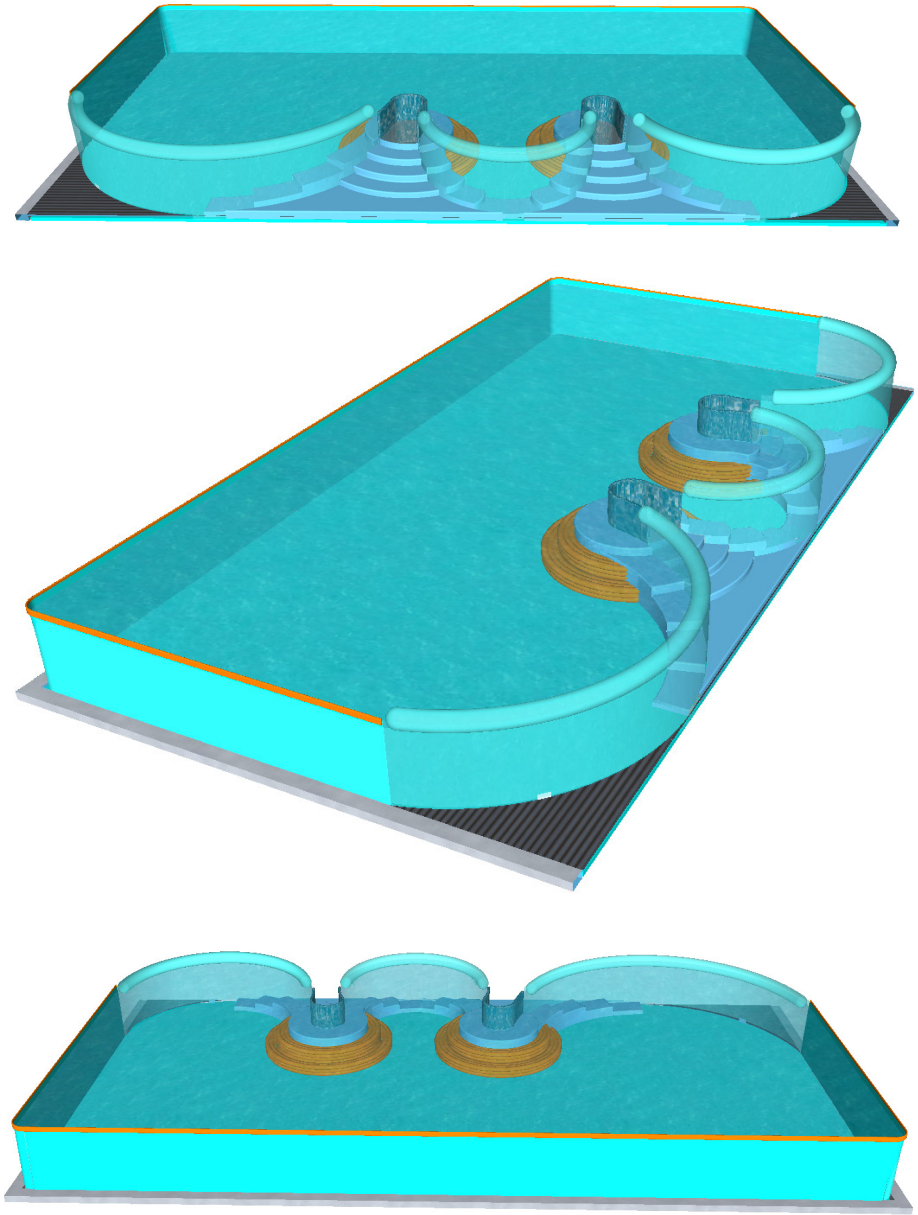


Figure 120. CAD model of the final concept.

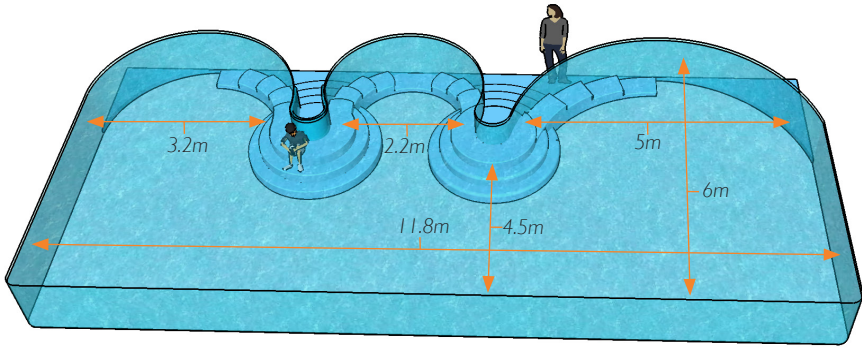


Figure 121. The pool space offers a range of movement 'journeys' each with a point of departure and a point of destination (traditionally, learners are directed to swim to an arbitrary point in the middle of the pool). The intention is that a fixed destination will provide motivation and surety for learner swimmers.

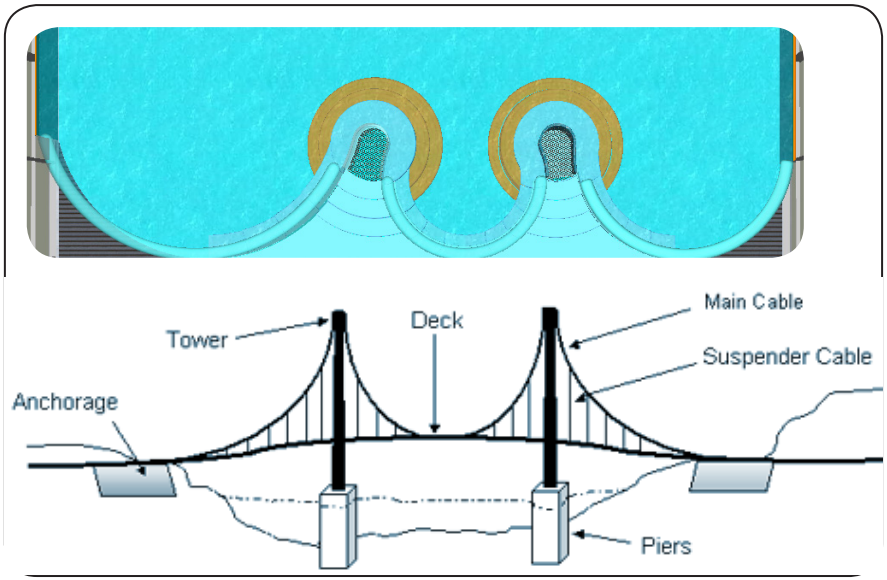


Figure 122. The big bay concept is based on the suspension bridge model. The stairs act like the towers and the pool wall is like the main cable. The inertia of the container acts as the piers and the enclosure wall as the lateral anchorage.

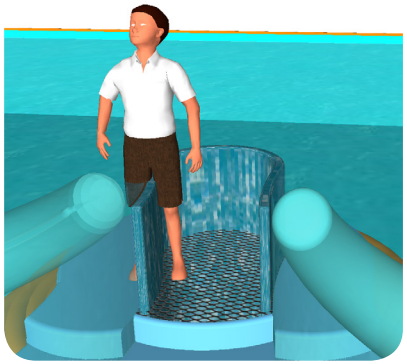
The three bays have different diameters which reflect the different distances children are instructed to swim during lessons. This distance increases as their skill levels develop, so swimmers can move to progressively larger bays. A class of children with a range of swimming ability can be divided into groups and each group can occupy a separate space in the pool that reflects that groups ability level.

The internal stairs and platforms are filled with water and attach into the headlands. Both the PVC and PETE plastics used to make the components have higher specific gravities than water; therefore they will sink in water and be easy to install once the pool is filled.

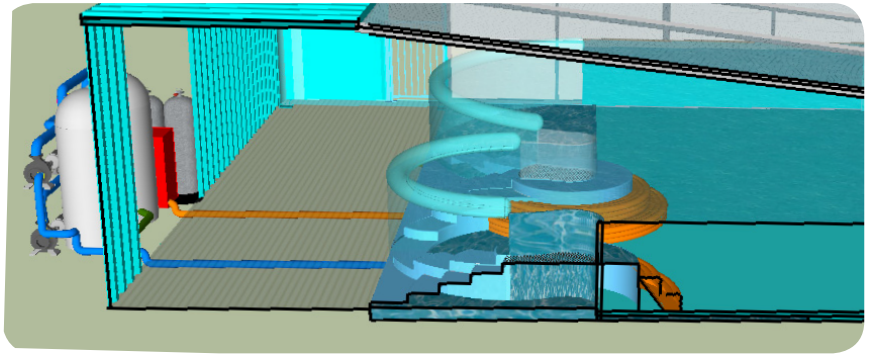
9.2 The Weir Wall and Balance Tanks

The top of the acrylic headland sits 6mm below the water line and allows a constant amount of water to cascade over the top of the wall. The water runs down the exterior face of the wall and through a grill in the floor of the external platform. The platform and stairs are hollow and function as balance tanks. As swimmers enter the pool, the water displaced by their bodies flows over the acrylic wall and into the two tanks. When swimmers exit the pool, the water level in the pool falls temporarily until the pump siphons the displaced water from the tanks back to the pool. The balance tanks allow the pool to maintain a consistent equilibrium of water to flow over the wall drawing floating and suspended debris from the pool into the filters. The water is pumped from the balance tanks, under the container floor to the plant room for treatment and returned to the pool via jets built into the internal stairs. This means there are no drainage outlets directly in the pool creating suction that swimmers can become trapped or injured by, and no scary pool skimmers constantly flapping.

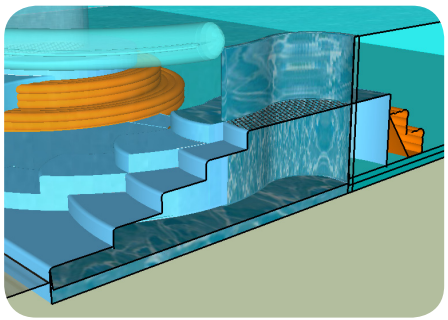
When a swimmer gets out of the pool, the water shedding off their body falls through the grill and is returned to the pool system thus reducing water use and keeping the stairs as dry and slip free as possible.



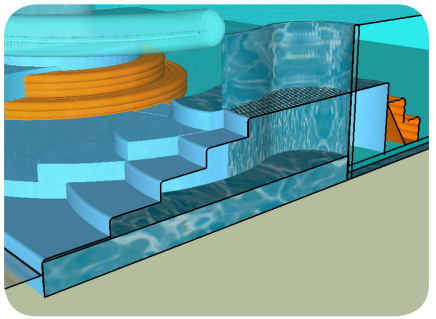
The straddle weir wall pool entrance.



Water is drawn from (blue) the two balance tanks under the container floor to the plant room and returned to (orange) the pool via inlet jets in the internal stairs.



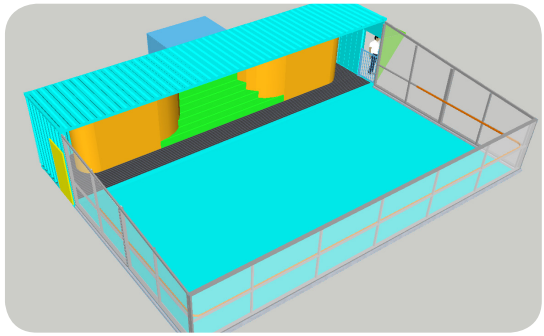
Section diagram of the balance tank at normal operating water level.



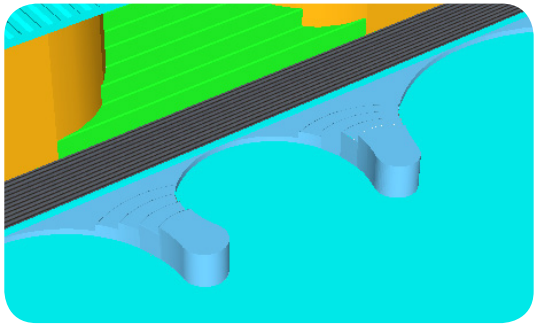
As people enter the pool the balance tank fills with water displaced by bodies.

Figure 123. The weir wall and balance tanks.

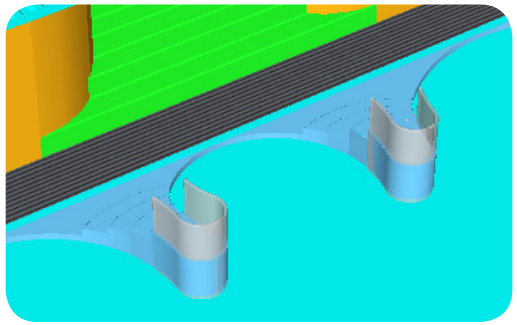
9.3 Set-Up Sequence of The Rockpool



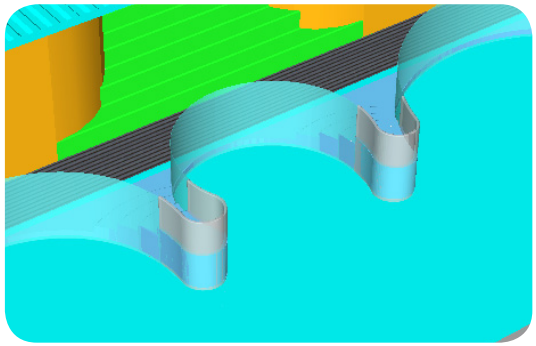
1. *The enclosure is set up on location.*



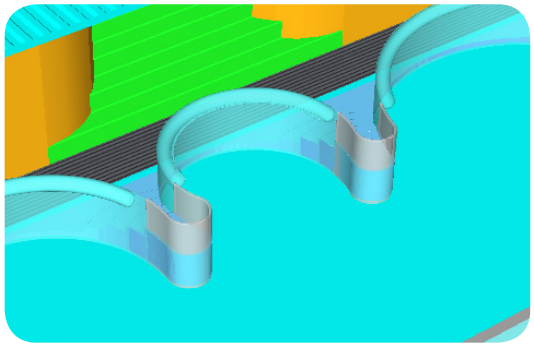
2. *The two sets of external pool stairs / balance tanks are slotted into position against the edge of the container floor.*



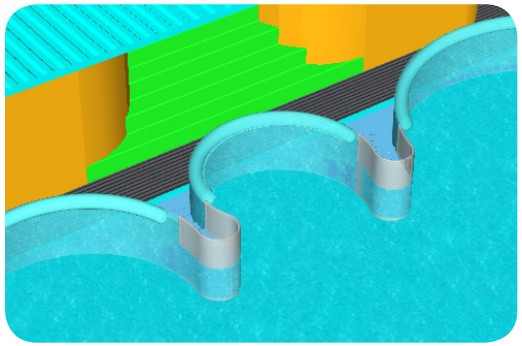
3. *The acrylic headlands are fitted to the ends of the stairs.*



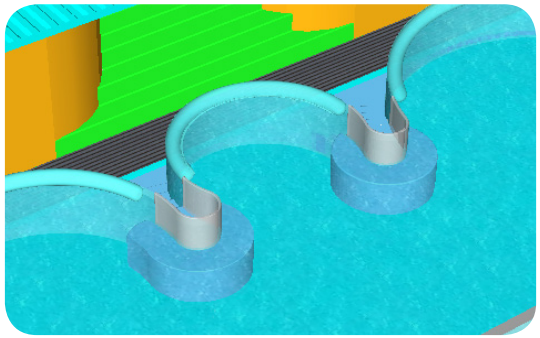
4. *The vinyl liner is attached to the enclosure walls and fastened to the headlands.*



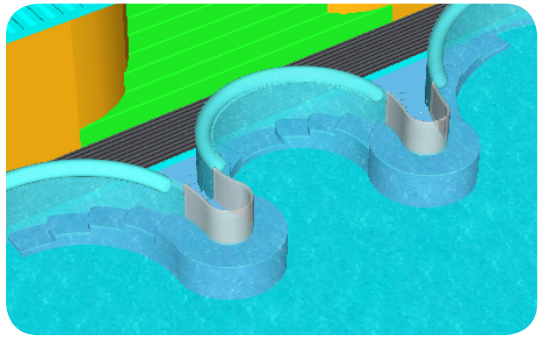
5. *The wall floats are inflated (the wall between the headlands and enclosure walls is not upright at this stage, it will rise as the pool is filled with water).*



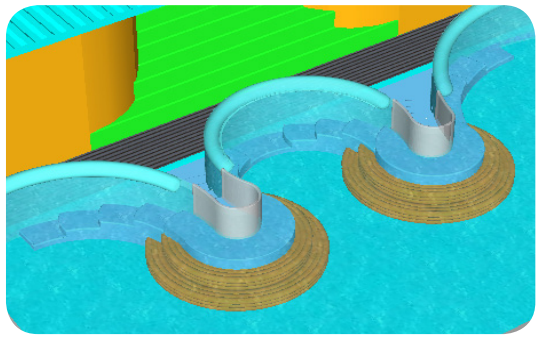
6. *The pool is filled with water from a street hydrant using a 100mm fabric fire hose.*



7. *The internal platform is secured on to the outside of the acrylic headland.*



8. *The four sets of internal steps are connected to the internal platforms.*



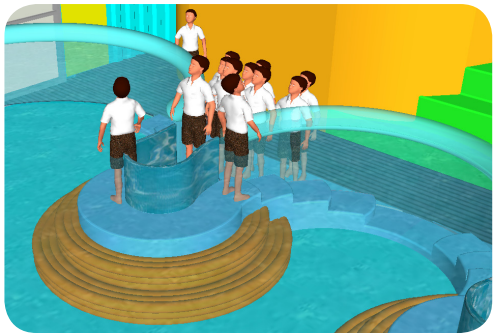
9. *The PVC fabric steps are connected to the platform and are inflated with water.*

Figure 124. Set-Up Sequence of The Rockpool

9.4 User Scenario of The Rockpool

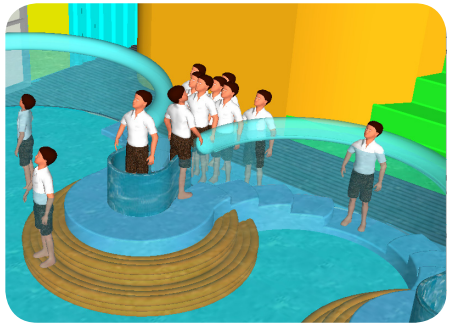
1). A group of children enter the pool space from the changing room and gather on one of the pool entrance stairs.

2). The children start to climb over the pool wall into the water.

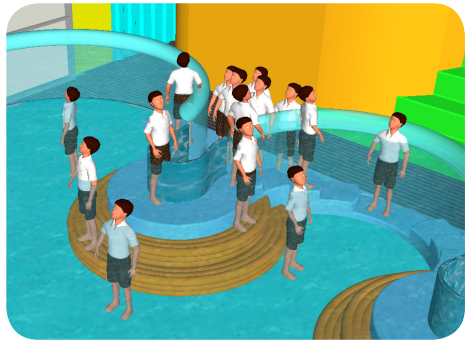


3). One child in the group reaches the wall but is suddenly unsure about climbing in.

4). There is enough room on the platform for children to move around the stationary child and continue to get into the pool.



5). The tentative child sits on the pool wall for a while with one leg in the water and watches his class-mates explore the pool. He has a commanding view of the space and the water feels warm and inviting.



6). When he is ready the child climbs over the wall, and holding the soft hand grip on the wall pontoon he makes his way down the curved stairs to the rear of the small central bay and continues around to the opposite entrance platform.

Figure 125. User scenario of The Rockpool

9.5 Design Features and Improved Usability

① Visual

Transparent pool wall.

Users' instant understanding of the pool space mitigates fear of the unknown.

② Translucent cladding.

The building utilises natural lighting and reveals its function to outside viewers while maintaining privacy for users.

② Tactile

Soft materials used on most touch points.

Reduction of collision injuries associated with traditional pools..

Atmospheric

③ Insulated and temperature controlled indoor swimming environment.

Year round comfort for swimmers. Reduced energy consumption due to heat retention.

④ Integrated changing rooms.

Users do not have to move from a warm to a cold environment until they are dry and dressed.

⑤ Sound absorbing walls and ceiling.

Reverberant noise is reduced. The space is pleasant to teach, learn and spectate in.

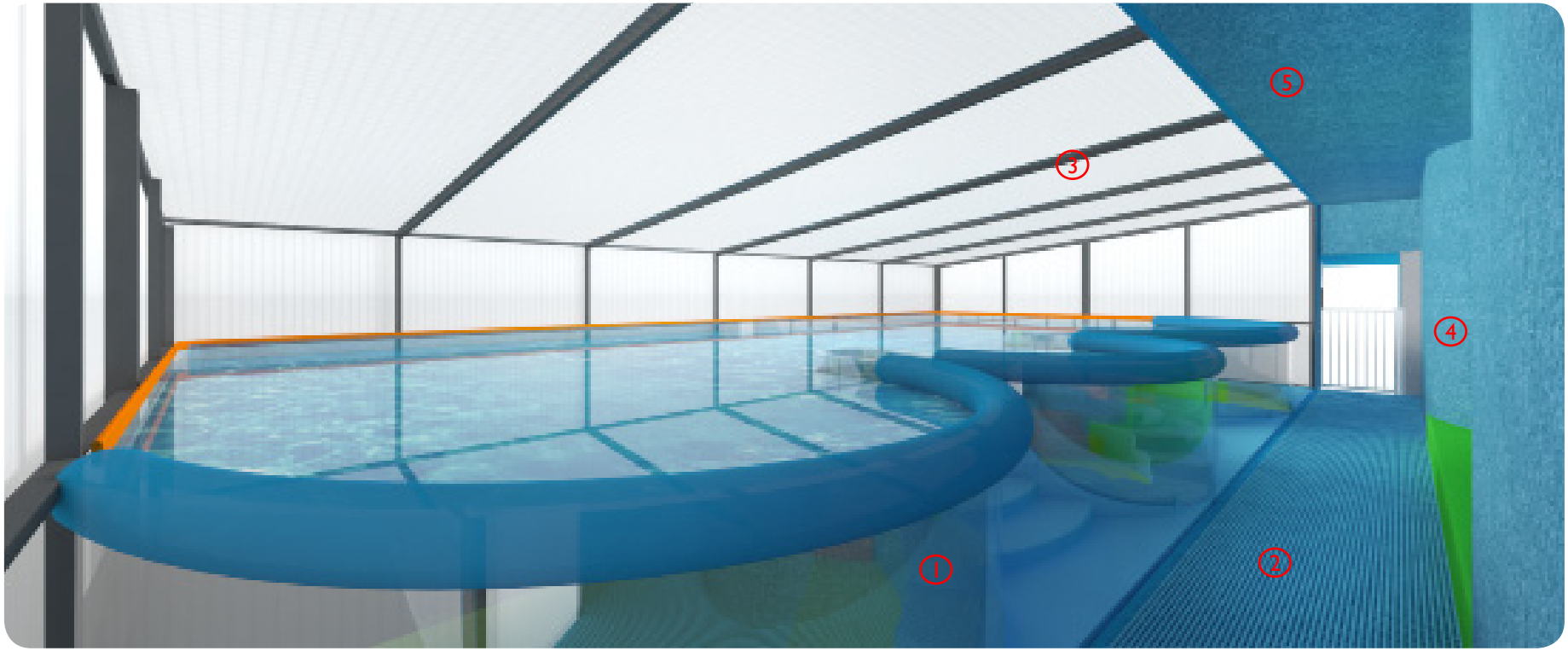


Figure 126. View of the pool from the changing room entrance.

Access

⑥ Two broad entry and exit points.
Single file queues are eliminated. A hesitant child is not compelled into the water by a line of students behind them.

⑦ Straddle weir wall.
The entrance point to the water is as low as possible. Climbing into the pool is as easy and familiar as climbing into a bathtub.

⑧ Multiple entry options into the deep water.
Students can choose how fast and from what direction they enter the water according to their ability and confidence.

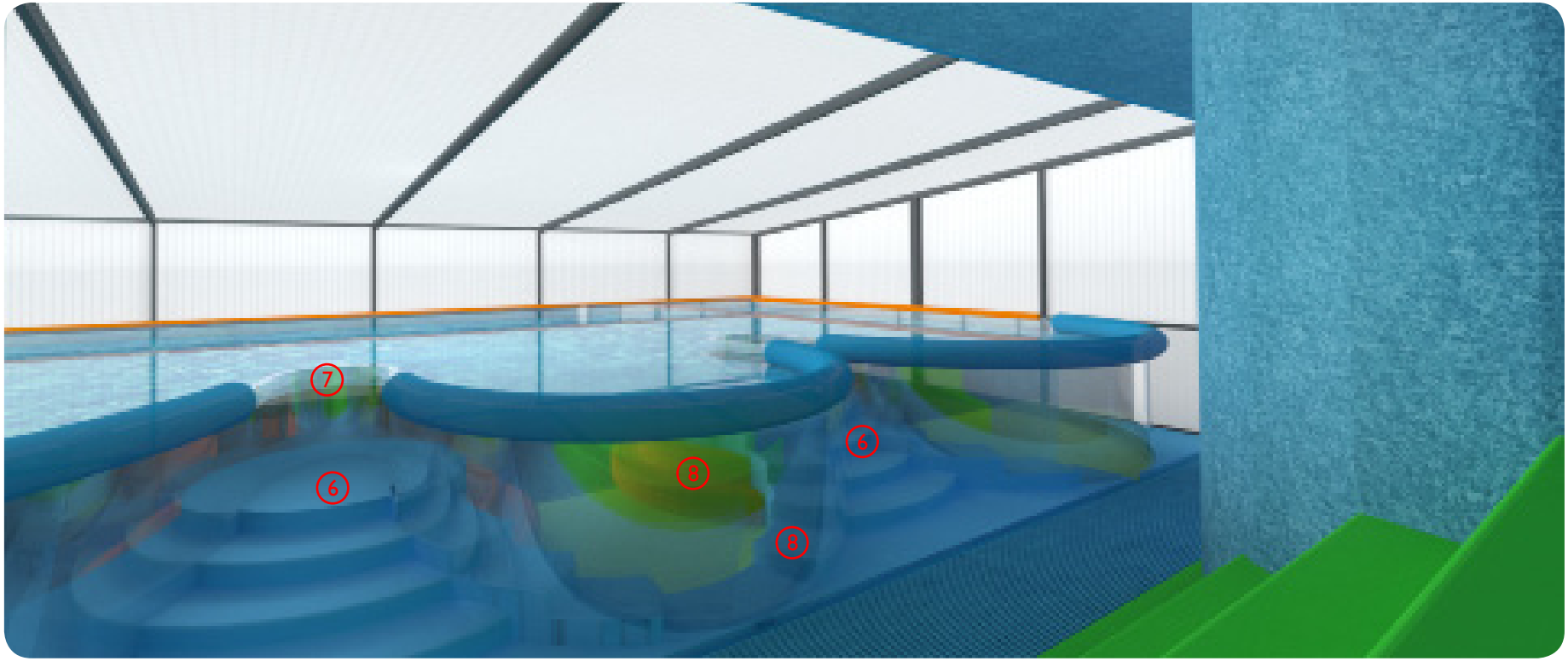


Figure 127. View of the pool from the spectator seating.

Pedagogy

(9) Hand grip at the waterline

Providing a fixture of safety and reassurance at an optimal height around the pool perimeter, the hand grip operates as an affective learning aide.

(10) Four distinct learning spaces

Differentiated spaces to suit varied (and changing) levels of swimming ability and water confidence.

Trained swimming instructors delivering in-pool lessons

Quality assurance of aquatic teaching is provided for all users.

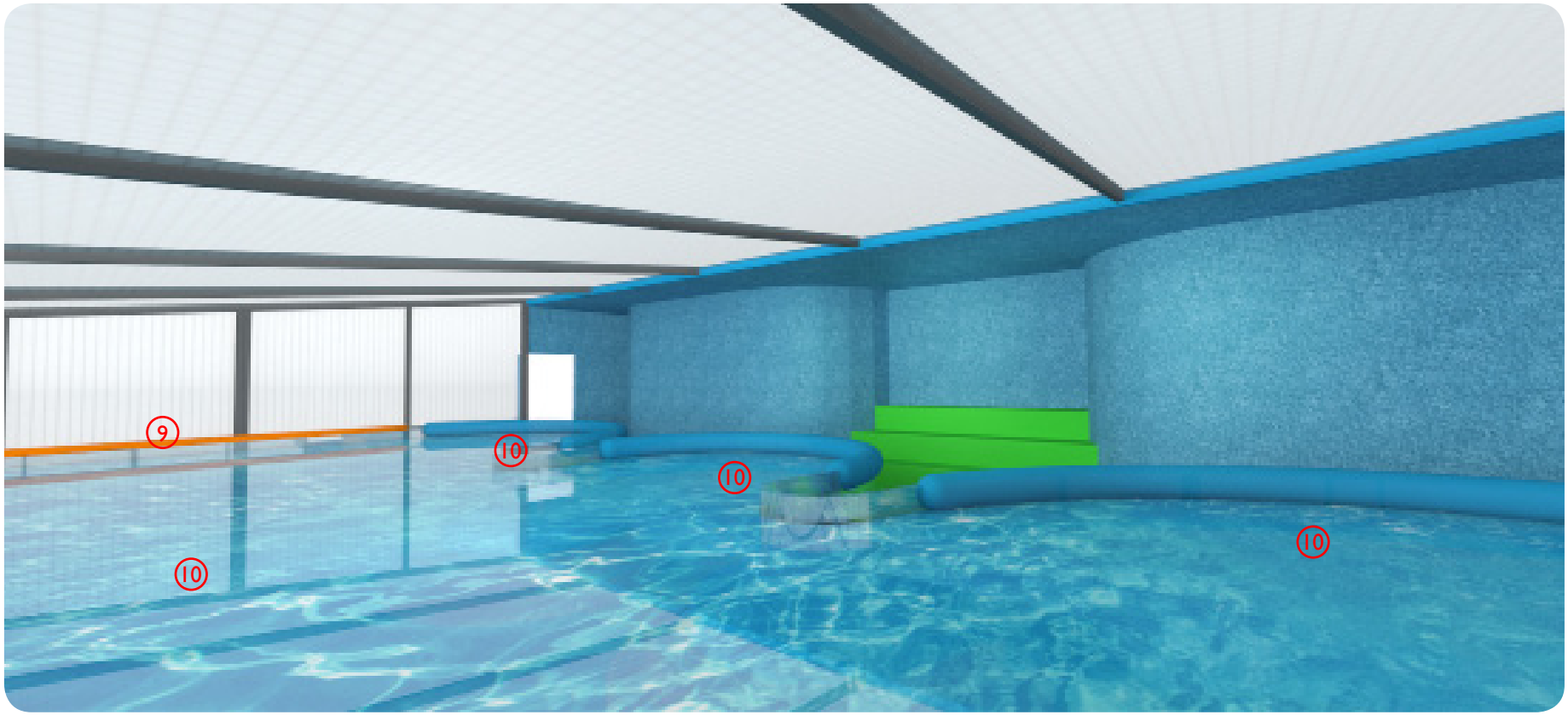


Figure 128. View of the pool from the water.

Revenue

(11) Large, flat exterior walls for sponsor branding.

Third party sponsors can subsidise the capital and running costs of the facility.

Security

(12) Fully enclosed, robust and self contained transportable unit

Lockable doors and an automatic pool gate restrict accidental or unwanted entry. The sheer external walls limit access onto the roof reducing the risk of injury or damage. Motion operated security cameras and flood lighting can be fitted to deter vandalism.

Operation

(14) Remote monitors on plant and security system.

Pool staff can monitor water quality and building security after hours.

(15) Third party transport

Any transport company can be hired to relocate the facility. A dedicated transport vehicle is not required.

Complete service.

The facility can be relocated and made operational in two days by two operators. No assistance by the school or extra hired labour is required.

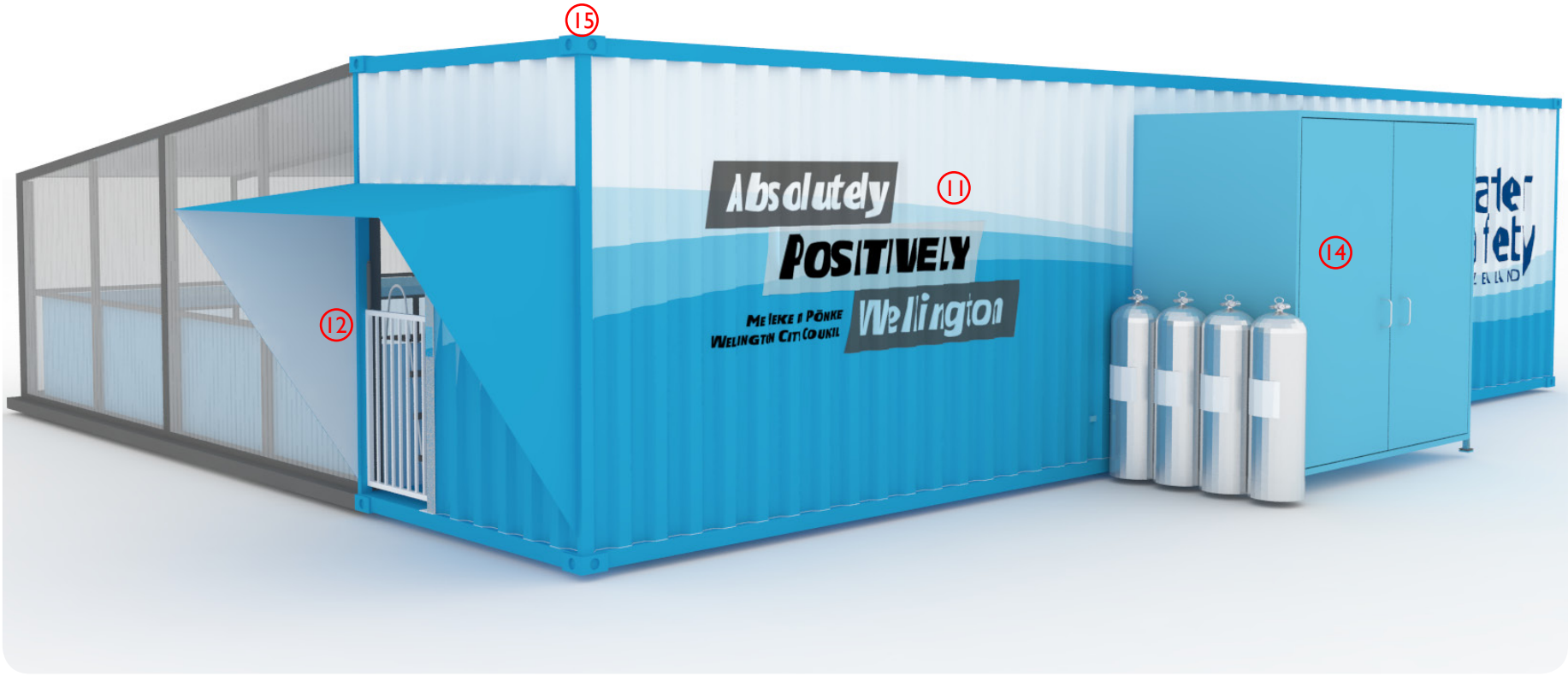


Figure 129. Exterior of the Rockpool enclosure.

9.6 Criteria Evaluation

The new pool design fulfils the established criteria in terms of performance and user-experience.

Performance Criteria

- A self-contained indoor swimming facility able to accommodate a class of 32 junior primary school children (five to seven-year-olds).
- Integrated changing rooms.
- Turn key setup— A level of automation in the deployment of the facility that does not require school staff or community members to assist with the set up or pack down procedures.
- Conforms to current New Zealand swimming pool regulations.
- Easily transportable.
- Lockable and secure.
- Insulated and warm for year-round use.
- Provides a non-reverberant space.
- Soft, non-slip and collision friendly surfaces throughout the space.
- Able to be manufactured using existing technology at a lesser cost than an equivalent sized traditional school pool.

Experience Criteria

- A space that is exciting to be in.
- A pool that reveals its contents.
- A warm, quiet space—both the changing rooms and the pool.
- Provision for users to move freely and independently into the pool without being compelled in by a following queue.
- Multiple entry points and entry options to accommodate a diverse range of pool confidence.

Conclusions

The results of this project show that a mobile learn-to-swim pool need not be an inferior substitute to a traditional swimming pool. By applying user-centered design thinking to a learer pool the result can be a space that is not only conducive to learning but one that fosters self motivation and joy for all students.

The Rockpool can re-establish New Zealand as both a nation of water confident people and a world leader in innovative aquatic education design solutions.

Future Research

This design project has hopefully illustrated the need for and viability of its final design. The next phase of this research is to source funding to allow further design development with the goal of producing a working prototype. This requires ongoing design research and collaboration with a multitude of industry specialists and stakeholders.

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Appendix

Appendix 1 Site Visits and Informal Interviews

1. Todd Morton, Manger of Easy Swim swim school, Khandallah.

2. Benoit Lavigne, Manager of Aquazone swim school, Newtown Wellington.

3. Lynn Coetzee, Manager of Aquazone Miramar Wellington.

4. Bryce Coleman, Principal of Te Aro School Wellington.

4. Steve Francis, head coach of the Karori Pirates Swim Squad at Karori Public Pool Wellington.

5. Peter Whipp, Associate Professor Life and Physical Sciences at The University of Western Australia, Perth.

6. Nigel Guest, Operations Manager at Royal Wolf Christchurch.

7. Peter Justice, heating and ventilation specialist Palmerston North.

8. Matt Claridge, Chief Executive Water Safety New Zealand.

9. Catherine Delahunty, Member of New Zealand Parliament.

10. Lance Jacobs, Managing Director of Jacobs Construction. Waipukurau, Central Hawkes Bay

11. Jamie Delich, Wellington City Council Manager of Recreational Services.

12. Dave Cameron, Contracts Manager at Filtration Pump Commercial Ltd Palmerston North.

13. Scott Wilson, owner and Manager of Wellington swim school TSW.

14. Ross Stevens, industrial design Lecturer at Victoria University, and shipping container enthusiast.

15 Liz Rhodes, Principal of Brooklyn Primary School Wellington.

16. Chris Bryant, former Principal of Brooklyn Primary School, Wellington.

17. Paul Creighton, General Manager at Royal Wolf Trading, Auckland.

Appendix 2 User-experiences of Learning to Swim.

Not sure how much I actually remember about my first experiences but I remember that I never had any professional lessons and I still to this day can't do freestyle properly as I #1 go crooked #2 Never really got the breathing on both sides properly.

I never really understood what teachers at school were 'teaching' me at swimming time. I always loved swimming though and could do backstroke and breast stoke pretty well. Having a pool at home was probably how I learned to swim the most. It wasn't too deep (not much over a meter at the shallow end and a bit deeper at the other end.) We had a ladder at the deep end only which was fine. In public pools I didn't like swimming at the deep end unless I was close to the edge in case I got tired.

Pools around these days (like ones I can take Charlie too) are so much better because they have specific pools for specific abilities. Toddler pools with gradual ramps are great and not too daunting for small children as they aren't in amongst all the big kids/ adult learn-to-swim. Charlie LOVES the water and although she can't swim (only 2yr) she is confident in the spa without being held at all and doesn't panic if she slips under briefly.

Hope this helps a little bit Gus....
MM - NZ

We had school lessons in an outdoor pool that was probably about 90 cm deep and pretty cold, we ran round it 3 times to dry of and got changed in the shed. I can remember pretending that I could not swim so that you could have extra sessions after school. As a child I found breaststroke and back stroke easier than front crawl. Its a lot easier to learn front crawl is you have decent goggles.
I teach both mainstream and special needs swimming now and it helps that the water is a bit warmer and try and keep the children moving. Do a lot of water confidence at an early age, like jumping, bubbles in the water, submersion and keep the play element even when they are older. If they are happy and relaxed the swimming part is a lot easier. I am not a fan of arm bands when teaching as it puts the child in a tricky body position, I use a combination of floats, jackets and noodles and time without aids in each session then its not too hard to wean them off.
Good luck Gus

KB - UK

We walked from school along oriental bay to the Freyburg pools. I used to enjoy running my hand along the seawall - the vibration from texture of the cement making my fingers numb. We held onto the side of the pool, kicked and blew bubbles, we floated on our backs- starfish. One summer before I had learned to swim we were camped at a river. The big attraction was a pair of inflatable armbands which made you float. This was exciting - a quick fix. I was walking across a waterhole to collect them from another kid and fell in over my head. I remember sinking peacefully and sometimes breaking the surface and seeing adults running to get me. I don't remember exactly when I learnt to swim though, it must have been cumulative. Being in the water is a peculiar interaction between joy and fear, S plays cat and mouse with waves on the beach at present, the Saturday morning swim-fest at Kilbirnie pool is also an exciting place for him, its like a mass re-birthing session with all the parents and kids jostling around in a peculiar amniotic tangle of foam rubber noodles and kick boards. Occasionally everyone vacates the pool as the attendants scoop out a whoopsie. Everyone is terribly understanding.

Hope thats useful.
CW – NZ

My first learning to swim experiences were group lessons outside school time. These were a big deal because it required travel - a trip to the metropolis of Balclutha...the next big town up. I often got car sick. I can't remember having to go to Balcultha for anything else but my swimming lessons. The pool seemed very large which was initially intimating for this small town girl. But I loved the water and, being a child, I lived in the moment - the car trip and size of the pool soon forgotten. I remember having a few scary moments...that desperation for finding your next breath. I also remember floating on the kick board and being taught to blow out bubbles underwater loudly - to this day when I swim I sing the air out.

Shortly after these lessons we did swimming at school. We were asked to perform and then put into groups. I hated that. It felt competitive rather than being about having fun and pretending to be a fish. But I was proud the day I could swim the length without panicking and was then moved into the big pool. After that it kind felt like that task was over - learn-to-swim, tick. Subsequent water experiences hardly ever required kick boards or swimming styles, and were more about handstands, bombs, touching the bottom and the like.

SR - NZ

Hi Gus,
I can tell you about what happened when L first had a lesson at Kilbirnie pool. When I came to write this I found it hard as it was such a distressing thing to go through.
L was sitting on the side of the pool, her instructor was in the water talking to her, she was the first of her class to arrive. M was in the lane next to her about to start her lesson. I sat the opposite side of the pool watching both girls. I looked at M for a short while and when I looked back at L she was face down in the water on her own hardly moving and her instructor was my end with his back to L talking to another parent. Time seemed to turn to thick treacle and I couldn't speak or stand fast enough, I did though and shouted 'what the f*** is going on' M heard and I pointed to L as I ran round to her. M grabbed her teachers arm and they ducked under the dividers to help L out. By the time I got to her and pulled her out she was white and her eyes were dilated and staring. She started coughing and threw up water. 'Why did you leave her ?" I sobbed. The teacher replied "I left her sitting on the side of the pool. 'Why did you leave her?" I repeated "it's her first lesson and the pool is too deep for her to reach the bottom. It's not a good start is it?" ….."Sorry" he said lamely.

I tried to stay as calm as I could for L as I knew that if I freaked she would get a complex about water. She said " I tried to get to the side mummy, but I ran out of breath and it was too far away" After a while she calmed down and I wondered if she should ' get back on the horse' and asked her if she wanted to try again, she seemed ok enough to get back into the water. L is so exuberant about life she always puts in so much effort, she was so brave and got in for another go. I stood right by the edge and made another instructor get into the water with her and hold her.
I have never felt so numbingly scarred in my life during that ordeal , it's one of a parents worst fears , it's so elemental. When she talked about it afterwards I focussed on the fact that she did get out ok and carried on afterwards and what a good swimmer she will be. It should be a wonderful experience being at one with the water, and I can say now that L is very confidant in the water and is learning to swim well — I switched to swim zone in Te Aro and we swim together for fun. They had an inquiry at Kilbirnie pool and some retraining and I had a personal apology from the manager of the pool and the manager of the life guards, that were conspicuous by their absence during the whole episode. There are several things that should have been different, (apart from the obvious negligence) but a few ideas; first lessons should be in a warm pool that the child can stand up in and be a head or more clear of the water, it should be a gradual slope in not a drop into the deep. It's a shame pools are so noisy too as it can be quite over whelming, some sound muffling would be really good. Good luck with the research.
MF- NZ

Well swim experience … I guess I'll take the role of the bad experience.
I did not learn-to-swim until the 5th or 6th grade. I could mange in water but didn't really swim.
Don't recall if it was the 5th or 6th grade were we started taking swimming lesson as part of the sports program in school. We were divided into groups per level of skills so they were two groups and I was in the lower level.
All I remember was that all my friends and most of the boys were in the "know how to swim" group and I was with all the girls and some boys who were the "geeks". I don't recall much but I do remember a big feeling of embarrassment.
(Now you put me in a pool with all the girls I am the happiest man … so it's all about perspective.. LOL)

As for my sons the 6 years old one is taking some swimming lessons now and crazy about it. Same time last year he started the same course but did not want to continue after two lessons , was still a bit unconfident.
My 4 years was really not into the pool up until last weekend where he just flipped direction and it's a week now is does not want to get out of the water J
On a general note I strongly recommend to start at a very early age .. even 3 months. I wish we have done it.
Do you want me to elaborate or is that enough ?

YA - Israel

Hi Lara and Gus
I hated swimming!! Was scared of the water and managed to avoid swimming sports for my entire school life!! Funny because I love it now. I blame the cold water. Warm water is so much more user friendly especially for a skinny wee thing like I was!! I could manage a few minutes in normal cold water then want out. You just cant learn like that. In my home town there were no heated pools just a swimming hole in a creek and the school pool. Also goggles. I hated not being able to see under water. I don't think there are many children now who swim with out goggles. The day I got goggles I could swim so much better.

FC – NZ

M started lessons when she was 4. Big disaster. Could not stand up properly in our community pool. Clung to the side. One instructor with about 4 or 5 kids. Instructor tried but M would not leave side of the pool. Very unsure of herself. Water not very warm (about 26 I reckon) .
School lessons - OK, not much time to do anything. Lots of waiting at the end and arsing around with friends. Lots of standing on the side, or sitting waiting for your group's turn. A big chunk out of the day for very little learning.

SB – NZ

One of my first memories of swimming was literally being thrown into the rough sea at Worthing, by my Aunty Liz and her standing on the beach shouting "SWIM!!". Liz was a PE teacher and not wanting to disappoint her I tried very hard, but didn't really know what to do. I think I was about 7 and she did allow me armbands...

At school I was in the bottom group for swimming and it took me ages to get the hang of a basic doggy paddle. No-one ever taught us strokes per se and to this day I don't know how to breathe properly whilst doing front crawl. However I love water and swimming and I have water confidence. I don't remember ever worrying about getting in to the water or having it splash my face. We always went in the sea on holidays and I suppose I was used to it. I remember going for my stage 2 award at school. This involved swimming various distances and then, bizarrely 2 lengths of the pool wearing our pajamas, followed immediately by having to tread water in them for what felt like forever. I was so proud to get that badge, I'd worked really hard for it and it was awarded in assembly.

I have not enrolled my girls in any pre school swimming lessons. We go as a family and I want them to think of it as a fun activity at the moment. The lessons can come later. P is very water confident and will swim the width of the pool with armbands, doing doggy paddle. You can see the sense of achievement on her little face, it's great.

Hope this helps...

Good luck with the project

RW – UK

Hi
Learn-to-swim experience for B as a new entrant was initially not a pleasant experience. It was first term and possibly first time at swimming pool without parents. She is normally an outgoing child who thrives on new experiences however this was not happening. The second week I turned up to what appeared to be mayhem, was in the changing rooms and overheard a teacher telling another child if she didn't stop crying her mum would not be allowed to come again. I said my good byes to B, to be followed out the building by another mother who knew B and said it was rather out of character as she was crying. When I returned the teacher just pulled her in to line and again said if you don't stop crying your mum wont come again. It was not a pleasant experience for child or mother. B then refused to go back on questioning she said it was too noisy, she struggled to hear when her class was called and was frightened she would get in to bother or get lost. For that first term of swimming we literally used bribes and countdown. With regards the swimming, when they were assessed for their levels it meant nothing as B was swimming at a higher level with her private swimming lesson than she was at her school lesson. Also watching the sessions the kids appeared to be swimming over the top of each other. I was quite relieved when the first term was over and did feel quite anxious on the swimming mornings incase she got really upset and was put off swimming for ever. We never had any issues with her private lessons and she enjoyed these. I think new entrants are too young for swimming with the school, the numbers are too large and quality of the session is not worth all the dramas. I think it is more around increasing independence and adjusting to the environment than learning to swim. I don't think it is worth the money and if you were only having school swimming lessons I don't think it would be enough. Certainly this year being a year older it is quite a difference experience for child and mum,however we continue to view it as more a play at the pool than a swimming lesson.
Hope this is helpful.

AG – NZ

With swimming with little ones I know that having gradual slope or gentle incline of steps was particularly helpful - rather than trying to carry an anxious toddler/baby down a steep ladder.

Went to Greeton Hot Pools recently for the first time and noted in their warmer pool they had a great gentle slope (probably for disabled access) as well as steps plus a ladder so there were plenty of options making it really user friendly.

Pool temperature is also a big thing. The kids don't seem to mind it cooler but for us old folks more heat helps those aching joints without it being so hot you feel like passing out! Really good for the littlies too to feel comfortable - just like taking a bath.

Hope that's of some help?

CD – NZ

My first swimming experience was in our villages outdoor pool (non heated!) but we have hot summers...
I remember so clearly jumping into the deep end (maybe I thought I could stand in there) and realised the ground was too far away for my feet to stand on. I then had to "survive"and just copied our dog. I had seen him many times swim. So I actually stayed above water quite comfortably. Then my mum screamed and got me out. I was maybe 5 or 6.
In Primary School we had swimming. I cannot recall them being nice lessons. Rather competitive achievement circus. Teachers were from the pool. They had their timing watches and timed us for everything. Then a quick check on the rules and times schedule...Ah 1 second away from being number 1 and out were you...
So I remember them being very anal about what you had to do (tasks like diving for things, swimming lanes, style, jumping from the towers) all very intimidating and around the time we were just becoming teenagers aware of the other sex and exposed to the bones in our growing Figures...Boys were just mean and the girls were mean bitches as well...I wasn't good but survived. Points were gathered or certain achievements had to be ticked and then you received batches like in the girl guides. These were sewn onto our togs. So visible how good or bad you are. So competitive was not my cup of tea and quite stressful.

Anyway that's me.
L had a Kilbirnie holiday swimming course. In my eyes useless and she was not challenged enough. Every day for a week... Too expensive for the quality. I do like the warm pool though and that the teacher is with them in the water.

The school swimming looks like they just want to tick this curriculum box. We always end up with the winter term which is not great. Bugs and cold all the time. Once a year for 10 weeks is not much. Again only half an hour lesson in a max 10 person group. Waiting for the littlies in the splash pool. (All in Kilbirnie) We have the lessons in the colder pool and the big pool not the lovely warm exclusive pool. WHY?

I observed my youngest a couple of times and liked that teachers were in the water with the kids. Different styles: One teacher made everyone follow her in the lane and copy her. So they all started the same time. Very good for saving time and getting more training or practice done but considering the space rather silly! They all bump into each other. Then other teachers (younger teachers looking under 25 def!) look really bored! One got really annoyed with the splashing into her face. She rolled her eyes a lot. What do you expect being a swimming teacher for preschoolers?? So I suggest teachers with experience in teaching children!!
Again I feel Kilbirnie pool is loving the exclusiveness of their location and newer pools. They raised their price which sucks. (Or our school did or the busses) Any way for that little bit of practice driving all the way and loosing a whole morning school time plus the potential infection of a tummy bug which is keeps mum or dad at home with a sick child is not effective in my eyes. And that price! All parents want their kids to know how to swim but cannot afford extra scholar swimming lessons that are more responsive and of higher quality.
For that reason we started swimming with Hataitai swim club in Freyberg Pool. Highly affordable lessons but very cold water and bad acoustics. So hard for kids to hear their teacher and they also stand outside the pool. However it looks like the kids have learned a lot and would not drown straight away! Disadvantage is parking and the time: Friday night. Plus ferocious ticket wardens hiding behind bushes to award you with a $40 !! ticket for parking without ticket. So dangerous streets to get in conflict with the council I have to say.

That's all from me..Questions welcome..

AB – Germany and NZ

Hiya Lara, whats Gus up to then..designing kid-friendly steps?
Me & my two sisters used to go to swimming lessons on a Saturday morning - we were kind of around 6 -8 age i think.

we learned to swim in the kiddy pool at the valley leisure centre in Newtownabbey. there was a massive mushroom at the shallow stepped entrance to the kiddy pool that was a water fountain that they used to switch on after the lesson.
we had an awesome swimming teacher, the same one for all of our courses of swimming lessons. she was quite fat & old :) never got near the water herself, fully clothed by the pool side.
Mum was always in the spectators gallery, we all wanted to show off to her how good we were, she never learned to swim & still hasn't.

As well as going to swimming lessons dad took us all swimming every Friday evening after school before we went out for tea. it wasn't really about improving our swimming, we mostly played sharks & bombed into the deep end.

We didn't have swimming lessons at school until first year at high school, most of my friends were swimmers by then. it was a bit of a shame for the non-swimmers being in the learners group. we did more diving & improving our strokes at high school although it was only in first year & probably only about a dozen times.

I asked G & he said he used to do the staple bomb into the AC pools in Taupo.. reckons that was where he learned to swim.

Its all a bit hazy I'm afraid Lara..being so long ago!! hope this is some help to Gus & feel free to ask more specific questions if it'd help xx

JW – Ireland and NZ

Hi. O and H's swimming experiences have been quite different. O started one to one lessons when he was 5. He had a great woman teacher called Jan. he enjoyed it at first but eventually felt tired and frustrated and wanted to give up. When I told Jan this, she put him in for his first test and he got a badge. This completely turned him around and he started really striving for badges. When he was 7 he achieved his Gold Personal Survival Award. He got a great sense of pride from it and was looking very athletic and fit. However, that's as far as Jan could take him and the next step was to join a competitive swimming club. O was dead against this as he doesn't like to swim against anyone else (for fear of losing!) we emphasised that he didn't have to win but that is when he stopped lessons. He's using his swimming skills for sailing now.
Henry loves to mess around in pools and can stay afloat. He also started with Jan but it became such a trauma getting him to go that we decided it was no longer worth it. We tried a group lesson elsewhere but he hated it so now I take him swimming whenever I can. I think his objection to formal lessons is due to his frustration at being in a pool but unable to play and mess around. He loves swimming but wants to be his own boss. Both boys currently swim with the school and seem to enjoy it. They go to our nearest senior school who have a pool. This is the school where O will go from September so it's great to have that connection. I think it's quite a different experience swimming with their school friends for two reasons - firstly, it's quite sociable as an activity and secondly, they are split into 3 different groups according to ability, which creates an element of hierarchy within the class.

SN – UK

Hi,

Ok....I got lessons both at school and privately (with in a class) at Massey. Drury school pools all I can remember is all the kids having to jump in at once and Figurehting to find space on the side to hold on. Also that you would only have to do about three kicks to reach the other side. Lessons would only be in the summer months. I think it was just our teacher teaching us which I now realize after trying to teach M how to swim you need to know how to teach swimming in a formal class setting so not sure how the kids who did not know how to swim coped.

I guess one of my clearest memories to do with swimming lessons is putting my togs on backwards and jumping I the pool and everyone laughing.

EC– NZ

You know this is a big ask! I'm getting on in years I think I learnt to swim when I was about 6/7 (33yrs ago)! That would have been about 1978.

I was put in the water long before that learning doggy paddle in a rubber ring with my mum and dad! Then I was sent to formal classes because we sailed a lot as a family in the summer.

Mine was probably a fairly rare experience as I went to classes at military baths in Aldershot. It was a daunting red bricked building with loads of wide steps at the front and an imposing entrance that just smothered you in fear as I entered. I never felt relaxed, the anxiety started in the car or just packing my bag. The baths themselves were very sparten with a high ceiling and an echo that meant you couldn't hear a word the instructors said. This wasn't helped by the fact I had bad eyesight

from the age of 5 and there were no such things as prescription goggles. No seating for mum to give me reassurance and no heating. I don't think the pool water temperature was too bad as that's not a traumatic memory but the showers were cold and on the pool side.

The training was not a softly, softly approach. We did stand on the side doing frog leg impressions then had to jump in with rubber rings (later with arm bands) and basically just swim until ready to move up to the deep end and do 3/4 lengths. Our teacher had a long pole and marched up and down the side shouting the inaudible instructions. I think the pole was to chivvy you up or hold onto when swallowing water and near death. Lifeguards? I doubt it. One instructor to about 15 kids maybe. All in all not a pleasant experience!

At that point there were no water confidence skills or games, maybe the odd float to hold. The goal was to just swim a distance and a small amount of holding your breath under water. I think I managed a 10/15 metre badge.

After that at about 9/10 I did a junior swimmers badge that was all about water confidence. Floating mushrooms, forward rolls, jumping in, dive bombing and picking things up from the bottom. This was at an outdoor school pool still very basic, no changing rooms and expected to swim in all weathers, but a lot more fun and when i started to enjoy the water. We had to swim 25 metres to pass the course and do the skills as I said before. I don't ever remember being taught crawl just breast stroke. Luckily my friend's mum liked the water (my mum and dad weren't that keen) and took us swimming in a local pool a lot after that where she taught me to tread water and occasionally they had a large inflatable octopus out on Saturday mornings. That's when I learned about being splashed, kicked, ducked under water, swimming through legs and pulling the boys trunks down! I think I had a few more lessons in my teens to try to dive but unsuccessfully, at a modern swimming pool where it was warm, had benches, viewing balconies and large windows looking outdoors. The changing rooms had cubicles and warm showers and there was that antiseptic foot bath that didn't kill veruccas! A much more relaxing,fun and enticing experience.

Lastly, at middle school we had the odd trip to an outdoor lido that was all about slides, and messing around.I never learnt to dive and I have taught myself crawl. Recently I have actually been thinking about having some 1:1 coaching to improve my crawl and learn to dive. I now swim occasionally with confidence about 40 lengths and really don't mind capsizing in a dinghy! Unlike you antipodeons I'm not good in waves at the beach. LP- UK

I had swimming lessons at my middle school in England, around the age of 9 / 10 yrs. It was an outside swimming pool with raised concrete sides, and the water was not heated. Boys and girls learned together. I remember hating lessons, because we had to get changed in the wooden changing rooms, boys in one room and us in the other, there were holes in the wood and the boys would spy and laugh at us girls! That aside, it was an age when I was overly conscious of my body and having to wear so little in front of everyone was horrendous for me. Once in our swimming costumes, we had to run around the concrete jungle of a pool to warm up. The pool water was freezing, and you had to climb up the 2 foot surrounding border before plunging into the cold water. We were not allowed to wear goggles, or use swimming aids! I had only been in a pool a few times previous and had no confidence submerged in it, and didn't like the water in my face. The teacher would get in the pool in her shorts and t-shirt (not having to bear her body!!) and try and get us into the right swimming position with a hand under our stomach and then push our faces into the water so we were in a straight line, and make us do 50 lengths before being allowed to get out (it wasn't a very big pool!). We were then made to run around the pool again to get dry (being England it was not sunny very often, so we didn't get dry we just got colder!). My experience was not a good one. Since then I have taught myself how to swim and actually do 100 lengths of our community pool, using front crawl, breast stroke and back stroke! Not mastered butterfly yet.

Now I live in Spain, have two young children (L is 6 and S is 3 and a half) and our community pool is closest to our house, so it is really important that they know how to swim. When L was 2 yrs old we found someone who gave swimming lessons in an indoor heated pool. She was English and one parent was required to enter the pool their child. L, even at that young age was not impressed with being told what to do, and Virginia, the tutor, found it difficult to instruct him and not let him run the class, just doing what he wanted to do!!! She did get him used to being under the water and we have some great photos of that! She was kind and did fun things with the kids, singing songs and making everything a game, but for some reason L didn't like her. We continued with her for about six months, hiring her to come to our pool during the summer months! L would see her coming down the road and run to hide in the house, shouting 'Virginia - nooooooo!' We assessed the situation and Figured maybe it was because L speaks Spanish more than English, and although she tried to speak Spanish for him, she was pretty hopeless. So, plan B... L by now almost 3 yrs old, we found a Spanish class in another town, and took him there twice a week. The approach there was to deliver your child, and leave him there for the hour.... First class was a dream and he loved it and the lady... we spied from close by and saw him jumping in with noodles and generally being well behaved. After that it all went pear shaped, he would cry when we arrived and

she would have to peel him off us to take him inside! He said he didn't want to go every time we took him, but she assured us he only cried for 5 mins and after that he was fine and enjoyed the class! However, each week, he would realise further and further back into our journey there, that's where we were headed and would start crying and saying he didn't want to go, he wouldn't get out the car and we would have to prise his hands off the seat belt he was gripping so hard, his hands went white. After a few weeks we decided it was all too distressing for all of us and cancelled his swimming classes. We would take him to our pool ourselves every day and he loved it, we taught him and he taught himself too and he had always refused to wear arm bands or a ring. We found the magic ingredient were a pair of goggles which covered his nose as well... once he had them on, he was off on his own, under the water, swimming widths of the pool. Since then he has never looked back, last year (age 5) we taught him to dive, taking videos so he could see his style and improve on it. He is really confident in the water, be it the pool or the sea, and loved the huge waves on holiday. He now uses normal goggles with no nose cover.

We decided not to take S to lessons and we taught her to swim last year. She didn't mind using arm bands and a rubber ring, after she realised she could use the whole pool without having to cling on to one of us. We got her the same goggles with a nose cover and they give her untold confidence! Its amazing to see. Last year too, she would come snorkeling with us and marveled at the fish in the sea and would float about without swimming aids. This year she used her arm bands for a week just to get her confidence back, and now she is back to being a little fish with a style all of her own!

So, my opinion based on the above is, swimming lessons are great, everyone should learn-to-swim from an early age, but ..... they are not for us!!!!!!!!

Hope this is helpful Gus, and good luck!

JF – Spain and UK.

I could swim as a toddler as a result of trying to keep up with my older brothers, but I do remember actual swimming lessons, conducted by teachers, at Seatoun primary school. Like someone else who posted on the FB page, the school had an outdoor pool which was probably about 90cm deep and maybe about 10 metres long. I doubt that they conducted swimming lessons during winter, but it was always freezing, in or out of the water. The teacher (who never got in the pool) used to get us to hold the bars on the sides and kick, kick, kick! We used to warm up by walking fast around the inside of the pool. The whole class would do this and it was pretty cool creating an artificial whirlpool which kids would, of course, let themselves get caught up in. The teacher would get us to swim widths, and then lengths toward the end of the lesson. The cold concrete changing sheds were always the worst part (there is just nothing comfortable about them and I still have an aversion to them!)

Swimming lessons were never that much fun (for me, mostly because I could already swim, was cold, and just wanted to play in the pool). The teacher would let us have a few minutes play time at the end, which was fun!

LH – NZ

Regarding my learning to swim experience - it was so early that I don't remember too much. I could doggy paddle and was quite comfortable in the water by myself (no wings in those days) before I was two years old. There is a photo of me at 26 months standing on the beach with my hand up to shield my eyes from the sun - and evidently I was telling my dad all about the strong currents to avoid (rips) - seriously (must have already been told about it and just regurgitating).

I joined swimming club at 3 years old in the babies group. (actually it was a month before my birthday so 35 months old. But I was in the main children's pool doing flutter board type stuff before that season was out. I went to swimming club every summer - training 4 hours a day until I was 14. (I did swim in the winter but not competitively) I was moved up through the beginners groups (red, green blue,yellow) and was swimming in the Olympic pool at 6 with 10-17 year olds. I won lots of cups and stuff - ribbons and medals. I rose through the training groups faster than any other kid - and was always the youngest in any one group (by years and years)

Oh also to note was that school swimming was pants for me because they were all so bad at it (the other kids) - i just did the things they wanted and that was that. But I know several kids who had no exposure before this and were frightened and the teachers were not very nice or supportive to them...

MA – NZ

I learnt to swim at school. There was a pool at the back of the school just for the little kids. I remember playing games "big a little a bouncing B the cats in the cradle and you can't see me" at which point you dove under the water. and pretending to

be washing machines. I loved it!!! And i never understood the kids who would cry about putting their heads under the water! We used to go swimming at Ashley river too but it was never really deep i never liked it as much though cause the water was quite swift and it would be slimy on the bottom. We would go to the beach at Waikuku and jump around in the waves. Dad would swim out and we wouldn't be able to see him any more. That always scared me! In fact i'm pretty sure i had a recurring nightmare about it. I guess looking back i have always enjoyed swimming in pools where i felt safe but have a slight fear of swimming in the "wild".

EK – NZ

Carolyn: I had played in the shallow end of the pool at our next door neighbors house from the time I was a baby - it was when I was four when my neighbor threw me into the deep end
as he knew I would be able to swim to the side - I remember coming up for air scared & crying
I heard him say " swim to the side if you want to get out" so I did and you couldn't keep me out of the deep end. I grew up loving the water, living in Malibu California there was no way to keep me out of e ocean. At 14 I tried out and got onto my high school swim team, I then joined a Olympic training swimming program to help me improve. I was a record holder for the 1600 km and the 500 km. After highs hook I became a Life Guard & Swim Coach, and it all started by being thrown into the deep end!

CH– USA

My first memories of swimming were being thrown into the deep end at Airlies by Will and being left to furiously paddle- possible aged around 5.
Later I was given one arm floatie which meant that I was topsy-turvey upsided and almost drowning – these events I remember being particularly terrifying. Will remembers them with great humor!

Our school had a small pool around 10 - 15 metres long and the kids got to swim in there 2 or 3 times a week. I still remember the breeze block changing rooms and to this day the smell of chlorine reminds me of being a primary kid in the pool. This is one of my favorite memories of being a kid – spending class time in the pool! We had an annual swimming sports, the highlight of which was the underwater swim competition – Baldy's brother Mark was the reigning champ for years!

I first learnt to swim formally in the large outdoor pool at Whitianga when I went to stay there with my Grandmother. I have very clear memories of the teacher making me hold on the end and put my head in the water whilst kicking away then practice breathing. Then it was hold with one arm and breath and then we were unleashed to swim down the pool whilst breathing with a flutter board kick, breath, kick, breath. I still really love to swim lengths in outdoor pools when and where I can.

Let me know if you want any more 'pool memories'!

MD– NZ

Here are my two experiences of swimming.

When I was a kid we didn't have swimming lessons at school in the '50's. There were no school pools and swimming lessons were not part of the curriculum. That is why so many people of my age don't swim I guess. Also of course, our climate is such that sea swimming in the 50's and 60's was very restricted to a week's holiday a year.

My Dad tried to teach me in the sea but eventually, when my boy cousin was staying with us, we went to a swimming pool and my dad taught me to swim with David giving me encouragement. I suppose I was about 7 or 8.

I never really liked swimming and wasn't confident in the water. I wouldn't go out of my depth. When I was about 52, a friend from the tennis club, who had a swimming pool in his garden, and who had taught loads of people to swim, gave me confidence and I allowed him to teach me. I remember learning to do the star fish, lying on my front, with head in water and legs and arms out and that was the most useful thing I learnt, as it gave me confidence. Going under the water was the most important thing to me, so now I can dive in off the edge of the pool, do lengths of breast stroke with my head in the water - as long as I have goggles. Goggles were not available in the 50's and 60's!

I still don't like swimming and now don't visit a pool, but there was a time in mid-life that I really did enjoy it and went swimming once a week in a pool.

I hope this is what you need Gus. I also think that teaching a baby to be confident in the water is an absolute must. Water awareness through out life is also essential

especially when you have so much coast around you as in NZ.

I forgot to say, Gus, that the temperature in the swimming pool was definitely something that caused me to not enjoy swimming. I don't like extremes of temperature and getting into cold water was really very off putting as a child. Why get into cold water and feel afraid because I couldn't put my head under? So temperature is very important to some people and especially children who's only experience of water will have been in a lovely warm shower or bath.

I always used the steps in the swimming pool but they were ladders. The best swimming pools were large and had a gradual "beach" like entrance into the water. Much better and I felt safer.

RN– UK

On an early summer South Christchurch in 1952 my tender feet grazed the freezing concrete steps into the shallow end of West Spreydon School swimming pool. My belted black woollen swimming togs (with modesty gusset) soaked up the crystalline chill of the chlorine reeking pool. My first class swimming lesson was to begin . I looked at the other kids similarly attired the girls in frilly flowered togs squealed and shrieked their way down the steps the boys punched each other.

The tallest kids were told to take the rail furthest down the pool. I was in the middle next to a girl with no teeth ..Teacher told us to put our faces in the water and walk across the pool taking a breath to our right side when we needed to. I felt quite grown up- swimming was for big kids I could be friends with them if I could swim..When teacher told us to float face down I was into it. Though my head ached with cold and my eyes stung by chlorine I floated -then kicked and dog paddled choking on a lung full the strange tasting water the last ten feet to the far side -I could swim!

BM – NZ

Hi Lara, I had two experiences of learning to swim as a tiny tot. One was terrible (but it was the early 70's) and they literally chucked us in the pool on the first time and told us to just 'follow our instincts' and swim to the side. I was only 6 years old and petrified, cried and screamed that I never wanted to go back (I can remember it as if it was yesterday and it was 40 years ago). I swallowed heaps of chlorinated water and just hated the whole idea of swimming which was weird as I was actually quite a risk taker as a kid.

My Dad, then took me to a swim club where parents played with their kids for several weeks, all kinds of 'get wet' type of games in the shallow end of the pool, gradually making us dive across into the water to catch hoops and balls and then we had absolutely no fear of putting our heads under the water. If there was any greater success story from gaining confidence, it was this as I became pretty good at swimming and was in a swim team for the next 15 years and swam competitively for my school, then college and university and for my county. Just goes to show how important all this stuff is!

RW - UK