

Tauranga City Council – Baywave Project



Project and Lessons Learned Review

October 2019



Document Issue

REV:	DATE:	ISSUE TO:	VERSION:	PREPARED:	APPROVED:
1.0	October 2019	Tauranga City Council	1.0	Todd Jones	Darryl Fox

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Executive Summary

This report follows the RFP request and our response to it, to provide Tauranga City Council (TCC) with a high level review of the “Baywave” project designed and constructed between 2002 and 2005. The purpose of the review being to provide a series of “lessons learnt” to be implemented by TCC on future projects it undertakes.

Our review has followed a structured process that can be broadly summarised as:

- Literature Review – incorporating the searching and reading of TCC provided documentation from both internal filing systems and publicly available “Council Property File” information.
- Interviews – a series of interviews have been conducted with key personnel identified through the literature review.

The findings documented within this report are comprised of both qualitative and quantitative research through research of documentation provided by TCC and interviews carried out with key members of the Baywave project team. The documentation provided and reviewed was relatively extensive in quantum, and not specifically arranged or organised in any way, presumably due to the timing of the project being in the early days of digital storage media.

Interviews and conversations were carried out with the following key Baywave project team members/stakeholders:

- John Scott – TCC Project Manager
- Gary Dawson – CEO - Bay Venues Limited
- Steve Edgecombe – Asset & Project Manager – Bay Venues Limited
- Gavin Frost & Maximo Muller – Structural Engineers responsible for seismic assessment – Beca
- Chris Jack – Project Architect, Jasmax
- Shane Rowse – Contracts Supervisor – Mainzeal Property and Construction Limited
- Bruce Black, Structural Peer Review Signatory – Holmes Consulting Limited
- Other project participants who did not wish to be named.

The categories of investigation and their accompanying descriptions as defined within our proposal, are as follows:

Client & scope

The clarity and control of baseline requirements, objectives, success criteria, business case, terms of reference, contracts and benefits realisations. In particular, the procurement methodology; how the design was managed and the risks mitigated throughout the project lifecycle.

Supply chain

The procurement processes, engagement with, and capability of, both the internal and external supply chain.

End Product

The deliverables and outcomes to meet the Business requirements. Including product and / or service quality and the impact of the finished product or service on the social, physical and economic development.

Finance

The commercial management and administration.

Governance

the process of alignment with interests and strategic direction of Business and sponsors

These headers have been adopted in setting out the lessons learned.

The quantum of documentation provided by TCC is extensive. The scope of this review has not permitted the complete and extensive review of each and every document. A high-level review of the type of documentation on file and their general content has been completed.

A series of interviews were undertaken with members of the original project team. These interviews were focused on gaining a first-hand understanding of the project and the way in which events unfolded. Items of particular focus were; Project Governance and structure, Design team performance and attendance, Quality control, change control.

Through the combined research approach outlined and detailed within this report key themes have been identified as being key to the generation of a lessons learned summary. These key points are identified below (as they relate to the investigation categories identified);

NO.	CATEGORY	Key Themes
1	Client & scope	Decision by TCC to introduce a Public Private Partnership into the project at a late stage. Poor record keeping Introduction of scope change and increase at the behest of the Private Partner Introduction of additional scope by Elected Members
2	Supply chain	Evaluation of capability of individual team members of proposing organisations Implementation of "single line of accountability" consultant procurement method.
3	End Product	Significant Structural deficiencies Suitability of designed materials and Construction Systems
4	Finance	Lack of control of budget and uplift of funding to accommodate change
5	Governance	Lack of formalized and effective governance

These items are described in detail within section 5 of this report.

1. Format of the report

1.1 Summary

This report follows the RFP request and our response to it, to provide Tauranga City Council (TCC) with a high level review of the “Baywave” project designed and constructed between 2002 and 2005. The purpose of the review being to provide a series of “lessons learnt” to be implemented by TCC on future projects it undertakes.

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- Interviews – a series of interviews have been conducted with key personnel identified through the literature review.

These processes are documented within this report with a series of overarching themes or headlines adopted to inform the preparation of specific learnings to be taken from both the failings of the project and the successes. These learnings are framed as “lessons learnt”.

1.2 Review Methodology

1.2.1 The findings documented within this report are comprised of both qualitative and quantitative research through research of documentation provided by TCC and interviews carried out with key members of the Baywave project team. The documentation provided and reviewed was relatively extensive in quantum, and not specifically arranged or organised in any way – presumably due to the timing of the project being in the early days of digital storage media. The information supplied can however be broadly categorised;

- Technical Documents produced by the various design consultants involved with the project,
- Internal TCC correspondence
- Records of stakeholder discussions
- Contractual documentation
- Meeting correspondence (agenda and minutes)
- Post Contract communications with Bay Venues Limited and other stakeholders.

1.2.2 A detailed document review was undertaken the content of the reviewed documents or in some instances gaps in documents, directed further specific research.

1.2.3 Interviews and conversations were carried out with the following key Baywave project team members/stakeholders:

- John Scott – TCC Project Manager
- Gary Dawson – CEO - Bay Venues Limited
- Steve Edgecombe – Asset & Project Manager – Bay Venues Limited
- Gavin Frost & Maximo Muller – Structural Engineers responsible for seismic assessment – Beca
- Chris Jack – Project Architect, Jasmox
- Shane Rowse – Contracts Supervisor – Mainzeal Property and Construction Limited
- Bruce Black, Structural Peer Review Signatory – Holmes Consulting Limited
- Other project participants who did not wish to be named.

1.2.4 Attempts were made to contact other project participants however these attempts were unsuccessful.

1.2.5 From the combined qualitative and quantitative research we have then identified several key themes that have informed the population of a lessons learned matrix, the basis of which is discussed in detail in the findings section of this report.

The categories of investigation and their accompanying descriptions as defined within our proposal, are as follows:

Client & scope

The clarity and control of baseline requirements, objectives, success criteria, business case, terms of reference, contracts and benefits realisations. In particular, the procurement methodology; how the design was managed and the risks mitigated throughout the project lifecycle.

Supply chain

The procurement processes, engagement with, and capability of, both the internal and external supply chain.

End Product

The deliverables and outcomes to meet the Business requirements. Including product and / or service quality and the impact of the finished product or service on the social, physical and economic development.

Finance

The commercial management and administration.

Governance

The process alignment with interests and strategic direction of Business and sponsors

These headers have been adopted in setting out the lessons learned.

2. Presentation of findings from documentation

- 2.1.1 The quantum of documentation provided by TCC is extensive. The scope of this review has not permitted the complete and extensive review of each and every document. A high-level review of the type of documentation on file and their general content has been completed.
- 2.1.2 From documentation reviewed, it appears that consultation for the proposed Baywave facility commenced with stakeholders and interested parties sometime in early-mid 2002. This consultation seems to have consisted of various workshops and engagement events. The outputs of these events being documented and informing the future development stages.
- 2.1.3 Davis Langdon were engaged as Consultant Project Manager/Cost Consultant. The engagement was formalised in April 2003, though it is evident that their involvement commenced prior to March 2003.
- 2.1.4 In early 2003 proposals from design consultants were sought and a design team subsequently appointed. Of specific note in this regard is that the method of engagement followed a "Single Line of Accountability" model. The specifics of the model employed effectively held the Architect – Jasmax, in the position of Lead Designer and contracted party. Jasmax was then responsible for the engagement of design sub-consultants including Mechanical, Electrical, Hydraulic, Fire (Lincolne Scott) and Structural Engineering (Harris Foster Consultants) services.
- 2.1.5 In June 2003 TCC sought Expressions of Interest for "a long term partner to jointly invest, develop, manage and operate its network of Aquatic Facilities, current and future". This EOI resulted in a submission being made on 29 August 2003 by H2O Management Limited. A Heads of Agreement was subsequently entered into in November 2003, with the goal being to conclude an agreement. A Memorandum of Understanding was eventually entered into in March 2004.
- 2.1.6 It is inferred from various reviewed documents (though not explicitly stated) that H2O were consulted with by TCC and the project design team with various requests then implemented into the design. It appears that the intention was for H2O to fund these items. It is suggested that these elements included the fitout of the fitness centre, kitchen and other operator specific areas. The funding expectation being significant, though unclear as to specifics
- 2.1.7 During October of 2003 a Request for Expressions of Interest was issued to market, calling for suitably qualified Constructors to respond. The EOI was to be the first of a two stage procurement process. The premise of the EOI was to produce a shortlist of competent contractors who would then be asked to provide tenders on the basis of "P&G and Margin". This method incorporating the provision of a fixed Preliminary and General sum (on-site overheads) and fixed margin sum (offsite overheads and profit). It was proposed that the successful respondent to stage two would then be engaged to provide "Contractor input into design" with the negotiation of a fixed price lumpsum to follow.
- 2.1.8 It is understood that in December 2003 the second stage procurement described in 1.1.5 was undertaken, this process resulting in the issue of a letter of intent to Mainzeal Property and Construction Limited. This notice confirmed Mainzeal and being the "preferred tenderer" and stated that they were to get underway with the provision of contractor advice in relation to the design immediately.
- 2.1.9 A fixed price lumpsum "tender" was submitted by Mainzeal on 31 March 2004. This fixed price lumpsum submission, presumably being the result of the "negotiation" referred to in the initial EOI documents. It is of note though that the submission was not framed as any form of negotiation. The reason for this process unfolding in this way is not clear. There is no record of any Contractor Advice available.

- 2.1.10 The value of Mainzeal's tender was \$13,436,665.87+GST and was based on a Schedule of Quantities produced by DL, this value being the subject of recommendation for acceptance by Davis Langdon. DL's recommendation report dated 19 April 2014 provides a detailed breakdown/reconciliation of the financial position of the project. Importantly, this reconciliation includes deductions (credits) to account for various items that were included in Mainzeal's price but were set to be funded separately, either through fundraising or by the management operator. The value of such items being identified as \$872,975+GST. It is of note that any failure to obtain additional funding would have caused the project to exceed the total budget allocated.
- 2.1.11 A letter of acceptance was subsequently authored by Stephen Town – Chief Executive and dated 29 April 2004. This letter was ultimately incorporated into the Contract documents.
- 2.1.12 Construction commenced in late May 2004 with a due date for completion of 13 May 2005. This timeframe appearing unrealistically short when benchmarked against similarly sized and complex buildings.
- 2.1.13 Construction progressed throughout 2004, documentation suggests that site meetings were held on a fortnightly basis, these being minuted by the Project Manager. Records available are sporadic and only contain a handful of minute sets.
- 2.1.14 There are also records of a project steering group, which consisted of members of the project team along with the project sponsor. There are only a small number of these meetings recorded within the documentation available for review. The content of the minutes does not appear to suggest that any significant decision making existed at this level, and whilst items were recorded these did not appear to be readily resolved or closed.
- 2.1.15 Documentation available throughout the construction phase is fairly limited, so little detail as to the day-to-day operations and administration is able to be analysed.
- 2.1.16 In December 2004 an award of an extension of time was made to Mainzeal – this award gave Mainzeal a so called "ex-gratia" extension of time that took the revised Due date for completion to 6 July 2005.
- 2.1.17 While no record of any further claim for extension of time is apparent, it appears that a further extension of time was retrospectively negotiated and the Due Date for Completion amended to 14 October 2005.
- 2.1.18 On 11 November 2005, a settlement agreement was drafted by Davis Langdon as a formal record of commercial negotiations that had taken place with Mainzeal in agreeing a Final Account. This document was subsequently signed by Mainzeal and countersigned by TCC with the agreement formalised and concluded on 21 November 2005.
- 2.1.19 The final account was agreed and signed at a value of \$16,100,000, a total uplift of \$2,663,334.13 or 19.8% over the lumpsum fixed price contract value. This level of cost increase being well in excess of what could be anticipated for a project of this type - typically 5-10%.
- 2.1.20 On 14 November 2005 a Certificate of Practical Completion was issued to Mainzeal. The Certificate was backdated to 14 October 2005.

3. Interviews

- 3.1.1 A series of interviews were undertaken with members of the original project team. These interviews were focused on gaining a first-hand understanding of the project and the way in which events unfolded. Items of particular focus were; Project Governance and structure, Design team performance and attendance, Quality control, change control.
- 3.1.2 Within forthcoming sections of this report, each interview will be documented specifically, an overall precis of the findings and process follows.
- 3.1.3 Interviews followed a conversational methodology where participants were asked fairly open questions and allowed to respond freely. The media by which interviews were conducted consisted of a combination of phone, video conferencing and face-to-face meetings.
- 3.1.4 The comments and views expressed within this section are based on information provided verbally by interview participants. As such Greenstone Group do not make any representation as to the accuracy of specific statements, and the opinions or views expressed are not those of the writer of Greenstone Group.
- 3.1.5 The overall perception of the project from all interview participants was (without exception) by and large that the project was, at the time, a success. There was a general consensus that the project team worked well together and that all members put the best interests of the project at the forefront of their actions.
- 3.1.6 We were advised that the project was the first large scale development project undertaken for some 20 years, the first since the construction of "Baycourt". Because of this fact the council were lacking experience with the implementation and delivery of significant projects.
- 3.1.7 Suggestion was made that the Chief Executive Officer prior to the construction period commencing was weak in communication methods and lacking in leadership. This apparently caused fractures within the organisation that resulted in numerous resignations and a split council.
- 3.1.8 It was clear that the TCC's approach to managing the project at the time was fairly "hands-off" and a lack of project structure and governance was evident. It appears that the effective running of the project was left to a single TCC employee without the backing of a genuine Project Control Group.
- 3.1.9 A fairly robust procurement approach is understood to have been undertaken, with processes seemingly in line with good practice at the time.
- 3.1.10 The project team felt that significant design change during construction was not specifically an issue and that the majority of variations during construction were the result of ambiguity between documents or general detailing requirements.
- 3.1.11 It was evident that TCC made a decision to introduce a private sector partner as operator at a very late stage. The impacts of this late introduction were magnified immeasurably by the fact that the ultimate partner – H20 – had significant input on specific design decisions and then at some point early in the construction phase became insolvent due to extraneous circumstances well beyond the projects control.
- 3.1.12 The dissolution of the management agreement is purported to have resulted in the loss of approximately \$3-\$5m of additional promised funding. Whether that funding was ever genuinely available to H20 is questionable according to interview participants. There was a feel from the project team that the project budget had not been fairly represented in the media at the time, with reports of budget over runs. It would appear that these budget overruns related in large part to the removal of the operators funding and the fact that TCC had already committed to constructing the facility by that stage.
- 3.1.13 A belief that there was a 'dysfunctional' environment within TCC at the time was conveyed. This dysfunction was described as a feeling that "other parts of council were attempting to sabotage the project particularly the finance department".

- 3.1.14 There was a consensus from the project team that at the time, a significant construction “boom” was ongoing within the Bay of Plenty. This significant workload was impacting the availability of resource from both contractors (and sub-contractors) and consultants.
- 3.1.15 Suggestion was made that the specific experience of the individual members of the contractor team was questionable with respect to the inherent complexities of indoor aquatic facilities. This supposed inexperience was seen as generating issues with construction methodologies and the understanding of specific design elements.
- 3.1.16 The construction team lacked a “service coordination” resource. This absence of crucial team member led to several instances of clashes and issues during the commissioning of the building.
- 3.1.17 Participants confirmed that the project specifications were fairly intensive in terms of extensive requirements for the production and provision of samples and mock-ups. These were apparently well adhered to.
- 3.1.18 It has been stated that during construction several issues were found with both the buildability of parts of the concrete structure – due to the significant size of precast wall panels required, this size suggested as potentially leading to the significant cracking evident to panels. In relation to this specific defect comment was also made identifying doubts as to the suitability and durability of internal finishing of the same – I.E lack of coatings allowing corrosive pool environment to migrate through cracks and worsen.
- 3.1.19 It was confirmed that whilst at the time no concerns were held about the detailing of the connection of “Dycore” flooring units (to the mezzanine floor) to the supporting walls. Shortly after the completion of Baywave the constructor undertook a project using a similar structural system. This project however incorporated significantly more robust structural connections – this raised a flag for the contractor at the time. Though we understand this wasn’t raised in turn with TCC.
- 3.1.20 There was genuine surprise from the majority of interviewees when told of the ongoing issues with the seismic rating of the building. It was from an interview with the Project Architect that it was discovered that a Peer Review had been undertaken upon the structural design at the time. This peer review being undertaken by Holmes Consulting Group – a highly regarded Structural Engineering consultant. This seemingly at odds with the significant shortcomings identified within Beca reports produced during 2017.
- 3.1.21 The project team felt that, generally speaking, the level of involvement of consultants during construction was appropriate and in keeping with common practice of the time. The consultant team collectively had significant experience in the design and construction of pools. The design phase incorporated significant levels of research including study trips abroad to ensure that the most up-to-date practices were followed. It was identified that portions of the Structural Engineering observation were outsourced by the design engineer – Harris Foster Consultants – to a third party engineer – Holmes Consulting Group.
- 3.1.22 It was stated that the issues surrounding the seismic rating of the building stem from the structural design philosophy – or lack of evident philosophy. The assumptions made within the design documentation are apparently untested and in part incorrect. These assumptions led to the detailing and construction of a building that is transferring significant structural loads through brittle and inadequate connections. Beca’s attempts to engage with the design engineer have apparently been ineffective with a reluctance for dialogue advised.

3.2 Individual Interview Findings

- 3.2.1 The following section outlines the discussion and content of the series of interviews that were undertaken in completing this report. Each interview subject is identified, along with their role and relationship to the project, with a series of key points/findings from the conversational interview presented.

John Scott – Tauranga City Council – Project Manager

- 3.2.2 A significant amount of preparation and planning took place for the project, with various foundation documents being prepared including a Project Execution Plan, detailed brief and business case (none of these sighted as part of this report).
- 3.2.3 The preparation of the detailed briefing document was outsourced to an external consultant, as was the business case.
- 3.2.4 The project was the first of any scale to be delivered by TCC for approximately 20 years, the last comparable project being Bay Court Theatre. This lack of recent enterprise wide experience resulted in a very inexperienced council being charged with the delivery of Baywave.
- 3.2.5 At the beginning of the project, Jasmax and Davis Langdon were engaged, as a joint venture, to undertake a feasibility study responding to the briefing documents. This process resulted in the presentation of 3-4 options for further investigation. At this point financial modelling was produced that clearly indicated the fact that pools are not typically a source of great profit.
- 3.2.6 A detailed procurement plan was put in place (not sighted as part of this report) with the first approach to market being for Project Management and Quantity Surveying/Cost Management services. This procurement process included a competitive bid process which included a formal evaluation and interview that included senior TCC staff and councillors.
- 3.2.7 A procurement document was produced by Davis Langdon to seek design services. This procurement was structured to procure a single line of design accountability whereby the Architect was to contract to TCC for the provision of all design disciplines and utilise sub-contract agreements with sub-consultants for the provision of services outside of the Architectural realm.
- 3.2.8 The evaluation process for design services followed a similar path to the Project/Cost Management procurement and included internal council staff and councillors. A significant amount of due diligence was undertaken and included reference checking and the like. This process ended in the appointment of Jasmax.
- 3.2.9 During the design phase regular estimates were undertaken along with a detailed value management process. No significant pressure was applied from a budget perspective where the building's structural elements were concerned. This largely being due to the knowledge of the critical nature of the structure and in particular the specialist durability requirements existing with provisioning for a highly corrosive interior environment inherent with indoor aquatic facilities. At the time of the design, there had been anecdotally significant issues with the structural design of Tauranga Hospital – this being designed by HFC also.
- 3.2.10 A competitive tender process was entered into to seek suitably qualified construction contractors this process resulted in the receipt of two compliant tenders – Mainzeal Property and Construction and McMillan & Lockwood. The resulting evaluation concluded with the appointment of Mainzeal based upon non-price criteria, specifically their company experience with the delivery of similar aquatics projects. There were a number of provisional sums incorporated within the Contract price, these pertaining to elements of work that were not yet fully designed.
- 3.2.11 As a separately procured portion of work, TCC completed a tender process for civil contractors to complete the carpark area. This procurement coincided with the implementation of the TCC "City Partners" scheme – one of the City Partners being Fulton Hogan. The tender return had Fulton Hogan not sitting as preferred contractor due to their price being approximately \$60,000 more than other tenderers, the contract was, however, ultimately awarded to Fulton Hogan.
- 3.2.12 TCC changed their mind on the delivery/operation method at a very late date and decided to introduce a Public Private Partnership model whereby a private entity would be sought to deliver the operational side of the development. This process resulted in the introduction of the third party operator "H2O Management". The manager of H2O was very opinionated with regard to specific aspects of the design, including the water treatment and filtration system and increasing the size of the fitness club areas among other things. A number of significant design changes were made to accommodate these specific requests. These ideas were good in theory for the generation of revenue, however no additional funding was ever obtained.

- 3.2.13 The PPP that was entered into, was perceived to significantly favour the private operator and contained favourable long lease terms. The setup of the agreement left TCC very exposed when the manager of H2O encountered personal legal issues which led to the insolvency of the company and ultimately the cancellation of the management agreement. TCC were left facing a circa \$5 million funding gap that needed to be bridged.
- 3.2.14 Throughout the project, a severe lack of strong governance existed. There was a lack of consistency of leadership from within TCC, with various elected and non-elected staff interfering sporadically with the process. One such interference being a decision by the Council to change the type of wave pool being installed – this change carried an additional cost of circa \$600,000 and had not been budgeted for, yet no additional funding was secured prior to instructing the change.
- 3.2.15 During Construction, significant variations were encountered. These variations were not able to be covered by the allocated contingency sum. The TCC CEO engaged a “professional fundraiser” to assist with the obtaining of funds.
- 3.2.16 Difficulties arose during construction with the provision of sub-contractor resource. This is thought to have been due to a combination of the aggressive Mainzeal culture and the extremely stretched market at the time.
- 3.2.17 Mainzeal proved to be difficult from a commercial perspective throughout the project and submitted a final account that sat circa \$800,000 adrift from assessed progress valuations. This resulted in a negotiation process where eventually a settlement was reached whereby TCC agreed to pay a further \$400,000.
- 3.2.18 There was a sense that during the project, despite being informed multiple times about budget pressure and risk of overruns, councillors did not listen or act. There was a complete void in terms of any leadership or governance coming from elected members, and involvement only tended to happen when forced, and then there was a complete lack of understanding demonstrated.

Bay Venues Limited (Gary Dawson, CEO – Steve Edgecombe, Asset & Project Manager), Beca Limited (Gavin Frost, Technical Director – Maximo Muller, Structural Engineer – Both involved with seismic assessments)

- 3.2.19 Generally speaking significant concerns are held by Bay Venues as the owners of an asset only 14 years old with an array of issues.
- 3.2.20 The issues experienced and identified since BVL's ownership include;
- Seismic and Non-seismic structural issues,
 - Durability concerns with protective coatings and the like,
 - Weathertightness issues relating to detailing an apparent failures
 - Integrity of water bores, where cracking the below ground steel casings corroded and collapsed within 13 years.
 - Issues with some tiling elements.
- 3.2.21 Whilst elements of the Building Management System required replacement and reconfiguration, subsequent to that taking place the building systems operate well and are fit for purpose.

- 3.2.22 In terms of the significant seismic issues identified with the buildings structure, it is fair to state that at the time of the building's design the various seismic design codes were much more vague than the standards currently in place particularly in determining the importance level that a building has been designed to. Applying the current code the Baywave building should clearly be an "Importance Level 3" (IL3) structure. However, it is possible that at the time, the design engineer determined the building as being "Importance Level 2" (IL2). The fact that no design features report has been sighted means that this is not able to be easily determined. The impact of this however would be minor in terms of the assessed compliance of the building.
- 3.2.23 From the outset of the structural design, flaws existed. Based on the geotechnical information available, the wrong soil class assumptions were carried forward to the structural design. Type B soil and the relevant parameters were adopted in the design of the foundation system, this should have been a Type C soil. The effect on the seismic performance of the building due to this error is, however, relatively small compared to other more critical design errors.
- 3.2.24 From structural calculations reviewed, an assumption adopted in respect to ductility has been incorrectly applied to the design of certain elements – this is particularly applicable to the design and detailing of the connections between the concrete mezzanine floor and the underlying structural walls. This incorrect assumption has led to brittle connections being detailed and constructed in these locations – these being the determining factor in concluding the overall building seismic rating. These connections are critical as significant load paths from the ladder frame roof truss are transferred through these elements – based on Beca's interpretation of the design philosophy.
- 3.2.25 From destructive investigation it has been clearly identified that the reinforcing placement within Structural Concrete elements has been undertaken incorrectly, this contributes to the poor seismic rating.
- 3.2.26 There are specific locations that bracing is shown on structural drawings. However, this has not been constructed. These "braced bays" have instead been constructed as infill aluminium window joinery. The absence of this bracing fundamentally alters the analysed load paths present within the building structure.
- 3.2.27 During the interview it was noted that a concrete block shear wall has been identified as appearing to be hollow, at least in part – I.E not filled with concrete. This poses a potential further risk and issue that had not previously been accounted for within Beca's analysis, Beca and BVL noted that investigations on this element were to be ongoing.

Chris Jack – Project Architect, Jasmax

- 3.2.28 The Principal Architect that delivered the design of the Project was Ivan Mercep, he has since passed away. Chris Jack joined the project during the detailed documentation phase and remained involved as the Project Architect throughout the Construction phase undertaking construction observation and the like.
- 3.2.29 Jasmax had worked successfully with their sub-consultant team on various occasions previously and maintained a good working relationship throughout the project.
- 3.2.30 Whilst the whole of the consultant team was based in Auckland, the group frequently ride shared to attend the site on at least a fortnightly basis throughout the Construction phase. This level of attendance and observation felt appropriate at the time.
- 3.2.31 Throughout involvement with the project, it appeared that there was very little governance structure in place and the whole of the project seemed to be run by John Scott of TCC with no apparent leadership from a higher level within TCC.
- 3.2.32 Although not able to be confirmed from Jasmax internal records there was a fair degree of certainty that a Structural Peer Review had been undertaken at the Building Consent stage by Holmes Consulting. (This was subsequently verified and discovered within the TCC "Property File".)

- 3.2.33 The quality assurance requirements for the project were stringently set out within specification documents and were fairly “intensive” requiring numerous samples and mock-ups.
- 3.2.34 The construction programme that Mainzeal were engaged to deliver upon was very tight (a little over 12 Months). This felt like a short timeframe at the time considering the complexities of the project.
- 3.2.35 From the outset of the construction phase, Jasmax had concerns with the level of specific experience of the project team with similar projects. It felt as though there was a significant degree of hand-holding required to assist Mainzeal in resolving methodology and sequencing issues caused by this lack of knowledge.
- 3.2.36 It was felt that Mainzeal completely underestimated/misunderstood the specialist detailing requirements inherent with an indoor aquatic facility. This lack of knowledge led to a very high volume of site raised Requests for Information (RFI's) that in Jasmax's view wouldn't have been raised by a suitably experienced contractor.
- 3.2.37 Mainzeal's site team did not include a services coordinator. This was unusual and not adequate for a project with such an intensive services engineering component.
- 3.2.38 The pool of suitable sub-contractors to undertake various specialist tasks was very limited at the time. This clearly impacted on Mainzeal's ability to deliver.
- 3.2.39 Significant strain was put on the project when the contracted pool operator departed. This appeared to have substantive impacts upon the budget. This strain was compounded when an alternative pool management company (Leisure Co) from Australia were appointed to manage the facility. From the outset there were significant concerns around the ability and knowledge of Leisure Co.

Shane Rowse – Contract Supervisor, Mainzeal Property and Construction

- 3.2.40 The frequency of visits by Consultants to undertake site observation, seemed in line with common practice at the time. Harris Foster Consulting engaged Holmes Consulting to undertake the majority of the structural construction observation processes on their behalf. This involvement included the checking of items such as pre concrete pours and extended to the issuing of Consultant Advice Notes.
- 3.2.41 As part of the structural and Architectural specifications a significant quantum of samples and mock-ups were required. This was in excess of what was generally required at the time, and the requirements were complied with by Mainzeal with numerous samples produced and reviewed by the consultant team onsite. Overall Mainzeal's perspective on the quality delivered was that it was of a high standard.
- 3.2.42 The level of design change experienced throughout the construction phase was not seen as significant. There were however a number of contentious items, these predominantly linked to the accuracy of the Schedule of Quantities upon which Mainzeal's contract price was based, along with various detailing requirements that were seen as outside of what was shown/demonstrated on drawings.
- 3.2.43 At the time it was perceived that a very capable team of consultants had been assembled to design and deliver the project. This translated to a well-developed set of construction documentation.
- 3.2.44 There were a number of buildability issues encountered during construction, a key one of these being the large size of the precast concrete panels that the design called for – this created issues with lifting and transporting the panels due to the potential for cracking under their own weight.
- 3.2.45 The construction programme was very tight and was perceived as somewhat enforced upon Mainzeal. To maintain the programme required significant effort from the whole construction team and necessitated a heavy management resource commitment. Significant issues were encountered as in-ground construction progressed through an extremely wet winter this caused the water table to become highly elevated and required a large amount of de-watering to be completed.
- 3.2.46 At the time the construction and detailing of the "Dycore" concrete mezzanine floor did not seem unusual or inadequate other than to say that the thickness of the topping slab seemed thin at a nominal 65mm thickness, all things considered. Shortly after Baywave was complete, however, another similar concrete structure was built and this structure employed significantly more substantial and robust connection details – this did raise a flag as to the adequacy of the Baywave structure at the time.
- 3.2.47 The design of the building was considered "different" and relied on unusual means to control the internal environment, it was considered perhaps a little 1-dimensional from Mainzeal's perspective.
- 3.2.48 A number of surface treatments seemed questionable in terms of long-term maintenance. An example of this being areas of exposed concrete wall panels. There is a feeling that the highly corrosive internal environment of the complex could easily penetrate the concrete panels and potentially impact the integral reinforcing steel. An applied paint finish is suggested as perhaps a more appropriate treatment.
- 3.2.49 The overall ongoing maintenance of the facility appears questionable. Corrosion seems to be evident to Stainless Steel surfaces and it is questionable as to whether this is regularly cleaned down as required to suitably maintain the surfaces.

4. Lessons Learned

4.1 Summary of Key Points Informing Lessons Learned

4.1.1 Through the combined research approach outlined and detailed within this report key themes have been identified as being key to the generation of a lessons learned summary. These key points are identified below (as they relate to the investigation categories identified);

NO.	CATEGORY	Key Themes
1	Client & scope	Decision by TCC to introduce a Public Private Partnership into the project at a late stage. Poor record keeping Introduction of scope change and increase at the behest of the Private Partner Introduction of additional scope by Elected Members.
2	Supply chain	Evaluation of capability of individual team members of proposing organisations Implementation of "single line of accountability" consultant procurement method. Overly ambitious construction programme proposed and accepted
3	End Product	Significant Structural deficiencies Suitability of designed materials and Construction Systems
4	Finance	Lack of control of budget and uplift of funding to accommodate change
5	Governance	Lack of formalized and effective governance

4.2 Client and Scope

4.2.1 Decision by TCC to introduce a Public Private Partnership into the project at a late stage and Introduction of Scope Change as a result.

4.2.2 It is clear from the research undertaken that the late introduction of a PPP into the Baywave project had significant implications for the project, these implications stemming from a multifaceted failure;

- The impact of late changes to the design due to the remit given to the private partner,
- The impact of the eventual departure of the private partner.

4.2.3 The agreement between the TCC and H20 management enabled H20 to have a significant influence over the design of the facility – a good approach when applied correctly. The fact that H20 were procured at a time when the majority of the design and budget had been finalised meant that the incorporation of changes appears to have been undertaken hurriedly. This late introduction with fixed timelines already in place means that it would have been very difficult to appropriately design, estimate cost, value manage and adjust budgets to accommodate. TCC were put in a compromised position whereby there was insufficient time to evaluate the relevance and/or necessity of H20's requests and effectively had no real choice but to implement the changes without the requisite due diligence being undertaken.

4.2.4 The fact that the director of the partner organisation encountered personal legal issues that resulted in TCC being forced to dissolve the partnership exacerbated TCC's exposure as a result of the PPP no end. Not only had TCC been effectively forced into accommodating late changes, but now they were also exposed to significant additional costs for which no budget existed. This event created the environment and circumstances that played out as the project being significantly over budget etc.

4.2.5 The portions of the agreement reviewed for the purpose of this report contain no provision of performance bonds or insurances to account for the default of the TCC partner. The absence of such provision left TCC exposed to the full risk associated with H20's non-performance or inability to perform. Future Partnering Agreements should incorporate protective measures to mitigate the catastrophic impacts of the dissolution of such an agreement.

4.2.6 Lesson Learned

4.2.7 Documentation laying the foundation of the purpose and direction of a project at its outset is core to the delivery of any project. This documentation should exist in the form of a Project Execution Plan (PEP). Within the PEP funding arrangements and methods should be identified along with the project structure. It is at this point of a project that significant decisions relating to financial models and the like should be taken.

4.2.8 PPP's can tend to be complex agreements that take significant time and effort to negotiate and agree upon a mutually beneficial arrangement. Ultimately the specifics of such an agreement should feed in to the strategy and approach to the delivery of the project. And inform such things and procurement models, consultant selection, programme etc. etc. This need makes the decision to adopt a PPP (where this is being considered) an early stage task for the project governance group. Once a project has been initiated and commences any proposed change in the core delivery method should be fully considered and if taken up a review of the status of the project undertaken, a risk assessment completed and ideally progress paused while a PPP is formed. The project delivery timeframe would then require adjustment to facilitate the briefing process and accommodate the lost time during the "pause". Introducing such significant structural changes without adjusting delivery expectations can prove fatal to the perceived success of a project, as evidenced through Baywave.

4.2.9 The due diligence functions required to confirm the suitability of a partner are absolutely crucial. Whilst it is not possible to ascertain what level of Due Diligence was undertaken by TCC nor whether any additional reasonable due diligence would have ultimately uncovered the legal issues the director was faced with. The situation is a key reminder as to the risks of a public entity entering into a partnership with a private organisation.

4.2.10 **Poor Record Keeping**

4.2.11 The approach taken with the undertaking of this review, highlighted an inadequate level of record keeping and organisation of those records.

4.2.12 It is worth noting that the time that the project took place coincided with significant shifts in technology, where email was beginning to replace written and faxed correspondence but all forms coexisted. It is fair to assume that this step change would have posed significant challenges to the way in which files were stored.

4.2.13 **Lesson Learned**

4.2.14 The accuracy and organisation of records relating to any project is absolutely critical – without a structured and well maintained record/archive system it is extremely difficult for a third party – I.E any person that was not intimately involved in the delivery of the project - to locate specific key documents. There are several absolutely critical documents referred to within our interview with John Scott, that despite him stating that they were produced, no record can be found of them.

4.2.15 A well organised. Logical, file structure should be determined at the outset of any project. The files contained within this structure should wherever possible follow a logical naming convention, consistent across an organisation, to enable documents to be readily searchable. This process is at the core of both the administration of the project during its lifecycle and the archiving and retaining of files for future reference.

4.2.16 **Introduction of additional scope by Elected Members**

4.2.17 A directive to amend the design to incorporate a different wave pool did not of itself create an issue. It is the fact that such a directive was given without any apparent consideration of the financial implications or adjustment of project budget to accommodate the change that caused an issue.

4.2.18 **Lesson Learned**

4.2.19 Change requests and subsequent change management process are part of the nature of the delivery of projects with multiple stakeholders, they are to an extent unavoidable, it is how requests for change are dealt with that is critical. Processes for dealing with change should be developed at the outset of the project. These processes should record: what the proposed change is, who has generated the change request, the reason for the change any financial or time related impact of the change. These change request forms should then be approved by the Project Control Group, and ultimately signed off by the Project Sponsor. The process of approving change should incorporate reviewing the cost and benefit of the change along with evaluating whether the change can be tolerated by the project constraints.

4.3 **Supply Chain**

4.3.1 **Evaluation of capability of individual team members of proposing organisations**

4.3.2 The specific skillsets associated with successfully delivering unique projects in the Construction industry are often best obtained through experience with projects posing similar challenges. Indoor aquatic facilities are highly specialised spaces that incorporate highly bespoke detailing and construction systems to deal with the set of challenges associated with a highly corrosive, high humidity internal environment. Through the procurement of the construction contractor, ultimately Mainzael, a high value was placed on the experience of Mainzael as an organisation.

4.3.3 **Lesson Learned**

4.3.4 For large construction contractors the crucial element to assessing competency is the specific experience of their allocated team. Often the sharing of specific knowledge within large organisations in the Construction Industry is lacking. Essentially it is not unreasonable to suggest that despite Mainzeal, as a company, having delivered several directly comparable projects it is highly likely that (as evidenced through interviews undertaken) that the individual team members charged with delivering the project had little or no experience with the construction principles key to delivering the project without significant coaching.

4.3.5 The use of procurement methods where a suitable weighting is given to individual team member experience along with applying a monetary bond to secure those team members put forward within a proposal is an effective means of ensuring that the best value can be derived from a contractors tender.

4.3.6 **Implementation of “single line of accountability” consultant procurement method.**

4.3.7 The concept of undertaking only a single procurement process and engaging in only a single contract agreement for the delivery of the whole design element of a project is an attractive proposition. Prima facie the use of a single line of accountability should reduce the risks to a client organisation and places the design team performance risk on the shoulders of one party. However, in practice the approach significantly reduces the power of the client to direct and control the design process. This process also limits the Client’s control of the actual personnel of sub consultants which poses the same issue as the above mentioned contractor team selection.

4.3.8 **Lesson Learned**

4.3.9 Where large, complex projects are being delivered it is highly advisable that individual, independent design consultants are engaged under separate agreements with appropriate liability provisions.

4.3.10 The development of robust scoping documentation and consulting agreements allows for the mitigation of risk associated with the appointment of individual, independent design consultants and enables the Client to undertake its own due diligence on each and every design consultant ensuring that relevant experience exists and that the requisite insurances are in place. Through this approach the Architect can still be appointed as the lead designer and hold the overall responsibility for coordinating the design team towards a collaborative and complete solution.

4.3.11 Throughout the project duration each of the consultant team is directly answerable to the Client and opportunities for the covering up of design errors and the like are minimised through management processes implemented by an appropriately competent Project Manager.

4.3.12 Direct procurement also ensures the Client has the ability to select a team with the required experience and drive from the individual consultants.

4.3.13 The provision of carefully scoped and prepared individual consulting agreements enables the clear allocation of liability provisions within standard form agreements (CCCS, NZIA etc). It is crucial that the liability caps within these agreements are tailored to address the actual risks associated with the design work being carried out, and the potential cost of rectification in the event of failure of the Consultant. The standard liability provision of “5 times the fee” is very rarely a suitable level of coverage.

4.3.14 **Overly ambitious construction programme proposed and accepted**

4.3.15 TCC’s Request for Tender document stated a contract duration as 12 months, to which Mainzeal’s Tender response complied, this subsequently forming part of the Contract. The ultimate construction duration ended up being slightly under 18 months.

4.3.16 The Baywave building is fairly significant in size and contains significant complexity. It is fair to say that the achievement of the delivery of the building in a 12 month timeframe, in a constrained market, was unrealistic at best.

4.3.17 **Lesson Learned**

- 4.3.18 A prudent approach to the procurement of Construction Contractors includes leaving the definition of programme as much as possible to the tendering Contractor's discretion. It is a reasonable assumption to make that if a client states a completion date, then a contractor will make their tender programme duration fit to avoid losing in a competitive environment. The end result of the acceptance (or enforcement) of an unrealistic Construction timeframe will generally be that the Contractor is looking at ways and means of recovering time (and resultant money) to build a buffer to shield them from Liquidated Damages. This process results in various claims for Extension of Time and commonly progresses towards conflict and formal dispute.
- 4.3.19 As part of any tender evaluation, it is suggested that an interrogation of the construction programme is undertaken rather than just blindly accepting the fact that the contract says they can complete within a certain timeframe. A competent contractor should be able to demonstrate a clear logic and have sufficient knowledge of the building and the means by which it will be constructed that all activities should be shown including dependencies, allowing sufficient time for the production and review of off-site activities such as shop drawings.

4.4 **End Product**

4.4.1 **Significant Structural Deficiencies**

- 4.4.2 The resulting structure of the Baywave building was evaluated by Beca as an independent expert as holding a seismic rating of 25% of the New Building Standard (NBS). Urgent works were then undertaken to improve elements of the structure and bring the building up to an assessed 35% NBS. This rating is only marginally above the 33% threshold for the building to be legally categorised as "Earthquake Prone". This is a situation that is clearly an unacceptable position to be in with a building constructed only 14 years ago.
- 4.4.3 The particular structural deficiencies largely relate to the way a series of structural assumptions have been made and implemented. These assumptions have been identified as either incorrect or incorrectly interpreted/implemented. The overall seismic rating is determined through the lowest scoring specific element of the design, this due to the critical nature of these elements and how they interact with transfer of significant structural loads within the building.
- 4.4.4 A structural peer review was undertaken at the building consent phase. It is reasonable to expect that where a design is produced by a CPEng Engineer and then formally reviewed by another that the fundamental elements of the building design are compliant with relevant codes of practice and standards.

4.4.5 **Lesson Learned**

- 4.4.6 A high degree of trust is placed upon the design and peer review process where highly technical design elements are concerned as is the case with Structural Designs. The process has at times proven to be somewhat flawed. These instances could speculatively be linked to the means by which the Peer Reviewer is selected. Often the Structural Engineer is asked who they would like to use to undertake the peer review. There exists a risk with this approach that the design engineer will select a peer reviewer with whom they may be overly familiar – I.E an ex colleague or similar. Where there is an innate sense of trust between the Designer and Peer Reviewer there is potential that the review process will not be completed with the rigour that is intended of it. There is anecdotal suggestion that whilst the Designer and Peer Reviewer of Baywave were both considered skilled Engineers in their own right, the Peer Reviewer had in fact previously been employed by Harris Foster Consulting, presenting a clear conflict of interest.
- 4.4.7 It is unclear from the scope of our review as to the means by which the structural peer reviewer was engaged. However, given the Consultant procurement methodology adopted (single line accountability – as discussed in the "Supply Chain section above) it is fair to assume that the Peer Reviewer was selected and engaged by Jasmax, most likely having followed the recommendation of Harris Foster.

4.4.8 It is a recommended approach for a prudent client that any Peer Reviewer is engaged directly by the Client after following its own procurement process. Part of the procurement should require the prospective Peer Reviewers to clearly state any perceived or actual conflicts of interest. It is crucial that the Peer Reviewer be engaged in the early phases of any project to enable critical analysis of the design and related assumptions to be undertaken prior to the design being “set-in-stone” and an overall design philosophy agreed between the two parties. The client should be privy to all communications between the designer and peer reviewer with all queries and discussions recorded – the final version of this record should demonstrate the progression through any issues from identification, to resolution. It is suggested that this process be followed for any complex technical discipline.

4.4.9 **Suitability of Designed Materials and Construction Systems**

4.4.10 Areas of the building are not performing in line with expectations in terms of durability with many elements exhibiting early deterioration.

4.4.11 **Lesson Learned**

4.4.12 Indoor Aquatic Facilities are inherently extremely complex buildings. The interior environment is incredibly difficult to manage as a combination of high (and constant) humidity, and highly corrosive elements mix. Unique consideration needs to be given to the selection of materials and finishes along with the detailing of the external envelope.

4.4.13 Whilst it appears that a high degree of effort was put into the surface protection of the various steel components within the building, it is questionable as to whether the same degree of rigour was applied to the selection of other materials and their finishes. There are various elements within the building that incorporate “exposed” surfaces such as concrete block structural walls and precast concrete external walls. It is possible that whilst these elements are exhibiting signs of early deterioration by way of cracking, the actual presence of these cracks and the fact that a number bridge from the interior to the exterior mean that there is a high likelihood that corrosive condensation is able to form on the inside of the panel and potentially contact reinforcing steel leading to the growth of cracks. A more appropriate finish may potentially have been available for these surfaces such as an appropriately durable paint system.

4.4.14 It is suggested that any future aquatic complex projects incorporate the services of a building enclosure specialist (façade engineer) to ensure the right balance between the aesthetic and building durability and performance is found.

4.5 **Finance**

4.5.1 **Lack of control of budget and uplift of funding to accommodate change**

4.5.2 The Baywave Project encountered significant financial issues, where original budgets were exceeded and additional funding was required to complete the project. This funding shortfall was due to a number of factors including; the exit of the operator H2O, changes to the project without adjustment to budget and a complicated funding arrangement.

4.5.3 The ultimate cause of the exceeding of the budget however appears to boil down to the overall financial management of the project and a lack of decisive action from Councillors when told of budget pressures.

4.5.4 **Lesson Learned**

4.5.5 The control of budget and the manner in which possible cost overruns are dealt with is an absolutely fundamental aspect of the control of a project. Generally speaking, additional costs come about as a result of change, whether the change be to the overarching parameters of the project or for a more detail oriented reason. Some elements of change within a Construction Project are unavoidable, these changes relate to unforeseen situations where specific conditions found on the site dictate that aspects of the design, either significant or minor, must change to enable the delivery of the project – these types of change are what a contingency is held to cover. In the case of Baywave, the contingency seems to have been utilised to accommodate both avoidable change and major project structure change. The level of contingency held within the budget was never going to be sufficient to cover the circa \$3m - \$5m shortfall that was created by the failure of the PPP agreement. At the point of the dissolution of the management agreement, the facility was well into its construction phase. So in many ways the ultimate budget overrun became unavoidable, the situation highlights the importance of the points raised earlier in this report with respect to the checks and balances that must be completed prior to entering into any commercial agreement on which the Council relies. While this item specifically relates to Budget Control, it is very much linked to Project Governance which is considered below.

4.6 Governance

4.6.1 It is evidenced through the research undertaken in the preparation of this report that the Project lacked any truly effective governance. This lack of governance and formality appears to have led to or contributed to the perceived failings of the project.

4.6.2 Good governance is at the heart of structuring a project for success. The importance of this project function is amplified when a project exists within a complex organisation such as TCC where numerous stakeholders exist and deliverables span across various different business units or departments.

4.6.3 Lesson Learned

4.6.4 As a large organisation that frequently undertakes project based work, TCC should have a structured approach to defining project governance structures. Whilst the specifics of any given project may differ significantly the role of governance does not. Every project requires a governance structure regardless of the value or size of the project.

4.6.5 Generally, any project should have a Project Control Group initiated at the outset. The role of this group being to fulfil the core Governance functions associated with the project. The purpose being to provide strategic oversight, resolve issues and ensure the resources are available so that the project meets its objectives and delivers the projected benefits.

4.6.6 The makeup of the PCG should be identified and agreed at the project initiation. Of paramount importance is that the members of the group understand their individual role. A clear delineation of hierarchy, responsibilities and delegation of authority should be drafted, agreed and implemented without deviation. It is crucial that the group include a designated chair/decision maker – this is not necessarily the Project Sponsor, but a person with a formalised delegated authority under which they may act.

4.6.7 The function of the PCG can be broadly described as including;

- Provide overall strategic guidance
- Manage political risk
- Approve all major plans and authorise any major deviation from the agreed plan
- Agree the project tolerances for time, quality and cost
- Provide advice and support for the project sponsor
- Make recommendations as appropriate to the Council
- Ensure all the required resources are available
- Facilitate organisational or cultural change which may be required within the organisation.
- Take responsibility for the ongoing funding of the project, including agreeing the budget and approving any additional funding requirements.

- 4.6.8 It is important to understand that the role of the PCG should ideally not involve the detailed management of various workstreams but be limited to the Governance of the project and ensuring that each of the various workstreams are able to succeed in delivering on the project objectives. Providing this separation of function enables the PCG to operate at an appropriately high level and not get “bogged down” in detail.
- 4.6.9 It is crucial that there is continuity of the participants in the PCG, and attendance at PCG meetings is limited to those participants with a specific role. It is not beneficial to a project to have numerous extraneous attendees nor is it useful having nominated attendees whom infrequently attend PCG meetings. The organisation must entrust the PCG and its members with carrying out the responsibilities and functions bestowed on it. Equally, the PCG must report to the Project Sponsor frequently and clearly understand when items need to be escalated.

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