

***Appendix 8.11 – Building Consents***

# **Building Code Compliance**

## **SHORT FORM REPORT**

### **Cobham Park & Westpac Stadium Concourse Indoor Community Sports Building Comparison Report**

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## 1.0 Executive Summary

This report is a review of compliance with the New Zealand Building Code for the Cobham Park and the Westpac Stadium Concourse, Indoor Community Sports Building designs.

The Cobham Park design was submitted in November 2008 to the Wellington City Council Building Consent and Licensing team (BCLS), as the City's accredited Building Consent Authority (BCA).

The project in its scale and innovative design includes a number of elements of design that are referred to as alternative solutions. All of the aspects of design (alternative and prescribed solutions) have been supported by adequate information requested and required by BCLS and with the exception of two minor aspects of proposal, the application has been approved in all areas as complying with the Building Code. Ewan Brown of Tennent & Brown Architects has indicated that this information is readily available, however, the design and project team (through negotiation with BCLS) have agreed for the application to remain on "suspend", until the independent review for stadium location and any potential Resource Management Act appeal hearings are resolved.

The Westpac Stadium Concourse design had not been submitted or discussed with BCLS prior to the commencement of this review. The extent of documentation provided to this review for the purpose of demonstrating compliance with the building code was limited. Although further information was provided after the submission of the original BCLS report, it remains below the level of documentation required for a project of this type.

During the initial review BCLS requested clarification on all aspects of building code compliance identified. The Concourse team through Beca Consulting Engineers did provide additional information, however there remains extensive areas of design that require clarification and widespread design development.

A significant concern has been raised by BCLS and New Zealand Fire Service (NZFS) with regard to the effect of the concourse building on the existing fire egress and the safe pedestrian access/exit from the stadium for large scale events. The original BCLS report identified the issue as significant. This was responded to with further information from Beca. BCLS instructed Geoff Thomas CPEng (PHD Fire) to provide a review of the information and fire design rationale proposed by Beca. He commented that the fire design proposed was not definitive and still required extensive review. He concluded that depending upon the design option and the intended use; it may necessitate radical re-evaluation of the existing evacuation provisions for the Westpac Trust Stadium. Based on the significant issues identified, the Stadium Concourse as proposed would not provide reasonable grounds to demonstrate compliance with the building code.

## 1.1 Cobham Park Development

### 1.2 Current status of compliance

All of the aspects of design (alternative and prescribed solutions) have been supported by adequate information requested and required by BCLS and with the exception of two minor aspects of design, the application has been approved in all areas as complying with the Building Code. Ewan Brown of Tennent & Brown Architects has indicated that this information is readily available.

The building consent for the ISCC Cobham Park is awaiting two final pieces of information from the design team. The two items of information are:

1. Waterproofing detail to the glazing /concrete panel interface.
2. The final peer review documentation for the Siphonic surface water drainage.

It has been conveyed to the design and project team that once these two items are received BCLS will issue the full building consent.

It has been mutually agreed that the project will remain suspended awaiting these two minor items whilst this review is completed.

### 1.3 Project compliance solutions proposed

The Cobham Park project design team engaged in pre-application discussion with the WCC building control team approximately 12 months ahead of the application date (Application received Nov 2008). BCLS discussed all aspects of the design in principle prior to receipt of the application. Through this process it was possible to identify the particular aspects of design that would require in-depth review and specifically expert opinion to demonstrate compliance.

### 1.4 Alternative compliance solutions proposed

The main areas of alternative design identified were:

- **B1** Structure
- **B2** Durability (materials)
- **C2–C4** Fire Design
- **D1** Accessible provisions
- **E2** Façade (External Moisture)
- **G1** Sanitary provisions
- **G4** Ventilation

#### 1.4.1 B1 Structure

The structural design provided for the Cobham Park project was proposed by Sinclair Knight & Merz (SKM) and peer reviewed for BCLS by Beca Consulting Engineers. The review did identify queries with regard to the locating of the building in an area identified as potentially prone to seismic induced settlement, as a result of liquefaction. However, the calculations supporting the design were found to be acceptable on the basis of achieving compliance with the building code on reasonable grounds.

Note: The New Zealand Building Code sets out performance standards that all new building work must meet to achieve the intended principles of the Building Act. The primary objective of the Building Act is to provide health and safety for users. Property protection is not a primary objective of the Building Act, except where it relates to persons affected by the use of a building.

Note: The proposed buildings performance for structure will be reviewed in greater detail by Peter Smith's report

#### **1.4.2 B2 Durability (materials) E2 Façade (External Moisture)**

The choice of materials is critical in a marine environment to ensure that buildings durability can be maintained. Durability of materials of construction effects primarily structure and integrity; however there can also be adverse effects on services. The NZ Building Code (NZBC) requires:

- The structure and concealed elements of construction of a building to last no less than 50 years from the issuing of code compliance certificate
- The external fabric and moderately concealed elements of construction of a building to last no less than 15 years from the issuing of code compliance certificate.
- The linings, protective coatings and other building elements are to last no less than 5 years from the issuing of code compliance certificate

The proposed buildings facade is a combination of lightweight aluminium roof system, walls of staggered pre-cast concrete panels with glazing in between.

The products selected for the external façade have demonstrated on reasonable grounds that their serviceable life expectancy is well in excess of the building code requirements. The roof system is supported by a 25 year warranty and is reported to have a life expectancy of 40+ years. Concrete panels have in service history in excess of 50 years and the glazing system elements will provide 15 years serviceable life if properly maintained.

The choice of pre-cast concrete panels for the wall construction is a proven technology for structure, durability and weathertightness. The Council did not require specific expert opinion for this system apart from the detailing of the intersection with the glazing system.

#### **1.4.3 C2–C4 Fire Design**

The design was proposed by Greg Barnes ME, ME FireE, CPEng of Holmes Fire and Safety Ltd on the basis of first principle fire engineering. The Council required the proposal to demonstrate compliance with NZBC

- C2 Means of escape from fire,
- C3 Spread of fire and
- C4 Structural stability during fire.

The fire safety design and modelling was reviewed by Geoff Thomas (PhD in Fire Engineering, Chartered Professional Engineer and Lecture of Victoria University of Wellington).

The Council's decision to approve was made on the basis of the review of the design scope, competency of both original designer, the competency and satisfactory review by the peer reviewer and the satisfactory review by the NZFS DRU.

#### **1.4.4 D1 Accessibility**

The Building Act 2004 specifically requires that all new public buildings provide access and facilities for persons with disabilities (accessibility). Ron Pynenberg who is a registered Architect, ex- president of the Registered Architect association and a Barrier Free Trust of NZ, barrier free auditor and seminar presenter was appointed to review the design. With minor amendments the design was revised and it was agreed by both the Council and the peer reviewer that the project demonstrated compliance for accessibility.

#### **1.4.5 G1 Sanitary provisions**

The design team provided a report supporting the maximum gender numbers associated with the large scale events and proposed to utilise an innovative swing sign approach by which the gender of a toilet area could be switched dependant upon the event happening. This proposal was technically an alternative solution; however the BCLS staff was suitably qualified to review the proposal and accepted it as suitable means of compliance.

#### **1.4.6 G4 Ventilation**

The requirement for building code compliance for ventilation was assessed through the design proposed by Ehrmann Volkers of SKM. Because the design of natural ventilation of this scale is a specialist field David Fullbrook from eCubed Building Workshop Ltd was identified as an appropriate peer reviewer for the design and confirmed the system design was acceptable.

### **1.5 Building Code limitations**

During the processing of the building consent application it was identified to the design and project team that the design whilst compliant, did not afford the client property protection in full by means of complying with the New Zealand Building Code.

The specific areas of design discussed were structure and fire and it was identified that whilst the calculations supporting the design were found to be acceptable on the basis of achieving compliance with the building code on reasonable grounds, the building code's level of compliance was the minimum requirement under the Building Act and is specifically targeted at building user safety. Property protection is only required in part to contain a hazard from spreading to other properties and extending the risk to emergency services.

## **2.0 Westpac Stadium Concourse**

### **2.1 Current Status of compliance**

The Westpac Stadium Concourse design had not been submitted or discussed with BCLS prior to the commencement of this review. The extent of documentation provided to this review for the purpose of demonstrating compliance with the building code was limited. Although further information was provided after the submission of the original BCLS report, it remains below the level of documentation required for a project of this type, requiring extensive design clarification and further design development.

A significant concern was raised by BCLS and New Zealand Fire Service (NZFS) with regard to the effect of the concourse building on the existing fire egress and the safe pedestrian access/exit from the stadium for large scale events remains and has now been supported by expert peer review.

Based on the significant issues identified the Stadium Concourse as proposed does not provide reasonable grounds to demonstrate compliance with the building code.

### **2.2 Project compliance solutions proposed**

The WSC project design team have not engaged in any form of pre-application discussion with the BCLS team and this review is based on the documentation provided by Tim Harrod of the Project Management Office (PMO) and enquiries made following initial discussions at the presentation of the WSC project team to the review panel.

Following the review meeting on 16 March 2009, initial building code compliance assessment was made by BCLS; the assessment document was forwarded to Tim Harrod PMO, on 20 March 2009.

The original BCLS report was submitted to the review panel on 31<sup>st</sup> March as scheduled. Further information to support the design and specifically the fire design rationale was received by BCLS on 1<sup>st</sup> and 2<sup>nd</sup> April.

### **2.3 Comparison assessment**

Detailed below for the purpose of comparison is an assessment of four main areas of alternative design for the Concourse option compared to those previously described for the Cobham project. These areas were identified through the Cobham review as elements of design that required comprehensive analysis.

Due to the lack of information provided the author has made assumption based on industry and regulatory knowledge/experience and applied to the design documentation provided.

The areas of alternative design assessed are:

- Structure
- Façade (External Moisture)
- Durability (materials)
- Fire Design

#### **2.3.1 B1 Structure**

The building structure rationale was proposed Adam Thornton CPEng of Dunning Thornton Consultants. If the application was to progress it would be subject to a full peer review process identical to that undertaken on the Cobham Park proposal

Note: The proposed buildings performance for structure will be covered by Peter Smith's report.

### **2.3.2 Facade – B2 Durability and E2 External Moisture**

The proposed buildings facade was assumed to be identical to the materials and systems used on the Westpac Stadium. BCLS would require considerable investigation before accepting the use of the same materials on any future project as it is aware that corrosion issues have been identified on the Stadium. It is also worth noting that knowledge of weathertight design for buildings has dramatically increased since the stadium design and it would be the responsibility of the applicant to demonstrate that the building provides sufficient protection against external moisture. If the application was to progress it would be potentially be subject to a full peer review depending greatly upon further information provided to support the design.

Note: For the purpose of the cost analysis it was assumed that the façade materials for both projects were identical.

### **2.3.3 C2 –C4 Fire**

The original fire design for the Concourse proposal was also proposed by Greg Barnes ME, ME FireE, CPEng when he was working at Beca Engineering Consultants in 2003.

Beca's provided an up to date comment through Jason King Senior Fire Engineer. His initial comment on the fire design was via phone conversation and he conceded that in the timeframe available he would not be able to provide a response. I asked that he conveyed that to his client.

The original BCLS report was submitted on 31 March 2009 and at that time no further fire design rationale had been provided directly to BCLS and therefore a conclusion was made based on the limited information provided, discussions with NZFS and research carried out by BCLS.

On 1<sup>st</sup> and 2<sup>nd</sup> April BCLS received additional information from Beca with regard fire design. BCLS instructed Geoff Thomas CPEng (PHD Fire) to provide a review of the fire design rationale proposed. He concluded that the fire design was not definitive, still requiring extensive review and depending upon the design option and the intended use, it may necessitate radical re-evaluation of the existing evacuation provisions for the Westpac Trust Stadium.

## **2.4 Additional aspects of Building code compliance considered**

WCC public drainage team provided comment on the capacity for additional services to be connected in the area. Engineers for Capacity indicated that the pump station on Cornwall St that served the stadium currently runs at full capacity when a large event is taking place and therefore staging full capacity events in the Stadium and ISCB would be beyond current capabilities.

## 3.0 Building Code Compliance Conclusion

The Cobham Park design was submitted in November 2008 to the Wellington City Council Building Consent and Licensing team (BCLS), as the City's accredited Building Consent Authority (BCA).

The methods for demonstrating compliance ranged from the use of acceptable solution, material manufacturers warranty, expert opinion (both quantitative and qualitative) and documented in-service history. The project included a number of elements of design that are referred to as alternative solutions. All of the major alternative solutions and the method for documenting their compliance on reasonable grounds have been outlined in this report.

During the processing of the building consent application it was identified to the design and project team that the design whilst compliant, did not afford the client property protection in full. The specific areas of design discussed were structure and fire and it was identified that whilst their proposal demonstrated compliance with the building code, the building code's level of compliance was the minimum requirement under the Building Act and is specifically targeted at building user safety. Property protection is only required in part to contain a hazard from spreading to other properties and extending the risk or emergency services.

The two minor aspects of design that are outstanding to demonstrate compliance with the building code have been discussed with Tennent & Brown Architects in full. In conclusion, the Cobham Park project subject to the information outstanding demonstrates compliance with the building code.

The Westpac Stadium Concourse design in contrast to the Cobham Park project was not discussed with BCLS, prior to the commencement of this review. The extent of documentation provided to this review for the purpose of demonstrating compliance with the building code, was limited and was comprehensively below the level of documentation required for a project of this type. The review has identified extensive areas of design that require clarification and widespread further design development.

The continued access and egress to the stadium is a particular design issue that has been reviewed and discussed in depth as part of this report. BCLS engaged in informal discussion with the NZFS and received unanimous support for its conclusion of insufficient fire egress. BCLS also discussed informally with consulting fire engineers the specific matter of the suitability of the enclosed concourse to provide a 'safe place' for patrons evacuating the stadium in a fire scenario. Unfortunately at that time the fire engineering consultants for the Concourse project were provided with limited time to comment and the original BCLS report concluded that *'the continuation and increased requirements for safe entrance, exit and evacuation to both venues should have been one of the main factors to be taken account of in the design and the rationale for fire egress as proposed would require fundamental re-design'*.

After the submission of the original BCLS report further information to support the fire design was submitted by Beca. BCLS instructed Geoff Thomas CPEng (PHD Fire) to provide a review of the information and fire design rationale proposed. He commented that the additional fire design proposed was not definitive and still required extensive review. He concluded that depending upon the design option and the intended 'use', it may necessitate radical re-evaluation of the existing evacuation provisions for the Westpac Stadium.

It remains BCLS's opinion that the continuation and increased requirements for safe entrance, exit and evacuation to both venues should have been one of the main factors to be taken account of in the design. The rationale for fire egress as presently proposed still requires

significant clarification and any future proposal for the air space should give primary design consideration to this matter.

To conclude based on the current design material provided BCLS must unfortunately acknowledge that the extent of the design issues identified are still significant and the scheme as proposed would not demonstrate compliance with the building code.