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**I hereby give notice that a Confidential Special Council Meeting will be held on:**

**Date: Monday, 3 June 2019**  
**Time: 5.30 p.m.**  
**Location: Council Chamber**  
**Civic Centre**  
**10 Watson Terrace**  
**Mount Gambier**

# **AGENDA**

## **Confidential Special Council Meeting 3 June 2019**

**Andrew Meddle**  
**Chief Executive Officer**

**31 May 2019**

## 4.2 COMMUNITY AND RECREATION HUB - TIMBER FEASIBILITY STRUCTURE STUDY – REPORT NO. AR19/27070

### CONSIDERATION FOR EXCLUSION OF THE PUBLIC

Pursuant to section 90(2) of the *Local Government Act 1999* the Council orders that all members of the public, except Mayor L Martin, Councillors K Amoroso, M Bruins, B Hood, P Jenner, C Greco, S Mezinec, F Morello and S Perryman and Council Officers A Meddle, B Cernovskis, P Lee, N Serle, S McLean, H Gajic and A Lavia be excluded from attendance at the meeting for the receipt, discussion and consideration in confidence of Agenda Item 4.2 AR19/27070 Community and Recreation Hub - Timber Feasibility Structure Study.

The Council is satisfied that, pursuant to section 90(3) (b) and (k) of the Act, the information to be received, discussed or considered in relation to the Agenda Item is:

- information the disclosure of which could reasonably be expected to confer a commercial advantage on a person with whom the Council is
  - conducting business; or
  - proposing to conduct business; or
  - to prejudice the commercial position of the Council
- tenders for the:
  - supply of goods, or
  - the provision of services, or
  - the carrying out of works

The Council is satisfied that the principle that the meeting be conducted in a place open to the public has been outweighed in the circumstances because the information contained in the report and to be discussed includes detailed costings and other information relevant to the specification and assessment of a tender submission which, if disclosed, is considered to reasonably confer an advantage on tender respondents and accordingly prejudice the commercial position of council and therefore not be in the public interest as tender submissions may be unduly influenced and detrimental to achieving best value for the community.

**4.2 COMMUNITY AND RECREATION HUB - TIMBER FEASIBILITY STRUCTURE STUDY  
– REPORT NO. AR19/27070**

<b>Committee:</b>	<b>Council</b>
<b>Meeting Date:</b>	<b>3 June 2019</b>
<b>Report No.:</b>	<b>AR19/27070</b>
<b>CM9 Reference:</b>	<b>AF13/64</b>
<b>Author:</b>	<b>Heidi Gajic, Community Development and Engagement Officer</b>
<b>Authoriser:</b>	<b>Barbara Cernovskis, General Manager Community Wellbeing</b>
<b>Summary:</b>	<b>Recommendation for the use of timber as a structural elements in the construction of the Community and Recreation Hub.</b>
<b>Community Plan Reference:</b>	<b>Goal 1: Our People</b> <b>Goal 3: Our Diverse Economy</b> <b>Goal 4: Our Climate, Natural Resources, Arts, Culture and Heritage</b>

The Council is satisfied that, pursuant to Section 90(2) & (3) of the *Local Government Act 1999*, the information to be received, discussed or considered in relation to this agenda item is:

- (b) information the disclosure of which could reasonably be expected to confer a commercial advantage on a person with whom the Council is conducting business; or proposing to conduct business; or to prejudice the commercial position of the Council
- (k) tenders for the: supply of goods, or the provision of services, or the carrying out of works.

**REPORT RECOMMENDATION**

1. That Council Report No. AR19/27070 titled 'Community and Recreation Hub - Timber Feasibility Structure Study' as presented on 03 June 2019 be noted.
2. That Council accept the recommendation presented in the Timber Feasibility Structure report and endorse the timber option for the Pool Hall and the Hybrid Option 1 for the Courts as the structural elements to be included in the detailed design of the Community and Recreation Hub.



## BACKGROUND

In preparation for completion of the detailed design for the Community and Recreation Hub the architects, DesignInc and Co-Op Studios have engaged specialised consultants to undertake site investigations and feasibility studies into various elements of the facility.

SCP Consulting (SCP) have been contracted to complete a Timber Structure Feasibility Study for the new facility.

## DISCUSSION

Timber is being considered as a potential construction material for the building structure of the Community and Recreation Hub. The proposed facility consists of three main functional areas, the Pool Hall, the Indoor Courts and the Amenities area (refer page 21 Attachment 1).

Of these functional areas, timber structural elements have been considered for the Pool Hall and Indoor Courts. Due to the large spans and open volumes of the spaces, these areas provide opportunity to leverage the benefits of timber as a structural material whilst having the most visual impact.

For each of the functional areas, timber structural elements bring a number of advantages and disadvantages compared with conventional steel framed construction. In order to compare timber versus steel, SCP prepared a feasibility assessment which identifies the advantages, disadvantages and order of cost for timber and steel construction based on intermediate designs for the facility. Where the cost of timber is deemed to be cost prohibitive, consideration of hybrid timber-steel solutions has also been investigated.

For the purposes of comparison, timber was considered for the three (3) key structural elements of beams, columns and roof (roof diaphragm system). These structural elements provide the most opportunity for visual impact and represent the majority of cost for the facility superstructure.

Four (4) options have been explored for each structural element:

- The Timber option is fully timber (beams, columns, and roof)
- The Steel option is fully steel (beams, columns, and roof)
- The Hybrid option 1 is made up of steel beams, timber columns, and timber roof
- The Hybrid option 2 is made up of steel beams, steel columns, and timber roof

On analysis of all available options for each functional area and structural element SCP Consulting's recommendation is as per below table:

	Timber Option	Steel Option	Hybrid Option 1	Difference (average)
<b>Pool Hall</b>	2.0 – 2.4M	1.5 – 1.8M		+0.75M
<b>Courts</b>		4.1 – 5.0M	4.0 – 4.7M	-0.3M
<b>Total</b>				+0.45M

The Timber option is recommended for the pool hall, and Hybrid Option 1 for the courts as this balances the use of timber with its greater visual appeal and increased acoustic performance against the overall cost. These options represent an increase in cost of \$450,000 (average of expected range) in comparison with the purely steel option.

### Pool Hall

Given the moist and caustic environment in the pool hall, the whole of life risks are greater for steel elements than timber. Design measures such as high-performance finishes and special detailing will reduce degradation over time; however, there will still be localized areas susceptible to



corrosion such as exposed connection details that and will need to be maintained. Using small timber beams allows the entire structure to be sourced in Australia (refer page 21 Attachment 1).

#### Indoor Courts

Hybrid option 1 (steel beams, timber columns and timber roof), steel represents a savings of \$300,000 (average of expected range) in comparison with the steel option which is accounted by increased column height and significantly more beams and columns. The steel beams would be spaced at 6m intervals increasing the CLT requirement; however, the increased CLT depth can be included in the thermal calculations thereby reducing insulation requirements. As there is less risk to corrosion in the courts, there is less risk of surface finish failure and maintenance cost overruns with the use of steel (refer page 22 Attachment 1).

#### **CONCLUSION**

Adopting the recommendation in the Timber Structure Feasibility Assessment will increase individual elements costs translating to increases in total project costs at this point in time. However there are anticipated compensatory savings in areas such as insulation requirements and acoustic treatments with these inclusions. Additionally, there are expected efficiencies in the whole of life operating costs of the facility.

#### **ATTACHMENTS**

1. Community and Recreation Hub - Timber Feasibility Assessment [↓](#)



Report



# Mount Gambier Regional Sport and Recreation Centre Timber Structure Feasibility Assessment

**Client** CO-OP Studio  
**Project** 192003 - Mount Gambier Regional Sport and Recreation Centre  
**Revision** 1  
**Date** 24 May 2019

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## Revision Table

REVISION	DATE	ISSUE DESCRIPTION	PREPARED	REVIEWED
0	15 May 2019	Work in Progress	NP	LPC
1	24 May 2019	For Client Review	NP	LPC

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## 1 Introduction

### 1.1 Background

For the Mount Gambier Regional Sport and Recreation Centre Project (the 'Project'), timber is being considered as a potential construction material for the building structure. The proposed building consists of three (main) functional areas (refer Figure 1):

- Pool Hall
- Indoor Sports Courts (Courts)
- Amenities

Of these functional areas, timber structural elements are being considered for the Pool Hall and Indoor Sports Courts. Due to the large spans and open volumes of the spaces, these areas provide opportunity to leverage the benefits of timber as a structural material whilst having the most visual impact.

For each of the functional areas above, timber structural elements bring a number of advantages and disadvantages compared with conventional steel framed construction. In order to compare timber versus steel for the Project, SCP Consulting (SCP) have prepared this feasibility assessment which identifies the advantages, disadvantages and order of cost for timber and steel construction based on preliminary sketch designs for the building. Where the cost of timber is deemed to be cost prohibitive, consideration of hybrid timber-steel solutions has also been investigated.

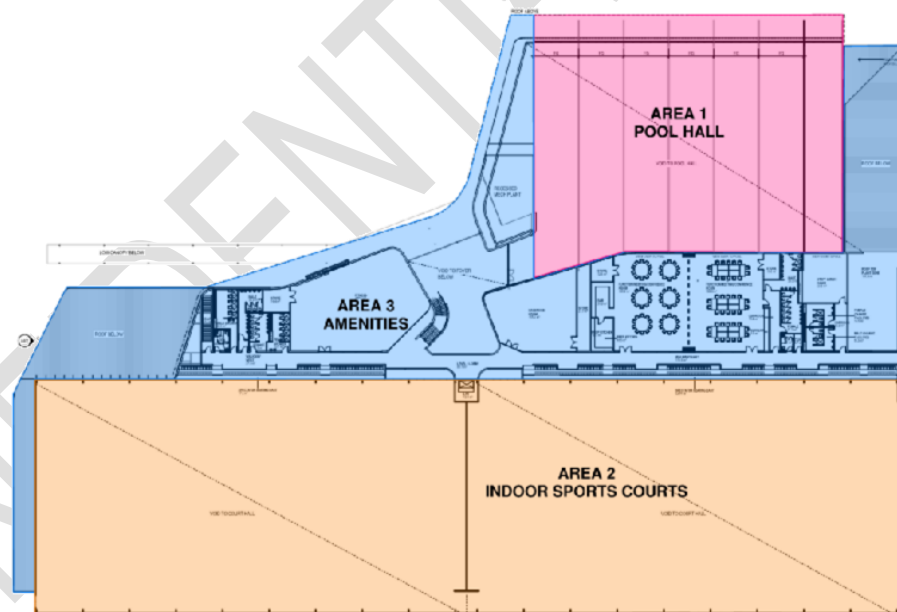


Figure 1 - Functional areas for the proposed building





## 1.2 Objectives of this Report

The core objective of this report is to assess the feasibility of timber construction on the Project, enabling Council to make an informed decision as to whether the investment in timber offers 'value-for-money' outcomes for the Project. In achieving this objective, this report will cover the following items:

- Identification of timber material options for key structural elements
- Development of a conventional steel structure alternative for each of the key structural elements
- Comparison of advantages, disadvantages of timber and steel for each of the key structural elements
- Timber suppliers and materials availability to service the Project considering location and logistics
- 'High order' costs for comparisons of timber and steel structures including Whole of Life (WOL) considerations
- Assessment of the feasibility of timber versus steel construction for each structural element based on several criteria

## 1.3 Limitations

This feasibility assessment has several limitations which should be considered during review and interpretation, including:

- The structural design is in its preliminary stages. Only preliminary structural design sketches have been prepared to date, including indicative sizing, spacing and specification for key structural elements. The structural design will be subject to changes as the design develops. These preliminary designs have been used as the basis for assessment of timber and steel members within this report;
- Costs and associated cost comparisons should be considered 'high order' only, meaning that costs have been developed based on preliminary supplier feedback, standard industry cost reference materials (e.g. Rawlinson's Construction Handbook) and engineering judgement. SCP are not qualified cost planners or quantity surveyors, and therefore any cost advice should be considered an order of magnitude only. For detailed cost advice, it is recommended that certified third-party specialists (e.g. the Project Quantity Surveyor / Cost Planner) review and provide their independent advice with regards to construction and WOL costs.





## 2 Key Structural Elements

For the purposes of comparison, timber is being considered for the three (3) key structural elements:

- Beams
- Columns
- Roof (roof diaphragm system)

These structural elements provide the most opportunity for visual impact and represent the majority of cost for the building superstructure. Timber options and a steel alternative have been investigated within this assessment for each of these key structural elements.

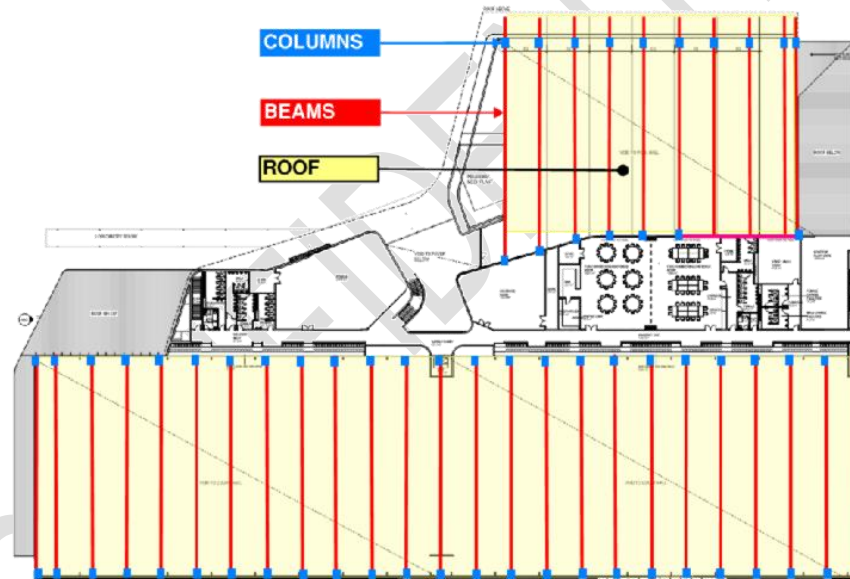


Figure 2 - Key Structural Elements



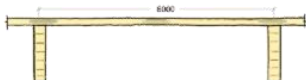





### 3 Timber and Steel Options

#### 3.1 Beams



The beams span the full width of the building of 38m without intermediate support. The design options are comprised of 13m length beams (timber) OR 19m length (steel) that would be joined together on-site to reduce manufacturing and transportation demand.

Table 1 - Beam Options

OPTION	PHOTO IDENTIFIER	ADVANTAGES	DISADVANTAGES	ROM COST
<p><b>OPTION 1 – LARGE TIMBER BEAMS</b></p> <p>Beam size for this option is 1560 (depth) x 365 (width) spaced at 6000 on centre</p> 		<ul style="list-style-type: none"> <li>Naturally resistant to corrosion in aquatic environment</li> <li>WoL benefit</li> <li>Significant timber presence</li> <li>Aligns closely with original architectural intent</li> </ul>	<ul style="list-style-type: none"> <li>Limited suppliers, no Australian suppliers</li> <li>Transportation would be freight on top of trucking</li> <li>Larger columns or transfer beam required</li> </ul>	<p>Pool Hall: 1.6 – 1.9M</p> <p>Courts: 4.4 – 5.1M</p>
<p><b>OPTION 2 – SMALL TIMBER BEAMS</b></p> <p>Beam size for this option is 1050 (depth) x 265 (width) spaced at 2000 on centre</p> 		<ul style="list-style-type: none"> <li>Reduced beam depth of 1050mm</li> <li>Reduced envelope height compared to option 1. Savings in cladding and HVAC volume</li> <li>Increased head space to house mechanical and not impede views from second floor into pool hall from amenities area</li> <li>Increased acoustic performance with coffered spaces between beams</li> <li>Reduced roofing thickness requirement</li> <li>Efficient configuration with columns spaced directly under beams doubling as mullions</li> <li>Local manufacturers produce beam size</li> <li>Lighter, smaller beams are easier to handle and install with smaller crane requirement</li> <li>Resistant to corrosion in aquatic environment</li> </ul>	<ul style="list-style-type: none"> <li>Increased installation time with more glulam beams to place (compared to 6.0m spacing option)</li> <li>Cost</li> </ul>	<p>Pool Hall: 1.2 – 1.4M</p> <p>Courts: 3.4 – 4.0M</p>





OPTION	PHOTO IDENTIFIER	ADVANTAGES	DISADVANTAGES	ROM COST
<p><b>OPTION 3 – STEEL BEAMS</b></p> <p>Beam size for this option is 1000 WB 258 spaced at 6000 on centre</p> 		<ul style="list-style-type: none"> <li>• Increased head space to house mechanical and not impede views from second floor into pool hall from amenities area</li> <li>• Local manufacturers available</li> <li>• Reduced transportation demand with less members</li> <li>• Reduced envelope height compared to option 1. Savings in cladding and HVAC volume</li> <li>• Cost effective solution</li> <li>• Does “heavy lifting” for long spans while integrating with timber roof and columns to provide overall timber presence</li> <li>• Simple connection detailing</li> </ul>	<ul style="list-style-type: none"> <li>• Higher maintenance to inhibit corrosion</li> <li>• Reduced timber supply</li> <li>• On site welding and localised high-performance coatings increases installation time</li> <li>• Larger columns or transfer beam required</li> </ul>	<p>Pool Hall: 0.6 – 0.7M</p> <p>Courts: 1.6 – 1.9M</p>

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### 3.2 Columns


The columns support the long spanning beams and transfer the roof load down to the foundations. The column elements represent a good opportunity to showcase timber as they will be in close proximity to community centre patrons

Table 2 - Column Options

OPTION	PHOTO IDENTIFIER	ADVANTAGES	DISADVANTAGES	ROM COST
<p><b>OPTION 1 – LARGE TIMBER COLUMNS</b></p> <p>Column size for this option is 265x600 spaced at 6000mm on centre</p>		<ul style="list-style-type: none"> <li>Resistant to corrosion in aquatic environment</li> <li>Efficient configuration with columns spaced directly under beams doubling as mullions</li> <li>Can be supplied locally</li> </ul>	<ul style="list-style-type: none"> <li>Increased upfront cost</li> <li>Additional mullions would be required</li> <li>Increased localised load on foundations</li> </ul>	<p>Pool Hall: 0.2 - 0.3M</p> <p>Courts: 0.6 – 0.7M</p>
<p><b>OPTION 2 – SMALL TIMBER COLUMNS</b></p> <p>Column size for this option is 215x450 spaced at 2000mm on centre</p>		<ul style="list-style-type: none"> <li>Resistant to corrosion in aquatic environment</li> <li>Reduced column size in comparison to 6m span option</li> <li>Efficient configuration with columns spaced directly under beams doubling as mullions</li> <li>Local manufacturers are able produce beam size</li> </ul>	<ul style="list-style-type: none"> <li>Increased assembly time with more glulam beams to place (compared to 6m spacing option)</li> <li>More volume of timber resulting in higher cost</li> <li>Transfer beam required with 6m spaced beam options</li> </ul>	<p>Pool Hall: 0.3 – 0.4M</p> <p>Courts: 0.9 – 1.0M</p>





OPTION	PHOTO IDENTIFIER	ADVANTAGES	DISADVANTAGES	ROM COST
<p><b>OPTION 3 – STEEL COLUMNS</b></p> <p>Column size for this option is 310 UC 158 spaced at 6000 on centre</p>		<ul style="list-style-type: none"> <li>Local manufacturers are able produce beam size</li> <li>Lower upfront cost</li> <li>Reduced column dimensions</li> </ul>	<ul style="list-style-type: none"> <li>Higher maintenance WOL costs to inhibit corrosion</li> <li>Reduced timber supply</li> <li>Additional mullions would be required</li> <li>Increased localised load on foundations</li> </ul>	<p>Pool Hall: 0.1 – 0.2M</p> <p>Courts: 0.4 – 0.6M</p>

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### 3.3 Roof

Although it is not typically considered as grand as building columns and beams, the roof is capable of showcasing timber in a cost-effective manner. The roof diaphragm spans the beams and supports the waterproofing, insulation, electrical fixtures, ventilation ducting etc. Additionally, it can act as a diaphragm to transfer lateral loads to bracing elements in the walls.

Table 3 - Roof Diaphragm Options

OPTION	PHOTO IDENTIFIER	ADVANTAGES	DISADVANTAGES	ROM COST
<p><b>OPTION 1 – 3PLY CLT ROOF DIAPHRAGM</b></p> <p>Panels 12000 x2400 optimised for transportation.</p> <p>Thickness of this option is ~105mm</p> 		<ul style="list-style-type: none"> <li>Resistant to corrosion in aquatic environment</li> <li>Desirable timber aesthetics</li> <li>Reduced assembly time</li> <li>Can transfer lateral (wind) loads to central core of building increasing open glazing area</li> <li>Cost effective with less volume of timber</li> </ul>	<ul style="list-style-type: none"> <li>Reduced allowable span – requires maximum beam spacing of 3.0m.</li> </ul>	<p>Pool Hall: 0.5 – 0.6M</p> <p>Courts: 1.2 – 1.4M</p>
<p><b>OPTION 2 – 5PLY CLT ROOF DIAPHRAGM</b></p> <p>Panels 12000 x2400 optimised for transportation.</p> <p>Thickness of this option is ~175mm</p> 		<ul style="list-style-type: none"> <li>Resistant to corrosion in aquatic environment</li> <li>Desirable timber aesthetics</li> <li>Reduced assembly time</li> <li>Provides thermal resistivity reducing insulation requirements</li> <li>Can transfer lateral (wind) loads to central core of building increasing open glazing area</li> <li>Increased spanning capabilities</li> </ul>	<ul style="list-style-type: none"> <li>Heavier option increasing loads in beams and columns</li> <li>Increased volume of timber results in increased cost compared to Option 1.</li> </ul>	<p>Pool Hall: 0.7 – 0.8M</p> <p>Courts: 1.8 – 2.1M</p>





OPTION	PHOTO IDENTIFIER	ADVANTAGES	DISADVANTAGES	ROM COST
<p><b>OPTION 3 – STEEL PURLINS, STEEL SHEETING</b></p> <p>Z20019 @ 1200 cc topped with Kliplok 406 and insulation</p> 		<ul style="list-style-type: none"> <li>• Common construction practice</li> <li>• Locally supplied</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced application of timber</li> <li>• Requires ceiling panels for acoustics</li> <li>• Increased construction time</li> <li>• Higher maintenance demand in pool hall</li> <li>• Increased cost</li> <li>• Reduced lateral load distribution ability</li> </ul>	<p>Pool Hall: 0.8 – 0.9M</p> <p>Gym: 2.1 – 2.5</p>

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#### 4 Timber Suppliers

Local suppliers have been contacted to inform design options and limitations. The following table is a summary of suppliers contacted and their capabilities in regard to product dimensions as detailed in the options.

Table 4 - Timber Supplier Matrix

SUPPLIER AND CONTACT	LOCATION OF MANUFACTURE	OPTION 1 - LARGE TIMBER BEAMS	OPTION 2 - SMALL TIMBER BEAMS	OPTION 1 - LARGE TIMBER COLUMNS	OPTION 2 - SMALL TIMBER COLUMNS	OPTION 1 - CLT TIMBER PANELS 3PLY	OPTION 2 - CLT TIMBER PANELS 5PLY
<b>Hyne</b> Robert Mansell - Business Development Manager 0407 646 416 robert.mansell@hyne.com.au	Tumbarumba, Australia	✗	✓	✓	✓	✗	✗
<b>XLam</b> Anthony Antonino - Technical Sales Representative +61 (0) 458 333 886 Anthony.Antonino@xlam.com.au	Wodonga, Australia	✗	✗	✗	✗	✓	✓
<b>CrossLam</b> Philip Kemp - Operations Manager +61 8 6244 3830 sales@crosslamaustralia.com.au	Perth, Australia	✗	✗	✗	✗	✓	✓

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SUPPLIER AND CONTACT	LOCATION OF MANUFACTURE	OPTION 1 - LARGE TIMBER BEAMS	OPTION 2 - SMALL TIMBER BEAMS	OPTION 1 - LARGE TIMBER COLUMNS	OPTION 2 - SMALL TIMBER COLUMNS	OPTION 1 - CLT TIMBER PANELS 3PLY	OPTION 2 - CLT TIMBER PANELS 5PLY
<b>TimberLab</b> Andrew Hewitt – Project Manager Ph: +64 09 253 9349 / Mo: 027 808 3289 andrew@timberlab.co.nz	Auckland, NZ	✓	✓	✓	✓	✗	✗
<b>KLH</b> Stefan Fritz - Technical Sales Ph. 43-3588-8835-61 Cell. 43-664-54-84-678 Stephan.fritz@klh.at	Austria	✗	✗	✗	✗	✓	✓
<b>Hess</b> Rensteph Thompson - Managing Director Tel. +49 (0) 93 71 / 40 03 – 111 rensteph.thompson@hess-timber.com	Kleinheubach, Germany	✓	✓	✓	✓	✗	✗
<b>BinderHolz</b> Patrick Rehr - Sales manager Phone: +43 6245 70500-17156 patrick.rehr@binderholz.com	Hallein, Austria	✓	✓	✓	✓	✓	✓





## 5 Proposed Design Options Summary

Plan view sketches of the options for the structure are appended.

- The Timber option is fully timber (beams, columns, and roof)
- The Steel option is fully steel (beams, columns, and roof)
- The Hybrid option 1 is made up of steel beams, timber columns, and timber roof
- The Hybrid option 2 is made up of steel beams, steel columns, and timber roof

Table 5 - Proposed design summary

	STEEL	TIMBER	
DESIGN OPTION	BEAM OPTION		COLUMN OPTION
	ROOF OPTION		
<b>Timber</b> (Annexure A)	Option 2 - Small Timber Beams	Option 2 - Small Timber Columns	Option 1 - 3Ply CLT Timber panels
<b>Steel</b> (Annexure B)	Option 3 - Steel Beams	Option 3 - Steel Columns	Option 3 - Steel purlins & sheeting
<b>Hybrid Option 1</b> (Annexure C)	Option 3 - Steel Beams	Option 1 - Large Timber columns	Option 2 - 5Ply CLT Timber panels
<b>Hybrid Option 2</b> (Annexure D)	Option 3 - Steel Beams	Option 3 - Steel Columns	Option 2 - 5Ply CLT Timber panels





## 6 Cost Considerations

### 6.1 ROM Capital Costs

Costs and associated cost comparisons should be considered 'high order' only, meaning that costs have been developed based on preliminary supplier feedback, standard industry cost reference materials (e.g. Rawlinson's Construction Handbook) and engineering judgement. Costs presented include material, transportation, and installation.

The costing information does not include ongoing maintenance costs. The costing has included high performance finish allowance for steel and deep penetrating oil finish allowance for timber; however, it is expected that steel elements will have associated risk of corrosion and increased WoL cost in the pool hall area.

**The costs summarized are in reference to the three design options as appended.**

Table 6 - ROM capital cost summary

POOL HALL			
Timber Option	Steel Option	Hybrid Option 1	Hybrid Option 2
2.0 – 2.4M	1.5 – 1.8M	1.5 – 1.8M	1.4 – 1.7M

INDOOR SPORTS COURTS			
Timber Option	Steel Option	Hybrid Option 1	Hybrid Option 2
5.5 – 6.4M	4.1 – 5.0M	4.0 – 4.7M	3.8 – 4.6M





## 6.2 Transportation Considerations

It is understood that the transportation portion of the supply can be contracted out locally, and therefore, an understanding on the value of this work is appreciated. Costs and consideration are based on preliminary sketches and discussions with suppliers and trucking companies. Transportation cost (trucking, shipping) increases after 12m and significantly when beams are greater than 19m long and again after 35m (SA transportation guidelines require special assessment requiring 3 pilots and police escort over 40m length including truck length)

If material is sourced from overseas the nearest port to Mt Gambier is Portland ~120km away.

- A typical load of 12m length from Portland to Mt Gambier is approximately \$1000.
- For a load up to 35m the price is ~\$5000 including pilots and police escorts

If material is sourced locally, timber would be sourced from Tumbarumba, NSW, Wodonga, NSW, and/or Perth, WA.

- A typical load of 12m length from Wodonga to Mt Gambier is approximately \$3500.

## 6.3 Whole of Life (WoL) Considerations

WoL is especially important in the pool hall where high moisture content and ambient chlorine exists. Deep penetrating oils would be used to inhibit water egress into the wood fiber and end grain would be physically capped and protected from rainwater.

In the pool hall, chloramines in the air concentrate on the surface of the structural elements and create localised pockets thereby rendering steel elements susceptible to corrosion. As such, steel beams would require high performance finishes such as hot dipped galvanisation or three coat epoxy system. This finishing process accounts for ~1/3 of the steel cost (beams).

Timber on the other hand is not susceptible to corrosion; however, will require feed stock to be treated to H3 level as per AS 1604 and finished with penetrating oil to inhibit moisture egress and rotting as well as considering termite and a white ant infestation. Wood fiber end grain is particularly susceptible to moisture egress; therefore, all end grain elements will be physically capped with steel and protected from rainwater. Steel connection plates required to join the timber elements will be concealed within the timber and hot dipped galvanized.

The base of the columns will require specific detail in the pool hall to ensure no water is trapped both to prevent corrosion of the steel and rot for the timber. Typical detailing would raise the timber off the foundation with a splice plate and tiled to allow ventilation and water escape.





## 7 Options Assessment

Table 7 - Options Assessment Matrix

	Best value with low associated risk
	Good value with some inherent risk
	Limited value and some inherent risk
	Poor value and high risk

STRUCTURAL ELEMENT	OPTION	VISUAL IMPACT	LOCAL SUPPLY	CONSTRUCTION COMPLEXITY	WOL BENEFITS	MATERIAL COST	TRANSPORT COST	COMMENTARY
Beams	Option 1 - Large Timber Beams							Most expensive; best visual impact; no local suppliers.
	Option 2 - Small Timber Beams							Locally supplied, increased installation time
	Option 3 - Steel Beams							Cost effective; can be locally supplied, increased WoL cost in pool hall
Columns	Option 1 - Large Timber Columns							Cost effective, can be locally supplied
	Option 2 - Small Timber Columns							Integrates with mullions, increased cost, can be locally supplied
	Option 3 - Steel Columns							Cost effective, can be locally supplied, increased WoL cost in pool hall
Roof	Option 1 - CLT Timber panels 3ply							Only available with reduced spacing of beams as per option 2.
	Option 2 - CLT Timber panels 5ply							Integrates with steel beams; fast installation, locally supplied
	Option 3 - Steel purlins & sheeting							Requires ceiling panels, increased WoL cost in pool hall







## 8 Discussion

### 8.1 Beams

The beams span the full width of the building at 38m without intermediate support. To accommodate transportation and local manufacturing limitations, the design of the timber beams the timber options consist of 3 beams spliced together on site to make up the full 38m span.

Detailed design will determine a concealed timber beam connection detail; however, an example of a typical connection could entail pre-setting dowels with epoxy into the ends of each timber beam at the plant and then bolting the steel assembly together on site. Alternatively, there are proprietary technologies that allow for short timber beams to be finger jointed together on site (Hess - European glulam supplier) resulting in a steel-less connection.

Steel beams could be sourced close to Mt Gambier and may be optimised with 2x 19m lengths with a single weld at the midspan on site.

Beams must withstand high stresses in bending and shear. Although both timber and steel can achieve these required spans, steel is much better suited to achieve the architectural form resulting in reduced number of beams as well as reduced cross-sectional depth allowing for simpler coordination with mechanical systems and viewing facades etc.

The steel beams can still be integrated with timber columns and timber roof diaphragm to provide an overall timber presence in the facility while providing the cost savings that local suppliers can offer.

### 8.2 Columns

The columns support the long spanning beams and transfer the roof load down to the foundations. Timber properties efficiently resists compression forces perpendicular to the wood grain as are present in columns. Additionally, the proximity of the columns to the Centre's patrons gives timber options an advantage as they provide superior aesthetics.

The heights of the columns do not exceed 12m; therefore, there is no complicated scenarios for transporting the beams as presented herein. At these lengths, timber beams can be supplied locally or shipped economically and can be erected without complex splice connections.

### 8.3 Roof Diaphragm

The roof diaphragm spans the beams and supports the waterproofing, insulation, electrical fixtures etc. Although it is not typically considered as grand as building columns and beams, the roof diaphragm is capable of showcasing timber in a cost-effective manner. Cross laminated timber (CLT) is strong in shear capacity and transfers the lateral loads more effectively than steel purlins.

CLT panels can be sourced by local suppliers (Wodonga, NSW) and (Perth, WA) as well as numerous international suppliers. The size of the panels can be optimised for transport and maximised to reduce installation time.

The increased WoL risk as well as initial cost makes the traditional steel purlin and sheeting option uncompetitive against CLT options.





## 9 Recommendations

The recommendations of this report are separated for each functional area and structural element respectively with design plans appended.

In the pool hall, the timber option is recommended, and in the courts, the hybrid option 1 is recommended. The table below compares the recommended options against the purely steel option. The total below summarizes the cost comparison. A (+) indicates additional cost for proposed option where a (-) indicates savings in comparison to the steel alternative. **A timber option in the pool hall combined with hybrid option 1 in the courts represents an increase in cost of \$450,000 (average of expected range) in comparison with the purely steel option.**

Table 8 - Recommended option - cost comparison with steel alternative

	TIMBER OPTION	STEEL OPTION	HYBRID OPTION 1	DIFFERENCE (AVERAGE)
<b>Pool Hall</b>	2.0 – 2.4M	1.5 – 1.8M		+ 0.75M
<b>Courts</b>		4.1 – 5.0M	4.0 – 4.7M	-0.3M
<b>Total</b>				<b>+0.45M</b>

### 9.1 Pool Hall

Given the moist and caustic environment in the pool hall, the WoL risks are greater for steel elements than they are for timber. Design measures such as high-performance finishes and special detailing will reduce degradation over time; however, there will still be localized areas susceptible to corrosion such as exposed connection details and will need to be maintained.

The Timber option holds an increase in cost of \$750,000 (average of expected range) in comparison with the Steel solution which is accounted by the increased timber beam and column costs.

The beams spaced at 2.0m allows for a reduced beam profile depth of 1000mm while providing increased acoustic performance. With this reduced beam spacing, the thickness requirement for the CLT roof diaphragm is reduced. The small timber beams option allows the entire structure to be sourced in Australia.

**The timber option is recommended for the pool hall.**



Figure 3 – Photo of timber option





## 9.2 Indoor Sports Courts

Because of the larger area encompassed by the Courts, increases in individual element cost are translated to significant increases in total project costs.

The Hybrid option 1 represents a savings of \$300,000 (average of expected range) in comparison with the steel option which is accounted by increased column height and significantly more beams and columns. The steel beams in this option would be spaced at 6m intervals thereby increasing the CLT requirement; however, the increased CLT depth can be included in the thermal calculations thereby reducing insulation requirements.

As there is less risk to corrosion in the courts, there is less risk of surface finish failure and maintenance cost overruns.

The hybrid option 1 can also be fully sourced in Australia. Timber columns (as specified in hybrid option 1) have been recommended for aesthetic value however, it is noted that Hybrid option 2, with steel columns, provides additional savings as presented in the alternatives section below.

**The Hybrid option 1 is recommended for the Courts.**



Figure 4 - Photo of hybrid option

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## 10 Alternatives to Recommendation

As an alternative to the recommendation, the hybrid options could be used for both the pool hall and indoor courts, providing additional savings in cost.

The total below summarizes the cost comparison of the hybrid option with the steel option. A (+) indicates additional cost for the proposed option where a (-) indicates savings in comparison to the steel alternative.

**The hybrid option 1 in both the pool hall and courts represents a savings in cost of \$200,000 (average of expected range) compared with the steel option.**

Table 9 – Hybrid option 1 - cost comparison with steel alternative

	STEEL OPTION	HYBRID OPTION 1	DIFFERENCE (AVERAGE)
<b>Pool Hall</b>	1.5 – 1.8M	1.5 – 1.8M	0
<b>Courts</b>	4.1 – 5.0M	4.0 – 4.7M	-0.2M
<b>Total</b>			<b>-0.2M</b>

**The hybrid option 2 in both the pool hall and courts represents a savings in cost of \$450,000 (average of expected range) compared with the steel option.**

Table 10 - Hybrid option 2 - cost comparison with steel alternative

	STEEL OPTION	HYBRID OPTION 2	DIFFERENCE (AVERAGE)
<b>Pool Hall</b>	1.5 – 1.8M	1.4 – 1.7M	-0.1M
<b>Courts</b>	4.1 – 5.0M	3.8 – 4.6M	-0.35M
<b>Total</b>			<b>-0.45M</b>

**A hybrid option 1 in the pool hall and a hybrid option 2 in the courts represents a savings in cost of \$350,000 (average of expected range) compared with the steel option.)**

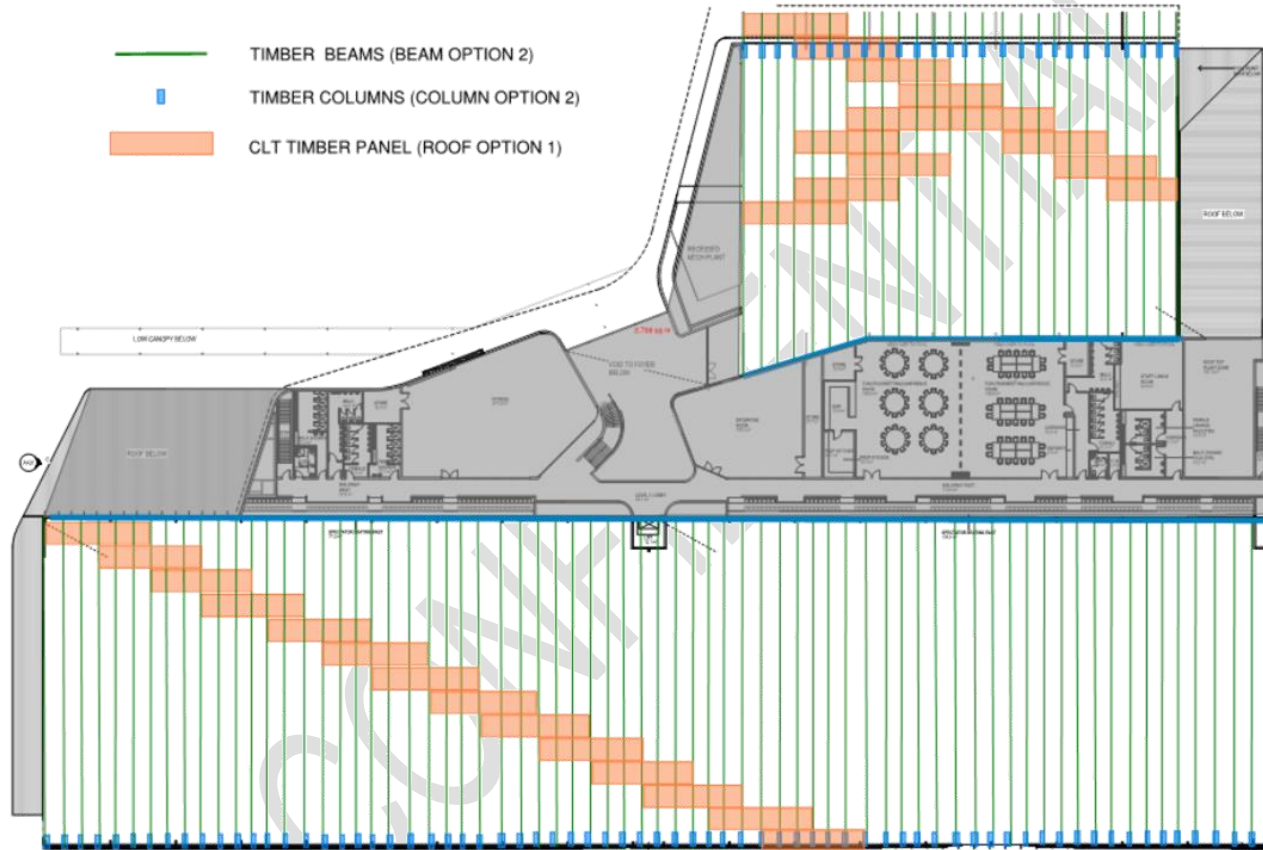
Table 11 -Hybrid options - cost comparison with steel alternative

	STEEL OPTION	HYBRID OPTION 1	HYBRID OPTION 2	DIFFERENCE (AVERAGE)
<b>Pool Hall</b>	1.5 – 1.8M	1.5 – 1.8M		0
<b>Courts</b>	4.1 – 5.0M		3.8 – 4.6M	-0.35M
<b>Total</b>				<b>-0.35M</b>





### Annexure A Preliminary Structural Sketch – Timber Option



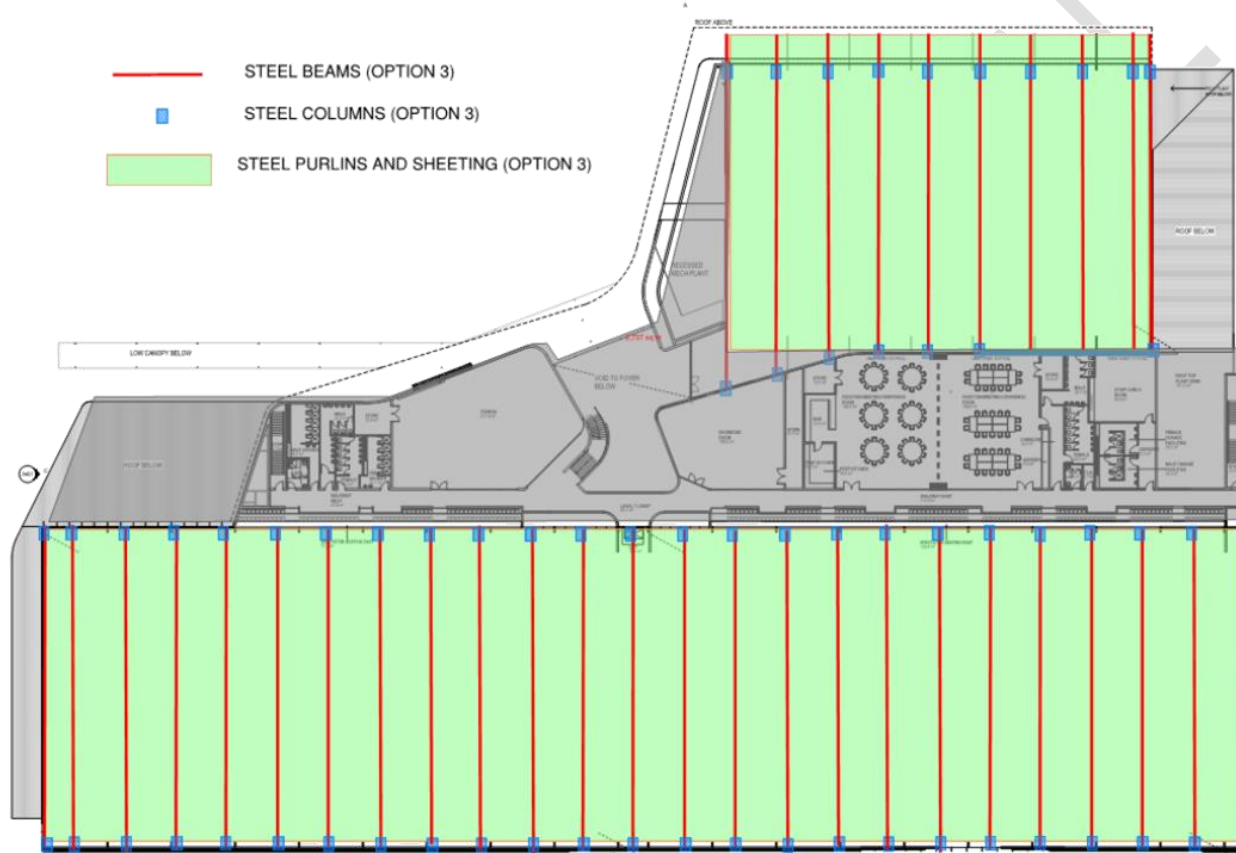
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### Annexure B Preliminary Structural Sketch – Steel Option



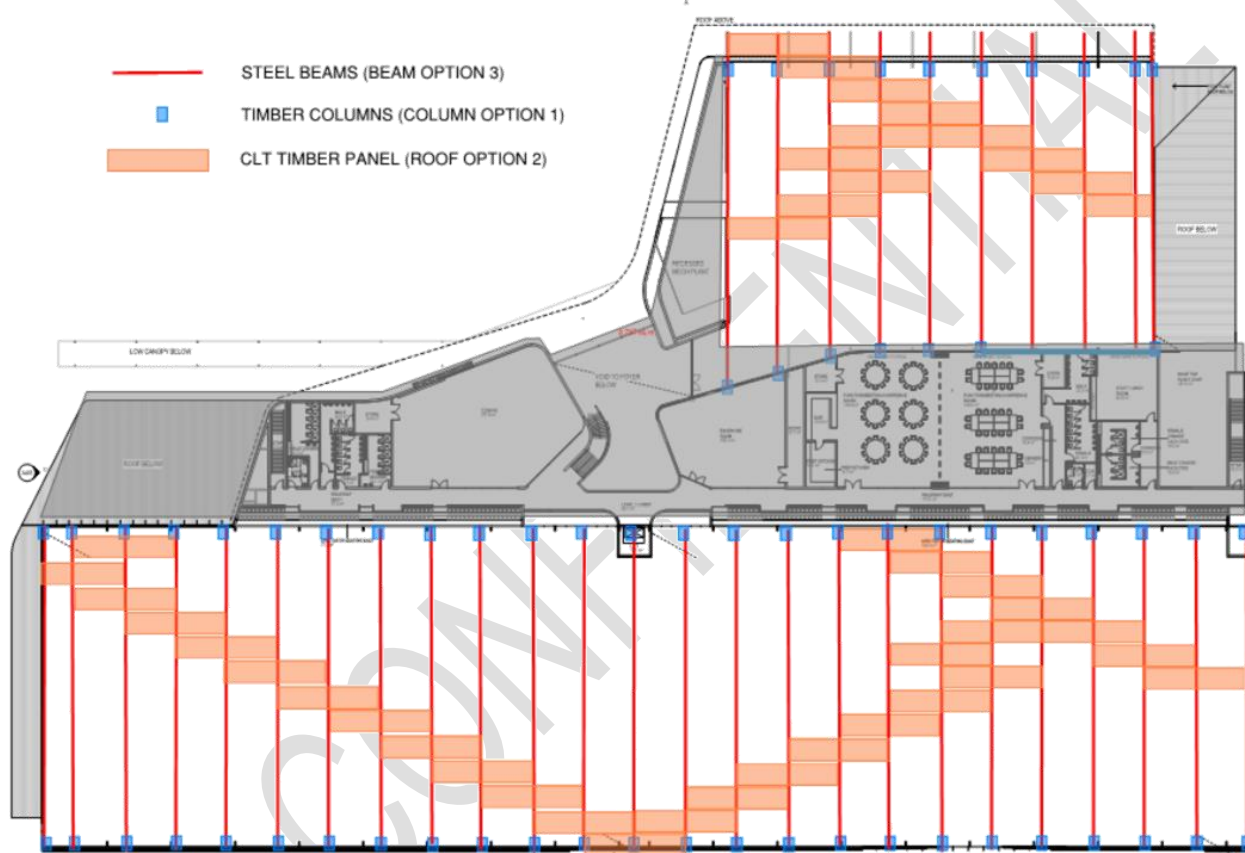
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### Annexure C Preliminary Structural Sketch – Hybrid Option 1



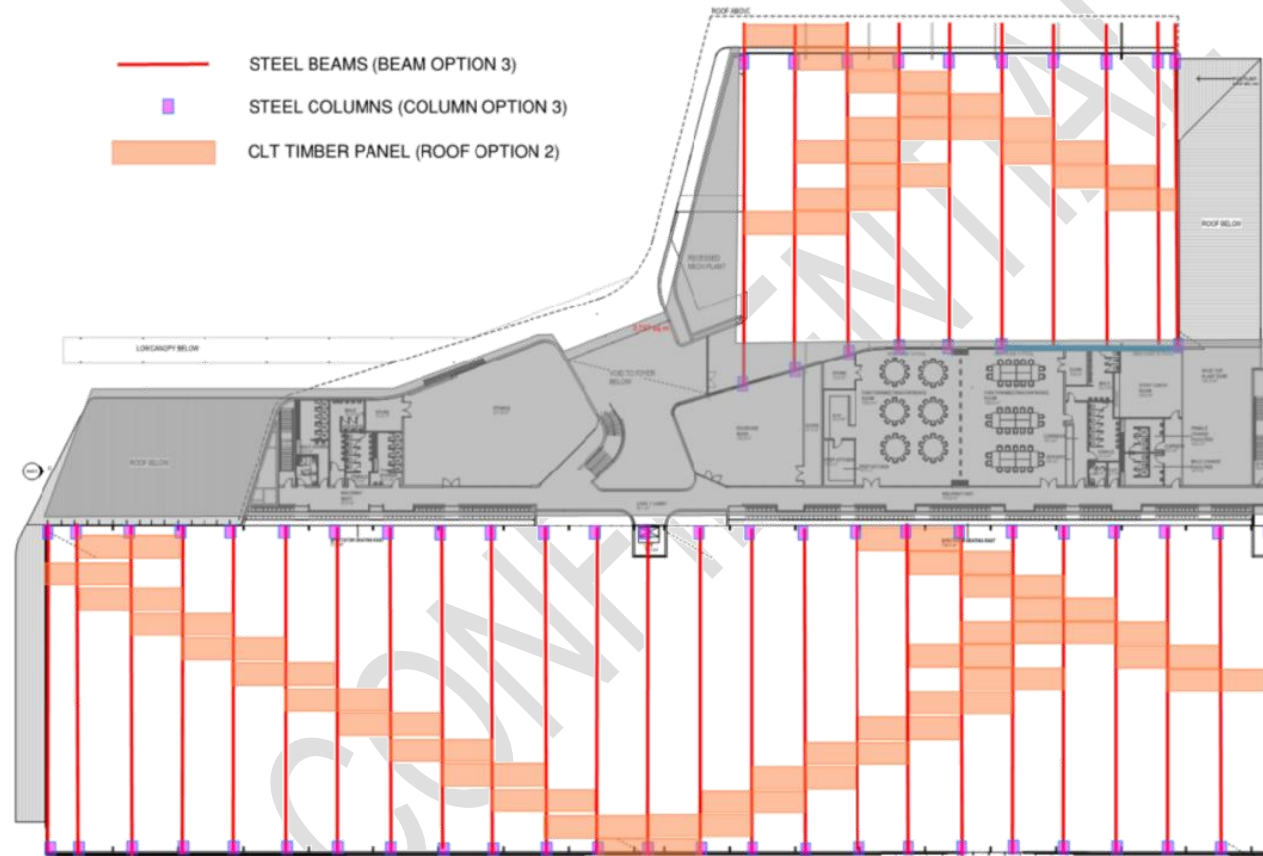
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### Annexure D Preliminary Structural Sketch – Hybrid Option 2



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**CONSIDERATION FOR KEEPING ITEMS CONFIDENTIAL**

1. In accordance with Sections 91(7) and 91(9) of the *Local Government Act 1999* the Council orders that the report 4.2 AR19/27070 Community and Recreation Hub - Timber Feasibility Structure Study and its attachments, the discussion and the resolution/s and minutes arising from the report, having been considered by the Council in confidence under Section 90(2) & (3) (b) and (k) be kept confidential and not available for public inspection until a contract has been executed in relation to the matter.
2. Further that Council delegates the power of review revoke, but not the extension, of the confidential order to the Chief Executive Officer on a monthly basis in accordance with the provisions of Section 91(9)(c) of the *Local Government Act 1999*.

CONFIDENTIAL

**MINUTES OF CONFIDENTIAL SPECIAL COUNCIL MEETING  
HELD AT THE COUNCIL CHAMBER, CIVIC CENTRE,  
10 WATSON TERRACE, MOUNT GAMBIER  
ON MONDAY, 3 JUNE 2019 AT 5.35 P.M.**

**PRESENT:** Mayor Lynette Martin (OAM), Cr Kate Amoroso, Cr Max Bruins, Cr Ben Hood (arrived at 5:52 pm), Cr Sonya Meziniec, Cr Frank Morello, Cr Steven Perryman (arrived at 5:39 pm)

**OFFICERS  
IN ATTENDANCE:**

Chief Executive Officer	-	Mr A Meddle
General Manager Community Wellbeing	-	Ms B Cernovskis
General Manager Council Business Services	-	Mrs P Lee
General Manager City Infrastructure	-	Mr N Serle
Manager Executive Administration	-	Mr M McCarthy
Community Development and Engagement Officer	-	Mrs H Gajic
Executive Administration Officer	-	Ms A Lavia

#### 4.2 COMMUNITY AND RECREATION HUB - TIMBER FEASIBILITY STRUCTURE STUDY – REPORT NO. AR19/27070

##### **RESOLUTION 2019/128**

Moved: Mayor Lynette Martin  
Seconded: Cr Frank Morello

##### **CONSIDERATION FOR EXCLUSION OF THE PUBLIC**

Pursuant to section 90(2) of the *Local Government Act 1999* the Council orders that all members of the public, except Mayor L Martin, Councillors K Amoroso, M Bruins, S Mezinac, F Morello and S Perryman and Council Officers A Meddle, B Cernovskis, P Lee, N Serle, H Gajic, M McCarthy and A Lavia be excluded from attendance at the meeting for the receipt, discussion and consideration in confidence of Agenda Item 4.2 AR19/27070 Community and Recreation Hub - Timber Feasibility Structure Study.

The Council is satisfied that, pursuant to section 90(3) (b) and (k) of the Act, the information to be received, discussed or considered in relation to the Agenda Item is:

- information the disclosure of which could reasonably be expected to confer a commercial advantage on a person with whom the Council is
  - conducting business; or
  - proposing to conduct business; or
  - to prejudice the commercial position of the Council
- tenders for the:
  - supply of goods, or
  - the provision of services, or
  - the carrying out of works

The Council is satisfied that the principle that the meeting be conducted in a place open to the public has been outweighed in the circumstances because the information contained in the report and to be discussed includes detailed costings and other information relevant to the specification and assessment of a tender submission which, if disclosed, is considered to reasonably confer an advantage on tender respondents and accordingly prejudice the commercial position of council and therefore not be in the public interest as tender submissions may be unduly influenced and detrimental to achieving best value for the community.

**CARRIED**



**RESOLUTION 2019/129**

Moved: Mayor Lynette Martin  
Seconded: Cr Max Bruins

1. That Council Report No. AR19/27070 titled 'Community and Recreation Hub - Timber Feasibility Structure Study' as presented on 03 June 2019 be noted.
2. That Council accept the recommendation presented in the Timber Feasibility Structure report and endorse the timber option for the Pool Hall and the Hybrid Option 1 for the Courts as the structural elements to be included in the detailed design of the Community and Recreation Hub.

**CARRIED**

**RESOLUTION 2019/130**

Moved: Cr Sonya Mezinac  
Seconded: Cr Max Bruins

**CONSIDERATION FOR KEEPING ITEMS CONFIDENTIAL**

1. In accordance with Sections 91(7) and 91(9) of the *Local Government Act 1999* the Council orders that the report 4.2 AR19/27070 Community and Recreation Hub - Timber Feasibility Structure Study and its attachments, the discussion and the resolution/s and minutes arising from the report, having been considered by the Council in confidence under Section 90(2) & (3) (b) and (k) be kept confidential and not available for public inspection until a contract has been executed in relation to the matter.
2. Further that Council delegates the power of review revoke, but not the extension, of the confidential order to the Chief Executive Officer on a monthly basis in accordance with the provisions of Section 91(9)(c) of the *Local Government Act 1999*.

**CARRIED**

