

E Existing Conditions Reviews

- E.1 *Structural Engineering Review*, 23 August 2013, Irwinconsult, structural engineer.
- E.2 *Document and Existing Conditions Review*, 3 September 2014, BRT Consultants Pty Ltd, building services engineers.
- E.3 *Existing Conditions Review, Theatre Systems and Acoustics*, 20 August 2013, Revision 01, Marshall Day Entertech, theatre planning and acoustic consultants.

WHITEHORSE CENTRE BUSINESS CASE – STRUCTURAL ENGINEERING REVIEW

Date: 23 August 2013
Project No: 12ME0460
Client: Williams Ross Architects

DOCUMENT REVIEW

- **Geotechnical Site Investigation Report for New Building at Whitehorse Centre Report Numbers 101801 and 101801/2 by Hardrock Geotechnical dated 01/02/2011 and 12/11/2012.**

Both Reports encountered surface filling and classify the site as P but identify suitable founding in clay or siltstone at approximately 1m to 2m depth for the clay and 2m to 3m for the rock. Both strata are satisfactory for supporting buildings on the site.

The fill depths are higher around the auditorium.

Basements are feasible although exaction in rock at depths below 3m will require more effort.

There is no permanent ground water, however perched water tables can exist. These require minor works to control during excavation.

It is possible that slabs founded on deeper fills may need to be suspended and that some 'improvement' works may be necessary for pavement construction.

We also are aware of anecdotal advice that the site was a former landfill. The geotechnical investigation did not identify anything that would be remnant putrescible waste.

Aerial photos have been reviewed dating back to 1936 showing agricultural use originally as well as what looks to be shallow excavation over parts of the site through the 1960's and 1970's but no evidence of it being used as a tip.

- **Whitehorse Centre Feasibility Study – Structural Conditions Report No 101229 prepared by VDM Consulting, dated 12/01/2011.**

This report describes the existing structures for the Foyer, Theatre, Orchestra Pit, Stage, Upper Stage, Grid, Loading Dock, Storeroom, Sound Shell, Dressing Room, Offices and External Pavement and concludes that the building is generally structurally sound with no significant defects identified.

The report also describes options to alter some areas as follows:

- Theatre Seating Capacity increase.
Increasing to the north or providing a gallery were considered most feasible



- Orchestra Pit
Could be extended under the stage
 - Storage Room
Could be extended to the west
 - Grid
Could be extended 3m or so towards fly tower (west)
 - Offices
Could be extended to the north or east
- **Drawings**
- John Clayton & Associates Consulting Structural & Civil Engineers drawing numbers B099/S1 & S2 for minor extensions to the Arts & Entertainment Centre dated November 1997.

David Gawler Architects

Drawings 7815/ 3,5,11 & 17 and unknown dated August 1984. 8713/8

Richard Mabin & Associates Architects Drawings 6934 – A1 dated 1996 and 7902 – A1, A2, A3 & A5.

These drawings describe the original architecture and the architecture and structure for the 1997 extensions.

Comments

The building, although in good condition and possible to extend beyond its perimeter, would not be straightforward to upgrade to accommodate a modern Theatre, equipment and associated loadings. It is probable that such upgrades would require demolition and replacement of the fly tower superstructure. Similarly the addition of new plant platforms or gallery theatre seating would involve replacement of part of the roof structure and the additional of new perimeter supports and foundations.

The Marshall Day conclusions correctly identify major structural issues with changes to seating capacity, proscenium, stages, fly tower, counterweights, orchestra pit and lighting bridge.

These issues can all be resolved with strengthening and or partial rebuild but would need to be compared to the cost of demolition and new build.

Cost would appear to be the only structural issue associated with this as we believe the existing structures are in good condition and there have been no significant regulatory changes that would impact on their re-use, albeit with alteration.



DOCUMENT & EXISTING
CONDITIONS REVIEW

of the

BUILDING SERVICES

as part of the

WHITEHORSE CENTRE

REDEVELOPMENT

Date 3/9/14

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BUILDING SERVICES

1 GENERAL

1.1 Overview

This services review covers the review of documents as received from City of Whitehorse in relation to the existing performing arts centre known as the Whitehorse Centre.

We also have provided comments based on our own review of services on site.

2 Existing Conditions Report.

The following is BRT's report on the visual inspection carried out during a site Visit in May. :

2.1 Building Fabric

The building fabric is dated and will need significant work to enable the mechanical services to work efficiently and effectively into the future. There are significant leakage points in the theatre rigging loft that work as a chimney which makes controlling temperature in the theatre difficult and significantly increases heating costs.

- Gaps in walls;
- Gaps in junctions between roof and walls;
- Insulation breaking down and not up to standard.

2.2 Sewer

The existing sewer runs to the north to an authority sewer main that runs east-west across the property. The authority main will most likely not be able to be built over. There are no major issues with sewer in and around the site and it should not be a major impediment to either a rebuild or refurbishment except that any new building will need to keep in mind the location of the existing authority sewer main and associated easement.

2.3 Cold Water and Fire

The site block plans indicate that water and fire services come from the south via the council office. It does not appear to be separately metered. The service is fed from a 225mm main and the information on site suggests that the pressure and flow appears adequate.

The fire service feeds both hydrants and hose reels and a sprinkler system that services the stage and stagehouse only.

Cold water should be adequate for any future redevelopment.

2.4 Power

The existing building has a dedicated indoor sub-station located in the NW corner of the building. The High Voltage supply appears to come from the north. The power supply appears to be independent from the Civic Centre. Cable diagrams onsite indicate that the power supply to the existing facility is in the order of 400A. this will need to be increased if the facility is expanded.

2.5 Gas

The gas meter for the site is located to the NW of the building. It appears to be only feeding the Whitehorse Centre, however this may need further investigation. From our preliminary investigation we believe that gas capacity will be adequate whether the building is redeveloped or rebuilt.

BUILDING SERVICES

2.6 Telecommunications

Phone cables appear to run via the Civic Centre. There appears to be a 30 pair cable as part of the Telstra Assets. This should be sufficient for any future expansion of the site.

2.7 Electrical Services

The existing electrical services, although adequate for the existing facility, are nearing the end of their useful life and should be upgraded for compliance and energy efficiency reasons. If the existing building is altered and extended, the electrical reticulation would almost need to be replaced with new. This is due to the following:

- All lights will need to be replaced with new.
- Any changes in the building will require new/modified electrical reticulation which involves the electrician certifying the new and old reticulation. Generally subcontractors will not certify old reticulations and fittings.
- All switchboards need to be upgraded as they don't comply with current regulations, specifically in relation to Earth Leakage Protection.

2.8 Mechanical Services

The existing Mechanical services consist of the following:

- Central Boiler located in the NE corner under the auditorium seating, this is not the best location for a boiler in relation to acoustic separation from theatrical spaces and fire risk;
- Central Chiller located adjacent to the sub-station. Relatively new but in a poor location in relation to acoustic separation from theatrical spaces;
- Ducted Fan Coil air handling units servicing major spaces.
- The auditorium fan coil unit is located beneath the seating and feeds into the space via exposed ducting. This can be a noise issue and would be difficult to modify if the auditorium space was expanded.
- The fan coil units to the ancillary spaces are located in roof wells. The units are hard to access and would be difficult to modify if the spaces were enhanced.
- The existing fan coil units although adequate in their existing configuration, would not be suitable for re-use if the spaces are changed in any way. We also consider that their location is problematic both in achieving safe access for maintenance but also achieving access to maintain the roof structure.

2.9 Redevelopment versus Rebuild - Cost

Having reviewed the condition and capacity of the existing building services we do not believe that there would be a significant cost difference whether the building was redeveloped or rebuilt.

BUILDING SERVICES

3 DOCUMENT REVIEW

Our review is limited to the building services and therefore, as many documents have no direct relevance to the building services, in these cases we have made no comment.

3.1 Feasibility Report - Feb 2012 - Peter Wright and Associates

Comments

- The report comments on leakage in the building. This was evident in our inspection particularly in relation to the stage rigging loft. This can cause issues with heating. The rigging loft works as a chimney and heating is hard to control at the lower seating levels. Sealing the building fabric is an important issue.

3.2 Dial Before You Dig Documents

- Optic fibre appears to be not reticulated through the site;
- 30 pair phone cable going to Arts Centre which should be adequate for any future development
- Yarra Valley Water - There is an authority sewer main that runs across the site just north of the existing building. This is an authority main and any development would most likely **not** be allowed to build over the main. Relocation may be an option but could be expensive. Ideally the building would need to remain south of the sewer main. Refer attached sketch. Investigation as to options will be required during further stages.

3.3 Land Survey

- The 2013 land survey shows the sewer easement just north of the existing building. Refer notes above in relation to sewer.

3.4 Existing Drawings

- Architectural - No Comment
- Electrical - There are very few electrical drawings that relate to the Whitehorse centre. Most relate to the civic centre.
- Hydraulic - Sewer plans useful, Hydraulic plans only show 80mm fire service from the civic building. The site visit indicated that the existing service is 100mm.
- All water and fire services appear to come from the south. The size may be an issue.
- Any up to date fire reports on the centre would be useful.
- Mechanical – Plan set useful but not complete.

3.5 Energy Action Plan

The City of Whitehorse Energy action plan sets Greenhouse Gas emissions targets, albeit by 2012. Any design of the new building services, which would include the design of the external building fabric will need to be assessed in the light of the information in the document.

Due to its target date, Council may need to confirm/revise targets if any.

BUILDING SERVICES

3.6 Sustainability Strategy Document

The City of Whitehorse Energy sustainability document sets Sustainability Standards and Greenhouse Gas emissions targets, albeit by 2012. Any design of the new building services, which would include the design of the external building fabric will need to be assessed in the light of the information in the document.

Due to its target day, Council may need to confirm current/revised targets and requirements.

3.7 Draft Design Standard

This document lays out a clear rationale for new building services and if up to date, should be referred to in any future development of the site.

3.8 Climate Change Vulnerability Assessment

This document raises several vulnerabilities, we have commented on a few, however this document should be reviewed in the light of any proposed redevelopment.

- Loss of Power during extreme weather – As the site has its own sub-station the risk is significantly reduced. A cost benefit analysis needs to be completed to verify whether backup generation financially viable. The major risk is loss of revenue if a performance is cancelled.
- Over loading of AC in hot weather - existing systems may be vulnerable, however new system usually cope well in extreme conditions even though space temperatures may rise.

3.9 ESD Consideration Prompt List

This document lists many valuable recommendations for good ESD design. It should however be checked against the unique operation and commercial value of a performing arts centre as some of the measures are in conflict to the operation requirements of such a facility.

3.10 Underground Services Trace

File could not be opened. Waiting on new file.

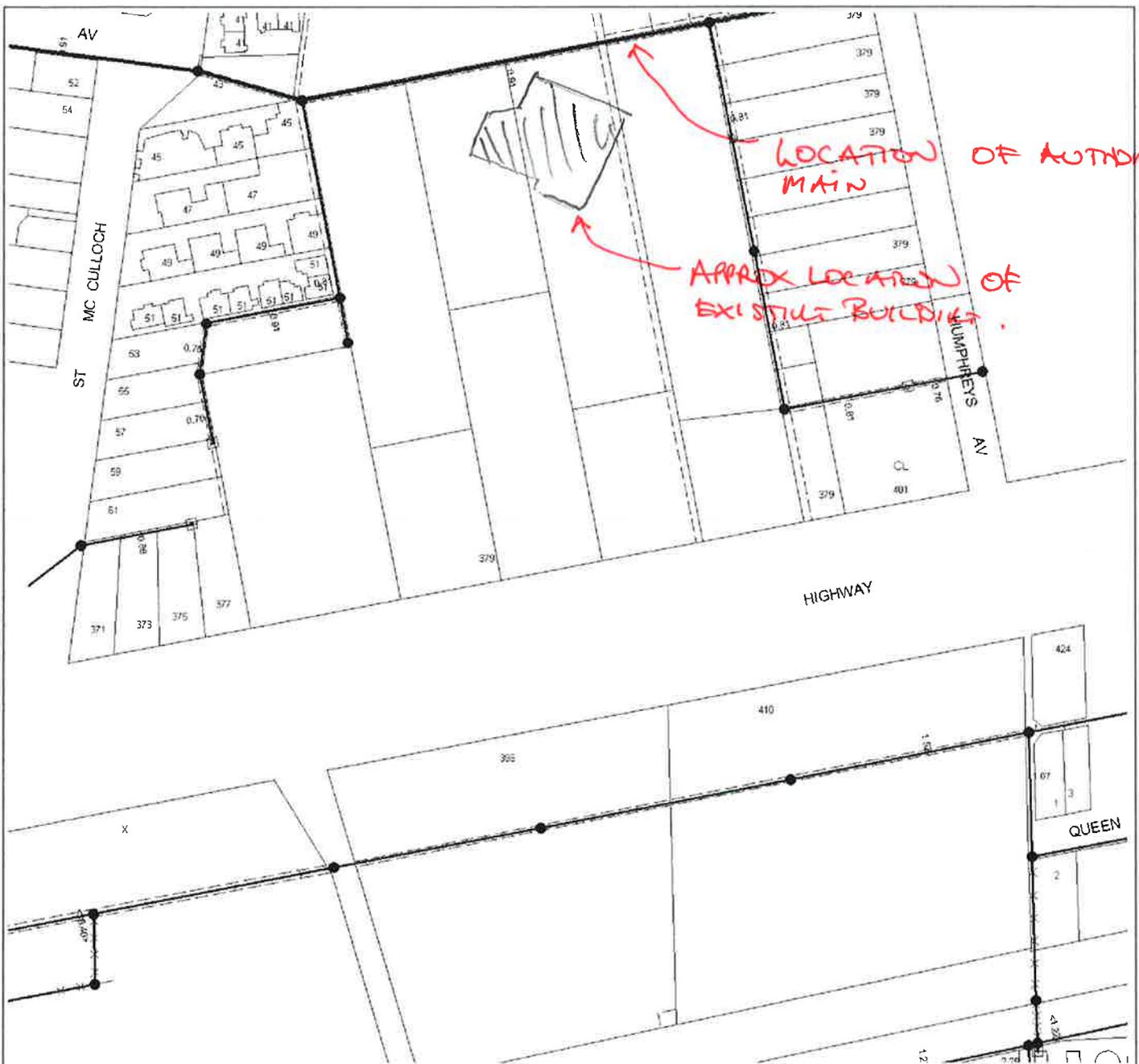
3.11 BCA Works Spreadsheet

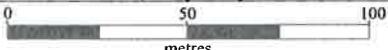
The report on BCA works to the Whitehorse Centre, identifies the following essential services features installed in the Centre:

- Smoke and thermal fire detection and alarm system (FIP located in council civic centre building);
- Partial sprinkler coverage to stage and back stage area;
- Smoke and heat vents to stage and back stage area;
- External fire hydrants;
- Internal fire hose reels;
- Portable fire extinguishers;
- Horizontal fire compartmentation as discussed in 2.3 above;
- Vertical fire compartmentation as discussed in 2.3 above;
- Emergency and exit lighting throughout.

This is consistent with our site inspection of the facility.

The report however outlines several deficiencies with the fire services and building services in relation to compliance with the building code. These would need to be rectified should the existing building be redeveloped.



Sewer Asset Information	Address	WHITEHORSE RD NUNAWADING 3131	
	Melway Ref.	48G9	
Dial Before You Dig Sequence No.	Date	26/10/2010	 
	19837461		

Existing Title		Circular Access Point		Inspection Shaft	
Proposed Title		Junction		End of Pipe	
Existing Sewer		Gas Check Manhole		Maintenance Shaft	
Offset Distance		Square Manhole		Ventilation	
Change of Grade		Rectangle Manhole		Chambered Manhole	

Warning – This plan is issued solely for the purpose of assisting you in identifying Yarra Valley Water’s specified assets through further investigation only. It’s not to be used for any other purpose, including to identify any other assets, property boundaries or dimensions. Accordingly, the location of all assets should be proven by hand on site prior to the commencement of any work. (Refer to attached letter for further details.)

WHITEHORSE CENTRE - EXISTING CONDITIONS REVIEW, THEATRE SYSTEMS AND ACOUSTICS**Date: 20th August 2013****Project No: 2013069****Client: Williams Ross Architects****OVERVIEW**

The Whitehorse Centre is the municipal performing arts centre in the City of Whitehorse. The Centre includes a 400+ seat proscenium arch theatre, full stage facilities, function room, sound shell, foyer, rehearsal rooms and ancillary spaces.

Marshall Day Entertech and Marshall Day Acoustics have been engaged to review the existing conditions of the Whitehorse Centre theatrical systems, equipment and acoustics and to provide input to the development of a range of concept options and business cases to be refined to a single option for the redevelopment or expansion of the Whitehorse Centre.

THEATRE**Theatre auditorium**

The seating capacity of the theatre is small for this type of community venue, with similar venues catering for a minimum of 500 persons. While wheelchair seating numbers appear to satisfy the Building Code for class 9b buildings, we consider that this is low considering the potential audience demographic for this venue.

Horizontal sight lines are in line with the minimum benchmark of 85% of seats with excellent sightlines. The auditorium rake is generally considered to be too shallow and is not consistent with modern facilities, however the maximum viewing distance (distance to the rear row of seats) is acceptable, at less than 20m from the stage. The auditorium seats are in reasonable condition, and are not showing visible signs of wear.

Auditorium lighting and access

There is no access from the control room to the stage, without entering the auditorium. Access to lighting bridges is limited to a stairway from the control room, and there is no access from stage.

Stage area

The proscenium opening (10m wide x 4.7m high) is consistent with community venues of this age and type, however these limited dimensions restrict the scale of works that can be performed on the stage.

The acting area (7.7m from setting line to rear wall) is small compared to similar community or regional venues of this type, and restricts the number of performers that can occupy the stage and the size of production elements that can be used.

The stage consists of a hardwood floor covered with a sacrificial layer of Masonite. This satisfies operational requirements.

Stage wings

The stage wing space is limited on both sides and access to the stage from the workshop is constrained. According to staff it is common for scenic elements to be made to reduced size or cut down on site by local theatre companies in order to navigate this difficult travel path.

Wing height on OP side is restricted by the fly gallery, 4.2m above stage level.

Grid

The existing grid allows access to the loft beams for inspection and maintenance of the counterweight flying system, and for installation of temporary rigging. The grid coverage includes the acting area and OP side of stage. The distance from the stage to the underside of the grid is 11.75 metres

Flying system

The theatre stage is equipped with 26 single purchase counterweight fly lines. The standard working load limit of each of the fly lines is 240kg, which is below the industry standard of 350kg. The current flying system is in fair condition and is often used to capacity with existing performances.

The ratio of the proscenium height to grid height is 2.5:1, which is less than the desired ratio of 2.75:1. Some large scenery elements may not be able to be flown out of audience view with a proscenium to grid ratio of only 2.5:1.

Space is available within the existing counterweight frame to provide additional fly lines up to a maximum of approximately 35 (subject to structural advice.)

Subject to further review, it is unlikely that the building structure would support an upgrade of both quantity and working load to the flying system.

Orchestra pit

The orchestra pit is approximately 26m², including an irregular shaped annexe, and has a ceiling height of 2.1m. The pit floor is carpeted and access is via a stair and hatch into the auditorium. The pit lacks direct access from backstage.

In order to extend the stage into the auditorium, as required for some performances, the orchestra pit has a series of lids, which are required to be removed when the pit is in operation. Venue operational staff have identified manual handling issues with removal of the orchestra pit lids.

Community based musical theatre and opera performances often require a larger number of performers than the theatre orchestra pit can accommodate.

Dressing room facilities

The theatre has one dedicated ensemble dressing room with a capacity of 30 persons. Additional upstairs dressing room (15 persons) is shared with the resident ballet school. The facility lacks small dressing rooms for principal performers, and facilities of this size generally have 2 ensemble dressing rooms. The dressing room facilities are aging, but are currently in operational condition.

Sound system

The existing passive loudspeaker system is in a left, centre, right configuration, supported by front fill, delay speakers and a stage foldback system.

The loudspeakers are from four different manufacturers, supported by amplifiers from four different manufacturers.

There appears to be no overall venue sound system design, with components added over time as operational budgets have allowed.

The venue requires a complete sound system upgrade.

Stage Lighting

The venue is equipped with 24 x 5kw analogue and 84 x 2.5kw digital dimmers. The analogue dimmers are becoming increasingly unreliable and difficult to maintain, and do not have modern circuit breakers or earth Leakage protection (from RCD's) as generally required in Council owned spaces.

The layout of the dimmer area is poor, with some newer dimmers badly positioned. The dimmer area is confusing mix of new and legacy systems that no longer effectively supports the lighting control requirements for the theatre.

Additional lighting bars have been installed in the theatre without permanent cable reticulated to the dimming area.

Technical infrastructure

Recent upgrades have included a limited quantity of Cat 5/6 data cabling, however the venue does not contain the type of technical infrastructure to enable ongoing digital connectivity, including fibre optic backbone cabling, HD-SDI digital video infrastructure, Ethernet based DMX nodes (lighting control), or a modern stage management console.

Various work around solutions have been installed over the years and these long term temporary solutions are not suitable for permanent installation or ongoing operation.

FUNCTION ROOM

The Waratah Room is the Whitehorse Centre's function room. It hosts conferences, meetings, seminars and other civic events. It contains a commercial kitchen that requires substantial upgrade.

The track based lighting system is not designed for event lighting. Although projectors, sound equipment and a lectern are available in the Waratah Room, it lacks adaptable rigging and audio-visual infrastructure such as lighting bars, luminaires, floorboxes, comprehensive sound system, and connectivity to the theatre, that are often required for event theming, and adaptable usage configurations such as presentations lectures, large meetings. The space is viable and is in very regular use.

SOUND SHELL

The sound shell caters for occasional large outdoor concerts servicing the entire municipality, such as the annual Australia Day concert and fireworks and the Whitehorse Christmas Carols event. The Australia Day Concert draws an audience of approximately 15,000.

The sound shell is of an appropriate size for the type of events, and generally functions effectively.

Temporary event infrastructure including power and cabling within the centre and associated grounds are not sufficient for increasing production sizes and values for these events.

The sound shell also operates as a rehearsal room and as an assembly space for large casts or ensembles. The sound shell has a wooden presentation floor, with a tarkett dance surface installed for ballet rehearsals. The space is approximately 4m high and is serviced by split system air conditioning.

SUPPORT AREAS

Loading docks

The loading docks for the kitchen and theatre are designed for small delivery vehicles. Generally, bar and kitchen deliveries do not use the dedicated loading dock area and are required to load without the use of a loading dock.

Large vehicles loading into the theatre are required to drive over grass and occasionally become bogged, leading to operational and safety issues.

Workshop

The theatre workshop area is located adjacent to the loading dock and the theatre prompt side wing. The space is double height and is used for storage of theatre equipment, such as luminaires, tools, staging, manual handling equipment, steel pipe and lighting booms. As there is no scene dock, the workshop is used for the storage of sets. It is also used as a cast assembly area.

Storage

Storage for all of the municipal activities conducted in the centre is inadequate, with storage of a large quantity of theatrical costumes, props and sets occurring in plant rooms, under the auditorium seating block and other unsprinkled potentially unsafe locations.

Staff Accommodation

Administration areas no longer cater appropriately for the quantity of staff that are employed to run the centre. Staff that are located at the Whitehorse Centre also manage facilities in the adjacent civic centre and library building.

ACOUSTICS

Room acoustics

Theatre

The theatre acoustics are controlled and suitable for drama, amplified and acoustic music and other similar performance or events. No particular acoustic issues with performances have been noted or advised by Whitehorse Centre staff.

Waratah Function Room

The acoustics of the Waratah Function Room are comparable to many similar venues. The carpeted floor, drapes and furnishings result in controlled acoustics suitable for a function room.

Foyer

The foyer is relatively lively as the only acoustically absorptive surface is the carpeted floor. However the roof structure, ducts and other building elements provide acoustic diffusion which breaks up and scatters sound. This is beneficial, particularly when the foyer is occupied pre and post shows and functions.

Banksia Function Room

This room is very lively as all surfaces are hard which provide a low level of sound absorption. As this room is used primarily by external users for dance classes, the acoustics are acceptable.

Soundshell

The Soundshell space has been provided with acoustic panels to provide some control of occupant noise during dance classes. This treatment is also beneficial when the external doors are open and the space forms part of the stage.

Internal sound insulation

Improvements in sound insulation between the following spaces have been identified as being desirable by staff to improve the flexibility and concurrent use of the spaces:

Issue	Comments
Sound insulation between the Waratah Function Room and the theatre stage. These spaces are separated by a single skin masonry wall.	Potential interruptions to theatre performances are currently managed by booking quiet functions in the adjacent function room, or using the operable wall to separate the function from the adjacent theatre.
Waratah Function Room operable wall.	The operable wall provides acceptable acoustic separation for concurrent functions that are meetings, conferences etc. A function that involves any type of amplified music means that the adjacent function room cannot be used for quieter functions
Waratah Function Room kitchens/bar.	The kitchens and bar are not adequately separated from the function room.
Workshop to the theatre stage.	The workshop is not adequately separated from the theatre stage.

External sound insulation

The following items have been identified which affect the control of external noise intrusion into the theatre:

- The external double doors in the theatre which open to the plant area.
- Rain impact noise on the theatre roof which can affect quiet performance

Building services noise

No significant building services noise issues have been identified in the building except for some noise and vibration from the theatre air conditioning system which is evident during quiet performances.

CONCLUSION

A full redevelopment of the existing Whitehorse Centre has the potential to address the majority of the deficiencies in the Whitehorse Centre's existing infrastructure. However, due to structural requirements, operational impact or functional relations with other spaces, substantial elements of a refurbishment of the Centre would be very challenging to address in any partial or staged redevelopment. These include:

- Any increases to the theatre audience capacity or changes to sightlines
- Changes to the proscenium height and width
- Improvements to the stage and stage wing size
- Increases in the flytower structural loading
- Increases to the flytower height and counterweight fly system drift
- Improvements to the orchestra pit size and access and lid system
- Replacement of the ageing technical cabling infrastructure
- Code compliance in the lighting bridge headroom
- Provision of access to flytower
- Improvement in internal and external sound insulation
- Control of building services noise and vibration in the theatre
- Control of rain noise in the theatre.