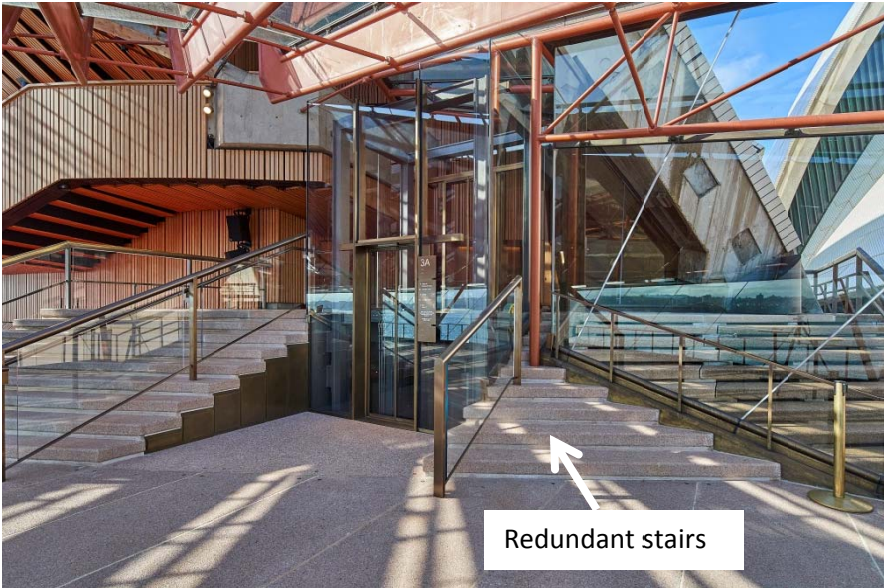
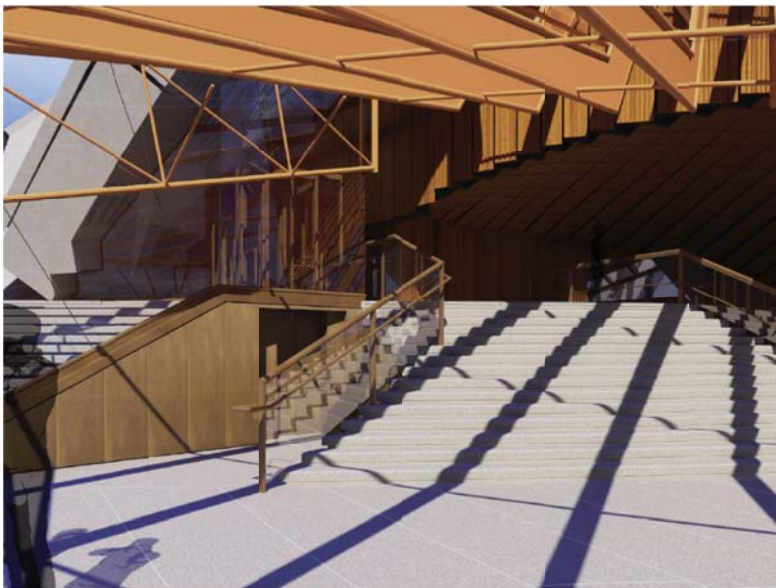

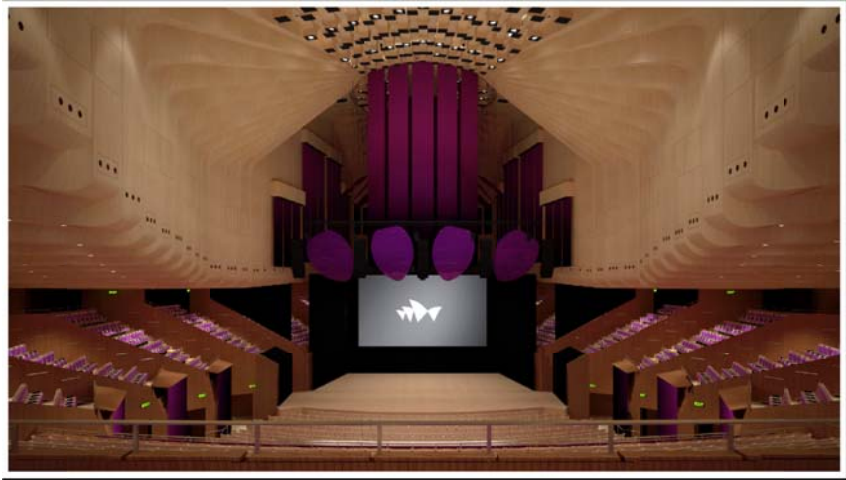




Attachment 3: Responses to Issues Raised in Submission from Office of Environment & Heritage to the Department of Planning (20 December 2018)

Issue	Commentary	Reference
<p>1. Impact of accessibility works (physical, spatial and visual) in the Concert Hall foyer spaces and any collateral works affected by this including:</p> <ul style="list-style-type: none">• The proposed lower concrete surround of the lifts is bulky, but the members accepted there was no realistic alternative given the changes in levels and the structural support requirements. The quality of the finishes will be critical to the management of the impact.• SOH should identify what is to be retained, demolished and reused from the stairs impacted by the cutting to access the lifts. As much of the original material of the stairs should be retained as possible including maximising reuse of original material.• Cutting into the stairs is a major physical intervention but it was acknowledged that the original Utzon design had a tunnel near this location.	<p>The accessibility works in the Concert Hall foyer spaces will have an impact on fabric. The Heritage Impact Statement (HIS) concludes that the impacts ‘must be considered in relation to the substantial positive impacts with regard to accessibility of the Concert Hall and its foyers for a broader section of the public’.</p> <p>Lifts 29 and 30</p> <p>The proposed position and configuration of the lifts as well as the detailing has been determined following extensive options analysis. As noted in the HIS, ‘while the insertion of Lifts 29 and 30 will have high impacts on the broad sweep of stairs and cranked concrete beams at each end of the Northern Foyer and east and west caves below, carefully considered location and detailing, and adoption of Utzon and Hall’s palette of materials will lessen their overall impact on the aesthetic qualities of these spaces’.</p> <p><i>Levels 2A to 3</i></p> <p>These stairs are carpeted. Prior to demolition for the construction of the lift shaft, the carpet is removed to expose the concrete stairs. The opening to the lift is created by cutting through the stairs and demolishing this section of stairs only, including the supporting cranked beams. This is shown on Plan DA0707. More detail is also included in Plan A0900 (which was not included in the DA package but is part of the complete architectural design). The removed material is incapable of reuse due to the nature of the demolition required in this area. The stairs will be recarpeted after major construction is complete. The ends of the cut stair treads are re-finished as off-form concrete to match the existing stair ends on the carpeted staircases. As was done with the JST, the area will be re-carpeted in the same colour as existing and this is consistent with the Conservation Management Plan 4th Edition (CMP4) <i>Policy 12.1 Carpet</i> and the Sydney Opera House Carpet Strategy 2006.</p> <p><i>Level 3A to 4</i></p> <p>These are stairs with granite pre-cast treads. All treads that are removed, are carefully stored for either reinstatement, or otherwise stored for future re-use at the SOH. The required demolition on this level sees the pre-cast stair treads removed back to the nearest join. Generally the removed treads are not reinstated because the exposed tread ends must have curved edges and the granite finish on the exposed ends. As such new pre-cast treads are manufactured to suit the specific installation requirements. Demolition of the cranked beams through the location of the lift entry is necessary and the material is unable to be reused or reinstated due to the nature of the demolition required in this area. The demolition required is shown on DA0708. More detail is provided in Plan A0903 (which was not included in the DA package but is part of the complete architectural package).</p> <p>The landing area from which the lift is accessed on Level 3A has been designed to sit parallel to the glass line, as opposed to the JST Lift were the landing area runs perpendicular from the lift. This is illustrated in Figures 1 & 2 below.</p> <div></div> <p>Fig. 1 Lift 36 Entry at Level 3A in the Joan Sutherland Theatre</p> <div></div> <p>Fig. 2 Render of Lift 30 Entry at Level 3A in the Concert Hall</p>	''''

Issue	Commentary	Reference
<p>2. Aesthetic impacts of the acoustic upgrade to the Peter Hall interior of Concert Hall (physical and visual) and integrity of the Concert Hall finishes and forms in the 'at rest' mode (visual).</p> <ul style="list-style-type: none"> Generally, the members were satisfied with the effort to manage the impact of very significant changes to the Concert Hall to improve its acoustics. The quality of the finishes will again be critical to 	<p>This arrangement is driven by the different geometry of the spaces and the opportunity in the Concert Hall to maximise the area of usable stair. This means that, for the Concert Hall, there will not be a residual area of stair which does not provide any access. While the proposal has a structural impact on the stairs between Levels 3A and 4 and the cranked beams which sit on their underside, the SOH considers that the proposal is the optimal design outcome and resolves the redundant stair issue that was unavoidable in the JST.</p> <p>The lower concrete surround of the lift has been proposed to satisfy complex structural requirements. ARM Architecture has proposed cladding this surround in bronze panelling which refers back to the existing palette of the building whilst also signifying these elements as new insertions into the built form. This detail, to be applied on Levels 2 and Levels 2A/3 of Lifts 29 and 30 is the same as the detail which has been constructed on recently completed Lift 31 in the JST Northern Foyer. The finishes will be specified to the same standard achieved in the JST lift.</p> <p>As explained by the HIS, 'the remaining large sweep of these exceptional finely finished beams across the space will remain uninterrupted and unaffected'. The HIS also notes that:</p> <p style="padding-left: 40px;">'The original configuration, materials, colour and finish of these beams will be respected in the proposed changes to these beams. The new or changed work will retain the original line of direction changes in the beams, with new configurations stepping back from these.' (page 24)</p> <p style="padding-left: 40px;">'The expression of the cuts through the stairs and beams has been carefully resolved and detailed not to distract from or diminish the quality and character of these elements or the space. Alignment of the stair cuts between Levels 3A and 4 coincide with the existing glass wall and are to be clad with bronze panels that reflect the configuration of the steps. Details of the modifications to beams below should retain and respect the line of the primary crank points. The sense of horizontal continuity of the stairs beyond the glass walls is an essential part of these stairs and is to be retained and respected as much as possible.'</p> <p style="padding-left: 40px;">'The splayed cut through the granite stairs for the landing on Level 3A results in the cutting of additional beams (including in the above figures) but does provide a better visual result in that there is less interruption and reduction to the broad sweep of stairs at each end. ... The crease line in the beams is retained on the underside to minimise visual impacts and retain the sense of the full extent of the structure.'</p> <p><i>Level 4</i></p> <p>Some precast granite floor panels are removed to allow for the construction of the lift and surrounds. These are stored for potential reuse elsewhere at the SOH. The double glass doors and surrounding bronze frame are removed and stored for potential reuse elsewhere at the SOH. This detail is also shown on Plan A0903.</p> <p>Eastern Foyer Passageway</p> <p>Similar to the Level 3A to 4 stairs in the Northern Foyer, the Eastern Foyer stairs will have the complete pre-cast tread that spans the passageway opening carefully removed and these will be stored for potential future reuse at the SOH. The extent of demolition is shown in Plan A0905. SOH notes the Council's acknowledgment of the tunnels through the side foyers stairs in Utzon's original designs (and later design for the JST), which is referenced at page 15 of the Architectural Statement (EIS Appendix 4).</p> <p>The design of the proposed acoustic elements in the hall has been developed to complement and minimise impacts to the heritage significance of the space. The modifications will improve the acoustics of the space while respecting the heritage significance of the Concert Hall and its elements.</p> <p>Acoustic Elements and Finishes</p> <p>The principle adjustment is the introduction of the reflector array which uses a magenta colour. The HIS cites two reasons in support of this design:</p> <p style="padding-left: 40px;">'Firstly it visually separates these suspended elements from the radiating geometry of the plywood ceiling, avoiding visual confusion and</p>	<p>HIS p60</p>

Issue	Commentary	Reference
<p>the management of this impact. Also, where possible, new acoustic finishes or amended surfaces should overlay original material and forms. Future changes in acoustics technology may enable original forms and surfaces to be exposed once more at a later date.</p> <ul style="list-style-type: none"> The documentation should show and graphically illustrate, the various operational modes of the space to indicate the visual impacts of each mode (including at rest). This should also confirm that the ‘at rest mode’ clearly enables direct vision of the organ and pipes ensemble, the folded and domed ceiling forms and the timber finishes which were significant Peter Hall design elements. 	<p>respecting Hall’s design, and secondly, it strengthens the sense of ‘celebration’ of the performance space as intended by both Utzon and Hall, using Hall’s original colour palette.’</p> <p>The reflector elements are going through an extensive prototyping process to ensure a high quality finish, including experimentation with different materiality, gloss level and method of paint application.</p> <p>The new reflector array will replace the existing acoustic clouds. As noted by the HIS:</p> <p>‘The replacement of the existing acrylic acoustic ‘clouds’ and their replacement with a new array of petal shaped solid reflectors is supported provided they meet the following conditions:</p> <ul style="list-style-type: none"> before manufacture of the final reflectors, the final colour and finish is prototyped in situ in the Concert Hall and approved by the Opera House’s Conservation Council, Eminent Architects Panel, and heritage architect; and an original acrylic cloud reflector in good condition is identified and archived as part of the Opera House’s collection. <p>Another acoustic element is the introduction of diffusive brush box panels. As explained by the HIS:</p> <p>‘The proposed works affect much of the original 1973 laminated brush box wall fabric, however the new panelling respects the original material of the auditorium by continued use of glue laminated brush box – high impact on original fabric but with overall positive acoustic benefits.’</p> <p>The introduction of the diffusive panels is proposed for the following locations: front of boxes A, B, C, D, E, U, V, W, X, and Y; rear walls of boxes C,D,E, F, W, X, Y, and Z; rear walls of the Upper Circle, Stalls and Choir Stalls; and the front of the Choir Stalls. The original “saw-tooth” box fronts (A, B, C, D, E, W, U, V, W, X and Y) were replaced with flat brushbox panels in 2011, with the original panels placed in storage. The full scope of the proposed diffusive panels is shown in the drawings (EIS Appendix 4) at drawings DA5331 to DA5335.</p> <p>This design of the diffusive panels is being extensively prototyped. A recently installed full size prototype has demonstrated the capacity for a high quality finish to be achieved while suggesting a number of refinements which are possible prior to manufacture and installation. The existing, but not original box front flat panels installed in 2011 will be removed and stored with the original 1973 saw tooth panels, which would provide the option of reinstating either the flat panels or the original ‘saw tooth’ panels at a future date.</p> <p>The series of acoustic elements, including operable sidewall reflectors and banner boxes will require work to take place on the plywood ceiling. The HIS details the approach which will be taken to this work, noting that ‘before the commencement of works on any part of the plywood ceiling, the process and methodology for panel dismantling, cutting out, construction, and operation of these new inserted panels, should be tested via a full size operational prototype’.</p> <p>Ultimately the HIS concludes that ‘the materials and finishes proposed within the Concert Hall respect and maintain the high quality and standards set by Hall, Todd & Littlemore’s original work’</p> <p>Various Operational Modes</p> <p>Due to the wide variety of programming presented in the hall, the space has countless operational modes in which it will be viewed. For the purposes of understanding the changes proposed for the hall, three general modes have been represented in a series of renders. These are ‘acoustic mode’, ‘amplified mode’ and ‘at rest mode’.</p> <p>Due to the high utilisation of the hall for year-round artistic programming, there are limited instances when the hall will be in ‘at rest mode’. As can be seen in the attached series of renders - the ‘at rest mode’ clearly enables direct vision of the organ and pipes ensemble, the folded and domed ceiling forms and the timber finishes which are significant Peter Hall design elements. These elements are also visible from most areas of the hall in acoustic mode. The at-rest mode would additionally present the white birch auditorium walls in a similar state to their current form.</p> <p>The question of sightlines is addressed in the HIS as such:</p> <p>‘The proposed functional and acoustic upgrades within the Concert Hall auditorium will result in some adverse visual impacts from the</p>	<p>HIS p60</p> <p>HIS p105</p> <p>HIS p60.</p> <p>HIS p24</p> <p>Renders and descriptions of the Concert Hall in Acoustic and Amplified Modes are included in the Architectural Statement – EIS Appendix 4</p> <p>Attached renders of “at rest” mode – Attachment 4</p> <p>HIS p118</p>

Issue	Commentary	Reference
	<p>proposed over-stage acoustic reflectors, associated stage lighting and speaker arrays on the significant character of the Concert Hall auditorium. Depending on viewing position, these will partially mask views towards the grand organ and the faceted ceiling above. This will be most evident from the stalls and the front of the circle. However Peter Hall's design aesthetic and choice of materials and finishes will be respected by these changes.'</p> <p>The following renders demonstrate indicative views of the hall in acoustic, amplified and 'at rest' mode and additional views are provided in Attachment 4. The description of the hall in Acoustic mode is detailed in the Architectural Statement (EIS Appendix 4) pp 104-124</p> <p>The description of the hall in Amplified mode is detailed in the Architectural Statement (EIS Appendix 4) pp 125-136.</p> <div data-bbox="742 630 1528 1119"><p>VIEW FROM UPPER CIRCLE - NEW ACOUSTIC ELEMENTS - HOUSE LIGHTING</p></div> <div data-bbox="1546 623 2335 1119"><p>VIEW FROM UPPER CIRCLE - AMPLIFIED MODE - HOUSE LIGHTING</p></div> <div data-bbox="742 1150 1528 1598"></div> <div data-bbox="742 1627 1528 1669"><div>A&M ARCHITECTURE</div><div>FROM UPPER CIRCLE</div><div>CONCERT HALL 'AT REST' IMAGES 25TH JANUARY 2019</div></div>	

Issue	Commentary	Reference
<p>3. Extent of legibility of original forms and reversal of previous interventions in forming the new Creative Learning Centre space.</p> <ul style="list-style-type: none"> A photographic record should be provided of the before and after for the Learning Centre 	<p>Original Forms and Previous Interventions</p> <p>The conversion of the area proposed to become a Creative Learning Centre will improve the legibility of original forms and reverse many previous interventions in the space.</p> <p>The space is currently used as administrative offices. As a result, a number of fixed temporary walls, doors and screen partitions are in place. These interventions will be removed, reducing clutter in the space and allowing the geography and original spaces within the podium to be read more clearly.</p> <p>The external door from the space to the Western Broadwalk, originally intended as the main entrance route to this space is currently bolted shut for security and operational reasons. The construction of the Creative Learning Centre will see this location reactivated as an entrance to this space as originally intended.</p> <p>A number of original concrete wall surfaces in the area are currently coated in white paint. This paint will be carefully removed to reveal the original concrete surface.</p> <p>The largest physical intervention in this space is the modification (demolition and strengthening i.e. opening up) of a section of an east/west wall to create the primary learning space. The HIS concludes that these impacts are considered acceptable. The opening has been limited in height in order to retain the maximum amount of the original wall and allow the original form of the wall to be interpreted. The HIS describes this modification and how its construction will be managed:</p> <p style="padding-left: 40px;">‘Removal of a large section of a major curved loadbearing wall below approx. 3m, retaining nibs on each side, to create the primary learning space. This opening will require additional strengthening at the lintel and this is presently indicated as steel. Detail resolution of this opening should be refined in the documentation stage to minimise any potentially negative impacts and retain the integrity if [sic] this important concrete element.’</p> <p>While the proposed changes will improve legibility of original forms and reverse previous interventions, the design will respect key Peter Hall design elements. As explained by the HIS:</p> <p style="padding-left: 40px;">‘The northern most sections of the two main spaces will be fitted out on walls and ceilings with the wobbly panels in the same manner as Peter Hall had intended within the administrative areas of the Podium, providing a consistent character with adjacent spaces when viewed from the Broadwalk. Other parts of the Creative Learning Centre will have pared back finished to closely reflect the character of service and backstage areas.’</p> <p>Archival Recording</p> <p>As with all of the Renewal works at the Sydney Opera House, a full archival photographic record of the before and after conditions will be produced and provided to the OEH and Heritage Council. The SOH will accept a condition similar to B.10 in SSD7665:</p> <p style="padding-left: 40px;">Archival Recording B10. Prior to the certification of Crown Building Works, a photographic archival record of all areas undergoing works must be prepared in accordance with the document How to Prepare Archival Records by the Heritage Council of NSW, and submitted to the Heritage Council and the Department.</p>	<p>HIS p4</p> <p>HIS p32</p> <p>HIS p5</p>
<p>4. Any archaeological impacts relating to lift base installations should identify the methodology for excavation, and include monitoring of the excavation by an archaeologist, recording of anything uncovered and the retention of as much as possible in-situ. This will ensure the proactive management and acknowledgement of any significant archaeology.</p>	<p>The construction of Lifts 29 and 30 in the Concert Hall Northern Foyer does not require any excavation below the existing floor level of Level 1 of the Sydney Opera House. This is shown in the vertical section plans of the lifts on drawings 49-BR-ARM01 Sheets DA5115 and DA5126.</p> <p>These lifts are similar to Lift 31 recently completed in the JST Northern Foyer. The lowest point of construction for this lift is Level 1, where the lift pit is situated. These lifts are quite distinct from new Lift 36 in the JST Southern Foyer (under construction) which requires excavation below Ground Level.</p>	<p>Plans DA5115 & DA5126</p>

Issue	Commentary	Reference
<p>5. Reversibility and reinstatement generally</p> <ul style="list-style-type: none"> Degrees of reversibility and reinstatement should be integrated where possible rather than total replacement. To assist in this process, the SOH should clarify the extent of the minimum demolition required and identify areas where careful dismantling and reinstatement can occur and where replacement of significant fabric is the last resort. 	<p>The design team has sought to comprehensively identify opportunities to integrate possibilities for reversibility and reinstatement. Where relevant this is captured in the design documentation.</p> <p>Areas where reversibility can occur</p> <ul style="list-style-type: none"> Acrylic cloud reflectors, replaced with newly manufactured acrylic cloud reflectors if so required Diffusive box fronts and rear wall surfaces (either to existing flat panel or original saw tooth) Reinstatement of cannon ports Installation of new hand rails in Eastern and Western Foyers <p>Areas where dismantling and reinstatement will occur in the development:</p> <ul style="list-style-type: none"> Brush box facades on the foyer facing sides of the CH wings Brush box lining of the stage ante-room Repositioning of wobblies in the Creative Learning Centre Reinstatement of white birch finishes to external faces of operable side wall reflectors and banner boxes Glass facades adjacent to Lift 29/30 entries at Level 3A <p>Areas where replacement of significant fabric is the last resort:</p> <ul style="list-style-type: none"> Replacement of stage to accommodate arena risers, increased stage area and lowering of stage level Modifications to stairs to insert passageway and lifts Glazing and façade works to accommodate Lifts 29/30 at Level 4 Structural modifications to widen the CH stage wings Creation of wall openings in CLC <p>The below extracts from the HIS discuss reversibility, reinstatement and reuse:</p> <p>‘These projecting operable reflector panels are considered to have a high visual and fabric impact but are acceptable provided they meet the following conditions:</p> <ul style="list-style-type: none"> the existing white birch panels are retained and reinstated in their original locations, and not replaced with new as these are book and end-matched from a single log with panels above; cuts across an original sheet junction are avoided wherever possible, and where this is not possible, the sheet junction is retained in its existing location; there is minimal visual interruption of existing white birch plywood, and preferably, the cut out section to accommodate the reflector is used as the face of the new flap to ensure it matches; flaps are fully retracted and the original plywood surface finish flush with the existing plywood when these reflector flaps are not required.’ <p>‘The substantial modifications to the ceiling crown and side walls to accommodate the drapes and their machinery is as least intrusive as possible, so that when retracted, the crown and side walls look as close as possible to their configuration.’</p> <p>‘The existing white birch rings are retained and not replaced as these ring elements are matched from a single log with other ceiling panels.’</p> <p>‘There is minimal loss of existing white birch plywood, and preferably, the cut out section to accommodate each acoustic drape unit is used as the lower face of its access panel to ensure it matches.’</p> <p>‘The only potential impact is the additional ceiling penetrations. These should, wherever possible, be adjusted to re-use the existing penetrations, and all old/disused penetrations carefully patched in white birch to match existing.’</p> <p>‘These infilled and modified ‘canon-port’ openings and new ceiling registers / diffusers should have minimum impact as long as the existing plywood is retained and the order and proportion of existing openings registers and ceiling geometry is retained and respected with the new work.’</p> <p>‘The white birch plywood seats shells should only be replaced with matching if they are beyond repair.’</p>	<p>HIS p102 & p116</p> <p>HIS p64 (similar text on p106)</p> <p>HIS p107</p> <p>HIS p109</p> <p>HIS p109</p> <p>HIS p116</p>

6. A concise summary should be provided of why the changes are happening and the degree of intervention to the items being disturbed.	<i>Description of Change</i>	<i>Reason for Change</i>	<i>Degree of intervention</i>	<i>Reference</i>
	Concert Hall Projects			
	<i>Accessibility</i> <ul style="list-style-type: none"> On-grade access from the Southern Foyer at Level 2 to the corresponding level in the Northern Foyer via new passageway within the Eastern Foyer stairs 	The new passageway provides an accessible path of travel from the CH Southern Foyer to Northern Foyer, and thereby to the new Lifts 29 and 30.	Partial demolition of stairs, construction of new passageway	CH Architectural Statement p4 & p14
	<ul style="list-style-type: none"> Two new lifts, No 29 and 30, located in the east and west of the Northern Foyer 	<p>The two new lifts provide an accessible path of travel to all levels of the CH Northern Foyer, and thereby access to the increased number of wheelchair seating positions within the CH, only accessible from Level 4 in the Eastern and Western Foyers</p> <p>'Lifts 29 and 30 should ideally be larger, but this would have resulted in considerably greater impact on the cranked concrete beams, broad sweep of stairs, and available space, particularly at the top granite level, Level 4'.</p>	Partial demolition of stairs, construction of new lifts and supporting structure	CH Architectural Statement p4 & p31 HIS p95
	<ul style="list-style-type: none"> New handrails in the centre of the Eastern and Western Foyer stairs 	The handrails are necessary to improve accessibility for older and mobility impaired patrons.	Introduction of new element, to meet BCA compliance, could be removed	CH Architectural Statement p4 & p67
	<ul style="list-style-type: none"> New handrails to replace existing non-compliant handrails throughout the Concert Hall 	Within the Concert Hall new code compliant handrails will replace existing non-compliant handrails where new are necessary. All new handrails utilise the Bronze Project kit of parts to be implemented across all the public spaces affected by the SOH Renewal Projects.	Introduction of new element, to meet BCA compliance, could be removed, includes replacement of existing non-original fabric handrails on box fronts	CH Architectural Statement p4 & p67
	<ul style="list-style-type: none"> Changes to accommodate increased number of wheelchair positions (up to 34 total) throughout the Concert Hall 	<p>The current wheelchair accessible seating locations are restricted in number and confined to the front of the stalls. This does not comply with the Building Code of Australia (BCA).</p> <p>It is proposed to increase the number of positions available to meet code and to improve the equity of their distribution across the Concert Hall.</p> <p>New positions will be available at the rear of the circle and the rear of the side boxes A, B, C, U, V, and W accessed from the Level 4 entries. In addition an increased number of positions in the stalls will be provided. A total of 34 accessible positions will be provided.</p>	Minor intervention to include removable seats to allow wheelchair positions and adjoining companion seats, could be removed	CH Architectural Statement p5 & p71
	<ul style="list-style-type: none"> Two new accessible sanitary facilities on Level 3 of the Northern Foyer 	These are required to provide compliance with the BCA.	Introduction of new elements	CH Architectural Statement p4 & p77
	<ul style="list-style-type: none"> Improved mobility access and wet area facilities to the performers dressing rooms on Level 1 	In response to the SOH Accessibility Master Plan 2015 the Concert Hall performers dressing rooms on Level 1 are being upgraded to provide wheelchair access to agreed areas and additional accessible sanitary facilities.	Improved back of house facilities to meet BCA compliance	CH Architectural Statement p4 & p80

Issue	Commentary			Reference
	<i>Theatre Planning and Technology</i> <ul style="list-style-type: none"> Stage <ul style="list-style-type: none"> Redesign and reconstruction of stage 	The reconstruction of the stage is to provide an “arena-style” configuration for orchestral performance, along with additional stage area to facilitate this style of stage.	Complete reconstruction of stage	CH Architectural Statement p4 & p84
	<ul style="list-style-type: none"> Automated and adjustable stage risers 	The automated and adjustable stage risers are necessary to provide the arena-style configuration for orchestral performance. This configuration will provide improved visual and acoustic feedback for all members of the orchestra, along with improved sightlines for audience members to all members of the orchestra.	Complete reconstruction of stage	CH Architectural Statement p4 & p84
	<ul style="list-style-type: none"> Lowering the stage level 	There is currently a difference of 700mm in elevation between the stage and the anteroom. This results in access difficulties for performers and crew. The current configuration has stairs on the western side, and a ramp on the eastern side. All stage equipment, including large items such as grand pianos, must be taken on stage via one of these pathways. Lowering the stage, combined with raising the anteroom floor will ensure level access to the stage on both sides. The lowering of the stage will also provide greatly improved sightlines for the audience.	Complete reconstruction of stage	CH Architectural Statement p4 & p84
	<ul style="list-style-type: none"> Provide under stage storage, including automated storage of seating rows A and B when stage extension is implemented 	Currently rows A,B & C must be manually removed to raise the forestage extension (necessary for full orchestral performance, along with some other CH performance modes). The automation and understage storage will remove a number of occupational health and safety (OHS) issues associated with the manual removal of the seating, and will also make these processes more efficient.	Minor intervention to improve venue efficiency	CH Architectural Statement p4 & p84
	<ul style="list-style-type: none"> Backstage <ul style="list-style-type: none"> Adjustment to the floor level to meet the stage level 	As discussed above, this intervention is required to provide level access to the stage	Reconstruction of ante-room floor and ceiling	CH Architectural Statement p4 & p89
	<ul style="list-style-type: none"> Increased size of the stage wings 	The increased size of the stage wings achieves two outcomes: the provision of downstage entry doors (discussed next), and larger access paths to the stage for performers and crew.	Complete reconstruction of wings, but original finishes dismantled and reinstalled where possible	CH Architectural Statement p5 & p89
	<ul style="list-style-type: none"> New downstage entry doors 	With the introduction of the arena-style stage risers, the existing stage access doors will not provide access to the stage when the risers are in the raised position. The new doors provide access to the stage, downstage of the risers.	Reconstruction of wings and stage leads to introduction of new downstage entry doors	CH Architectural Statement p5 & p89
	<ul style="list-style-type: none"> 			

Issue	Commentary			Reference
	<ul style="list-style-type: none"> Technical Zone <ul style="list-style-type: none"> New technical equipment zone in the ceiling above 	Over time since the opening of the Concert Hall in 1973, many different performance modes have been implemented in the Hall. This has led to numerous ad-hoc installations for winches, lighting and other stage equipment. The new technical zone will provide a more organised and safer working environment for SOH staff.	Upgrading of back of house systems	CH Architectural Statement p5 & p95
	<ul style="list-style-type: none"> New winch room 	Centralisation of the winch equipment in a dedicated winch room will provide capacity for an increased number of winches and a safer working environment.	Upgrading of back of house systems	CH Architectural Statement p5 & p95
	<ul style="list-style-type: none"> Relocation of some of the Plant Room 21 mechanical equipment 	The relocation of some of the Plant Room 21 equipment allows for the installation of the new winch room.	Upgrading of back of house systems	CH Architectural Statement p5 & p95
	<ul style="list-style-type: none"> New penetrations in the existing ceiling 	New penetrations in the existing ceiling to accommodate an increased number of rigging lines for the flying of acoustic and theatrical elements over the stage.	New penetrations only introduced where necessary, redundant penetrations closed and finished to match white birch	CH Architectural Statement p5 & p95
	<p><i>Acoustics</i></p> <ul style="list-style-type: none"> Acoustic Music <ul style="list-style-type: none"> Replacement of the existing acrylic over stage reflectors with a new array of adjustable reflectors 	<p>The existing acrylic cloud (donut) reflectors do not provide sufficient coverage to achieve adequate reflections back to the performers in acoustic mode. This has been recognised as a shortcoming of the Concert Hall since its opening. To achieve adequate acoustic reflection over the stage and front stalls, a solid material with a density greater than acrylic and covering a larger area is required. Various configurations have been considered by the design team and reviewed by the Opera House's Eminent Architects Panel and petal shaped reflectors arranged with a gap centred on the central axis of the hall and grand organ was preferred, and is now proposed. The colour and finish of these reflectors have also been prototyped and reviewed in-situ. These prototypes confirmed that a colour based on Hall's signature magenta in the seat upholstery was preferred over a lighter natural timber finish matching the white birch ceiling. The latter potentially confuses and detracts from the strong geometric configuration of the ceiling.</p> <p>This will improve the acoustic response for the orchestra, the choir and project more energy from the stage into the audience.</p> <p>The "petal" configuration of the array provides the desired percentage of coverage above the stage,</p>	Introduction of new acoustic element	CH Architectural Statement p5 & p104

Issue	Commentary			Reference
		the ability to fly other theatrical elements between them and allows view lines to the organ. Their curved shape and profile are resolved to provide the optimum acoustic performance. The reflectors are able to be flown up and/or rotated to allow the introduction of rigging for amplified music performance.		
	○ New operable side wall reflectors	Operable side wall reflectors have also been found necessary by the acousticians to provide acoustic enhancement to the stage and the audience. These are integrated into the existing side walls and are retractable to accommodate both for amplified mode when they are not required and acoustic mode when they are required. The finish for the reflectors will match the existing White Birch wall and ceiling finish.	Introduction of new acoustic element	CH Architectural Statement p5 & p104
	○ New adjustable stage risers	As described above, the adjustable stage risers provide improved improved visual and acoustic feedback for all members of the orchestra, along with improved sightlines for audience members to all members of the orchestra.	As noted above, reconstruction of stage, delivers improved acoustics for orchestral performance	
	○ New stage floor	The existing stage floor is heavily worn and will need to be replaced as part of the installation of the automated stage risers. There will be new timber flooring and detailing to the riser edges. It is proposed that the new timber flooring be sympathetic with the existing timber species and deliver the required acoustic performance.	New material to replace existing heavily worn stage	
	○ New acoustically diffusive timber panelling to the box fronts	<p>The addition of profiled diffusive and angled surfaces to the following parts of the existing interior walls to ensure optimum acoustic reflections and diffusion:</p> <ul style="list-style-type: none"> • The side box fronts, the walls surrounding the stage and the rear wall of the stalls all are designed to have a non-repetitive relief pattern of 100mm maximum depth constructed from glue laminated brushbox timber to match the existing timber finish. • The rear wall of the upper circle level, rear wall of the choir stalls and the rear walls of boxes C,D,E,F,W,X,Y,Z all are designed to have a non-repetitive relief pattern of 50mm maximum depth constructed from brushbox timber to match the existing timber finish. <p>Various options for the pattern and profile of the diffusive wall panels have been explored. They have been based on patterns generated by musical wave geometry. This has allowed a variety of options to be easily generated and acoustically tested. The proposed pattern has</p>	Introduction of new acoustic element	CH Architectural Statement p5 & p104

Issue	Commentary			Reference
		also been prototyped in the brushbox timber finish and tested by the Acoustic Engineers.		
	<ul style="list-style-type: none"> ○ New acoustically diffusive timber panelling to the stage surround 	See above	Introduction of new acoustic element	CH Architectural Statement p5 & p104
	<ul style="list-style-type: none"> ○ New acoustically diffusive timber panelling to the rear of the side boxes, the rear wall of the circle, choir and the rear wall of the stalls 	See above	Introduction of new acoustic element	CH Architectural Statement p5 & p104
	<ul style="list-style-type: none"> ○ Adjustment of the box fronts and stage surround geometry 	The changed geometry of the box fronts and stage surrounds is designed to provide the required geometry for the new diffusive surfaces that will provided the improved acoustic diffusion of the sound energy nearest the podium.	Adjustment of stage surround and box front alignments	CH Architectural Statement p5 & p104
	<ul style="list-style-type: none"> • Amplified Music <ul style="list-style-type: none"> ○ Acoustically absorbent fabric introduced to the venue via mechanically deployed banners above the stage and on the stage-surround walls, box fronts and rear walls 	A substantial proportion of performances in the Concert Hall are amplified, and these performances require a degree of acoustic absorption to be introduced into the room. Currently manually erected black absorbent drapes are installed for these performances. The new design is intended to automate this process with absorptive fabric banners that can be deployed automatically from concealed positions. The fabric banners are designed to have a specified weight determined by their absorption. It is proposed that these be a custom designed fabric incorporating a colour palette that grades from the existing seat magenta to black at the stage to ensure that it is suitable for the proposed performance mode and visually appropriate to the significance of the Concert Hall.	Introduction of new acoustic element, only for amplified performances, to replace existing method of manually installed draping	CH Architectural Statement p5 & p125
	<ul style="list-style-type: none"> ○ New speaker amplification system 	Proposal includes replacement of the two speaker arrays over the front of the stage with five smaller ones between the acoustic reflector 'petals' with one in the centre. Replacement of the rear stage speakers with a greater number of smaller speakers to both the sides and rear of the stage.	Replacement of existing system	CH Architectural Statement p5
	<i>Concert Hall air conditioning</i>	The existing air conditioning within the Hall is a top down supply with the air being fed from the 'cannon port' openings in the side walls and the return air ducted below the floor. This currently does not meet the proposed improved acoustic performance required in the Hall and also provides poor occupant comfort. As such the existing system will be modified to address both acoustics and comfort.		CH Architectural Statement p5 & p137
	<ul style="list-style-type: none"> • New secondary air ductwork behind the side walls of the Hall 	Necessary installation to provide additional air volume	New back of house ductwork	CH Architectural Statement p5 & p137

Issue	Commentary			Reference
	<ul style="list-style-type: none"> Closing up of the existing cannon port openings and installation of new air conditioning diffuser outlets 	This will improve the acoustic performance of the Hall by removing the large rectangular openings in the side walls	New panels introduced to close up cannon port openings, white birch plywood to match existing will be used	CH Architectural Statement p5 & p137
	<ul style="list-style-type: none"> Increased number of ceiling diffusers in the lower sections of ceiling over the boxes 	Necessary to provide the additional air volume	New diffusers introduced	CH Architectural Statement p5 & p137
	<ul style="list-style-type: none"> Upgrade of the smoke exhaust capacity within the Concert Hall 	To meet the requirement for an enhanced fire engineering performance. This will be achieved via the installation of two new smoke exhaust fans above the Concert Hall ceiling which utilise existing ductwork and an existing exhaust grill in the copper face of Shell A3.	Replacement of existing smoke exhaust fans	CH Architectural Statement p5 & p137
	<i>Seat Refurbishment</i> <ul style="list-style-type: none"> Refurbishment of sections of existing patron seating to comply with fire engineering requirements and requirements for different patron seating configurations/wheelchair use/technical operational requirements 	<p>The existing patron seating is required to be refurbished to deliver the following improvements:</p> <ul style="list-style-type: none"> Fire engineering performance criteria for the seating materials to meet regulatory indices. This necessitates the plywood seat elements, the cushion foam and the seat fabric to meet improved fire indices. The seat to meet a specified acoustic performance as part of the overall acoustic improvement for performances. Requirement for the seat-base to incorporate a quick release mechanism for a percentage of the seats which will be regularly removed for wheelchair use, different patron seating configurations and technical operational requirements. Repair of damage to the existing seats. 	No change to appearance of existing seating, but upgrade to fire resistance of materials	CH Architectural Statement p5 & p143
	<i>Other</i> <ul style="list-style-type: none"> New external air exhaust hood on Level 2 of the western podium facade 	The requirement for the new grille is due to the relocation of an existing plant room on the eastern side of the Concert Hall to accommodate the new accessible passage at Level 2. The detail of the exhaust grille will be identical to the existing hooded intake adjacent to it further to the south on the western façade.	New external hood introduced on western side of podium, to match with existing hoods and grilles	CH Architectural Statement p145

Issue	Commentary			Reference	
	<i>Creative Learning Centre</i> Introduction of Creative Learning Centre	<p>For the first time, the Opera House will have a dedicated space for children and young people to experiment and learn in a building that embodies creativity and innovation. Students, teachers and visitors will learn to collaborate in ways that foster creativity, problem-solving and innovative-thinking.</p> <p>This project transforms existing office spaces in the building's north-western corner to maximise public enjoyment of the Opera House – a public asset - and enable artists, Opera House resident arts companies and creative-learning specialists to inspire the community.</p> <p>The Creative Learning Centre will be a flexible space hosting workshops, creative-play activities, talks and performances, and will also include a separate space for a permanent digital classroom. Consistent with the multi-purpose nature of the Opera House and most spaces within the building, when the Centre is not being used for creative learning, it may be used for occasional small scale events and functions e.g. for gatherings prior to performances in the Concert Hall or Western Venues.</p>	Re-purposing of existing back of house spaces to become new front of house venue for the SOH creative learning programs	EIS p28	
	Relocation of existing bronze doors westwards within the existing inset entry space	This provides an internal connection between the learning spaces and refurbished facilities	Minor relocation of doors, but existing covered entry remains with doors well back from Western Broadwalk	CLC Architectural Statement	
	Creation of opening in curved wall	Allows creation of large (“primary”) learning space with exposure to external windows in northern façade.	Some demolition and strengthening of curved wall	CLC Architectural Statement	
	Creation of entry from Western Foyer	<p>A connecting entry foyer to the Creative Learning Centre is proposed off the northern end of the Western Foyer. This will involve the reconfiguration of walls enclosing the existing stair and Lift 9, and modification of existing storage units at the north end of the Western Foyer.</p> <p>Proposed finishes on the Western Foyer side retain the design language, materials and finishes of this Utzon space, and will have little visible impact. The new double door entry to the Creative</p>	Introduction of new entry to the space, finishes consistent with existing Western Foyers	CLC Architectural Statement	

Issue	Commentary			Reference	
		Learning Centre from within the Western Foyer, will match other venue entry doors in this space, but with the addition of a vision panel providing a glimpse of the 'magic' beyond. Signage over the door will be consistent with other venue signage in this foyer.			
	Introduction of facilities	WC's (including accessible facility) and kitchenette	New facilities introduced into existing back of house space	CLC Architectural Statement	