

Ref: B23076CO02 MK/lw

28 November 2024

Clarence Valley Conservatorium
C/- DRA Architects Pty Ltd
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Dear Warren,

**Re: Clarence Valley Conservatorium
DA Input - Mechanical**

This report summarises various items in the "Mechanical Services" category to assist in planning and your DA submission of documents to Clarence Valley Council.

Documents issued by your firm have been used as the basis for this report, along with a site visit carried out by our firm on (1/11/23). Some of the items covered in the report, may not bear directly on the DA submission, but will be important during the Scheme Design and Detailed Design Phases of the Project.

Attachments to this report clarify some of the issues raised for consideration/incorporation.

Topics covered in this report include: -

- Smoke Hazard Management
 - Class 9b: Automatic shutdown of air handling systems
 - Existing stage
- Existing Air conditioning and ventilation system
 - Existing music room air conditioning
 - Existing auditorium air conditioning
- New Air conditioning and ventilation system
 - Outdoor condenser plant
 - Indoor fan coil units
 - Toilet exhaust system
 - Outdoor air system
- Ancillary Mechanical Service provisions
 - Motor Control Centre
 - Service Riser
 - Plant Platform / Enclosure
- DA conditions
- BCA report

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Smoke Hazard Management

In NSW Class 9b assembly building are required to be provided with smoke hazard management facilities in accordance with NCC Vol 1 2022 NSW E2D16.

Automatic Shutdown of Air Handling Systems

The building is a class 9b assembly building. In NSW class 9b assembly buildings are required to be provided with automatic shutdown of any air handling systems. Exemptions apply to:

- Non ducted individual room units (< 1000L/s capacity)
- Miscellaneous exhaust system installed in accordance with AS1668.1 Section 5 and section 6.

The existing air handling systems are typically small room cassette type recirculating air handling systems. It is anticipated that these systems are exempt from the automatic air handling shutdown by virtue of being non ducted individual room units (< 1000L/s capacity).

The new air conditioning system are proposed to be ducted type to provided improved internal acoustic and aesthetic performance. These systems will require automatic shutdown.

In accordance with AS1668.2 Section 5 the new toilet exhaust and outdoor air systems are considered major exhaust and supply systems and will require automatic shutdown.

To facilitate automatic shutdown of the air handling systems smoke detection and alarm system in accordance with S20C6 is required. Refer to electrical services details for further information on this system.

Existing Auditorium and Stage

The existing auditorium contain as stage that has a floor area of 87m². The auditorium and stage are a class 9b assembly building.

The stage is greater than 50m², less than 150m² and is required to have:

1. Automatic Smoke exhaust system complying with Specification 21.

OR

2. Roof Mounted Automatic Smoke and Heat Vent complying with NSW I4D59.

The existing stage is not provided with either of these services. The extent of this smoke hazard management upgrade will need to be confirmed as part of the construction certificate process.

Existing Air Conditioning and Ventilation Systems

Existing office / music rooms

These rooms are provided with air conditioning via small split systems with wall mounted indoor cassette units. Ventilation requirements are addressed by natural ventilation openings (existing openable windows and doors). These systems shall be retained in place.



Existing Performance Space

The existing auditorium and stage are provided with air conditioning via split systems with ceiling mounted indoor cassette units. Ventilation requirements are most likely addressed by natural ventilation openings (existing openable bifold doors). These systems shall be retained in place pending confirmation of the extent of the fitout scope.

The practise of relying on openable doors to achieve ventilation compliance in this space is not conducive to effective conditions for music performances. The open doors compromise the acoustics. Thus, we suspect the doors remain closed and the auditorium space and not effectively ventilated during performances. If there is scope to improve the fitout of the auditorium, then we would recommend the installation of a new energy recovery ventilation type package units to provide energy efficient ventilation and air conditioning to this space. This improvement is recommended to replace the need to open the Bifold door during performances to achieve occupant ventilation.

This system is a ducted air handling system and would require automatic shutdown which can be readily addressed into the new air conditioning system design.

The concept plant layout provided space for this ERV package unit. The ERV Package unit capacity is approx. 50kW cooling, 2000L/s supply air flow.

New Building Air Conditioning and Ventilation Services

Outdoor Condenser Units

The new spaces shall be provided with a new Variable Refrigeration Flow (VRF) multi split air conditioning system. The total capacity of the new system to cater for the new development is estimated to be 120kW.

The condenser units provide the central refrigeration system that provide cooling and heating to the indoor fan coil units. The condenser is connected to the indoor fan coil units via a network of insulated refrigeration pipework. Heat recovery systems are recommended to enable simultaneous heating and cooling of the individual air conditioning zones.

An initial refrigerant charge safety assessment has been undertaken and this load shall be split into three condensers. Two small condensers of 25kW capacity and 1 large condenser of 70kW capacity. Further detailed review will be required to ensure refrigerant safety concerns are addressed.

The concept plant layout provides space for these condensers.

New Indoor Systems

The new internal spaces shall be provided with a new ducted fan coil units installed in the ceiling void above and adjacent to the spaces served. Ducted air conditioning system are recommended to provide suitable acoustic performance for the music practice rooms.

Fan coil units shall be zoned to cater for each individual room and enclosure to ensure NCC section J thermal zone control requirements are addressed.



The fan coil units will require a ceiling void of at least 500mm to enable the installation of fan coil units, ductwork and condensate drainage.

This air handling systems are ducted and will need to be automatically shut down in fire mode. This control can be readily addressed into the new air conditioning system design.

Toilet Exhaust System

The new toilets will require Mechanical exhaust ventilation in accordance with AS1668.2 2012.

Our design assessment has allowed for a single large toilet exhaust fan to be installed in the roof plant room enclosure, with ductwork extending to the floors below via a riser provision. At each level a duct will extend through the ceiling void and collect exhaust air via ceiling grille located in the bathroom areas.

The toilet exhaust system is a major exhaust system in accordance with AS1668.2 2015 and will need to be automatically shut down in fire mode. This control can be readily addressed into the new air conditioning system design.

The concept plant layout provides space for this toilet exhaust fan and riser space for the main exhaust duct.

Outdoor air supply

Outdoor air shall be provided to all air conditioning system to provide fresh air for occupants and to dilute contaminants generated in the space. Outdoor air provisions shall be in accordance with AS1668.2 2012.

In addition to this occupant ventilation requirements outdoor air shall be introduced to balance any Mechanical exhaust ventilations system to ensure the space is maintained at neutral pressurisation.

Preliminary exhaust system calculations indicate that the exhaust flow rates exceed the required outdoor air ventilations rate. Thus, the outdoor air ventilation system has been sized to cater for the exhaust system make-up air requirement.

The outdoor air system is considered to be a major supply system in accordance with AS1668.2 2015 and will need to be automatically shut down in fire mode. This control can be readily addressed into the new air conditioning system design.

The concept plant layout provides space for the outdoor air fan, intake separation from the toilet exhaust system and riser space for the main outdoor air duct to the floors below.

Mechanical Services Ancillary Provisions

Mechanical Services Motor Control Centre

A Mechanical service motor control centre is provided in the roof plant enclosure. This will be a weatherproof electrical board and contain Mechanical services power distribution equipment and electronic controls.

This board provide the source of electrical power supply to all new Mechanical equipment and is the location of the central control system that provide automatic air conditioning and ventilation system functions.



Automatic air handling system shutdown can be readily arranged by providing a fire trip from the smoke detection system to the motor control centre. Reset after a fire alarm can be arranged via the resetting of the smoke detection system.

The concept plant layout provides space for the Motor Control Centre.

Service Riser

A service riser is nominated in the corner of the plant enclosure. This riser provides a pathway for the Mechanical services into the ground and first floor ceiling voids.

The riser size is as per the architectural details and accommodates the following services:

- Toilet exhaust duct that provided exhaust to all new toilet facilities
- Outdoor air duct that provided outdoor air for occupant ventilation and toilet exhaust make-up air purposes
- Refrigerant pipework reticulation pathway to Fan coil units installed in the ceiling void of the ground and first floors
- Electrical power cable reticulation pathway to Fan coil units installed in the ceiling void of the ground and first floors
- Control cable reticulation pathway to Fan coil units installed in the ceiling void of the ground and first floors.

The concept plant layout provides preliminary details of this riser layout.

Mechanical Services Plant Deck

A Mechanical services plant deck has been located above the level 1 toilets. The Mechanical plant shall be installed on a structural steel / aluminium plant platform. The concept design indicated that this plant enclosure is approx. 7.5m long and 7m wide. Plant space can be reduced if the existing auditorium air conditioning system is not part of the scope.

The platform shall be provided with louvred surrounds to conceal services and equipment. Louvred screening is anticipated to be a min 1800mm high to conceal plant. Additional acoustic treatments of the floor and surrounds should be considered to mitigate any noise concerns.

Personnel access shall be provided to the plant deck. An access hatch location has been indicated on the plant and shall be coordinated into the final design to provide safe work access for service trade people.

DA Conditions

We have reviewed the Pre-DA Lodgement Meeting minutes (23/06/22) and acknowledge the 7.08 AHD for the (1:100) year flood and this will be observed with the placement of Mechanical plant on the roof in a dedicated plant enclosure.

The building is located in a residential area and an acoustic assessment is required. This assessment should include the noise output from the new air conditioning plant. If hours of operation extend into the evening, then the plant platform shall be acoustically treated to mitigate this concern. The plant platform design should include a solid floor and acoustic louvred screens.

At the completion of the Mechanical services design, certification can be provided for the compliance with the National Construction Code and referenced standards.



BCA Report

At this time a BCA report for this development has not been sighted, but any requirements identified in our discipline will be incorporated in the design.

Any queries on this report should be directed to the undersigned in the first instance.

Regards

Matthew Karpik

Director

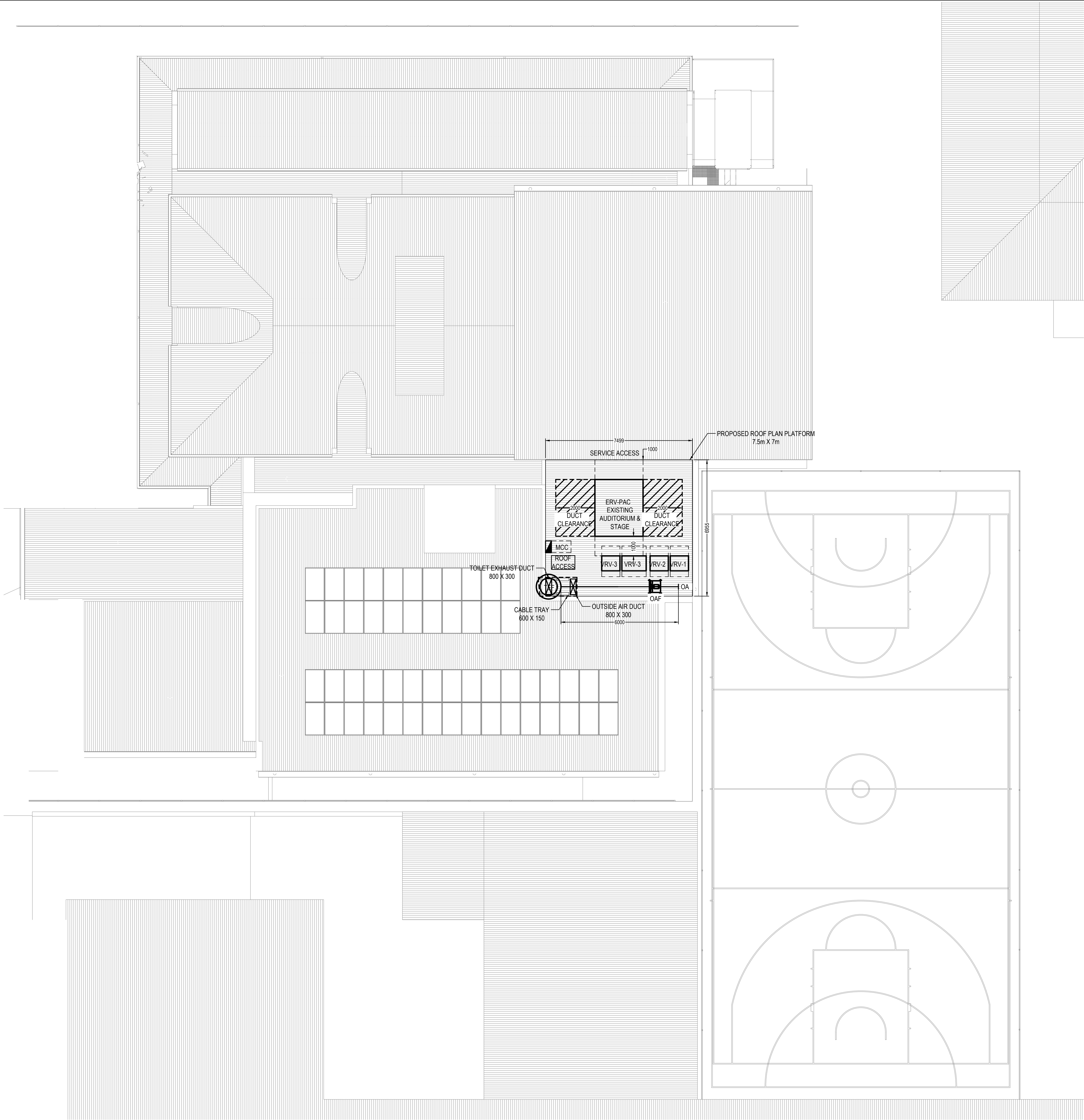
NSW Professional Engineer (Mechanical) PRE0000527

NSW Design Practitioner (Mechanical) DEP0000524

ENCL:

Concept roof plan

Concept plant deck



QUALITY ASSURANCE DOCUMENT CONTROL		
STATUS	DATE	INITIALS
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DESIGN DEVELOPMENT		
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TENDER ISSUE		
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AMENDMENTS			
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01	PRELIMINARY ISSUE	28/11/24	MK

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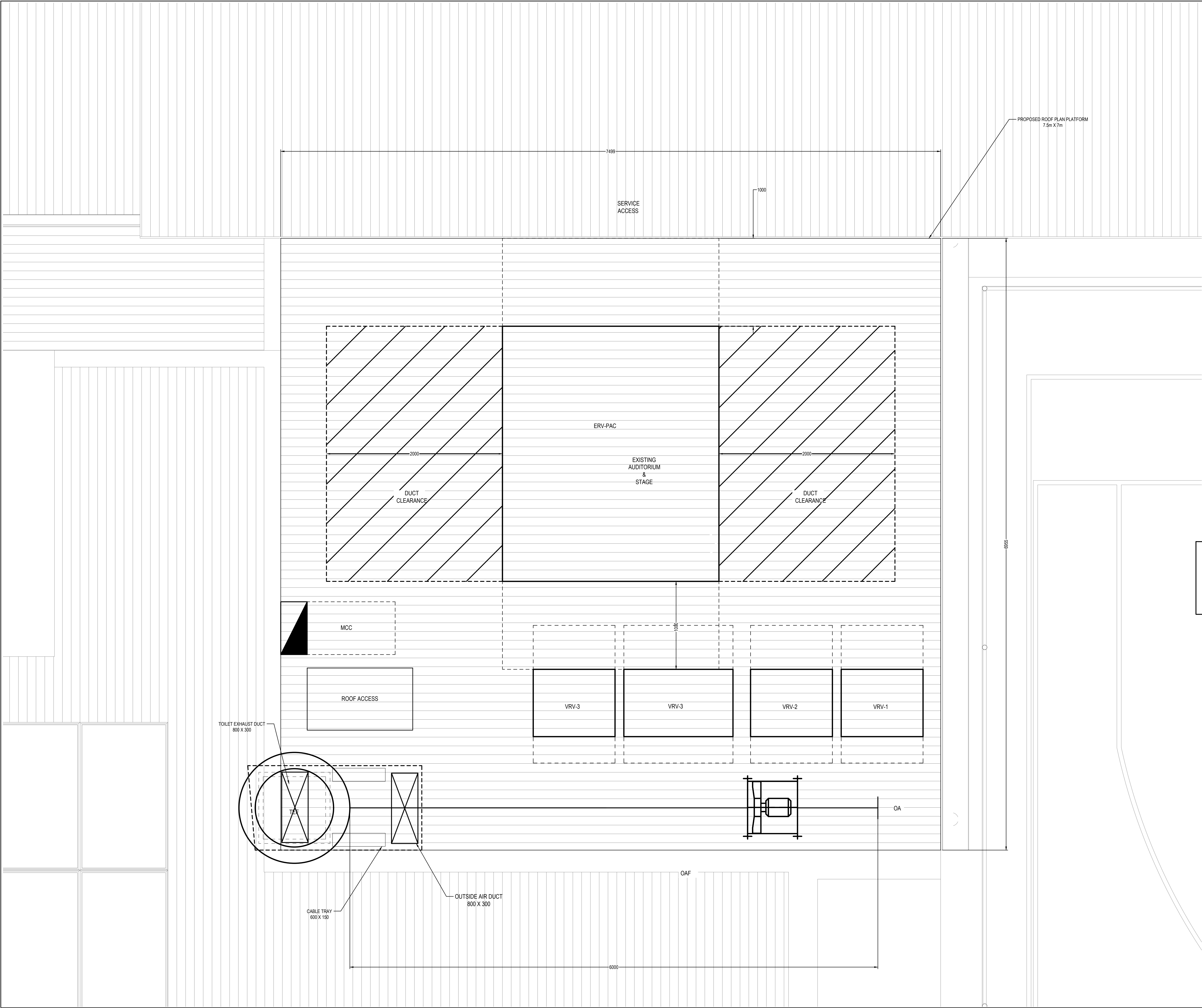
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PROJECT
CLARENCE VALLEY CONSERVATORIUM,
8 VILLIERS STREET,
GRAFTON NSW 2460

DRAWING TITLE
MECHANICAL SERVICES
CONCEPT DESIGN ROOF PLAN

DRAWING SCALE	DATE	DRAWN BY	CHECKED BY
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PROJECT No.	DRAWING No.	REVISION	
B23076	MSK-03	01	

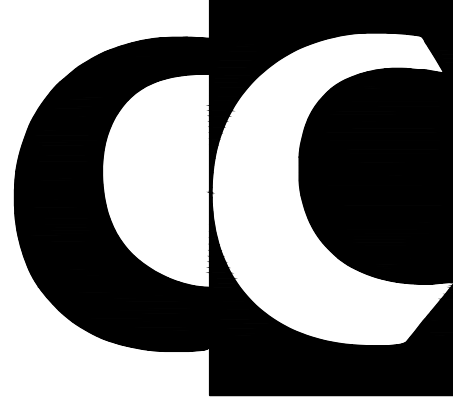


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DRAWING TITLE

MECHANICAL SERVICES
CONCEPT DESIGN PLANT LAYOUT

DRAWING SCALE	DATE	DRAWN BY	CHECKED BY
1:100	NOV24	NW	MK
PROJECT No.	DRAWING No.	REVISION	
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