NATIONAL FILM
AND SOUND ARCHIVE
OF AUSTRALIA

Request for Tender
NFSA RFT 2425/P060A

Nitrate Vault Extension and Refit Project Lead Consultant for Design Services

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RFT Document 2A
Project Scope Briefing

Cover page image - https://www.enricotaglietti.com/home/opus/dwellings-1/1977-nitrate-vaults

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Introduction

The National Film and Sound Archive of Australia (NFSA) invites Tender Responses from suitably qualified and experienced organisations for the provision of a Nitrate Vault Extension and Refit Project Lead Consultant for Design Services.

This Project Scope Briefing document is to be read in conjunction with *RFT Document 2 – Statement of Requirements*.

Introduction to the NFSA and its collection

The NFSA is Australia's national audiovisual cultural institution. We collect, preserve and share Australia's audiovisual culture.

From our earliest recordings in the 1890s to the latest games and immersive digital productions, the NFSA collection represents not only our technical and artistic achievements, but also our stories, obsessions and myths; our triumphs and sorrows; who we were, are, and want to be. Our memories, preserved with the uncanny immediacy of recorded sound and motion pictures.

Our collection began in 1935, making us one of the first audiovisual archives in the world (some individual collection items date back to the 1890s). Originally known as the National Historical Film and Speaking Record Library, and operating under the auspices of the Commonwealth National Library, the NFSA became an independent cultural organisation in 1984.

Today, the collection includes not only video and audio recordings, but also contextual materials such as costumes, scripts, props, photographs and promotional materials. It is a diverse, dynamic and often surprising repository, ranging from items inducted into the UNESCO Memory of the World register to sporting matches, game shows and advertising jingles.

The NFSA's nitrate collection consists of approximately 14,000 rolls of nitrate film. We also have arrangements in place to store the nitrate film and photographic stills and negatives from five other Australian national collecting institutions.

The opportunity

On 15 May 2024, the Minister for the Arts announced that the NFSA will receive $9.3 million over four years to upgrade and extend the existing facilities, located in Canberra, for the storage and preservation of nitrate film and images.

This funding will allow the NFSA to double its nitrate storage capacity and provide international best practice storage for nitrate collection materials. This will ensure the long-term preservation of these materials for Australians to view and access.

The NFSA is committed to providing the best possible care and security for the national audiovisual collection. Nitrate containing collection materials are challenging to store; they are flammable and require low temperatures and humidity. The construction of nitrate storage facilities for audiovisual collections is relatively rare internationally, and this project offers both the challenge and opportunity of designing and delivering a unique collection storage facility that will be in operation for decades to come.

Project Scope

Project need

Storage of nitrate containing audiovisual and photographic materials is high risk due to the flammability of nitrate cellulose materials. The NFSA's current nitrate vault facility is at capacity. For a number of years additional nitrate collection material has been housed in modified shipping containers. The NFSA has made diligent efforts to ensure site safety; however, given advancements in fire and mechanical systems, there is an urgent need for renovation and expansion to ensure a minimal risk of ignition.

The NFSA and other national collecting institutions continue to identify and bring nitrate containing materials into their collections, and this new extension is intended to cover collection growth for the next 20 years.

Project vision

The NFSA is seeking to build a new nitrate collection facility that is world class, and which secures collection material for long-term preservation – with a working life of up to fifty years. The refit of the existing facility will ensure it can provide best practice storage into the future.

Key project design principles

The key design outcomes sought from the project are:

- Provision of a best practice, international standard collection facility for the safe storage and handling of nitrate containing collection materials.
- Deliver a value for money extension that offers flexibility to meet collection and staff needs.
- Improves the energy efficiency performance of the existing facility, delivers a design that will enable the sustainable operation of the new facility into the future, assisting the NFSA to meet Net Zero obligations, and considers low carbon construction methodologies.
- Improves operational efficiency and provides a safe and fit for purpose work environment for NFSA and other workers.
- Is designed and delivered safely, and brings the existing facility up to date with contemporary building codes and standards.
- Ensures the risks inherent to nitrate containing materials are well managed and that fire systems and related services are robust, well researched and meet, and preferably exceed, the current standards.
- That respect is shown for the design of the original facility and its place in Canberra's architectural history and development.
- Considers future Canberra climates – Climate projections.

The role of the Nitrate Film Vault

The key role of the nitrate vault is to:

- Store nitrate collection materials securely and at the correct environmental conditions for the NFSA and five other national collecting institutions.
- Provide separation from other collection materials to minimise fire risk.

- Meet specific fire safety requirements for the nitrate collection.
- Supports staff in the safe handling and care of nitrate containing collection materials.

Project objectives

The following objectives underpin the development of the Nitrate Extension and Refit Project:

- Increased nitrate storage to house the materials currently in shipping containers and to house new acquisitions into the collection over the coming decades,
- Achieving international best practice for nitrate storage in the old and new facility, which includes being able to deliver flexible temperature and humidity requirements, and provision effective fire systems,
- An effective refit of the existing building to ensure it can continue to be used to storage nitrate materials for another 50 years, and
- Provide our staff and partner organisations with a safe and fit for purpose environment for their work to maintain and use the nitrate collection.

The primary concern associated with storing nitrate film is its high flammability. Current industry guidelines outline specifications for building design, fire detection and suppression systems, environmental parameters, and how collections should be stored to minimise the risk of a film fire. While the original building met the standards of the 1970s, safety protocols for the well-being of individuals, property, and collections have progressed significantly since then.

The NFSA is also committed to addressing other significant concerns related to the less-than-optimal design of the original structure and the interim shipping containers.

When the original building was conceived, there was never the intention for conservation or collection management work to occur within the building. Over its 40 years of operation however, the need to have a small workspace to handle, prepare and survey nitrate has become essential.

Further examples to this include external evaluations have characterised the internal vault doors as excessively heavy, inconvenient, and unsafe. And the presence of ramps and steps for accessing the shipping containers also introduces challenges in the safe handling and movement of nitrate film.

In shaping any new design, the integration of considerations for the working environment is of paramount importance. This approach ensures the safeguarding of our invaluable cultural heritage while also prioritising the well-being and operational efficiency of the dedicated individuals entrusted with its care. The NFSA expects that the design will consider and where possible limit environmental impacts from the construction process.

Existing Facilities

The Nitrate Film Vault was designed by architect Enrico Taglietti in 1977 for the National Capital Development Commission. The ownership of the site shifted to the National Film and Sound Archives of Australia from the Australian War Memorial in 1987.

The Vault is not Commonwealth or ACT heritage listed, however the NFSA recognises the heritage value attached to the architect's work in the Canberra region, and this project aims to respect the 1977 design intent in any refit of the existing building, and a sensitive approach to the siting and design of the extension.

The original building contains 12 nitrate film vaults, which reached maximum storage capacity some time ago. To address additional storage needs, three (3) temporary overflow shipping containers were added to the site.

Applicable Codes and Standards

The storage of nitrocellulose requires the precautions as per *AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods*.

ACT Workcover classifies nitrate motion picture film as a Dangerous Goods Class 4.1. Film vaults are classified as flammability hazard Zone 2.

Nitrate vaults constructed in the USA and Canada have applied the National Fire Protection Standard (NFPA40) for their facilities. This standard is generally applied for facilities globally.

The British Film Institute (BFI) apply the Buildings Research Establishment Group advice to their storage facilities, including environmental, thermal and health and safety standards.

The two largest collections of nitrate internationally are held by BFI and USA Library of Congress.

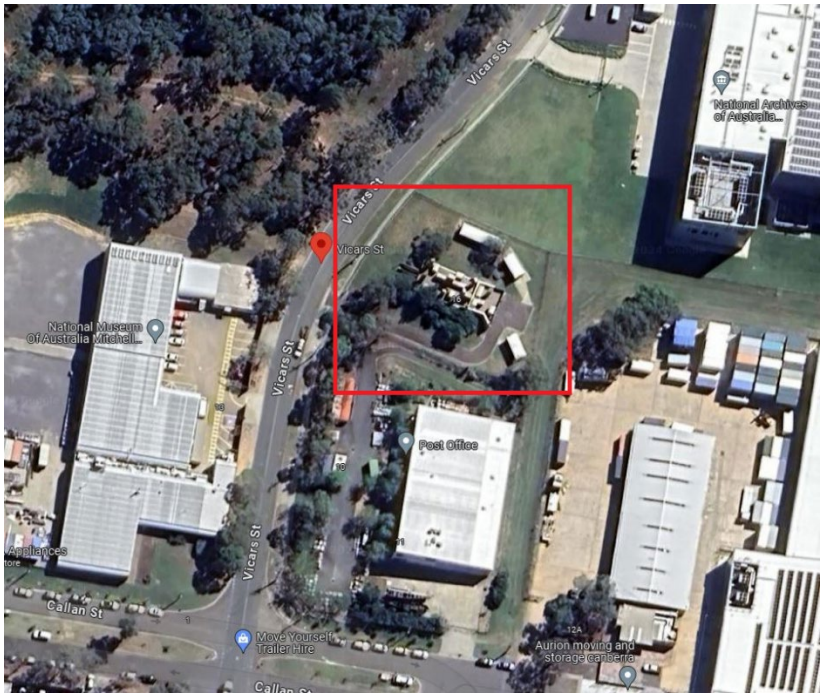
The consultant team must ensure that other relevant Australian Standards are appropriately met.

Planning requirement

The existing facility is within the IZ1 zone under the Territory Plan, however the site is identified as National Land. Therefore, it is subject to provisions of the National Capital Plan, and on-site works undertaken will require review and endorsement by the National Capital Authority (NCA). A Development Control Plan may need to be approved by the NCA Board prior to any on-site works.

Proposed siting

The Nitrate Film Vault is located at 16 Vicars St Mitchell ACT. The image below shows the driveway, existing building and shipping containers. The proposal is for the extension to fit around the existing building. The containers will be removed.



The image below shows a concept diagram developed as part of a Shared Storage Project investigation in 2021. It indicates how an extension of a similar footprint to the existing could fit on the site. It is provided to show the size of the available site in relation to the current facility and current placement of shipping containers.

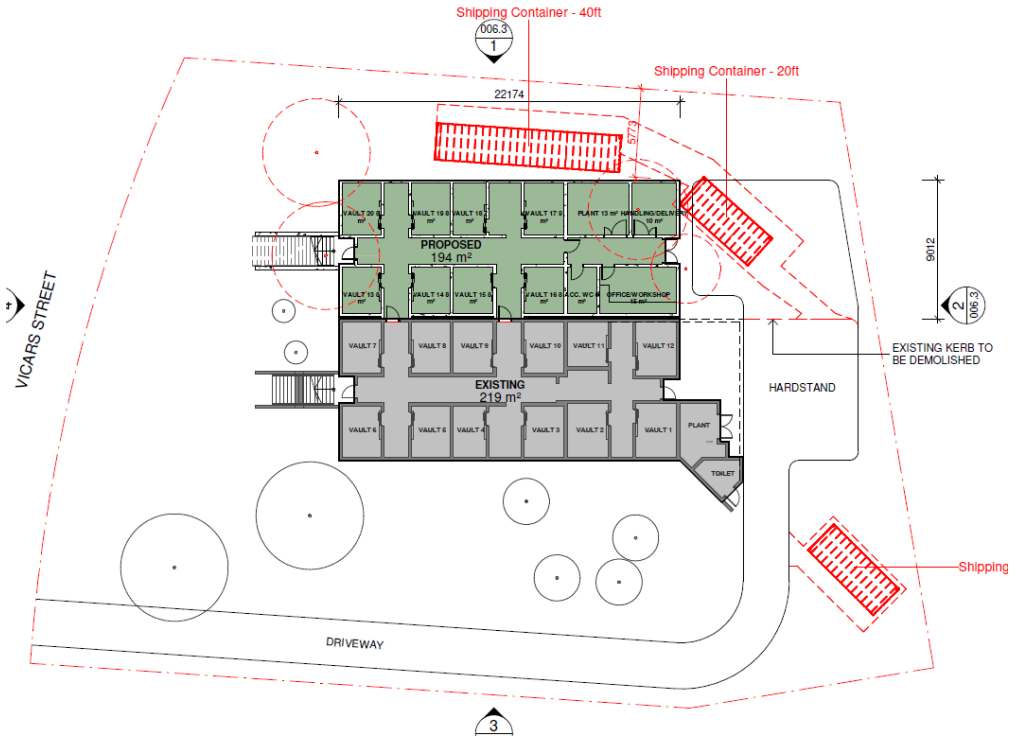


Image – NBRS Architecture

General Facility Requirements

General vault requirements

- Suitable compactus or shelving (to be resolved in relation to best practice findings).
- Explosion venting will be required in vaults that are used for the storage or acclimatisation of nitrate film. Design of the explosion venting must take into consideration the explosive force of the volume of nitrate being stored in the vault.
- Vault doors in both the new and old sections of the building must be fire doors, meeting or exceeding the required standard for the design fire solution. The current doors have a 3 hour rating. Door lip is to be flat for trolley access.
- Spark free task lighting available with manual lighting control.
- Emergency and exit lighting, and consideration given to communication in an emergency (safe radio or other communication technology)
- Spark proof swipe card entry per door.

The NFSA is not providing vault dimensions or area specifications as these will vary with different design solutions. Variables include the shelving method, placement of sprinklers, height and accessibility of shelving and total volume of nitrate permissible in each vault to match blast and fire mitigation calculations.

In order for the new facility to meet our 50 year lifespan requirement the aim is to provide vault storage equivalent to the existing facility.

This represents:

- Shelving to accommodate up to 14,000 film cans
- Not less than 700 linear metres of storage space (noting that this measurement comes with uncertainty due to depth of shelving)
- Not less than 100 square metres of total vault storage space
- Not less than 8 square metres of space per vault.

Mechanical services

The key functional requirement of the vault is to meet required environmental conditions for the storage of film, particularly, but not limited to, nitrate cellulose film.

The rate of decomposition of cellulose nitrate films roughly doubles with every increase of six degrees Centigrade, so the higher the storage temperature, the faster the film will deteriorate. Storage temperatures therefore need to be as cold as possible (with consideration to operational and resourcing constraints).

In addition, the relative humidity must also be as low as practicable to slow down the deterioration of nitrate materials. At higher temperatures and humidities nitrogen dioxide gas is more quickly formed which reacts with water in the atmosphere and in the photographic emulsion to form nitric acid which will attack the film.

The design must be able to consistently deliver environmental conditions in the film vaults of 6 °C and 35% relative humidity all year round. Corridors and interstitial spaces should be at 12 °C and 35% relative humidity to assist with acclimatisation of collection as it is removed from vault. Staff work spaces should meet standards for laboratories. Consideration should be given to whether temperatures of between 0°C and 6°C could be achieved in the vaults in the new facility.

Typically, the rate of fresh air in-take should allow the air to be renewed in less than an hour. Internationally this rate varies between five minutes and 30 minutes depending on the vault design. A general empirical guideline is that if it is possible to smell the nitrate then air replenishment is insufficient.

The mechanical services should allow for individual vaults to be set at different temperature and humidity points within the new facility. The ability to control this functionality will also need to be extended to small, dedicated acclimatisation vaults. Nitrate film moving in and out of cool environments (6 °C) must be brought up and down from ambient conditions over a 24-hour period to prevent the risk of condensation developing on the film's surface.

This functionality is not currently available in the old building but will be essential in any new design. This may also be useful to meet the requirements of different kinds of collection material if vaults are to be used for non-nitrate materials, such as vinegar affected acetate films.

The NFSA is interested in innovative HVAC and associated building designs that meet or exceed the above demands. This may include moving away from the current system of small plants for each vault to a central HVAC plant for ease of maintenance and removing hot works and contractors away from flammable nitrate materials.

Provision must be made for generators to be connected in the event of a long-term power outage.

Fire services

As noted previously fire prevention and mitigation is of primary importance when storing nitrate cellulose materials.

The vaults must be provisioned with adequate fire detection, prevention and action systems to mitigate the risk of collection loss through catastrophic fire. This may include the installation of VESDA systems. Water fire suppression systems are also preferred which is the international standard for nitrate film vaults.

The Fire services design must comply with the relevant Australian Standards, but should also consider international best practice.

Communications

The Nitrate Vault should be connected to the NFSA's information technology network infrastructure. Wi-Fi coverage should be as extensive as possible, and innovative solutions to Wi-Fi within vaults should be considered. Work areas for staff are to have appropriate data connections and Wi-Fi for use of collection and business systems.

The Nitrate Vault should be integrated with the Building Management System to ensure remote monitoring of all environmental, fire and security systems. The NFSA will be upgrading its existing BMS within the life of this project, with relevant specifications to be provided in line with the rollout of that project.

Security

The Nitrate Vault requires CCTV coverage of all external doors and any parking and loading areas.

All doors should have swipe care entry points, to be integrated with the NFSA's existing security system. All external doors should preferably have cascade airlocks forcing air out to prevent insects and dust entering the building.

Revision or replacement of the existing site fencing may also be required post construction, and should be considered in scope. Electric sliding gates with swipe card access will be required for driveway access from the road.

Electrical

Lighting should be appropriate for tasks in the vault spaces, be spark free and meet the relevant fire mitigation requirements.

Lighting must ensure safe access during night hours, and that appropriate consideration is given to security systems such as CCTV placement. Paths, doorways and entry spaces should be adequately lit. Lighting should meet preferred colour temperatures to reduce pest and insect activity.

General and emergency lighting must align to current NFSA systems.

Work areas – Conservation Laboratory

- Height adjustable workstation.
- Ergonomic chairs.
- Whiteboard.
- Fume cupboard for handling of film on site.

- Sink with hot and cold water.
- Winding bench (to NFSA design).
- Work bench with fume extraction arm.
- Temperature range 20° ± 2°, with manual control.
- Power and data outlets.
- Recycling bins for paper and gloves.
- Wayfinding and safety signage.

Staff amenities

- One accessible toilet.
- Tea point with sink, hot and cold water, small fridge, microwave.
- Tea point is to be separated from Conservation Laboratory by door to limit potential for pest spread due to food sources.
- First Aid point – wall mounted first aid kit.

Storage

- Staff lockers x 6.
- General storage cupboards.
- Disaster management supplies cupboard – sufficient for wheelie bin, mops, pig mats etc.
- Small cleaners room with sink and storage space for vacuums, mops, brooms and other cleaning supplies.

Undercover loading area

- Enclosed loading dock and awnings to cover building entry points. Current NFSA small truck height is 3.8 meters.
- CCTV coverage.
- Warehouse type lighting and emergency lighting.
- Coverage from external hydrants.

Car parking and hard stand

- Appropriate falls and drainage.
- Car parking for two vehicles and one small truck.
- General wayfinding signage.
- Redesign of the turning circle or installation of a road loop to enable safe truck operations.

Reference Images

Current facility with hard stand, and shipping container

Current facility with stairs down to rear entry

Current facility, view from Vicars St

https://www.enricotaglietti.com/home/opus/dwellings-1/1977-nitrate-vaults
View of Nitrate Vaults from Vicars St, c. 1977.

Internal of current Nitrate Vault showing storage system, fire sprinklers and spark proof lights.

Internal of current Nitrate Vault

Current internal mechanical and electrical systems

Appendix 1 – Summary of issues with existing facility

Identified issue	Proposed solution
The past 24 months have seen Conservation and Collection Management invest substantial time at this site, engaging in activities such as collection relocation projects, disaster recovery, shelf checks, vault cleaning, condition surveying, and preparing film for transport to Acton and Mitchell.	Small workspace with a sorting table, manual winding bench, computer, barcode printer and barcode scanner. This space could also be used to store cold Room PPE (Personal Protective Equipment), normal collection handling equipment, trollies, and disaster supplies.
Lack of appropriate space for parking and a safe truck turning circle.	Redesign of the current car parking arrangement and truck turning circle or road loop.
Absence of a dedicated loading dock has led to challenges in maintaining optimal temperature and humidity conditions around the nitrate film when it is moved in and out of the vaults. Furthermore, in wet weather Nitrate cannot be moved out and in of the building as it will get wet and be subjected to a very high level of humidity accelerating its deterioration.	Design an enclosed loading dock that assists in maintaining the temperature and humidity of the collection and shields it from wet weather.
The absence of an airlock on the main access door has resulted in elevated levels of dirt and insect activity in the corridor. Without an airlock system, when the front door is opened, external contaminants such as dust, dirt, and insects can easily enter the interior space.	Design a new entrance that incorporates a double door cascade airlock. This will also greatly assist in maintain corridor environmental conditions.
New main access door needs to be able to be held open to allow the safe movement of collection material through it.	Design a door system that can be held open either manually or electronically.
Current plant and HVAC are inside the building which is an issue as it increases the amount of sparking electrical equipment near the nitrate collection. This also increases the number of contractors using sparking power tools near nitrate.	Relocating current plant and HVAC outside the collection storage facility and any new extension.
The external toilet lacks an airlock, resulting in dirt accumulation and discomfort due to cold conditions.	The toilet should be relocated into the building or extension to make it usable.

The toilet is being used as a cleaner's storage area.	Ensure that there is sufficient storage for cleaner's supplies and bathroom supplies.
In the event of a film core being accidentally dropped at the nitrate site, there is currently no secure method for its recovery.	It is imperative to include a manual winding bench within the newly proposed workspace to address this issue effectively.
There are no acclimatisation vaults.	Integrating acclimatisation vaults with a blast door or stack in the new extension is required. Strategic placement of this space is required, ensuring its seamless integration with the work area and loading dock.
Nitrate Vaults are 100% full. Nitrate Shippers have limited run growth left for NFSA collections.	Not only do the shippers need to be removed the new extension must take into consideration the material coming out of the shippers but also run growth for a minimum 20 years. This sounds like a lot of space but using current acquisitions rates of nitrate this is reasonable.
Nitrate vault double doors to vaults are difficult to open and to wheel trollies through safely. The 2016 Nitrate lifecycle report states they are, "At present the vault sliding doors are excessively heavy, inconvenient and unsafe".	Change doors over to the type used at the LoC (Library of Congress) and GEM (George Eastman Museum). Single door in line with NFPA 40 standards or ACT legislation, whichever is greater.
Electrical equipment both fixed and portable is being used in the nitrate vaults and corridor.	Spark proof electrical fittings inside nitrate storage and handling areas.
Floors that are easy to clean and don't have impediments like elevated compactor tracks.	Extension and renovation to consider easy to clean floor options that don't create impediments to dry mopping.
Current collection storage compactor systems are old and outdated. Elevated tracks are a health and safety trip issue. The tracks are also a cleaning issue. Uncertain if the compactor unit was designed in combination with the fire suppression system.	A new compactor storage system is needed in both the old and new vaults. The design of the unit must compliment the water fire suppression system. Water fire suppression systems in most cases do not extinguish a nitrate fire, as burning nitrate produces its own oxygen, but it is there to reduce the temperature of the cans in proximity which reduces the likelihood of the fire spreading. Therefor a compactor that allows water to flow through it is needed. The health and

	safety concerns of weight and raised compactor tracks must also be considered.
The roof membrane of the Taglietti building has deteriorated to the point where water is now leaking into the nitrate storage vaults.	A major renovation of the Taglietti building is needed including its structure, internal fittings and the equipment used within.
The noise levels in the shippers require ear protection to be worn and it is difficult to work in the environment for long durations.	Removal of shipping containers in place of an extension and renovation.
The current facility requires significant garden maintenance, particularly in spring. Much of the garden is in place to prevent erosion of the bunker covering.	Design of extension should keep this cost in mind.